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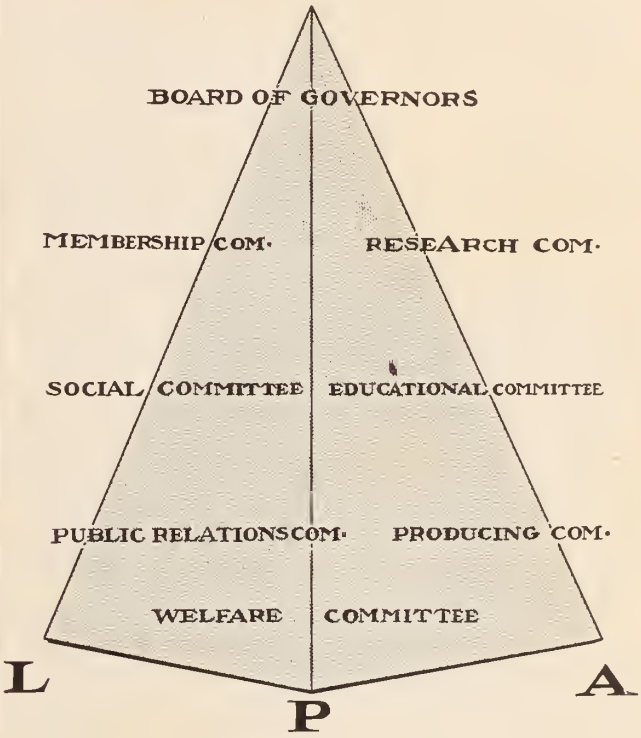
A. S. C.

The Pyramid of Progress



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New Mitchell Product

Enterprising Hollywood Concern Introduces a New Camera Pull-Down Mechanism

By George A. Mitchell

of the Mitchell Camera Corporation, Hollywood, California

The use of miniatures in motion picture productions, where a part of the scene is normal action, and part built to a smaller scale, especially where there is action in both exposures, has called for a positive acting high speed movement. In the taking of these scenes it has been customary to employ two cameras, one for the high speed or miniature, and another for the normal takes.

In the photography of animals especially, and other scenes, it is desirable to have a camera which operates as quickly as possible.

The following is a brief description of a movement designed to meet these requirements.

Fig. 1 shows the movement unit, the gear box, the driving shaft and large crank. The movement is interchangeable in any of our cameras, no machine work being necessary. On the gear box are three places to attach the crank, and two places to attach the driving shaft. On the top of the box is a gear shift lever, and with this arrangement, eleven speed changes are possible, from 2-128 pictures per second, the operator turning the crank 120 per minute, or normal.

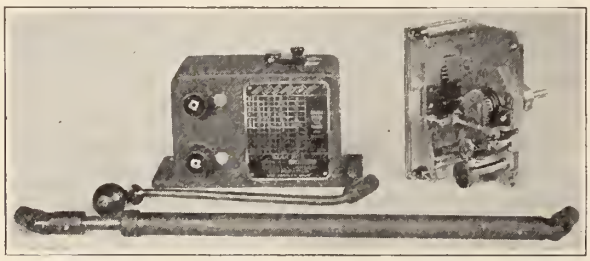


Fig. 1

The extension shaft has a "V" groove on each side and corresponding grooves in the outer casing. These grooves form a ball race, and instead of keys we use balls to drive. By this method no end thrust can be transmitted to the camera.

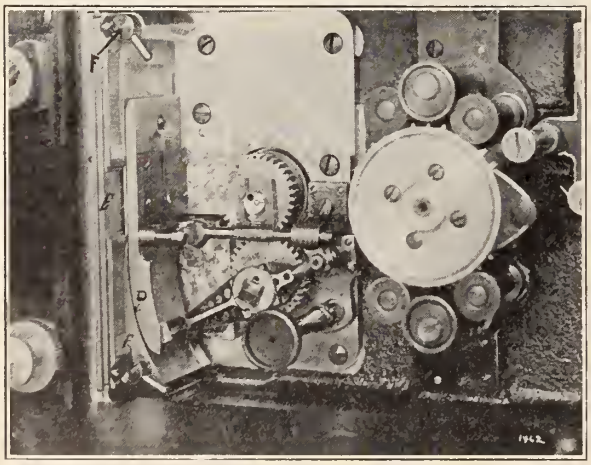


Fig. 2

Fig. 2 is a larger view of the movement mechanism, showing the pilot pins in the film, and the pull-down claws disengaged and returning to the top position. Two claws are used on each side for pulling the film, and the claws and pilot pins overlap, one entering before the other disengages.

The pull-down member slides in part A, and pivots at the same point. Two cams of the same design but of different throw operate the pull-down and pilot pins. The pull-down arm, is moved to the rear as shown in Fig. 3, while the pilot pins are disengaged, enabling the operator to slide the film in slot D.

This slot will accommodate two thicknesses of film for special work, and matting 1/16 of an inch in front of the film may be done at opening E. By loosening two clamps, FF, the front plate may be easily withdrawn for cleaning. The pressure plate is made with two rollers in the center of the aperture, and two steel shoes over the perforations, so that no prssure is on the picture area. This has a constant pressure of a very light spring. The rollers are made of ebony, with a steel core. The film race is of stainless steel.

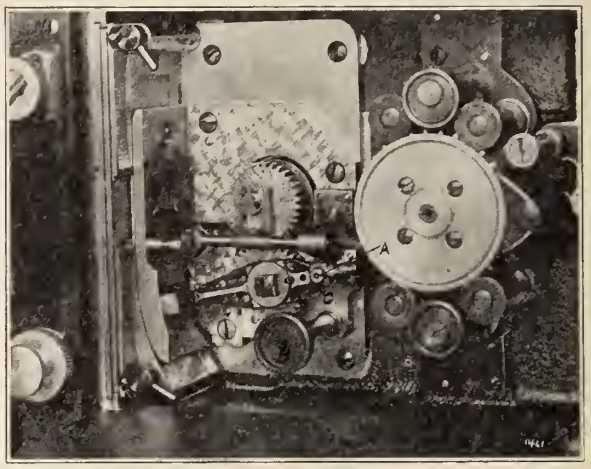


Fig. 3

BLASTING CAP FILM

As a part of a nation-wide safety campaign designed to minimize the number of blasting cap accidents in which children suffer injury or death, the Institute of Makers of Explosives recently completed a one-reel motion picture film entitled "How Jimmy Won the Game," designed to emphasize the danger to children of using the blasting cap as a plaything. The film is printed on safety stock and will be screened in the public and parochial schools in those states where most of the blasting cap accidents occur. It is estimated that 500 children are maimed or killed every year in these accidents.

S. M. P. E. Transactions

Discussion On "The Tungsten Lamp Situation In the Studio"

[This paper, read at the Lake Placid convention of the S. M. P. E., was published in full in the American Cinematographer for November.—Editor's Note.]

By Peter Mole

MR. BEGGS—About a year ago I tried to calculate the theoretical costs of lighting a studio with mazda lamps. At that time it was felt that mazda lamps were impossible, but calculations made theoretically showed that the costs were approximately the same as for arcs. Now, the film is a little faster for incandescents, and labor costs have been calculated closer, so that the figures I published at that time do not necessarily apply for mazda lamps, although at that time it was about a toss-up for cost for lamps, fixtures and labor. Since that time we have been asked to produce a metal reflector. It is not so efficient as silvered glass, but it is indestructible, and chromium has been found to be the most successful plating. The advantages are chiefly that it is easily cleaned. Chromium is going to be very popular as a surface plating material. Probably you noticed that the Kodascope projector used it, and it is being used in the lighting field for industry.

I should like to ask Mr. Farnham about the over-voltage operation of lamps. Any of these incandescent lamps can be burned with over-voltage with reasonable assurance that it will give fair photographic performance, but it may destroy the lamp, and there should be an agreement among studio engineers, I believe, concerning the exact over-voltage which should be used.

Another point is the avoidance wherever possible of these extremely expensive lamps; $175 is the present price of the 10 kilowatt lamp with 100 hours' life. The same light flux can be obtained from ten 1000-watt lamps for $2.50 each, which gives a different total price, and it seems unreasonable that studio engineers should insist on using the very expensive lamps. I think they might get together a symposium on the use of incandescent lamps for studio engineers.

MR. FARNHAM—With reference to operating lamps at an over-voltage, the studios now working with incandescent lamps operate them from the same source of supply that they operate their arc equipment, and hence it is not practicable to operate the lamps at other than the voltage of the circuit without causing trouble on other sets that are using the same source of supply.

The light output of an incandescent lamp operating at from 250 to 400 hours' life has the correct color characteristics for use with the Panchromatic film, and if they were operated at an over-voltage a relatively greater increase in the blues and violets would result, and the color renedition would not be correct. Instead of over-voltaging a lamp at the time the picture is being taken, I would suggest the practice of operating lamps at an under-voltage during rehearsing and at times when it is not necessary to expose the film, and then before the picture is to be taken the lamps should be brought up to normal voltage.

In considering future practice where the lamps are operated directly from alternating current source it would be a simple matter to install a portable induction regulator between the supply circuit entering the building and the particular set on which it is desired to control the current. This would make it possible to operate the lamps at an under-voltage until the time to make the picture, when they could be quickly brought up to full voltage.

The use of this device would likewise permit bringing lamps from total darkness to full brilliancy or from full brilliancy to total darkness for special lighting effects, duplications of sunrise and sunset scenes, etc.

With reference to Mr. Beggs' point that it would be more desirable to use ten 1000-watt lamps instead off one 10,000-watt lamp; this might be practical in some cases, but there are many instances where it is desired to create the effect of strong sunlight streaming in through a window or door, the intensity of this source must be considerably greater than that of the other light source illuminating the set. For this purpose a single source of high-wattage such as 10-killowatt lamps would be required. Ten 1000-watt lamps would be quite out of the question because they would create ten individual shadows and spoil the illusion of sunlight.

MR. ISAACS—I should like to ask Mr. Farnham what the advantage would be of cutting back from DC to AC when the latter gives flicker.

MR. FARNHAM—A mazda lamp operates equally well on alternating or direct current. The studios would naturally not wish to discard their existing motor generator sets, but as the present equipment becomes obsolete or greater lighting capacity is required, they would gradually shift to AC operation and thus remove the heavy investment in substations and the necessary attendant which rotating equipment requires. With regard to flicker on alternating current circuits due to the relatively small size filament wire of the 100-watt lamps and those of lesser wattage, there is a noticeable flicker when the lamps are operated on 25-cycle currents. On 60-cycle currents this flicker cannot be detected with the eye, but it can be observed by stroboscopic methods. However, as we increase the wattage of the lamps and hence the diameter or mass of the filament wire, the heat storage capacity of the filament becomes greater and the fluctuations of the light, due to the cyclic variations of the current, becomes less. From tests which we have conducted using a special stroboscopic device, we find that fluctuation of the light disappears with lamps of 500 watt, 115 volt ratings and above on 60 cycle circuits. In the studio district 50 cycle circuits are the rule so that it is probable that the 750 watt lamps would mark the dividing line between flicker and non-flicker. Since all of the lamps employed in studio lighting service are of 1000 watts and above, I can assure you that there will be no possibility of flicker caused by the shutter getting into synchronism with the alternating current cyclic changes.

MR. BAUER: Some years ago Westinghouse went into the problem of sufficiently heavy filaments in incandescent lamps. As Mr. Farnham says, it frequently happened that the synchronism mentioned was noticeable on the screen as a decided flicker. The result of their investigation was that they brought out a transformer with 20 ampere 20 volt light which is equivalent to 400 watts. In an ordinary 400 watt incandescent lamp, the flicker would persist, but with the 20 volt 20 ampere lamp, the filament was sufficiently heavy to prevent this.

MR. CRABTREE: I should like to mention that in the studio in Rochester for taking color motion pictures it is our practice to burn the lamps at under-voltage during actual exposure. This is done by means of rheostats.

MR. BEGGS: All the prize fights are photographed in the light of incandescent lamps. At Chicago they used 44 one thousand watt lamps in 44 reflectors. These burned at normal voltage and were of the ordinary type

(Continued on Page 16)

Amateur Cinematography

A Professional's Notes for Amateurs—XV

By Joseph A. Dubray, A. S. C.

(Continued from December Cinematographer)

In the previous chapters it has been established that the orthoscopic formation of images by spherical lenses is subordinate to the correction of a number of imperfections called aberrations and it has been stated that such correction is possible by the proper selection of glasses, by the combination of several lenses of different form and material, by the curvature of the surfaces of the lenses, their distance apart and by the limitation of a certain number of rays that concur to form the image.

It is quite evident that a number of problems have arisen from such complex generalities and that a number of objectives have been calculated, designed and constructed, each one presenting a certain marked improvement in one or the other of the fields of correction, thus making each instrument especially suitable for certain working conditions or certain desirable results.

This has given rise to a number of denominations which have come down to us since the beginning of the perfectment of photographic objectives, such as **Single Achromat, Rectilinear, Portrait lens, Anastigmat,** etc., which in turn have given rise to a number of different objectives bearing a trade name or the name of the inventor and so known by the photographic world.

It would be impossible to analyze in this series of articles all the different makes of objectives and their attributes. A great deal of literature is available on this subject and I shall therefore confine myself to generalities.

While discussing the different aberrations of lenses it has been found that these aberrations could be destroyed, neutralized or minimized under certain specified conditions.

Chromatic aberration can thus be corrected by compounding a lens with two different kind of glasses. Astigmatism is also removed by making use of different kinds of optical glasses so designed that the components produce astigmatism of contrary kind which will neutralize each other.

Spherical aberration is corrected by the proper curving of the lenses' surface and their position in respect to the incident light, which curvatures are calculated keeping in view the fact that they have an influence in the correction of the chromatic aberration.

In a general way of expression it can be said that the methods by which the different aberrations can be corrected dove-tail, so to speak, into each other. It is thus possible to compound several lenses into an objective, which finally present the greatest possible correction for all its aberrations.

Let us supose a convergent achromatic lens formed by the combination of one positive plano convex crown glass and one negative plano concave flint glass lens. The image formed by such compound will be chromatically corrected, but will present spherical aberration and astigmatism as well.

If the plano surfaces of the two lenses be curved so that they coincide with each other, three radii of curvature will then be at the disposal of the designer and the spherical aberration present in the first system may be greatly corrected in the second.

The necessity of limiting the number of rays that may be allowed to concur in the formation of the image requires, as previously stated, the use of a stop or diaphram. The use of such a stop would, although reducing the astigmatic aberration as well as the spherical, tend to produce a distortion in the image. The remedy for this distortion is to construct the objective of two separate components, both chromatically and spherically corrected, and to place the stop or diaphram between them, which principle is followed in the designing of all modern photographic objectives.

The diaphram defines thus the bounds of the photographic objectives, limits the rays permitted to concur to the formation of the image and is, therefore, of paramount importance, not only for its action in the correction of aberrations, but also because it determines the luminosity of the image and consequently the so-called **Speed** of the objective—

Let us now suppose an objective constructed according to the above mentioned data, i. e., composed of two achromatic lenses symmetrically placed on a common axis and separated by a diaphram symmetrically set in respect to the lenses, and let the two lenses be made of similar kinds of glasses and having the same focal length.

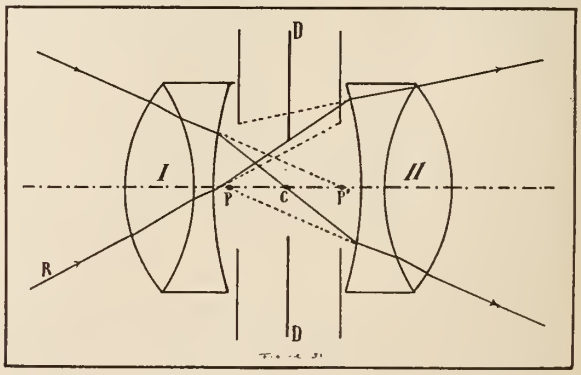
If, by means of such an objective, we bring to a focus on a ground glass an object-point situated on its axis and we then exclude all the light in the object-plane and illuminate the ground-glass from the back, then when we place the eye in the same position at which the object-point was, we will see a bright circle, which is the virtual image of the diaphragm formed by the components of the objective which are **situated between the eye and the diaphragm itself.**

If we reverse the operation and place the ground glass where the object-point was and replace the ground glass by the object-point itself, through the same proceedings we find that the components of the objective situated at the opposite side of the diaphragm also form a virtual image of the diaphragm which will be exactly similar to the first, due to the symmetrical construction of the objective under consideration.

The diaphragm itself is called the Aperture Stop; its image formed by the component of the objective preceding it on the side facing the object is called the Entrance Pupil and its image formed by the components of the objective on the side facing the image is called the Exit Pupil.

The terms **entrance** and **exit pupils** have been introduced by Professor Abbe, of Jena, and their amplitude determines the exact dimension of the cone of rays from an object point which is concurring to form its image on the ground glass.

Let us consider now, an objective constructed according to the limitations expressed above, as symmetry of the system:



Let I and II be respectively the front and back components of the objective and D. the diaphragm or stop.

Let us take into consideration any ray passing through the center of the diaphragm at C. Due to the symmetry of the components of the objective and of the diaphragm in respect to them, such ray will meet

(Continued on Page 17)

The Lubrication of Motion Picture Film

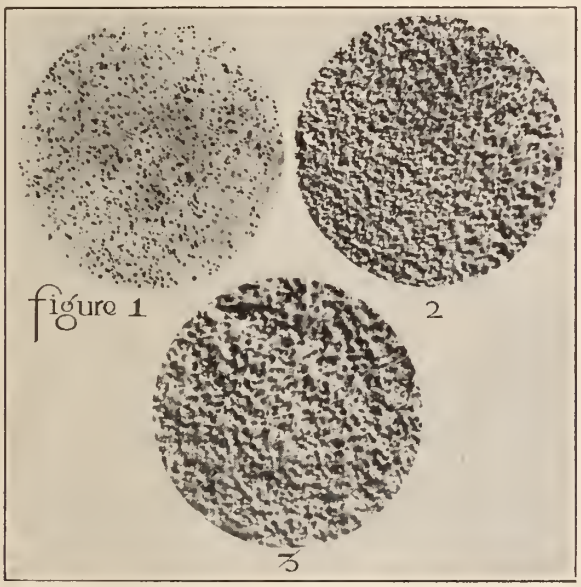
By J. I. Crabtree *and* C. E. Ives

(Communication No. 330 from the Eastman Kodak Research Laboratories)

When freshly developed or so-called "green" motion picture film is passed through a projector, there is a tendency for an incrustation to accumulate on the aperture plate or tension springs which retards the free passage of the film through the machine. Chemical analysis has shown that this incrustation consists largely of gelatin with more or less silver, dirt, and oil, but it contains usually only a trace of the metal or alloy of which the gate is composed.

The effect of the incrustation is to increase the friction between the metal parts of the gate and the gelatin coated surface of the film. This causes excessive strains on the edges of the perforations at the pull-down sprocket which ultimately results in torn perforations and therefore a diminished projection life of the film.

It is possible to reduce considerably the tendency for the formation of the gate incrustation by suitable lubrication of the film surface. This is accomplished usually by the application of a thin line of paraffin wax to the edge of the film which melts under the heat of the projector and forms an effective lubricant. However, the wax tends to wander over the picture area if applied in excess and particularly in the case of sound record films; this is very objectionable.



Photomicrographs showing appearance of surface of motion picture film by reflected light. Fig. 1—Clear area of film. Fig. 2—Area in region of silver image. Fig. 3—Silver image toned with iron ferrocyanide.

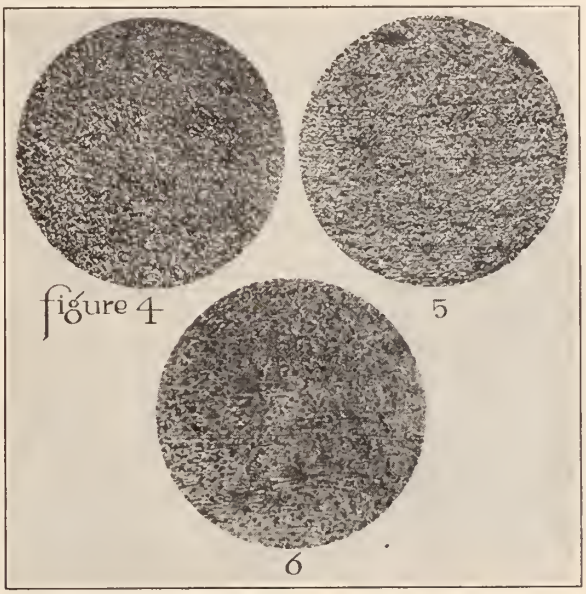
It is the object of this paper to discuss the various methods of lubrication employed to date and to indicate a new method which is equally satisfactory for sound record and ordinary motion picture films.

Factors Affecting the Ease of Passage of Motion Picture Film through a Projector

The facility with which the film passes under the pressure springs in the projector gate depends on:

1. The physical condition of the gelatin coating of the film.
2. The conditions to which the film is subjected in the projector.

1. If motion picture film is examined under a microscope by reflected light, it is seen that the gelatin surface, even in the region which is relatively free from silver, is covered with innumerable extrusions (see Fig. 1, magnification 540). The roughness of the surface is much greater in the vicinity of the silver image (see Fig. 2, magnification 790) and if the latter is toned with iron or uranium the roughness is still greater (see Fig. 3, magnification 790). This is as would be expected because the toning process intensifies the image by virtue of the deposition of iron or uranium ferrocyanide around the silver grains composing the image and thus enlarges them.



Photomicrographs showing effect of burnishing, and coating the film surface with wax and then burnishing. Fig. 4—Untreated film. Fig. 5—Burnished. Fig. 6—Waxed and burnished.

It is possible to smooth the film surface either by grinding away or burnishing down the minute projections or by filling up the crater-like depressions. The effect of burnishing and of filling up the depressions with wax and then burnishing or polishing is strikingly shown in Figs. 4, 5, and 6. Fig. 4 shows the surface of untreated film (magnification 540). Fig. 5 shows the same film after burnishing and Fig. 6 after applying wax and burnishing.

Fig. 7—Showing partial burnishing effect on film during projection.

Tests have been shown that the act of burnishing or polishing the film surface without the application of a lubricant such as wax or oil does not appreciably facilitate the passage of the film through the projector gate. It is well known, however, that film which has been projected once or twice has a much less tendency to pro-

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News Man Saves Old Glory

A. S. C. Man Shooting the Chinese War Finds the Flag Desecrated When Shek's Men Sack Consulate at Nanking

By A. E. Lilius

[Mr. A. E. Lilius, Paramount News cameraman, and latest applicant for membership in the A. S. C., contributes the following interesting account of his recent adventures in China where he was on the firing line for his particular service. Mr. Lilius has just returned from China and will make his home in Hollywood.—Editor's Note.]

General Chiang Kai Shek had captured Nanking on March 23rd. A few Americans, British and Japanese were murdered and the world expected that justice would be meted out—news about intervention—a punitive expedition which would teach the Chinese how to behave—but nothing came out of the hoped for military expedition of the British and Americans, and, finally, the gasping world was astonished by the news that the good old U. S. A. was not going to do a thing or even take part in any unfriendly notes demanding satisfaction for the American lives that were lost in Nanking.

Mr. A. E. Lilius

The news was "first page news" and had to be covered. A cable from Paramount "News," for whom I covered the Chinese struggle, advised me about the desirability of going to Nanking to "shoot" Chiang Kai Shek and the American Consulate, which was supposed to have been looted; the Socony Hill where everything had been destroyed; and to record on the film the situation in general.

Now, I am an old war horse and know that personal safety is, under peculiar circumstances, purely a diplomatic accomplishment, so I secured all kinds of papers from the foreign office of the Nationalist Government in Shanghai, and also wired to Nanking personally to the General, Shek, asking for permission "to record in pictures the marvellous progress of the Nationalist movement under his captaincy." I received a favorable reply and was ready to go.

But I could not go without an interpreter. The times were rather too dangerous and one could never know what a situation one might fall into. I wanted a more or less educated man to go with me and I had seven candidates at various prices, but as soon as they found out that I wanted to go to Nanking each one found reasons to retire gracefully. One bird told me that he refused to go with me because I used to swear and was not Christian enough. That happened about two minutes before the train was to go and I had disclosed to him our destination. What I said to him then must have confirmed his former judgment.

I had to go back to the hotel and there I asked the room clerk to get me a "boy," a servant who understood English. The very next day he got me a sullen-faced chap who spoke a delightful pidgeon-English and I found later that he was a marvellous cook and did not care whether he was with the Nationalists or the Northerners and was ready to go anywhere I went, so, throughout the whole campaign he accompanied me both as servant and interpreter. But unfortunately the last train that went for weeks to Nanking was just the train I missed the previous day and there was only one thing to do—to go by steamer up the Yangtse Kiang River.

I went to the American authorities to get a translation of my passport, but when they found out where I was going they refused the translation and forbade me to go. They even pointed out that should I go and anything happened to me they were not responsible and no assistance could or should be expected.

I went anyway. It took us five days to reach Nanking, and we were escorted part of the way by an English gunboat, which obligingly answered every shot fired at us from both banks of the Yangtse. Once our steamer collided with a junk, just as I was ready to shoot some river scenery and, of course, I got the whole adventure from the very beginning to the end. I had the good fortune to stand ready on the bridge when I saw what was coming and I really believe this to be the first actual collision-picture—not ordered—shot from one of the colliding vessels.

Finally we arrived at Nanking. There was no communication with the shore. On the north bank of the river were the Northern troops, on the other were Chiang Kai Shek's army, both armies bombarding each other. Here were also a few Americans, British and Japanese destroyers stationed out of reach of the Chinese artillery and, under their protective guns, floated the small Standard Oil Co.'s motor-tank MEI-LU, whereto the American Consul after the massacre had fled. We got aboard the Mei-Lu.

Now, when a countryman meets another anywhere else in the world there is always a handclasp and a friendly greeting. We met the consul who eyed us suspiciously and we met the Standard Oil officials who did not eye us at all. The consul demanded my credentials and I showed him the passport and my cables and all the papers I had. I asked his permission to shoot his picture, etc., which was firmly refused. Finally I persuaded him to pose, but the Standard Oil officials refused stubbornly and, when politely requested to give me their initials for my reports, they frankly bade me to go to h—l. I asked the consul's permission to let my "boy" go elsewhere with his two Chinese secretaries who lived in Nanking, but he refused. Finally I got hold of a sampan, navigated by two old women, and the "boy" went away with word to the General that I had arrived and wanted protection if I was to go ashore. Unfortunately I had to stay overnight aboard the Mei-Lu and early the following morning the "boy" returned with the General's personal secretary who welcomed me and told me that a body-guard awaited us on the south bank. When I bade my host good-bye I was reminded that I should pay for the two meals I had, but that there was no charge for the deckspace I had occupied during the night. Well, I paid.

Nobody shot at us, I believe, while we rowed ashore, at least there was no hits and we landed. The general had sent an automobile and four soldiers armed to the teeth for our protection. Then we were whisked away to a native hotel and the secretary told us exactly what pictures we could take and what should not be taken.

But to shoot pictures of what the General wanted to have shot was not my idea of good news work, so I did my best to evade my bodyguard and I succeeded a few times, but finally I had to tell the secretary that what I came for was the picture of the American Consulate and, in pictures, show the world whether there

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Pan. Film and Globes

The Coming of Panchromatic Started Something That Cannot Be Stopped

Contributed by a Member of the A. S. C.

The advent of Panchromatic film is being followed at the present time by the adoption of a system of lighting better adapted for bringing out the fine qualities of this film, together with economical and psychological considerations of prime importance.

In the October issue The American Cinematographer published a paper submitted by Mr. Peter Mole to the Society of Motion Picture Engineers at their fall convention, on incandescent lighting as adapted to motion pictures, and to the already quite imposing array of productions mentioned as "shot" partially or totally with incandescent lights may now be added "13 Washington Square," produced by Universal with Mr. John Stumar at the camera; "French Dressing," a First National picture photographed by Mr. Ernest Haller; "Louisiana," a Fitzmaurise production shot by Mr. Lee Garmes; "The General," of Famous Players with Mr. Bert Glennon responsible for the photography.

The reports on the results obtained by these companies are most enthusiastic, especially when commenting on "close-up" work.

The trueness of the final result, the much better rendering of the values of the settings and finally the total absence of strain upon the eyes of the players as compared with the glaring arc lights, make this method of lighting very popular among cinematographers, art directors and actors, and proves conclusively that incandescent lighting is accepted and welcomed in motion picture productions.

The American Society of Cinematographers is at work in collaboration with several electrical manufacturers who can foresee the near universal adoption of this system of lighting, in order to increase the already proven efficiency of the equipment already in use and to design and adopt other equipment so as to be in a position to solve all problems that may arise during production.

The Research Committee of the A. S. C. has been for the last few months experimenting extensively in a practical and theoretical way, and gathering important data from all competent sources. The line of investigation conducted by the Research Committee extends naturally to all factors that enter into the success of incandescent lighting, and is especially centered on the sensitive emulsions and the photographic lenses.

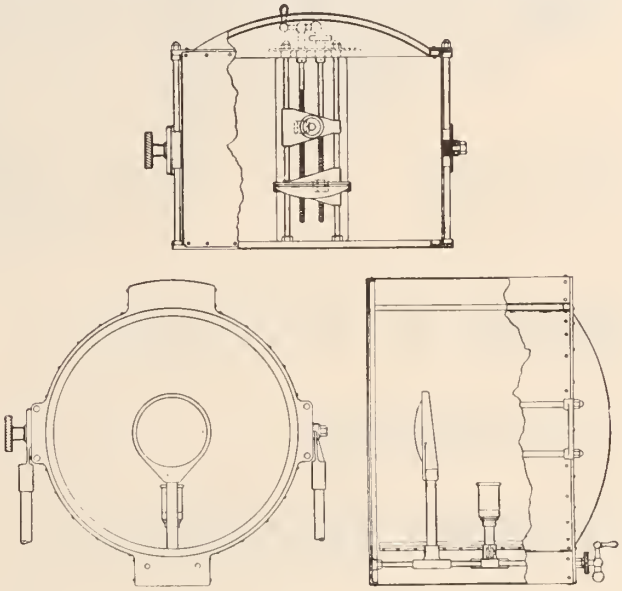
The community of efforts thus inaugurated by the A. S. C. is bringing about remarkable results, and although the committee is not yet quite ready to report in full upon the results of its labors, this announcement will not suffer great delay and will doubtless add important evidence to that already adduced in favor of the supremacy of incandescent lighting over the old exclusive arc-light system.

Besides the question of RESULTS, which is paramount in production of motion pictures, the economic question has been carefully analyzed and the conclusions reached point out clearly that the new system deserves in every respect, not only all the encouragement that it can receive, but also warrants expenditures of money and time to bring to a point of perfection equipment of all sorts that will be necessary for rendering this innovation a truly accomplished fact.

The Mole-Richardson Co., of Hollywood, pioneers in the manufacture of incandescent lights for use in motion picture studios, have put on the market, in addition to the broadside units, an 18-inch incandescent spotlight, a diagram of which is hereby reproduced.

The spotlight is usually equipped with a 3000 Watts Tungsten bulb. The diameter of the parabolic mirror is 18 inches and a 6-inch condenser is set in front of the bulb to equalize the surface illuminated.

The rays reflected by the mirror would be interfered with by the bulb itself and all the rays emitted by the bulb's filament from the portion facing the object to illuminate, would be scattered were it not for the condenser, whose power has been carefully estimated and whose adjustability permits a perfect balancing of the



intensity of the luminous rays. This precludes any waste of light energy and destroys the "ghost" visible when the condenser is not in use.

The intensity of illumination of the spotlight with a 3000 Watts bulb, and when it is used in conjunction with incandescent broadsides, may be compared, as per balance of intensity, to a 120 Amps. or an 80 Amps. rotary arc spot, used in connection with arc broadsires.

On a walnut background set, furnished with somber living room furnishings, and actors without make-up of any sort and dividing the lights in over-head and front lightings he obtained fully exposed negatives, using approximately 45000 Watts for a background area of 225 square feet with an F.3.5 lens and a 170 degree shutter.

This figure is given as documentary information to be considered as a maximum of lighting required under the trying conditions explained above.

Besides the technical and economic advantages that the incandescent lights present, another important element must be taken into consideration. The writer has interviewed several actors and actresses, stars and featured players, on their impressions as in the matter and unanimously the new system has been acclaimed as restful, less disturbing, in other words, more intimate than the exclusive arc-lights system.

And this is of great importance indeed.

Rifiht at the moment a player is to give vent to the emotional sentiments with which he has imbued himself through deep concentration; right at a moment in which he is divesting himself of his own personality to become the living counterpart of the character he is portraying,

(Continued on Page 16)

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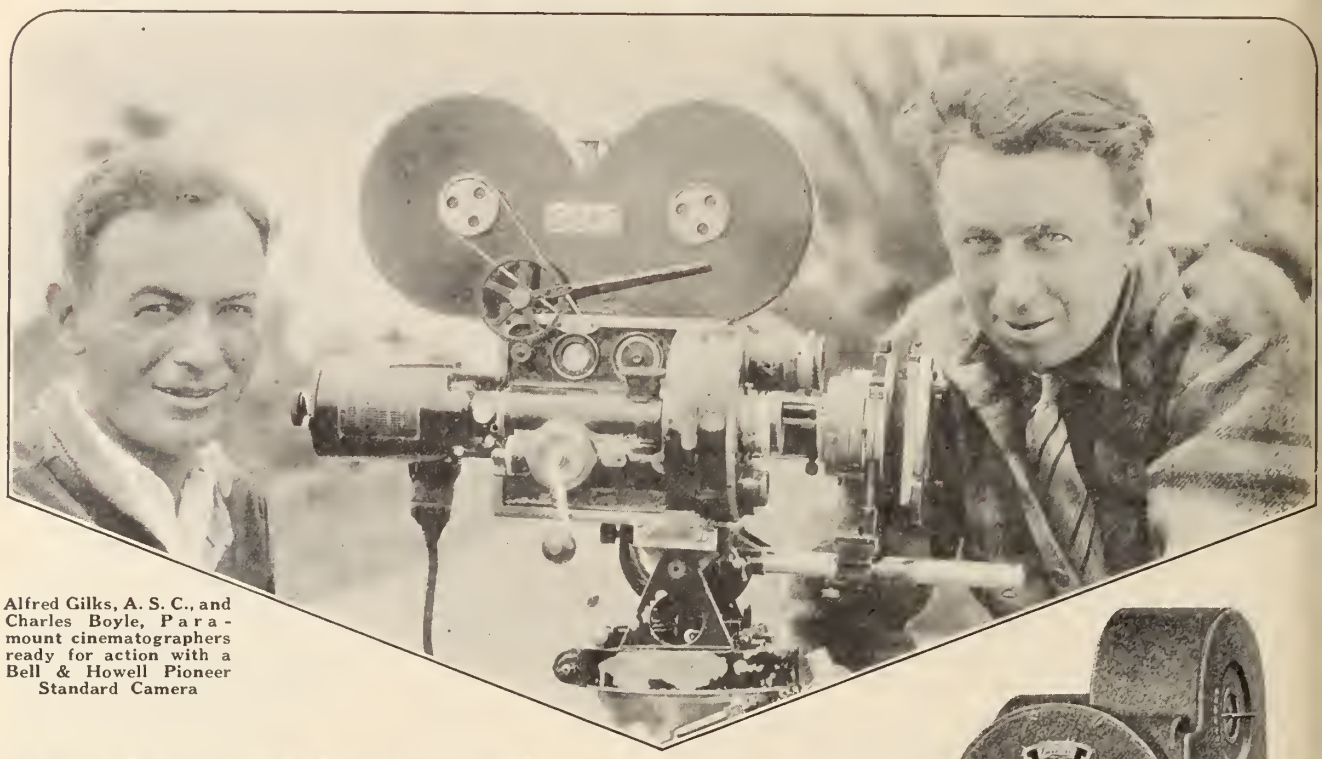

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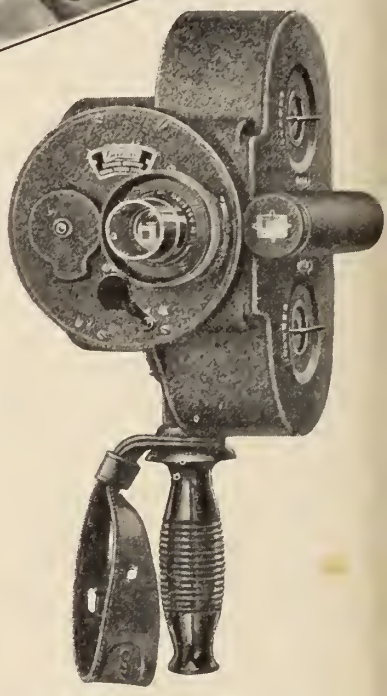

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Abel, David—De Mille.
Arnold, John—M.-G.-M.
Badaracco, Jake—
Barlatier, Andre—
Bergquist, Rudolph—
Boyle, Chas. P.—De Mille.
Boyle, John W.—Sennett.
Boyce, St. Elmo—Sennett.
Bridenbecker, Milton—Universal.
Brown—Jas. S., Jr.—F. B. O.
Benoit, Georges—
Barnes, George S—Goldwyn.
Brotherton, Joseph—
Broening, H. Lyman—
Beckway, Wm. J.—
Carter, Claude C.—Australia.
Cline, Robt. E.—Scholck Studio.
Cline, Wilfried—Universal.
Crocker, Geo. D.—
Cronjager, Edward—Lasky.
Cronjager, Henry—
Clark, Daniel B.—Tom Mix, Fox.
Cooper, Harry H.—
Cotner, Frank M.—
Clarke, Chas. G.—Fox.
Cowling, H. T.—Eastman Kodak Co., Rochester, N. Y.
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Draper, Lauren—Sierra Pictures.
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Davey, Allen M.—
Davis, Harry—Fine Arts.
De Vinna, Clyde—M.-G.-M.
DeGrasse, Robert—F. B. O.
Diamond, James—Metropolitan.
Doran, Robt. V.—
Dored, John—Paramount News, Riga Latvia.
Dubray, Jos. A.—
Du Par, E. B.—Warners.
Du Pont, Max—
Dean, Faxon M.—
Eagler, Paul E.—M.-G.-M.
Eldredge, F. R.—Universal.
Eslick, Le Roy—F. B. O.
Evans, Perry—
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Forbes, Harry W.—Stern Film Corporation.
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Fildew, William—
Fischbeck, H. A.—Lasky.
Fisher, Ross G.—First National.
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Mohr, Hal—Warners.
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Oswald, H. M.—

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Stumar, Chas.—Universal.
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Williams, Frank D.—Special Process
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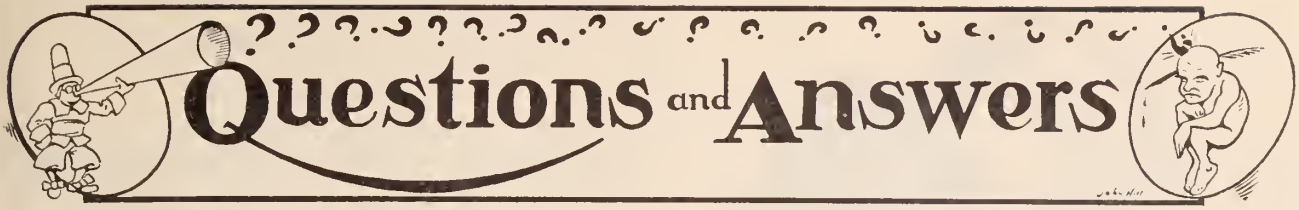


[*The Question and Answer Department of The American Cinematographer is not reserved for professional cinematographers, but is open to anyone who may have any inquiry to make appertaining to cinematography or to photographic subjects in general. The questions are answered by experts and the information published is as near 100 per cent correct as our archives and wide experience yield.*—EDITOR'S NOTE.]

QUESTION—Why is a cameraman always represented in cartoons as wearing a cap backwards?

ANSWER—Most of the Motion Picture cameras in use by professional cameramen are equipped with a powerful magnifier for critically focusing on the ground glass. The design of the magnifier is such that the eye has to be very close to it when being put to use. Exigencies of construction of the camera require this magnifier to be very close to the general frame of the instrument. The visor of a cap or the brim of a hat interferes with the necessity of bringing the eye to the required nearness of the magnifier, hence the habit of getting the interference out of the way, by turning the cap around in the peculiar position which has struck the attention of cartoonists and provoked your question.

* * *

QUESTION—When is it best to use a filter?

ANSWER—It is very simple to ask such a question, but the answer would take a whole volume. As photographic emulsions are over sensitive to the blue—violet—and infra violet rays, a yellow filter is used when this excess of illumination and color value would be detrimental to the desired results. The use of Panchromatic and orthochromatic materials warrants the use of a filter on all occasions, while with normal emulsions a light yellow filter may be found useful whenever a large expanse of sky and water form the subject (at the sea shore, for instance). Filters are also used when it is desired to obtain a distortion of the relative value of a color sensation, when, for instance, it is desired to produce a night effect by obtaining a dark sky in a picture taken in day time. The American Cinematographer will treat on the subject in the near future.

* * *

QUESTION—What is an "aerial focus?"

ANSWER—A photographic objective forms an image of a given object in a focal plane conjugate to the plane of the object. This image may be collected on a screen such as a ground-glass and thus be rendered visible to the naked eye, or may be viewed through the use of a suitable optical combination such as a magnifier. An image inspected under such conditions is called an aerial image and can be focused (hence the expression aerial focus) when proper precautions are taken to avoid errors due to the power of accommodation of the eye.

* * *

QUESTION—Is the cameraman or the director responsible for the artistic effects in a Motion Picture?

ANSWER—The cinematographer is fully responsible for the photographic effects in a Motion Picture production. Selection of settings is made by the cameraman in collaboration with the director, according to the requirements of the production. Interior settings are designed and finished by art-directors and decorators, and the cameraman is responsible for the artistic composition and lightings of the numerous scenes photographed in the setting, which is always photographed under a great variety of angles.

* * *

QUESTION—Is it possible to edit and cut a film in its developed negative state, or is it only advisable to perform this operation on the positive? Which method is the correct one?

ANSWER—The advisable method is as follows:

I—Trim from the negative all footage which is absolutely unnecessary to the finished picture, as, for instance, the few frames or feet always taken at the beginning and end of each scene which are not essential to the scene itself.

II—Cut and edit the positive printed from the trimmed negative. This operation to be done by progressive steps, viewing the film, constantly eliminating or shortening scenes, or re-adding scenes or portions of scenes eliminated by first judgment.

III—If more than one print is desired, cut the negative by matching the scenes that your judgment have considered indispensable to your picture. This to avoid unnecessary expenditure in the printing and time in editing every print.

* * *

QUESTION——Is an extra charge made for developing and printing Panchromatic films in the laboratories?

ANSWER—A moderate extra charge is made for developing Panchromatic negative, but no extra charge is made for the printing, this process being the same for both Panchromatic and regular negatives.

* * *

QUESTION—What is the charge per foot for the best professional developing of (a) the negative, (b) the positive and (c) the printing?

ANSWER—This department cannot quote any prices for any photographic manipulation done in laboratories or elsewhere, this being beyond its sphere of action. If you communicate directly with laboratories you will obtain the information you request.

* * *

QUESTION—Is the original negative the "master?" Are all the final positives printed from this same negative?

ANSWER—Yes.

* * *

QUESTION—In every instance are two negatives exposed (one for foreign and one for domestic release)?

ANSWER—Whenever a foreign release is sought or secured, it is customary to expose two negatives. This mostly in order to be in position to release the picture in foreign countries without being in the necessity of waiting for this release until all prints for domestic release are made. This is the case in practically all motion picture productions made for exploitation.

* * *

QUESTION—I have a De Vry portable camera and wish to know how I can adapt filters for Panchromatic work to it?

ANSWER—A glass filter may be adapted in front of the lens by using proper filter mount. More advisable is the use of gelatine filters, which can be inserted between the lens and the film. The filter may be held securely in place by constructing a metallic cylindrical holder which can be inserted in the cylindrical projection of the De Vry camera, which holds the bayonet mount of the lens.

* * *

QUESTION—Who is considered the best cameraman in Motion Pictures?

ANSWER—It would be very unethical for this department to express a judgment in this question, the answer pertains to the public in general. It is, in our estimation, impossible to decide upon the very best cinematographer, but we can say that the very best (plurally speaking) are found among the A. S. C.'s.

S. M. P. E. Transactions

(Continued from Page 7)

used for industrial lighting. Had they operated the lamps at over-voltage as in the Kodak studio, the total number of lamps would be reduced about 30% using the same type of lamps and fixtures.

Recently, we received an order for lamps from a studio on the Coast asking for 2000 and 2500 watt lamps. The particular types described on the order are designed for high intensity spot lighting. They will give an aver-life of 50 hours each, and it will be our job to change the order to something more reasonable for studio lighting. Tomorrow we may have another order from another studi fr lamps just as porly suited for their work. The efect photographically is excellent, but the cost is excessive and the chance are they will over-volt them. You shoul dnot over-volt a lamp desigend for the extreme intensity of the 50-hour lamp, and yet I am quite sure that unless steps are taken now in advance, and Mr. Farham and others could save a good deal of money in this way.

I think Mr. Farnham should tell the members about the heat of Mazda lamps on which he has had direct experience.

MR. FARNHAM: In my work in the various studios on the use of incandescent lamps the question of heat from these lamps has never been raised. I have made inquiry on this point from the actors and other people employed on the sets, and the usual reply was that they had not noticed any particular difference. The incandescent lamp equipment does not require ballast resistances which dissipate a considerable quantity of heat, and hence, causes an increase of temperature in the vicinity of the set. The decrease in make-up required when incandescent lamps are employed unquestionablly accounts for the greater comfort of the actors when working on sets lighted by incandescent lamps.

MR. ROSS: Do not the fast lenses now generally employed assist materially in reducing the illumination required?

MR. FARNHAM: Yes. Heretofore, the standard lens has been the f/3.5 and the studios are now using f/2.3 or f/1.8 or 1.9, and one is experimenting with f/1.5 with very satisfactory results.

Pan. Film and Globes

(Continued from Page 11)

a sudden unnatural glare of lights is actually blazed into his face, accompanied most of the time by hissing, sputtering, sizzling, smoking and what-not, which throws an enormous task upon the nervous system of the player and very often leaves him disconcerted. We have often wondered at the great self-control actors must possess and at the energy that must be wasted to keep such control.

One could keep on writing "ad infinitum" on this subject, the moral and material effects, the cleanliness of it, the lighter physical burden imposed upon all and many other phases of the system that IS with us to stay.

The A. S. C. and each cinematographer individually is taking into consideration all of the advantages presented by the incandescent system of lighting and can promise greater achievements, which means greater service to the public we serve.

The Cinema Triangle

(Continued from Page 4)

from beneath suggestive of infernal fires, feeding the imagination, and breathing that into the picture that makes the observer feel as well as see the story. In the ball room we look for brilliant overhead or "face-level" lightings, suggesting cheerfulness and freedom from the shady things of life. Again, we know that flat lighting (from the front) lends distance to our exteriors, and cheapness to interiors; whereas "back-lighting" (light towards the lens) tends to foreshorten, i. e., to bring the scene closer to us, as well as to enrich interior settings, and a judicious mingling of these two lightings gives us the beautiful "modelings" so much sought for, and which we so much admire on the screen.

Speaking of the camera's untruthfulness, we know that it is an honorary member of the Ananias Club, and as such proves of great value to the writer. As the magic carpet of old transported its owner at once to any country, the camera of today, through the medium of the screen, will transport a Los Angeles Circus parade to an Indian Durbar or set a Hollywood mob in front of Buckingham Palace, unknown to the participants until they see it at their local theatre.

Should the scenario call for an old castle, it is not necessary to send a director and his troupe to Germany or Spain; its exact counterpart can be built in Hollywood, and not even the Hollywood-ite will know of its existence, because it will be built in miniature, yet which it appears on the screen, the audience will see a real castle, with its peopled drawbridge, its moat, and all action called for by the script. Another story calls for a storm at sea, with the collision of two ships; one sinks and the other becomes helpless! lightning adds its terrors; the audience sits and gasps, their bodies tense with the action that thrills them. A few years ago such a scene would have been impossible; today it can be done on any studio lot. The Pyramids of Egypt can be set on the San Pedro hills; the bay of Naples can be set in a crescent below Hollywood, Mount Hollywood turned into a Vesuvius, and the audience will believe they are seeing an Italian wonder-scene. It would be a wonder scene, but not Italian. These things are possible because the camera does lie. But in lying it speaks a great truth. After all, the camera is only a thing of metal, a dead thing until touched by a Midas of Thought. Guided by the cameraman's knowledge of its functionings it performs the miracle of motion photography that transforms the writer's abstract thought into concrete images, that he who sees may understand.

It is such knowledge as this that the writer must have or be able to obtain to enable him to further his story values and give his audiences cause to wish for more of his work. If the cameraman can, with his lightings, illusions, "fakes," etc., enable the writer to create a demand for his stories, he welds together the triangular producing organization by bettering good stories and giving to the director a script that makes his work a pleasure and insures a tri-mutual co-operation that makes for beter pictures.

Amateur Cinematography

(Continued from Page 8)

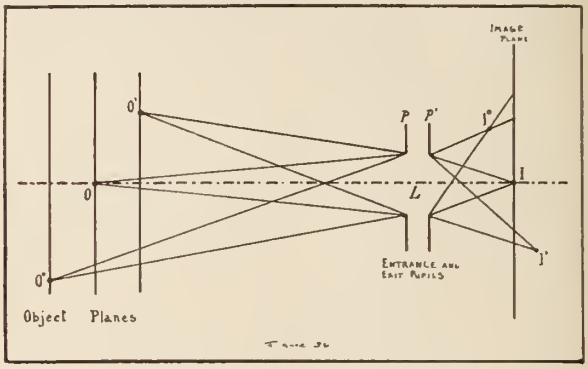
the lenses under the same angle and at corresponding points as indicated in the figure, and consequently the emergent ray will be parallel to the incident one. Their prolongations will meet the axis at the center of the entrance and exit pupils P and P' in the Fig. and therefore determine the position of the pupils.

Moreover let us consider a ray R which, in its path between the components of the objective, grazes the edge of the diaphragm. In such case the emergent ray is not parallel to the incident one, but the prolongation

of incident and emergent rays are directed to corresponding points on the edges of the pupils and thus determine their amplitude.

When the components of the objective are not symmetrical the size and position of the pupils vary in regard to the diaphragm, but their size and position can be varied by altering the position of the stop in respect to the components of the objective.

If we consider now a solid object, that is to say, an object occupying the three dimensions of space, width, breadth and depth as indicated in Fig. 32, we find that the existence of the entrance and exit pupils admits through the objective, a **cone** of rays pertaining to each single point of the object.



Suppose O, O′ and O″ to be three object-points pertaining to the same object at different distances from the objective L. The result is evident that if the point O is brought to a focus on the image plane I, the points O′ and O″ will be refracted upon I as discs of confusion, whose dimensions are determined by the size of the entrance and exit pupils P and P′.

As a consequence images formed by an objective of finite aperture can be **absolutely sharp**, only in one plane, corresponding to its conjugate plane in the object space. All other planes closer or farther from this object plane will then be less sharp, the more distant they are from the plane brought to the perfect focus. This inability of an objective to bring all points of a deep object in focus would be very disturbing, were it not for the impossibility of the human eye to distinguish any such imperfection within certain limits.

It has been explained in another chapter that the eye cannot distinguish separately two points subtended in an angle whose aperture is approximately one minute or 1/60 of a degree. Whenever the disc of confusion does not exceed this measurement the image appears perfectly sharp; in reality even a much greater amplitude of the disc of confusion can be used as limiting point of sharpness before the indistinctness of the image becomes disturbing.

It is quite evident that the smaller the size of the pupils hence of the diaphragm, the more tapered are the cones of rays admitted to form the image and therefore the smaller are the discs of confusion for any given point of the image space. Thus the smaller the diaphragm the more of the object planes are brought into sufficient sharpness and the more the objective is said to have Depth of Focus.

If we do not take into consideration any of the aberrations of the objective and we consider them as perfectly corrected, the **depth of focus** due to the aperture is absolutely independent of quality of glasses, number of elements and general design of the objective and stands equal for all makes of photographic lenses.

(To be continued Next Month)

Lubrication of M. P. Film

(Continued from Page 9)

duce an incrustation on the gate than "green" film and this is usually attributed to the burnishing or polishing action of the aperture plate or pressure springs on the gelatin coating of the film. The burnishing effect produced by projecting the film in a Simplex projector ten times is very slight as shown in Fig. 7 (magnification 540). This is a photomicrograph of the film surface in the region between the perforations. The lower half of the figure shows a portion of the film surface which was in contact with the aperture plate. The burnishing effect on the film surface is negligible.

It is considered that traces of oil which are transferred to the film surface during the first projection are chiefly responsible for the increased ease of passage of the film on subsequent projection.

It is obvious also that the moisture content and degree of hardening of the gelatin coating are important factors which determine the rate of formation of the incrustation in the gate. If the gelatin coating of the film contains an excess of moisture, it tends to soften and become "tacky" much more readily in the hot projector gate than is the case with dry film. This tendency of the gelatin coating to soften under the action of heat can be diminished by hardening during processing. However, excessive hardening tends to increase the brittleness of the film and is not to be recommended.

2. Apart from the condition of the film, the following factors relating to the conditions existing in the projector also determine the extent of the formation of the gate incrustation.

(A) The tension of the gate springs. This should be of the order of eight ounces for each spring or a total of sixteen ounces. The spring tensions should be adjusted individually at intervals by attaching a spring balance to the upper end of a narrow film strip placed at one side of the gate and increasing or decreasing the gate tension until the film just commences to travel upwards when the spring balance registers eight ounces with an upward pull.

In a like manner the tension with full width film should be adjusted to sixteen ounces.

(B) The nature and smoothness of the gate surfaces. The nature of the gate material in contact with the film surface, providing it is of sufficient hardness, is of less importance than its degree of smoothness. Satisfactory materials are cast iron or stainless steel, either plain or chromium plated. Corrosion should be carefully guarded against and any gelatin incrustation removed with a wood or bone scraper so as not to scratch the polished surface.

(C) The temperature existing at the gate. As explained above, the tendency of the gelatin to incrust on the gate springs in the case of freshly processed film increases with temperature. Any means of reducing gate temperature such as the use of heat absorbing glass, a blast of air impinging on the gate, or suitable radiating fins on the gate, is desirable.

Methods of Facilitating the Passage of Motion Picture Film through the Projector

Even though a projector is in good mechanical condition and the above requirements are fulfilled, there is invariably a tendency for a gate incrustation to form with "green" film. Numerous methods of treating the film to effect this have been suggested from time to time as follows:

1. By Edge Burnishing the Gelatin Surface. It was considered that if the burnishing effect of the gate springs on the gelatin coating of the film could be simulated by a preliminary treatment, the difficulty caused by incrustation might be diminished. Accordingly, a machine was constructed for burnishing the edges of the film (see Fig. 8) consisting of a highly polished undercut roller (R1) working against the edges of the film and revolving in contact with and above an idler roller (R2). The film was fed between rollers R1 and R2 by means of a gearing so arranged that the film advanced

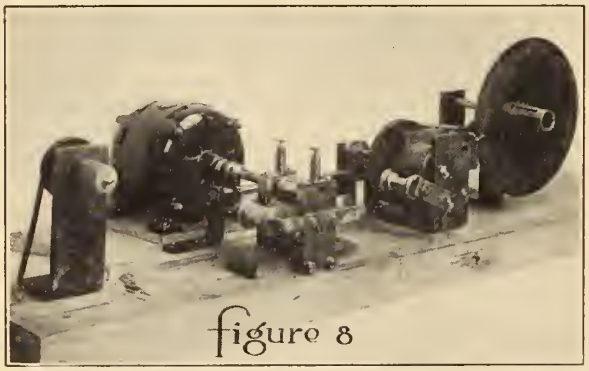


Fig. 8—Film burnishing machine.

through a distance of 1/80th the circumference of the roller R1 for every revolution of the latter. It was possible to adjust the pressure on the burnishing roller by means of adjustable screws.

With undeveloped film an appreciable degree of burnishing was observed to take place but with film fixed in a hardening bath the effect was very slight. Moreover, in view of the slight buckling of the film around the perforations, it was necessary to exert considerable pressure on the burnishing roller in order to flatten out the film so as to insure perfect contact. As a result of this pressure, a considerable amount of heat was developed, so much so that after the passage of a few feet of film, the gelatin coating commenced to grind away and particles of gelatin accumulated on the burnishing roller, stopping the machine. In order to prevent this it was necessary to apply a thin film of grease or oil to the burnishing roller which reduced the friction and prevented the grinding away of the gelatin.

In order to determine the precise effect of the burnishing as apart from the effect of the grease, a roll of film burnished with the aid of automobile grease was passed through the projector and a similar roll was merely treated along the edges with the grease. Since no difference was observed between the projection life of the two films, it was concluded that a mere application of oil or grease was just as effective as burnishing.

Experiments were made also with a heat burnisher consisting of a highly burnished heated roller working above a second roller and between which the film was passed with the gelatin surface in contact with the burnished metal. If the roller was heated to a temperature at which a drop of water sizzled on the metal, a satisfactory degree of burnishing was effected although this treatment did not materially prolong the life of the film on projection.

2. By Edge Lubrication. (a) Before the advent of more refined machinery for the purpose, it was customary to apply a layer of wax to the edge of the film during rewinding by passing the film face downwards over the blocks or candles of hard wax separated by a distance equal to the width of a picture frame. Although effective from a lubrication standpoint, with such an apparatus it is difficult to control the quantity of wax applied because this depends on the temperature of the wax, the pressure applied, and the rate of travel of the film. Usually the tendency is to apply too much wax which then encroaches on the picture area and causes dark spots or patches on the screen. An excess of wax is also apt to cause projector trouble as explained below.

(b) A suitable machine for applying a thin line of wax along each edge of the film surface and between

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Does The Camera Lie?

Mr. Louis W. Physioc Demonstrates How It May Become The Biggest Liar in All the World

By Louis W. Physioc

The accompanying pictures are a series of photographs of the head of the celebrated "Venus de Milo." They were designed to illustrate how different lightings may change the character of the subject; destroy or preserve beauty, exaggerate or subdue blemishes, aggravate or favor the signs of age.

This would seem a matter of supreme importance, especially to our feminine stars, for the question becomes more serious as the years roll by. It becomes almost tragic when they have reached that glorious age which combines the fullness of womanhood, maturity of character, compelling personality and dramatic experience, all of which combine to make them great artistes, when they find all this pitted against the smooth, youthful faces of the ingenues.

Louis W. Physioc

These wonderful women are continually taunted by that old bugaboo of a phrase "the camera never lies," and it is in their interest that we will endeavor to show that the camera may become the greatest liar in the world.

For many years some of our stars have been under the delusion sion that their best appearance on the screen was dependent upon an excess of flat light. How often have we heard the expression among the cameramen: "I have to burn her up."

Let us study the subject carefully and see what we can learn for the benefit of our stars. There is an impression among many of them that any degree of modeling or shading produces a muddy, dirty face on the screen and discloses age. This is an erroneous idea—it is muddy high lights that give the dirty appearance. Character lines and signs of age can be beautifully smoothed out by soft shading; it is the cast shadows from strong, direct light that does the damage. In the proper place we will distinguish between the shade and shadow. There is an axiom that we cannot assail, and it is this: Picture making depends upon light and shade, but we know also, that the best results demand a proper distribution of these elements, light and shade. There is no beauty in a white, flat surface outlined against a background. The elements of beauty in a face are nature's mould of the features, general coloring, the expression of the intelligent features, the eyes and mouth, which are so much influenced by the development of character, the evidence of temperament and personality and above all, the soul that shines through all—and these marvelous elements can just as easily be burnt up as the purely physical imperfections in the skin texture. How can we hope to find the soul of a beautiful woman in a pair of "klieg eyes"—the lure of dainty lips lost in a flood of flat light? The portrait of our goddess is usually represented in a pair of squinting, bloodshot orbs, two black spots marking the nostrils and a dash of rouge for delicately modeled lips. Must we call this feminine beauty?

Now there must be some simple rule that we may deduce from or study of this subject—some broad, fundamental fact that we may easily keep in mind, and we suggest a natural law that artists in all ages have recognized—it is this simple certainty that **the stronger the light the harsher the shadows and the harsher the shadows the more prominent the imperfections,** whether these imperfections be faulty mould of the features, a mole, wrinkles, pimples or other excrescences of the skin.

The recognition of this rule, then, naturally leads to a more detailed application to insure the most artistic results. The critical study, over a period of many years, has resulted in a general agreement among artists that these harsher effects of strong light and shade are sometimes suitable for rendering dramatic and spectacular ideas but that the more delicate forms of beauty should be lighted with more softness and plasticity. This last idea of lighting is not an easy thing to accomplish. It requires skill in the placing of the lights, a thorough knowledge of the quality of this light and a very refined taste and judgment as to the intensity of the lights and the depth of the shadows. The general illumination should be sufficiently soft to permit freedom of expression in the eyes but brilliant enough to avoid muddy lights; so highly diffused as to produce no cast shadows and so arranged as to furnish the proper modeling, upon which the reproduction of beauty absolutely depends.

In lighting a head we have five well defined elements, and it is the arrangement of these that demonstrates the talent of the photographer. They are Lights, High Lights, Shade, Shadow and Reflects. First, let us distinguish between shade and shadow. Common definitions do not furnish a satisfactory distinction between these two terms, but to the artists and photographers there is a wide discrimination. The artist defines shadow as the result of an opaque body intercepting the passage of direct light, leaving a dark contour of the object on the surrounding planes. This shadow is composed of two densities—the penumbra, that portion of the shadow that lies near the edge of the shadow and which is slightly illuminated by rays diffracted around the edge of the body casting the shadow; and the umbra, that portion not reached by any of the diffracted rays and left in total obscurity. This umbra controls the contrast of a picture and, as before mentioned, is directly proportionate to the intensity of the light. The modification of this umbra, by reffection, is important.

The shades are those portions of the subject unilluminated, and like the shadows, may be modified by reflects.

The lights of a picture are those areas subjected to light and are, in turn, modified by High-lights—points of light of greater intensity than the general lighting, thrown on the protuberating features to produce relief.

From all this we deduce another principle; artistic results depend upon the proper quality of light and its skillful arrangement. Now in selecting the quality of our light we must revert to our primary consideration, the fact that harsh shadows are unfavorable to the reproduction of the face, and that the only light that does not cast shadows is that which is highly diffused. Here we are confronted with a grave difficulty. For many years, the good old North light has been considered the ideal source, but modern expedients have forced us to desert this form of light.

The multiple bank of Cooper-Hewitts furnish a finely diffused light but have been mostly discarded because of their unwieldly mountings, and with the use of the present panchromatic stock they are useless, due to their spectroscopic limitations. That which is left to us, then, among the artificial lights, is the incandescent, now being experimented with, and the arc—and we find that they are both subject to the same important problem of sufficient diffusion without too much loss of light.

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2

4

1

3

5

A


2
4
1
3
5
B

Does The Camera Lie?

(Continued from Page 21)

This difficulty lies in the fact that no matter how much we silk them down (cover them with mediums) there is always that active point of energy that casts the baneful shadow. With the aid of modern lenses and panchromatic film we are looking forward to the time when some one will be bold enough to make some experiments with matt surface reflectors as the basic source of light, especially for close-up work, in lieu of direct lighting. Surely we have been given sufficient hints of the value of indirect lighting.

For the benefit of those who still believe that to preserve their beauty, it is necessary to burn out the blemishes with a blaze of light, it is our humble opinion that there is more security in Dryden's ancient lines, as true now as when he wrote them:

"'Tis every painter's art to hide from sight
and cast in shades what seen would not delight."

In the accompanying cuts, Plate A shows various treatments of the full face, and we may learn something by studying each individually:

No. 2 A. Shows the lovely Venus transformed into a stupid, gross featured, flat nosed, blear-eyed individual. Note the ugly cast shadows, from the nose, across the cheeks; and also, how well definied are the imperfections on the surface of the model. This effect is achieved by the popular burn-up method of throwing strong, open arcs, at the same angle, across the face. The whole is flat and uninteresting.

No. 4 A. Is a similar effect, except that the photographer has thought to help the situation a little by diffusing the light. However, it is still flat and uninteresting, due to too even a distribution of light. See how broad is the bridge of the nose, the eyes still dull and stupid, the mouth thick lipped and sensual and the surface of the face blotchy.

No. 3 A. Is more engaging, but is harsh and contrasty, and tends to destroy feminine delicacy by suggesting more an Adonis than a Venus. Observe the square, sharp cut effect of the nose and eye sockets. However, the eyes begin to assume a little expression—they are enveloped in shadow and the imagination comes to the aid of the plaster Venus. But study the surface—there is no disguising the fact that she is nothing more than cold, hard plaster.

No. 5 A. Here, the photographer has attempted to burn out a little fullness under the chin that seems not to have worried Venus, but annoys some of the present beauties. This method may accomplish its design, but see what else has happened—it makes Venus' right cheek appear inflamed with the tooth ache and her expression gives evidence of the pain—her eyes are rolling up in her head and her nostrils are twitching in her paroxysm.

No. 1 A. Shows the ideal system of lighting. All the features are softly rounded and modeled. The lovely work of this ancient and unknown sculptor is preserved and reproduced in all its feminine delicacy and charm. Compare the beauty of the lips and the sweetness of their expression to the other reproductions. Study the dainty modeling of the nose, how round and shapely the head and we can almost feel the presence of the eyes. But most important of all, the imperfections on the surface of the cast are hardly noticeable and there is almost a feeling of flesh rather than the hard, cold plaster-paris.

Plate B.

This group shows the three-quarter view. This is an interesting pose of the head from the standpoint of drawing but presents a broad, flat area of cheek, which is not easy to keep from appearing flat. This pose is generally used under the assumption that one side of the face often appears more favorable than the other.

No. 2 B. Is softly back-lighted and the right side held in shade to present a little mystery to the imagination in taking care of the broad area of the cheek, also to hide an ugly blotch on the right cheek.

No. 4 B. Is the same pose, lighted too contrastily and gives a sharp, angular effect down the center of the face.

No. 3 B. In this picture, the few pleasing points of the two preceding lightings are destroyed and no semblance of effect remains, due to too strong and direct a light on the right cheek. Note how the blotches show up as soon as the harsh light is used, also the rough spots and deep, ugly shadows on the left cheek. Observe also the unbalanced expression of the eyes and the lack of any feeling of distance between the extremity of the nose and the right ear. This is just as apt to happen in photographing the living model.

No. 5 B. Here, the small area of the right side is held in shade and an attempt is made to throw the eyes in the shade to create expression and an apparent direction of vision. This scheme of lighting is favorable to light blue eyes. That portion of the cheek which bears the ugly blotch, is also shaded and there is beginning to be a feeling of roundness and distance between the nose and ear.

No. 1 B. Here there is a perfect sense of roundness. Note how the two cheeks seem to lead around to the back of the head. Observe the delicate modeling of the eyes and lips. The living model would require a little stronger reflected light in the shaded portions, but with the cast, too strong a reflect would give a crossed effect to the eyes. This like No. 1 A, is a very fair representation of the work the great and unknown sculptor and all of these different lightings show that the camera can become a great liar.

We do not deny, however, that for dramatic reasons, some of these effects may be desired rather than avoided, and for those who may be interested, we offer a series of plans showing each arrangement of lighting:

100 represents the full, open unit (arc or globe).
75 a lesser amount, undiffused.
D the full unit with one diffuser.
DD the full unit with two diffusers.
TD the full unit with triple diffusers.
R reflector.

We have just received word from Jackson J. Rose, A. S. C., that he has returned from a desert location trip near Guadalupe, California. Rose as chief cinematographer on Universal's "The Foreign Legion," and Edward Sloman, director, spent several weeks on the desert location with a company which included Norman Kerry, Lewis Stone, June Marlow, Mary Noolan, and Walter Perry. Other A. S. C. members who assisted Rose's filming included Harold Smith, Milton Brickenbecker, Howard Oswald, Edward Wetzel, and Frederick Eldredge. Many new ideas were injected in the filming of the scenes in the desert. For the first time, moving shots from caterpillar tractors were used in following an army marching through the desert. For storm effects eight of the largest wind machines obtainable were mounted on tractors to follow the troop, making realistic sand storm effects as they moved along. The resulting pictures were startling, unusual, and very beautiful. Roy Hunter, head of the Universal camera department, has expressed the opinion that the desert scenes obtained are the most beautiful he has ever seen.

Lubrication of M. P. Film

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the perforations has been described by J. G. Jones.[1] This

1. "A Film Waxing Machine" by J. G. Jones, Trans. Soc. M. P. Eng., No. 15, 251 (1922).

consists essentially of two parallel thin steel discs separated by a distance of 1-3/32" rotating in a vertical plane. The discs dip into a bath of molten paraffin wax and apply the wax to the film at their upper edge. The quantity of wax applied is controlled by the thickness of the discs, the temperature of the molten wax, and the rate of travel of the film.

Precautions to be Observed when Edge Waxing

The above method of lubrication is entirely satisfactory providing the wax is applied correctly, and no better lubricant than paraffin wax is known to date. However, if the temperature of the molten wax is not sufficiently high during application, too much wax is applied by the discs and this does not solidify sufficiently before the film is rewound. This causes the wax to cement the edges of the film convolutions so that on rewinding, particles of wax are torn away from the film and these tend to encroach on the picture area causing spots and blotches on the screen. This is harmful particularly in the case of film with an edge sound record.

Another very serious danger resulting from the application of an excess of wax arises if the projector is threaded while hot with newly waxed film. As the projector cools, the wax solidifies and holds the film so tightly that on starting the projector, the intermittent sprocket may tear out the perforations instead of pulling the film down through the gate. Since the fire shutter opens immediately when the projector starts, more or less film is apt to be burned up if the film does not start to move down promptly past the aperture.

A series of practical tests was made in this connection to determine the exact conditions under which candle edge waxing or Eastman edge waxing tends to cause the above trouble.

Film was first waxed with a waxer of the candle type which normally applies an excessive quantity of wax. After focusing the light ray from a 30 ampere reflector arc on the aperture opening of a Simplex projector for 30 minutes, this projector became heated to a temperature which would normally exist after the projection of a reel of film. Film waxed in the above manner was then threaded in the heated projector and left to cool for forty minutes. After cooling for such a period the projector had attained room temperature and any wax in the gate had hardened. On starting the projector, the intermittent sprocket tore through the perforations leaving the film stationary in the gate. Upon examination of the samples, it was found that the wax had softened and collected in the perforations and had cemented the film to the film tracks and the pressure springs.

The possibility of this difficulty occurring when film was waxed with the Eastman waxer was then determined. The projector was cleaned thoroughly and a one thousand foot reel of film waxed with the Eastman waxer was projected in the normal way. Immediately after projection the projector was threaded with a length of unwaxed film and allowed to cool. When the projector was started the film pulled down through the gate with no difficulty. Several thousand foot rolls were then waxed with the Eastman waxer and projected in thousand foot units running each reel through the projector only once. After the projection of each reel the projector was threaded with unwaxed film, allowed to cool, and then started. No trouble was experienced until several thousand feet had been projected when enough wax had collected to hold the film from being properly drawn through the gate. After cleaning the projector, it was possible again to project several thousand feet of waxed film before enough wax collected to cement the film, but after each 8,000 or 10,000 feet, the trouble was almost sure to occur.

Tests were then made to determine the quantity of wax which could be put on the film before it could be classed as waxed film which would cause trouble by sticking in the projector. Several strips of film were prepared by waxing on the Eastman waxer, once, twice, three times, etc. In this way film coated with a known quantity of wax was obtained. The projector was then thoroughly cleaned, heated for thirty minutes, and threaded first with film which had been waxed once and allowed to cool. This procedure was followed with the film waxed twice, three times, etc., successively until indications of sticking in the gate were discovered. Repeated tests showed that trouble was not likely to occur unless the film was waxed for five or six times and therefore contained five or six times the quantity of wax normally applied by the Eastman waxer.

Research and Inventions

(Reprinted from The Exhibitors Herald)

The other day a group of technical men employed at one of Hollywood's greatest studios were talking of the various and sundry individual plans of research known to be in process of working out, when somebody inquired of Daniel B. Clark, president of the A. S. C. what a certain friend of his had accomplished along a line of research he had been following for almost a year.

"He is making progress," replied Mr. Clark, "but the producer is so niggardly with his research budget that he is not able to proceed as rapidly as he could if he had an adequate fund to draw upon.

"In fact the allowance of this man is so small (and this is one of our largest studios) that he is not able to use any initiative which is the very life and inspiration of all research. Instead, therefore, of proceeding along original lines he is forced to await opportunities offered by regular production to make progress in research—to make the experiments his intuition prompts.

"Such a policy toward the research department is at best short-sighted for it stands in the way of the very thing the producer seeks to bring about—better methods of photography, new effects, better ways of doing things, saving of time and money.

"And this," continued Mr. Clark, "calls to mind another evil that threatens the very life of motion photography—the multifarious patents on process shots of various kinds.

"It is getting so that producers are afraid to seek for the unusual in photographic effects lest they bring down an avalanche of lawsuits on their heads.

"Most of these are vitiated by priority of use on the part of cameramen who employed them years before the 'inventors' took out letters of patent on them, but while members of the A. S. C. know this and use the shots as they like, the producer does not know it and either does not employ the shots or is strong-armed into paying for them.

"Of course there are some legitimately patented process shots, but more of them are of no force if the truth were known, and it is time the truth were known when studios are taking out patents on their own inventions and special processes, not to sell them, but to prevent some pirate patenting them and placing all producers under tribute for their use. This, I should say, is rather an undesirable situation and one that needs clearing up.

"And this is just what the A. S. C. is going to do as a part of the house-cleaning of the industry, for very soon our Society will invite all the inventors of special processes, etc., to meet the producers at a special session of the A. S. C. so that it may be established without question just what claims are valid and what claims are erroneous. This will go a long way toward clearing the atmosphere.

"The A. S. C. is made up of men of wide experience and exhaustive research in cinematography and few tricks have escaped them. For the most part they have been too busy to commercialize the results of their discoveries, but have been glad to pass their better methods on to their fellows without consideration. The situation, however, is becoming serious and a show-down is absolutely necessary."

Tribute to Mr. Bausch

More than 300 of Rochester's social and financial leaders banded together Thursday night, November 10th, to pay a tribute of affection and respect as well as loyalty to William Bausch, secretary of the Bausch & Lomb Optical Company, manufacturers of photographic lenses and other optical instruments.

The occasion was the celebration of Mr. Bausch's twenty-fifth anniversary as president of the Rochester club, the leading as well as oldest social organization in the city.

Mr. Bausch

A judge of the state supreme court, a poet, two members of the club and representatives of employees of the club told in their various ways of the deep friendship and affection their different groups feel for the "father of the Rochester Club."

A silver vase I presented to Mr. Bausch as a token of esteem was filled with twenty-five American Beauty roses, a thoughtful memento from the employees of the club.

In his reply to the various speakers, Mr. Bausch said that only in service to his fellows can a person be worthy of the highest estate of manhood.

News Man Saves Old Glory

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had been any destruction of foreign properties, etc. After many and long conferences we were allowed to proceed to the American Consulate grounds, but, I was all the time followed by two officers.

The Consulate was looted, window panes broken and the archives apparently destroyed. Then I saw the American flag on the ground. It was the same American flag which on the evening of March 23rd had signalled S. O. S. to the destroyers on the river, too late to save some American women from terrible outrages committed by Chinese soldiers, and—well, it may be good policy not to say anything more. But a lot more could probably have been done to prevent those disasters if some of the American officials in Nanking had acted in time.

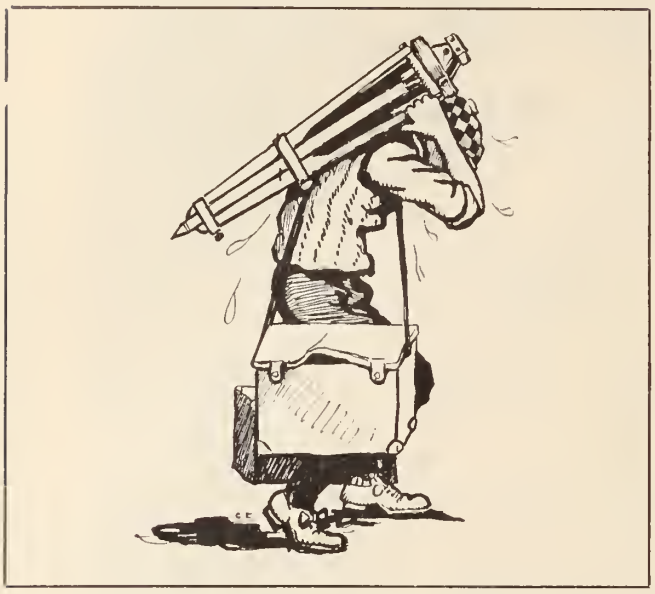
There was the flag. It was torn, desecrated. Pieces of it were used for purely insulting, unclean purposes. I leave the rest to the imagination. I motioned to the boy. The good chap understood me immediately. I told him to go and ask one of the officers any foolish question he liked. He went. In the meantime I had manipulated the flag under me. Then I signalled to the boy. Without uttering a word he came to me and motioned to me to tuck the flag under his shirt. At that moment the guard advanced and we had to be quick about it. I got the flag inside his shirt, but when he turned around a piece of it "flagged." I whispered to him to sit down. He lay down, thus covering the red and greyish white colors which would have betrayed us—and if we had been discovered, well—there was only one thing that could have been expected from the Chinese.

Fortunately the guards' attention was drawn to the consulate's dog which the consul had left behind when he fled. I motioned now to the boy to advance, got the camera out of the case and tucked the flag inside the case.

Off we went. But then somebody remembered the flag and got suspicious. They questioned the boy if he had seen it, but he of course did not know anything about it. The news about the flag got to the General's headquarters I believe, because the boy came to me the following day saying that he had been threatened with death and the best thing we could do was to disappear.

The flag was returned to the American Consulate General at Nanking, but I never got an explanation of the peculiar behavior accorded us on board the Mei-Lu. Maybe they thought us to be Bolsheviks!

Jimmy The Assistant



THE GOLDEN GIFT OF GAB

I'm the only permunant guy in pictures. Little extra kids which used to bum light tests off me to take home and dream over has become big stars; flaming youths who used to run around delivering office mail with four pimples and a whisker is now way up in the Brain Department warming a big leather chair with a secretary and is harder to see than the Pope; and even guys that used to be camera-punks and drop magazines right along with me has had their spell of being a first and some of them is even setting in a director's chair with a deep voice and a megaphone to use it through; but as for me—I'm still picking 'em up and laying 'em down—Jimmy the Camera Punk—always was and never will be. I got as much chance of being anything else as Will Hayes and Welford Beaton has of kissing. Every time I get in line for a raise or permotion the studio closes down, and I'm out in the cold like a Polar bear's nose. Or, if that don't happen I always manage to make some break and get fired for it, which, taken by and large, and carefully considered from every angle with due regard to all the facts of the case, amounts to much the same thing so far as I'm concerned. But I don't mind getting fired. I'm used to it. I've been fired oftener than Bill Hart's gun.

I once asked one of my many bosses why this was, and he told me I talked too much. Giggle **that** awaft. Talk too much my eye! It ain't possible. This whole blessed business is run on talk.

A guy that ain't a good fast oily talker has got no chance in the Silent Drama. Every good job is got on talk, held on talk, and lost by not enough talk. Writers tell their stories, directors tell their ideas, actors tell their interpretations and girls tell their mothers. Talk, talk, talk! A studio on a busy day uses more words than the International Convention of Orators. Talk too much mu aged aunt! A good line of chatter is doing all the work that used to be done by brains in the old days. You can get along without sense in this game—it's kinda in the way anyway—and you don't have to know anything about pictures; but lose your line and you're sunk. How many producers that's sitting in the saddle right now has got anything to point to in the way of actual successful perductions to alibi their positions? How many of them shows anything that could be figured as picture sense? And ain't it true that if they was in any other business and pulled the kid boners they do that they'd be out on their necks in a split second? The answer is yes! They ain't business men, they aint picture men, they ain't artists; but you should hear'em when they get going good at an executive meeting. Boy, it's just beautiful, no kidding.

Not that I care a hang. More power to 'em for getting away with it. But all this bedtime story stuff about still waters running deep and all that belongs out in the stable with the rest of the horses. Just lemme give you an example.

You're a cameraman. That means you got to know pictures. Cameramen can't bluff like other folks. When they shoot a scene it stays shot, and you can't add or take away from what was put there. Cameramen can't guess. They got to know. There ain't no time to sit down and write to Rochester about exposure when there's people waiting on the set. Whatever a cameraman does he has to do on positive knowledge acquired by actual experience of years of training.

There ain't no argument against the fact that the cameraman that is a cameraman knows more about actual picture making than anybody else in the studio. According to all the laws of common sense there ought to be more directors made from cameramen than from all other departments put together. They ain't, though, which is just another proof that the laws of common sense has been repealed so far as studios is concerned.

Now suppose that you've got so sick of telling sap directors what to do that you decide to make a stab at directing alone, instead of shooting and directing both. You finally get in to see the Main Brain and what happens? You talk, brother, you talk! There are ninety-seven other guys all after that same job, and you gotta tell why you're the best one for it. And when I say 'tell why' I mean you gotta tell why. You can't show why. You ain't got anything to show. You ain't never directed a picture in your life—that's got your name on it. Yea, sir! You gotta talk plenty fast, because there's a lot o' fast talking birds with plenty pictures back of 'em all after that same chance. Talk? Boy, you'll talk, or else! And that ain't all. You got to bluff.

Bluff does it. The guy you're talking to bluffed his way into his job, and is holding it on bluff.

You gotta bluff this head bluffer into swallowing your bluff. Sweet job, ain't it?

Go on past performances and you're sunk. If past performances meant anything—if absolutely established facts meant anything the whole picture business would be lots different than it is. It ain't what you've done, but what you say you're going to do that counts. And the guy that tells what great things he's going to do, and tells it the loudest, wins the hokobolos.

So when you get in to see the Main Brain you gotta absolutely sell him the idear that you not being a director is all that's wrong with the movies. Do that and you'll get the job. Get the job, and you've done the hardest thing there is about making moving pictures. But it'll take talk to do it—nothing else get over.

They say talk's cheap—but it cost the movies plenty.

Facts is facts, and the guy that kicks against hard facts just gets a sore toe for his trouble. You might just as well admit that as long as the good talkers has more Rolls Royces than socks it's a good idear to learn how to talk, when to talk, and who to talk to.

Trouble with me ain't that I talk too much, but that I talk too little, and don't time it right when I do. I oughta talk all the time—then I'd be right some of the time anyway. Lemme give you just one example.

There was a first cameraman come to the lot, a forrener from Checkovia or somewhere, and he talked English like a excited Chinaman trying to recite a Bjornsjern-Bjornsjern poem backwards with the original language. He didn't make sense. I figgured out that the poor gpy was up against a tough break and figgured to help him out all I could. The first day's

work was all exterior, and how could a guy that couldn't even read a no smoking sign read the reely intrickate figures on a lens? I couldn't figger how he was goin' to get by, not bein' able to read stops or nothin', and me not able to tell him so's he'd know. If I told him 6.8 he'd think I was talkin' about fast waltz time. Well, I worked all night the night before we started—worked like a son-of-a-gun, and soldered all his lens stops at 5.6, but left the diaphragm rings loose so he could play with them if he wanted to. Pertectin' him, you see.

We got out and started, and you should have seen this guy do his art. He was slower than the next raise. I had to laugh when I see him figuring exposure. He had a actinometer with more different gadgets on it than a flute has toots, and everytime he'd work it he'd forget something and have to start all over. All this got over big with the boss. He was getting art at last. Then this guy sets his stops as careful and delicate as a blind man peeling a cactus. Finally we gets the scene, and a few more before dark.

Next day we all goes into the perjection room sollem and expectant as a kid alone in a haunted house. All except me. You know, and I know that anything shot at 5.6 in cross sunlight is as safe as if it was in God's pocket, so I wasn't worried. The stuff come on and it was beautiful. You should'a heard 'em rave. This guy blushes, and stammers, and gets up to take a bow, and just then I beats him to it. I ups and told 'em how I saved the day. Was they grateful? And did that guy thank me for savin' his job? Don't be silly! I was about due to be fired again anyway, so it didn't bother me none. I guess I must have spoke at the wrong time.

But because I flop a thing ain't nothin' against it. I can get a bum break out of anything. Bet you if I flipped a double-headed penny and hollered heads it'd stand on edge. But what I said about talkin' is right, even if I can't do it myself. Learn to say the right thing to the right guy at the right time, then talk your head off. That's all there is to succeeding in the movies.

Stolen--Most Valuable of All Photographs

The Royal Photographic Society of London recently held an exhibit in its building at Russell Square, and one of the most interesting of the items shown was a photographic slide measuring three and a half inches by half an inch. Looking at it with the naked eye revealed nothing but the slide itself. It appeared to be ordinary glass, of no particular value, yet the directors of the society considered it to be the most important and valuable exhibit shown.

It was, in fact, priceless. Upon the small slab of glass was mounted a photograph. The picture, a likeness of J. N. Niepece, the French inventor who contributed a great deal to the science of photography, was microscopic. It was so small that three hundred reproductions of it would only occupy the space of a pinhead. Magnified 160,000 times, the photograph of M. Niepece would be an oval and a little more than an inch deep.

The exhibition was open evenings until 9:30, and on the final day of the show the unusual photograph was still in its case. But the next morning it had disappeared. The matter was at once reported to Scotland Yard. The police were sure that the theft must have been carried out by a collector who wanted it for his museum, as the value of the photograph is not intrinsic. It was the property of the British Photographic Research Association, who had loaned it to the society for its exhibition.

Small hope is held out for the recovery of the photograph for some time to come, but the police are confident that sooner or later the culprit will be apprehended and the picture recovered. The collector who stole it—and Scotland Yard is positive that it was a collector—will be tempted, they feel sure, to exhibit his prize. He will undoubtedly pledge to secrecy those who are given a chance to examine the photograph under the microscope, but human nature will make it impossible for every one of the favored ones who see the photograph to keep the secret.

The Camera Rules

A dispatch to the Christian Science Monitor from its Washington bureau tells this story of the absolute rule of the cameramen over our great men at the National Capital:

Great is the power of photographers in Washington. Officials, from the President down, obey them. They take precedence over ambassadors and ministers, admirals and generals, and may rightly be termed the fifth estate.

The most important visitor to Washington one day recently was Dwight W. Morrow, about to take up the important mission of Ambassador to Mexico. He was closeted with Frank B. Kellogg, Secretary of State. The "White House photographers" shouldered their cameras and walked across the street. When Mr. Kellogg emerged from his private office he found two chairs, one higher than the other, placed beside a table and the photographic phalanx waiting.

"Is this a battery?" Mr. Kellogg inquired.

"We want Mr. Morrow," said a photographer in answer.

The Secretary of State obediently called Mr. Morrow.

"You sit in that chair and Mr. Morrow in the other," a photographer ordered.

"Talk," was the command and Mr. Kellogg made motions with his lips. Mr. Morrow looked self-conscious.

"Look at me, Mr. Morrow," one photographer said. "Look right into my camera here."

Then another photographer gave a similar order, and the new ambassador shifted his glance.

"Sit closer together; lean forward, do this for the movie men; now for the other photographers. Are you going to the White House from here? Well then, Mr. Morrow, you go down to the first floor and stand at the door. We will come down there and take some more pictures."

A flash! That was the end of that session. Mr. Kellogg arose promptly, and as the smoke cleared the photographers folded their paraphernalia and departed to "get" Mr. Morrow again.

"I did want to work on that French note," said the Secretary of State ruefully as he watched the precious minutes escaping. That was of no interest to the photographers. They got what they wanted.

Transactions Of S. M. P. E.

[*To our esteemed Mr. Herford Tynes Cowling, A. S. C.,* THE AMERICAN CINEMATOGRAPHER *is indebted for the following excerpts from interesting papers read at the September meeting of the Society of Motion Picture Engineers. Later the full text of these papers will be printed.*]

Behavior of Gelatin in the Processing of Motion Picture Film

By S. E. SHEPPARD

(Extract)

Scientific investigation has shown that the gelatin photographic emulsion layer, which with the "celluloid-like" support comprises the film, is subject to considerable physical change due to swelling and shrinking. Excess swelling or shrinkage of the gelatin in a direction perpendicular to the film surface does not make itself noticed but that taking place along the surface is resisted by the unyielding support with the result that the film tends to curl up into a tubular shape. If a strip of motion picture film is curled in this manner the picture projected from it will, when viewed on the screen, appear "fuzzy" in places and will seem to sway back and forth producing an extremely disagreeable effect.

It has been found possible to prevent this effect entirely by the careful choice of gelatin in manufacturing film and by the use of processing solutions having the correct chemical constitution.

Our Brothers in the East

Here are a few interesting happenings in the East, as sent us by our friend and brother A. S. C., Mr. Herford Tynes Cowling, chief cinematographer of the Educational Department of the Eastman Kodak Company, Rochester, N. Y.:

"Mr. Charles H. Bell of the Ray Bell Film Company, St. Paul, Minn., is just starting on a year's trip to Central Africa with the O'Brien-Burbridge Expedition to obtain photographs of gorillas, pigmies and other interesting things in the Congo and in German East Africa. Mr. Bell is an experienced cameraman and has promised to write me some letters giving accounts of his work for publication in the A. C.

* * *

"In December Mr. Earl Rossman is leaving on a photographic expedition to the northern part of Alaska. Here he will be working for nearly a year. Rossman, as you know is an old hand at the Arctic game, having made his last trip with the Wilkins Flight Expedition and having made several previous photographic expeditions to Alaska, during which he photographed "Kivalina of the Northland," the only native Alaskan film drama ever taken.

* * *

"Mr. Cerveth Wells, lecturer, and Mr. Donald Thompson will take a movie expedition into China and the Gobi Desert on a three-year trip. They hope to come out across Chinese Turkestan. Mr. Thompson is an old hand at the game, having done considerable correspondence work during the war and photographed "The Batallion of Death in Russia," which was the Russian ladies'

A Misplaced Thrill

Arthur Edeson, photographer of First National's big war picture, "The Patent Leather Kid," starring Richard Barthelmess, has photographed many of the biggest film spectacles and has had enough hair-breadth escapes to fill a small volume.

His closest call, however, was in one of his earlier pictures and not in "Robin Hood," "The Thief of Bagdad," or "The End of The World," three of the biggest pictures ever made for the screen.

It was in "The Dollar Mark," the old World picture directed by Oscar Lund, with Robert Warwick.

"We were photographing scenes on the rapids in Wilmington Falls, Lake Placid, in the Adirondacks," Edeson said. "I was on a raft with one of the old Pathe cameras. It was lunch time, and for some strange reason I didn't know it.

"From the shore, they started to pull the raft towards land, and threw me off my balance.

"With the camera over my shoulder I went into the icy water, the weight of the camera taking me down rapidly.

"I clung to the camera, however, and together we went over the falls, about the time that both Lund and Warwick plunged in, to my rescue.

"How I ever got out of that situation alive I will never know. But I did, and what is more, we saved the camera.

"We took it apart and dried it out, and by four o'clock we were shooting again. All I lost was a lot of breath and the film we had shot just before the accident.

"It was my closest call, and I never want to have another similar experience."

The new home of Tremont Laboratories, Inc., just completed at 823-5-7-9 Seward Avenue, Hollywood, by H. H. McMurphy, for Horn and Glickman, formerly of the famous Tremont laboratories of New York City. The plant cost $100,000 to build and equip, and is claimed by the proprietors to be the most up-to-date- in the industry.

Film Industry In Switzerland

By A. Herz, *Editor Camera, Lucerne*

One can hardly as yet speak of a film industry in Switzerland since, with the exception of a few small studios where industiral or educational films are produced, this country is entirely lacking in dramatic film studios.

However, this is soon to be changed for efforts are already being made to attract this industry here. Negotiations with German producers are now well under way and America would do well to turn her attention to possibilities here. When one examines the matter more closely it is evident that this country is in a position to offer film producers unusual advantages.

First, there is the question of electric current. Switzerland offers studios power at a very much lower price (perhaps about one-tenth of the American price) and, when one remembers that it is just this lavish use of electric light which is one of the reasons for the great beauty of Hollywood productions, this factor cannot be too seriously considered.

How many German pictures show the effect of insufficient lighting! There is indeed a very great difference in the quality of pictures which have had just barely sufficient lighting and those which have not suffered from economy.

The second factor in favor of Switzerland as a home for film studios, and in particular Central Switzerland, is the astonishingly beautiful landscape ready to hand, from the idyllic to the heroic being only a step. One can choose sites commanding incredibly lovely backgrounds without going further.

Another important point to remember is that the people of Switzerland are very gifted dramatically; almost every one takes part in theatricals and outdoor fetes without end. In short, there is the richest material at hand here. Again, this country is an excellent film market in itself, two hundred and thirty cinemas being already in existence, to which one could add a whole chain of newly built giant picture houses in the larger towns.

Should film production become a home industry, these houses would be the first consumers. Those who know the patriotic feeling of the Swiss people realize that genuine Swiss films would be in the greatest demand by all theaters. Swiss products are always given preference by the people here. In addition to this factor one may safely anticipate that Swiss films would receive most favorable protection.

In short, the outlook for local film production is exceptionally favorable from every standpoint and Switzerland is admirably situated for the making not only of films dealing with local character or exploiting its wonderful landscape, but of all that is comprehended in the work of the great ateliers abroad.

Getting The Stuff

The Gentle Art of Shooting Pictures is Full of Excitement

By Ira Morgan, A. S. C.

Imagine sitting on a small platform, crazily swaying on a couple of long ropes that suspended it a few feet over the middle of a churning, boiling river, where the slightest mishap might mean death to even the strongest swimmer. It would be a diverting experience, to say the least, even on solid footing—but with nothing but a couple of swinging ropes between yourself and doom—well—that's a situation calculated to keep a man from brooding over the affairs of the Motion Picture Academy!

This was a little thrill a few of the boys in the Metro-Goldwyn-Mayer camera department enjoyed not long since. And, as they hung on the swinging parallel, they had to keep their minds on their cameras—pick out the most spectacular spots in the boiling rapids and transfer them to celluloid. No—the boys weren't thinking about what they were going to have for supper that night.

It happened upon the Copper River in Alaska, when Metro-Goldwyn-Mayer sent Harry Schenck up with a party of cameramen to film inserts for "The Trail of '98," Clarence Brown's big Klondike picture. Bob Roberts, Faxon Dean, Chet Lyons, Bob Newhard and Pierra Mouls made the trip. One of the important shots wanted was a close-up of the White Horse Rapids in action—and a perfect replica was found in the Copper River rapids, a short distance further south—but equally as spectacular. The rapids, in fact, are even more dangerous, coming down a rocky gorge into a perfect maelstrom of seething foam.

Schenck and his party, together with a few guides and a camera pack train, passed several days investigating curves in the stream and possible vantage points, but decided that nothing taken from land would show the real fury of the turbulent waters. Then they decided on a bold procedure.

Getting a couple of heavy ropes across the stream by the expedient of using a string to haul a cord across, then a small rope and then the heavy cables, they flung a double cable over the river, anchored to trees. A parallel, or camera platform was fixed between these parallel ropes, the cameras and cameramen placed on this, and it was slowly pulled by rope to its teetering perch at the center of the stream.

Here the men hung, about ten feet over the water. Every move set the platform to careening wildly.

"The thing to do," decided Lyons, "is for us all to sit perfectly still, until she stops swinging—then we'll shoot."

For twenty minutes, scarcely breathing, the men sat on the platform as its pendulum-like swing slowly quieted down, then so cautiously as not to start it swinging again, they cranked their cameras. All the time the giant rapids roared beneath them.

Afterward came the trip back, clinging to the parallel as it jerked, swayed and bobbed.

Yes—a cameraman every now and then gets a thrill out of his calling. Percy Hilburn, for instance, sat in a pit, covered with boards and turf, through which his lenses projected to film the thundering hoofs of the horses in the "Ben-Hur" chariot race as they galloped over his head.

Had a hoof come through the planking that covered him—Percy wouldn't be grinding today. Every time one of them thumped on his thin protection Percy realized this. But when it was over he packed his camera and philosophically prepared for the next shot.

In this he and his camera perched on the back of a trailer that ran just ahead of the horses, and about three feet from the ground. The trailer was started by motor, then ran ahead by momentum so that it wouldn't jar or spoil the film. Had it stopped a little too soon it would have spoiled Percy—but that again is a chance

a cameraman takes once in a while. Percy laughs over it today—but he looked a little pale, even through the dust that encrusted him, when the motors dragged him away from a position about six inches from the front feet of the galloping chariot team.

Almost every picture has a thrill in it somewhere that the audience never sees, and that the cameraman usually enjoys exclusively. The writer got one lashed to a battleship mast over a pair of fourteen-inch guns during target practice in "Tell It To The Marines." The concussion was so heavy that it seemed as though it would snap the lashings of camera and platform on the mast. Shooting the chase with the rum runners, from an Eagle boat at night, in "Twelve Miles Out," provided another thrill. They had my feet fastened down so that the waves couldn't wash me off—and the camera anchored. Every now and then I got a good slap from about half a ton of water. No sailor's life in mine.

Paul Scholokow and Douglas Shearer, brother of Norma Shearer, the star, had one of the most thrilling experiences in a long time in the filming of "Rookies." Each was lashed with a camera on the wing of an airplane, and they had to film another plane as it dropped a dummy onto a captive balloon. The planes, in following the movements of the one with the dummy were sometimes nose up, sometimes nose down—the men were turned every way except right side up. Nothing under them but thin air. Yes—there was a thrill to it—to say nothing of the thrill of landing, perched on a wing. One can't help wondering if the pilot will get her down safely with one wing out of balance from a man's weight.

Thrills—yes, we have 'em.

Recent Development in the Pre-Focusing Base and Socket For Projection Lamps

By A. Burnap

(Extract)

For those classes of motion picture projectors which must be operated with a minimum of attention and without the supervision of a skilled projectionist, the tungsten lamp has come to be indispensable. A projector equipped in this way and used for advertising purposes or in a church or school auditorium must operate faithfully day after day. When a new lamp is put in the machine because the old one has become blackened or has burned out, the filaments of the new lamp must assume the exact position of the old or the picture will be very unevenly lighted. Even this delicate process has been made very simple by the use of the so-called pre-focusing lamp and lamp base. A newly developed arrangement for this requires only that the base be properly adjusted in the projector lamphouse after which a new lamp can be placed merely by pushing it into the socket and rotating it through a one-quarter turn. Only a few seconds are consumed instead of several minutes as previously.

The Structure of the Motion Picture Industry

By William A. Johnson

(Extract)

The motion picture industry has grown in a few years from a sideshow novelty to one of our great industries. Of the billion and one-half dollars invested, five-sixths of it is in theaters and the remainder in producing and distributing organizations. Much has been written about the "stars" and the producing companies but the existance of that important branch, the distributing organization is hardly realized. It is this wholesaler who brings about the rapid circulation of pictures to all parts of the world. It is through this agent that the inhabitants of the back country and even the remote corners of other continents are able to see the latest from "Broadway." Forty per cent of the film production in America goes to make up eighty-five per cent of the movies of the rest of the world.

Nearly half of the population of the United States attends a motion picture exhibition each week. The motion picture theater is fast making a name for itself as a center of culture which offers the utmost in entertainment and comfort.

The Movies Shoot High

Army Ace Finds Greatest Thrills While Piloting A. S. C. Cameraman During The Filming of "Wings"

By Lieut. E. H. Robinson

[*While shooting air sequences for Paramount's story of the American ace, "Wings," at San Antonio, Texas, Lieut. Robinson and two cameramen ran into a terrific sleet storm at an altitude of* 11,000 *feet. For more than twenty minutes they were entirely lost. Lieut. Robinson could not even see the instrument board before him. Here is his own story of the experience.*—Editor's Note].

Many thrills have been tucked away in the fuselage of my ships in the past and particularly in training, but the greatest thrill of my life came while piloting a camera ship in making a certain sequence of air shots above the clouds for Paramount's great road-show, "Wings," at San Antonio, Texas. As I look back upon it, Cameramen "Buddy" Williams, Faxon Deane and I were very fortunate to get out of this jam with our lives. As this is being written, however, it merely takes the place of a gigantic thrill.

On the day of this one incident we had postponed flight until late in the afternoon simply because Director William Wellman needed a background of great clouds for the sequence, and these had been missing the earlier part of the day. In the afternoon they gathered and we made preparations to take-off. Richard Arlen and Charles Rogers, featured players in the production, took to their own "ships," and we followed as quickly as possible. Arlen and Rogers had fast "ships" of the "P1" and "02" type, while I piloted a large three-passenger "ship" of the bomber type.

After climbing steadily we encountered the first layer of clouds at about 4,500 feet. Upon getting above them, we found the light still insufficient to take the scene, so we proceeded to climb to the next layer. I reached these at an altitude of about 8,500 feet, which was almost the ceiling of my ship. We found there that by flying northwest a beautiful background could be obtained for our shot, so I headed the bomber in that direction and signalled the pilots of the other ships to carry out their maneuvers as pre-arranged. Through some misunderstanding of signals, it was quite some time before the other ships got in their proper positions.

All of this time the peaks of the clouds had been rising, which necessitated my climbing higher. I now was at an altitude of about 11,000 feet—the absolute ceiling of the bomber. From time to time I encountered peaks of clouds rising in my line of flight and therefore was required either to fly through them or around them. Both of my motors were very cold; the temperature probably being, at that altitude, somewhere in the vicinity of zero. While flying through the peak of the clouds one of my motors, due to its coldness, "knocked" (stopped), thereby sinking me down again.

After a few minutes I realized that it was futile to attempt to pick my way out—so, idling both motors, I started down. I then realized we had fallen into the heart of a cumulous storm cloud in which violent convectional currents were at work.

Soon my goggles were covered with ice and frozen to my face. I was unable to see the instrument board before me. The camera, which was mounted on the nose not five feet distant, was but a dim shape. Not knowing whether we were right side up, upside down, in a tail spin or falling leaf, other than by "feel," I fought to keep control of the ship as we made our perilous descent. Every few moments I pried the goggles from my eyes and peered at the alti-meter through the haze. Five thousand feet and no sight of land. Six thousand feet and no sight of land, eight thousand feet and still no sight of land, and then the feeling came over me that it would be necessary for the two cameramen and myself to take to our parachutes.

I knew we were over a mountainous part of the country and that the hilltops probably would be fifteen hundred feet higher than the field from which we had taken off. When we had descended 9000 feet and still I could not see the ground, I called to the cameramen and told them that if ground was not sighted within another thousand feet we were going to jump. Even then I was reluctant to call upon two inexperienced men to make parachute jumps and turn loose the ship which I knew would cost $40,000 to replace.

Left to Right—"Buddy" Williams, Lieut. Robinson and Faxon Dean.

But another thousand feet we broke through the clouds and sighted the ground just eight hundred feet below us. A hurried look served to show me that we had been very fortunate in coming out in the center of a valley, which was entirely surrounded by high hills disappearing into the clouds. In other words, a mile and one-half in any other direction would have unquestionably seen us crashed into a mountain.

I picked a likely looking field, glided for it—approaching it "into the wind"—and made a good landing without injuring anything or anybody. I was informed by some natives who ran out to the plane that we had landed in the town of Comfort, fifteen miles north of our starting point. We were soaking wet; almost dead from the cold, but you can rest assured we were comfortable in mind in spite of the ironical name of the town in such a predicament.

And, also, we returned to the "Wings" location by automobile, not by "ship."

"Stills Move The Movies"

By John Stillman

EDITOR'S NOTE

(In the reproduction of these stills, the values were greatly impaired by too great reduction... A still must be complete in detail for proper analysis. In the hurry of going to press there was no time to change the art.—Editor's Note.)

"Laugh and the world laughs with you!" An old slogan but always effective in its meaning and one that has been put into actual practice by the movies for the enjoyment of the little ones and of the grown-up little ones too.

"How silly," we have all heard many times between chuckles and frank outbursts of laughter during the screening of a motion picture farce.

"How silly," may be true, but still the beneficial effects of laughter are stimulated and the picture has answered its purpose.

Now, folks, we are going to let you into a little secret if you promise not to let it interfere with the pleasure that you will derive from the next "silly" picture you will have the opportunity to see on the screen.

All this silliness, all this laughter, is the result of WORK, often of very hard work that leaves little or no time to frolicking thoughts.

Making comedies is a serious business, a very serious business which requires much thought, preparation, care, understanding of human nature, real humor, which explains the outburst of a certain producer, who in answer to a rather sarcastic criticism of one of his pictures, heatedly exclaimed: **"This comedy is not to be laughed at!"**

A comedy may be compared to an agile acrobat, who in a fleeting second performs a feat of daring and precision with a grace that seems superhuman and with no apparent effort, but back of which are marvels of level-headedness, clean habits, self control mental and phyical, accumulated through years of self-sacrificing intensive training.

This seems to be quite an obtrusive preamble to the presentation of a few "funny" stills, but as we are in the photographic "business" we like to look at things in a business-like way and combine both the artistic and the commercial values of our product.

Now, which should be the requisites of a "still" destined to advertise and "sell" a comedy photoplay?

It has to be "funny," of course. It doesn't take a genius to find that out; but, what is it that makes a still picture funny? This is another question.

In a comedy photoplay, a story of some sort is always carried on, replete with comical situations cleverly arranged so as to create and sustain the farcial whole of

the picture and an audience is usually "carried" by stunts, thrills and situations following each other in rapid succession, that make the whole pleasing and comically entertaining. But what of the still-cameraman? He has constantly to follow every footstep of the company to which he is assigned, constantly to study the situations most of which are improvised right on the spot; he has to be constantly ready to catch with his camera the fleeting instant that will tell a story and a "funny" one at that.

Accuracy, speed, a keen sense of humor together with a thorough knowledge of photography are required of a comedy-still cameraman.

Experience tells us that "action" pictures are the most successful in bringing out the farcical qualities of a subject and this, assumed and accepted as a fact, the comedy-still-cameraman, began to figure out how to reconcile action and speed with the sharpness that is essential in all details of a comedy still.

It is a well known fact that depth of focus or complete sharpness of a picture is secured at a sacrifice of the speed of the lens used in taking the picture and that less depth of focus is obtained with lenses of same speed, but covering a larger area under similar conditions of subject and lighting.

And here surged one of the great problems the solution of which is responsible for many sleepless nights spent by the comedy-still-cameraman.

The cinematographer in charge of production arranges his lightings according to the different effects he wants to obtain and to the "speed of the lens he is using" in order to register the action upon the small surface of a picture "frame," and this arrangement, for the reasons explained above, is always insufficient for the still man who has to "grab" the picture while the action is going on.

This problem has been solved as is proven by the few stills from the Christie Studios, of Hollywood, that embellish this story.

Jimmy Adams and a confederate trying to force a bath upon the elephant, and Bobby Vernon extinguishing the fires that burn within him, are excellent results obtained in interior action-still-photography.

The flag-pole stills of Billy Dooly, though easier to obtain, being exterior pictures, give action a plenty through the impression of danger conveyed by the dizzy position of Dooly. The picture of dear old Jack Duffy and the rabbit is, in our estimation, one of the finest examples of humorous snap photography carrying as it does a whole story with it and a pleasantness of effort very seldom recorded.

The pastel-like background suggestive of happy sunlit mornings and rural peace, beautifully contrast with the bushes in the foreground suggestive of thorns and ambush, declared enemies of frock-coats and silk-hats, and the suggestion of a wild chase after the rabbit, through the open fields and ending in the bush, is completely carried out up to the climax of the capture. And here the mind pauses and—well—read the story yourself, or still better, try to find out how many stories you can read into the subject and we venture to say that you will not regret the time you will devote to it.

* * *

The writer of this yarn was paying a visit to the Christie "lot" recently when he espied these pictures and was gracefully accorded the privilege of using them in the "American Cinematographer."

Mr. Talbot, the photographer of many of them, was present and the writer viewing such an array of remarkable stills, and spurred by his own knowledge of the difficulties involved in such work, could not refrain from asking Talbot the "silly" question: "How do you do it?"

"Well," was the answer, "it all depends on the lens, and the shutter and the developer—"

"And the man behind all these things," the writer added.

"I am afraid they will be looking for me on the set," was Talbot's conclusion, and he hurried away.

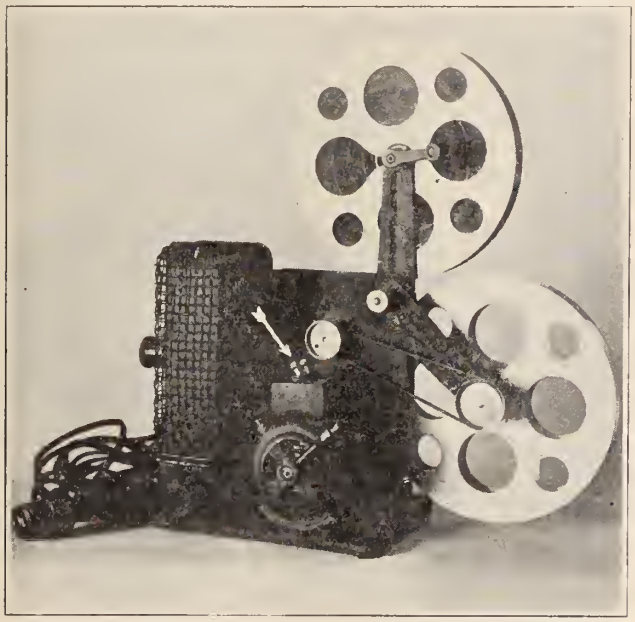
And this, to prove that modesty can still walk together with success.

Combination Control Switch For Model C Kodascope

By Hamilton Riddel

As the Model C Kodascope is equipped it has but a single switch. This control lights both the lamp and starts the motor in one operation. However, it is often convenient to be able to exercise a separate control in the operation of the projector. Two instances are self evident. One occurs when the operator wishes to operate the machine by hand, thus doing away with the necessity of keeping the motor running. The other, and one which is quite important to the careful home-projectionist, is the matter of allowing just titles and actual pictures to reach the screen without the annoying and trying effect of having a white beam of light flare upon the screen at the beginning and end of a reel in projection.

For these two reasons the writer adapted a combination control switch to his Kodascope. The attached switch is shown in the accompanying illustration. The two "click" switches were mounted inside of a metal box, the latter being screwed to the top of the motor. Proper electrical connections were made so that the light and motor could be operated separately.



When operating the Kodascope by the hand crank, the motor is turned off and only the lamp switch is turned on. In the second instance, already mentioned, the lamp is lighted while focusing is effected. The motor switch is then clicked on and projection follows. With the appearance of the closing scene or title of the reel, the lamp switch is turned off, the motor still being allowed to run. Thus the projected picture ends, not being followed with a white flare which passes through the empty gate, and yet the end of the film is rolled upon the take-up reel by the motor which is still in operation.

There are several places where this combination control switch may be mounted on the Kodascope, model C. To those, however, who have the small carrying case for their projector, it will be found that the switch is most conveniently placed on top of the motor. So attached there is enough clearance to store the projector in the standard carrying case.

The Technology of Glass

By FRED MCBAN
Physicist of Creco

Since glass is more or less necessary to our work in motion pictures, a semi-technical glossary on the manufacture and uses of it, should be of interest to us.

Glass, as generally classified under the name, is a translucent or transparent mixture of silicates, or sand derivatives, one of which is usually of a metal base.

Calcium carbonate, lead oxide, sodium carbonate and potassium carbonate are the main constituents of glass, be it camera lens or rhinestone.

Sodium-calcium, window glass is easily affected by the elements, becomes porous when used under certain circumstances and is practically useless for chemical apparatus and measuring or graduating glasses such as we use in photographic dark-rooms and laboratories.

For this reason we use a glass made by the Bohemian process, a method of making glass, comprised of Silica, Calcium and Potassium Carbonate of the highest purity. The product of this process is characterized by extreme hardness and resistance to chemical reactions.

Flint glass, one of the fundamental bases of photographic and optical lenses, is manufactured by smelting together lead-oxide, Silicon-oxide and Potassium Carbonate. This combination gives great refractive power, along with a low melting point and high specific gravity, making it easy to work for trueness and rendering in the course of manufacture.

Crown and flint glasses, almost exclusively used in the making of photographic lenses, are manufactured in a great number of varieties, obtained by incorporating in them different metallic elements, which, in changing their densities, change their power of refraction and dispersion.

Strass or German glass is of the lead base variety. Being very rich in lead it follows that its refractive power is very high and for this reason it is used to make rhinestones, artificial diamonds, etc.

The various colours in glass are obtained by mixing heterogenous mineral and vegetable colourings with the liquid or molten mass and not by the temperature of the mass while it is in the furnaces, as we are sometimes led to believe.

Cobalt compounds enter into the manufacture of blue glass, which is used quite extensively at this time in photographing close-ups shots in cinematography.

The only advantage, if any, that can be claimed for the use of blue glass is as a diffusing medium or a slight psychological effect.

Copper chrominium compositions are used for green glasses, oxides of copper for the reds, and uraniums for the ambers and yellows.

Common bottle glass is composed of sand, limestone, sodium sulphates, common salt, etc., according to the color or intensity of color desired.

The slower the cooling of the glass after it has been brought from the pot and molded the better its quality. The gradual reduction in the temperature is accomplished by means of a long oven, known as the annealing oven and the operation is called the annealing process.

When red-hot glass is introduced into heated oil or paraffine wax, which is a process of hardening, we have the method by which the various forms of heat-resisting lenses and heat absorbing glasses are made.

This latter is a form of glass that the studios are greatly interested in at present.

Pyrex glassware, the kind we use for domestic purposes, is made by this method, i. e., by dipping it in oil while red-hot. This process is generally supposed to be a trade secret.

A Camera You Can't See

Mr. W. S. Ashby, Vice-President and General Manager of the Seebold Invisible Camera Corporation, Rochester, N. Y., sends the "American Cinematographer" the following description of that organization's Invisible Camera. Says Mr. Ashby:

"It is rather hard to display a thing that is invisible. Invisible Camera is not a magical device; it is invisible because it is concealed.

"The original idea of this camera was to photograph bandits or hold-ups in action. It was designed to install in banks, stores, filling stations, mail cars or other places which might be in danger of robbery.

"The camera measures 8½ inches high, three inches front to back and six inches in width. Those installed in banks will be enclosed in bullet proof steel cases. The camera can be concealed in the wall or can be put in any sort of a cabinet large enough to hold it.

"The lens opening is five-eighths of an inch. It uses one of our ultrastigmat lenses F: 1.9. The pictures are made on standard motion picture film and are one inch square.

"The magazine holds about sixteen feet of film, enough for one hundred and sixty pictures.

"The camera may be operated by a floor button or any other electrical connection desired. A touch of the button makes one exposure. After the exposure the film automatically rolls up ready for the next picture. A continuous pressure of the button makes a series of pictures. The moment the pressure on the button is released the camera stops. If the contact continues the entire roll of film will be used up.

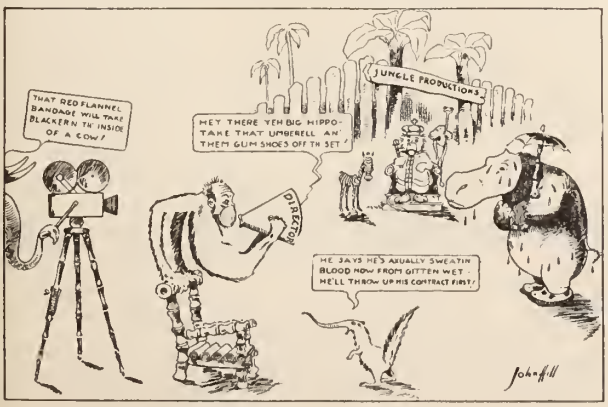
"The instant the last exposure is made the camera signals that it is out of film. This signal is optional with the owner, whether a light is turned on or whether a buzzer or bell is sounded.

"With the exception of the instant that the lens is exposed, there is nothing to indicate that there is a camera in the room. We have one installed in a filing cabinet at the factory and at a little distance a person would never suspect that the cabinet contained a camera.

"The General Electric Company has completed for us an arrangement that operates by a light. A ray of light is thrown on an electric cell. The moment that light is interrupted the camera operates.

"To cover a room it would be necessary to have four cameras, one set in each wall. They may all be controlled by the same button. Or if the bandit walked through a ray of light all four cameras would click. If he should shoot the light out it would continue to make pictures.

"We also have a flash light set in the electric wiring, which looks like a fuse, for night work. The camera can either operate the flash or turn on sufficient illumination under ordinary office illumination."



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"Photo-Era"	4.15	5.00	5.90
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American Cinematographer,
1222 Guaranty Building,
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WANTED—MOTION PICTURE CAMERAS

170-DEGREE Bell and Howell wanted. Have 1924 Buick Sport Touring car, in excellent condition, as down payment. Remainder to be paid within six months of purchase. Write or phone Herman Schopp, care of the A. S. C., 1219 Guaranty Building, Hollywood, California. GRanite 4274 or GRanite 4704.

FOR SALE—CAMERAS

FOR SALE—De Vry Projector using standard film. In first class shape—$100. Cost $225 new. (See the machine in the A. S. C. office, 1220 Guaranty Building, GR. 4274).

FOR SALE, CAMERA—Super-speed Debrie equipment. 2-inch B. & L. Lens, 2 magazines, 1 tripod, 2 jacks. Price $750.00. Abe Scholtz. See camera in A. S. C. office. GR 4274.

FOR SALE—New Eyemo camera, carrying case, extra magazine. Price $225. Call Ben White, OX 7335.

FOR RENT—CAMERAS

FOR RENT—Akeley Head. Cinemotor, batteries and Eyemo. Frank M. Cotner. HO. 5046.

FOR RENT—To reliable party, one Bell & Howell camera with Mitchell legs; Astro Lens F. 2.3., Fl. 8. 6 magazines. Fred Hoefner mat box. In perfect shape and fully equipped. Joe LaShelle. ORegon 6730.

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MITCHELL and Bell & Howell cameras. F.1.8 and F.2.3 lens equipment. All kinds of lenses and equipment for rent. John S. Stumar, 3602 Cardiff Ave., Palms, Los Angeles. Phone: Culver City 3542; or call C. Glouner, Camera Dept., Universal City, HEmpstead 3131.

ONE DE VRY Motion Picture Camera. Complete outfit. Alvin Wyckoff, Phone Care A. S. C., GRanite 4274.

FOR RENT—Akeley camera to responsible parties. Call A. Le Roy Greiner, A. S. C., GL 7046.

THREE Bell & Howell 170-degree cameras. Complete equipment. Eddie Linden, 6017 Eleanor Ave., Hollywood, HEmpstead 8333 or Hollywood 7716.

CAMERAS, ALL KINDS—Akeley, Bell & Howell 170%, also Speed, De Vry, Graflex, Still, (late model Anscos). For rent by day or week to responsible parties. Ries Bros., Ries Building, 1152 No. Western Ave. Phone GRanite 1185. Residence HO 1055.

BELL & HOWELL. Victor Milner, 2221 Observatory Ave., Los Angeles, California. 596-944.

BELL & HOWELL—Phone Perry Evans, DUnkirk 3890 or Hollywood A. S. C.

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BELL & HOWELL, 170, with 30, 40, 50 and 75 lens equipment. Baby tripod. Also B. & H. Cine motor. Charles Stumar. GRanite 9845. 7501 Lexington Ave., Hollywood.

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WILL TRADE—Carl Zeiss, F. 3.5, 50 mm. lens in B. & H. mount. Trade for late model Veedor Counter. Bert Longenecker, 597-724.

FOR TRADE—Have good Ereman standard 35mm film printer 60 cycle ¼ H large light dimmer, 24 stops, in very good order, good contact. Will trade for a Universal or other good make tripod. Printer regulated to print from 13 to 20 feet per minute. Address World Wide Out Door Motion Picture Co., 1114 Fifth Street, Sioux City, Iowa.

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ONE 8x10 still camera—complete. Care A. S. C., GRanite 4274.

FOR SALE—LENSES

FOR TRADE—New 100 ft. Stineman Developing Outfit. One Reel, Three Tanks. Also F 3.5 Bausch & Lomb Tessar in Focus Mount with Diaphram and Sun Shade. Exchange for Tripod. Must be steady. George Horst, 1924 Green St., Philadelphia, Pennsylvania.

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ONE two-inch Bausch & Lomb F.2:7; one Dahlmeyer Pentac 37 mm. F.2:9. Georges Benoit, care of American Society of Cinematographers, Hollywood, California.

CARL ZEISS, F. 2.7, 50 mm. in Bell & Howell mount. Dan Clark, care American Society of Cinematographers.

NEW 40 mm. Goerz Hypar f. 3. 5. lens in Bell & Powell mount: price, $50.00. Write Charles Clarke, 1222 Guaranty Building, Hollywood, California.

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FOR RENT—Mitchell, f. 2.3. Sstro lenses. Brand new outfit. GLadstone 0033.

WANTED—PROJECTOR

USED SIMPLEX wanted. State model, price, condition, etc. Address Box R, American Cinematographer.

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WANTED, CAMERA—Will buy Bell & Howell camera. State price and equipment. John P. Whalen. Gl. 1101 or A. S. C. GR. 4274.

WANTED, CAMERA—170 degree Bell & Howell camera. Would like Mitchell tripod. Harry H. Cooper, 851 No. Fuller Street. Phone GL 5239.

FOR RENT, LENSES—Trick lenses of all descriptions for rent by day or week. Call George Meehan, A. S. C. Phone GR 3830, 744 North Curson Ave., Hollywood, California.

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COMPLETE new style Bell & Howell matt box for sale. Joseph B. Walker, 1037 N. Sycamore Ave., Hollywood. Phone GLadstone 3797.

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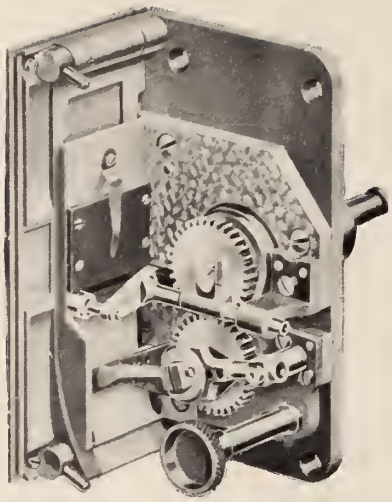
PATHE panorama head for professional camera, with detachable aluminum tilting head, easily adapted to any standard tripod. A first-class unit for some one, who is experimenting or engaged in research work, to add to their equipment. Stephen S. Norton, care A. S. C., Guaranty Bldg., Hollywood.



Announcing

The NEW HI-SPEED MOVEMENT for our camera, which has been in the field long enough now to have proven its merit.

This movement will operate equally well at all speeds from one picture per second to eight times normal, or One Hundred and Twenty-eight pictures per second. It has been run as high as One Hundred and Sixty pictures per second, but we recommend that eight times normal will give perfect results with no strain on the mechanism.

The pull-down arm has two fingers on each side, engaging four perforations simultaneously, thereby insuring against tearing of the film when operated at high speed.

Registering pins are provided, moving in hardened and extremely long bushings, which will guarantee long wear and perfect registration. Two pins are provided, one at each side of the film. both pins being mounted on the same operating arm so that registration must be correct.

Movement can be operated either backwards or forward with equal efficiency, and function perfectly. Fade-outs can also be made at high speed if desired.

This movement is a typical MITCHELL development.

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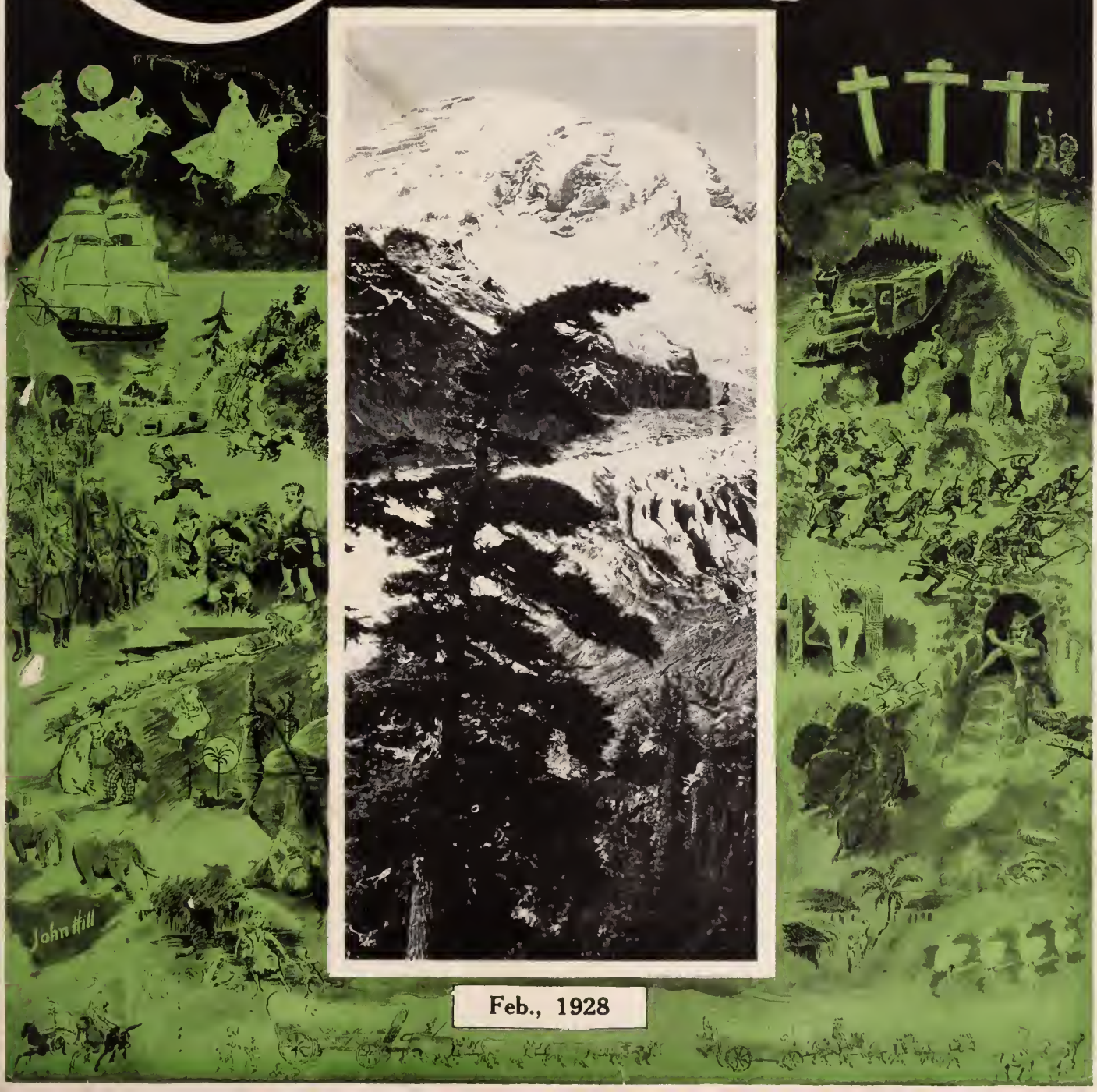

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American Cinematographer

SILAS EDGAR SNYDER
Editor and General Manager

JOSEPH DUBRAY
Technical Editor

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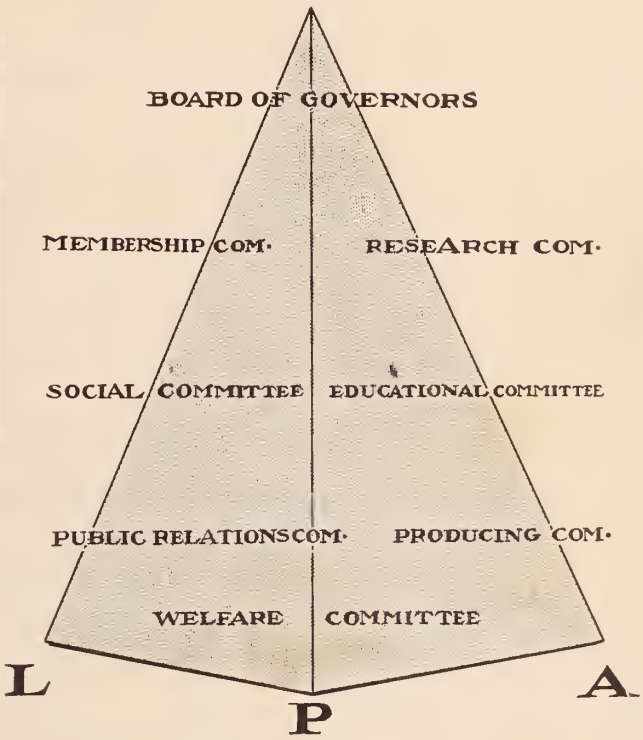

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The Talking Pictures

Progress Made During the Past Year Toward the Perfection of Motion Pictures that Speak

WRITTEN FOR THE AMERICAN CINEMATOGRAPHER *by* LEE DEFOREST

Great technical progress has been made during 1927 in perfecting talking motion pictures, including the method using phonograph records, and the Phonofilm method of photographing sound waves on the margin of the cine film. Both systems have been amply demonstrated before the public in motion picture theaters, so that it is now fair to draw certain conclusions relative to the practical and commercial possibilities of the two, the one exploited by Warner Brothers as "Vitaphone;" and the other by the Phonofilm Company and by Fox under the name of Movietone. It is only fair to state at the outset that Movietone is a complete copy of Phonofilm, differing in no essential manner from the earlier method, but having been exploited commercially to a much greater degree.

The public response to vaudeville presentations, such as constitute the prologue to the main picture of Vitaphone presentations, indicates pretty clearly that even with such stars as Martinelli, Mischa Elman and Talley the interest seems to wane after ten or fourteen weeks of this sort of talking picture in any given theater.

Warner Brothers struck a real key note, however, as to what the public enjoys as "talking pictures" when they produced "The Jazz Singer" with Al Jolson. The day of the complete talking motion picture feature has not yet arrived, but I have no doubt that it is not far hence. A successful 100% talking motion picture requires very careful thought, planning of the scenario, selection of artists and general arrangement of the sequence. I have no doubt that some producer will shortly bring out a picture which will meet these requirements and which will forever silence the skepticism of motion picture producers who, until last year had no faith in the talking picture, whatsoever, and most of whom now assert that its value is to be limited to the reproduction of incidental music scored for a silent picture or for occasional noise effects.

The practical advantages of the Phonofilm method over that of the synchronized phonograph in reproduction, have been so clearly demonstrated to those who are familiar now with the actual manipulation of the two methods in studio and theater, as to confirm beyond any question the correctness of my prediction made in 1919 that the success of the talking picture would lie eventually entirely with the method which photographs sound on the film margin. With the Phonofilm method an entirely new art and technique had to be developed from the very beginning, whereas with the synchronized phonograph we had a highly developed industry of the past thirty years to fall back on. The first six years of Phonofilm pioneering resulted in solving the basic problems and demonstrating to any unbiased technician that the method was practical and could, without question, be eventually worked out to a point of perfection equal to, or cancelling that, of the phonograph art. Both the modern method of recording and reproducing from phonograph and that of recording and reproducing from the Phonofilm owe an immeasurable debt to the radio art, or, more particularly, to the art of "audion amplification," without which the highly advanced technique along this line which the demands of Radio Broadcast have produced Vitaphone or the Phonofilm in their present state of perfection would be quite impossibile. But taking full advantage of what the Radio Broadcasting art has produced along these lines there still remain very difficult and intricate problems in Phonofilm, particularly as regards the light recording, sound photographing means; and the successful taking off of sound from the photographic record on the film. And in between lay many problems in photography, exposure, development, printing, and protecting the sound record.

Great progress has been made in the perfecting of the "photion," or gas-filled lamp, which is placed in the camera and which, when connected to the output of the audion amplifier, reproduces perfectly in light variations the electrical values impressed upon its terminals. The photion tube, which I first conceived in 1918 and patented in 1923, has thus far proved its distinct superiority over other methods of telephonic light control such as the vibrating mirror and the "light valve" (the latter is a type of bi-filar Einthoven string galvanometer acting as a shutter to "valve" the light from a fixed source). While the photion is not yet fully perfected its reproduction in light fluctuations of telephonic currents impressed upon it is so nearly perfect, throughout the useful range of audio-frequencies, as to justify our faith in its continued supremacy in the field of sound photography. Its simplicity, compactness, lightness of weight, and ruggedness, as compared with that of the vibrating mirror and light valve, argue powerfully for its continued use in preference to the other types. Particularly do the above advantages hold for portable Phonofilm or "Movietone" equipment, where a light, easily portable camera, to be quickly carried from a truck and set up at a moment's notice for recording swiftly passing topical events, is absolutely essential. And the success of the audible topical weekly is already so abundantly demonstrated as to prove that in the future this feature will become more and more essential in every motion picture program. Much progress has been made also in the design of compact portable picture program. Much progress has been made also in the design of compact portable amplifiers for such recording of outdoor news events.

The difficulties in securing perfect motion of the film past the light source in the camera have been eliminated during the past year, so that now it is possible to secure as perfect film motion with a cheap portable projection machine as is obtained with the finest phonograph turntable.

For use in the projection room of the motion picture theater highly improved amplifiers with sound fade-in and fade-out devices have been largely perfected. The Phonofilm amplifier for the theater has been made very compact and fool-proof, requiring practically no skill on the part of the motion picture operator for its proper manipulation.

Back of the screen has seen possibly the most striking advances of any in this art during the past year. New loud-speakers of entirely novel design, permitting a naturalness of reproduction which is almost uncanny, have been worked out. A new form of screen, transparent to sound and possessing the necessary optical property to throw a brilliant picture, has been found so that the sound no longer seems to emanate from one side or the other or the screen, but directly from the mouth of the speakers wherever they may be in the picture.

Nineteen twenty-eight will see these various improvements which I have described exploited and demonstrated to the public in many hundreds of theaters scattered throughout the country. The chief remaining problems in the talking picture art lie not in the theatre or engineering laboratory, but in the motion picture studio. There scenario writers, producers, artists and cameramen must gradually acquire working knowledge of the new art and how to take full artistic advantages of the countless and immeasurably rich possibilities which this new art has now brought forth for the entertainment and cultural uplift of the motion picture public.

The A. S. C. expects every member to live up to this:

"You gentlemen here are known throughout the world without any dispute or question as the greatest exponents of the art of photography—there is no question about it—the cameramen of Hollywood are the greatest known in the art of cinematography—in that field you are supreme."

Tribute to the members of The American Society of Cinematographers by Dr. Kenneth Mees, chief of the Research Department of the Eastman Kodak Co.

Movie Make-Up

A Technical and Artistic Analysis of Motion Picture Make-Up With an Historical Sketch

By Louis W. Physioc

From the first mention of Dramatic Art, we find that the idea of make-up was, originally, a profession expedient, either as a direct result of the demands of the patrons of the art, or the individual enterprise of the artist, in his effort to influence the imagination of the spectators or to meet the current exigencies of the art. And what is more remarkable, we find all sorts of customs prevailing even after the evolution of the art has made these artifices unnecessary. It is interesting to review the history of this bit of dramatic technique. As remote a period as the first century, B. C., we are furnished descriptions of the make-up idea by the Chinese, Japanese and Hindu dramatists, among whom was a prevailing notion that it was necessary for the actors to disguise their faces with grotesque masks to inspire the effect of terror or humor in the minds of the spectator. The custom must have been successful for it was adopted, also, in warfare; the warrior or actor who could fashion the most terrifying or grotesque mask being the most successful. In 535 A. D., we find this use of the mask mentioned as an invention, ascribed to Thespis. In addition to the modification of the mask, we are told of his having, also, used a pigment for the actor's disguise. This is, probably, the first mention of any form of make-up, as we consider it to-day. This event is also interesting as being the first occasion where a definite reason is given for the custom. This reason was due to the arrangement of the theaters of this period. The great chorus was placed between the audience and the actor, who found himself at such a great distance that it was necessary for him to resort to some means of reaching his audience. This, he achieved by exaggerating his features and expressions by the use of the mask or paint. At a later date, Aeschylus invented the cothurnus, or buskin—a laced boot, to give the actor greater stature. He also modified the mask, introducing a little more refinement into its features. In fact, the poor actor, of that period, was so far removed that he had to depend more on the claque (paid applauders) than to the mask or buskin, to impress his audience. Later, during the development of the Roman Drama, the chorus was placed behind the principal, which brought him in more intimate relationship with his audience and this developed a more critical appreciation. The people began to use their own initiative in expressing themselves through the customary applause, and the claque was abolished. The mask was made still more refined and was often superseded by pigmentary make-up. At this stage of the evolution, different colored wigs were also used to distinguish the different characters. But strange as it may seem, this funny mask, in one form or another, remained in vogue for many centuries and has become a tradition of the stage, and, even to this day, the grinning face of "Comedy" and doleful visage of "Tragedy" may be seen on drop-curtains, and other forms of theatrical decorations, as definite symbols of the drama.

As late as the seventeenth century, comic plays were still being presented, with all of the characters—without any apparent reason—masked. However, there was a particular period when there was a semblance of reason connected with the use of the mask and other forms of disguise. This was at the close of the Elizabethan era when the stage began to find bitter opposition in Puritanism, and was naturally, but unfortunately, led to employ its great medium as a means of exploiting religious and political controversies. After the civil war, Puritanism began to prevail, and in the month of September, 1642, the memorable order went forth: "that while these sad causes and set times of humiliation do continue, public stage plays shall cease and be forborn." Following this proclamation, every one connected with the drama fell into disgrace, and now the mask and other forms of disguise came into their own again, for in spite of this prohibition—as in all such legal stringencies—players still continued to perform, in private dwellings and out-of-the-way places, and like the early days of motion pictures, hid their identity behind masks and make-up.

Then came the abandon of the Restoration, when the drama, following in the wake of a general moral recklessness, set a pace held only by our present day dramatic daring, except that some of the performances of that period were so risque as not to be ventured in public, but were performed in private mansions, and, again, the mask came to the aid of what little modesty was left among those playing such naughty characters.

We next find the most important suggestion, as to innovations in the matter of make-up (as we now consider it) in the year 1720, when dip candles were superseded by moulded candles. Here we find mention of the footlights, "with their unpleasant, upward shadows." This observation, indeed, suggested the necessity of an expedient, and the artifice adopted has prevailed through the days of tallow candle, lamp light, gas and electricity, and brings us very near to our present consideration of the motion picture make-up.

We are shown that a spectroscopic analysis of most forms of artificial light, other than the Cooper Hewitt mercury vapor tube, is composed, mostly, of the yellow, orange and red rays, and these, arranged according to the accepted system of stage illumination—especially the footlights, "with their unpleasant, upward shadows," were very unfavorable to the appearance to the face. These warm lights neutralized all of the ruddy tints of the complexion—the effect being the same as viewing these colors through a yellow or orange glass. In addition to the color of the lights, the general arrangement was such that the modeling of the features was destroyed by this highly scattered form of lighting. To overcome this effect, the actors found it necessary to exaggerate the roseates of the complexion by the use of rouge and lip stick. To improve the modeling, they marked the brows heavily with mascaro, beaded the lashes and shaded eye sockets with a greenish-gray pigment, a color complementary to the warm color of the lights. This treatment was so successful that it has generally influenced the feminine make-up for all occasions.

In like manner, the moving picture artists were confronted with similar problems. In the early days of the industry, they were subjected to the unnatural effects of the Cooper-Hewitts, which created just the opposite effect of the stage lighting, except that they were equally flat lighted. These defects of lighting were, also, combined with crtain photographic difficulties, chief among them being the impossibility of retouching the negatives, as ordinary still photography, and the limited knowledge of the cameraman of those early days. Consequently, the motion picture actor soon learned that the art of make-up aided the flat lighting and smoothed out the imperfections of the skin, in lieu of retouching.

Now the foregoing historical sketch is furnished to show that the adoption of make-up, at all times, was the result of some well defined necessity in the dramatic arts, but that its influence was so great that its application was rigorously maintained even when evolution might have allowed of modification. This was due to the common timidity as regards innovations. This is particu-

(Continued on Page 25)

The Game in England

Our Friend Leslie Eveleigh Hints at New Lighting Source Eliminating Electricity

WRITTEN FOR THE AMERICAN CINEMATOGRAPHER BY LESLIE EVELEIGH

[The author of this article spent the whole of the winter of 1925-26 over here, during which time he made a complete survey of the technical end, incorporating his observations in 14 special articles to the English Trade Paper "The Bioscope." At one of our meetings he addserred the Society on "Conditions in England," and now in the following article he shows us how things have changed over there since his return to his own country.]—EDITOR'S NOTE.

When I had the honour, in January, 1926, of telling the American Society of Cinematographers something about conditions as they were then in this country, I pointed out that there were only three well-equipped studios here. That was two years ago. Even while I was talking then, J. D. Williams had conceived the first really large studio to be built especially for the production of motion pictures and was setting about carrying out his concept. Hitches and delays occurred, but eventually the British National Studios, at Elstree, were an accomplished fact—and J. D. Williams left. This building with its two stages 300 feet long by 100 feet wide began to give the people over here some little idea of the kind of studios which are taken for granted in the States. But—British production was languishing.

Leslie Eveleigh

Then came definite talk of the Quota Bill, and as soon as realization came that this would be a certainty things began to happen. Capital was forthcoming for the production of better pictures than this country had ever before turned out. Directors and technicians generally, who had, up to this time, been starved for lack of adequate capital, took hold of their new opportunities with both hands, and startled everyone by showing that they **could** produce results, provided they had the facilities. New equipment was bought and installed in the older studios and more up-to-date equipment was added to the three studios about which I told you when I was over among you. New directors brought fresh ideas and a new type of picture was evolved. As the Quota Bill neared its consummation in Parliament new organizations came into existence with schedules for building new studios in and around London.

By the time these lines are in print another crop of new companies with projects for the building of new studios will be in existence, and the Quota Bill will be a **fait accompli.** The year 1928 will see such an amount of production as has never yet been known in this country, for, apart from the necessary capital being forthcoming, the authorities here have at long last awakened to the fact that pictures cannot be produced without facilities, and it must be said that with the realization of this a very generous granting of the necessary facilities has been made.

Plans are on foot by various companies to invite successful directors, stars and cinematographers over from Hollywood to help us to make the pictures necessary to fill the quota, at the same time our own technical boys are advancing by leaps and bounds in response to the influx of new equipment and new facilities. Some really excellent technical work has been turned out within the last six months.

The use of Panchromatic stock is becoming more general, several studios are incorporating incandescent lighting units mixed with their ordinary arc equipment, and I, personally, have been engaged, in conjunction with a well-known professor over on this side, for the last nine months upon experiments with a new lighting source altogether.

This new lighting source aims at cutting out electricity altogether, and is nearly excluisvely designed for use with Panchromatic stock. Should the final experiments (which we are hoping to carry out within the next month) be successful, I hope to let the A. S. C. know all about it in my next letter.

I do not know if the new Agfa super-Panchromatic stock has reached the U. S. A. yet, but we are using it over here with excellent results. With this stock it is possible to obtain very effective results at night with ordinary street lighting; certain interior effects with the normal lighting which would be in this particular interior and for night shots on locations it is invaluable.

This absorption of part of the German motion picture technique is going on in several other directions over here, which is all to the good of picture making in this country. One branch, however, which both Germany and yourselves employ extensively, the use of mechanical miniatures, is very nearly ignored. Why this should be so is difficult to ascertain because so much production expenditure can be saved by this means. However, with the advent of the new studios we shall probably see several of these units spring into existence.

Altogether, 1928 presents a brighter outlook to the people engaged in the production of motion pictures on this side of the Atlantic than ever before in the histtory of the game.

Incandescents

Considerable attention is now being given to use of incandescent lamps for lighting motion picture sets.

Heretofore the studios have neglected this class of lighting due to the general opinion that it was not a suitable light source and deficient in the qualities required.

The general improvement in incandescent globe design and the recent introduction by Mole-Richardson, Inc., of Hollywood, of a special line of equipment adapted to give a very flexible application of this form of lighting has caused a marked change of opinion throughout the studios.

Many recent pictures, including "Dress Parade," "A Texas Steer," "13 Washington Square," "Rose of the Golden West," "The Leather Face" and "On the Tonto Rim," have been made entirely or in part with incandescent lighting.

The Caddo Company, at Metropolitan Studios, now making "Hell's Angels" are using the Mole-Richardson equipment.

Tony Gaudio, A. S. C., and Harry Perry, A. S. C., working with highly sensitized panchromatic stock, are obtaining excellent effects.

This is all of considerable import to the profession as it will give wider range to the cameraman and greater production economy to the producer.

We take this opportunity to express our appreciation for the pioneering work of Mole-Richardson, Inc.

Amateur Cinematography

A Professional's Notes for Amateurs—XVI

By Joseph A. Dubray, A. S. C.

(Continued from January Cinematographer)

From the expression of depth of focus of a photographic objective, as analyzed in the preceding chapter, we deduce that DEPTH OF FOCUS is dependent upon the following attributes of an objective.

1—Its focal length. 2—Its aperture. 3—The distance of the object plane brought to focus. 4—The chosen limit of permissible unsharpness defined by the size of the disc of confusion.

As photographic objectives used in motion picture work are well corrected in regard to spherical aberration it is possible, for practical use, to find, through a simple operation their depth of focus, and conversely to find at which aperture the objective must be worked to obtain a certain desired depth.

Joseph A. Dubray

When an object **at infinity,** for instance an object which is in the extreme distance of a landscape, another object much nearer the camera can be found to present sufficient sharpness without altering the "focus" of the camera. The distance from the lens to this nearer object is called the **Hyperfocal Distance.**

It is evident that the hyperfocal distance is dependent upon the aperture of the lens and upon the size of the disc of confusion that is chosen as the permissible limit of sharpness.

Practical experimentation has been instrumental to the writer for following Mr. F. R. Fraprie's suggestion that a smaller disc of confusion is to be chosen for the shorter focal length, the disc being made larger as the focal length increases.

The following table gives the size of the disc for different focal lengths as used by the writer with infallible success:

Focal Lengths in Inches	Size of Disc in Inches
From 1 to 3	1/400
From 3½ to 4½	1/300
From 5 to 7	1/250
From 8 to 9	1/200
From 10 to	1/150
From 11 to 12	1/100
From 13 to 16	1/75

To ascertain the Hyperfocal Distance of a photographic object, square the focal length, multiply by the size of the disc of confusion and divide by the aperture, or F. number at which the objective is worked for a specified scene.

For example: While using an objective of 2-inch focal length in an exterior scene to be photographed at an aperture of F.8, it is desired to know at what distance from the camera an object will be sufficiently in "focus."

The square of 2-inch is 4: According to the table, 1/400 of an inch is the size of the disc of confusion chosen for a 2-inch objective; 4 multiplied by 400 equals 1600, which divided by 8 (the F. number) gives 200 inches or 16 feet and 8/10ths. In such cases all objects from approximately 17 feet to infinity will be sufficiently sharp so has to be called "in focus" following the vernacular expression.

It is evident that for each point in the object space that is critically focused by a given objective, there exists a NEAR and a FAR point which present a sharpness within the limits of the chosen disc of confusion. These two points represent then the limits of depth of focus which cannot be surpassed without obtaining an image of objectionable unsharpness.

Once the hyperfocal distance is known, the **near** and **far** distances for any chosen point of an object, may be found thus:

The **near** distance by multiplying the chosen object distance by the hyperfocal distance of the lens and dividing the result by the same hyperfocal distance **plus** the chosen object distance at which the lens is critically focused.

The **far** distance by multiplying, as before, the chosen object disatnce by the hyperfocal distance of the lens and dividing the result by the same hyperfocal distance **minus** the chosen object distance at which the lens is critically focused.

Suppose for instance a scene critically focused at 12 feet with a 2-inch lens at an aperture of 5.6; The **near** distance would hten be

$$\frac{24 \times 12}{24+12} = 8 \text{ feet.}$$

and the **far** distance would be

$$\frac{24 \times 12}{24-12} = 24 \text{ feet}$$

Such scene would therefore be sufficiently sharp in all planes between 8 and 24 feet for a disc of confusion of 1/400 of an inch.

Following the above data, it results quite easy to prepare tables of depth of focus which would at a glance give the **near** and **far** distances and consequently the aperture that should be used for obtaining a certain desired depth of focus.

Such tables should prove very useful to the adept in cinematography, especially when we consider the great aperture of the objectives generally used in motion picture photography. Such tables become indispensible for hand cameras which do not present the convenience of a focusing ground glass.

Dr. Rudolph has recently expounded the opinion that focal length and the aperture of the objective are not the only factors upon which depth of focus is dependent. The eminent scientist points to his Plasmat objective as possessing a greater depth than other lenses of equal focal lengths are creditd to possess for the same aperture.

It is claimed for this lens that an improved color correction raises the Plasmat to the grade of Sphero-Achromats with the result that it has a greater sharpness of depth.

Dr. Rudolph has constructed a new depth testing object which is discussed in detail in N. 20, 1921, of the Photographic Review, tending to prove his contention.

It appears, however, that the scientific world is still awaiting for more satisfactory proof of the case, although the greater depth of the Plasmat objectives is practically considered as a true fact.

Dr. Rudolph's contention will undoubtedly stimulate the manufacturers of objectives to carry an extensive investigation of the question and its merits.

The aperture of an objective is also the factor that controls the quantity of light admitted to form an image and therefore controls the intensity of illumination of the image, which in turn controls the exposure which is necessary to produce an image on the sensitive material of the plate or film.

The aperture of an objective is controllable by means of a diaphragm which is usually constructed so

(Continued on Page 31)

The Lubrication of Motion Picture Film

By J. I. Crabtree and C. E. Ives

Communication No. 330 from the Eastman Kodak Research Laboratories.

(Continued from January Cinematographer)

The above experiments serve to emphasize the importance of applying the correct quantity of wax to the film and of removing at very frequent intervals any wax which accumulates on the projector gate.

Lubrication of the Entire Gelatin Surface of Motion Picture Film

At the outset it was considered that by coating the entire gelatin surface of motion picture film with a thin layer of a suitable lubricant, many of the objections to edge lubrication would be overcome. Also, if the coating could be made impermeable to oil, trouble from oil spots would be eliminated likewise.

The idea of lubricating the entire gelatin coating of the film is by no means new. A large number of patents have been granted for particular lubricating formulas which include the use of tallow, lard, spermaceti, stearic acid, sodium stearate in methanol, oil of turpentine, olive oil, cotton seed oil, linseed oil, petrolatum, a suspension of gypsum in menthanol, beeswax, and paraffin wax.

Before the commencement of the experiments described below, the Dworsky Film Mfg. Co. was supplying a film buffing machine shown in Fig. 9. This consists

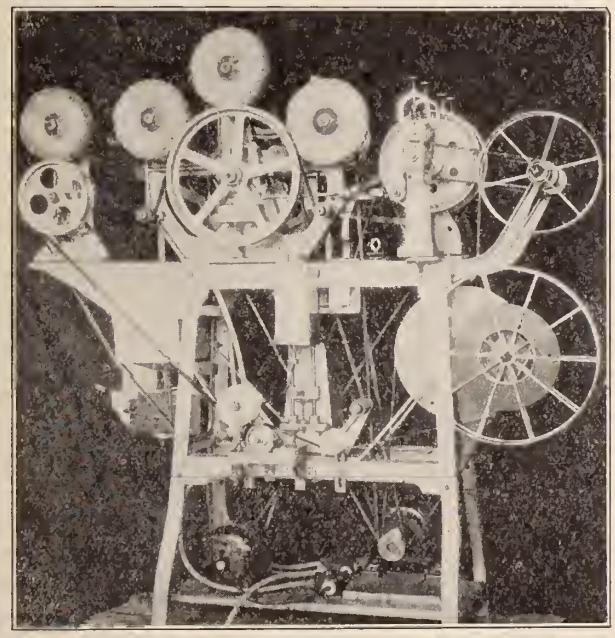

Fig. 9—Film waxing and polishing machine.

essentially of a series of four or five cloth buffing wheels similar to those used for polishing electro-plated metals, which buffers rotate at a high speed in contact with the gelatin surface of the film. The film is pulled through the machine by means of two rubber covered rollers of the laundry wringer type, the machine being entirely sprocketless. (The lower application roller attachment was not originally fitted to this machine). Usually a little tripoli (polishing powder) was applied to the buffers to produce more rapid polishing of the film surface.

Although it might be expected that this buffing treatment would tend to scratch the gelatin surface, this was not found to be the case. Instead, the treatment produced a noticeable gloss on the gelatin surface (see Fig. 5 as compared with Fig. 4).

Projection life tests made with buffed and unbuffed film indicated that the buffing treatment was of questionable value. However, the machine appeared to be readily adaptable for the application of lubricants to the entire film surface and the following experiments were therefore made.

1. Machine oil or Russian mineral oil was applied to the entire gelatin surface and then buffed in the above manner. Projection tests indicated that film so treated had a projection life comparable with that of edge waxed film, although after storing in the rolled up condition for two or three days, the film developed oil spots. Attempts were made, therefore, to find a solid lubricant which would be impervious to the effect of oil.

2. Waxes were next applied to the film surface by holding a piece of solid wax against the first buffing wheel, which in turn applied the wax to the film. The remaining buffers then spread out the wax more evenly and imparted a high gloss to the film surface which resembled that of highly polished footwear.

Projection tests with film waxed in this manner with various waxes indicated that there is a wide difference in the lubricating quality of different waxes. Data regarding this will be given later. Oil treatment tests after waxing indicated that a surface coating of almost any wax over the gelatin surface of the film will materially reduce the propensity of the film to show oil spots on the screen.

Mechanical Methods of Applying Wax to the Film

(A) It was soon apparent that the above method of application of the wax was entirely impracticable and that a mechanical method of application was required. The application roller method of applying a solution of various waxes in suitable solvents was tried out and this was ultimately entirely satisfactory.

The first arrangements of application rollers is shown in Fog. 10. The wax solution is contained in tank

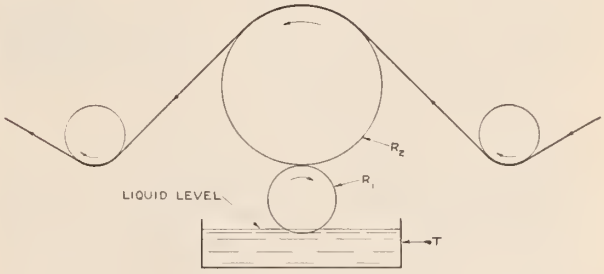

Fig. 10—Showing method of application of wax solution to film surface.

T in which a small flangeless aluminum roller R1 covered with felt rotates. Roller R1 bears against roller R2 which is covered with silk plush. The film runs face downwards against roller R2 and rotates it and in turn this roller rotates the lower roller R1 which is immersed to a depth of about ¼ inch in the wax solution. By adjusting the distance between the rollers R1 and R2, roller R2 acts as a wringer and squeezes the excess wax solution from roller R1 so that the quantity of liquid applied by the plush coating of roller R2 can be regulated.

This method of application had the objection that the plush did not apply the wax solution sufficiently evenly and it was not possible to control the quantity of wax applied with sufficient precision to insure that the wax solution did not pass through the perforations on to the base side of the film.

(B) An entirely satisfactory mechanism for applying the wax solution is shown in Fig. 11. The film

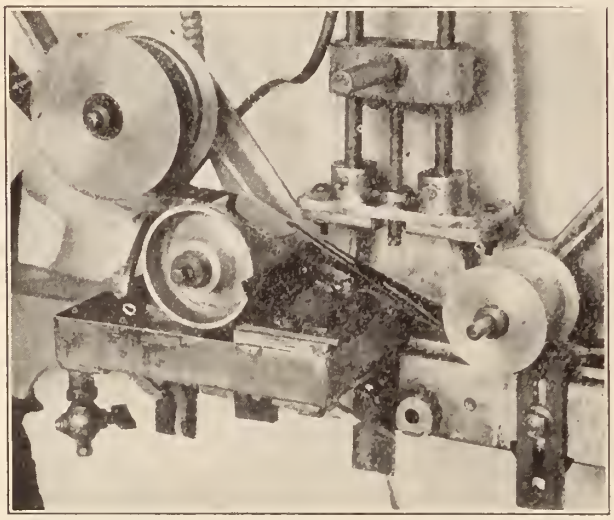

Fig. 11—Application roller for applying wax solution.

passes gelatin side downward over the polished aluminum roller R1 (about 2½ inches diameter) which dips in the wax solution at room temperature in tank T to a depth of about ¼ inch. The excess wax solution is removed from the surface of the roller by means of a "doctor" S consisting of a sheet of thick paper on ordinary motion picture film. This leaves an extremely thin layer of wax solution on the roller which is applied to the film surface at P. The friction between the roller R1 and the film is sufficient to drive the roller R1 without danger of slippage. This friction can be increased by lowering the idler roller R2 in relation to roller P.

The latest type of Dworsky buffing machine is shown in Fig. 12. This is shown fitted with application

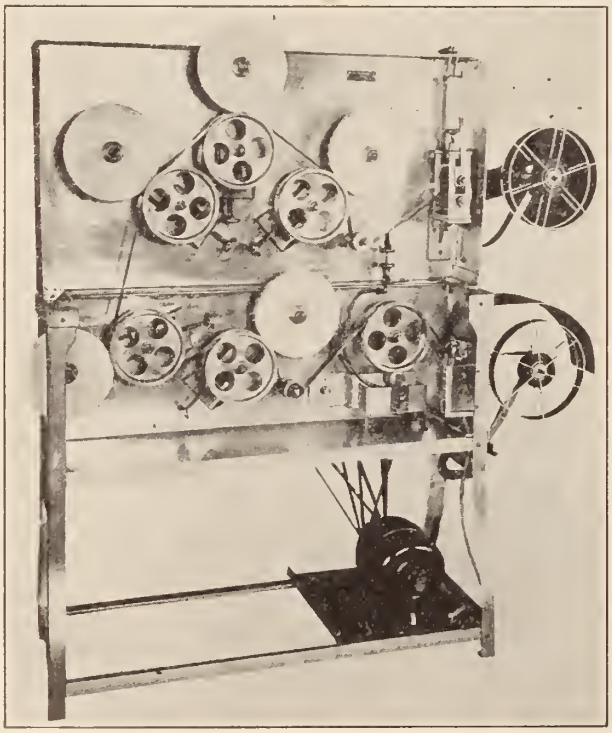

Fig. 12—Improved type of waxing and polishing machine.

rollers as first developed by the authors. It is suggested that the single application roller shown in Fig. 11 be fitted to the new type machine.

Manipulation Details

Although at first sight the waxing machine appears somewhat complicated, it is very simple to operate, does not get out of adjustment, and requires little or no attention other than changing of the reels. The level of the wax solution is maintained constant by means of an inverted bottle or can fitted with a tube dipping into the tank of liquid. The depth of the liquid is then at all times equal to the distance between the tube orifice and the bottom of the tank which holds the liquid. The film travels at the rate of six to twelve inches per second, the six inch speed giving a more desirable polish to the film surface. A roll of one thousand feet is, therefore, waxed in from fifteen to thirty minutes.

About two ounces of liquid are required per one thousand feet of film providing the exposed surface of liquid in the tank is covered as far as possible to prevent evaporation.

The rubber rollers at A (Figs. 9 and 12) should be celaned at intervals by holding a cloth moistened with carbon tetrachloride against the surface so as to remove tracts of lint.

After waxing it is desirable to rewind the film while passing it between the folds of plush so as to remove occasional particles of lint which tend to adhere to the film after polishing.

It might be considered that the film would ignite from the heat developed by friction perchance the film should remain stationary in contact with the rotating buffers. Tests indicated that the film did not fire after remaining stationary in contact with the buffers for thirty minutes.

Choice of Waxes and Solvents

The following waxes were tested: beeswax, cantol wax, candelilla, carbnauba, Japanese, Johnson's floor wax, montan, hard paraffin, and Simoniz wax.

The choice of suitble solvents is somewhat limited because as pointed out in a previous paper,[2] many

2. "Film Cleaning Liquids for Motion Picture Flm" by J. I. Crabtree and H. C. Carlton, Trans. So. M. P. Eng., No. 30, 277 (1927).

solvents have a tendency to attack the silver image and are therefore unsuitable. The three solvents, benzene, gasoline, and carbon tetrachloride were used in the preliminary tests. Since carbon tetrachloride is non-inflammable and when pure has no harmful effect on the film, this solvent was used exclusively in the later tests.

Properties of Motion Picture Film With a Coating of Wax over the Entire Gelatin Surface

1. The Projection Life as Compared with Edge Waxed Film.

Comparative measurements were made on the projection life of the various samples of waxed film as follows: The ends of six-foot length of each sample of film were spliced together so as to form a loop and this was run continuously through a Powers projector maintained as nearly as possible under standardized conditions. The gate spring tensions were checked at regular intervals, and the machine otherwise maintained in first class condition. If any incrustation tended to form in the gate, this was indicated by a distinctive noise and the incrustation was at once removed. The number of times which the film passed through the machine was recorded by a counting device and projection of the film was continued until the perforations became torn to such an extent that the film would no longer pass successfully through the machine.

Assuming a basis of 100% projection life for normally processed film which was not treated in any way before projection, the results of tests with fiums lubricated over the entire surface with various waxes were as follows:

Nature of Wax or Oil Solution in Carbon Tetrachloride	Projection Life
Plain film (untreated)	100% 10
Montan 1%	77%
Montan 5%	94%
Turpentine	100%

(Continued on Page 27)

Shooting the Colorado

By Glenn Kershner, A. S. C.

After that wild ride down the Colorado River, it was a pleasure the other evening to attend the A. S. C. meeting and be with a bunch of cameramen who are doing hazardous things each day. This trip was so different from all others I have taken that I would like to tell the readers of The Cinematographer how thirteen of us went from Green River, Utah, down the Green River and Colorado River, through the Grand Canyon to Hermit Rapids.

We used six boats; four were eighteen feet long and two were sixteen feet long. These were wonderfully built boats, made with two water tight compartments and only a cock-pit in the center of the boat big enough for the oarsman. In the end of these water-tight compartments were air-tight cans to keep the boat afloat even though one compartment should be crushed. The hatches on these water-tight compartments were bolted down on rubber gaskets. It was in these compartments that we successfully stored tons of equipment, supplies, bed sacks, etc.

Glenn Kershner

One of the boats was filled with radio equipment of the United States Army, but owing to some unknown conditions they were unable to work in Cataract Canyon at all, which cut off our communication with the outside world.

While all the newspaper headlines and radios were broadcasting that we were lost and given up I was right down there bobbing up and down on an ice-covered boat, which showed a disposition to be the longest underwater diver I ever succeeded in riding, and I must confess that that river has little respect as to whether one's "undies" are of silk or wool, for after shooting each rapids we were forced to build a fire and dry them.

Cold weather caused low water which made many more rapids than have been found before. Low water meant many more rocks which caused us to make but few miles a day, when we were scheduled to make many. Many times we had to portage everything and let the boats through with ropes and at one time even the boats had to be picked up bodily and carried on our shoulders over and around acres of rocks.

These unexpected delays put us many days behind causing our cook to use careful judgment in reducing our daily rations. The scenery was very impressive on the Green River, while the walls and many rapids of the Cataract Canyon were wonderful. We pictured the boats shooting these many rapids.

The trip from Lee's Ferry was the prize winner, boats turned over, men struggled in the rapids; time and again we came to walls rising straight up out of the river thousands of feet where the waters rushed with terrific force. At times we found no driftwood for fires which caused us much discomfort being unable to warm ourselves or dry our clothes.

At times sand storms were so severe that we had to find shelter in holes and among the crevasses in the rocks. The narrow canyons soon became dark and cold and the boats being covered with ice made them slippery to hold on to.

Then came those awful Soap Creek, Socdologer and Grape Vine Rapids that have claimed so many already. They seemed possessed to claim every man and boat as we struggled through those mountains of icy water.

During the trip we made short stays at Dark Canyon on Thanksgiving Day; repaired and restocked grub at Lee's Ferry; rested up at Phantom Ranch and then joined Elmer Clifton at Hermit Creek Rapids where he was directing the main company in "The Bride of the Colorado" for Pathe-Bray.

After shooting a week or so we traded our boats for mules and came up to the El Tovar Hotel in knee deep snow and I was home for Christmas Eve, a very happy man to be back with my family and friends although the children did not recognize me at first with my two months' crop of whiskers.

In summing up the trip it was wonderful—the scenery so beautiful it is beyond my vocabulary to describe it, and the pictures are gorgeous. I used Panchromatic negative which gave me all the gradations of the spectrum. Filters played a very important part as the Grand Canyon is like the rainbow itself.

Glenn R. Kershner, A. S. C., who photographed the Pathe-Bray Colorado River expedition, with his camera ready to shoot the deadly Soap Creek Rapids

The party, now called "The Lucky Thirteen" was composed of Leigh Smith, Director; E. C. LaRue, Glenn R. Kershner, Pat Gannon, John Shubert, Sargeant Herrick, Bob Barber and the boatmen were Nick Samoff, Val Woodbury, Con Rodin, Owen Clark, Dean Daily and Frank Dodge, head boatman. As a party we had a wonderful time but would hardly care to repeat such a hazardous trip under such awful conditions.

A Gift to the Industry

Armin Fried, camera technician, and Norman DeVol, Akeley specialist of the Fox Studios, have recently made a contribution for the good of the industry in the way of a roller pressure plate for the Akeley Camera which is so efficient that it practically eliminates all waste caused by scratches and abrasions in the handling of film. This clever device can be easily adjusted to almost all the machines used in the production of finished pictures as Bell & Howell printers, Testing Machines, Polishing Machines, Measuring devices, etc.

The inventors call the new device, which they generously give to the industry, a roller pressure plate, and by applying it to the Akeley they have succeeded in eliminating aperture scratches 100%.

This roller pressure plate is of a very simple design. It consists of two tracks pressing on the edges of the film and two steel rollers holding the film straight in front of the aperture. An added feature is that the roller bearings in which the rollers revolve are not round but triangular and act as a three point bearing; therefore the rollers have no tendency to stick.

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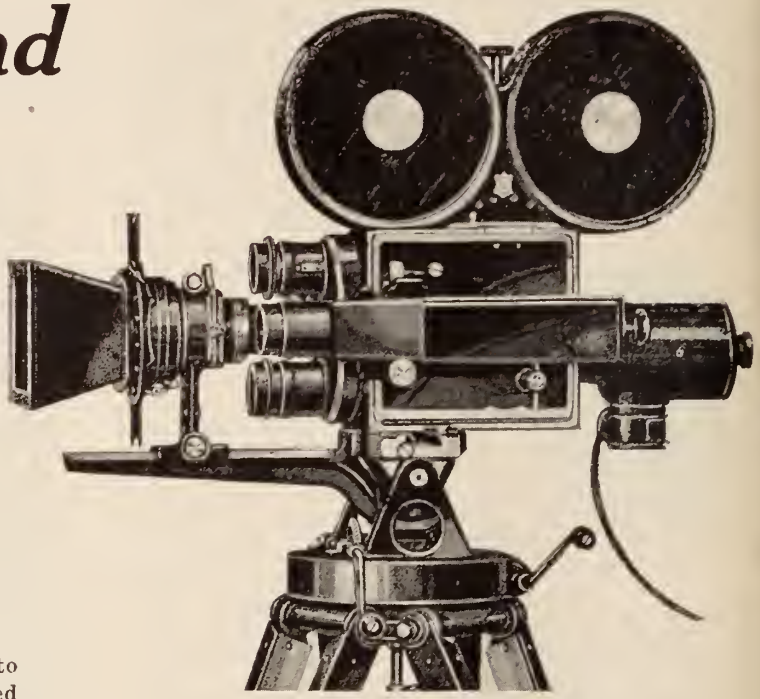

Such features as interchangeable ultra speed movement, multiple lens mounts and lenses, automatic dissolve mechanism and the cinemotor, combined with unequaled precision and longevity, have won this camera its dominant place on the leading movie lots of the world. It has been the favorite for 21 years.

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"The Bell & Howell Camera which you supplied to this company in January last and which was used throughout our production "The Somme," has fulfilled every requirement. The technical quality of the photography has been excellent.

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"'I had occasion, for the purpose of double exposure, to rewind 300 feet of film through the camera not less than **eighteen** times, and am glad to say that the negative came through **without a single mark**—and upon projection was perfectly "rock steady."'

"Particularly efficient also is the ultra speed attachment which has not, on any occasion, given the slightest trouble by way of static marking or scratching of any kind.

"With kindest regards and good wishes,
Yours faithfully,
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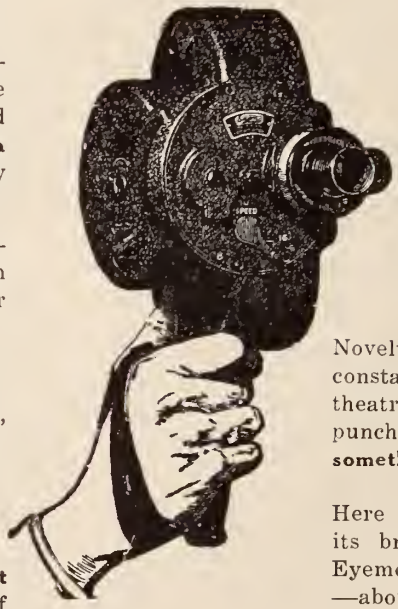

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A New Pressure Plate for the Akeley

By Ira B. Hoke, A. S. C.

Since entering the independent Akeley field some two years ago it has been the aim of Mr. John W. Boyle and myself to perfect the aperture plate and pressure race of the Akeley camera in some manner to insure freedom from celluloid scratches under any adverse conditions.

Very early in the game we discovered that, while the Akeley pressure gate gave no trouble when operated under favorable conditions, the moment the camera was subjected to a dusty, dirty or windy location scratches were likely to appear.

Every operator of the Akeley has undoubtedly met with an experience similar to ours. We first went over the magazines and tested them minutely for the slightest sign of abrasion and found none. We then went through the period of short loops, long loops and the standard loop; finally adopting the last as most satisfactory. We tried different methods of loading. We lined the magazines with velvet and as the scratches still appeared decided there was nothing left but the pressure plate to experiment on.

To make a long story short we finally discovered that when a tiny grain of sand, dust or similar matter was carried from the unexposed portion of the film, either from within the magazine or between the magazine and the pressure plate, almost invariably it became lodged between the film and the steel pressure plate just above the aperture line.

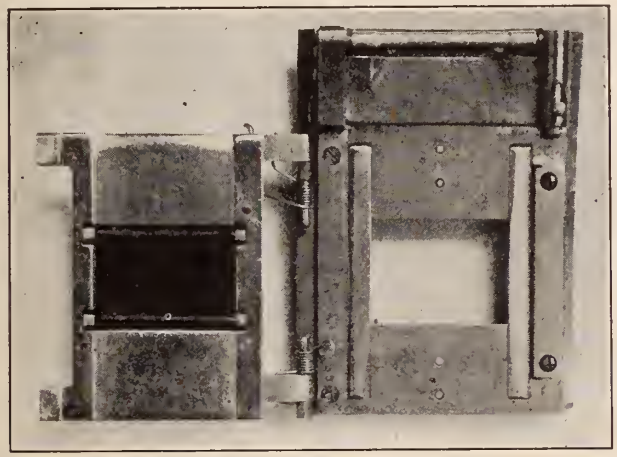

Figure 1.
Gate open showing portion milled away and method of placing ebony rollers across picture area. At the top is steel roller designed to relieve the drag on the emulsion side of the top loop.

Now a foreign substance, however minute it may be at the beginning, does not behave like the proverbial "rolling stone" when it is pinched tight against the rapidly moving celluloid surface and a steel plate. Once let a particle stick to the plate and within a few feet it gathers enough celluloid to become quite a promising scratch within the next twenty or thirty feet.

I used to open the gate after each scene to look for pick ups and found plenty of them whenever there was an excuse of dust on the location. Well, that was the solution to the problem so far. Next we borrowed a little wisdom from our memory of an old adage—"A rolling stone gathers no moss"—and something more from past experience of successful roller pressure plates on the DeBrie and other earlier cameras. When we put two and two together we found the most obvious way to make four out of it was to take our pressure plate to Mr. George Mitchell of the Mitchell Camera Company who has embodied in his new speed movement the most modern cousin of the old roller pressure plate.

After some weeks Mr. Mitchell turned over to us a simple adaptation of the Mitchell Camera ebony rollers embodied in the regular Akeley plate. These rollers which are made of ebony with a steel core are set inside the aperture line itself and bridge across the picture area of the film. The front pressure shoes are replaced with stainless steel of the same design as the original. At the top of the gate member a steel roller is placed to take the loop on the emulsion side instead of the original cutaway which had a drag on each side where the perforations touched.

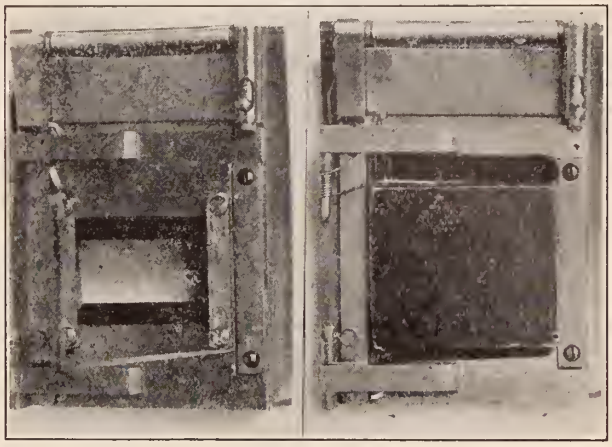

Figure 2.
Gate closed showing bearing bridges which support the ebony rollers. Also trap door designed to minimize light reflections.

As the redesigned plate now sets in the camera there is nowhere a drag on either the front or back of the film within the area ultimately to be occupied by the picture. The old steel gate has been milled away in the center to a depth of 1/64 of an inch. The sides over the perforations remain as originally designed and the two ebony rollers are raised to that level, thus forming a focal plane rigid and exact but not a sliding pressure anywhere. Sand particles coming down with the film touch the rollers and are passed harmlessly by them without a chance of scracthing.

This plate has been in use for some time under any number of different conditions always with gratifying results. In one instance while on location with Christies' production "Tillies' Punctured Romance" I encountered three days of sandstorm during which time sand was sifted into literally every piece of equipment I carried. The film came through the camera in perfect order and I attribute not a little of the success to the Mitchell roller plate.

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Developer Perfected

Mr. Roy Hunter, Director of Universal Film Laboratories, Reports Revolutionary Advance in Development of Motion Picture Negative Film

[*In the December issue of THE AMERICAN CINEMATOGRAPHER Mr. Frank E. Garbutt of the Paramount Laborities, expressed his belief in the advent of the developing of negative films by machine and gave an expose of the work conducted by him and his associates in this line of endeavor. The Universal Laboratories have devoted much time and energy to the same end under the guidance of Mr. Roy Hunter, and this system of development has in these laboratories outgrown the experimental stage and has been put into actual practice. THE AMERICAN CINEMATOGRAPHER is grateful to these up-builders of our industry for the opportunity of being made the medium through which such improvements are brought before the cinematographers and the public in general.—Editor's Note.*]

Mr. Roy Hunter, superintendent of the Universal Laboratories, announces an extremely important and very interesting advance in motion picture production. Mr. Hunter has been for several years working upon the solution of the momentous problem of eliminating all chances of imperfection in the development of motion picture negative film.

The solution has been reached by Mr. Hunter through the adaptation of a developing machine which has been put into practical use in the Universal laboratories for over six months, during which time not less than 6,000,000 feet of negative film have been developed with a uniformity of results which cannot be surpassed and with an ease of operation which guarantees the maximum of safety in the physical handling of the valuable film.

The rack and tank system of development which has been uniformly in use in all laboratories calls for a series of manipulations of the film after exposure, each one of which presents possibilities of mishaps, some chargeable to the actual handling of the film by the operator and some to physical and chemical influences very difficult if not impossible to control.

In the rack and tank system the exposed film is put through the following series of operations: It is wound on the rack, submitted to a preliminary washing, dipped in the developing tanks, then it is rinsed, fixed, washed, transferred to the drying drum, polished and finally sent through the process of printing.

All these operations up to and including the polishing are, in the Universal Laboratory, accomplished by the machine so that the film is never actually touched by human hands from the time it leaves the manufacturer to the time it is put through the printing machine.

Let us analyze some of the most important advantages of this elimination of the human element in developing. The winding on the developing rack is subject to mishaps due to imperfect cleanliness of the rack —scratches during the guiding by hand of the film in the proper position on the rack—broken perforations while setting the film between the rack's pins—unnecessary exposure to the atmosphere from the time the film is wound on the rack to the time it is put in the developer—limitation of the length of the film that can be developed at one time. The following preliminary washing, which is at times dispensed with, should not present any particular chance of mishap if handled with care.

The developing itself by rack presents the possibility of air bells, rack flashes (almost unavoidable), nonuniformity in the flow of the developer, oxidation of the parts of the film from time to time exposed to the air for inspection, the possibility on the part of the operator of **pulling the film too short** when appearing over-exposed, or inversely of **forcing it** by a longer time of development when appearing as under-exposed. This last question is of vital importance and has been the bug-a-boo of many cinematographers and laboratory experts. Its advisability has been discussed in practical and scientific circles, and Mr. Hunter apparently gives it the practical solution. We will return to it later.

The rinsing after development should not present any uncontrollable chances of accident. The fixing may produce rack marks, and trouble due to physico-chemical effects created by the carryign of the fixing and hardening in a single solution, while the greatest possibility of serious accident, due to the physical handling of the film, lies in the transfer of the film to the drying drum, in "squeegeeing" out of it the excess of water, and the repeated handling on the drum itself called for by the shrinkage of the film during the drying process.

All of these possibilities of harm to the extremely valuable negative film have been the cause of constant apprehension to even the most conscientious laboratory operators and have caused from time to time severe losses to the producers by the necessity of retaking scenes ruined by one or more of these enumerated causes, in spite of the greatest care exercised by the laboratory operator.

Mr. Hunter's developing machine, which eliminates entirely such occurrences, is the result of some modifications brought forth into the positive film developing machines which have been in use in several laboratories for some time.

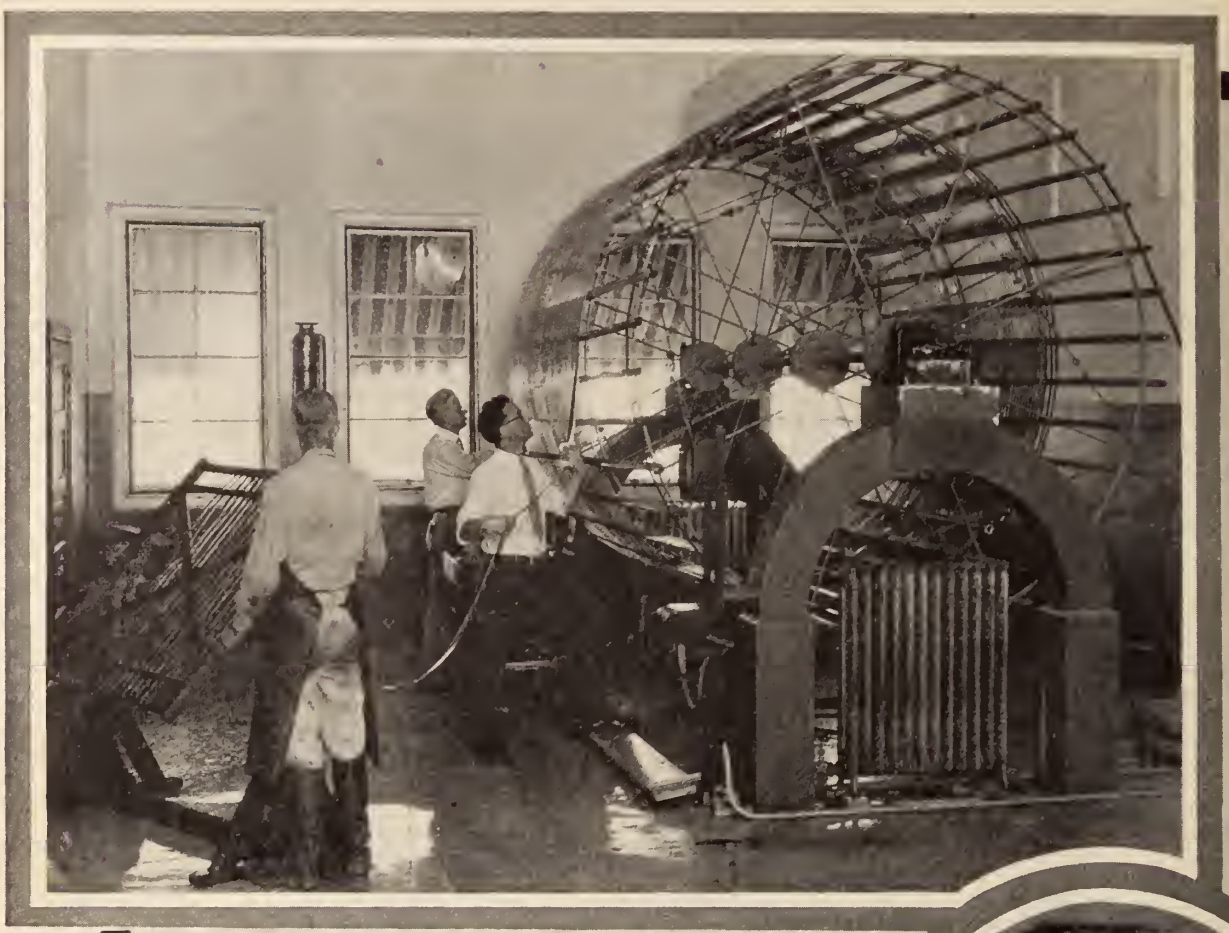
The functioning of the machine has been so studied and timed that during the twelve minutes in which the film remains in the developer, the flow of the solution is regulated so as to avoid all possibility of uneveness of development. A recording tachometer registers the speeds of the machine and the motive force is so arranged that if the driving motor should suddenly stop functioning batteries enter into immediate play and, if the batteries should fail, the operator can have immediate recourse to man power, one hand being sufficient to drive the whole machine, the tachometer giving the means of checking for a constant and regular speed.

From the developing troughs the film is sent through the rinsing process, the fixing, the hardening, the washing, which is carried in the most thorough and rational manner, the "squeegeeing" and the drying and polishing, without touch by hand, except in the rare cases in which a breakage of the film should occur, for which emergency the machine is so constructed that the broken parts of the film are within easy reach of the operator.

Seven seconds only are necessary for repairing any breakage, and this time of interruption in the forward march of the film is absolutely negligible when set against the twelve miuutes necessary to complete the development.

Any and all kinds of film have been developed by Mr. Hunter during a continuous run of the machine. Par and super-speed, Orthochromatic and Panchromatic films from Agfa, Eastman and DuPont have been simultaneously developed by the machine, giving a perfection of results seldom if ever obtained by the rack and tank system.

Critical tests of different subjects photographed under the greatest imaginable scale of conditions of light and exposure, have given remarkably good results and



Old Drying Drum

Old Tank and Rack method of developing

ew
method
eloping
gative

Developing end

Drying end of Negative machine
Developed, washed, dried
and polished negative coming
out ready for printing

Mr. Hunter points with pride to the quality of development attained by the Universal laboratories during the time in which the machine has been in operation, citing the forthcoming super-production, "The Man Who Laughs," photographed by Gilbert Warrenton, A. S. C., as a photographic jewel. The negatives of this production, which has required six months to make, and in which all conditions of light and lighting imaginable have been put to a severe test, have been developed through the machine with the most accurate results of evenness and quality, although these results speak very highly of Mr. Warrenton's mastery of the photographic art, they speak not less highly of the advantages of Mr. Hunter's machine and of its perfect adaptability to practical laboratory processes.

The Universal Company produces a great number of pictures, as Mr. Hunter points out, ranging from simple short subjects to the most elaborate and costly productions. No other studio entrusts to its laboratory such a diversified product, and it is interesting indeed to consider that productions representing, as stated previously 6,000,000 feet of film have been developed by Mr. Hunter's machine without a single re-take due to laboratory operations.

These remarkable results represent such a reduction of expenditure and such an element of safety that one can foresee in the near future the time when all producers and commercial laboratories will adopt the system which is the consummation of Mr. Hunter's perseverance, ingenuity and thorough knowledge of laboratory practice.

The question that arises and which is of foremost importance to the cinematographer is this: Is the time and temperature system of development as carried out by the machine to be preferred to the rack and tank hand-developing which permits the operator to constantly watch the negative and perhaps correct imperfections of exposure caused by error or by conditions of light beyond the cinematographer's control?

The answer of the writer of this article is: Although it is true that such imperfections can be partially corrected BY TRANSFERRING THE NEGATIVE IN COURSE OF DEVELOPMENT FROM ONE DEVELOPER TO ANOTHER MORE SUITABLE UNDER THE SPECIFIC CONDITION OF UNDER OR OVER-EXPOSURE, this method is never resorted to because of it being impractical in laboratories handling daily great quantities of film. BESIDES, for the same development, (and using word for word the statement of such an authority as Mr. Crabtree):

"When the exposed emulsion is developed and thereby reduced to metallic silver for a given time of development, the quantity of silver produced is PROPORTIONAL TO THE EXPOSURE except in the case of the extreme shadows and highlights, although IN THE CASE OF MOTION PICTURE NEGATIVE FILM THIS PROPORTIONALITY EXISTS OVER A LONGER RANGE OF EXPOSURE THAN FOR ANY OTHER KNOWN PHOTOGRAPHIC MATERIAL."

In other words, the densities of negative increase during development proportionally to the time of exposure and an under-exposed negative for instance, when overdeveloped, does not give a better or fuller negative, but a negative in which the silver deposit in the highlights is proportionally greater than in the shadows when compared with the normally developed negative. It is consequently a harder negative but not and by far, a better one.

The same proportionality, of course, stands for under-exposed negatives and a negative pulled too short from the developer will present the "mushy" appearance so well known and frankly detested by all cinematographers.

If we consider also that the laboratory operator is always ignorant of the particular subject photographed and of the effects that the cinematographer is striving to obtain the time and temperature system provided by Mr. Hunter's machine should prove a help to the cinematographer and preclude the possibility of obtaining results very far from those anticipated.

Possible variations in the developing time are checked by Mr. Hunter by testing the developer with a strip of a standard-exposed negative which is kept in the laboratories and renewed when exhausted under the most exacting precautions.

A 400-foot roll of exposed negative has been used for such tests and lasted over a period of two months. The numerous short strips were at the end of the period spliced together, the densities were carefully examined and a print made, under one single normal printing light. Variations of densities were not noticed by a number of experts called to view the film for the purpose of finding fault.

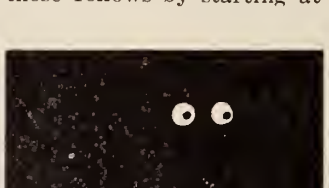
Beside the normal, every-day work of the laboratory the Hunter developing system has given a great impulse to the difficult problem of duplicating negatives.

Mr. Hunter asserts that with the use of Eastman duplicating film and his developing system, duplicate negatives of unsurpassed quality have been obtained at the Universal Laboratories, and that it is his belief that in the course of the present year the matter of duplicating negative to perfection will be an accomplished fact.

The consequence of such results are of tremendous importance in the motion picture industry, and the cinematographer awaits them with confidence and hope in the future of his art.

Why Cinematographers Leave Home

Someone came into the studio the other day and left a tourist folder describing a certain country in the Far East. After reading this, I have come to the conclusion that the writers who specialize in jotting down flowery titles will be in line to write travel literature after a few years of hard training. A good publicity man and press agent might also stand a fair chance with these fellows by starting at the very bottom. They use approximately one gross of assorted adjectives to the paragraph, and if a small fraction of what they say is true, then I'm going up there and sprout a set of wings and settle down with the inhabitants because the place must be paradise.

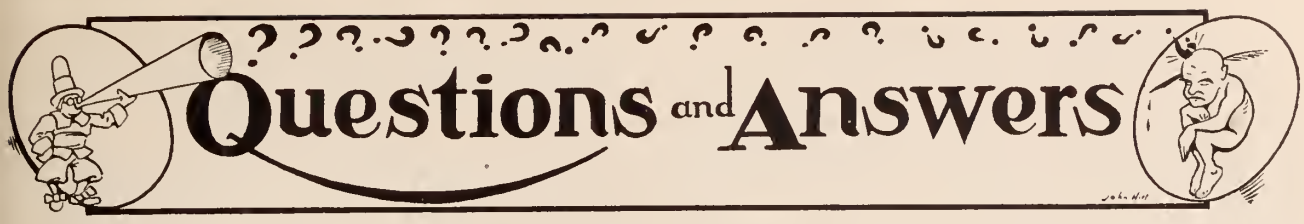


Portrait of Len H. Roos, A. S. C., loading Panchromatic negative

Not because I happened to read this folder through, and not because I have a hankering to have Christmas dinner in Singapore, and not because there are stories up in those countries that will be new to the camera, and not because it's the Tropics, the real Tropics; I say it wasn't any of these things that influenced me, but I just thought I'd like a change (a periodical affliction since I was a small boy), so I went down to the shipping company that published that folder and booked passage for Siam—via Singapore.

The folder says there are plenty of elephants in Siam; and they say that the picture theatres open to the really nice crowds about eleven o'clock at night and there are lots of parties and good food and everything going all night which will probably lead to a conversation something like this after I get settled:

"Boy! Have my Mahout park my town elephant out back of the lab. And, Boy! Tell him to turn on the tail light, I expect to be out late tonight."—From a letter to the Editor by Len Roos, A. S. C., now in Siam.



QUESTION—Does the use of Panchromatic Film require a great deal of experience?

ANSWER—Anyone who has a fair knowledge of photography, can revert from ordinary to Panchromatic films without experiencing a great deal of trouble. We advise of course, to get thoroughly familiar with the features of Panchromatic film, before attempting its use. The time and expenditure that will be required to become an expert in the use of this film will be many times repaid by the improvement in results.

* * *

QUESTION—Is it objectionable to use both ordinary and Panchromatic films in one picture?

ANSWER—The uninitiated will not perhaps detect a difference between Panchromatic and Ordinary films, but the evenness of results and hte increased beauty that can be obtaind with Panchromatic film makes it advisable to use only this kind of film throughout a picture.

* * *

QUESTION—Kindly give a list of pictures which have been photographed on Panchromatic film.

ANSWER—Most all of recent productions are photographed on Panchromatic film. It is impossible for this department to give the required list.

* * *

QUESTION—Is it essential to use a Filter with Panchromatic film?

ANSWER—The sensitivity of Panchromatic film compared with ordinary emulsions is greatly increased in the yellow-to-red regions of the spectrum while its sensitiveness to the blue region remains practically unchanged. To reduce the excess of sensitivity to the blue radiations, a filter is necessary. The transmitting qualities of the different filters should be studied so as to be able to select the proper filtr for the photographing conditions. The beginner can, generally speaking, make use of a Wratten K.2 filter for long shots and of a K.1 for medium and close shots. Experience will dictate a larger selection.

* * *

QUESTION—Is Panchromatic film faster than ordinary?

ANSWER—No; Panchromatic film is not faster than par speed film but through its increased sensitivity to the yellow and red radiations, it permits sufficient exposure in many cases where par speed film would fail to give satisfaction. During the late hours of the day, for instance, when the sunlight becomes rich in warm tones, Panchromatic film will give results unattainable with par speed emulsions.

* * *

QUESTION—What different degrees of shutter aperture are used for various subjects of different speeds such as emotional drama, slap-stick comedy, interiors and exteriors, etc., do professional cinematographers use?

ANSWER—The various degrees of shutter aperture are used almost exclusively to regulate the exposures indpendently to the speed or "tempo" of the picture. In som particular cases such as while cinematograping an exceedingly rapidly moving object, or revolving wheels of a piece of machinery the regulating of the shutter is done so as to "stop" the moving object as much as possible in each frame-picture in the first case, and so as to synchronize the movement of the rotating wheels with the rotation of the shutter tiself, in the second case.

* * *

QUESTION—What salary are the cinematographers now-a-days getting?

ANSWER—These are trade-secrets—not to be given to the press. Nevertheless we may tell you that the cinematographer's salary is based upon his artistic and scientific achievements.

* * *

QUESTION—What is the usual life of a Positive print? Is it the same as a negative?

ANSWER—The life of a Positive print is dependent upon the care with which it is handled during projection. The unaboidable wear to which it is submitted is of course superior to the wear to which the negative film is going through in the process of printing. Care in the projecting of the positive and in storing it following the instructions given by the manufacturer, is responsible for the keeping qualities of the film.

* * *

QUESTION—In titling a picture is it best to use a past or present tense?

ANSWER—As a general rule, an audience, if interested in the picture will "live with it." The title is complementary to the action that the subject is performing right at the time that your audience is looking at it on the screen, therefore the present tense is generally the most adaptable to titling.

* * *

QUESTION—How can I obtain cloud effects in my films?

ANSWER—By the use of panchromatic film and suitable filters, you can so reduce the excess of light that is given forth by the sky, and register every little cloud even if it is almost invisible to the eye.

* * *

QUESTION—How much more exposure shall be given when using light filters?

ANSWER—Filter manufacturers give an exposure factor for each filter. These factors are quite reliable for all practical purposes and intents.

Some Psychological Aspects of Natural Color Motion Pictures

By L. T. Troland

(Extract from S. M. P. E. Paper)

It has been the belief of many persons that natural color introduced into motion pictures is not required by the public and more than this that color actually detracts from the dramatic effect. It is argued that a story can be told well in cold print, and that attempts at anything more than a mild coloration of pictures have been up to the present only in the nature of a novelty.

In refuting these arguments it is asked: "How can the existence of the stage or the motion picture continue if cold print is adequate in building up in our minds a complete picturization?" The answer is that natural sounds, natural coloration and increased reality due to any other characteristic are necessary to produce the most enjoyable result. The overdrawn sounds and colors of the stage and the profusion of color that appeals to us from every package label and billboard certainly have a strong appeal.

A new process of color photography now makes possible a really truthful representation of colors, especially those which we know best such as those of flesh and foliage. In the near future increased reality, due to natural sound and natural coloration will add to the already great attractiveness of the motion picture.

Color Carbons

By C. W. Handley, *National Carbon Co., Inc.*

With the advent of Panchromatic film the cinematographer is becoming even more of an artist than ever. It is not only necessary for him to know where to place the lights and how much light to use but he must also use lights of various color values to get proper rendition. Panchromatic film unlike regular film is sensitive to all colors of the spectrum in varying degrees and he must know what the color value of his illumination is as well as the reflective value of the sets. In likening the cinematographer who paints with light to the artist who paints with pigment we cannot tell him how much paint he should use or where he should apply it, as that is a characteristic of his artistic ability, but we can furnish him with valuable information as to the mixing of paints and the proper use of the brushes.

For further discussion, let us divide light into four factors—Quantity and Quality, Direct and Diffused. For our purpose, Quantity is that factor which determines the key in which the picture is produced, that is, if it is produced in low key a smaller quantity of light is used and when the figures leave the foreground they become silhouettes. High key then is the opposite. Quality is that factor which determines the true color rendition of the objects photographed in their proper shade of gray, from white to black.

Direct light is characterized by the high-intensity arc where we have an enormous amount of light coming from a small source—Approximately 5/8 of an inch in diameter.

Diffused light is obtained by scattering the rays in all directions.

In producing an image on motion picture negative there are three vital factors, namely: The sensitivity of the film to various colors of light; the quality of the illumination and the reflective value of the objects photographed. For example, let us photograph a card painted with various color bands, using regular film and white flame carbons. We will start with the card. The red band is not actually red; it only appears so because of the pigment in the paint which has the characteristic of absorbing all of the other colors in the illumination and reflecting red. To prove this to yourself, hold any red article under a mercury tube, and you will see there is no semblance of red in it. That is because there is no red in the radiation of a mercury tube.

When you look at an article to be photographed, do not think of it as being of a certain color, but think of it as being a mirror that will only reflect the one color and will absorb all others, then you can readily understand why it is necessary to have all the colors in the illumination to give true value.

What happens when we start the camera to photograph this sign? We have a film that is only sensitive to blue and violet, and we have a large amount of blue in the illuminating light. Let us take the blue band. The Blue Band reflects blue through the camera lens and makes an impression on the negative (which is sensitive to blue) and the higher its reflective value the more blue it reflects and the darker it makes the negative and naturally the lighter that makes the positive, so that light blue which has a higher reflective value than dark blue appears almost white.

However, when we take the red band, this same condition does not exist because the film is not sensitive to red and little or no impression is made on the negative which makes the positive dark.

This lack of sensitivity in the film gives us distortion because blue which is ordinarily a darker color to the eye than red photographs lighter. This makse it necessary to use heavy grease paint which covers up the natural color—otherwise if the person photographed flushed (as in anger), it would not tend to register the red part of the face as strongly on the negative and would make a dark blotchy appearance on the positive. Panchromatic film was produced to correct this condition, and it is in varying degrees sensitive to all colors.

Let us now photograph the card with Panchromatic film and White Flame Lighting: The Blue Band reflects blue—there is plenty of blue in the illumination to be reflected and the film is sensitive to blue, therefore for that color, conditions are ideal—however, when it comes to the yellow, orange and red bands it is not so good, because while we have the proper reflector and a film that is sensitive to all colors, our lighting is overbalanced in the blue so that our blue band gets more than its share of color and therefore makes more of an impression on the negative than it should in relation to the other colors, and while there is not the distorted condition that we have with regular film and white flame carbons, we still do not have satisfactory color rendering.

If white flame carbons did not have some of the yellow, red and orange in them however, our conditions would be exactly the same as with regular film—in other words, if we should use Panchromatic film with a light 100% blue and violet, we would be bringing Panchromatic film back to regular stock by means of illumination.

To make this necessary "color painting" possible, there has been produced a series of carbons that will give any range of color balance desired. With the advent of these new carbons, it is now possible with the present arc lamp equipment to obtain a light which is highly desirable for use with Panchromatic film by merely inserting them in the place of those now used with Orthochromatic film. The White Flame Carbons were designed to meet the requirements of Orthochromatic film and are particularly rich in the shorter wave lengths of light, i. e., blue, violet and near ultra-violet.

The Orange Flame Carbons were designed to meet the requirements of Panchromatic film, that is they produce a light rich in red and green as well as the blue and violet. In addition to meeting this requirement they produce a very pleasing light which is easy to work under, as is the case of the white flame arc, the orange flame carbon produces several times as much light per unit of energy consumed as any other illuminant known.

It is estimated that there is between two and three millions of dollars invested in arc lamp equipment in the motion picture studios. Were it not possible to produce carbons for use with this equipment, it would necessarily have to be scrapped. Fortunately, however, the carbon arc may be called a versatile light source, in that it is capable of being adapted to many various conditions. Certain elements can be introduced in the cores of carbons which increase the light in the short ultra-violet wave lengths. Other elements in the blue and violet, still others in the red and green. In other words, by introducing certain elements in the cores it is possible to incease the light in certain bands. It became therefore a problem of merely changing the ingredients of the carbon to meet the changed conditions.

Mr. George A. Blair, Sales Manager Motion Picture Division, Eastman Kodak Company, Rochester, N. Y., will be at the Hollywood headquarters, 6700 Santa Monica Boulevard, during the month of February, arriving here February 1st.

"Color Vision and the Eye"

By Fred McBan, *Physicist, Creco, Inc.*

The normal human eye is made up of a spherical chamber with a circular opening by a system of lenses contained therein and controlled by the brain. Light enters the opening of the eye, forming an impression, or image, on the back of the chamber, identically in the same manner as does a photographer's camera.

When we analyze sections of the eye, we find that it is surrounded by a filmy material called the "Sclerotic." A portion of this filmy substance is transparent and is known as the "Cornea." The crystalline lens is attached to the walls of the eye by the ciliary muscle. In front of this lens is the diaphragm, usually called the "Iris." The color of the iris is referred to as the color of the eye.

In the center of the diaphragm is a circular orifice known as the "Pupil," behind which is the crystalline or lens. When the eye is at rest or in the normal position it is so adjusted that the image of any distant object is focused by the lens on the "Retina." If, when brought to focus on a nearer object, it must be altered; this is done by a forward motion of the lens with an increase in the curvature of both its surfaces.

When the eye is adjusted for ordinary light conditions, that is light containing all its known wave lengths, being white to the eye, the focus of the violet, or short waves, comes nearer to the eye lens than those of the red, or longer waves.

This difference of focus can be clearly proved by looking through a piece of cobalt blue glass, the familiar blue glass that is used in getting the true photographic renderings of motion picture sets to be photographed on orthochromatic film stock. For an example test, if we look through a piece of this same glass at an ordinary electric incandescent lamp, such as used in the home and studios, we see two images of the filament superimposed; a blue-violet one and a red one. Should the lamp and the filament be at a considerable distance, for instance, twenty or thirty feet, the eye will involuntarily focus on the red image, which consequently appears surrounded by a blue-velvet light. Should the filament of the light be so near that the eye cannot focus on the red, the blue-violet image will be seen to be surrounded by a red haze of light.

By actual tests we know that the eye functions best when the character and settings are viewed with the aid of a white light.

Indications are that for low intensities, or low key lighting, sensibility occurs mostly in the green end of the spectrum, that for the more intense lights toward the red end of the same, this combination would seem to make conditions ideal for cinematography, but until we have the right kind of film stock, we are at the saturation point of results.

When we consider visual acuity and that alone, monochromatic light has a slight advantage in that it gives more detail than light with an extended spectrum, but the reason against its use is the one of unnatural line and false reflective values.

A Mazda Marathon

For the information of those outside of the A. S. C. who may be interested in incandescent lighting in the production of motion pictures it is announced that the A. S. C., in co-operation with the Academy of Motion Picture Arts and Sciences and Warner Brothers Studios, began on the night of January 16, a sixty day demonstration the conditions of which are set forth in a general letter sent to the entire membership of the A. S. C.

For the place of demonstration the A. S. C. is indebted to Warner Brothers Studio who have provided a suitable set with full equipment of both incandescent and arc lights and have installed seats for observers. Actual operations in the studio are under the direction of Mr. Fred Gage, laboratory superintendent, and Mr. Frank Murphy, electrical engineer.

Subjects also are provided through the Warner Studio, while raw stock is generously supplied by the Agfa, Dupont and Eastman Western representatives.

The last word in incandescent lighting equipment is supplied by Mole-Richardson.

All tests are made by first cinematographers and the set is at the disposal of the demonstrators between 9 A. M. and 5 P. M. in periods of two hours each. Night demonstrations may be arranged for when desired.

Regular meetings of the A. S. C. will be held on the set on Wednesday and Friday nights throughout the sixty days period of demonstration. On these nights representative cinematographers will be chosen to have charge of the tests.

Arrangements for time and use of set and equipment must be made at headquarters of the A. S. C. in the Guaranty Building, Hollywood.

Negative may be developed by any laboratory, at the choice of the cinematographer making the test.

A complete record of every test and demonstration will be kept in technical detail and will become a part of the records of the A. S. C. for the benefit of the industry in general.

All members of the A. S. C. are urged to seize this opportunity to obtain a liberal education in lighting.

In this connection Mr. Frederick Beetson, Executive Vice-President of the Association of Motion Picture Producers, has become so impressed with the importance of this sixty day demonstration that he sent out the following letter to representative officials in all departments of the industry. THE AMERICAN CINEMATOGRAPHER hereby acknowledges the courtesy of Mr. Beetson in permitting its publication:

January 19, 1928.

Last night I attended a major demonstration of Mazda lighting equipment with actual shots made on Eastman, Agfa and DuPont stock followed by the same sets being shot on the same stock with hard lighting.

There were present last night one hundred and twelve cameramen seriously studying the effects in order to make themselves of greater value to the industry.

These demonstrations will continue two and three nights a week for the next five or six weeks. The expenses are being met by this Association through the Academy of Motion Picture Arts and Sciences.

The stage space is free, the juice is free, developing and printing free—most of this through the very generous courtesy of Warner Brothers and particularly through Mr. Koenig and Mr. Murphy of that company. The cameramen are devoting their time free and the various film companies are furnishing the stock free, the only cost being for electricians day and night and a few extras to dress the sets.

It behooves everyone in this industry to attend some of these demonstrations and I urge that all of those interested in this particular line of work, from the chief executive down the line, attend some of the demonstrations. I assure you it will be a revelation to you.

Very truly yours,

FRED W. BEETSON,
Executive Vice-President.

Movie Make-Up

By Louis W. Physioc

(Continued from Page 6)

larly true with motion pictures, due, probably, to the great expense of production. We have lapsed into a state of ultra conservatism as regards things new. We wish, always, to "place the safe bets." However, the photographic department has begun to loosen these fetters of conservatism, somewhat, by the adoption of panchromatic film, but we are yet a little uneasy about the make-up in connection with the use of this new stock. We, therefore, suggest a modification of make-up, for reasons that we may classify in detail.

1st. The panchromatic film, now being widely used, is sensitive to a wide range of colors, compared to the ordinary film, and for this reason the make-up may assume the more natural flesh tints, except that the rouge on the cheeks may be ignored. There is one difficulty, however, with the natural make-up, which is found to be due to the difference between the exterior and interior light. In such cases, a touch of neutral gray will not altogether destroy the natural color and will aid in matching face values under the different lights.

2nd. Modeling is very often the result of delicate coloring, both in the lights and shades, therefore, no exaggeration of make-up, such as shading eye sockets, etc., should be practiced, except, purely, for character work. Flatness is often greatly relieved, even under highly diffused light, by the power of panchromatic film to render delicate values represented in tints rather than tones. Great freedom in chiaroscuro lighting can be employed, with the more natural make-up, plus the pan stock, without much danger of harshness to the photographs or disfavor to the artists.

3rd. Imperfections in the texture of the skin are exaggerated in photography for various reasons. Lights and cast-shadows are cooler (that is they tend towards the blue end of the spectrum) than the local color and shades, and these values are rendered more extreme by the photographic process. The cooler tones of the lights develop up, in the negative, in greater proportion than the warmer tones of the shades, which accounts for the unpleasant, blotchy appearance of pictures from unretouched negatives. The panchromatic film reduces this fault by virtue of its color sensitivity.

4th. Because of those facts, cited in No. 3, the make-up should be considered, not so much from the standpoint of color as for the purpose of filling up excrescences, character lines or signs of maturity. This should not be overlooked, even in the enthusiasm for Panchromatic film.

5th. Characters and types should require no make-up, with panchromatic film, their value lies in giving to the camera all they have.

6th. Although some cameramen are very enthusiastic as to powers of panchromatic film, we suggest caution among the stars and principals in relinquishing make-up entirely. We cannot yet retouch the motion negative, and their beauty is of paramount importance to their public. Their chief care should be to endeavor not to present too great a contrast to those, near them, without make-up.

7th. There is, yet, a great difference between exterior and interior lighting, even with the tungsten incandescents, and it is very difficult to make the colors of make-up, costumes, etc., appear the same under these two conditions. The aesculin and aero filters match exteriors very well with the tungsten light of the studios, but photographers working with the arcs should recommend a more neutral make-up, because the arc, without the modification of filters, will render the more natural flesh tints muddy and coarse. Reds are extremely difficult to match on exteriors and interiors under these conditions.

8th. When working against a sky which is being held down for a night effect, an entirely different make-up is necessary. The effect depends upon a high degree of correction with a deep red or gamma filter, which neutralizes all of ruddy tints of the flesh and makes the face appear a ghastly white, and although it may sound unpleasant, a greenish-gray make-up would be more suitable.

9th. Some earnest actors welcome the abolishment of make-up, because they are allowed the freedom of touching their faces, or mopping their eyes—instead of their noses, in crying scenes, and gives free play to facial expressions without fear of spoiling the make-up. However, there are others who say that they feel lost and uncomfortable, and even naked and indecent without their grease paint.

In conclusion, we feel constrained to call attention to certain facts that may be of assistance to actors and cameramen, alike. There is a wide diversity of opinion, among the cameramen, as to the treatment of panchromatic film which must, of necessity, have a great influence on make-up. Some are using this stock entirely without filters; some using the filters on exteriors; others using filters on both exteriors and interiors; some working under the arcs and those now adopting the tungstens. This great variety of treatment must often mean an unbalanced effect of faces on the screen. It is, therefore, highly important to work for a uniform system of treatment, without too far submerging the individuality of the cinematographer. Otherwise, it would entail considerable trouble and study on the part of the actors in modifying their make-up to keep up with the great range of panchromatic film. It must not be overlooked, however, that the greater the range of any medium we are working in, the greater the opportunities of individual artistry.

In the Stone Age

By Perry Evans, A. S. C.

This one dates back to the STONE AGE of moving pictures when directors were temperamental and cameras looked like a kitchen stove. In the incident I am about to relate, friend cameraman was equally temperamental, in fact so much so that he refused to mingle with the commonplace actors at luncheon, but brought his own and ate in solitary majesty.

In those days if a director had more than three people on the set he became very nervous, in fact every one connected with the troupe felt the strain of a terrific overhead. In this case we were using a troupe of cavalry for the day and, having finished my own production I was sent out to shoot an extra camera with the Temperamental Troupe. Considering the big occasion of course every one was very nervous.

After setting up our cameras the director went through what I learned later to be his customary routine by howling at the top of his voice: READY! ACTION! CAMERA! GO! We started cranking and over the hill came the cavalry. Glancing over at friend cinematographer, I noticed him bearing down heavy on his crank, each turn becoming slower and slower until finally he came to a stop. Then he ran out in front of my camera howling and waving his hands in a frantic effort to bring the oncoming cavalry to a halt.

Left to right—Perry Evans, A. S. C., cameraman; Monte Blue, star; Joseph Brotherton, director.

By this time our temperamental director went into his animal act by first throwing his scenario on the ground, then his hat, then his coat, all in one pile, then he got on top of it all, tramping it down, howling and crying like a Comanche Indian and ending up by falling over in a faint.

Here the temperamental cinematographer picked up the action by kicking his tripod legs and calling his camera everything he could think of, saying it never was any good and never would be.

By this time the troupe of cavalry had gathered around close to find out who was at fault. Also our director came to just in time to see the cameraman open up his camera and after one glance at the inside of the box he went into the second episode of his animal act and passed out again.

Characteristic of a camera buckle, there in plain view were yards of mangled film, knotted, twisted and packed tight, and last but not least were those two delicious club-house sandwiches all ground up in the sprockets.

Lubrication of M. P. Film

By J. I. Crabtree *and* C. E. Ives

(Continued from Page 10)

Carnauba 5%	125%
Johnson's floor wax 6%	185%
Beeswax	260%
Paraffin 1% (M. P. 130°-140°F)	310%
2% Paraffin 2 parts Carnauba 1 part	380%
5% Paraffin 2 parts Carnauba 1 part	480%
Paraffin 5%	850%
Eastman edge waxed film	950%

The above results indicate that certain waxes such as montan can produce a negative lubricating effect and that the lubrication produced by all the waxes increases with the quantity applied.

Of the waxes tested, paraffin wax was the best lubricant and at a concentration of 5% was as satisfactory as Eastman edge waxing. However, a coating of pure paraffin wax was relatively soft and tended to show finger marks. Experiments were therefore made with a mixture of a hard wax (carnauba) and paraffin wax in the proportion of two parts of paraffin and one part carnauba. Such a mixture gave a harder coating with a high gloss but the projection life was about 40% less than that of plain paraffin. However, in practice the projection life of film is usually determined by factors other than the point at which the perforations break down. Film is frequently rejected on account of bad scratches before this point is reached and it is therefore considered that the projection life of film treated with the carnauba-paraffin mixture is satisfactory.

2. The Tendency of Surface Waxed Flm to Deposit an Excess of Wax in the Projector Gate.

As mentioned previously, in the case of edge waxed film, there is a tendency for an excess of wax to accumulate in the gate so that on threading a warm projector and allowing to cool, the wax cements the film to the gate so that it will not pass down through the gate on starting the machine.

Tests were accordingly made with film surface waxed with a 5% solution of a mixture of two parts carnauba wax and one part paraffin wax. Twelve one thousand foot reels were projected in succession through a simplex projector without disturbing the gate. At the completion of the run, a piece of unwaxed film was threaded in the machine and the machine allowed to stand for one hour so as to be cool thoroughly. On starting the cooled machine, the film pulled down satisfactorily through the gate showing that no serious quantity of wax had accumulated as a result of the projection of the twelve reels. Examination of the gate showed the presence of negligible traces of wax but there was present a slight amount of "fluff" which was presumably deposited on the film from the buffing wheels.

In this connection the heated reels after projection were allowed to cool thoroughly and then rewound. No tendency for the convolutions to stick together was observed and the possibility of this happening is somewhat remote because the surface coating of wax applied to the film is extremely thin.

3. Effect of Surface Waxing on the Propensity of Film to Show Oil Spots to Projection.

It is well known that when film accumulates oil in the projector, hte effect of the oil is usually visible on the screen as patches of lesser density than the surrounding portion which is free from oil. The effect of clean oil is to fill up the tiny surface craters thus reducing light scatter which results in an increased transparency of the film. In the case of dirty oil, or when

dirt is applied to clean film treated with clean oil, the oil spotting is greatly exaggerated and such dirty oil produces dark spots.

A study of the surface structure of motion picture film (see Fig. 2) explains why it is difficult to remove oil by mere wiping. The oil sinks into the innumerable craters present on the surface and can only be removed by treatment with suitable solvents.

At the outset it was considered that a waxing treatment might insulate the gelatin surface from the oil and reduce the propensity for oil spots to show on the screen. This was tested as follows:

Film toned with an unraium toner was used for the test because such toned film has a maximum propensity to show oil spots, presumably because of the extremely pittel nature of the film surface. A reel of film was assembled consisting of fifty foot strips treated as follows:

Sample	Nature of Film
No. 1	Plain unarium tone.
No. 2	Waxed with 5% paraffin in carbon tetrachloride.
No. 3	Waxed with 5% solution of 2 parts paraffin and 1 part carnauba.
No. 4	Waxed with 1% carnauba and overcoated with 5% paraffin.
No. 5	Waxed with 1.5% candelilla and overcoated with 5% paraffin.

Preliminary tests to determine the rate of solution of cold waxes and mineral oil indicated that carnauba and candelilla waxes were more impermeable to oil than paraffin, so that in the above double coated tests the object of the first coating of carnauba or candelilla wax was to protect the film against oil, while the coating of paraffin was to secure maximum lubrication.

A good grade of light machine oil was splashed in liberal quantities on all the samples while the film was being wound from one reel to another. The film roll was then rewound twice during which time the oil was smeared over the surface with a cloth. After this treatment the film surface presented a mottled appearance. The reel was then projected immediately and subsequently three times each day.

After the first day objectionable oil spots appeared on the unwaxed sample. At the end of one week no oil spots were visible on any of the waxed samples. It was concluded therefore that paraffin wax although miscible with oil, prevents oil spots. In order to prevent oil spots it is apparently merely necessary to fill up the crater-like depressions on the surface of the film.

A roll of toned film treated with candelilla wax and then splashed with oil was prepared over a year ago and projected at frequent intervals up to the present time. No oil spots have appeared on this film to date.

4. The Tendency of Surface Waxed Film to Accumulate Dirst and Develop Scratches on Projection.

Sufficient data have not yet been secured to determine the effect of the surface coating on the propensity of the film to accumulate dirt and develop scratches on projection in comparison with untreated film. A projection test was made by applying dirt to the projector gate and by throwing the film on a dirty floor and then projecting. No appreciable difference in the quantity of scratches or dirt accumulated on the film was noticed between surface waxed and edge waxed film.

Data in this connection are being secured by circulating reels, half of which are surface waxed and one-half edge waxed, through various exchanges.

5. The Tendency of Surface Waxed Film to Retain Mositure.

It is well known that if the gelatin coating of motion picture film is deprived of its moisture content, the film tends to become brittle. The chief cause of brittleness of projected film is the loss of moisture as a result of repeated baking of the film in the hot projector gate.

It was considered that possibly the surface coating of wax might retard the evaporation of moisture from the gelatin and this was tested by first humidifying a strip of film for one hour in an atmosphere at 90% relative humidity, surface coating one-half of the strip with wax and then placing the waxed and unwaxed strips in a desiccator over night. No difference in brittleness of the two dried out film samples was noticed. Apparently the wax coating on the film surface is so thin that it does not appreciably retard the rate of evaporation of mositure from the film.

Summary and Practical Recommendations

The projection life of motion picture film can be prolonged considerably by coating either the edges in the region of the perforations or the entire gelatin surface of the film with a thin film of wax. Edge waxing as now practiced by use of the Eastman edge waxing machine is an efficient means of lubrication providing it is done correctly, but if the molten wax is not heated sufficiently during application, there is a tendency to apply too much wax to the film. This causes an excess of wax to accumulate in the projector gate so that if the freshly waxed film is threaded in a warm projector which is then allowed to cool, the wax solidifies and holds the film so tightly that on starting the projector the film remains sationary in the gate and, in the case of most projectors, then catches fire.

An excess of wax on the film also causes the convolutions of the film to adhere together when the film roll cools after projection, and particles of wax torn from the film on rewinding tend to settle on the picture area causing spots and unevenness on the scheen. Edge waxing is also impossible in the case of film with an edge sound record.

By coating the entire surface of the film with an extremely thin coating of a suitable wax, or mixture of waxes, and then buffing or polishing, many objections to edge waxing are overcome. This may be done efficiently by applying a 2% solution of a mixture of carnauba wax and paraffin wax dissolved in carbon tetrachloride, by means of a suitable machine which buffs the film surface to a high gloss after application of the wax. The exact proportion of carnauba and paraffin waxes is a matter of choice. A high proportion of carnauba gives a hard, highly polished coating while a high proportion of paraffin gives a softer coating with less gloss but with a greater lubricating value. The following formula containing equal parts of carnauba and paraffin gives a sufficiently hard coating with satisfactory lubricating qualities.

	Meteric	Avoir.
Carbauba wax (M. P. 175°-185°F)	10 grams	150 grains
Hard paraffin wax (M. P. 130°-140°F)	10 grams	150 grains
Carbon tetrachloride to	1000 cc.	32 oz.

With this method of application it is practically impossible to apply a dangerous excess of wax to the film so that the above difficulties caused by the application of an excess of wax are eliminated.

A film surface waxed in the above manner has also a minimum propensity to show oil spots on projection even when a liberal quantity of machine oil is applied to the film in the projector.

Practical tests have shown that the projection life of surface waxed and buffed film, as determined by the point of complete breakdown of the perforations, is not quite as great as that of edge waxed film. However, in practice film is rejected usually for other reasons before the complete breakdown of the perforations, so that the projection life of surface waxed film is considered satisfactory.

Acknowledgement

The authors are indebted to P. J. Closser and L. F. Muehler who assisted in the experimental work and to R. N. Titus who made the photomicrographs.

September 16, 1927.
Rochester, N. Y.

Len's Terrible Dream

By Len Roos, A. S. C.

The other night I had a dream. It seemed that Claude Carter, A. S. C., came up to me on the street:

"Big story breaking in Heaven this afternoon, Len," he ses.

"Yeah?" I asks.

"Yeah," ses Claude, "and I think I'll run up there and cover it."

"Shoot a piece for me, too," I ses.

"Righto," ses Claude ("Righto" is the Australian equivalent for "You're Faded").

So he grabbed a camera and beat it up the stairs, and when he got to the top he rang the bell at the gate and St. Peter answered the ring and asked what he wanted. Claude told him that he had heard there was a big story breaking and he wanted to make a picture of it.

St. Peter says: "I'm horribly sorry and all that sort of thing, old chap, but you see we have had a rule up here since time immemorial that no cinematographers are to be allowed in Heaven."

"Well," ses Claude, "I never have any trouble getting in other places to make pictures, and besides it's a beautiful day for pictures. What's the story, anyway," ses Claude.

"We are unpacking a new shipment of harps," says St. Peter.

"Bonza" (Australian for "Great"), ses Claude. "Can you imagine what they'll do titling that? 'Largest shipment of harps in history arrives in Heaven,' 'Crowd awaits spell-bound as new instruments are unpacked.' We could make a longshot of the shipment arriving and then show a closeup of a case and then cut to the crowd and then show closeups in the crowd of people straining to see and then show a case being opened and the harps being unpacked, and then giving the biggest one to some prominent person and then fade out on a group all playing and somebody doing the Charlesburg or something. It would make a great picture," says Claude.

"I don't doubt that," says St. Peter, "but I am not in a position to break this rule."

"That means that I can't get in," ses Claude.

"I'm sorry, but I'm afraid it does," says St. Peter.

"Fudge," says Claude, and came back down the stairs with his camera. I met him as he left the golden stairway and asked how he got on.

"No good," ses Claude, "they won't allow cinematographers in Heaven."

"Do you mean to say," I asks, "that you went all the way up there and then didn't get a story?"

"Too right" (Australian for correct), ses Claude.

"What's the matter with you," I ses, "is that you ain't firm enough with 'em; give me that camera," I ses, "and I'll show you how to get it."

Claude handed over his equipment and I went up the stairs to the gate while Claude stood at the foot watching. I rang the bell and when St. Peter answered I said "Roos is my name. I've got a camera here and I'd like to make some pictures of your celebration this afternoon."

"Certainly," says St. Peter. "Come right in."

"Claude, from below, saw me enter the gate and came up the stairs three at a time and rang the bell.

"Well," says St. Petr, "what is it now?"

"Didn't you tell me a few minutes ago that you don't allow Cinematographers in Heaven?" asks Claude.

'That is correct," says St. Peter.

"Well," ses Claude, "you just let Len Roos in, and he's a Cinematographer!"

"Oh, no!" says St. Peter, "HE ONLY THINKS HE IS.

Amateur Cinematography

By Joseph Dubray

(Continued from Page 8)

that a number of leaves, controlled by as many pivots, are simultaneously set in motion by the turning of a hub in such manner that an innumerable series of concentric round apertures are obtained.

The name **iris** is sometimes applied to these diaphragms, for the similarity of their play with the iris of the eye.

The volume of light admitted to form the image is of course dependent upon the area of the circular diaphragm and is therefore proportional to the square of their diameters.

The necessity of standardizing the nomenclature of the diaphragms of photographic objectives brought forth the following decisions agreed upon at the International photographic convention held in Paris in 1900:

"1—Each diaphragm shall be characterized by a fraction of the form F/n, where n is the number obtained by dividing the absolute focal length of the objective by the diameter of the diaphragm."

"2—For all objectives a uniform series of diaphragms shall be employed, such that the progression of the effective diameter of the diaphragms shall be as follows, which corresponds for each one of its terms to an exposure double of the preceding one.

F/1	F/1.4	F/2	F/2.8	F/4	F/5.6	F/8	F/11.3	F/16	F/23	F/32	F/45

3—If the maximum effective aperture of the objective does not correspond to one of the terms of the preceding progression, the maximum diaphragm shall be characterized by a conventional sign, a point, the value of the effective diameter of such diaphragm shall be engraved with other inscriptions on the mount of the objective."

Thus the value of F/3.5 so common in motion picture objectives, is not to be found in the series above tabulated. The value F/3.5 will then be found on the mount of the objective following by the F/4 mark which is the next value to be found in the series. It is evident that the F/4 aperture will not require double the exposure of F/3.5, but only an exposure slightly under 1.5 times the F/3.5 exposure.

This series is now universally adopted with the exception that it has become customary to manufacturers to round off the F/11.3 mark to F/11.

It shall be noted that the exposures required with F. numbers are proportional not to the numbers themselves but to their "squares." This because the volume of light admitted to form the image is proportional to the "area" of the diaphragm and not to its diameter.

In any objective having a positive front element, the effective aperture is larger than the diameter of the diaphragm.

This is due to the condensing power of the front element, which tapers down, so to speak, the bundle of rays admitted to pass through the diaphragm.

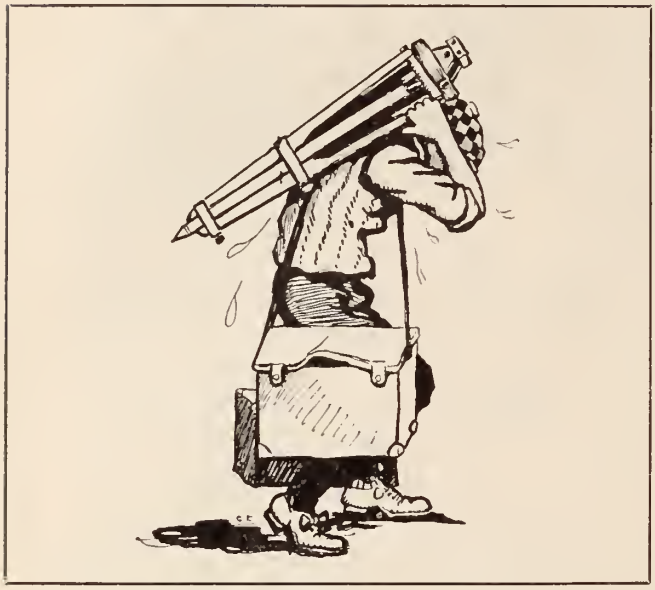
The truly effective aperture of an objective may be found thus:

Focus an object placed at infinity on the ground glass of a camera, replace the ground glass by a card with a pin-hole at the center of it, and then using this pin-hole as a source of light, receive the image of the dipahragm on a ground class or light sensitive material placed on the hood of the objective. The size of the image of the diaphragm so obtained will give the effective aperaure of the objective.

Many complaints have reached manufacturers of photographic objective who have been accused of misrepresentation in the aperture of their objectives because the actual diameter of the diaphragm instead of the real effective aperture of the objective has been measured.

The result of using the diameter of the diaphragm instead of the effective aperture may reduce the apparent aperture of an objective as much as one-third, for certain types of objectives.

Jimmy the Assistant



A PURELY TECHNICAL DISCOURSE

Copyright by Jimmy

The more I find out about this game the less I know for sure. Just take exposure, f'rinstance. Way back in the Stone Age of pictures when I started we had film that was so slow that a right fast assistant could thread up a camera without foggin' no leader, unless the film got right out **in** the sunlight. We was grindin' this practically light-proof stock through old Pathe cameras with a 25% shutter opening and usin' nothin' but Heliar 4.5 lenses; and the only holler from the lab was about burnin' the stuff up. No kiddin', we'd go out and shoot a day's exteriors at around 8 and 11 and the negative would be denser than a business manager's report. And ther wouldn't be much reflection on the stuff, neither, because we didn't have no aluminum reflectors then—nothin' but the assistant doing the Goddess of Liberty act with a white sheet. And for night stuff we'd have only as many flares as we had guys to hold them, and that wasn't very many. Regular interiors were made on an open stage under diffusers with side light kicked in from white flats—the same as we box sets in with now. For spots we had mirrors, but we didn't ever use 'em unless we wanted to **see** somebody. The holler from the lab was always the same—burnt up.

Of course, the old lab system had something to do with it. We used a negative soup that was stronger than a lumberman's sock; and the idear in developing the stuff was to make it all come through on the celluloid side if it took a week. Your old time negative man wouldn't pull a rack until he could feel all the detail on the celluloid side with his gloves on and you couldn't see through the stuff no more'n you could see through a brick wall, and of course the emulsion side didn't mean **nothin'**—it was blacker than the prospect of a raise. I know of one lab that in two years' time didn't throw away more'n 63 cents worth of silver in the hypo. When those boys developed a negative it got **developed**—plenty!

Of course, the results wasn't what you might call ideal. What with the cameramen whittling their exposure down all the time, and the negative soup getting to be actually thick like mush there was times when some of the stuff commenced to look a little hard. When you get a negative that looks like the negative man had went off on a week-end vacation while it was cooking, and then come back and intensified it with silver, it stands to reason it ain't going to be easy to get a nice soft print off'n it. We just **had** to use step-printers in them days, so you could print a frame at a time and let it bake. And naturally, the positive didn't never get any too much light even through the parts of the negative you could **see** through, so when a roll was printed the positive developer would just put it to soak like a batch of clothes—come back after a while and see if there was anything on it. The only thing wrong with the system was that the negatives looked like positives and the positives looked like hell.

But it took nothin' short of the War to stop it. There ain't no tellin' how we would be workin' now if that war hadn't come along and saved the day. Prob'ly shootin' through pin-hole lenses on a dark stage with panchro safelights for illumination, and developin' nine hours in melted metol.

It was sure tough for a while after they clamped down on the regular developer. We had been using metol and ortol with hydroquinone; and all we could get now was hydroquinone. There's lots of angels that ain't got done weepin' yet at some of the stuff that come out of straight hydroquinone soup made after the knock-'em-dead formula. Hard? Boy, that stuff would just warp a screen right out of shape every time you projected it. You couldn't rewind it—you had to coil it, like a steel clock spring.

The situation got desprit. Exhibitors were hollerin' about the stuff bein' so violently contrasty—said it made permanent impressions on their screens, and the images left by last week's show was clutterin' up everything and they had to wait till it faded until they could open up again. About this time we figgered out that maybe we wasn't handling the stuff just right. Anyway, the cameramen got reckless and desprit and took a long stevie and opened up their shutters to 50%—sump'n they never did unless they was stuck to shoot daylight stuff at nine in the evening in November. And they started socking the exposure into the stuff—opened right up to 4.5, sometimes. Somebody tackled the same problem from the lab end, and started using a reasonable soup and not trying to bring up an image all over includin' fades.

Results resulted. Cameramen were giving the film more than a fleeting glimpse of the scene and used lights on interiors. It took a lot of hollering to get them lights, but they was finally got. The preducers died hard. They couldn't see why they should go to California for sunlight and then shoot in a barn with lights. Klieg lights! Nobody never uses them much now. Their very name only survives in the name for an inflammation of the eyes caused by the bad stuff they're selling nowadays.

The combination of both the cameramen and the lab men treating the business with the same care that they would if it was something delicate like a photographic process, for instance, brought the results that resulted, as I said. You could see who the people was, for one thing, and that was the foundation of the star system.

I don't have much trouble understanding them conditions because there was a real reason back of it all that you could figure out. The stuff was overdeveloped and improperly exposed, and that'll make anything—even a nice girl—hard. What does puzzle me is things the way they are now.

Where we used to get burnt up stuff with slow lenses and shock proof film the trouble seems to be all the other way now. Lenses have got faster and faster until now nobody tries to shoot unless he's got a hunk of glass on the camera that looks like a bay window, yet the negatives are running thin. We used to shoot with thin stops and get thick negatives. Now we shoot through a lens that looks like a port-hole glass off'n a battleship and the negatives is as weak as the star's excuse for bein' late. And not only that but the film has got faster and faster until now you can't speak above a whisper in the loadin' room without foggin' all the stock. That ain't all, neither. One punk little set gets more Killywatts turned on it in the way of lights than we'd use for a ballroom ten years ago, and yet it's all thin. Just a few months ago I heard a cameraman alibi an underexposed shot by sayin' that the set was so small he couldn't get enough lights into it. And he was right, too, for I seen the set. It was a little cabin, and his camera just could get a peek at the action through the forest

of sun-arc tripods that was crowded up to it. He was using exter fast film and a lens like a glass man-hole cover, yet the stuff was as gray as Monday morning.

It's all kinder hard to figger out but the ultimate result is clear enough. If they make the lenses any faster, and the film any more sensitive, and the lab machinery any more refined, why we'll just have to stop making pictures, that's all. It's hard enough to get an exposure as it is. All we need to sink us now is a stronger light.

It used to be that the only time we got a printably thin negative was when the lab man had a date and was in a hurry to get through. Now our only chance of getting a negative with pictures on it is to bribe some of the help to smuggle a few grains of developer into the developer. For the solutions is sure running weak. Some places they even dilute the wash water. I suppose it has to be. If they ever put a present day exposed negative into a tank of old time soup there'd prob'ly be a loud report and the lab man wonderin' where the film had went, or how the soup started boilin' so sudden. It all has to balance up somehow. In the old days when the cameraman used to keep the film in the dark as to what the scene was about, the lab had to blast an image out of it somehow, and did it with developers so strong that it would eat away three sets of racks a week; while now, when the cameramen sock the film with so much light that they have to turn at least sixteen to keep the film from ketching fire, the only answer is a solution so weak it has to be helped wet the film.

But there ain't no use me argin' the time honored cameraman vs. lab battle. You'd probly think I was exaggeratin', and besides, it's a argument like which comes first, the chicken or the egg. The answer is: both; and in the working of the cameraman and the lab there ain't no way that I can see how you can tell where one leaves off and the other begins.

It's all one job, you see; one single job the object of which is to put the best possible positive in the hands of the exhibitor. But as long as there's any jobs in the world that one man starts for another to finish there's goin' to be arguments, so I don't see no truce in sight ever. So I ain't even goin' to think about arguin' one side or the other, but there's this much about it: If they improve lights, lenses, or film one speck more I'm goin' to take back my paper route before the business crashes. One more improvement and pictures is sunk.

Our President Up a Tree

Cameramen do not always keep their feet on the ground. Here is President Dan Clark, of the A. S. C., getting an Eyemo shot of Tom Mix and Tony from a hand swing sixty feet in the air.

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FOR SALE—New Eyemo camera, carrying case, extra magazine. Price $225. Call Ben White, OX 7335.

FOR RENT—CAMERAS

FOR RENT—Akeley Head. Cinemotor, batteries and Eyemo. Frank M. Cotner. HO. 5046.

FOR RENT—To reliable party, one Bell & Howell camera with Mitchell legs; Astro Lens F. 2.3., Fl. 8. 6 magazines. Fred Hoefner mat box. In perfect shape and fully equipped. Joe LaShelle. ORegon 6730.

FOR RENT—Two Bell & Howell cameras, large finders, astro lenses, F. 2.3. B & L 2.7. Also Akeley Head cinemotor, batteries and Eyemo. Frank Cotner, HO. 5046.

FOR RENT, CAMERA—3 Bell & Howells. Fully equipped. Lenses 2.3, 2.5 and 2.7. Large finders; Baby tripod. No. 6 Lense. Special side prism. Also Special Hi speed DeBrie. Call B. B. Ray, A. S. C. Office, GR 4274. Home, OL 2727. 1119 N Edgemont Ave.

FOR RENT—CAMERAS, ALL KINDS. Akeley, Bell & Howell 170%, also Speed DeVry Graflex, Still (late model Anscos). For rent by day or week to responsible parties. Ries Bros., Ries Bldg., 1152 No. Western Ave. Phone GRanite 1185; Residence, HO-1055.

MITCHELL and Bell & Howell cameras. F.1.8 and F.2.3 lens equipment. All kinds of lenses and equipment for rent. John S. Stumar, 3602 Cardiff Ave., Palms, Los Angeles. Phone: Culver City 3512 or call C. Glouner, Camera Dept., Universal City, HEmpstead 3131.

FOR RENT—Mitchell Camera outfit for rent. Astro 2.3 lenses, also Graf. lense. Phone HE-1490, or A. S. C. office, A. L. Gilks.

ONE DE VRY Motion Picture Camera. Complete outfit. Alvin Wyckoff, Phone Care A. S. C., GRanite 4274.

FOR RENT—Akeley camera to responsible parties. Call A. Le Roy Greiner, A. S. C., GL 7046.

THREE Bell & Howell 170-degree cameras. Complete equipment. Eddie Linden, 6017 Eleanor Ave., Hollywood, HEmpstead 8333 or Hollywood 7716.

CAMERAS, ALL KINDS—Akeley, Bell & Howell 170%, also Speed, De Vry, Graflex, Still, (late model Anscos). For rent by day or week to responsible parties. Ries Bros., Ries Bullding, 1152 No. Western Ave. Phone GRanite 1185. Residence HO 1055.

BELL & HOWELL. Victor Milner, 2221 Observatory Ave., Los Angeles, California. 596-944.

BELL & HOWELL—Phone Perry Evans, OL 8797 or Hollywood A. S. C.

MITCHELL Friction Tilthead, 3 Mitchell cameras, 2 Bell & Howell. Astro F. 1.8, F. 2.3 lenses. Extra lenses and magazines. J. R. Lockwood, 523 N. Orange St., Glendale. Glen. 3361 W. Hollywood address, 959 Seward, HO 4366.

E. BURTON STEENE, Bell & Howell, and Akeley. Complete Camera equipment. Latest models. Address American Society of Cinematographers, Hollywood, California.

BELL & HOWELL, 170, with 30, 40, 50 and 75 lens equipment. Baby tripod. Also B. & H. Cine motor. Charles Stumar. GRanite 9845. 7501 Lexington Ave., Hollywood.

BELL & HOWELL No. 627. Five lenses: 32, 40 (f.2.7), 50 (f.2.7), 75, 100 mm. Complete studio equipment; gauzes, filters, etc. GLadstone 0033.

TWO Bell & Howells. Large finders. Also Eyemo for rent. Lenses: F 2.5; 2.3; 2.7. Frank M. Cotner, 6273 Selma Ave., Hollywood. HOllywood 5046.

FOR TRADE—CAMERAS

WILL TRADE—Carl Zeiss, F. 3.5, 50 mm. lens in B. & H. mount. Trade for late model Veedor Counter. Bert Longenecker, 597-724.

FOR TRADE—Have good Ereman standard 35mm film printer 60 cycle ¼ H large light dimmer, 24 stops, in very good order, good contact. Will trade for a Universal or other good make tripod. Printer regulated to print from 13 to 20 feet per minute. Address World Wide Out Door Motion Picture Co., 1114 Fifth Street, Sioux City, Iowa.

FOR RENT—STILL CAMERAS

FOR RENT 1 8x10 Still Camera, focal plane shutter, complete, 1 Mitchell Friction Tripod, new, for B. & H. 1 Eyemo Camera with special lock. 1 4x5 Graflex B. & L. lens. 1 B.-H. Low Boy to fit new style B.-H. Tripod head. Joe LaShelle, 639 N. Sierra Bonita, ORegon 6730.

FOR RENT—Bell & Howell with Mitchell Tripod, 8x10 still camera, all complete. Cliff Thomas, GLadstone 4228.

ONE 8x10 still camera—complete. Care A. S. C., GRanite 4274.

FOR RENT—MISCELLANEOUS

FOR RENT—One Cinemotor with Veeder Counter in first-class shape. Call B. B. Ray, OL-2727, 1119 N. Edgemont Street.

FOR SALE—LENSES

FOR TRADE—New 100 ft. Stineman Developing Outfit. One Reel, Three Tanks. Also F 3.5 Bausch & Lomb Tessar in Focus Mount with Diaphram and Sun Shade. Exchange for Tripod. Must be steady. George Horst, 1924 Green St., Philadelphia, Pennsylvania.

FOR SALE, LENSES—Carl Zeiss, F. 3.5, 50 mm., mounted in latest B. & H. mount. Looks like new. Perry Evans, 413 No. Mariposa Ave., Hollywood, California.

BELL & HOWELL, all ASTRO lenses. Akeley Camera complete, also Eyemo. E. Burton Steene, 1760 No. Wilcox Ave., GLadstone 6131.

ONE two-inch Bausch & Lomb F.2:7; one Dahlmeyer Pentac 37 mm. F.2:9. Georges Benoit, care of American Society of Cinematographers. Hollywood, California.

CARL ZEISS, F. 2.7, 50 mm. in Bell & Howell mount. Dan Clark, care American Society of Cinematographers.

NEW 40 mm. Goerz Hypar f. 3. 5. lens in Bell & Powell mount: price, $50.00. Write Charles Clarke, 1222 Guaranty Building, Hollywood, California.

FOR RENT—Mitchell, f. 2.3 Astro lenses. Brand new outfit. GLadstone 0033.

WANTED—PROJECTOR

USED SIMPLEX wanted. State model, price, condition, etc. Address Box R, American Cinematographer.

WANTED—MISCELLANEOUS

FOR RENT, LENSES—Trick lenses of all descriptions for rent by day or week. Call George Meehan, A. S. C. Phone GR 3830, 744 North Curson Ave., Hollywood, California.

WANTED—Will buy Bell & Howell cinemotor and a 32 M. M. Lense. Call Herman Schopp, HOlly 4735 or care A. S. C. office, GR. 4274.

FOR SALE—SPECIAL CAMERA EQUIPMENT

COMPLETE new style Bell & Howell matt box for sale. Joseph B. Walker, 1037 N. Sycamore Ave., Hollywood. Phone GLadstone 3797.

PATHE panorama head for professional camera, with detachable aluminum tilting head, easily adapted to any standard tripod. A first-class unit for some one, who is experimenting or engaged in research work, to add to their equipment. Stephen S. Norton, care A. S. C., Guaranty Bldg., Hollywood.

FOR SALE—3 new Goertz Hy P.3.5. 1 small Film Inspection Machine, Rewinders, miscellaneous magnifying lenses. Dense Mount H. & H. $45. Lot 1, Transformer Mercury Bank, 615 E. 35th Place evenings. Light, $15.00.

FOR SALE—100-foot Stineman Developing Outfit with two reels and three tanks, $50.00. Want to buy two Bell and Howell Magazines. Will buy 120 degree Bell & Howell head if cheap. Write J. Burgi Contner, 320 Cannon Street, Lakeland, Florida.

Friction Tilthead

This new type tripod is used for making the transverse "follow shots" for races and any place where it is desired to follow action. This tripod head is very smooth in operation and may be used for regular stage work, eliminating the crank tripod if desired. Telephoto lenses are regularly used with this head with much success, though when using lenses of longer focus than six inches it is recommended that a motor drive, or extension shaft drive be used, so as to eliminate the intermittent torque of hand-cranking. Locks are provided so that the tilt or panoram, or both, may be locked rigidly. Compensating devices are provided so the weight of the camera does not cause the tilt to fall forward, or backward, when the camera is off the central position.

This head is governed entirely by friction, a multiple disc arrangement on each side bearing gives the necessary friction, and may be adjusted to suit the operator, by the knob on the side. A knob under the head controls the friction for the panoram.

The control handle may be adjusted to suit the user, either up or down. When this is used with our large Universal finder with erect image, a very efficient and convenient combination is had. An all-metal, telescoping handle with rubber grip can be furnished at a slight additional cost.

Mitchell Camera Corporation

6011-6025 Santa Monica Blvd. **Hollywood, Calif.**

American Cinematographer

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Grant M. Parker, A.S.C.

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American Cinematographer

SILAS EDGAR SNYDER
Editor and General Manager

JOSEPH DUBRAY
Technical Editor

Table of Contents

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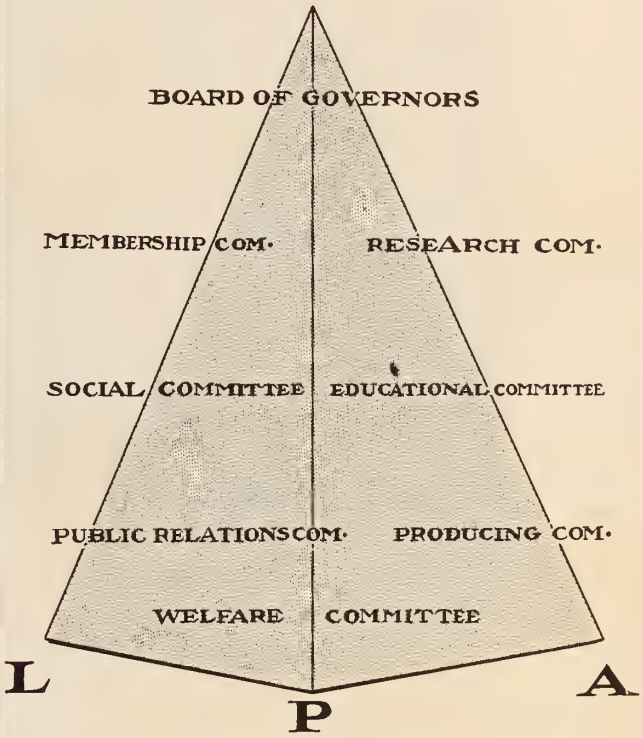
A. S. C.

The Pyramid of Progress



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The S. M. P. E.

The Spring Convention Will Open in Hollywood On the Ninth of April

Mr. L. C. Porter, of the Edison Lamp Works, Harrison, N. J., and secretary of the Society of Motion Picture Engineers, who is in Hollywood arranging for the spring convention of that organization, announces that April 9, has been selected as the opening date and that he expects a good attendance, considering the long distance to be traveled by most of the delegates.

Officers of the Society of Motion Picture Engineers: Left to right, they are: C. Francis Jenkins, founder of the Society; John A. Summers, secretary pro tem; L. A. Jones, past president; W. C. Hubbard, treasurer; J. C. Kroesen, member board of governors; H. P. Gage, vice-president; Willard B. Cook, president; J. H. Theiss, member of board of governors; J. I. Crabtree, member of board of governors and chairman of papers committee; F. H. Richardson, member board of governors, and Miss Schmidt, not an officer but the one who has for years taken the shorthand minutes of every meeting.

The local committees are:

Arrangements—Chairman, Fred W. Beetson; Roy Pomeroy, Paramount; W. V. D. Kelley, Kelley Color; William Sistrom, Metropolitan Studios; A. G. Volk, De Mille Studios; J. C. Ball, Technicolor.

Papers—J. C. Ball, Technicolor; L. C. Porter, Secretary S. M. P. E.; Dan Clark, President A. S. C.; A. G. Volk, John W. Boyle, A. S. C.; Fred W. Beetson; Douglas Shearer, M.-G.-M.; Joseph Dubray, A. S. C.; W. V. D. Kelley.

The entire local motion picture industry will cooperate in the entertainment of the engineers and their sojourn here will be made memorable. The program will be announced in the April CINEMATOGRAPHER.

The first introduction of the S. M. P. E. to Hollywood was in 1922 when Harold E. O'Brien, then of Lasky's, wrote a monograph on the Society for THE AMERICAN CINEMATOGRAPHER, excerpts from which follow:

In February, 1916, twenty-five men met in New York city and organized the Society of Motion Picture Engineers. The objects of this organization, as stated in the constitution and by-laws, are: "Advancement in the theory and practice of motion picture engineering and the allied arts and sciences; the standardization of mechanisms and practices employed therein, and the maintenance of a high professional standing among its members."

"Ever since its organization, the Society has shown a steady and healthy growth. It has become to the motion picture world what the Society of Automotive Engineers is to the automobile industry; the American Institute of Electrical Engineers to the electrical industry, or the Illuminating Engineering Society to any who use light. The society is entirely self-supporting and its finances in healthy shape. All of the officers serve without pay.

"The society meets semi-annually, in the Spring and Fall. These conventions afford a common ground on which men in the various branches of motion picture work meet each other to exchange and discuss ideas, to standardize methods and equipment. This work will unquestionably result not only in the production of better pictures, but also in improving their surroundings and broadening their application for scientific research, education and entertainment.

"The transactions of these conventions are issued semi-annually, and contain very valuable data on all branches of the industry.

"The present membership of about two hundred is drawn from many states in the U. S. A., several foreign countries, Canada and Cuba. So you can realize that no matter what your connections with the motion picture industry may be, whether technical or otherwise, you would find something of value and interest in the society.

"In October of 1920 I attended the convention at Dayton, Ohio, and I assure you it was well worth while. It was a pleasure to meet member engineers from the various large manufacturers of equipment, like Eastman, Bell & Howell, General Electric, Westinghouse and many other representative firms.

"These engineers seemed eager and anxious to meet others engaged in the industry, particularly those directly connected with the actual production of pictures, for they realize that the success of their product depends upon its ability to meet the demands at the studio, and many of us know that much of the apparatus we are using in some lines is more or less of a makeshift that has been handed to us in about the same form it was used on the stage years ago, or as it is used in some other commercial lines at present.

"This is particularly true of electrical equipment. Think of the great improvements that can be accomplished by showing these manufacturers that certain changes should be made in their product in order that it would better meet the needs of the motion picture industry. You will find them quite willing to learn these needs and to co-operate with you. It is up to us to work with them so that the entire industry may benefit.

While at Dayton I told the membership committee that I felt the society needed more members among the technical men of the studios, and that in order to stimulate active interest in the greatest production center of the industry, located in Hollywood, we be allowed to organize a local chapter along the same lines as the American Institute of Electrical Engineers and hold local meetings where papers would be presented and discussed. Also that representative members from Hollywood studios be appointed on the various committees of the society in order to obtain co-operation and best results. The committee welcomed these suggestions and agreed to act favorably upon such a plan.

"I believe we will all concede that the technical branches of the industry, with the exception of the cameramen and directors, are not very well organized, and that great benefits can be reasonably expected by a large membership in such an organization as the Society of Motion Picture Engineers. Just think of the results accomplished in other lines by the American Institute of Electrical Engineers, who have established standards that are recognized throughout the electrical industry. Is there any reason why the motion picture industry cannot do likewise?

There are two classes of membership, associate and active. The associate membership is for those who are not in active engineering work. An associate member is entitled to attend all meetings, discuss papers and receive all transactions, etc., but is not entitled to vote for officers. An active member is entitled to all of these privileges.

"The qualifications for an active member are listed as follows: An active member shall not be less than twenty-five years of age, and shall be:

(a) A motion picture engineer by profession. He shall have been in the practice of his profession for a period of at least three years, and shall have taken the responsibility for the design, installation or operation of systems or apparatus pertaining to the motion picture industry.

"(b) A person regularly employed in motion pictures or closely allied work, who by his inventions or proficiency in motion picture science or as an executive of a motion picture enterprise of large scope, has attained a recognized standing in the motion picture art.

"An associate member shall not be less than twenty-one years of age, and shall be a person who is interested in or connected with the study of motion picture technical problems or the application of the same.

The Hollywood members of the S. M. P. E. are:

Joseph A. Ball, Technicolor Corporation, 1006 N. Cole avenue, Hollywood, Cal.; Lester E. Cuffe, Hollywood, Cal.; Max Handschiegel, 1040 McCadden place,

(Continued on Page 20)

Left to right: J. C. Kroesen, G. E. Lamp Works, Harrison, N. J.; Lewis M. Townsend, supervisor of projection for Eastman Co., Rochester, N. Y.; F. H. Richardson, Chauncey L. Greene, W. T. Yutzy, both from Minneapolis, Minn.; Ira Gordon, projectionist, Akron, Ohio; Arthur Gray, chief projectionist, Lancaster Theatre, Boston, Mass.; "Bill" Kunzman, National Carbon Co., Cleveland, Ohio; C. Francis Jenkins, "Founder of the S. M. P. E.;" (Name Omitted); J. H. Kurlander, of the Brenkert Company; Samuel Burns, vice-president International Projector Corporation; (Name Omitted); P. A. McGuire, International Projector Corporation.

EDITORIAL--The Voice of the A. S. C.

By unanimous vote of the Board of Governors of the A. S. C., Mr. Joseph Dubray, technical editor of THE AMERICAN CINEMATOGRAPHER has been chosen to represent the Society at the Forty-sixth Annual Convention of the Photographers Association of America to be held at Louisville, Kentucky, March 27th to 30th inclusive.

As a soldier, linguist, orator, writer, researcher, scientist, photographer and cinematographer, with a background of thirty years to enrich his store of knowledge Mr. Dubray is an ideal courier to carry the message of the A. S. C. to the P. A. of A. and he will go prepared to show the assembled artists in the Kentucky metropolis not only how motion pictures are made, but the equipment with which they are registered on the film and he will tell the story of production with both the spoken word and a motion picture shot by members of the A. S. C. for the occasion.

The P. A. of A. is one of the most substantial, prosperous, enterprising and progressive organizations in America. With forty-eight years of history behind it the P. A. of A. has come to be an American institution in the best sense of the term and it ranks internationally with the Royal Photographic Society of England.

One year ago last October this peppy organization took the first steps toward a national advertising campaign to promote the interests of the professional photographer and to date they have raised more than $1,600,000 for a four years' campaign.

It has a membership of over 4000 and has in two years multiplied its association activities about 400 percent.

The A. S. C. thus officially acknowledges the honor done it by the P. A. of A. in extending an invitation to our Society to send a representative to Louisville and it feels sure that out of this entente cordiale will arise an enduring spirit of co-operation to the glory of photography not only in America but throughout the world.

The A. S. C. also takes this occasion to congratulate the P. A. of A. upon its phenomenal success and growth and pledges its friendship and best efforts in assisting the Association to work out its program of constructive propaganda.

The Mazda Marathon at Warner Brothers Studio has been a great get-together affair for the technicians of the Hollywood production groups and now that we are together let us keep together and, as one man, work to sell the pictures to the public. This can best be done by every man giving the best that is in him to the picture. These are the days of "shopping." The picture fan shops for his picture entertainment as he shops for his necessities at the stores. In other words, we must not only sell the pictures to the public but we must make them *stay* sold.

The A. S. C. is indebted to Mr. C. Curtis Fetters, A. S. C., for the first unit of the stills exhibit now in process of assembly and installation at the Society's headquarters in the Guaranty Building, Hollywood. Mr. Fetter's unit includes 27 stills, three of them hand colored, and to say they are very beautiful is but faint praise for a wonderful artist.

Robert M. Parker, A. S. C. is preparing a unit for another panel of our assembly room and all other members are not only cordially invited, but urged to contribute units, numbering no matter how few or how many stills in order that our walls may be covered with the finest exhibit of still pictures in America. That's our ambition. Come in and reserve your panel and send in your works of art.

Our front cover this month is a study from the camera of Robert M. Parker, A. S. C. Its beauty and perfection of art is entirely worthy of a member of our society and the engraver's attractive reproduction has decided the editor that henceforth the front covers of THE AMERICAN CINEMATOGRAPHER will be reproduced exclusively from still pictures shot by artists of the A. S. C. Send in your masterpiece.

The incandescent light tests since January 18, in progress at Warner Brothers Studio will continue into March. Up to time of going to press upwards of fifty tests had been made by the same number of members of the A. S. C. and 78,000 feet of film had been used. No report of results can be published until the committee in charge has summed up the tests in detail which will not be until all returns are in. It may be said, however, that the demonstration promises important developments to the great benefit of the photographic department of the industry.

Just what is all this propaganda against Western Pictures about? Why the eagerness to kill the goose that laid the golden egg for so many producers. Has somebody an axe to grind or is it just a case of movie blues?

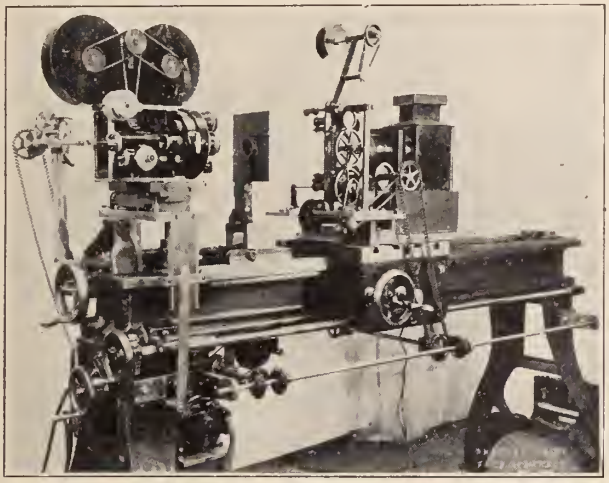
A. S. C. Outposts are being farther and farther outflung. Len Roos, A. S. C. is in Siam; Claude Carter, A. S. C. is in Sydney, Australia; John Dored, A. S. C. is in the Baltic provinces; Rene Guissart, A. S. C., is in France; Claude McDonnell A. S. C., is in London, England; J. B. Shackelford, A. S. C., is leaving in the spring for the Gobi Desert; another brother is leaving soon for Central America and still another for South Africa. Verily the A. S. C. is rapidly becoming international in its activities.

For Trick Work

Mr. Fred A. Barber Announces the Perfection of a Wonderful New Optical Printer

By Herford Tynes Cowling, A. S. C., F. R. P. S.

The printing of motion picture films by projection from the negative film onto the positive film is almost as old as the motion picture business. Nearly every inventor who worked with motion pictures at the inception of the industry used whatever size film that he fancied suitable for his purpose. Even after Thomas A. Edison standardized the size of the film to practically the same as it is today, other companies continued to operate with odd sized film



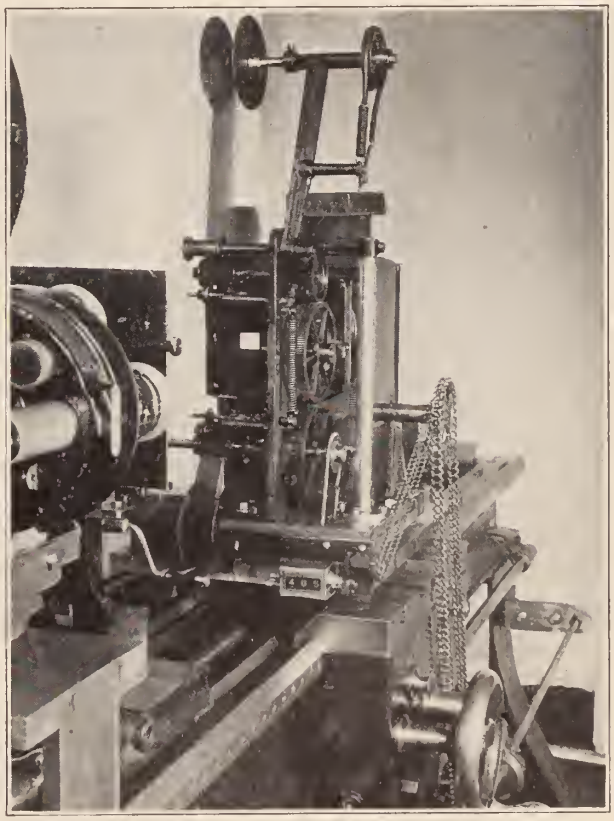
No. 1—Complete view of optical printer ready for operation.

until convinced against their will that they could not go against the principle of standardization. In order to make use of the negatives which they made, they found it necessary to print their larger sized negatives on the Edison or 35 mm. stock. Most of these odd sized negatives of any commercial value were larger than 35 mm. in width and in order to make standard prints they used crude optical printers constructed on the same principal as the reduction printers which are used today for the production of 16 mm. prints from 35 mm. negatives. Usually these optical printers consisted of two projection machine heads mounted on a board or table with a lens between them and a lamphouse behind the head carrying the negative film. By means of this arrangement a small picture of the negative could be projected upon the positive film in the standard projection head. By operating two machines in unison a small print was made from the large negative.

Standardization Essential to Progress

Although Edison standardized the size of the film it was not until a number of years later that the relation between the frame line and the perforations was standardized by the Society of Motion Picture Engineers. Today the line between the frames or pictures comes midway between perforations but before the standard frame line was adopted there was no uniformity and and the line might be on the center of the perforation, between the perforations, or anywhere else. Where more than one camera was used on a production the picture jumped out of frame at every camera change so that the projection machine operator had to keep his hand constantly on the framing lever. Optical printers were used to a limited extent for making prints with a uniform frame line. Some of the news companies like Pathe reperforated negatives to a uniform line until the adoption of the standard frame line rendered this unnecessary.

When the law forbidding the inter-state shipping of prize fight films was passed optical printers were put in operation with the two heads on opposite sides of the state line and the picture was projected across the line onto the film on the other side. Once more genius went



No. 2—Detail view of changeable frame line projection head on Barber Optical Printer.

unrewarded for the judge ruled that although the "shipping" consisted in transmitting such intangible things as rays of light the defendant was nevertheless guilty under the law.

(Continued on Page 22)

Movie Make-Up

Is Make-Up to Be or Not to Be---Panchromatic Film Causes Misapprehension

By Joseph Dubray, A. S. C.

The generalization of the use of Panchromatic emulsions in motion picture productions has brought about a situation which we will call unfortunate, though we are prone to use a much stronger adjective the more emphatically to lay stress upon the argument.

The use of panchromatic film will release the actors from the use of make-up. This is the dangerous conclusion arrived at, we do not know from what source or why. Just one of those misunderstood statements which pass from lip to lip until they take on the proportions of a dictum and insidiously sap the very existence of an absolute necessity.

On the advent of Panchromatic film a more perfect rendition of colors and tones was announced and the subsequent changes in make-up were heralded: a *change* in make-up but not its *abolition.* The declaration made at the time that less and more natural coloring in make-up could be used, was construed by many as the knell announcing the death of make-up, and grease-paints and powders were gaily tossed aside in spite of the protests of the cinematographer—even in spite of some of the unpleasant results thrown on the screen and blamed upon everything and everybody instead of being charged upon their real cause—the absence of make-up.

Let us analyze all causes and effects.

Make-up, beside tricky characterizations, has been deemed essential in the past because;

First: The photographic rendering of skin texture and colorings could not ring true with the non-panchromatic emulsions.

Second: Imperfections of contour and features, disfiguring marks undetectable by the eye in normal conditions, but emphasized by the camera and by the tense attention paid by an audience to the greatly enlarged picture on the screen, could be corrected and rendered invisible.

Third: The contrast of skin textures or colorings existing in nature and greatly emphasized and exaggerated by the photographic process could be reduced to a more pleasing uniformity, more true to the visual, natural impression.

Fourth: Changes brought forth in the general coloring of the features of the players by uncontrollable elements—such as, for instance, the tanning or sunburning of the skin through prolonged exposure to the elements —could be controlled and checked so as to keep the true characterization of the role throughout the picture.

Fifth: Evident signs of fatigue prominently visible and occasioned by the strenuous work, to which a player is subject during the making of a picture, could be kept under control and again, the continuity of characterization kept intact.

These are the main reasons which made the use of make-up imperative and we could keep on indefinitely citing particular cases demonstrating the essentiality of this artistic means of surmounting difficulties otherwise impossible to overcome.

Now what are the effects of Panchromatic film? A better rendering or translation in neutral tone of the varied colors; and this, to a certain extent, diminishes the necessity of heavy and unnatural looking make-ups that have been used in the past, but it *does not correct* the differences in color and unsightly patches latent in the smoothest skin and the most pleasing complexion which the camera unmercifully discloses.

Panchromatic film is an improved material by means of which the cinematographer can express the photographic qualities of the subject or scene he is photographing, but it has not the supernatural power to correct or control any of the above mentioned causes that make the use of make-up imperative.

It would seem ridiculous to expect Panchromatic film to perform plastic surgery or to perform the duties and labors that fall upon the retoucher of portrait photography, but this is, in fact, what it is asked to do when the make-up is dispensed with.

The skill and artistry implied in the application of make-up replace the deficiencies or better palliate the crude verities disclosed by the photographic emulsion, be it ordinary, orthochromatic or panchromatic. This skill and artistry represent the human element of added beauty to the better rendition of nature's gifts.

H. R. Poore expressed a great axiom when he said: *"Science has to do wholly with truth, Art with truth and beauty, but in establishing a precedent, puts beauty first."* The role of make-up is to put *beauty* in truth. It serves to correct the imperfections of nature and to add that element of Beauty that we call Art.

Now, the imperfections of nature are not in motion picture photography confined solely to the physical appearance of the subject or to the changes that may happen to his skin, smoothness and coloring from external causes, such as a slightly diseased condition provoked by prolonged exposure to the atmosphere, but these imperfections are also provoked by the limitation imposed upon the cinematographer by the mechanical, chemical and optical elements that are at his command and contribute to production of motion picture photography.

Most important of all are the limitations and peculiarities inherent in the light-sensitive material that forms the image that we call a picture.

It would be out of place to enter here into a technical discussion of this matter. Suffice to say that profound study and prolonged experience are necessary to acquire a thorough knowledge of these limitations and peculiarities and to become skillful in overcoming them.

Of prime importance is the rendition of tone values which is nothing else but the result of the photo-chemical action of the light reflected by the subject upon the sensi-

(Continued on Page 25)

Economy of Production

Evidences of Earnestness Seen in the Co-operation of the Academy and the A. S. C. in the Lighting Tests at Warner Brothers

By Lewis Physioc

We were beginning to think that the cry of economy was the usual motion picture "fadeout," for want of a better expedient, and we were just about to echo the old fabulistic simile "wolf! wolf!" but we were checked in our pessimism by some recent signs of renewed activity. The co-operation between the Academy of Arts and Sciences and The American Society of Cinematographers, in their experiments with incandescent lights at the Warner Brothers' Studios is an indication of a genuine desire, on the part of these technicians, to test the possibilities of economy in this important department.

These evidences of earnestness and sincerity should encourage the lowliest among the craft to express themselves, without fear of having imputed to them the least thought of impudence or presumption. Let us, rather, credit them with a genuine desire to do their bit towards the solution of the great problem. Everyone should be anxious and willing to contribute something to a movement that must be right since all seem to agree that it is necessary.

First of all, let us determine whether this picture making is a business, an art or a plaything. Each of these definitions has its claims to patronage. The magnitude to which it has developed as an industry proves that some hold it to be, purely a business proposition. The product, itself, demonstrates that civilization has developed a new and wonderful art. Popular fancy proclaims its value as an entertainment, and the delight of being associated with the actual production has led certain men of means to sponsor it as a hobby and they have enjoyed the two-fold pleasure of indulging a crotchet together with financial returns beyond expectations, to say nothing of the pleasure of public applause that acknowledges good sportsmanship, patronizing the arts and sciences and general benevolence.

Now let us consider the thing as an art.

The masterpieces of all branches of art teach us one truth that stands out above all other considerations; it is the fact that all great works of mankind are the result of some beautiful inspiration, engendered, primarily, in the heart of man, a noble desire to do something to make his fellows' existence a happier lot; to develop in them an appreciation of all things beautiful—music, printing, sculpture, architecture, astronomy, etc.—the development of the spiritual, intellectual and moral nature by works of literature. Whatever it is, the ultimate idea is to add to man's happiness and welfare.

Now the generous applause of a delighted public immediately introduces the natural consequence—material reward, which, in turn, establishes comparative values of great services rendered to mankind, with the ultimate and inevitable introduction of business. It is not surprising, then, that there might be aroused in man other passions as natural to the human breast as the nobler sentiments of benevolence—cupidity is conceived, love of praise, an ambition to outstrip the other fellow, all of which are temptations to debase the motives of art and employ them for material gain by appealing, indiscriminately to the passions. All this immediately establishes a natural affinity between these two elements, art and business. Men of letters have analyzed the great literary works and attempted to classify the elements of popular appeal, trying to discover the public taste, and have humored them fairly successfully—artists paint certain subjects that have proven good sellers—picture producers have followed the lead of great successes, and the result is that all of the forms of art, through comparison and criticism, are rapidly developing into a set of formulae, and we begin to fear the responsibility of judging innovations in technique as well as originality of conception and design. To this fact, is due the tendency to produce pictures for the critics who are supposed to reflect the public taste. Maybe it is erroneous to suppose that we can direct the public mind through the assumption that "we know what the people want." A survey of the great works of mankind seem to suggest that the people have had very little to say about what they wanted but, when given something that has pleased, they have always given generous proof of their approval. This should be some encouragement for great minds to proceed bodily, uninfluenced by rule or formula, honest, first of all, with themselves, in their effort to do their best, regardless of labor or cost. A painter cannot be stingy with his palette, poor colors will not endure and good ones are expensive. We must also remember that by formula or precedent, we may never produce another Shakespeare, da Vinci or Phidias but civilization will always enjoy beautiful and original works of other great minds—there will always be great motion pictures.

Now when it comes to counting the costs we must set reasonable bounds. We must acknowledge that we cannot emulate the fastidiousness of Thomas Gray who devoted seven years to his Elegy or a Macaulay who insisted on a final edition of his history to correct a single sentence, because we are engaged in an art that is so closely identified with business as to demand that we make every effort to reconcile the two. This we attempt by acknowledging that, both in art and in business, there is a curriculum that cannot be denied or evaded. Let us study this by offering a simple, but very relevant similitude: we may give a child a kodak and a generous supply of films and expect that by the merest chance he may bring in one or two very pretty pictures; and that by continually comparing failures with successes he may eventually develop an ability to achieve, directly, what he designs. This is a costly method but it is the one by which many of us have obtained our motion picture training. It has been the general process of the business for the past twenty-five years. We had no other resources. We had no trained exponents to show us short cuts to results. We suddenly found ourselves in the midst of a tangled web of beautiful possibilities and left to extricate

ourselves as best we could, while trained dramatists, technicians and business men watched the process with ridicule, resentment and, finally, with envy. But despite the fact that this school has been an expensive one the picture business has developed, in the very short period of twenty-five years, the most remarkable array of talent—business executives, techicians, writers—artists in all branches, probably, in the history of civilization—some of them geniuses, that but for the advent of motion pictures might have continued in obscurity.

But unfortunately, in this medley of recruits, we have discovered many who were not endowed with the natural qualifications to enable them to follow in the march of progress, many not capable of maintaining the leadership they had been accorded, and that all new movements need, and we are now face to face with the necessity of organizing and preserving to the industry those whose inherent talents justify their positions, and of cutting away the "dead wood"—a cruel expression, but as in all cases, the law of evolution asserts itself and we acknowledge the survival of the fittest. It is a difficult proposition—there is a great deal of sentiment connected with it—we hesitate to thrust out old pioneers because they are foot-sore and unfit to continue in the march of progress; but cold-blooded business refuses to recognize sentiment. Who is to inaugurate this reorganization?—the industrial leaders. They must discern the talent where it appears.

There is much talk, now-a-days, about the young man. Many account for the present cry for economy with the phrase "youth has had its fling," but if genius is exhibited in the young it must be recognized. Nor must the judgement and years of experience be overlooked as a value in directing youthful pep and enterprise—and great ability, both in youth and maturity, is often to be found in modest retiring natures. It is to be deplored, but this is a condition that is to be expected in a profession such as ours where publicity and influential representation is the only entree.

This we do know, by the traditions of the ages, "youth seldom counts the costs," which brings us to the queston under consideration.

When we consider the variety in character of the many pictures that are made and compare the results as to popular reception, this idea of costs should seem a simple one. A picture can be made for five thousand to five million dollars, which involves several considerations; first, what is the popular appeal? Is it simple beauty and nobility of theme adequately presented? Is it the extravaganza; sensationalism or star exploitation? Secondly, which of these have brought the greatest returns in proportion to amount of money invested? The first we may never be able to determine accurately but it seems logical to presume that the experience of the producer, the exchange man and the exhibitors should enable them to appraise these values. We assume that these appeals from the producers respecting economy is the result of these findings and that we have set a pace for elaboration of production to which we must surrender, and if this is the fact, it is incumbent upon every one engaged in the art, to aid in this program of retrenchment.

We cannot deny, however, that this movement will present many problems to the producer because there may develop a very natural jealousy among the various departments as to their importance, for it has already been observed that each one can give commanding arguments in its favor. The writers claim the importance of the story, the stars' popularity proclaims their position, the photographic department will tell you that "the film is the cheapest item of all," the art director asserts that all are sacrificed without adequate settings and so on through the entire organization. But when we consider a single picture that involves such items as a hundred thousand dollars for the story, an equal amount for a star's performance, double that amount for sets we begin to feel that even forty thousand dollars for film is an item to be considered.

But all troubles may be corrected at the source; therefore let us ask ourselves whether the present tendency towards expensive productions is the result of an honest desire for artistic excellence or merely a competitive policy, both as to magnitude or organization and extravagant display—a desire to out-do the other fellow. If this is the case, a solution may be found in a superior judgment as to what are the real elements of artistic production, a true discernment of talent and a judicious marshaling of these forces, in which event, competition will assert itself by force of merit rather than by the intimidation of expensive display.

Primarily, we are engaged in the art of picture making, and the elements of a picture should be simple, for those who have studied painting or the other branches of art , cannot be persuaded that there is a great dissimilarity in the rules of artistic expression, whether in motion pictures or the other forms. The first principle taught us is simplicty—of conception, composition, tone values—a simple palette, broad brushes and bold strokes. Now those among the producers who can draw a line between exaggeration of detail, extravagant display, a general complexity of all the elements and an elegant and a convincing simplicity, will produce more artistic and cheaper pictures. This is not easy; it represents the acme of artistic training.

It might appear presumptuous for any one to try to consider, generally, items for improvement, rather let us look to each department for their earnest intention, but there are certain observations continually recurring to the earnest student. The great sums of money involved frighten away all thought of innovations. We fear to risk a story that has not been proven by the publisher, and yet we feel that there may be overlooked many fine originals by people trained to picture writing. Directors take no chances of a failure—thousands of feet of film are expended in safety or covering shots, increasing the troubles of the cutter and endangering simplicity and fluency of continuity. Cameramen are excited to little extravagances —large rolls of film are thrown into the waste cans because of the fear of running out on an important scene, in the justifiable explanation that time is cheaper than film. We have not yet discovered, nor have been willing to acknowledge the limits or discriminating power of our two dimensional camera, and until the perfection of stereoscopic photography is a fact, the magnitude and elaboration of settings will be sacrificed to the flat field of a mono-lens rendition. And the very nature of this one-eyed monster makes it possible to cheat the cost of sets by substituting flat paintings, photographs, miniatures, etc., by camera tricks.

A fastidious attention to detail is also reflected in the choice of furnishings and materials. Priceless tapestries and antiques are placed where our cyclops of a camera

A. S. C. as Firemen

The following excerpt from the Illustrated Daily News pays a well deserved tribute to the members of the A. S. C. who volunteered as firemen at the Warner Brothers' studio fire and kept the blaze under control until the city fire fighters arrived:

Fire which caused about $100,000 loss to Warner Brothers' studio at Sunset boulevard and Van Ness avenue, and for a time threatened the entire plant, was brought under control last night by nine fire companies answering a second alarm, after the entire block between Sunset boulevard and Fernwood street on Van Ness avenue had been burned. The loss was covered by insurance.

When the alarm was turned in a group of cameramen were attending a lecture in the studio and their prompt first aid in fighting the fire is credited with saving $1,000,000 worth of unreleased film stored in a concrete laboratory building, which turned out also to be the strategic point of the fire fight, according to Chief Engineer Frank Murphy.

The fire started on warehouse stage 4 of the studio and was discovered first by an unidentified watchman across the street, who turned in the alarm. Cause of the blaze was spontaneous combustion in used sets stored in the building, firemen said. Police said it started in the transportation office.

The stage, another set storehouse and the studio transportation office were destroyed on the studio lot.

Mr. E. W. Johnston, of the Baush Lomb Optical Co., of Rochester, is in Hollywood conducting an investigation on lenses applying to both photographic and projection purposes. His visits to the offices of the A. S. C. and to the Warner Brothers' Studio during the incandescent-lamp tests have already resulted in a more perfect contact between cinematographer and lens manufacturer, and good RESULTS are expected to follow.

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cannot reveal their intrinsic value. These are all small items but when considered in every department and footed up at the end of every picture amount to considerable.

As regards the star, let us not forgt that as long as man has existed he has had his idols—hero worshiper, calls it. Nature's endowments in the form of beauty, personality and talent have always been idolized and always will be. So let us not quarrel with the stars, rather let us try and have them reason with us. The only unfortunate feature of the star system is that many good stories may be sacrificed on account of their being unfitted to the star.

This last consideration suggests an element in picture making that we cannot refrain from mentioning, and that is the independent producer. Independent seems to be a happy term, and we may learn a great deal from them. Independent of all the complications and exactions of the big organizations, burdensome overheads, long periods of inactivity—that seeming necessity of all starting and all finished at once. The independents secure the best story that may be available, as judgment directs, fitting their cast to the story and calling on other resources as needed, when and where they wish, independent of all production restrictions.

Credit Where Due

In recent reviews of "WINGS" critics give credit for its success to its aerial feats and spectacular shots of different kinds, which have never before been caught in action by the camera, and rightly give credit to the Paramount organization, Lucien Hubbard, Wm. Wellman and the cast. Now, in all fairness to Harry Perry as chief cinematographer on this production and to the men who co-operated with him, we want to tell their part in making "WINGS" an unusual and interesting picture.

Mr. Perry was engaged for this picture about two months before actual production started, because of his experience in aerial photography and so that he could have time to work out the mechanics necessary to get the effects called for in the script of "WINGS."

Many of these at first sight seemed impossible and he spent days figuring out mounts for cameras to be put in every possible and impossbile place on an airplane and in making tests and working out electrical devices so that they could be operated by the pilot or actor in the air; also mounts for cameras of different makes to be used on different types of airplanes by cameramen themselves.

Mr. Perry also went to Texas twice before the start of production to make tests in the air and help select locations. While on the picture he personally supervised over 200 motor-driven cameras on airplanes, working out the exposures and filters used on each shot before it went into the air and, besides this, the other cinematographers and Mr. Perry had nearly 300 hours of actual work in the air which involved the hardest kind of work, quite a few escapes from serious accidents, which meant no thought of personal safety.

Therefore we believe that the cameramen who actually put the majority of the air scenes in "WINGS" on the film are entitled to their share of the credit for "WINGS'" success, and they are Harry Perry, Burton Steene, Al Williams and Paul Perry.

William Rand, A. S. C., who photographed the Akeley shots in "The Last Command," and "The Street of Sin," is now busy on "The Patriot," an Ernst Lubitsch production also featuring Emil Jannings.

He tells us that Mr. Jannings is fast becoming familiar with the English language. When he arrived in Hollywood his vocabulary was limiited to such expressions as "Good morning" and Thank you." Since most of his directors speak German with ease the balance of the staff began to make Mr. Jannings familiar with English.

Rand reports that he quickly learned such studio phrases as "O. K.," "One hour for lunch," and "All right; 9 o'clock in the morning," and that now, after several months in this country, he speaks English with almost perfect ease.

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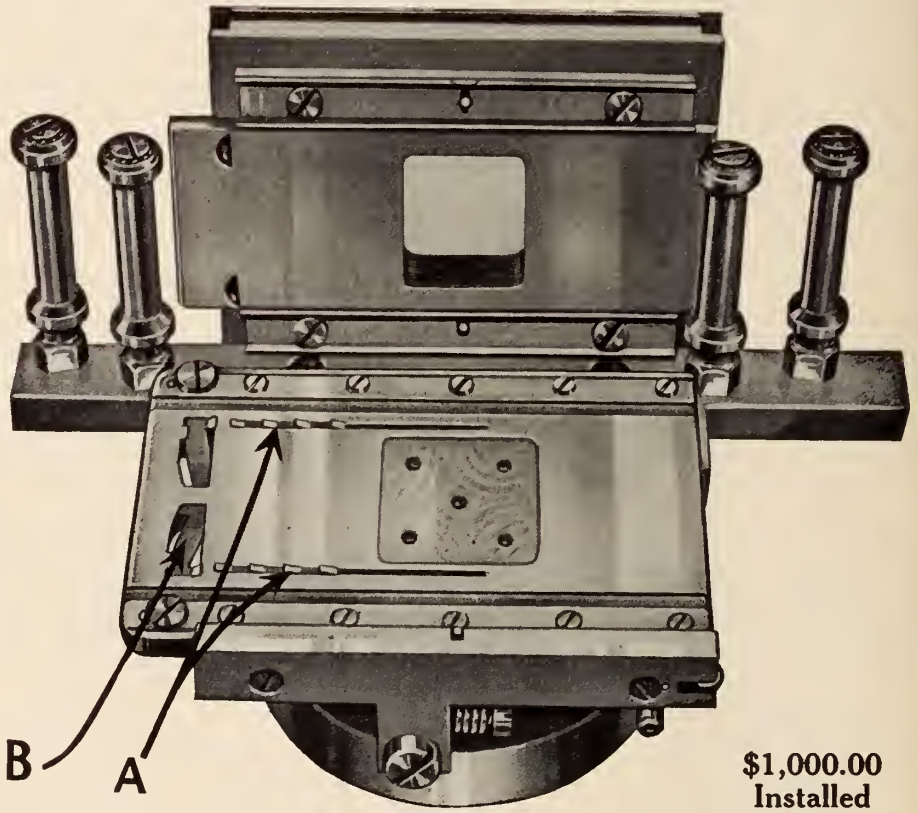

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Light Filters

Their Characteristics and Applications in Photography With Explanatory Diagrams---In Three Parts

By Loyd A. Jones

Of Eastman Research Laboratories.
Abridgement of Paper from S. M. P. E. Transactions.

In a previous communication the use of panchromatic film for motion picture purposes was discussed at some length. The fundamental principles involved in the photographic reproduction of the tonal scale, that is brightness and brightness differences, in the case of colored objects were outlined and attention called to some of the advantages arising from the use of panchromatic film for this purpose. The use of light filters was mentioned briefly but no attempt was made to deal with this subject in detail. Since a thorough understanding of the nature of light filters and their use for obtaining a desired effect is essential to the attainment of the best results in the application of panchromatic film to various problems confronting the photographic worker, it seems desirable at this time to present a somewhat more complete and detailed treatment of the subject. Believing firmly in the premise that the nearest approach to perfection in the practice of a science can be attained with greatest facility and certainty through an adequate knowledge of the theoretical aspects of the subject, the first part of this paper will be devoted to a discussion of some of the fundamental principles involved in the use of light filters. In the latter part the more practical phases of the subject will be dealt with and some data relative to the use of light filters will be given.

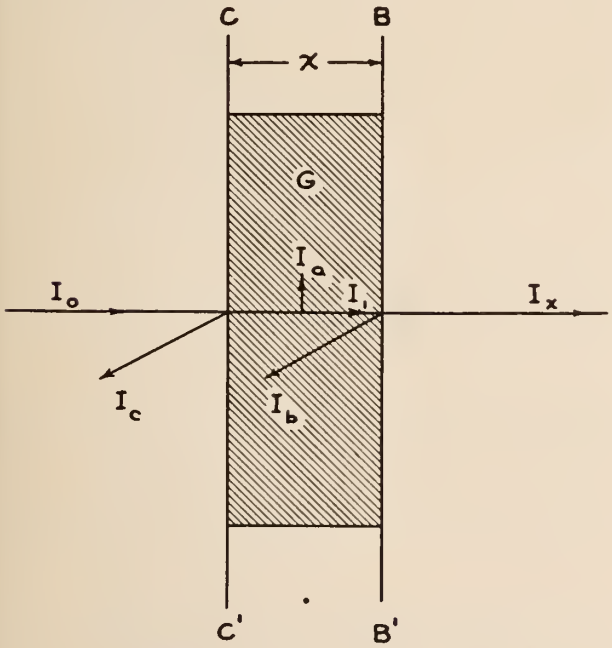

Fig. 1. Diagram illustrating reflection, absorption and transmission.

Fundamental Laws

When radiation falls upon a transmitting material, such as a piece of glass, a part is *reflected* at the first surface, some is *absorbed* within the material, some is *reflected* at the second surface, and the remainder is *transmitted.*

This case is illustrated schematically in Fig. 1, where the shaded area *G,* represents a cross section through a transmitting material, bounded by the parallel surfaces *CC′ and BB′.*

I_o represents the radiation falling upon the material; I_c the reflection suffered at the surface *CC′*; I_a the absorption within the material; I_b the reflection suffered at the second surface *BB′* and I_x the transmitted light.

The loss of intensity of radiation that results from the successive reflections and absorptions has been calculated following the Fresnell law of reflection and the results prove that the maximum intensity of light of any wave-length that can be transmitted through a filter having two glass surfaces is only 91.7 per cent of the incident intensity.

This 8 per cent (approximate) loss resulting from the use of a single layer of glass or gelatine is not as a rule serious, but if an attempt is made to obtain some desired result by the use of two or more layers, the loss of intensity due to this reflection at the glass-air or gelatine-air surface may be of consequence.

Absorption of Radiation. The absorption which occurs within a non-turbid transmitting material, follow a logarithmic law in the great majority of cases, including gases, liquids and solids. Thus if a given layer of material absorbs a certain fraction of the radiation, the next layer of the same thickness will absorb the same fraction of that transmitted by the first.

In dealing with solutions used as transmitting materials, the concentration of the solute in grams per unit volume is also to be considered and in the case of dyed gelatine filters, the calculation is carried including the dye concentration expressed in grams per unit area.

Measurements, Graphic Representation and Computation.

To determine quantitatively the absorption of a light filter for radiation of different wave-lengths a spectrophotometer is used. An essential element of this instrument is a device, such as a prism or diffraction grating, for dispersing or separating into its component parts the radiation from some suitable source (such as the electric arc or incandescent lamp) which emits many different wave-lengths. In this way a spectrum is formed and by means of a narrow slit suitably placed, radiation of any desired wave-length may be isolated. One-half of this *monochromatic* radiation is then allowed to fall upon the filter being examined and the intensity of the radiation transmitted by the filter is measured by comparing it in a suitable photometer with the other half of the monochromatic beam which has not been subjected to the absorbing action of the filter. In this way values of transmission, that is to say the ratio of the intensity of the light which is transmitted to that which falls upon the material, for a series of different wave-lengths are obtained.

These values plotted as a function of wave-length, give a curve which shows the absorption characteristics of the filter in graphic form. This is called a *"Spectrophotometric curve."* Such a curve is shown in Fig. 2 applying to a gelatine filter made by the use of Toluidine blue (Filter No. 38 of the Eastman catalogue of Wratten Light Filters).

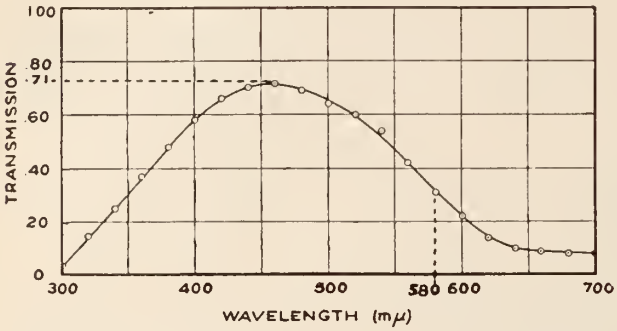

Fig. 2. Spectrophotometric transmission curve of green filter.

In this graph, the abscissa has been divided in as many parts as wave-lengths are to be found between 300 and 700 millimicrons, that is to say the wave-lengths ranging from the acitnic ultra violet to the red visible portion of the Spectrum.

The ordinates indicate the ratio of the light intensity after transmission to that before transmission.

For the Toluidine blue filter, we find that the maximum transmission is approximately at wave-length 460 in the blue region of the spectrum and is equal to approximately 71 per cent of the intensity of the original incident light.

For many purposes, the expression of absorption in terms of optical densities, is more convenient than in terms of transmission. If it is desired to compute the spectral distribution of absorption for two superposed filters, the *"transmission"* values at each wave-length for the two fllters must be *multiplied* together, while if *"density"* is used, it is only necessary to *add* the values at corresponding wave-length.

In the case of solids, liquids and gases the *"density"* is directly proportional to the thickness of the transmitting material.

In the case of dyed gelatine, *"density"* is directly proportional to the dye concentration expressed in grams per unit area.

This direct proportionality, of course, applies only to the values of the *"density"* after correction for surface reflection.

Density as computed from transmission measurements made in the usual manner, includes the intensity losses due to surface reflections.

Having determined the densities due to absorption of any wave-length for one thickness of the transmitting material or for the concentration of the dye incorporated in the gelatine filter, the densities due to absorption for any other thickness of the material or any other concentration of the dye, can be computed by simple procedure of multiplication.

In Fig. 3 curve *A*, the spectrophotometric curve for the filter illustrated in Fig. 2, is shown

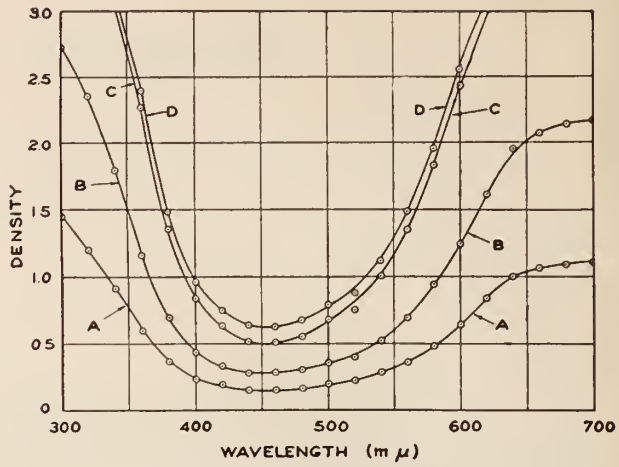

Fig. 3. Spectrophotometric density curves of green filter, illustrating relation between density and concentration and effect of surface reflection.

In plotting the graph, wave-length values are taken as abscissa from wave-length 300 to wave-length 700 as in the spectrophotometric transmission graph (Fig. 2). The *"density"* is expressed by the common logarithm of 1/Transmission, so that a density of one, corresponds to a transmission of 10%, a density of two to a transmission 1% and a desnity of three, to a transmission of 0.1%. The density is plotted as ordinate.

Let us consider, as an example, the transmission of the Toluidine filter in Fig. 2 at wave-length 580.

The spectrophotometric curve of this filter at this wave-length, indicates its transmission to be 0.316, or 316 per 1000. The corresponding density is then given by the logarithm of 1/0.316, i. e., by log 3.16. The tables of logarithm, give us log 3.16, equal 0.4997. In plotting the density graph, the density of this filter for wave-length 580 is then placed at the junction of the abscissa 580 and ordinate 0.4997 as shown in Fig 3.

Densities for other wave-lengths are similarly plotted and the curve *A* in Fig. 3 is finally obtained.

Now, suppose it is desired to determine the effect upon the spectral absorption of increased concentration of the dye used in making the filter. Let the required concentration be 2 and 4 times that represented by curve *A*. Computing the necessary values for various wave-length, taking into account the losses of intensity due to reflections and absorption of the transmitting medium and plotting, the curves *B* and *C* are obtained.

It is interesting to compare the result obtained by increasing the concentration 4 times (curve *C*), with that obtained by using 4 layers of the original film.

This case is represented by curve *D*, the ordinate of which were obtained by multiplying the ordinates of curve *A* by 4.

It will be noted that the minimum density of curve *C* is appreciably less than that of curve *D*, thus the transmission of filter *C* for the wave-length which it transmits most freely is greater than that of filter *D*. The filter obtained by increasing the concentration four times is therefore more efficient from the standpoint of high selectivity in absorption characteristics than that obtained by using four layers of film.

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Hallenberger, Harry—Lasky.
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Linden, Eddie—Universal.
Lloyd, Art—Hal Roach.
Longenecker, Bert—Artclass Prod.
Lyons,Chester—Fox
Lyons, Edgar—Christie.
Lyons, Reginald—Fox
Lundin, Walter—Harold Lloyd, Metropolitan.
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Newhard, Robt.—
Neumann, Harry C.—Universal.
Norton, Stephen S.—
Oswald, H. M.—

O'Connell, L. Wm.—Fox.
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Perry, Harry—Caddo Prod.—Met. Studio.
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Smith, Leonard—Educational.
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Wagner, Sidney C.—Fox.
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Walker, Joseph—Columhia.
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Whitman, Philip H.—Directing Sennett Studio.
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Walters, Joseph J.—F. B. O.
Westerherg, Fred—De Mille.
Wilde, Harry—
Williams, Alfred E.—Lasky.
Rex, Wimpy—Lasky.
Witzel, E. L.—Universal.

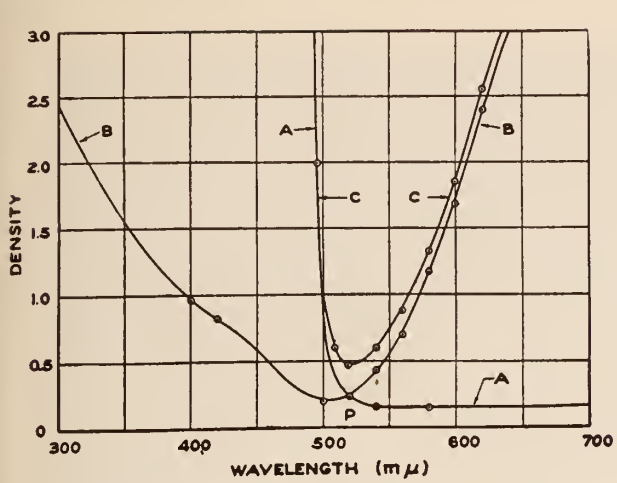


Fig. 4. Spectrophotometric density curves of "A" red filter, "B" green filter, and "C" the green filter obtained by superposing "A" and "B."

The expression of the data in the form of density is also most convenient where it is desired to compute the spectral absorption obtainable by the superposition of two or more filters or the use of two or more dyes in the same solution or gelatine film. In the case of the superposition of the two sheets of dyed gelatine or pieces of glass it is only necessary to add at each wave-length the density values as determined directly by the spectrophotometer. In case the addition is to be made by incorporating two dyes in the same solution or in the same sheet of gelatine it is apparent that the appropriate correction must be made for any surface reflection factor which may be included in the density values for the individual dye components. In Fig. 4, curve *A*, is shown the spectrophotometric density curve of a yellow (blue absorbing) gelatine filter. Curve *B* shows the same characteristic for a blue-green (red absorbing) gelatine filter. Curve *C* is that obtained by adding the ordinates of *A* and *B* and shows the spectral absorption obtained by the superposition of one layer of each filter. Curves *A* and *B* intersect at the point *p* of which the density value is 0.25 (transmission=56.4%). The density of the superposed combination, curve *C*, at the corresponding wave-length is two times 0.25 or 0.50 (transmission=32%). This is the

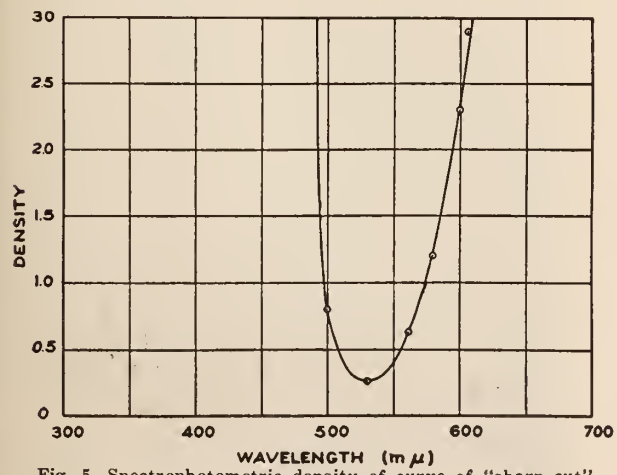


Fig. 5. Spectrophotometric density of curve of "sharp cut" green filter.

minimum density value of *C*. Hence at the wave-length which is transmitted most freely by the combination only 32 per cent of the incident radiation is transmitted. This compound filter (curve *C*) is bright green in color and isolates fairly well the wave-length band from 500 to 600mμ. A filter of much greater efficiency for this purpose can be made by incorporating properly selected dyes in a gelatine film. Such a filter is illustrated by the curve in Fig. 5. This has maximum transmission at approximately the same wave-length as *C* (Fig. 4) and its density value is approximately 0.25, corresponding to a transmission of 54 per cent, almost twice that of filter *C*.

A similar low efficiency is usually encountered to a greater or lesser extent whenever an attempt is made to isolate some particular spectral region by superposing two or more separate filters. This is due in part to the increasing loss in surface reflections as the number of separate filters is increased. Furthermore each filter is designed by the manufacturer to give some specific spectral absorption with maximum efficiency and to this end the best possible available dyes are selected. If some entirely

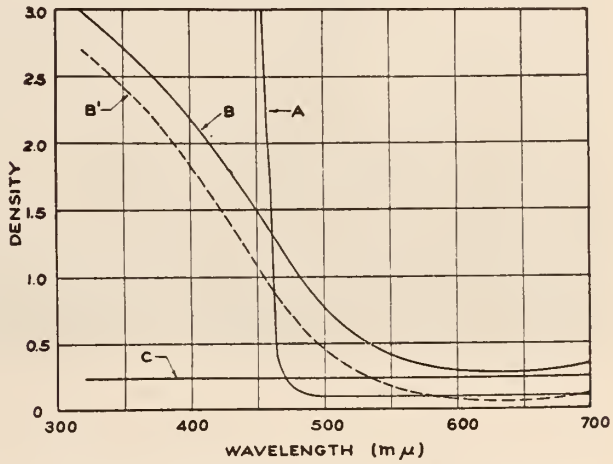


Fig. 6. Spectrophotometric curves illustrating "sharp cut" "A," gradual cut "inefficient" filter "B," and gradual cut efficient filter "B'."

different spectral absorption is required it is probable that dyes can be selected which will function with greater efficiency than can be obtained by combining two filters designed specifically to meet other requirements.

The terms "sharp cut" and "gradual cut" are frequently applied as descriptive of light filters. The significance of these terms may be illustrated by reference to Fig. 6. Curve *A* is the spectrophotometric curve of a brilliant yellow gelatine filter. Its density at all wave-lengths greater than 480mμ is 0.1 (transmission=86%). The absorption at wave-lengths less and 480 mμ increases rapidly so that at 460mμ its density is 1.5 (transmission =3.1%). Such a filter is described as a "sharp cut" filter. It is evident therefore that the term "sharp cut" applies to a filter of which the absorption curve is steep, that is the rate of change of absorption with variation in wave-length is great, or conversely the condition described as "sharp cut" applies to the case where a relatively small change in wave-length is accompanied by a large change in absorption.

Curve *B* applies to a piece of *amber* glass and to such a filter the descriptive term "gradual cut" is applied. It will be noted that the wave-length band over which the change from its minimum to maximum density occurs is very broad, extending from 600 mμ to 300 mμ

(Continued on Page 26)

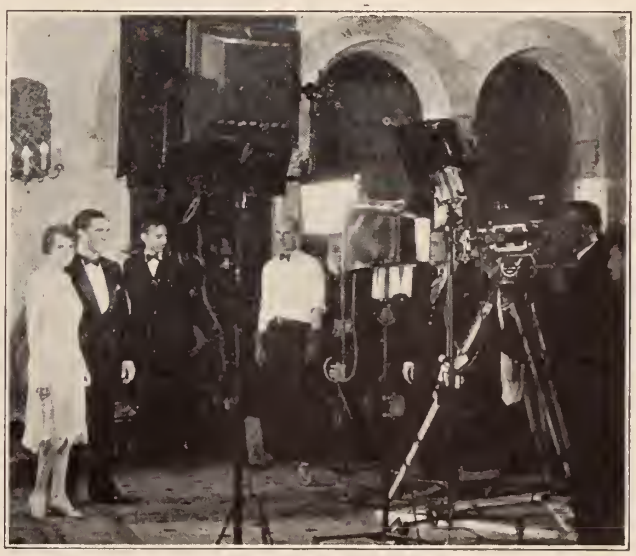
Aerial photograph shot by First Lieutenant Willis R. Taylor, commanding officer of the Fifteenth Photo Section, U. S. A., Crissy Field, California.

Standing—James, of the General Electric Company; Peter Mole and J. M. Richardson, of Mole-Richardson; Electrical Engineer F. N. Murphy, of Warner Brothers... Seated—Farnham, Van Horn and L. C. Porter, General Electric Company.

The Research Club of Paramount-Lasky Studio

Set at Warner Brothers' Studio used in the incandescent light tests now making under the direction of the Academy of Motion Picture Arts and Sciences and American Society of Cinematographers. The ceiling of this beautiful set is painted on glass and the light is from incandescent sources. The set has been used by all members of the A. S. C participating in the demonstrations.

ed of employees of the electrical department.



Gaetano Gaudio, A. S. C., directing incandescent light tests in the Roosevelt Hotel lobby, Hollywood; Donald Keyes, A. S. C., assisting.

The S. M. P. E.

(Continued from Page 5)

Los Angeles, Calif.; George A. Mitchell, Mitchell Camera Co., 6025 Santa Monica boulevard, Hollywood, Cal.; Otto K. Olesen, 1645 Hudson avenue, Hollywood, Cal.; M. W. Palmer, Famous-Players Lasky Corporation, Long Island City, N. Y.; Roy J. Pomeroy, Famous-Players-Lasky Studio, 5451 Marathon, Hollywood, Cal.; W. R. Rothacker, First National Studios, Burbank, Cal.; Wm. Sistrom, Cecil B. De Mille Studio, Culver City, Cal.; A. George Volck, Cecil B. De Mille Studio, Culver City., Cal.; C. A. Willat, 1803½ Gower street, Hollywood, Cal.; Alvin A. Wyckoff, American Society of Cinematographers, 1220 Guaranty building, Hollywood, Cal.

Following is a list of the organizations represented in the S. M. P. E.:

The American Society of Cinematographers; Motion Picture News, Inc., Alexander Film Co., Rothacker Aller Lab., Province of Ontario Pictures, Technicolor M. P. Corp., American Photography, Sperry Gyroscope Co., Rothacker Film Mfg., Co., Kiddle & Morgeson, Eastman Kodak Co., Brenkert Light Projection Co., Atlantic Belatin Co., Griffin & Bowen, Inc., Bristol Company, Edison Lamp Works, Westinghouse Electric & Mfg. Co., Duplex M. P. Industry, Inc., Carpenter-Goldman Lab., Pathe Exchange, Akeley Camera, Inc., Eastman Theater, Kodascope Libraries, Inc., National Carbon Co., Pathe-Dupont De Nemours Co., Cummings Laboratory, Government Motion Pictures, Prechistenka Obulkov (Russia), Spencer Lens Co., Pathescope Co. of Canada, Ltd., Westinghouse Lamp Co., Helios Corp., Bay State Film Co., American Projectionist, National Lamp Works, John O. Elms, Famous Players, Lasky Corp., Trumbull Amusement Co. of St. Petersburg, Ford Motor Co. of Canada, National Theater Supply Co., Celluloid Co. of Newark, E. E. Fulton Co., Corning Glass Work, Gaumont Co. Gundlach Manhattan Optical Co., Orpheum Theater, International Projector Corp., Gregory, Carl Louis, General Electric Co., Consolidated Film Lab., Hertner Electric Co., Duplex Motion Picture Industries, U. S. Army M. P. Service, Kiddle & Morgeson, Bell & Howell Co., Erbograph Co., Cooper-Hewitt Electric Co., Herbert & Huesgen, Marcus Loew, Inc., F. E. Ives, Francis C. Jenkins, Daylight Film Corp., Bausch & Lomb Optical Co., Fox Film Corp., Kelley Color Films, Keuffel-Esser Co., Lang Mfg. Works, Pathescope of Canada, J. E. McAuley Mfg. Co., Electrical Testing Lab., Matlack Corp., E. J. Electric Installation Co., Technique de Pathe Cinema, E. Leitz, Inc., Chicago Film Laboratory, Mitchell Camera Co., National Cash Register Co., Bray Productions, Associated Screen News, Dept. of Trade & Commerce, Perfection Arc Co., Southern Enterprises, Inc., Warner Research Lab., Caribbean Film Co., M. P. Producers & Distributors of America, Raven Screen Co., Ilford, Ltd., Moving Picture World, Pathe of France, Ltd., Kodak Co., Cine Dept., Cecil B. De Mille Studio, Akeley Camera Co., Case Research Lab., Colorat Studio, Ansco Co., Urban-Kineto Corporation, Victor Animatograph Co., Ward Cine Lab., Inc., Williamson Manufacturing Co., Ltd., Famous Players-Lasky Corp.

Question—How did Panchromatic film originate?

Answer—The question is quite timely and the interest that it will undoubtedly arouse prompts the Answerman to devote to its answer all the space allotted to this department.

In the year 1873 the German scientist and investigator, H. M. Vogel, was conducting a series of experiments in order to find a way to eliminate the halation caused by rays of light reflected back to the sensitive emulsion by the glass supporting it. He thought that by incorporating a dye in the sensitive collodion in use in those days he could reduce such halation without destroying the sensitiveness of the plate.

During his experiments he noticed that a change in the sensitivity of the emulsion was noticeable. With the use of CORALLIN the yellow rays were rendered more actinic than they were with the ordinary emulsion.

This led him to investigate the properties of a number of dyes and he discovered that the emulsions were rendered MORE SENSITIVE TO THE LIGHT ABSORBED BY THE DYE ITSELF. Corallin, for instance, absorbs the yellow-green rays and the sensitivity of the emulsion to these rays was increased when the dye was incorporated into the emulsion or applied by a soaking of the ordinary plate in a weak solution of the dye.

CYANIN was one of the dyes experimented upon by Vogel.

Plates thus prepared were named ORTHOCHROMATIC from the Greek ORTHO, meaning "correct," and CHROMOS "color."

This appellation was quite incorrect because the dyes known in those days did not correct the color rendition throughout the spectrum and a new word, PANCHROMATIC, had to be coined when such correction was found to be possible.

In 1882 the French chemist, Attout Tailfer, introduced the use of EOSIN and ERYTROSIN in conjunction with ammonia which rendered the plates more sensitive to the yellows and yellow-greens.

In 1884 Vogel brought the sensitivity of the emulsion into the Orange-yellow region by the use of QUINOLINE and also preconized the mixture of different dyes such as QUINOLINE RED and CYANIN, to which he gave the name of "AZALINE PLATES." Vogel also discovered that Eosin had the strongest effect when used in the form of its silver salts dissolved in Ammonia.

In 1881 HIGGS orthochromatized plates with ALIZARIN BLUE and COERULIN, which rendered them sensitive to the yellow, orange the red regions of the spectrum. Higgs used the plates so prepared in photographing the solar spectrum.

In 1904 E. KOENIG produced the dyes known under the commercial name of ORTHOCHROM T, PINAVERDOL and PINACHROME which, used with the silver bromide emulsions, extend the sensitivity in the reds but more so in the oranges and greens. In the same year MIETHE and TRAUBE found that ETHYL RED was more suitable than cyanin, being more stable and consequently avoiding trouble and deterioration of the sensitized plates.

HOMOLKA, in 1906, discovered PINACYANOL, a red sensitizer, which in conjunction with a green sensitizer such as Pinachrome or Pinaverdol, would sensitize an emulsion TO THE WHOLE OF THE VISIBLE SPECTRUM.

Panchromatic emulsions were thus born.

Due to the conditions created by the world war the United States increased their contribution to the question and POPE prepared dyes identical with the dyes which were up to this time prepared only by German manufacturers.

MEGGERS and McCLELLAN succeeded in photographing the infra red regions with DICYANINE, reaching as far as wave length 10,140.

ADAMS and HALLE, in 1919, discovered KRIPTOCYANIN, producing a strong sensitivity in the infra red region and, in 1925, H. T. CLARKE, of the Eastman Kodak Laboratories, discovered NEOCYANIN, which gave remarkable results for its sensitiveness in the infra red regions, reaching as far as wave length 11,290.

Professor Wright, of the Lick Observatory, and Dr. Mees, of the Eastman Kodak Company, proved the penetration through atmospheric haze of plates sensitized with KRIPTOCYANIN or NEOCYANIN.

This brief outline of the history of Panchromatic emulsions does not give the least idea of the tremendous amount of work conducted in these investigations and of the difficulties that have been overcome to bring about Panchromatic materials presenting the conditions of uniformity and stability required to make such material a commercial success.

Virgil E. Miller, A. S. C., has signed a long term contract with the F. B. O. studios, after completing a picture directed by Dudley Murphy, in which "Skeets" Gallagher, Ruth Dwyer, Albert Conti and Patricia Avery were featured. The first picture to be made under the new contract will also be directed by Mr. Murphy. Its working title will be "Stocks and Blondes."

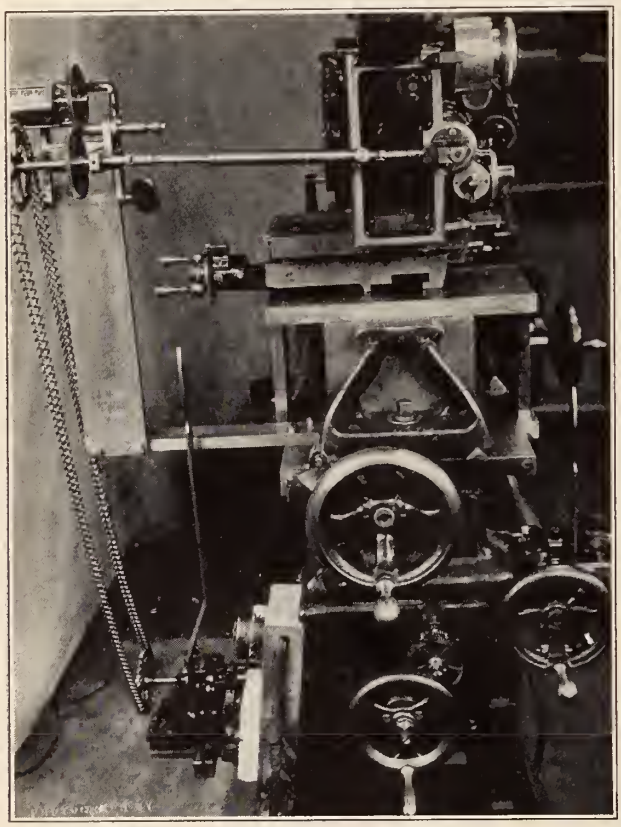
For Trick Work

By Hereford Tynes Cowling

(Continued from Page 7)

Invaluable for Animated Cartoons

With the development of the art of cartooning and of camera trick the optical printer came into use again as an ideal instrument for selecting from films already made, the components desired for the construction of composite or "trick" pictures, and for the recombining of these components into pictures. Most "trick" work and nearly all animation consists of an assembly or composite of time and action components. In animation the components are painstakingly drawn by hand and snythesized by photographing them in the proper sequence with a motion camera.



No. 3—Control end of Barber Optical Printer, showing wheels and levers which move and operate all parts of the machine from one controlling position.

New Life for Old Subjects

The requisite components for an infinite variety of new combinations exists in every small collection of photographically produced motion picture film, but to select these components from hundreds or thousands of film pictures, each no larger than a postage stamp, seems too staggering to attempt. This selection is only a half of the problem, for the components must then be reassembled with mathematical precision so fine that the new combination shall not reveal the joining lines between the welded parts even when maganified hundreds of diameters on the screen. The solution of this difficult problem is in a precision optical printer where every mechanical move can be controlled with micrometric precision.

Not a Secret

There is nothing secret about the principles of optical printing. They are known to every motion picture technician. A number of optical printers have been constructed for exclusive or private use and the details of their mechanical design have been kept more or less in seclusion. Realizing that there are many firms and individuals who have use for the product of such a machine and that the very few elaborate optical printers in existence are being kept for exclusive purposes, Mr. Fred A. Barber has constructed one of these instruments for the service of the public. Mr. Barber has put several years of time and experience into the design and construction of this precision instrument. He is a cinematographer and technical expert. His work as a specialist in the less known branches of cinematography have kept him in the laboratories and studios of companies which do only special and scientific work of difficult character. He is now associated with Carl Louis Gregory, in whose laboratory this machine is being operated.

Precision First Requisite

The base of the machine is a heavy six-foot lathe bed set on a concrete foundation. Sliding on the lathe bed which acts as an optical bench are three heads. The operator sits at one end of the machine where all of the controls ordinarily used are situated. On the head nearest the operator is a Bell & Howell camera with special magazines which take up automatically either backward or forward.

The second head has an interchangeable mount and takes any lens fitted for the Bell & Howell cameras. The third head carries a special projection head movement and lamphouse. All the heads may be shifted up and down or sideways and micrometer indicators reading in plain figures to one-eight-hundredth of an inch show the exact position of each member. A motor beneath the machine permits either head to run independent of the other and either head may run backward or forward. Several interchangeable mechanisms may be used on the different heads for different purposes, including enlarging from and reducing to 16 mm. size film.

Has Many Uses

So many different things can be done with this machine that it is not possible to list them here. Listed below are some of the principal things which can be done with it:—

1—Duplicate negatives which cannot be distinguished from original as no printer marks show on these negatives.

2—Changing frame line. Duplicate negatives can be made from non-standard negatives or prints and the frame line changed to coincide with any other standard.

3—Combining two or more negatives upon one film so that normal and ultra-speed may be shown side by side or a vision may be made from one negative and introduced into any other negative.

4—Negatives can be reproduced with the action slowed down or quickened to almost any extent. Normal action can be made from ultra-speed, thus giving normal and ultra-speed action from exactly the same view point.

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Exhibitors Trade Review:
"The best book ever written on the subject of Projection."

I. A. T. S. E. & M. P. M. O. of U. S. & Canada; Harry L. Spencer Assistant President:
"Every projectionist working in earnest for better screen results should read and benefit by the information which the book imparts in clear, understandable style."

Board of Education, City of Chicago:
"Like the book very much. Use it in visual instruction."

New York State Library:
"The book has been placed on our recommended book list."

The Largest and Most Comprehensive Book on the Subject Ever Published.

Cameron Publishing Co., Manhattan Beach, N. Y.

5—Hold action at any point. Action can be suspended and held still at any point in the film and then be continued or reversed or repeated. Very valuable for golf instruction films or for instruction in any other sport or for showing the action of machinery.

6—Reserve action. Any negative can be reversed to show the action backward, and this action can be slowed down or speeded up if desired.

7—Repeat action. Action can be repeated as many times as is required, and at the same time, reversed or the speed changed to suit any purpose.

8—Camera effects. All kinds of camera effects, such as: fade-in, fade,out, iris-in, iris-out, lap dissolves of any length or any other camera effect can be introduced onto negatives already taken.

9—Duplicate or multiple action of the same subject in the same scene. This can be in synchronism or different phases of the same action may be shown going on at the same time.

10—Double and multiple exposures from any number of original negatives in absolute register.

11—Super-imposed titles may be made in any portion of a negative which has already been taken and developed.

12—Borders, frames and masks may be introduced around any scene.

13—Close-ups can be made from semi-close-ups. Any part of any negative already taken can be enlarged or reduced.

14—Trucking shots. The effect of moving up on a scene for a closer view or of moving back to include more of the scene can be made from any negative already taken.

15—X-Ray views of machinery or any object in motion can be made showing both exterior and interior as if the machine were transparent.

16—Explanatory labels, animated lines, pointers, etc., can be introduced into negatives already made.

The effects enumerated above do not by any means tell all of the things which can be done by the various possible manipulations of the machine. The various combinations possible are limited only by the ingenuity of the operator and the film material which he has available for reproducing ideas.

With the ever-increasing demand to insure preservation of old film subjects of historical, scientific and other interest by duplicating processes; as well as to combine these features of past events within new productions; the development of this especially designed machine will meet a long-felt want. Mr. Barber is to be congratulated upon the ingenious labor he has given this subject.

R. G. Martin, A. S. C., formerly with M.-G.-M., has moved his equipment to the F. B. O. where he has just finished "Crooks Can't Win," starring Ralph Ince. He is now working on another opus with the same star.

Joe Dubray, A. S. C., has just finished making an extensive series of tests on Panchromatic emulsions. The Agfa sponsored these tests and Joe announces that he is gathering some data which will be very valuable to the members of the A. S. C.

Movie Make-Up

By Joseph Dubray

(Continued from Page 8)

tive film under conditions controlled by a lens. This photo-chemical action is not, even with Panchromatic emulsions, a perfect rendition of the impressions made by the same object on the human eye.

If the object be a human face, which is the case that interests us, the power of the reflected light that concurs to form the image on the films, varies considerably from subject to subject and still more considerable are the differences of its effects upon the sensitive film, the response of the film, in other words, to the reflected light.

Suppose, for instance (that which never exists in real life), two ideally perfect complexions, say of a young girl and a young man, which to all appearances would need no make-up at all for a perfect photographic rendition.

Taken individually the photographic results on the screen would be as perfect as may be desired, but if you put them together in the same picture, in the same scene, in a close-up, for instance, of the two heads, you would immediately notice that difference of response that is mentioned in the preceding paragraph.

All the ingenuity, all the artistry of the cinematographer is then called into play to balance his lightings so as to overcome the differences of actinic value of the two subjects.

And if the two subjects are not perfect, photographically perfect, so to speak; if their complexions are quite different in reflecting power in respect to the film, and if one of the subjects (and this is the condition that too often presents itself) wears make-up and the other none—well—it is then more than unjust to expect the cinematographer to perform the impossible feat of obtaining a well-balanced, perfect rendition of values, and the result then is bitter criticism, poor screen rendition, disillusionment, heart-ache and perhaps ill-feeling.

And if we consider the psychology of photography in regard to the dramatic values of a picture we may wonder how the beautiful heroine can sacrifice herself, the affections of her family, perhaps the love of her children, for the love of a hero of fine figure and lineaments but afflicted with a dirty, greasy looking face?

No matter how fine the performance the physical repellance reacts upon the audience to the detriment of the success which would be the reward of hard work, of sincere effort.

Make-up is the *controllable agent* that permits the abolition of these evils.

Some actors claim that make-up hampers their freedom of action and expression.

Let us be frank and unbiased. Make-up is a vital necessity in the making of motion pictures; it is a tool belonging to the trade of acting, and a very delicate tool requiring a great deal of study and experience in its use, study and experience which will minimize its possibly unpleasant features.

A man who has chosen the trade of carpentering has to accept the noise of the hammer hitting upon a nail no matter how unpleasantly the noise may offend his ears.

The artist painter accepts the odors of paint and varnishes.

The violinist can express his artistry in spite of the callouses that grow at the tips of his fingers.

And hammer and nails, paints and varnishes and pressure of the fingers upon the violin strings are as essential to these arts as make-up is to the motion picture performer.

IS MAKE-UP TO BE OR NOT TO BE?

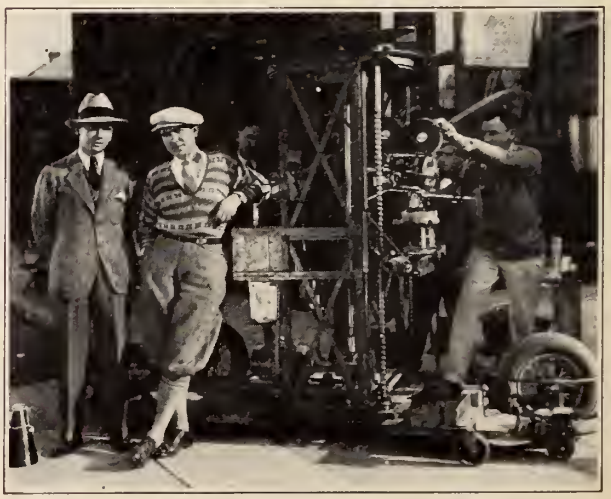
Light Filters

By Loyd A. Jones

(Continued from Page 71)

The slope of the absorption curve in this region of variable adsorption is low and hence the filter is described as one having a "gradual cut." The transmission of this filter for the wave-length it transmits most freely is very low, being approximately 50 per cent (density=0.3) in the region from 600 to 800 mμ. Filter A has a bright yellow color, while B has a hue slightly more orange and exhibits a dull "muddy" appearance. This term "muddy" is also used frequently as descriptive of light filters and indicates a relatively high general absorption for all wave-lengths in the visible region. The muddy appearance may be considered as due to an admixture of black in the filter. For instance let the dotted curve B' represent a filter having an absorption curve similar in shape to that of B but for which the density at all wave-lengths is .24 less than that of B. The maximum transmission of B', in the wave-length band from 600 to 690 mμ, is 90 per cent and such a filter has a clean brilliant appearance although the dominant wave-length is somewhat longer than in the case of filter A thus giving filter B' a hue which is more orange. Now suppose that to this filter (curve B') is added a black dye, represented by curve C of such concentration as to give a density of 0.24 at all wave-lengths. The addition of C to B' gives B, and the B' filter is changed thereby from a clear brilliant yellow-orange to a dull "muddy" amber. "Muddiness" in a filter is therefore due to something equivalent to the addition of a black component and is an indication of high absorption in the wave-length region of maximum transmission and hence of low optical efficiency.

(To Be Continued in April)



Wm. R. Howard and his A. S. C. comera crew at De Mille studio directing "His Country" for Pathe release. Left to right: Chief Cinematographer Lucian Andriot, who has shot all of Howard's pictures. Back of Andriot is Harold Stine, associate cinematographer. The weird contraption is the $10,000 electrical camera carriage. Elmer Fryer, company, still photographer, is also an A. S. C.

The P. A. of A.

Following is the program of the Forty-sixth Annual Convention of the Photographers' Association of America, to be held at Louisville, Kentucky, beginning Tuesday, March 27, 1928:

TUESDAY, MARCH 27

10:30 A. M.—Opening of Manufacturers' Exhibit.
1:30 to 2:00 P. M.—Community Singing.
2:00 P. M.—Convention called to order by Chairman of Convention Committee.
Singing of National Anthem.
Singing of British Anthem.
Address of Welcome
Response
Chairman of Convention Committee turns gavel over to President Townsend.
Annual Address of President.
Report of Treasurer.
Report of Secretary.
Report of Chairman of Commercial Section.
Report of Director of P. A. of A. School of Photography.
Report of Woman's Auxiliary.
Report of Advertising Committee.
Report of Constitutional Committee.
Appointment of Committees.
General Business.
Introduction of Richard Speaight.
Address of Richard Speaight.
Tuesday Afternoon—Richard Speaight.

WEDNESDAY, MARCH 28

Wednesday Morning
10:00 to 11:00 A. M.—I. T. Frary, Cleveland, Ohio, "Studio Decoration and Arrangement."
11:00 to 12:00 Noon—Open.
Wednesday Afternoon
2:00 to 3:00 P. M.—James Elliott, Underwood and Underwood. New York city, "Are You Charging Enough for Your Work?"
3:00 to 4:00 P. M.—George Harris, Washington, D. C., "National Advertising."
Fred Millis, Indianapolis, Indiana, "National Advertising."

THURSDAY, MARCH 29

Thursday Morning
10:00 to 10:40 A. M.—Dave Merriam, Minneapolis, Minn., "Photo Finishing as a Side Line."
10:40 to 11:20 A. M.—James Thompson, Knoxville, Tenn., "Commercial Photography in the Smaller Cities."
11:20 to 12:00 Noon—Art Director.
Thursday Afternoon
2:00 to 2:45 P. M.—L. W. Rand, Brockton, Mass., "System in the Studio."
2:45 to 3:10 P. M.—Pirie MacDonald, New York, N. Y., "Photography and Its Importance."
3:00 to 4:00 P. M.—Richard Speaight.

FRIDAY, MARCH 30

Friday Morning
9:45 to 10:45 A. M.—Business Session.
10:45 to 11:15 A. M.—Clarence Stearns, Rochester, Minn., "Personality."
11:45 to 12:00 Noon—Robert Young, San Francisco, California, "Commercial Demonstration."
Friday Afternoon
2:00 to 3:00 P. M.—Professors Bussey and Barton, Now York, New York, "Principals of Salesmanship."
3:00 to 4:00 P. M.—Delegate from American Society of Cinematographers.
Friday Evening
Banquet.

Advantages of the A. S. C. in the P. A. of A.

I. The Use of Travelling Exhibits.
  a. Five Portrait Exhibits.
  b. Three Commercial Exhibits.
II. The Use of Standard Forms.
  a. Copyright publication release.
  b. Model release for publication and copyright.
  c. Affidavit form for photographers taken for legal purposes.
  d. Cost forms for Commercial Photographers.
  e. Cost forms for Portrait Photographers.
  (The above are all in preparation).
III. The Commercial Photographic Service of the P. A. of A.
  a. A service whereby manufacturers can go to their local photographer and have work done in different cities all over the United States and Canada through members of the Commercial Section.
IV. The Winona School.
  a. Portrait Department.
  b. Commercial Department.
V. The Speakers Bureau.
  a. A service whereby the 80 or 90 clubs throughout the country can secure the services of 50 or more of the leading photographers in the country to address their meetings.
VI. Business Counsellor.
  a. A service whereby the clubs throughout the country can get the services of an experienced advertising man who will advise them on the Advertising Campaign, the tie-up material, and the various services that the Association has to offer. Services of this man will be free to all clubs.

(Continued on Next Page)

A Bit of History

A local periodical published not long ago a story by a United Press staff correspondent concerning the bringing to light of a French film.

Some errors of dates appeared in this yarn and in the spirit of impartiality the *American Cinematographer* publishes the following bit of history.

As far back as 1885 celluloid strips were coated with sensitive emulsions. In 1887 Hannibal Goodwin, of New Jersey, and Graff and Jougla, of France, manufactured photographic films. In 1888 Blair furnished Edison with celluloid films for his experiments and in 1889 the Eastman Kodak Company was manufacturing such material.

In 1894 the Lumiere Brothers of Lyons, France, organized the manufacture of sensitive films and in 1896 their manufacture of negative and positive films had reached a high degree of perfection.

The FIRST showing of PROJECTED motion pictures, which included "The Arrival of a Train in a Depot," "A Boat Leaving Port," etc., took place at a private showing March 1st, 1895, followed by other private exhibitions to photographic and scientific societies, on June 10, 1895, June 12, July 11, November 10 and November 16 of the same year.

The first PUBLIC exhibition took place in the Indian Room in the basement of the "Grand Cafe" in Paris, the evening of Saturday, December 28, 1895. The program was composed of ten pictures of a length of about 45 feet each.

Previous to this exhibition, the only motion pictures in existence (besides the little books composed of series of pictures, viewed by rapidly revolving the pages with the thumb of the hand that was holding the book) were the Edison "Kinetoscope," a *peep-hole* apparatus through which the cine-photographic film was viewed by one person at a time. The Kinetoscope when exhibited in Paris in 1894 spurred Mss. Lumiere in their researches on the taking and *projecting* of motion pictures.

The first projected pictures in America using Edison's Kinetoscope films, were shown to Mr. Edison in December, 1895, by Mr. Armat, of Washington, D. C., the inventor of the projector, in the offices of Raff & Gammon, in the Postal Telegraph building, 253 Broadway, New York city.

The Lumiere Brothers did not exploit their invention, their occupation being the manufacture of medical and photographic chemicals as well as sensitive plates, films and papers, one of the most flourishing industries in the world.

The exploitation of the Cinematographer was conducted by pioneer producers such as Mr. Charles Pathe, whose establishments led the motion picture world, until the world war occasioned a complete stop to activities in Europe.

The P. A. of A.

(Continued from Page 27)

VII. The Benefit of the National Advertising in over a dozen prominent magazines.
VIII. A Subscription to the Pathfinder.
IX. The use of Syndicate Form Letters and Direct Mail Literature.
X. The use of Syndicate Street Car Cards.
XI. The use of Syndicate Newspaper Advertisements.
XII. The use of Syndicate Bill Board Advertisements.
XIII. The National Convention.
XIV. Decalcomanias and Electrotypes of our Association Emblem.
XV. Fellowship Degree.

A Letter from Cooper Hewitt

The American Cinematographer is permitted to reproduce the following excerpts from an interesting letter recently received from the Cooper Hewitt Company by that organization's local representative, Mr. John T. Shannon:

* * * "It has never been the writer's idea that any one particular kind of form of light could ever be developed so that this particular form of light would be an all-purpose light. In other words, the writer's experience has caused him to believe that the mixture of two or more different types of lighting varying in quality and in kind give the cinematographer not only a great leeway in achieving the particular results for which he is striving, but this mixture of two kinds or qualities of light allows him to obtain certain artistic values which could not be obtained by the use of any one kind of light.

* * * "About two years ago the writer, having a knowledge of the qualities and the benefits to be derived from the use of Panchromatic film, and while at our factory in June, 1926, went into the matter with our engineering and construction departments regarding the possible manufacture of a tube using a new principle at that time, so that we could be able to supply to the cinematographers a combination of tubes each giving light emanations of such character as to obtain the greatest actinic value at either end of the spectrum and over-lapping at the yellow green lines. After the development of this tube, were it possible, we would try then various methods of combining these tubes with some form of mechanical control of the light so we could vary the light emanations therefrom and in this manner practically control the light as regards its color emanations.

Our factory, The Cooper-Hewitt Electric Company, a member of the large General Electric family, has produced in a practical manner this lamp after more than a year and a half of experiment and development. In other words, we have manufactured and are prepared to manufacture in quantities as desired a tube using a principle of incandescent neon gas that will supply emanations in the red portion of the spectrum.

Keenly anxious ourselves to assisit in any manner that we can, we have developed at the Hollywood shops two special Cooper-Hewitt outfits which are particularly suitable for close-up work. Each of these outfits consists of two Cooper-Hewitt U tubes and one Neon red light tube in the same light frame, said light frame being provided with the necessary devices for raising and lowering them and tilting the head, and also provided with slots so that various types of diffusing mediums may be used in conjunction therewith and the outfits are also provided with a mechanical diaphragm or shutter so the amount of red rays in the total light emanations may be varied at the will of the operator.

With these lamps effects may be varied so that an absolutely noonday sun or afternoon sunlight spectrum may be obtained at the will of the operator."

Charles J. Davis, A. S. C., has transferred his photographic activities from Warner Brothers' Vitaphone to Fox Movietone, New York.

If Cows Didn't Eat Mustard We Wouldn't Have Moving Pictures

The photographic industry sprang from a mustard seed. At least, the mustard seed plays a most important part in that industry, for it is tiny traces of mustard oil, carried into the photographic emulsions through the gelatin, that make the silver salts sensitive to light, according to Dr. C. E. Kenneth Mees, director of the research laboratories of the Eastman Kodak Company. In his recent address before the American Society of Cinematographers, Dr. Mees explained "The Foundation of a Photographic Picture."

"The creamy white layer on the film used in a Kodak or motion picture camera is composed of billions of tiny microscopic crystals of silver bromide, of which there are more on a square inch than there are human beings on the surface of the globe," said Dr. Mees. "Recently the scientists of the Kodak research laboratories have studied these microscopic crystals, and have even studied the behavior of single crystals isolated from their neighbors. It has been found that the sensitiveness of the films is not owing to the grains of silver bromide only, but is in some way connected with the presence in those grains of specks of some other substance.

Accidental Impurity

"After a long and careful study, the Kodak research laboratories have found that these specks are produced by an accidental impurity present in the gelatin. This impurity is derived from the plants eaten by the animals from whose skins the gelatin is made. There is only a very small amount of it in the gelatin, but when the gelatin is used for making the film, the tiny bit of sulphur which the impurity contains reacts with the silver bromide and produces specks of silver sulphide on the crystals.

"In some way or other these specks increase the effectiveness of the light to which the film is exposed in the camera and enable the light to change the silver bromide so as to form a trace of metallic silver. The silver acts during the development as a nucleus on which more silver can deposit by the chemical process until the whole of the silver bromide crystal is changed into silver. Each of the original crystals of the film, therefore, after exposure to light becomes a grain of silver in the developed film, and it is of these grains of silver that the image projected on the screen is composed."

Forms Minute Battery

The speaker explained how Dr. S. E. Sheppard discovered that the sensitizing material in gelatine is mustard oil, and how in the production of the photographic emulsion it is changed to an alkali sulphide. He also pointed out the mechanism devised by A. P. H. Trivelli to explain how this trace of silver sulphide produced as tiny specks on the silver bromide grain causes enough silver to be produced to make the grain developable. Of this, Dr. Mees said:

"If we accept Trivelli's hypothesis, the silver bromide was made to conduct electricity by the light which fell on it, and for one-fiftieth of a second a current flowed through the little battery made of silver sulphide and a trace of silver. The current decomposed some of the silver bromide and produced a speck of silver. This speck then acted in development as a nucleus for the deposition of more silver until the whole exposed crystal was turned into a speck of black silver."

Sky Stuff

By Perry Evans, A. S. C.

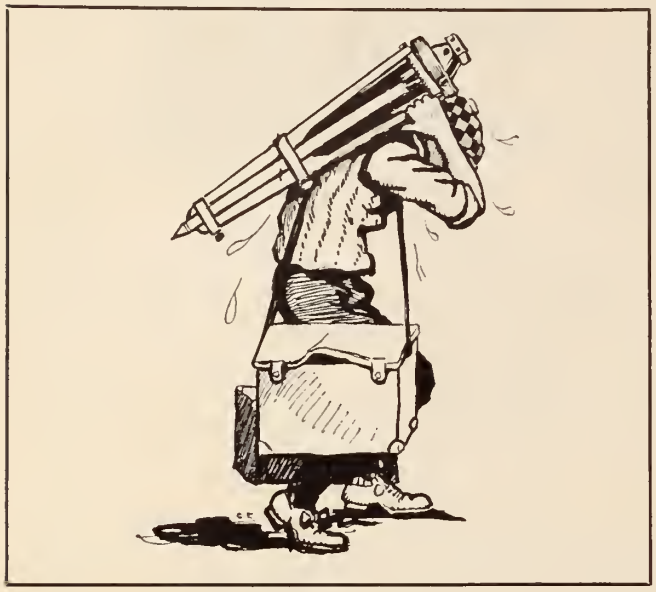
In another air production which required desert scenery we chose Dry Lake, twenty miles from Victorville, as our location. After a few days out in the heat our pilots became restless and as an incentive were told that as soon as we finished we would fly to Mexicala and take on something cool and soothing and then fly back home. This we did, and not mentioning any names, one little "runt" aviator flying a ship in keeping with his own size insisted on entering into the Mexican atmosphere by drinking "tequilla." In going back to our ships the little man had to be carried most of the way, so I suggested that some one else fly his ship and let him ride back with some of the other pilots. To this the boys unanimously agreed that the midget was capable of flying his own crate, drunk or sober. After assuring us that he would refrain from all "monkey business" and keep his place in formation, we tucked him in his crate, strapped him down, turned over his motor and he took off with the rest of us.

For the first half hour everything went fine when suddenly friend Midget takes a nose dive out of formation with motor wide open, and while we held our breath, expecting to see him hit the ground at 300 miles an hour he levelled her off and nosed her almost straight into the air to an altitude of 3000 feet above us where he did every stunt known to aviation and a few that were never heard of, ending up by turning his ship upside down and flying in that position for a mile or more, then came back and took his place in formation. This performance he repeated two or three times before we arrived at our home port, where he came down and made a perfect three-point landing regardless of the fact he had more under his belt than when we strapped him in down on the border.

In reprimanding him for his action his excuse was that he had a little bottle on his hip, and being afraid to hold it to his mouth in the customary manner, for fear the terrific kick from the propeller would blow it out of his hand, he conceived the idea of crouching down behind the cowl to avoid wind resistance, holding the bottle between his knees and putting his mouth over the neck of it then turned his ship upside down and in that manner let the contents gurgle down his throat.

When asked why all the "monkey business" before turning his ship upside down, he replied: "Oh, that was when I was struggling with the bottle trying to get the cork out."

Jimmy the Assistant



CONCERNING PANICS

I hate like thunder to preach; but when the hooey gets just so thick I kinda have to let go with some good fatherly advice. I'm sorry; but you ain't as stuck to read this as I am to write it.

The studios is all closing down. Most everybody is out. There ain't no jobs. There ain't no jobs in sight. Boo-Hoo. Razzberry! That kinda talk makes me sick—plenty.

Wait 'till you've been fired as often as I have and you'll feel different. I've been out on my neck so often that it just don't count—wouldn't seem nacheral, somehow if I wasn't bein' fired for sump'n or other.

But that ain't the point. Here's what's what. A lot of studios is closed and everybody's scared, and that's what makes me peevish. Why the scare? Why the panic? If you're due for the gate you're going to get it; and if you ain't you won't and that's that. It's a lead pipe cinch weeping and wailing about the possibilities one way or the other ain't helping matters none, but on the contrary, is hurting things a heluva lot . . . . . and that's what makes me sore. You'd think everybody in pictures was a lot of spoiled babies, the way they bellyache around about sump'n they're afraid maybe might happen.

The whole blamed truth about the matter is that pictures was never in as healthy a position as they are now. There ain't nothin' going to happen to 'em— that is, nothin' that shouldn't happen. Stop and think for a minute. The biggest investment in pictures is the theaters—biggest by many times. Our studio buildings and equipment is just a drop in the bucket compared to what's tied up in the Temples of the Cinema. What are they going to do—tear the seats out of the theaters and rent 'em out for garages or sump'n? Or maybe let the kids use the pipes out of the organs for blowguns? *Hooey*—and lots of it! *Sure* the studios is closing down—and maybe some of us is out of jobs, but that don't mean pictures is going on the rocks by a long way—no sir! Them theaters has got to have good pictures and lots of them—and that's as flat as your foot!

I said pictures was never in as healthy a condition as they are now and I sure mean it. Pictures has been awful sick for some time past—*awful* sick. For a long time they've been all bloated up out of any reasonable proportion and a lot of saps thought that was good. Well, it wasn't. Then again, a bunch of fast talkers had got hold of the game and was running it for what they could get out of it for themselves, and without any regard whatsoever to what kind of pictures they made while they were doing it. That's *another* thing that was wrong. Then we had the family system of hiring—one studio was fixed so that all the good jobs was held by one family. And then again, there was the social system of hiring and firing—you know; the system where the contracts were talked over on week ends and what not. That was all rotten—yet the patient *looked* fine. The patient—really awful sick all the time, looked good because everybody had jobs and money was rollin' in fine.

But jobs don't mean prosperity and activity don't mean work. A squirrel in a whirligig is plenty active but he don't get nowhere. Well, that's just what it's been like with pictures. We've been awful busy but we ain't done nothing—just ridin' on a merry-go-round.

To get right down to the ground, so's you can appreciate my worm's eye view of things, lets open the deal right up and *look* at it. Up until now everybody's been workin' for the guy right over him, ain't they? Cameramen have been workin' to please directors; directors has been workin' to please supervisors; and supervisors has been workin' to please the Big Boss and the Big Boss has been workin' to—what? Well, we don't know. Make money, maybe; but what we do know is this: everybody has been breakin' their necks to hold their jobs—NOT to make better pictures!

Now then, what happens? Everybody's trying to please somebody else and the result is that nobody pleases anybody. Meanwhile the poor dumb public is getting some lousy pictures.

A funny thing about the public is that it ain't got no voice. It don't never holler about nothin', no matter how hard it hurts. But the public has a funny way of doin' things on the quiet, and when they does these things somethin' usually happens—new Presidents or sump'n. And when the public started gettin' pictures that was a little bit *too* lousy to go to, they stopped going—that was all. No more of a holler than that—but it took.

We make lots of pictures. Lots of them. They all cost money. We're so used to shooting a quarter million or so on a picture that a quarter million doesn't mean as much to us in pictures as six bits does in cash money. But it's all money just the same, and it has to come from somewhere. Just where does it come from? You're right—the guys that's putting it up!

Now when the public—the poor dumb long-suffering public—slacked off on standing bad movies as tolerantly as they used to, somebody wanted to know why; and that somebody is the guys that's holding the sock—the guys

that's got the dough that we make pictures with. They've suddenly got interested in WHAT'S WRONG WITH THE MOVIES—*and how!*

The minute the Money Boys started picking up their ears and sniffing around a lot of False Alarms ducked for cover—and shut down their studios to cover their tracks.

Are you attached to a False Alarm? If you are—worry!—for you're shore stuck! It's open season for Bluffers, Fast Talkers, Fakes, and Smart Guys—up to and including their friends.

The Boys who stuck their dough into pictures figuring to make a profit on the deal had an idea they'd get a square break. They didn't—and now they're here on the job to see that they do. And they'll *see*—don't ever kid yourself that they won't!

And that's why I say that pictures is right now today in its very healthiest condition—for they're at last under Honest Supervision—and the guy that's willing to shoot square, be he laborer, supervisor, prop-man, director, set-dresser, cameraman, or—well, yes, even stand-in—if he's willing to play square and give for what he gets, *he's* safe. BUT! Oh, *boy!* The smart ones that's been living on pull, family connection, or party ability—what a sock in the nose they've got coming! AND HOW!

Of course, this all don't mean a thing. I'm just a camera-punk and I don't see nothing or don't know nothing—but I have my guesses. This is one of them.

New "Light Transformer"

The American Society of Cinematographers has just received this self-explanatory telegram from the National Carbons Company, Inc., Cleveland, Ohio. This message, received at the time of going to press is published without comment. In the next issue the subject will be treated with full details:

Motion pictures industry to be benefited by invention of New Light Transformer stop The most recent invention in improving the light source for Panchromatic film has just been announced by the research laboratories of National Carbon Co. By a very simple combination of a carbon arc light with a special glass in place of the ordinary glass it is now possible to obtain a light richer in the reds and yellows compared with the blues than any other source of light ever used in the motion pictures industry. This invention which may be termed a light transformer is remarkable because of its very simplicity its use will enable studios to obtain from their present arc lamp equipment a most complete range of photographic light of the highest efficiency for either Orthochromatic or Panchromatic film. The color of the light source can be varied from the intense blue white of the white flame arc to the rich red yellow light obtained with the light transformer.

NATIONAL CARBONS CO., INC.

CLASSIFIED ADVERTISING

Rates: Four cents a word. Minimum charge one dollar per insertion. All copy must be prepaid and must reach us before the fifteenth of the month preceding publication.

American Cinematographer,
1222 Guaranty Building,
Hollywood, California

WANTED—MOTION PICTURE CAMERAS

170-DEGREE Bell and Howell wanted. Have 1924 Buick Sport Touring car, in excellent condition, as down payment. Remainder to be paid within six months of purchase. Write or phone Herman Schopp, care of the A. S. C., 1219 Guaranty Building, Hollywood, California. GRanite 4274 or GRanite 4704.

WANTED, CAMERA—Will buy Bell & Howell camera. State price and equipment. John P. Whalen. Gl. 1101 or A. S. C. GR. 4274.

WANTED, CAMERA—170 degree Bell & Howell camera. Would like Mitchell tripod. Harry H. Cooper, 851 No. Fuller Street. Phone GL 5239.

WANTED—Mitchell, for cash or will trade Bell & Howell and cash. Must be completed outfit. W. V. Skall, GR 6156, 1243¾ N. Fairfax, Hollywood, Calif.

WANTED—Will buy 170 degree Bell & Howell camera outfits. Must be in A-No.-1 condition and priced right. Give full description and serial number. Wilding Picture Productions, Inc., 1358 Mullett Street, Detroit, Michigan.

WANTED—For cash, DeBrie, Pathe, Bell & Howell Standard cameras. Send full description. Bass Camera Company, 179 West Madison Street, Chicago.

FOR SALE—CAMERAS

FOR SALE—Akeley Camera. Complete equipment. Akeley Camera, equipped with 180 degree adjustable shutter and special side focusing prism, Panoramic Arm, Tilting arm, Telescopic pan handle, regular pan handle Ball and socket head. **Tripods,** Large tripod with Mitchell legs; Baby tripod adjustable legs. **Magazines,** Five standard Akeley Magazines, built in scratch-proof features. **Lens Equipment.** 1 pair 35 MM matched Carl Zeiss in Akeley mount. 1 pair 50 MM matched Carl Zeiss in Akeley mount. 1 pair 75 MM matched Carl Zeiss in Akeley 1 8 In. matched finder Carl Zeiss in Akeley mount. 1 5¼ in matched finder Carl Zeiss in Akeley mount. 1 8¼ in. matched finder Carl Zeiss in Akeley mount. 1 12 in. matched finder Dahlmeyer in Akeley mount. **Accessories,** Erect Mitchell finder with mounting to go on top of camera; Special Worth Matte box, matte on all lenses, from 35 MM to and including the 8½ inch lens, equipped for all kinds of mattes and glass filters both graduated sky and discs, etc. Auxiliary sun shade; Set of hard mattes and inside filter holders, Test tank, two foot capacity, changing bag, Special film rewind. **Equipment cases:** Lens case, special padding for travelling, Magazine case, holds five magazines; camera case; Accessory case, holds Worth matte box, Mitchell finder, six magazines and all accessories. These four cases are equipped with Yale locks. Tripod head case; Tripod case for large tripod. Tripod case for baby tripod. For sale by cash or will take trade-in on Bell & Howell camera. Call GR 4274 or GR 4704. Harry G. Mason, A. S. C.

FOR SALE—DeVry Projector, using standard film. Cost $225. New. (See machine in A. S. C. office, 1220 Guaranty Building). $100 cash or less. Make and offer. Call GR 4274.

FOR SALE—Bell & Howell Camera, 120 degree shutter. John Thompson, Escondido, Box 183, Route A.

FOR SALE, CAMERA—Super-speed Debrie equipment. 2-inch B. & L. Lens, 2 magazines, 1 tripod, 2 jacks. Price $750.00. Abe Scholtz. See camera in A. S. C. office. GR 4274.

FOR SALE—New Eyemo camera, carrying case, extra magazine. Price $225. Call Ben White, OX 7335.

FOR SALE—Brand new Wilart, never used, with 50 MM Carl Zeiss F-3.5 lens in Micrometer mount. 200 ft. magazine carrying case. Cost $175. Best offer takes it. Write Art-Craft Jewelry Co., Wollaston, Mass.

FOR RENT—CAMERAS

FOR RENT—Three Bell & Howell 170 Degree Cameras, F. 2.3 and F. 2.5 lenses, Mitchell Tripod legs. Complete equipment. Eddie Linden, 6017 Elinor Ave., Hollywood, HEmpstead 8333 or A. S. C. office, GR 4274, GR 4704.

FOR RENT—2 Mitchell cameras complete studio equipment No. 85 regular movement, No. 97 high speed movement 40 MM and 75 MM Astro 1.8 lenses. 50 MM 2.3 Astro. Extra magazines for rent. Also Eyemo camera with Hoefner Trueball tripod head. Pliny W. Horne, 1318 N. Stanley Ave., Hollywood 7682.

FOR RENT—170 Bell & Howell 2.3 Astro 2″. Carl Zeiss 35 MM 2″ and 3″ Mitchell Finder, Mitchell Tripod and tripod head. Ira B. Hoke, 1312 N. Detroit St., GR 5033.

FOR RENT—Camera equipment: 1 Mitchell Camera, 1 Mitchell Speed Camera with attachment, new. 1 Bell & Howell, 1 Akeley (Full Equipment). Ted Tettzlaff, Phone GR 9255. 1724 N. Western Ave., Hollywood.

FOR RENT—Complete Mitchell outfit with astro lenses, six magazines, by Al Gilks, HE 1490.

FOR RENT—To reliable party, one Bell & Howell camera with Mitchell legs; Astro Lens F. 2.3., Fl. 8. 6 magazines. Fred Hoefner mat box. In perfect shape and fully equipped. Joe LaShelle. ORegon 6730.

FOR RENT—Two Bell & Howell cameras, large finders, astro lenses, F. 2.3. B & L 2.7. Frank Cotner, HO 5046.

FOR RENT, CAMERA—3 Bell & Howells. Fully equipped. Lenses 2.3, 2.5 and 2.7. Large finders; Baby tripod. No. 6 Lense. Special side prism. Also Special Hi speed DeBrie. Call B. B. Ray, A. S. C. Office, GR 4274. Home, OL 2727. 1119 N Edgemont Ave.

FOR RENT—CAMERAS, ALL KINDS. Akeley, Bell & Howell 170%, also Speed DeVry Graflex, Still (late model Anscos). For rent by day or week to responsible parties. Ries Bros., Ries Bldg., 1152 No. Western Ave. Phone GRanite 1185; Residence, HO-1055.

MITCHELL and Bell & Howell cameras. F.1.8 and F.2.3 lens equipment. All kinds of lenses and equipment for rent. John S. Stumar, 3602 Cardiff Ave., Palms, Los Angeles. Phone: Culver City 3512, or call C. Glouner, Camera Dept., Universal City, HEmpstead 3131.

ONE DE VRY Motion Picture Camera. Complete outfit. Alvin Wyckoff, Phone Care A. S. C., GRanite 4274.

BELL & HOWELL. Victor Milner, 2221 Observatory Ave., Los Angeles, California. 596-944.

BELL & HOWELL—Phone Perry Evans, OL 8797 or Hollywood A. S. C.

MITCHELL Friction Tilthead, 3 Mitchell cameras, 2 Bell & Howell. Astro F. 1.8, F. 2.3 lenses. Extra lenses and magazines. J. R. Lockwood, 523 N. Orange St., Glendale. Glen. 3361 W. Hollywood address, 959 Seward, HO 4366.

E. BURTON STEENE, Bell & Howell, and Akeley. Complete Camera equipment. Latest models. Address American Society of Cinematographers, Hollywood, California.

BELL & HOWELL, 170, with 30, 40, 50 and 75 lens equipment. Baby tripod. Also B. & H. Cine motor. Charles Stumar. GRanite 9845. 7501 Lexington Ave., Hollywood.

FOR TRADE—CAMERAS

WILL TRADE—Carl Zeiss, F. 3.5, 50 mm. lens in B. & H. mount. Trade for late model Veedor Counter. Bert Longenecker, 597-724.

FOR RENT—STILL CAMERAS

FOR RENT 1 8x10 Still Camera, focal plane shutter, complete, 1 Mitchell Friction Tripod, new, for B. & H. 1 Eyemo Camera with special lock. 1 4x5 Graflex B. & L. lens. 1 B.-H. Low Boy to fit new style B.-H. Tripod head. Joe LaShelle, 639 N. Sierra Bonita, ORegon 6730.

ONE 8x10 still camera—complete. Care A. S. C., GRanite 4274.

FOR RENT—MISCELLANEOUS

FOR RENT—One Cinemotor with Veeder Counter in first-class shape. Call B. B. Ray, OL-2727, 1119 N. Edgemont Street.

FOR SALE—LENSES

FOR SALE, LENSES—Carl Zeiss, F. 3.5, 50 mm., mounted in latest B. & H. mount. Looks like new. Perry Evans, 413 No. Mariposa Ave., Hollywood, California.

BELL & HOWELL, all ASTRO lenses. Akeley Camera complete, also Eyemo. E. Burton Steene, 1760 No. Wilcox Ave., GLadstone 6131.

ONE two-inch Bausch & Lomb F.2:7; one Dahlmeyer Pentac 37 mm. F.2:9. Georges Benoit, care of American Society of Cinematographers, Hollywood, California.

NEW 40 mm. Goerz Hypar f. 3. 5. lens in Bell & Powell mount: price, $50.00. Write Charles Clarke, 1222 Guaranty Building, Hollywood, California.

WANTED—PROJECTOR

USED SIMPLEX wanted. State model, price, condition, etc. Address Box R, American Cinematographer.

WANTED—MISCELLANEOUS

FOR RENT, LENSES—Trick lenses of all descriptions for rent by day or week. Call George Meehan, A. S. C. Phone GR 3830, 744 North Curson Ave., Hollywood, California.

WANTED—Will buy Bell & Howell cinemotor and a 32 M. M. Lense. Call Herman Schopp, HOlly 4735 or care A. S. C. office, GR. 4274.

FOR SALE—SPECIAL CAMERA EQUIPMENT

COMPLETE new style Bell & Howell matt box for sale. Joseph B. Walker, 1037 N. Sycamore Ave., Hollywood. Phone GLadstone 3797.

PATHE panorama head for professional camera, with detachable aluminum tilting head, easily adapted to any standard tripod. A first-class unit for some one, who is experimenting or engaged in research work, to add to their equipment. Stephen S. Norton, care A. S. C., Guaranty Bldg., Hollywood.

There will be no interruption
in our production program
during the building of
our new plant.

Mitchell Camera Corporation

6011-6025 Santa Monica Blvd.
Hollywood, California

American Cinematographer

Vol. VIII No. 12
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American Cinematographer

SILAS EDGAR SNYDER
Editor and General Manager

JOSEPH DUBRAY
Technical Editor

Table of Contents

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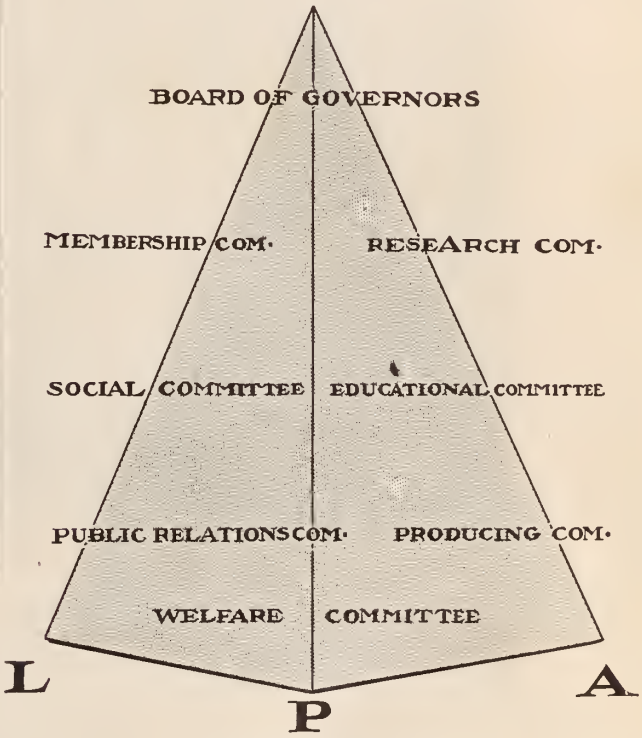
A. S. C.

The Pyramid of Progress



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The S. M. P. E.

The Spring Convention Will Open in Hollywood On the Ninth of April

Mr. L. C. Porter, of the Edison Lamp Works, Harrison, N. J., and secretary of the Society of Motion Picture Engineers, who is in Hollywood arranging for the spring convention of that organization, announces that April 9, has been selected as the opening date and that he expects a good attendance, considering the long distance to be traveled by most of the delegates.

Officers of the Society of Motion Picture Engineers: Left to right, they are: C. Francis Jenkins, founder of the Society; John A. Summers, secretary pro tem; L. A. Jones, past president; W. C. Hubbard, treasurer; J. C. Kroesen, member board of governors; H. P. Gage, vice-president; Willard B. Cook, president; J. H. Theiss, member of board of governors; J. I. Crabtree, member of board of governors and chairman of papers committee; F. H. Richardson, member board of governors, and Miss Schmidt, not an officer but the one who has for years taken the shorthand minutes of every meeting.

The local committees are:

Arrangements—Chairman, Fred W. Beetson; Roy Pomeroy, Paramount; W. V. D. Kelley, Kelley Color; William Sistrom, Metropolitan Studios; A. G. Volk, De Mille Studios; J. C. Ball, Technicolor.

Papers—J. C. Ball, Technicolor; L. C. Porter, Secretary S. M. P. E.; Dan Clark, President A. S. C.; A. G. Volk, John W. Boyle, A. S. C.; Fred W. Beetson; Douglas Shearer, M.-G.-M.; Joseph Dubray, A. S. C.; W. V. D. Kelley.

The entire local motion picture industry will cooperate in the entertainment of the engineers and their sojourn here will be made memorable. The program will be announced in the April CINEMATOGRAPHER.

The first introduction of the S. M. P. E. to Hollywood was in 1922 when Harold E. O'Brien, then of Lasky's, wrote a monograph on the Society for THE AMERICAN CINEMATOGRAPHER, excerpts from which follow:

In February, 1916, twenty-five men met in New York city and organized the Society of Motion Picture Engineers. The objects of this organization, as stated in the constitution and by-laws, are: "Advancement in the theory and practice of motion picture engineering and the allied arts and sciences; the standardization of mechanisms and practices employed therein, and the maintenance of a high professional standing among its members."

"Ever since its organization, the Society has shown a steady and healthy growth. It has become to the motion picture world what the Society of Automotive Engineers is to the automobile industry; the American Institute of Electrical Engineers to the electrical industry, or the Illuminating Engineering Society to any who use light. The society is entirely self-supporting and its finances in healthy shape. All of the officers serve without pay.

"The society meets semi-annually, in the Spring and Fall. These conventions afford a common ground on which men in the various branches of motion picture work meet each other to exchange and discuss ideas, to standardize methods and equipment. This work will unquestionably result not only in the production of better pictures, but also in improving their surroundings and broadening their application for scientific research, education and entertainment.

"The transactions of these conventions are issued semi-annually, and contain very valuable data on all branches of the industry.

"The present membership of about two hundred is drawn from many states in the U. S. A., several foreign countries, Canada and Cuba. So you can realize that no matter what your connections with the motion picture industry may be, whether technical or otherwise, you would find something of value and interest in the society.

"In October of 1920 I attended the convention at Dayton, Ohio, and I assure you it was well worth while. It was a pleasure to meet member engineers from the various large manufacturers of equipment, like Eastman, Bell & Howell, General Electric, Westinghouse and many other representative firms.

"These engineers seemed eager and anxious to meet others engaged in the industry, particularly those directly connected with the actual production of pictures, for they realize that the success of their product depends upon its ability to meet the demands at the studio, and many of us know that much of the apparatus we are using in some lines is more or less of a makeshift that has been handed to us in about the same form it was used on the stage years ago, or as it is used in some other commercial lines at present.

"This is particularly true of electrical equipment. Think of the great improvements that can be accomplished by showing these manufacturers that certain changes should be made in their product in order that it would better meet the needs of the motion picture industry. You will find them quite willing to learn these needs and to co-operate with you. It is up to us to work with them so that the entire industry may benefit.

While at Dayton I told the membership committee that I felt the society needed more members among the technical men of the studios, and that in order to stimulate active interest in the greatest production center of the industry, located in Hollywood, we be allowed to organize a local chapter along the same lines as the American Institute of Electrical Engineers and hold local meetings where papers would be presented and discussed. Also that representative members from Hollywood studios be appointed on the various committees of the society in order to obtain co-operation and best results. The committee welcomed these suggestions and agreed to act favorably upon such a plan.

"I believe we will all concede that the technical branches of the industry, with the exception of the cameramen and directors, are not very well organized, and that great benefits can be reasonably expected by a large membership in such an organization as the Society of Motion Picture Engineers. Just think of the results accomplished in other lines by the American Institute of Electrical Engineers, who have established standards that are recognized throughout the electrical industry. Is there any reason why the motion picture industry cannot do likewise?

There are two classes of membership, associate and active. The associate membership is for those who are not in active engineering work. An associate member is entitled to attend all meetings, discuss papers and receive all transactions, etc., but is not entitled to vote for officers. An active member is entitled to all of these privileges.

"The qualifications for an active member are listed as follows: An active member shall not be less than twenty-five years of age, and shall be:

(a) A motion picture engineer by profession. He shall have been in the practice of his profession for a period of at least three years, and shall have taken the responsibility for the design, installation or operation of systems or apparatus pertaining to the motion picture industry.

"(b) A person regularly employed in motion pictures or closely allied work, who by his inventions or proficiency in motion picture science or as an executive of a motion picture enterprise of large scope, has attained a recognized standing in the motion picture art.

"An associate member shall not be less than twenty-one years of age, and shall be a person who is interested in or connected with the study of motion picture technical problems or the application of the same.

The Hollywood members of the S. M. P. E. are:

Joseph A. Ball, Technicolor Corporation, 1006 N. Cole avenue, Hollywood, Cal.; Lester E. Cuffe, Hollywood, Cal.; Max Handschiegel, 1040 McCadden place,

(Continued on Page 20)

Left to right: J. C. Kroesen, G. E. Lamp Works, Harrison, N. J.; Lewis M. Townsend, supervisor of projection for Eastman Co., Rochester, N. Y.; F. H. Richardson, Chauncey L. Greene, W. T. Yutzy, both from Minneapolis, Minn.; Ira Gordon, projectionist, Akron, Ohio; Arthur Gray, chief projectionist, Lancaster Theatre, Boston, Mass.; "Bill" Kunzman, National Carbon Co., Cleveland, Ohio; C. Francis Jenkins, "Founder of the S. M. P. E.;" (Name Omitted); J. H. Kurlander, of the Brenkert Company; Samuel Burns, vice-president International Projector Corporation; (Name Omitted); P. A. McGuire, International Projector Corporation.

EDITORIAL--The Voice of the A. S. C.

By unanimous vote of the Board of Governors of the A. S. C., Mr. Joseph Dubray, technical editor of THE AMERICAN CINEMATOGRAPHER has been chosen to represent the Society at the Forty-sixth Annual Convention of the Photographers Association of America to be held at Louisville, Kentucky, March 27th to 30th inclusive.

As a soldier, linguist, orator, writer, researcher, scientist, photographer and cinematographer, with a background of thirty years to enrich his store of knowledge Mr. Dubray is an ideal courier to carry the message of the A. S. C. to the P. A. of A. and he will go prepared to show the assembled artists in the Kentucky metropolis not only how motion pictures are made, but the equipment with which they are registered on the film and he will tell the story of production with both the spoken word and a motion picture shot by members of the A. S. C. for the occasion.

The P. A. of A. is one of the most substantial, prosperous, enterprising and progressive organizations in America. With forty-eight years of history behind it the P. A. of A. has come to be an American institution in the best sense of the term and it ranks internationally with the Royal Photographic Society of England.

One year ago last October this peppy organization took the first steps toward a national advertising campaign to promote the interests of the professional photographer and to date they have raised more than $1,600,000 for a four years' campaign.

It has a membership of over 4000 and has in two years multiplied its association activities about 400 percent.

The A. S. C. thus officially acknowledges the honor done it by the P. A. of A. in extending an invitation to our Society to send a representative to Louisville and it feels sure that out of this entente cordiale will arise an enduring spirit of co-operation to the glory of photography not only in America but throughout the world.

The A. S. C. also takes this occasion to congratulate the P. A. of A. upon its phenomenal success and growth and pledges its friendship and best efforts in assisting the Association to work out its program of constructive propaganda.

The Mazda Marathon at Warner Brothers Studio has been a great get-together affair for the technicians of the Hollywood production groups and now that we are together let us keep together and, as one man, work to sell the pictures to the public. This can best be done by every man giving the best that is in him to the picture. These are the days of "shopping." The picture fan shops for his picture entertainment as he shops for his necessities at the stores. In other words, we must not only sell the pictures to the public but we must make them *stay* sold.

The A. S. C. is indebted to Mr. C. Curtis Fetters, A. S. C., for the first unit of the stills exhibit now in process of assembly and installation at the Society's headquarters in the Guaranty Building, Hollywood. Mr. Fetter's unit includes 27 stills, three of them hand colored, and to say they are very beautiful is but faint praise for a wonderful artist.

Robert M. Parker, A. S. C. is preparing a unit for another panel of our assembly room and all other members are not only cordially invited, but urged to contribute units, numbering no matter how few or how many stills in order that our walls may be covered with the finest exhibit of still pictures in America. That's our ambition. Come in and reserve your panel and send in your works of art.

Our front cover this month is a study from the camera of Robert M. Parker, A. S. C. Its beauty and perfection of art is entirely worthy of a member of our society and the engraver's attractive reproduction has decided the editor that henceforth the front covers of THE AMERICAN CINEMATOGRAPHER will be reproduced exclusively from still pictures shot by artists of the A. S. C. Send in your masterpiece.

The incandescent light tests since January 18, in progress at Warner Brothers Studio will continue into March. Up to time of going to press upwards of fifty tests had been made by the same number of members of the A. S. C. and 78,000 feet of film had been used. No report of results can be published until the committee in charge has summed up the tests in detail which will not be until all returns are in. It may be said, however, that the demonstration promises important developments to the great benefit of the photographic department of the industry.

Just what is all this propaganda against Western Pictures about? Why the eagerness to kill the goose that laid the golden egg for so many producers. Has somebody an axe to grind or is it just a case of movie blues?

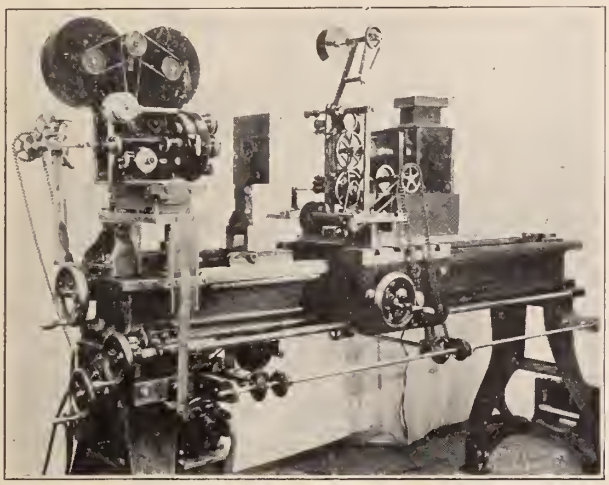
A. S. C. Outposts are being farther and farther outflung. Len Roos, A. S. C. is in Siam; Claude Carter, A. S. C. is in Sydney, Australia; John Dored, A. S. C. is in the Baltic provinces; Rene Guissart, A. S. C., is in France; Claude McDonnell A. S. C., is in London, England; J. B. Shackelford, A. S. C., is leaving in the spring for the Gobi Desert; another brother is leaving soon for Central America and still another for South Africa. Verily the A. S. C. is rapidly becoming international in its activities.

For Trick Work

Mr. Fred A. Barber Announces the Perfection of a Wonderful New Optical Printer

By Herford Tynes Cowling, A. S. C., F. R. P. S.

The printing of motion picture films by projection from the negative film onto the positive film is almost as old as the motion picture business. Nearly every inventor who worked with motion pictures at the inception of the industry used whatever size film that he fancied suitable for his purpose. Even after Thomas A. Edison standardized the size of the film to practically the same as it is today, other companies continued to operate with odd sized film



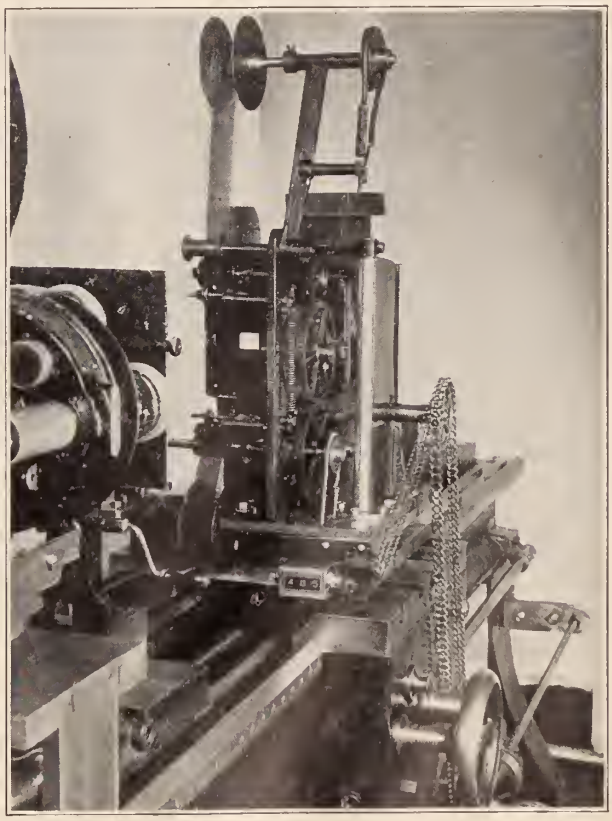
No. 1—Complete view of optical printer ready for operation.

until convinced against their will that they could not go against the principle of standardization. In order to make use of the negatives which they made, they found it necessary to print their larger sized negatives on the Edison or 35 mm. stock. Most of these odd sized negatives of any commercial value were larger than 35 mm. in width and in order to make standard prints they used crude optical printers constructed on the same principal as the reduction printers which are used today for the production of 16 mm. prints from 35 mm. negatives. Usually these optical printers consisted of two projection machine heads mounted on a board or table with a lens between them and a lamphouse behind the head carrying the negative film. By means of this arrangement a small picture of the negative could be projected upon the positive film in the standard projection head. By operating two machines in unison a small print was made from the large negative.

Standardization Essential to Progress

Although Edison standardized the size of the film it was not until a number of years later that the relation between the frame line and the perforations was standardized by the Society of Motion Picture Engineers. Today the line between the frames or pictures comes midway between perforations but before the standard frame line was adopted there was no uniformity and and the line might be on the center of the perforation, between the perforations, or anywhere else. Where more than one camera was used on a production the picture jumped out of frame at every camera change so that the projection machine operator had to keep his hand constantly on the framing lever. Optical printers were used to a limited extent for making prints with a uniform frame line. Some of the news companies like Pathe reperforated negatives to a uniform line until the adoption of the standard frame line rendered this unnecessary.

When the law forbidding the inter-state shipping of prize fight films was passed optical printers were put in operation with the two heads on opposite sides of the state line and the picture was projected across the line onto the film on the other side. Once more genius went



No. 2—Detail view of changeable frame line projection head on Barber Optical Printer.

unrewarded for the judge ruled that although the "shipping" consisted in transmitting such intangible things as rays of light the defendant was nevertheless guilty under the law.

(Continued on Page 22)

Movie Make-Up

Is Make-Up to Be or Not to Be---Panchromatic Film Causes Misapprehension

By Joseph Dubray, A. S. C.

The generalization of the use of Panchromatic emulsions in motion picture productions has brought about a situation which we will call unfortunate, though we are prone to use a much stronger adjective the more emphatically to lay stress upon the argument.

The use of panchromatic film will release the actors from the use of make-up. This is the dangerous conclusion arrived at, we do not know from what source or why. Just one of those misunderstood statements which pass from lip to lip until they take on the proportions of a dictum and insidiously sap the very existence of an absolute necessity.

On the advent of Panchromatic film a more perfect rendition of colors and tones was announced and the subsequent changes in make-up were heralded: a *change* in make-up but not its *abolition.* The declaration made at the time that less and more natural coloring in make-up could be used, was construed by many as the knell announcing the death of make-up, and grease-paints and powders were gaily tossed aside in spite of the protests of the cinematographer—even in spite of some of the unpleasant results thrown on the screen and blamed upon everything and everybody instead of being charged upon their real cause—the absence of make-up.

Let us analyze all causes and effects.

Make-up, beside tricky characterizations, has been deemed essential in the past because;

First: The photographic rendering of skin texture and colorings could not ring true with the non-panchromatic emulsions.

Second: Imperfections of contour and features, disfiguring marks undetectable by the eye in normal conditions, but emphasized by the camera and by the tense attention paid by an audience to the greatly enlarged picture on the screen, could be corrected and rendered invisible.

Third: The contrast of skin textures or colorings existing in nature and greatly emphasized and exaggerated by the photographic process could be reduced to a more pleasing uniformity, more true to the visual, natural impression.

Fourth: Changes brought forth in the general coloring of the features of the players by uncontrollable elements—such as, for instance, the tanning or sunburning of the skin through prolonged exposure to the elements —could be controlled and checked so as to keep the true characterization of the role throughout the picture.

Fifth: Evident signs of fatigue prominently visible and occasioned by the strenuous work, to which a player is subject during the making of a picture, could be kept under control and again, the continuity of characterization kept intact.

These are the main reasons which made the use of make-up imperative and we could keep on indefinitely citing particular cases demonstrating the essentiality of this artistic means of surmounting difficulties otherwise impossible to overcome.

Now what are the effects of Panchromatic film? A better rendering or translation in neutral tone of the varied colors; and this, to a certain extent, diminishes the necessity of heavy and unnatural looking make-ups that have been used in the past, but it *does not correct* the differences in color and unsightly patches latent in the smoothest skin and the most pleasing complexion which the camera unmercifully discloses.

Panchromatic film is an improved material by means of which the cinematographer can express the photographic qualities of the subject or scene he is photographing, but it has not the supernatural power to correct or control any of the above mentioned causes that make the use of make-up imperative.

It would seem ridiculous to expect Panchromatic film to perform plastic surgery or to perform the duties and labors that fall upon the retoucher of portrait photography, but this is, in fact, what it is asked to do when the make-up is dispensed with.

The skill and artistry implied in the application of make-up replace the deficiencies or better palliate the crude verities disclosed by the photographic emulsion, be it ordinary, orthochromatic or panchromatic. This skill and artistry represent the human element of added beauty to the better rendition of nature's gifts.

H. R. Poore expressed a great axiom when he said: *"Science has to do wholly with truth, Art with truth and beauty, but in establishing a precedent, puts beauty first."* The role of make-up is to put *beauty* in truth. It serves to correct the imperfections of nature and to add that element of Beauty that we call Art.

Now, the imperfections of nature are not in motion picture photography confined solely to the physical appearance of the subject or to the changes that may happen to his skin, smoothness and coloring from external causes, such as a slightly diseased condition provoked by prolonged exposure to the atmosphere, but these imperfections are also provoked by the limitation imposed upon the cinematographer by the mechanical, chemical and optical elements that are at his command and contribute to production of motion picture photography.

Most important of all are the limitations and peculiarities inherent in the light-sensitive material that forms the image that we call a picture.

It would be out of place to enter here into a technical discussion of this matter. Suffice to say that profound study and prolonged experience are necessary to acquire a thorough knowledge of these limitations and peculiarities and to become skillful in overcoming them.

Of prime importance is the rendition of tone values which is nothing else but the result of the photo-chemical action of the light reflected by the subject upon the sensi-

(Continued on Page 25)

Economy of Production

Evidences of Earnestness Seen in the Co-operation of the Academy and the A. S. C. in the Lighting Tests at Warner Brothers

By Lewis Physioc

We were beginning to think that the cry of economy was the usual motion picture "fadeout," for want of a better expedient, and we were just about to echo the old fabulistic simile "wolf! wolf!" but we were checked in our pessimism by some recent signs of renewed activity. The co-operation between the Academy of Arts and Sciences and The American Society of Cinematographers, in their experiments with incandescent lights at the Warner Brothers' Studios is an indication of a genuine desire, on the part of these technicians, to test the possibilities of economy in this important department.

These evidences of earnestness and sincerity should encourage the lowliest among the craft to express themselves, without fear of having imputed to them the least thought of impudence or presumption. Let us, rather, credit them with a genuine desire to do their bit towards the solution of the great problem. Everyone should be anxious and willing to contribute something to a movement that must be right since all seem to agree that it is necessary.

First of all, let us determine whether this picture making is a business, an art or a plaything. Each of these definitions has its claims to patronage. The magnitude to which it has developed as an industry proves that some hold it to be, purely a business proposition. The product, itself, demonstrates that civilization has developed a new and wonderful art. Popular fancy proclaims its value as an entertainment, and the delight of being associated with the actual production has led certain men of means to sponsor it as a hobby and they have enjoyed the two-fold pleasure of indulging a crotchet together with financial returns beyond expectations, to say nothing of the pleasure of public applause that acknowledges good sportsmanship, patronizing the arts and sciences and general benevolence.

Now let us consider the thing as an art.

The masterpieces of all branches of art teach us one truth that stands out above all other considerations; it is the fact that all great works of mankind are the result of some beautiful inspiration, engendered, primarily, in the heart of man, a noble desire to do something to make his fellows' existence a happier lot; to develop in them an appreciation of all things beautiful—music, printing, sculpture, architecture, astronomy, etc.—the development of the spiritual, intellectual and moral nature by works of literature. Whatever it is, the ultimate idea is to add to man's happiness and welfare.

Now the generous applause of a delighted public immediately introduces the natural consequence—material reward, which, in turn, establishes comparative values of great services rendered to mankind, with the ultimate and inevitable introduction of business. It is not surprising, then, that there might be aroused in man other passions as natural to the human breast as the nobler sentiments of benevolence—cupidity is conceived, love of praise, an ambition to outstrip the other fellow, all of which are temptations to debase the motives of art and employ them for material gain by appealing, indiscriminately to the passions. All this immediately establishes a natural affinity between these two elements, art and business. Men of letters have analyzed the great literary works and attempted to classify the elements of popular appeal, trying to discover the public taste, and have humored them fairly successfully—artists paint certain subjects that have proven good sellers—picture producers have followed the lead of great successes, and the result is that all of the forms of art, through comparison and criticism, are rapidly developing into a set of formulae, and we begin to fear the responsibility of judging innovations in technique as well as originality of conception and design. To this fact, is due the tendency to produce pictures for the critics who are supposed to reflect the public taste. Maybe it is erroneous to suppose that we can direct the public mind through the assumption that "we know what the people want." A survey of the great works of mankind seem to suggest that the people have had very little to say about what they wanted but, when given something that has pleased, they have always given generous proof of their approval. This should be some encouragement for great minds to proceed bodily, uninfluenced by rule or formula, honest, first of all, with themselves, in their effort to do their best, regardless of labor or cost. A painter cannot be stingy with his palette, poor colors will not endure and good ones are expensive. We must also remember that by formula or precedent, we may never produce another Shakespeare, da Vinci or Phidias but civilization will always enjoy beautiful and original works of other great minds—there will always be great motion pictures.

Now when it comes to counting the costs we must set reasonable bounds. We must acknowledge that we cannot emulate the fastidiousness of Thomas Gray who devoted seven years to his Elegy or a Macaulay who insisted on a final edition of his history to correct a single sentence, because we are engaged in an art that is so closely identified with business as to demand that we make every effort to reconcile the two. This we attempt by acknowledging that, both in art and in business, there is a curriculum that cannot be denied or evaded. Let us study this by offering a simple, but very relevant similitude: we may give a child a kodak and a generous supply of films and expect that by the merest chance he may bring in one or two very pretty pictures; and that by continually comparing failures with successes he may eventually develop an ability to achieve, directly, what he designs. This is a costly method but it is the one by which many of us have obtained our motion picture training. It has been the general process of the business for the past twenty-five years. We had no other resources. We had no trained exponents to show us short cuts to results. We suddenly found ourselves in the midst of a tangled web of beautiful possibilities and left to extricate

ourselves as best we could, while trained dramatists, technicians and business men watched the process with ridicule, resentment and, finally, with envy. But despite the fact that this school has been an expensive one the picture business has developed, in the very short period of twenty-five years, the most remarkable array of talent—business executives, techicians, writers—artists in all branches, probably, in the history of civilization—some of them geniuses, that but for the advent of motion pictures might have continued in obscurity.

But unfortunately, in this medley of recruits, we have discovered many who were not endowed with the natural qualifications to enable them to follow in the march of progress, many not capable of maintaining the leadership they had been accorded, and that all new movements need, and we are now face to face with the necessity of organizing and preserving to the industry those whose inherent talents justify their positions, and of cutting away the "dead wood"—a cruel expression, but as in all cases, the law of evolution asserts itself and we acknowledge the survival of the fittest. It is a difficult proposition—there is a great deal of sentiment connected with it—we hesitate to thrust out old pioneers because they are foot-sore and unfit to continue in the march of progress; but cold-blooded business refuses to recognize sentiment. Who is to inaugurate this reorganization?—the industrial leaders. They must discern the talent where it appears.

There is much talk, now-a-days, about the young man. Many account for the present cry for economy with the phrase "youth has had its fling," but if genius is exhibited in the young it must be recognized. Nor must the judgement and years of experience be overlooked as a value in directing youthful pep and enterprise—and great ability, both in youth and maturity, is often to be found in modest retiring natures. It is to be deplored, but this is a condition that is to be expected in a profession such as ours where publicity and influential representation is the only entree.

This we do know, by the traditions of the ages, "youth seldom counts the costs," which brings us to the queston under consideration.

When we consider the variety in character of the many pictures that are made and compare the results as to popular reception, this idea of costs should seem a simple one. A picture can be made for five thousand to five million dollars, which involves several considerations; first, what is the popular appeal? Is it simple beauty and nobility of theme adequately presented? Is it the extravaganza; sensationalism or star exploitation? Secondly, which of these have brought the greatest returns in proportion to amount of money invested? The first we may never be able to determine accurately but it seems logical to presume that the experience of the producer, the exchange man and the exhibitors should enable them to appraise these values. We assume that these appeals from the producers respecting economy is the result of these findings and that we have set a pace for elaboration of production to which we must surrender, and if this is the fact, it is incumbent upon every one engaged in the art, to aid in this program of retrenchment.

We cannot deny, however, that this movement will present many problems to the producer because there may develop a very natural jealousy among the various departments as to their importance, for it has already been observed that each one can give commanding arguments in its favor. The writers claim the importance of the story, the stars' popularity proclaims their position, the photographic department will tell you that "the film is the cheapest item of all," the art director asserts that all are sacrificed without adequate settings and so on through the entire organization. But when we consider a single picture that involves such items as a hundred thousand dollars for the story, an equal amount for a star's performance, double that amount for sets we begin to feel that even forty thousand dollars for film is an item to be considered.

But all troubles may be corrected at the source; therefore let us ask ourselves whether the present tendency towards expensive productions is the result of an honest desire for artistic excellence or merely a competitive policy, both as to magnitude or organization and extravagant display—a desire to out-do the other fellow. If this is the case, a solution may be found in a superior judgment as to what are the real elements of artistic production, a true discernment of talent and a judicious marshaling of these forces, in which event, competition will assert itself by force of merit rather than by the intimidation of expensive display.

Primarily, we are engaged in the art of picture making, and the elements of a picture should be simple, for those who have studied painting or the other branches of art , cannot be persuaded that there is a great dissimilarity in the rules of artistic expression, whether in motion pictures or the other forms. The first principle taught us is simplicty—of conception, composition, tone values—a simple palette, broad brushes and bold strokes. Now those among the producers who can draw a line between exaggeration of detail, extravagant display, a general complexity of all the elements and an elegant and a convincing simplicity, will produce more artistic and cheaper pictures. This is not easy; it represents the acme of artistic training.

It might appear presumptuous for any one to try to consider, generally, items for improvement, rather let us look to each department for their earnest intention, but there are certain observations continually recurring to the earnest student. The great sums of money involved frighten away all thought of innovations. We fear to risk a story that has not been proven by the publisher, and yet we feel that there may be overlooked many fine originals by people trained to picture writing. Directors take no chances of a failure—thousands of feet of film are expended in safety or covering shots, increasing the troubles of the cutter and endangering simplicity and fluency of continuity. Cameramen are excited to little extravagances —large rolls of film are thrown into the waste cans because of the fear of running out on an important scene, in the justifiable explanation that time is cheaper than film. We have not yet discovered, nor have been willing to acknowledge the limits or discriminating power of our two dimensional camera, and until the perfection of stereoscopic photography is a fact, the magnitude and elaboration of settings will be sacrificed to the flat field of a mono-lens rendition. And the very nature of this one-eyed monster makes it possible to cheat the cost of sets by substituting flat paintings, photographs, miniatures, etc., by camera tricks.

A fastidious attention to detail is also reflected in the choice of furnishings and materials. Priceless tapestries and antiques are placed where our cyclops of a camera

A. S. C. as Firemen

The following excerpt from the Illustrated Daily News pays a well deserved tribute to the members of the A. S. C. who volunteered as firemen at the Warner Brothers' studio fire and kept the blaze under control until the city fire fighters arrived:

Fire which caused about $100,000 loss to Warner Brothers' studio at Sunset boulevard and Van Ness avenue, and for a time threatened the entire plant, was brought under control last night by nine fire companies answering a second alarm, after the entire block between Sunset boulevard and Fernwood street on Van Ness avenue had been burned. The loss was covered by insurance.

When the alarm was turned in a group of cameramen were attending a lecture in the studio and their prompt first aid in fighting the fire is credited with saving $1,000,000 worth of unreleased film stored in a concrete laboratory building, which turned out also to be the strategic point of the fire fight, according to Chief Engineer Frank Murphy.

The fire started on warehouse stage 4 of the studio and was discovered first by an unidentified watchman across the street, who turned in the alarm. Cause of the blaze was spontaneous combustion in used sets stored in the building, firemen said. Police said it started in the transportation office.

The stage, another set storehouse and the studio transportation office were destroyed on the studio lot.

Mr. E. W. Johnston, of the Baush Lomb Optical Co., of Rochester, is in Hollywood conducting an investigation on lenses applying to both photographic and projection purposes. His visits to the offices of the A. S. C. and to the Warner Brothers' Studio during the incandescent-lamp tests have already resulted in a more perfect contact between cinematographer and lens manufacturer, and good RESULTS are expected to follow.

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cannot reveal their intrinsic value. These are all small items but when considered in every department and footed up at the end of every picture amount to considerable.

As regards the star, let us not forgt that as long as man has existed he has had his idols—hero worshiper, calls it. Nature's endowments in the form of beauty, personality and talent have always been idolized and always will be. So let us not quarrel with the stars, rather let us try and have them reason with us. The only unfortunate feature of the star system is that many good stories may be sacrificed on account of their being unfitted to the star.

This last consideration suggests an element in picture making that we cannot refrain from mentioning, and that is the independent producer. Independent seems to be a happy term, and we may learn a great deal from them. Independent of all the complications and exactions of the big organizations, burdensome overheads, long periods of inactivity—that seeming necessity of all starting and all finished at once. The independents secure the best story that may be available, as judgment directs, fitting their cast to the story and calling on other resources as needed, when and where they wish, independent of all production restrictions.

Credit Where Due

In recent reviews of "WINGS" critics give credit for its success to its aerial feats and spectacular shots of different kinds, which have never before been caught in action by the camera, and rightly give credit to the Paramount organization, Lucien Hubbard, Wm. Wellman and the cast. Now, in all fairness to Harry Perry as chief cinematographer on this production and to the men who co-operated with him, we want to tell their part in making "WINGS" an unusual and interesting picture.

Mr. Perry was engaged for this picture about two months before actual production started, because of his experience in aerial photography and so that he could have time to work out the mechanics necessary to get the effects called for in the script of "WINGS."

Many of these at first sight seemed impossible and he spent days figuring out mounts for cameras to be put in every possible and impossbile place on an airplane and in making tests and working out electrical devices so that they could be operated by the pilot or actor in the air; also mounts for cameras of different makes to be used on different types of airplanes by cameramen themselves.

Mr. Perry also went to Texas twice before the start of production to make tests in the air and help select locations. While on the picture he personally supervised over 200 motor-driven cameras on airplanes, working out the exposures and filters used on each shot before it went into the air and, besides this, the other cinematographers and Mr. Perry had nearly 300 hours of actual work in the air which involved the hardest kind of work, quite a few escapes from serious accidents, which meant no thought of personal safety.

Therefore we believe that the cameramen who actually put the majority of the air scenes in "WINGS" on the film are entitled to their share of the credit for "WINGS'" success, and they are Harry Perry, Burton Steene, Al Williams and Paul Perry.

William Rand, A. S. C., who photographed the Akeley shots in "The Last Command," and "The Street of Sin," is now busy on "The Patriot," an Ernst Lubitsch production also featuring Emil Jannings.

He tells us that Mr. Jannings is fast becoming familiar with the English language. When he arrived in Hollywood his vocabulary was limiited to such expressions as "Good morning" and Thank you." Since most of his directors speak German with ease the balance of the staff began to make Mr. Jannings familiar with English.

Rand reports that he quickly learned such studio phrases as "O. K.," "One hour for lunch," and "All right; 9 o'clock in the morning," and that now, after several months in this country, he speaks English with almost perfect ease.

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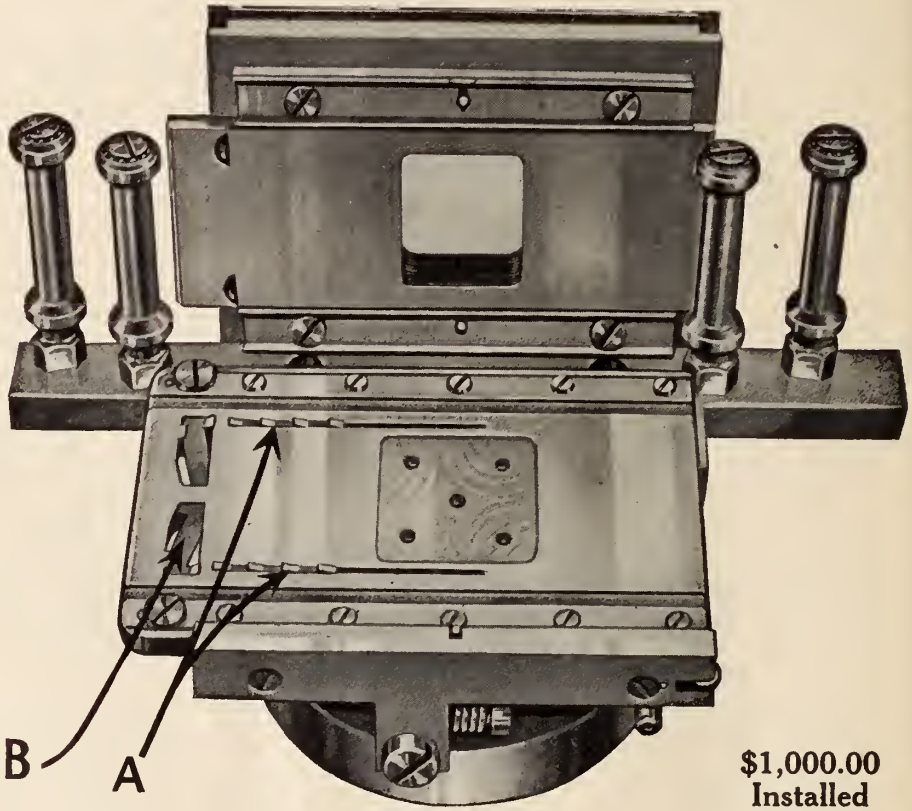

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Light Filters

Their Characteristics and Applications in Photography With Explanatory Diagrams---In Three Parts

By Loyd A. Jones

Of Eastman Research Laboratories.
Abridgement of Paper from S. M. P. E. Transactions.

In a previous communication the use of panchromatic film for motion picture purposes was discussed at some length. The fundamental principles involved in the photographic reproduction of the tonal scale, that is brightness and brightness differences, in the case of colored objects were outlined and attention called to some of the advantages arising from the use of panchromatic film for this purpose. The use of light filters was mentioned briefly but no attempt was made to deal with this subject in detail. Since a thorough understanding of the nature of light filters and their use for obtaining a desired effect is essential to the attainment of the best results in the application of panchromatic film to various problems confronting the photographic worker, it seems desirable at this time to present a somewhat more complete and detailed treatment of the subject. Believing firmly in the premise that the nearest approach to perfection in the practice of a science can be attained with greatest facility and certainty through an adequate knowledge of the theoretical aspects of the subject, the first part of this paper will be devoted to a discussion of some of the fundamental principles involved in the use of light filters. In the latter part the more practical phases of the subject will be dealt with and some data relative to the use of light filters will be given.

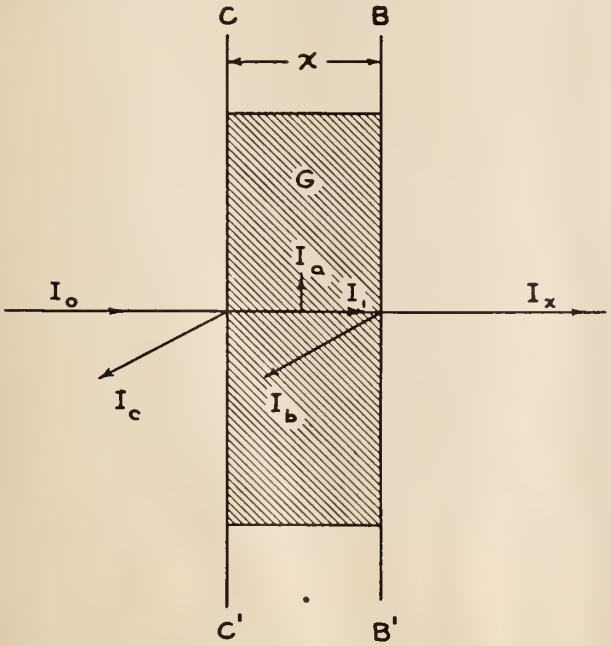

Fig. 1. Diagram illustrating reflection, absorption and transmission.

Fundamental Laws

When radiation falls upon a transmitting material, such as a piece of glass, a part is *reflected* at the first surface, some is *absorbed* within the material, some is *reflected* at the second surface, and the remainder is *transmitted.*

This case is illustrated schematically in Fig. 1, where the shaded area *G*, represents a cross section through a transmitting material, bounded by the parallel surfaces *CC′ and BB′*.

I_o represents the radiation falling upon the material; I_c the reflection suffered at the surface *CC′*; I_a the absorption within the material; I_b the reflection suffered at the second surface *BB′* and I_x the transmitted light.

The loss of intensity of radiation that results from the successive reflections and absorptions has been calculated following the Fresnell law of reflection and the results prove that the maximum intensity of light of any wave-length that can be transmitted through a filter having two glass surfaces is only 91.7 per cent of the incident intensity.

This 8 per cent (approximate) loss resulting from the use of a single layer of glass or gelatine is not as a rule serious, but if an attempt is made to obtain some desired result by the use of two or more layers, the loss of intensity due to this reflection at the glass-air or gelatine-air surface may be of consequence.

Absorption of Radiation. The absorption which occurs within a non-turbid transmitting material, follow a logarithmic law in the great majority of cases, including gases, liquids and solids. Thus if a given layer of material absorbs a certain fraction of the radiation, the next layer of the same thickness will absorb the same fraction of that transmitted by the first.

In dealing with solutions used as transmitting materials, the concentration of the solute in grams per unit volume is also to be considered and in the case of dyed gelatine filters, the calculation is carried including the dye concentration expressed in grams per unit area.

Measurements, Graphic Representation and Computation.

To determine quantitatively the absorption of a light filter for radiation of different wave-lengths a spectrophotometer is used. An essential element of this instrument is a device, such as a prism or diffraction grating, for dispersing or separating into its component parts the radiation from some suitable source (such as the electric arc or incandescent lamp) which emits many different wave-lengths. In this way a spectrum is formed and by means of a narrow slit suitably placed, radiation of any desired wave-length may be isolated. One-half of this *monochromatic* radiation is then allowed to fall upon the filter being examined and the intensity of the radiation transmitted by the filter is measured by comparing it in a suitable photometer with the other half of the monochromatic beam which has not been subjected to the absorbing action of the filter. In this way values of transmission, that is to say the ratio of the intensity of the light which is transmitted to that which falls upon the material, for a series of different wave-lengths are obtained.

These values plotted as a function of wave-length, give a curve which shows the absorption characteristics of the filter in graphic form. This is called a *"Spectrophotometric curve."* Such a curve is shown in Fig. 2 applying to a gelatine filter made by the use of Toluidine blue (Filter No. 38 of the Eastman catalogue of Wratten Light Filters).

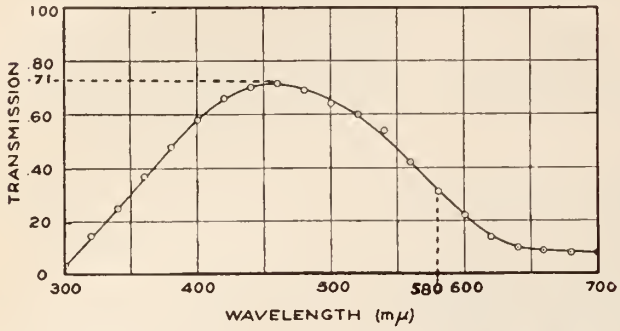

Fig. 2. Spectrophotometric transmission curve of green filter.

In this graph, the abscissa has been divided in as many parts as wave-lengths are to be found between 300 and 700 millimicrons, that is to say the wave-lengths ranging from the acitnic ultra violet to the red visible portion of the Spectrum.

The ordinates indicate the ratio of the light intensity after transmission to that before transmission.

For the Toluidine blue filter, we find that the maximum transmission is approximately at wave-length 460 in the blue region of the spectrum and is equal to approximately 71 per cent of the intensity of the original incident light.

For many purposes, the expression of absorption in terms of optical densities, is more convenient than in terms of transmission. If it is desired to compute the spectral distribution of absorption for two superposed filters, the *"transmission"* values at each wave-length for the two fllters must be *multiplied* together, while if *"density"* is used, it is only necessary to *add* the values at corresponding wave-length.

In the case of solids, liquids and gases the *"density"* is directly proportional to the thickness of the transmitting material.

In the case of dyed gelatine, *"density"* is directly proportional to the dye concentration expressed in grams per unit area.

This direct proportionality, of course, applies only to the values of the *"density"* after correction for surface reflection.

Density as computed from transmission measurements made in the usual manner, includes the intensity losses due to surface reflections.

Having determined the densities due to absorption of any wave-length for one thickness of the transmitting material or for the concentration of the dye incorporated in the gelatine filter, the densities due to absorption for any other thickness of the material or any other concentration of the dye, can be computed by simple procedure of multiplication.

In Fig. 3 curve *A*, the spectrophotometric curve for the filter illustrated in Fig. 2, is shown

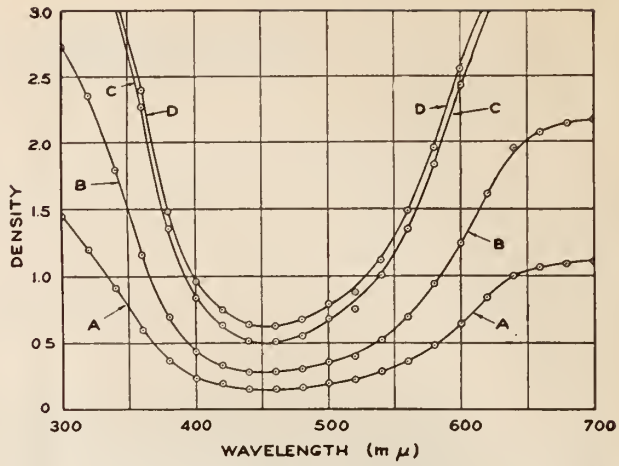

Fig. 3. Spectrophotometric density curves of green filter, illustrating relation between density and concentration and effect of surface reflection.

In plotting the graph, wave-length values are taken as abscissa from wave-length 300 to wave-length 700 as in the spectrophotometric transmission graph (Fig. 2). The *"density"* is expressed by the common logarithm of 1/Transmission, so that a density of one, corresponds to a transmission of 10%, a density of two to a transmission 1% and a desnity of three, to a transmission of 0.1%. The density is plotted as ordinate.

Let us consider, as an example, the transmission of the Toluidine filter in Fig. 2 at wave-length 580.

The spectrophotometric curve of this filter at this wave-length, indicates its transmission to be 0.316, or 316 per 1000. The corresponding density is then given by the logarithm of 1/0.316, i. e., by log 3.16. The tables of logarithm, give us log 3.16, equal 0.4997. In plotting the density graph, the density of this filter for wave-length 580 is then placed at the junction of the abscissa 580 and ordinate 0.4997 as shown in Fig 3.

Densities for other wave-lengths are similarly plotted and the curve *A* in Fig. 3 is finally obtained.

Now, suppose it is desired to determine the effect upon the spectral absorption of increased concentration of the dye used in making the filter. Let the required concentration be 2 and 4 times that represented by curve *A*. Computing the necessary values for various wave-length, taking into account the losses of intensity due to reflections and absorption of the transmitting medium and plotting, the curves *B* and *C* are obtained.

It is interesting to compare the result obtained by increasing the concentration 4 times (curve *C*), with that obtained by using 4 layers of the original film.

This case is represented by curve *D*, the ordinate of which were obtained by multiplying the ordinates of curve *A* by 4.

It will be noted that the minimum density of curve *C* is appreciably less than that of curve *D*, thus the transmission of filter *C* for the wave-length which it transmits most freely is greater than that of filter *D*. The filter obtained by increasing the concentration four times is therefore more efficient from the standpoint of high selectivity in absorption characteristics than that obtained by using four layers of film.

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Fildew, William—
Fischbeck, H. A.—Lasky.
Fisher, Ross G.—First National.
Gerrard, Henry William—Lasky.
Gheller, Edward—
Gerstad, Merritt B.—M.-G.-M.
Gobbett, David William—
Gosden, Alfred G.—
Gilks, Alfred—Lasky.
Gray, King D.—
Guissart, Rene—Paris, France.
Good, Frank B.—Fox Studio.
Griffin, Walter L.—David Hartford Productions.
Gaudio, Gaetano—Caddo Productions—Met. Studio.
Hallenberger, Harry—Lasky.
Harris, Emil—Universal.
Heisler, Frank B.—
Hilburn, Percy—M.-G.-M.
Hunt, Roy—Lasky.
Hyer, William C.—Educational.
Horne, Pliny—
Haller, Ernest—Robt. Kane Productions, Hollywood.
Heimerl, Alois—
Jones, Allen C.—Universal.
June, Ray—Fine Arts Studio.
Jackman, Floyd—
Jackman, Fred W.—Technical Director, Warner Bros.
Jackson, H. A.—Corinne Griffin, U. A.
Jennings, J. D.—Buster Keaton.
Kershner, Glen—Metropolitan Studios.
Kesson, Dave—United Artists.
Kesson, Frank A.—
Kirkpatrick, H. J.—Universal.
Klaffki, Roy H.—
Kornmann, Anthony—Universal.
Kull, Jacob—Universal.
Koenekamp, H. F.—
Kurrle, Robt. E.—First National.
Linden, Eddie—Universal.
Lloyd, Art—Hal Roach.
Longenecker, Bert—Artclass Prod.
Lyons,Chester—Fox
Lyons, Edgar—Christie.
Lyons, Reginald—Fox
Lundin, Walter—Harold Lloyd, Metropolitan.
Lockwood, J. R.—
Marley, J. Peverel—De Mille.
Mackenzie, Jack—Douglas McLean, Lasky.
Marsh, Oliver—M.-G.-M.
Marshall, Wm. C.—Lasky.
Martin, H. Kinley, Lasky.
Mescall, John J.—M.-G.-M.
Miller, Arthur—De Mille.
Miller, Ernest W.—Chadwick Studio.
Miller, Virgil E.—Universal.
Mohr, Hal—Warners.
McClung, Hugh C.—Douglas Fairbanks, U. A.
McCord, T. D.—First National.
McDonnell, Claude—London, England
McGill, Barney.
MacWilliams, Glen—Fox.
Meehan, Geo.—Fox.
Morgan, Ira H.—James Cruse, Metropolitan.
Musuraca, N.—F. B. O.
Milner, Victor—Lasky.
Murray, James V.—Lasky.
McManigal, E. L.—
Newhard, Robt.—
Neumann, Harry C.—Universal.
Norton, Stephen S.—
Oswald, H. M.—

O'Connell, L. Wm.—Fox.
Powers, Len—Hal Roach.
Phillips, Alex—Christie.
Perry, Paul P.—
Perry, Harry—Caddo Prod.—Met. Studio.
Palmer, Ernest—Fox.
Polito, Sol—First National.
Reeves, Arthur—Metropolitan Studio.
Reynolds, Ben F.—
Ries, Irving G.—M.-G.-M.
Robinson, Geo. H.—Universal.
Rosson, Hal—
Roos, Len H.—c/o Pathe Review, Singapore, S. S.
Rose, Jackson, J.—Universal.
Rosher, Chas.—Mary Pickford-U. A.
Ries, Park J.—
Scheurich, Victor—
Schoenbaum, Chas.—Lasky.
Scholtz, Abe—
Shamroy, Leon—Fine Arts Studio.
Smith, Ernest F.—
Smith, Harold I.—
Smith, Leonard—Educational.
Stengler, Mack—F. B. O.
Stevens, Geo.—Hal Roach.
Stevens, Jack—Richard Talmadge, Universal.
Struss, Karl—United Artists-D. W. Griffith.
Stumar, John—Universal.
Stumar, Chas.—Universal.
Sharp, Henry—M.-G.-M.
Smith, W. S., Jr.—
Schneiderman, Geo.—Fox.
Scott, Homer A.
Seitz, John F.—M.-G.-M.
Snyder, Edward J.—Pathe-DeMille. Metropolitan Studios.
Thompson, W. C.—Artclass Productions.
Tannura, Philip—F. B. O.
Tetzlaff, Ted—Chadwick.
Tover, Leo—United Artists.
Todd, Arthur L.—Universal.
Turner, J. Robert—Educational.
Tuers, Billy—
Tolhurst, Louis H.—Microscopic Pictures, Pathe.
Valentine, J. A.—Fox Studio.
Van Enger, Charles J.—
Van Trees, Jas. C.—First National.
Van Buren, Ned—Eastman Kodak, Hollywood.
Vogel, Paul E.—M.-G.-M.
Wagner, Blake—
Wagner, Sidney C.—Fox.
Walker, Earle F.—
Walker, Joseph—Columbia.
Walker, Vernon L.—Sennett.
Warren, Dwight W.—
Whalen, John P.—Santa Fe Studios (Monrovia).
Wheeler, Wm.—Christie Studio.
White, Ben—Fox.
Williams, Wm. N.—Sennett.
Widen, Carl—Tiffany.
Wrigley, Dewey—Metropolitan.
Wyckoff, Alvin—
Wells, Conrad—Warners Vitaphone Prods.
Wenstrom, Harold—
Whitman, Philip H.—Directing Sennett Studio.
Wilky, L. Guy—
Warrenton, Gilbert—Universal.
Young, Jack R.—M.-G.-M.
Zucker, Frank C.—Harold Lloyd Unit. New York.

HONORARY MEMBERS

Edison, Thomas A., Orange, N. J.
Eastman, George, Rochester, N. Y.
Webb, Arthur C.—Attorney.

SPECIAL PROCESS AND TRICK CINEMATOGRAPHERS

Baker, Friend—
Binger, R. O.—M.-G.-M.
Cully, Russell—Lasky.
Knechtel, Alvin V.—First National.
Emlay, Earl—E.R.L. Studios.
Fulton, J. Phipps—Universal.
Pollock, Gordon B.—Lasky.
Mammes, Ray—M.-G.-M.
Cohen, Eddie—
Edouart, Farciot—Lasky.
Flora, Rolla—Lasky.
Lipstein, Harold—M.-G.-M.
Pomeroy, Roy—Lasky.
Roberts, Oren W.—Lasky.
Shearer, Douglas G.—M.-G.-M.
Stull, William—Stull Prod.
Schlockow, Paul—M.-G.-M.
Smith, Arthur—Lasky.
Smith, Jack—Fox.
Williams, Frank D.—Special Process

AKELEY CINEMATOGRAPHERS

Bennett, Guy M.—
Blackstone, Cliff—Lasky.
De Vol, Norman—Fox.
Dyer, Elmer G.—Universal.
Fetters, C. Curtis—Fox.
Galezio, Leonard T.—
Greiner, A. Leroy—First National.
Hickson, John T.—
Hoke, Ira B.—
Larabee, Nelson—Warner Bros.
Marshall, Chas. A.—M.-G.-M.
Marzorati, Harold J.—M.-G.-M.
Mason, Harry G.—
Novak, Jos. J.—Universal.
Olsen, R. B.—
Ramsey, Ray Lloyd—Universal.
Rand, William—Lasky.
Roberts, Josiah—M.-G.-M.
Shackelford, J. B.—Lasky.
Sickner, William—First National.
Stout, Archie J.—Lasky.
Steene, E. Burton—Caddo Prod.—Met. Studio.

NEWS CINEMATOGRAPHERS

Grimes, William H.—M.-G.-M.
Parrish, Fred—Fox, Colorado Springs.
Staub, Ralph B.—Columbia, Specialties.

STILL PHOTOGRAPHERS

Alexander, Kenneth—United Artists—D. W. Griffith.
Archer, Fred R.—De Mille.
Fryer, Elmer—De Mille.
Kahle, Alexander—De Mille
Mannatt, Clifford—M.-G.-M.
Parker, Robt. M.—Stull Prod.
Richee, Eugene Robert—Lasky.
Rowley, Les—Lasky.
Stapp, W. B.—
Sigurdson, Oliver—Metropolitan Studio.
Thomas, Wm. E.—De Mille.
Van Rossem, Walter J.—James Cruse, Inc., Met. Studio.

SECOND CINEMATOGRAPHERS

Bader, Walter S.—M.-G.-M.
Bauder, Steve L.—M.-G.-M.
Baxter, George—De Mille.
Bennett, Monroe—
Borradaile, O. H.—Lasky.
Chaney, George—United Artists.
Chewning, Wallace D.—M.-G.-M.
Cunliffe, Donald—Universal.
Davis, Leland E.—
Doolittle, Jas. N.—First National.
Drought, Jas B.—Universal.
Dunn, Linwood G.—Metropolitan Studios.
Dyer, Edwin L.—
Fitzgerald, Edward—M.-G.-M.
Giridlian, Jas. N.—F. B. O.
Greene, Al M.—Technical Art.
Greenbalgh, Jack—F. B. O.
Guffy, G. Burnett—De Mille.
Haas, Walter—
Harten, Charles—New York.
Head, Gordon G.—
Hendrickson, Fred S.—Lasky.
Huggins, L. Owens—
Jenkins, John—
Julian, Mac—
Keyes, Donald B.—
Landrigan, John S.—Lasky.
Lang, Charles Bryant—Lasky.
Longet, Gaston—F. B. O.
Lanning, Reggie—Lasky.
La Shelle, Joe—
Laszlo, Ernest—
Lindon, Curly—
Martin, Robt. G.—F. B. O.
Marta, Jack A.—Fox.
Merland, Harry—Lasky.
Mols, Pierre M.—M.-G.-M.
MacLean, Gordon—M.-G.-M.
Nogle, Geo. G.—
Pahle, Ted—
Palmer, Robt—M.-G.-M.
Parsons, Harry—
Pittack, R. W.—Lasky.
Planck, Robt. H.—Columbia.
Prince, Al—Universal.
Pyle, Edwin L.—
Ragin, David—Fox.
Ray, Bernard B.—
Redman, Frank—DeMille.
Reed, Arthur—M.-G.-M.
Rees, Wm. A.—Fine Arts.
Schmitz, John J.—Special Process
Schopp, Herman—Metropolitan Studios.
Shepek, John, Jr.—Educational.
Silver, John—
Smith, Jean C.—De Mille.
Stine, Harold E.—De Mille.
Tappenbeck, Hatto—Fox.
Trezo, Fred—Universal.
Thompson, John—F. O. B.
Unholz, George—Sennett.
Van Dyke, Herbert—M.-G.-M.
Van Enger, Willard—Warner Bros. Vitaphone.
Wagner, Robt—First National.
Walters, Joseph J.—F. B. O.
Westerberg, Fred—De Mille.
Wilde, Harry—
Williams, Alfred E.—Lasky.
Rex, Wimpy—Lasky.
Witzel, E. L.—Universal.

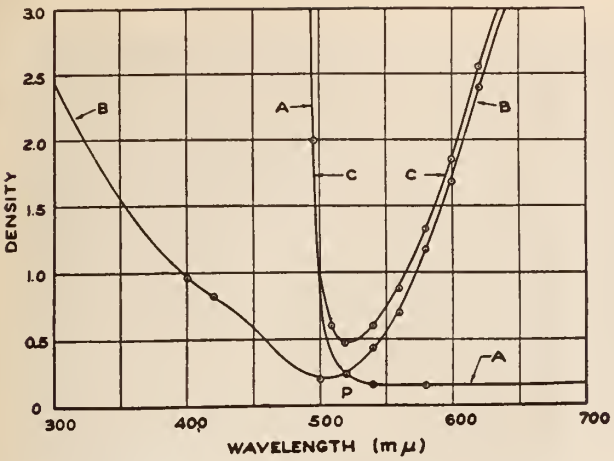


Fig. 4. Spectrophotometric density curves of "A" red filter, "B" green filter, and "C" the green filter obtained by superposing "A" and "B."

The expression of the data in the form of density is also most convenient where it is desired to compute the spectral absorption obtainable by the superposition of two or more filters or the use of two or more dyes in the same solution or gelatine film. In the case of the superposition of the two sheets of dyed gelatine or pieces of glass it is only necessary to add at each wave-length the density values as determined directly by the spectrophotometer. In case the addition is to be made by incorporating two dyes in the same solution or in the same sheet of gelatine it is apparent that the appropriate correction must be made for any surface reflection factor which may be included in the density values for the individual dye components. In Fig. 4, curve *A*, is shown the spectrophotometric density curve of a yellow (blue absorbing) gelatine filter. Curve *B* shows the same characteristic for a blue-green (red absorbing) gelatine filter. Curve *C* is that obtained by adding the ordinates of *A* and *B* and shows the spectral absorption obtained by the superposition of one layer of each filter. Curves *A* and *B* intersect at the point *p* of which the density value is 0.25 (transmission=56.4%). The density of the superposed combination, curve *C*, at the corresponding wave-length is two times 0.25 or 0.50 (transmission=32%). This is the

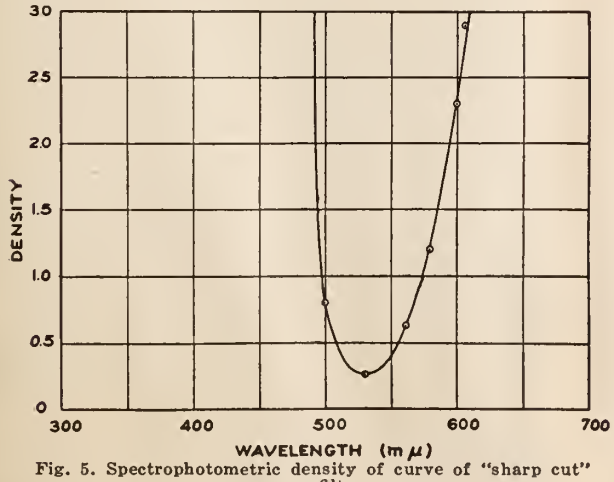


Fig. 5. Spectrophotometric density of curve of "sharp cut" green filter.

minimum density value of *C*. Hence at the wave-length which is transmitted most freely by the combination only 32 per cent of the incident radiation is transmitted. This compound filter (curve *C*) is bright green in color and isolates fairly well the wave-length band from 500 to 600mμ. A filter of much greater efficiency for this purpose can be made by incorporating properly selected dyes in a gelatine film. Such a filter is illustrated by the curve in Fig. 5. This has maximum transmission at approximately the same wave-length as *C* (Fig. 4) and its density value is approximately 0.25, corresponding to a transmission of 54 per cent, almost twice that of filter *C*.

A similar low efficiency is usually encountered to a greater or lesser extent whenever an attempt is made to isolate some particular spectral region by superposing two or more separate filters. This is due in part to the increasing loss in surface reflections as the number of separate filters is increased. Furthermore each filter is designed by the manufacturer to give some specific spectral absorption with maximum efficiency and to this end the best possible available dyes are selected. If some entirely

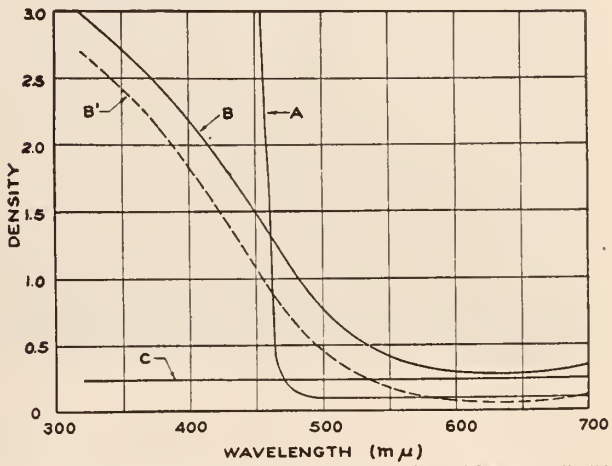


Fig. 6. Spectrophotometric curves illustrating "sharp cut" "A," gradual cut "inefficient" filter "B," and gradual cut efficient filter "B'."

different spectral absorption is required it is probable that dyes can be selected which will function with greater efficiency than can be obtained by combining two filters designed specifically to meet other requirements.

The terms "sharp cut" and "gradual cut" are frequently applied as descriptive of light filters. The significance of these terms may be illustrated by reference to Fig. 6. Curve *A* is the spectrophotometric curve of a brilliant yellow gelatine filter. Its density at all wave-lengths greater than 480mμ is 0.1 (transmission=86%). The absorption at wave-lengths less and 480 mμ increases rapidly so that at 460mμ its density is 1.5 (transmission =3.1%). Such a filter is described as a "sharp cut" filter. It is evident therefore that the term "sharp cut" applies to a filter of which the absorption curve is steep, that is the rate of change of absorption with variation in wave-length is great, or conversely the condition described as "sharp cut" applies to the case where a relatively small change in wave-length is accompanied by a large change in absorption.

Curve *B* applies to a piece of *amber* glass and to such a filter the descriptive term "gradual cut" is applied. It will be noted that the wave-length band over which the change from its minimum to maximum density occurs is very broad, extending from 600 mμ to 300 mμ

(Continued on Page 26)

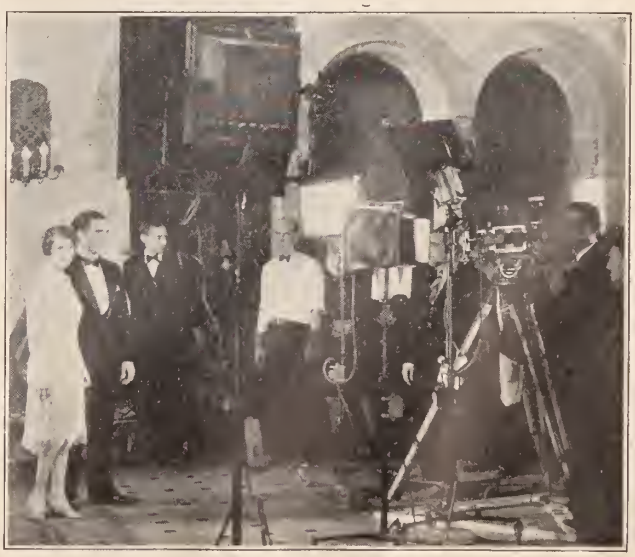
Aerial photograph shot by First Licutenant Willis R. Taylor, commanding officer of the Fifteenth Photo Section, U. S. A., Crissy Field, California.

Standing—James, of the General Electric Company; Peter Mole and J. M. Richardson, of Mole-Richardson; Electrical Engineer F. N. Murphy, of Warner Brothers... Seated—Farnham, Van Horn and L. C. Porter, General Electric Company.

The Research Club of Paramount-Lasky Studi

Set at Warner Brothers' Studio used in the incandescent light tests now making under the direction of the Academy of Motion Picture Arts and Sciences and American Society of Cinematographers. The ceiling of this beautiful set is painted on glass and the light is from incandescent sources. The set has been used by all members of the A. S. C participating in the demonstrations.

ns ed of employees of the electrical department.



Gaetano Gaudio, A. S. C., directing incandescent light tests in the Roosevelt Hotel lobby, Hollywood; Donald Keyes, A. S. C., assisting.

The S. M. P. E.

(Continued from Page 5)

Los Angeles, Calif.; George A. Mitchell, Mitchell Camera Co., 6025 Santa Monica boulevard, Hollywood, Cal.; Otto K. Olesen, 1645 Hudson avenue, Hollywood, Cal.; M. W. Palmer, Famous-Players Lasky Corporation, Long Island City, N. Y.; Roy J. Pomeroy, Famous-Players-Lasky Studio, 5451 Marathon, Hollywood, Cal.; W. R. Rothacker, First National Studios, Burbank, Cal.; Wm. Sistrom, Cecil B. De Mille Studio, Culver City, Cal.; A. George Volck, Cecil B. De Mille Studio, Culver City., Cal.; C. A. Willat, 1803½ Gower street, Hollywood, Cal.; Alvin A. Wyckoff, American Society of Cinematographers, 1220 Guaranty building, Hollywood, Cal.

Following is a list of the organizations represented in the S. M. P. E.:

The American Society of Cinematographers; Motion Picture News, Inc., Alexander Film Co., Rothacker Aller Lab., Province of Ontario Pictures, Technicolor M. P. Corp., American Photography, Sperry Gyroscope Co., Rothacker Film Mfg., Co., Kiddle & Morgeson, Eastman Kodak Co., Brenkert Light Projection Co., Atlantic Belatin Co., Griffin & Bowen, Inc., Bristol Company, Edison Lamp Works, Westinghouse Electric & Mfg. Co., Duplex M. P. Industry, Inc., Carpenter-Goldman Lab., Pathe Exchange, Akeley Camera, Inc., Eastman Theater, Kodascope Libraries, Inc., National Carbon Co., Pathe-Dupont De Nemours Co., Cummings Laboratory, Government Motion Pictures, Prechistenka Obulkov (Russia), Spencer Lens Co., Pathescope Co. of Canada, Ltd., Westinghouse Lamp Co., Helios Corp., Bay State Film Co., American Projectionist, National Lamp Works, John O. Elms, Famous Players, Lasky Corp., Trumbull Amusement Co. of St. Petersburg, Ford Motor Co. of Canada, National Theater Supply Co., Celluloid Co. of Newark, E. E. Fulton Co., Corning Glass Work, Gaumont Co. Gundlach Manhattan Optical Co., Orpheum Theater, International Projector Corp., Gregory, Carl Louis, General Electric Co., Consolidated Film Lab., Hertner Electric Co., Duplex Motion Picture Industries, U. S. Army M. P. Service, Kiddle & Morgeson, Bell & Howell Co., Erbograph Co., Cooper-Hewitt Electric Co., Herbert & Huesgen, Marcus Loew, Inc., F. E. Ives, Francis C. Jenkins, Daylight Film Corp., Bausch & Lomb Optical Co., Fox Film Corp., Kelley Color Films, Keuffel-Esser Co., Lang Mfg. Works, Pathescope of Canada, J. E. McAuley Mfg. Co., Electrical Testing Lab., Matlack Corp., E. J. Electric Installation Co., Technique de Pathe Cinema, E. Leitz, Inc., Chicago Film Laboratory, Mitchell Camera Co., National Cash Register Co., Bray Productions, Associated Screen News, Dept. of Trade & Commerce, Perfection Arc Co., Southern Enterprises, Inc., Warner Research Lab., Caribbean Film Co., M. P. Producers & Distributors of America, Raven Screen Co., Ilford, Ltd., Moving Picture World, Pathe of France, Ltd., Kodak Co., Cine Dept., Cecil B. De Mille Studio, Akeley Camera Co., Case Research Lab., Colorat Studio, Ansco Co., Urban-Kineto Corporation, Victor Animatograph Co., Ward Cine Lab., Inc., Williamson Manufacturing Co., Ltd., Famous Players-Lasky Corp.

Question—How did Panchromatic film originate?

Answer—The question is quite timely and the interest that it will undoubtedly arouse prompts the Answerman to devote to its answer all the space allotted to this department.

In the year 1873 the German scientist and investigator, H. M. Vogel, was conducting a series of experiments in order to find a way to eliminate the halation caused by rays of light reflected back to the sensitive emulsion by the glass supporting it. He thought that by incorporating a dye in the sensitive collodion in use in those days he could reduce such halation without destroying the sensitiveness of the plate.

During his experiments he noticed that a change in the sensitivity of the emulsion was noticeable. With the use of CORALLIN the yellow rays were rendered more actinic than they were with the ordinary emulsion.

This led him to investigate the properties of a number of dyes and he discovered that the emulsions were rendered MORE SENSITIVE TO THE LIGHT ABSORBED BY THE DYE ITSELF. Corallin, for instance, absorbs the yellow-green rays and the sensitivity of the emulsion to these rays was increased when the dye was incorporated into the emulsion or applied by a soaking of the ordinary plate in a weak solution of the dye.

CYANIN was one of the dyes experimented upon by Vogel.

Plates thus prepared were named ORTHOCHROMATIC from the Greek ORTHO, meaning "correct," and CHROMOS "color."

This appellation was quite incorrect because the dyes known in those days did not correct the color rendition throughout the spectrum and a new word, PANCHROMATIC, had to be coined when such correction was found to be possible.

In 1882 the French chemist, Attout Tailfer, introduced the use of EOSIN and ERYTROSIN in conjunction with ammonia which rendered the plates more sensitive to the yellows and yellow-greens.

In 1884 Vogel brought the sensitivity of the emulsion into the Orange-yellow region by the use of QUINOLINE and also preconized the mixture of different dyes such as QUINOLINE RED and CYANIN, to which he gave the name of "AZALINE PLATES." Vogel also discovered that Eosin had the strongest effect when used in the form of its silver salts dissolved in Ammonia.

In 1881 HIGGS orthochromatized plates with ALIZARIN BLUE and COERULIN, which rendered them sensitive to the yellow, orange the red regions of the spectrum. Higgs used the plates so prepared in photographing the solar spectrum.

In 1904 E. KOENIG produced the dyes known under the commercial name of ORTHOCHROM T, PINAVERDOL and PINACHROME which, used with the silver bromide emulsions, extend the sensitivity in the reds but more so in the oranges and greens. In the same year MIETHE and TRAUBE found that ETHYL RED was more suitable than cyanin, being more stable and consequently avoiding trouble and deterioration of the sensitized plates.

HOMOLKA, in 1906, discovered PINACYANOL, a red sensitizer, which in conjunction with a green sensitizer such as Pinachrome or Pinaverdol, would sensitize an emulsion TO THE WHOLE OF THE VISIBLE SPECTRUM.

Panchromatic emulsions were thus born.

Due to the conditions created by the world war the United States increased their contribution to the question and POPE prepared dyes identical with the dyes which were up to this time prepared only by German manufacturers.

MEGGERS and McCLELLAN succeeded in photographing the infra red regions with DICYANINE, reaching as far as wave length 10,140.

ADAMS and HALLE, in 1919, discovered KRIPTOCYANIN, producing a strong sensitivity in the infra red region and, in 1925, H. T. CLARKE, of the Eastman Kodak Laboratories, discovered NEOCYANIN, which gave remarkable results for its sensitiveness in the infra red regions, reaching as far as wave length 11,290.

Professor Wright, of the Lick Observatory, and Dr. Mees, of the Eastman Kodak Company, proved the penetration through atmospheric haze of plates sensitized with KRIPTOCYANIN or NEOCYANIN.

This brief outline of the history of Panchromatic emulsions does not give the least idea of the tremendous amount of work conducted in these investigations and of the difficulties that have been overcome to bring about Panchromatic materials presenting the conditions of uniformity and stability required to make such material a commercial success.

Virgil E. Miller, A. S. C., has signed a long term contract with the F. B. O. studios, after completing a picture directed by Dudley Murphy, in which "Skeets" Gallagher, Ruth Dwyer, Albert Conti and Patricia Avery were featured. The first picture to be made under the new contract will also be directed by Mr. Murphy. Its working title will be "Stocks and Blondes."

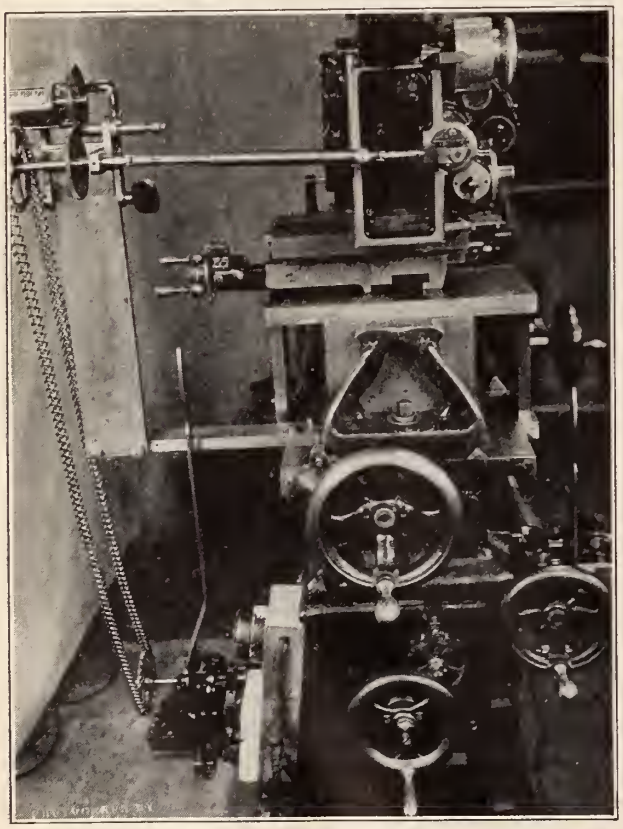
For Trick Work

By Hereford Tynes Cowling

(Continued from Page 7)

Invaluable for Animated Cartoons

With the development of the art of cartooning and of camera trick the optical printer came into use again as an ideal instrument for selecting from films already made, the components desired for the construction of composite or "trick" pictures, and for the recombining of these components into pictures. Most "trick" work and nearly all animation consists of an assembly or composite of time and action components. In animation the components are painstakingly drawn by hand and snythesized by photographing them in the proper sequence with a motion camera.



No. 3—Control end of Barber Optical Printer, showing wheels and levers which move and operate all parts of the machine from one controlling position.

New Life for Old Subjects

The requisite components for an infinite variety of new combinations exists in every small collection of photographically produced motion picture film, but to select these components from hundreds or thousands of film pictures, each no larger than a postage stamp, seems too staggering to attempt. This selection is only a half of the problem, for the components must then be reassembled with mathematical precision so fine that the new combination shall not reveal the joining lines between the welded parts even when maganified hundreds of diameters on the screen. The solution of this difficult problem is in a precision optical printer where every mechanical move can be controlled with micrometric precision.

Not a Secret

There is nothing secret about the principles of optical printing. They are known to every motion picture technician. A number of optical printers have been constructed for exclusive or private use and the details of their mechanical design have been kept more or less in seclusion. Realizing that there are many firms and individuals who have use for the product of such a machine and that the very few elaborate optical printers in existence are being kept for exclusive purposes, Mr. Fred A. Barber has constructed one of these instruments for the service of the public. Mr. Barber has put several years of time and experience into the design and construction of this precision instrument. He is a cinematographer and technical expert. His work as a specialist in the less known branches of cinematography have kept him in the laboratories and studios of companies which do only special and scientific work of difficult character. He is now associated with Carl Louis Gregory, in whose laboratory this machine is being operated.

Precision First Requisite

The base of the machine is a heavy six-foot lathe bed set on a concrete foundation. Sliding on the lathe bed which acts as an optical bench are three heads. The operator sits at one end of the machine where all of the controls ordinarily used are situated. On the head nearest the operator is a Bell & Howell camera with special magazines which take up automatically either backward or forward.

The second head has an interchangeable mount and takes any lens fitted for the Bell & Howell cameras. The third head carries a special projection head movement and lamphouse. All the heads may be shifted up and down or sideways and micrometer indicators reading in plain figures to one-eight-hundredth of an inch show the exact position of each member. A motor beneath the machine permits either head to run independent of the other and either head may run backward or forward. Several interchangeable mechanisms may be used on the different heads for different purposes, including enlarging from and reducing to 16 mm. size film.

Has Many Uses

So many different things can be done with this machine that it is not possible to list them here. Listed below are some of the principal things which can be done with it:—

1—Duplicate negatives which cannot be distinguished from original as no printer marks show on these negatives.

2—Changing frame line. Duplicate negatives can be made from non-standard negatives or prints and the frame line changed to coincide with any other standard.

3—Combining two or more negatives upon one film so that normal and ultra-speed may be shown side by side or a vision may be made from one negative and introduced into any other negative.

4—Negatives can be reproduced with the action slowed down or quickened to almost any extent. Normal action can be made from ultra-speed, thus giving normal and ultra-speed action from exactly the same view point.

5—Hold action at any point. Action can be suspended and held still at any point in the film and then be continued or reversed or repeated. Very valuable for golf instruction films or for instruction in any other sport or for showing the action of machinery.

6—Reserve action. Any negative can be reversed to show the action backward, and this action can be slowed down or speeded up if desired.

7—Repeat action. Action can be repeated as many times as is required, and at the same time, reversed or the speed changed to suit any purpose.

8—Camera effects. All kinds of camera effects, such as: fade-in, fade,out, iris-in, iris-out, lap dissolves of any length or any other camera effect can be introduced onto negatives already taken.

9—Duplicate or multiple action of the same subject in the same scene. This can be in synchronism or different phases of the same action may be shown going on at the same time.

10—Double and multiple exposures from any number of original negatives in absolute register.

11—Super-imposed titles may be made in any portion of a negative which has already been taken and developed.

12—Borders, frames and masks may be introduced around any scene.

13—Close-ups can be made from semi-close-ups. Any part of any negative already taken can be enlarged or reduced.

14—Trucking shots. The effect of moving up on a scene for a closer view or of moving back to include more of the scene can be made from any negative already taken.

15—X-Ray views of machinery or any object in motion can be made showing both exterior and interior as if the machine were transparent.

16—Explanatory labels, animated lines, pointers, etc., can be introduced into negatives already made.

The effects enumerated above do not by any means tell all of the things which can be done by the various possible manipulations of the machine. The various combinations possible are limited only by the ingenuity of the operator and the film material which he has available for reproducing ideas.

With the ever-increasing demand to insure preservation of old film subjects of historical, scientific and other interest by duplicating processes; as well as to combine these features of past events within new productions; the development of this especially designed machine will meet a long-felt want. Mr. Barber is to be congratulated upon the ingenious labor he has given this subject.

R. G. Martin, A. S. C., formerly with M.-G.-M., has moved his equipment to the F. B. O. where he has just finished "Crooks Can't Win," starring Ralph Ince. He is now working on another opus with the same star.

Joe Dubray, A. S. C., has just finished making an extensive series of tests on Panchromatic emulsions. The Agfa sponsored these tests and Joe announces that he is gathering some data which will be very valuable to the members of the A. S. C.

Movie Make-Up

By Joseph Dubray

(Continued from Page 8)

tive film under conditions controlled by a lens. This photochemical action is not, even with Panchromatic emulsions, a perfect rendition of the impressions made by the same object on the human eye.

If the object be a human face, which is the case that interests us, the power of the reflected light that concurs to form the image on the films, varies considerably from subject to subject and still more considerable are the differences of its effects upon the sensitive film, the response of the film, in other words, to the reflected light.

Suppose, for instance (that which never exists in real life), two ideally perfect complexions, say of a young girl and a young man, which to all appearances would need no make-up at all for a perfect photographic rendition.

Taken individually the photographic results on the screen would be as perfect as may be desired, but if you put them together in the same picture, in the same scene, in a close-up, for instance, of the two heads, you would immediately notice that difference of response that is mentioned in the preceding paragraph.

All the ingenuity, all the artistry of the cinematographer is then called into play to balance his lightings so as to overcome the differences of actinic value of the two subjects.

And if the two subjects are not perfect, photographically perfect, so to speak; if their complexions are quite different in reflecting power in respect to the film, and if one of the subjects (and this is the condition that too often presents itself) wears make-up and the other none—well—it is then more than unjust to expect the cinematographer to perform the impossible feat of obtaining a well-balanced, perfect rendition of values, and the result then is bitter criticism, poor screen rendition, disillusionment, heart-ache and perhaps ill-feeling.

And if we consider the psychology of photography in regard to the dramatic values of a picture we may wonder how the beautiful heroine can sacrifice herself, the affections of her family, perhaps the love of her children, for the love of a hero of fine figure and lineaments but afflicted with a dirty, greasy looking face?

No matter how fine the performance the physical repellance reacts upon the audience to the detriment of the success which would be the reward of hard work, of sincere effort.

Make-up is the *controllable agent* that permits the abolition of these evils.

Some actors claim that make-up hampers their freedom of action and expression.

Let us be frank and unbiased. Make-up is a vital necessity in the making of motion pictures; it is a tool belonging to the trade of acting, and a very delicate tool requiring a great deal of study and experience in its use, study and experience which will minimize its possibly unpleasant features.

A man who has chosen the trade of carpentering has to accept the noise of the hammer hitting upon a nail no matter how unpleasantly the noise may offend his ears.

The artist painter accepts the odors of paint and varnishes.

The violinist can express his artistry in spite of the callouses that grow at the tips of his fingers.

And hammer and nails, paints and varnishes and pressure of the fingers upon the violin strings are as essential to these arts as make-up is to the motion picture performer.

IS MAKE-UP TO BE OR NOT TO BE?

Light Filters

By Loyd A. Jones

(Continued from Page 71)

The slope of the absorption curve in this region of variable adsorption is low and hence the filter is described as one having a "gradual cut." The transmission of this filter for the wave-length it transmits most freely is very low, being approximately 50 per cent (density=0.3) in the region from 600 to 800 mμ. Filter A has a bright yellow color, while B has a hue slightly more orange and exhibits a dull "muddy" appearance. This term "muddy" is also used frequently as descriptive of light filters and indicates a relatively high general absorption for all wave-lengths in the visible region. The muddy appearance may be considered as due to an admixture of black in the filter. For instance let the dotted curve B' represent a filter having an absorption curve similar in shape to that of B but for which the density at all wave-lengths is .24 less than that of B. The maximum transmission of B', in the wave-length band from 600 to 690 mμ, is 90 per cent and such a filter has a clean brilliant appearance although the dominant wave-length is somewhat longer than in the case of filter A thus giving filter B' a hue which is more orange. Now suppose that to this filter (curve B') is added a black dye, represented by curve C of such concentration as to give a density of 0.24 at all wave-lengths. The addition of C to B' gives B, and the B' filter is changed thereby from a clear brilliant yellow-orange to a dull "muddy" amber. "Muddiness" in a filter is therefore due to something equivalent to the addition of a black component and is an indication of high absorption in the wave-length region of maximum transmission and hence of low optical efficiency.

(To Be Continued in April)

Wm. R. Howard and his A. S. C. comera crew at De Mille studio directing "His Country" for Pathe release. Left to right: Chief Cinematographer Lucian Andriot, who has shot all of Howard's pictures. Back of Andriot is Harold Stine, associate cinematographer. The weird contraption is the $10,000 electrical camera carriage. Elmer Fryer, company, still photographer, is also an A. S. C.

The P. A. of A.

Following is the program of the Forty-sixth Annual Convention of the Photographers' Association of America, to be held at Louisville, Kentucky, beginning Tuesday, March 27, 1928:

TUESDAY, MARCH 27

10:30 A. M.—Opening of Manufacturers' Exhibit.
1:30 to 2:00 P. M.—Community Singing.
2:00 P. M.—Convention called to order by Chairman of Convention Committee.
Singing of National Anthem.
Singing of British Anthem.
Address of Welcome
Response
Chairman of Convention Committee turns gavel over to President Townsend.
Annual Address of President.
Report of Treasurer.
Report of Secretary.
Report of Chairman of Commercial Section.
Report of Director of P. A. of A. School of Photography.
Report of Woman's Auxiliary.
Report of Advertising Committee.
Report of Constitutional Committee.
Appointment of Committees.
General Business.
Introduction of Richard Speaight.
Address of Richard Speaight.
Tuesday Afternoon—Richard Speaight.

WEDNESDAY, MARCH 28

Wednesday Morning
10:00 to 11:00 A. M.—I. T. Frary, Cleveland, Ohio, "Studio Decoration and Arrangement."
11:00 to 12:00 Noon—Open.
Wednesday Afternoon
2:00 to 3:00 P. M.—James Elliott, Underwood and Underwood. New York city, "Are You Charging Enough for Your Work?"
3:00 to 4:00 P. M.—George Harris, Washington, D. C., "National Advertising."
Fred Millis, Indianapolis, Indiana, "National Advertising."

THURSDAY, MARCH 29

Thursday Morning
10:00 to 10:40 A. M.—Dave Merriam, Minneapolis, Minn., "Photo Finishing as a Side Line."
10:40 to 11:20 A. M.—James Thompson, Knoxville, Tenn., "Commercial Photography in the Smaller Cities."
11:20 to 12:00 Noon—Art Director.
Thursday Afternoon
2:00 to 2:45 P. M.—L. W. Rand, Brockton, Mass., "System in the Studio."
2:45 to 3:10 P. M.—Pirie MacDonald, New York, N. Y., "Photography and Its Importance."
3:00 to 4:00 P. M.—Richard Speaight.

FRIDAY, MARCH 30

Friday Morning
9:45 to 10:45 A. M.—Business Session.
10:45 to 11:15 A. M.—Clarence Stearns, Rochester, Minn., "Personality."
11:45 to 12:00 Noon—Robert Young, San Francisco, California, "Commercial Demonstration."
Friday Afternoon
2:00 to 3:00 P. M.—Professors Bussey and Barton, Now York, New York, "Principals of Salesmanship."
3:00 to 4:00 P. M.—Delegate from American Society of Cinematographers.
Friday Evening
Banquet.

Advantages of the A. S. C. in the P. A. of A.

I. The Use of Travelling Exhibits.
  a. Five Portrait Exhibits.
  b. Three Commercial Exhibits.
II. The Use of Standard Forms.
  a. Copyright publication release.
  b. Model release for publication and copyright.
  c. Affidavit form for photographers taken for legal purposes.
  d. Cost forms for Commercial Photographers.
  e. Cost forms for Portrait Photographers.
  (The above are all in preparation).
III. The Commercial Photographic Service of the P. A. of A.
  a. A service whereby manufacturers can go to their local photographer and have work done in different cities all over the United States and Canada through members of the Commercial Section.
IV. The Winona School.
  a. Portrait Department.
  b. Commercial Department.
V. The Speakers Bureau.
  a. A service whereby the 80 or 90 clubs throughout the country can secure the services of 50 or more of the leading photographers in the country to address their meetings.
VI. Business Counsellor.
  a. A service whereby the clubs throughout the country can get the services of an experienced advertising man who will advise them on the Advertising Campaign, the tie-up material, and the various services that the Association has to offer. Services of this man will be free to all clubs.

(Continued on Next Page)

A Bit of History

A local periodical published not long ago a story by a United Press staff correspondent concerning the bringing to light of a French film.

Some errors of dates appeared in this yarn and in the spirit of impartiality the *American Cinematographer* publishes the following bit of history.

As far back as 1885 celluloid strips were coated with sensitive emulsions. In 1887 Hannibal Goodwin, of New Jersey, and Graff and Jougla, of France, manufactured photographic films. In 1888 Blair furnished Edison with celluloid films for his experiments and in 1889 the Eastman Kodak Company was manufacturing such material.

In 1894 the Lumiere Brothers of Lyons, France, organized the manufacture of sensitive films and in 1896 their manufacture of negative and positive films had reached a high degree of perfection.

The FIRST showing of PROJECTED motion pictures, which included "The Arrival of a Train in a Depot," "A Boat Leaving Port," etc., took place at a private showing March 1st, 1895, followed by other private exhibitions to photographic and scientific societies, on June 10, 1895, June 12, July 11, November 10 and November 16 of the same year.

The first PUBLIC exhibition took place in the Indian Room in the basement of the "Grand Cafe" in Paris, the evening of Saturday, December 28, 1895. The program was composed of ten pictures of a length of about 45 feet each.

Previous to this exhibition, the only motion pictures in existence (besides the little books composed of series of pictures, viewed by rapidly revolving the pages with the thumb of the hand that was holding the book) were the Edison "Kinetoscope," a *peep-hole* apparatus through which the cine-photographic film was viewed by one person at a time. The Kinetoscope when exhibited in Paris in 1894 spurred Mss. Lumiere in their researches on the taking and *projecting* of motion pictures.

The first projected pictures in America using Edison's Kinetoscope films, were shown to Mr. Edison in December, 1895, by Mr. Armat, of Washington, D. C., the inventor of the projector, in the offices of Raff & Gammon, in the Postal Telegraph building, 253 Broadway, New York city.

The Lumiere Brothers did not exploit their invention, their occupation being the manufacture of medical and photographic chemicals as well as sensitive plates, films and papers, one of the most flourishing industries in the world.

The exploitation of the Cinematographer was conducted by pioneer producers such as Mr. Charles Pathe, whose establishments led the motion picture world, until the world war occasioned a complete stop to activities in Europe.

The P. A. of A.

(Continued from Page 27)

VII. The Benefit of the National Advertising in over a dozen prominent magazines.
VIII. A Subscription to the Pathfinder.
IX. The use of Syndicate Form Letters and Direct Mail Literature.
X. The use of Syndicate Street Car Cards.
XI. The use of Syndicate Newspaper Advertisements.
XII. The use of Syndicate Bill Board Advertisements.
XIII. The National Convention.
XIV. Decalcomanias and Electrotypes of our Association Emblem.
XV. Fellowship Degree.

A Letter from Cooper Hewitt

The American Cinematographer is permitted to reproduce the following excerpts from an interesting letter recently received from the Cooper Hewitt Company by that organization's local representative, Mr. John T. Shannon:

* * * "It has never been the writer's idea that any one particular kind of form of light could ever be developed so that this particular form of light would be an all-purpose light. In other words, the writer's experience has caused him to believe that the mixture of two or more different types of lighting varying in quality and in kind give the cinematographer not only a great leeway in achieving the particular results for which he is striving, but this mixture of two kinds or qualities of light allows him to obtain certain artistic values which could not be obtained by the use of any one kind of light.

* * * "About two years ago the writer, having a knowledge of the qualities and the benefits to be derived from the use of Panchromatic film, and while at our factory in June, 1926, went into the matter with our engineering and construction departments regarding the possible manufacture of a tube using a new principle at that time, so that we could be able to supply to the cinematographers a combination of tubes each giving light emanations of such character as to obtain the greatest actinic value at either end of the spectrum and over-lapping at the yellow green lines. After the development of this tube, were it possible, we would try then various methods of combining these tubes with some form of mechanical control of the light so we could vary the light emanations therefrom and in this manner practically control the light as regards its color emanations.

Our factory, The Cooper-Hewitt Electric Company, a member of the large General Electric family, has produced in a practical manner this lamp after more than a year and a half of experiment and development. In other words, we have manufactured and are prepared to manufacture in quantities as desired a tube using a principle of incandescent neon gas that will supply emanations in the red portion of the spectrum.

Keenly anxious ourselves to assisit in any manner that we can, we have developed at the Hollywood shops two special Cooper-Hewitt outfits which are particularly suitable for close-up work. Each of these outfits consists of two Cooper-Hewitt U tubes and one Neon red light tube in the same light frame, said light frame being provided with the necessary devices for raising and lowering them and tilting the head, and also provided with slots so that various types of diffusing mediums may be used in conjunction therewith and the outfits are also provided with a mechanical diaphragm or shutter so the amount of red rays in the total light emanations may be varied at the will of the operator.

With these lamps effects may be varied so that an absolutely noonday sun or afternoon sunlight spectrum may be obtained at the will of the operator."

Charles J. Davis, A. S. C., has transferred his photographic activities from Warner Brothers' Vitaphone to Fox Movietone, New York.

If Cows Didn't Eat Mustard We Wouldn't Have Moving Pictures

The photographic industry sprang from a mustard seed. At least, the mustard seed plays a most important part in that industry, for it is tiny traces of mustard oil, carried into the photographic emulsions through the gelatin, that make the silver salts sensitive to light, according to Dr. C. E. Kenneth Mees, director of the research laboratories of the Eastman Kodak Company. In his recent address before the American Society of Cinematographers, Dr. Mees explained "The Foundation of a Photographic Picture."

"The creamy white layer on the film used in a Kodak or motion picture camera is composed of billions of tiny microscopic crystals of silver bromide, of which there are more on a square inch than there are human beings on the surface of the globe," said Dr. Mees. "Recently the scientists of the Kodak research laboratories have studied these microscopic crystals, and have even studied the behavior of single crystals isolated from their neighbors. It has been found that the sensitiveness of the films is not owing to the grains of silver bromide only, but is in some way connected with the presence in those grains of specks of some other substance.

Accidental Impurity

"After a long and careful study, the Kodak research laboratories have found that these specks are produced by an accidental impurity present in the gelatin. This impurity is derived from the plants eaten by the animals from whose skins the gelatin is made. There is only a very small amount of it in the gelatin, but when the gelatin is used for making the film, the tiny bit of sulphur which the impurity contains reacts with the silver bromide and produces specks of silver sulphide on the crystals.

"In some way or other these specks increase the effectiveness of the light to which the film is exposed in the camera and enable the light to change the silver bromide so as to form a trace of metallic silver. The silver acts during the development as a nucleus on which more silver can deposit by the chemical process until the whole of the silver bromide crystal is changed into silver. Each of the original crystals of the film, therefore, after exposure to light becomes a grain of silver in the developed film, and it is of these grains of silver that the image projected on the screen is composed."

Forms Minute Battery

The speaker explained how Dr. S. E. Sheppard discovered that the sensitizing material in gelatine is mustard oil, and how in the production of the photographic emulsion it is changed to an alkali sulphide. He also pointed out the mechanism devised by A. P. H. Trivelli to explain how this trace of silver sulphide produced as tiny specks on the silver bromide grain causes enough silver to be produced to make the grain developable. Of this, Dr. Mees said:

"If we accept Trivelli's hypothesis, the silver bromide was made to conduct electricity by the light which fell on it, and for one-fiftieth of a second a current flowed through the little battery made of silver sulphide and a trace of silver. The current decomposed some of the silver bromide and produced a speck of silver. This speck then acted in development as a nucleus for the deposition of more silver until the whole exposed crystal was turned into a speck of black silver."

Sky Stuff

By Perry Evans, A. S. C.

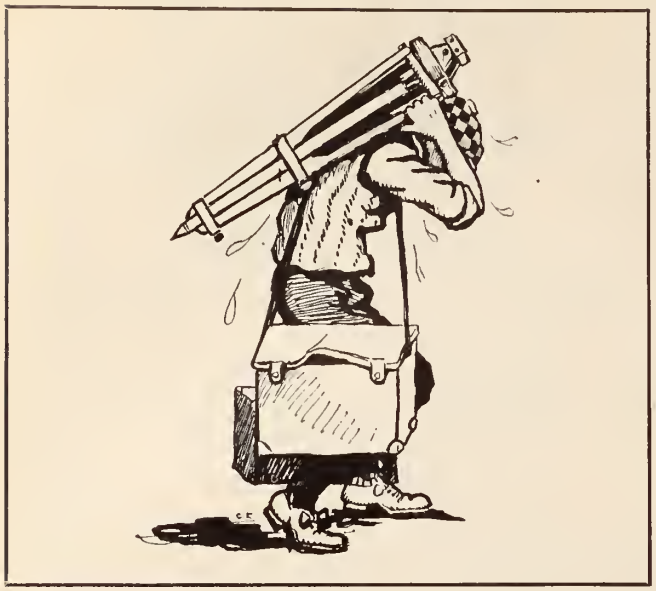
In another air production which required desert scenery we chose Dry Lake, twenty miles from Victorville, as our location. After a few days out in the heat our pilots became restless and as an incentive were told that as soon as we finished we would fly to Mexicala and take on something cool and soothing and then fly back home. This we did, and not mentioning any names, one little "runt" aviator flying a ship in keeping with his own size insisted on entering into the Mexican atmosphere by drinking "tequilla." In going back to our ships the little man had to be carried most of the way, so I suggested that some one else fly his ship and let him ride back with some of the other pilots. To this the boys unanimously agreed that the midget was capable of flying his own crate, drunk or sober. After assuring us that he would refrain from all "monkey business" and keep his place in formation, we tucked him in his crate, strapped him down, turned over his motor and he took off with the rest of us.

For the first half hour everything went fine when suddenly friend Midget takes a nose dive out of formation with motor wide open, and while we held our breath, expecting to see him hit the ground at 300 miles an hour he levelled her off and nosed her almost straight into the air to an altitude of 3000 feet above us where he did every stunt known to aviation and a few that were never heard of, ending up by turning his ship upside down and flying in that position for a mile or more, then came back and took his place in formation. This performance he repeated two or three times before we arrived at our home port, where he came down and made a perfect three-point landing regardless of the fact he had more under his belt than when we strapped him in down on the border.

In reprimanding him for his action his excuse was that he had a little bottle on his hip, and being afraid to hold it to his mouth in the customary manner, for fear the terrific kick from the propeller would blow it out of his hand, he conceived the idea of crouching down behind the cowl to avoid wind resistance, holding the bottle between his knees and putting his mouth over the neck of it then turned his ship upside down and in that manner let the contents gurgle down his throat.

When asked why all the "monkey business" before turning his ship upside down, he replied: "Oh, that was when I was struggling with the bottle trying to get the cork out."

Jimmy the Assistant



CONCERNING PANICS

I hate like thunder to preach; but when the hooey gets just so thick I kinda have to let go with some good fatherly advice. I'm sorry; but you ain't as stuck to read this as I am to write it.

The studios is all closing down. Most everybody is out. There ain't no jobs. There ain't no jobs in sight. Boo-Hoo. Razzberry! That kinda talk makes me sick—plenty.

Wait 'till you've been fired as often as I have and you'll feel different. I've been out on my neck so often that it just don't count—wouldn't seem nacheral, somehow if I wasn't bein' fired for sump'n or other.

But that ain't the point. Here's what's what. A lot of studios is closed and everybody's scared, and that's what makes me peevish. Why the scare? Why the panic? If you're due for the gate you're going to get it; and if you ain't you won't and that's that. It's a lead pipe cinch weeping and wailing about the possibilities one way or the other ain't helping matters none, but on the contrary, is hurting things a heluva lot . . . . . and that's what makes me sore. You'd think everybody in pictures was a lot of spoiled babies, the way they bellyache around about sump'n they're afraid maybe might happen.

The whole blamed truth about the matter is that pictures was never in as healthy a position as they are now. There ain't nothin' going to happen to 'em— that is, nothin' that shouldn't happen. Stop and think for a minute. The biggest investment in pictures is the theaters—biggest by many times. Our studio buildings and equipment is just a drop in the bucket compared to what's tied up in the Temples of the Cinema. What are they going to do—tear the seats out of the theaters and rent 'em out for garages or sump'n? Or maybe let the kids use the pipes out of the organs for blowguns? *Hooey*—and lots of it! *Sure* the studios is closing down—and maybe some of us is out of jobs, but that don't mean pictures is going on the rocks by a long way—no sir! Them theaters has got to have good pictures and lots of them—and that's as flat as your foot!

I said pictures was never in as healthy a condition as they are now and I sure mean it. Pictures has been awful sick for some time past—*awful* sick. For a long time they've been all bloated up out of any reasonable proportion and a lot of saps thought that was good. Well, it wasn't. Then again, a bunch of fast talkers had got hold of the game and was running it for what they could get out of it for themselves, and without any regard whatsoever to what kind of pictures they made while they were doing it. That's *another* thing that was wrong. Then we had the family system of hiring—one studio was fixed so that all the good jobs was held by one family. And then again, there was the social system of hiring and firing—you know; the system where the contracts were talked over on week ends and what not. That was all rotten—yet the patient *looked* fine. The patient—really awful sick all the time, looked good because everybody had jobs and money was rollin' in fine.

But jobs don't mean prosperity and activity don't mean work. A squirrel in a whirligig is plenty active but he don't get nowhere. Well, that's just what it's been like with pictures. We've been awful busy but we ain't done nothing—just ridin' on a merry-go-round.

To get right down to the ground, so's you can appreciate my worm's eye view of things, lets open the deal right up and *look* at it. Up until now everybody's been workin' for the guy right over him, ain't they? Cameramen have been workin' to please directors; directors has been workin' to please supervisors; and supervisors has been workin' to please the Big Boss and the Big Boss has been workin' to—what? Well, we don't know. Make money, maybe; but what we do know is this: everybody has been breakin' their necks to hold their jobs—NOT to make better pictures!

Now then, what happens? Everybody's trying to please somebody else and the result is that nobody pleases anybody. Meanwhile the poor dumb public is getting some lousy pictures.

A funny thing about the public is that it ain't got no voice. It don't never holler about nothin', no matter how hard it hurts. But the public has a funny way of doin' things on the quiet, and when they does these things somethin' usually happens—new Presidents or sump'n. And when the public started gettin' pictures that was a little bit *too* lousy to go to, they stopped going—that was all. No more of a holler than that—but it took.

We make lots of pictures. Lots of them. They all cost money. We're so used to shooting a quarter million or so on a picture that a quarter million doesn't mean as much to us in pictures as six bits does in cash money. But it's all money just the same, and it has to come from somewhere. Just where does it come from? You're right—the guys that's putting it up!

Now when the public—the poor dumb long-suffering public—slacked off on standing bad movies as tolerantly as they used to, somebody wanted to know why; and that somebody is the guys that's holding the sock—the guys

that's got the dough that we make pictures with. They've suddenly got interested in WHAT'S WRONG WITH THE MOVIES—*and how!*

The minute the Money Boys started picking up their ears and sniffing around a lot of False Alarms ducked for cover—and shut down their studios to cover their tracks.

Are you attached to a False Alarm? If you are—worry!—for you're shore stuck! It's open season for Bluffers, Fast Talkers, Fakes, and Smart Guys—up to and including their friends.

The Boys who stuck their dough into pictures figuring to make a profit on the deal had an idea they'd get a square break. They didn't—and now they're here on the job to see that they do. And they'll *see*—don't ever kid yourself that they won't!

And that's why I say that pictures is right now today in its very healthiest condition—for they're at last under Honest Supervision—and the guy that's willing to shoot square, be he laborer, supervisor, prop-man, director, set-dresser, cameraman, or—well, yes, even stand-in—if he's willing to play square and give for what he gets, *he's* safe. BUT! Oh, *boy!* The smart ones that's been living on pull, family connection, or party ability—what a sock in the nose they've got coming! AND HOW!

Of course, this all don't mean a thing. I'm just a camera-punk and I don't see nothing or don't know nothing—but I have my guesses. This is one of them.

New "Light Transformer"

The American Society of Cinematographers has just received this self-explanatory telegram from the National Carbons Company, Inc., Cleveland, Ohio. This message, received at the time of going to press is published without comment. In the next issue the subject will be treated with full details:

Motion pictures industry to be benefited by invention of New Light Transformer stop The most recent invention in improving the light source for Panchromatic film has just been announced by the research laboratories of National Carbon Co. By a very simple combination of a carbon arc light with a special glass in place of the ordinary glass it is now possible to obtain a light richer in the reds and yellows compared with the blues than any other source of light ever used in the motion pictures industry. This invention which may be termed a light transformer is remarkable because of its very simplicity its use will enable studios to obtain from their present arc lamp equipment a most complete range of photographic light of the highest efficiency for either Orthochromatic or Panchromatic film. The color of the light source can be varied from the intense blue white of the white flame arc to the rich red yellow light obtained with the light transformer.

NATIONAL CARBONS CO., INC.

CLASSIFIED ADVERTISING

Rates: Four cents a word. Minimum charge one dollar per insertion. All copy must be prepaid and must reach us before the fifteenth of the month preceding publication.

American Cinematographer,
1222 Guaranty Building,
Hollywood, California

WANTED—MOTION PICTURE CAMERAS

170-DEGREE Bell and Howell wanted. Have 1924 Buick Sport Touring car, in excellent condition, as down payment. Remainder to be paid within six months of purchase. Write or phone Herman Schopp, care of the A. S. C., 1219 Guaranty Building, Hollywood, California. GRanite 4274 or GRanite 4704.

WANTED, CAMERA—Will buy Bell & Howell camera. State price and equipment. John P. Whalen. Gl. 1101 or A. S. C. GR. 4274.

WANTED, CAMERA—170 degree Bell & Howell camera. Would like Mitchell tripod. Harry H. Cooper, 851 No. Fuller Street. Phone GL 5239.

WANTED—Mitchell, for cash or will trade Bell & Howell and cash. Must be completed outfit. W. V. Skall, GR 6156, 1243¾ N. Fairfax, Hollywood, Calif.

WANTED—Will buy 170 degree Bell & Howell camera outfits. Must be in A-No.-1 condition and priced right. Give full description and serial number. Wilding Picture Productions, Inc., 1358 Mullett Street, Detroit, Michigan.

WANTED—For cash, DeBrie, Pathe, Bell & Howell Standard cameras. Send full description. Bass Camera Company, 179 West Madison Street, Chicago.

FOR SALE—CAMERAS

FOR SALE—Akeley Camera. Complete equipment. Akeley Camera, equipped with 180 degree adjustable shutter and special side focusing prism, Panoramic Arm, Tilting arm, Telescopic pan handle, regular pan handle Ball and socket head. **Tripods,** Large tripod with Mitchell legs; Baby tripod adjustable legs. **Magazines,** Five standard Akeley Magazines, built in scratch-proof features. **Lens Equipment.** 1 pair 35 MM matched Carl Zeiss in Akeley mount. 1 pair 50 MM matched Carl Zeiss in Akeley mount. 1 pair 75 MM matched Carl Zeiss in Akeley 1 8 In. matched finder Carl Zeiss in Akeley mount. 1 5¼ in matched finder Carl Zeiss in Akeley mount. 1 8¼ in. matched finder Carl Zeiss in Akeley mount. 1 12 in. matched finder Dahlmeyer in Akeley mount. **Accessories,** Erect Mitchell finder with mounting to go on top of camera; Special Worth Matte box, matte on all lenses, from 35 MM to and including the 8¼ inch lens, equipped for all kinds of mattes and glass filters both graduated sky and discs, etc. Auxiliary sun shade; Set of hard mattes and inside filter holders, Test tank, two foot capacity, changing bag, Special film rewind. **Equipment cases:** Lens case, special padding for travelling, Magazine case, holds five magazines; camera case; Accessory case, holds Worth matte box, Mitchell finder, six magazines and all accessories. These four cases are equipped with Yale locks. Tripod head case; Tripod case for large tripod. Tripod case for baby tripod. For sale by cash or will take trade-in on Bell & Howell camera. Call GR 4274 or GR 4704. Harry G. Mason, A. S. C.

FOR SALE—DeVry Projector, using standard film. Cost $225. New. (See machine in A. S. C. office, 1220 Guaranty Building). $100 cash or less. Make and offer. Call GR 4274.

FOR SALE—Bell & Howell Camera, 120 degree shutter. John Thompson, Escondido, Box 183, Route A.

FOR SALE, CAMERA—Super-speed Debrie equipment. 2-inch B. & L. Lens, 2 magazines, 1 tripod, 2 jacks. Price $750.00. Abe Scholtz. See camera in A. S. C. office. GR 4274.

FOR SALE—New Eyemo camera, carrying case, extra magazine. Price $225. Call Ben White, OX 7335.

FOR SALE—Brand new Wilart, never used, with 50 MM Carl Zeiss F-3.5 lens in Micrometer mount. 200 ft. magazine carrying case. Cost $175. Best offer takes it. Write Art-Craft Jewelry Co., Wollaston, Mass.

FOR RENT—CAMERAS

FOR RENT—Three Bell & Howell 170 Degree Cameras, F. 2.3 and F. 2.5 lenses, Mitchell Tripod legs. Complete equipment. Eddie Linden, 6017 Elinor Ave., Hollywood, HEmpstead 8333 or A. S. C. office, GR 4274, GR 4704.

FOR RENT—2 Mitchell cameras complete studio equipment No. 85 regular movement, No. 97 high speed movement 40 MM and 75 MM Astro 1.8 lenses. 50 MM 2.3 Astro. Extra magazines for rent. Also Eyemo camera with Hoefner Trueball tripod head. Pliny W. Horne, 1318 N. Stanley Ave., Hollywood 7682.

FOR RENT—170 Bell & Howell 2.3 Astro 2″. Carl Zeiss 35 MM 2″ and 3″ Mitchell Finder, Mitchell Tripod and tripod head. Ira B. Hoke, 1312 N. Detroit St., GR 5033.

FOR RENT—Camera equipment: 1 Mitchell Camera, 1 Mitchell Speed Camera with attachment, new. 1 Bell & Howell, 1 Akeley (Full Equipment). Ted Tettzlaff, Phone GR 9255. 1724 N. Western Ave., Hollywood.

FOR RENT—Complete Mitchell outfit with astro lenses, six magazines, by Al Gilks, HE 1490.

FOR RENT—To reliable party, one Bell & Howell camera with Mitchell legs; Astro Lens F. 2.3., Fl. 8. 6 magazines. Fred Hoefner mat box. In perfect shape and fully equipped. Joe LaShelle. ORegon 6730.

FOR RENT—Two Bell & Howell cameras, large finders, astro lenses, F. 2.3. B & L 2.7. Frank Cotner, HO 5046.

FOR RENT, CAMERA—3 Bell & Howells. Fully equipped. Lenses 2.3, 2.5 and 2.7. Large finders; Baby tripod. No. 6 Lense. Special side prism. Also Special Hi speed DeBrie. Call B. B. Ray, A. S. C. Office, GR 4274. Home, OL 2727. 1119 N Edgemont Ave.

FOR RENT—CAMERAS, ALL KINDS. Akeley, Bell & Howell 170%, also Speed DeVry Graflex, Still (late model Anscos). For rent by day or week to responsible parties. Ries Bros., Ries Bldg., 1152 No. Western Ave. Phone GRanite 1185; Residence, HO-1055.

MITCHELL and Bell & Howell cameras. F.1.8 and F.2.3 lens equipment. All kinds of lenses and equipment for rent. John S. Stumar, 3602 Cardiff Ave., Palms, Los Angeles. Phone: Culver City 3512, or call C. Glouner, Camera Dept., Universal City, HEmpstead 3131.

ONE DE VRY Motion Picture Camera. Complete outfit. Alvin Wyckoff, Phone Care A. S. C., GRanite 4274.

BELL & HOWELL. Victor Milner, 2221 Observatory Ave., Los Angeles, California. 596-944.

BELL & HOWELL—Phone Perry Evans, OL 8797 or Hollywood A. S. C.

MITCHELL Friction Tilthead, 3 Mitchell cameras, 2 Bell & Howell. Astro F. 1.8, F. 2.3 lenses. Extra lenses and magazines. J. R. Lockwood, 523 N. Orange St., Glendale. Glen. 3361 W. Hollywood address, 959 Seward, HO 4366.

E. BURTON STEENE, Bell & Howell, and Akeley. Complete Camera equipment. Latest models. Address American Society of Cinematographers, Hollywood, California.

BELL & HOWELL, 170, with 30, 40, 50 and 75 lens equipment. Baby tripod. Also B. & H. Cine motor. Charles Stumar. GRanite 9845. 7501 Lexington Ave., Hollywood.

FOR TRADE—CAMERAS

WILL TRADE—Carl Zeiss, F. 3.5, 50 mm. lens in B. & H. mount. Trade for late model Veedor Counter. Bert Longenecker, 597-724.

FOR RENT—STILL CAMERAS

FOR RENT 1 8x10 Still Camera, focal plane shutter, complete, 1 Mitchell Friction Tripod, new, for B. & H. 1 Eyemo Camera with special lock. 1 4x5 Graflex B. & L. lens. 1 B.-H. Low Boy to fit new style B.-H. Tripod head. Joe LaShelle, 639 N. Sierra Bonita, ORegon 6730.

ONE 8x10 still camera—complete. Care A. S. C., GRanite 4274.

FOR RENT—MISCELLANEOUS

FOR RENT—One Cinemotor with Veeder Counter in first-class shape. Call B. B. Ray, OL-2727, 1119 N. Edgemont Street.

FOR SALE—LENSES

FOR SALE, LENSES—Carl Zeiss, F. 3.5, 50 mm., mounted in latest B. & H. mount. Looks like new. Perry Evans, 413 No. Mariposa Ave., Hollywood, California.

BELL & HOWELL, all ASTRO lenses. Akeley Camera complete, also Eyemo. E. Burton Steene, 1760 No. Wilcox Ave., GLadstone 6131.

ONE two-inch Bausch & Lomb F.2:7; one Dahlmeyer Pentac 37 mm. F.2:9. Georges Benoit, care of American Society of Cinematographers, Hollywood, California.

NEW 40 mm. Goerz Hypar f. 3. 5. lens in Bell & Powell mount: price, $50.00. Write Charles Clarke, 1222 Guaranty Building, Hollywood, California.

WANTED—PROJECTOR

USED SIMPLEX wanted. State model, price, condition, etc. Address Box R, American Cinematographer.

WANTED—MISCELLANEOUS

FOR RENT, LENSES—Trick lenses of all descriptions for rent by day or week. Call George Meehan, A. S. C. Phone GR 3830, 744 North Curson Ave., Hollywood, California.

WANTED—Will buy Bell & Howell cinemotor and a 32 M. M. Lense. Call Herman Schopp, HOlly 4735 or care A. S. C. office, GR. 4274.

FOR SALE—SPECIAL CAMERA EQUIPMENT

COMPLETE new style Bell & Howell matt box for sale. Joseph B. Walker, 1037 N. Sycamore Ave., Hollywood. Phone GLadstone 3797.

PATHE panorama head for professional camera, with detachable aluminum tilting head, easily adapted to any standard tripod. A first-class unit for some one, who is experimenting or engaged in research work, to add to their equipment. Stephen S. Norton, care A. S. C., Guaranty Bldg., Hollywood.

Vol. IX No. 1
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Vol. IX April, 1928 No. 1

American Cinematographer

An educational and instructive publication, espousing progress and art in motion picture photograpby.
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SILAS EDGAR SNYDER
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JOSEPH DUBRAY
Technical Editor

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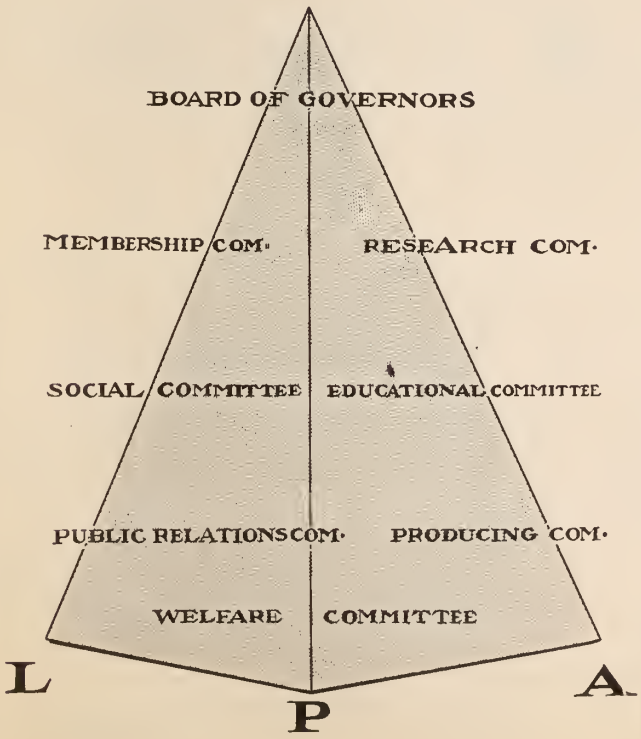

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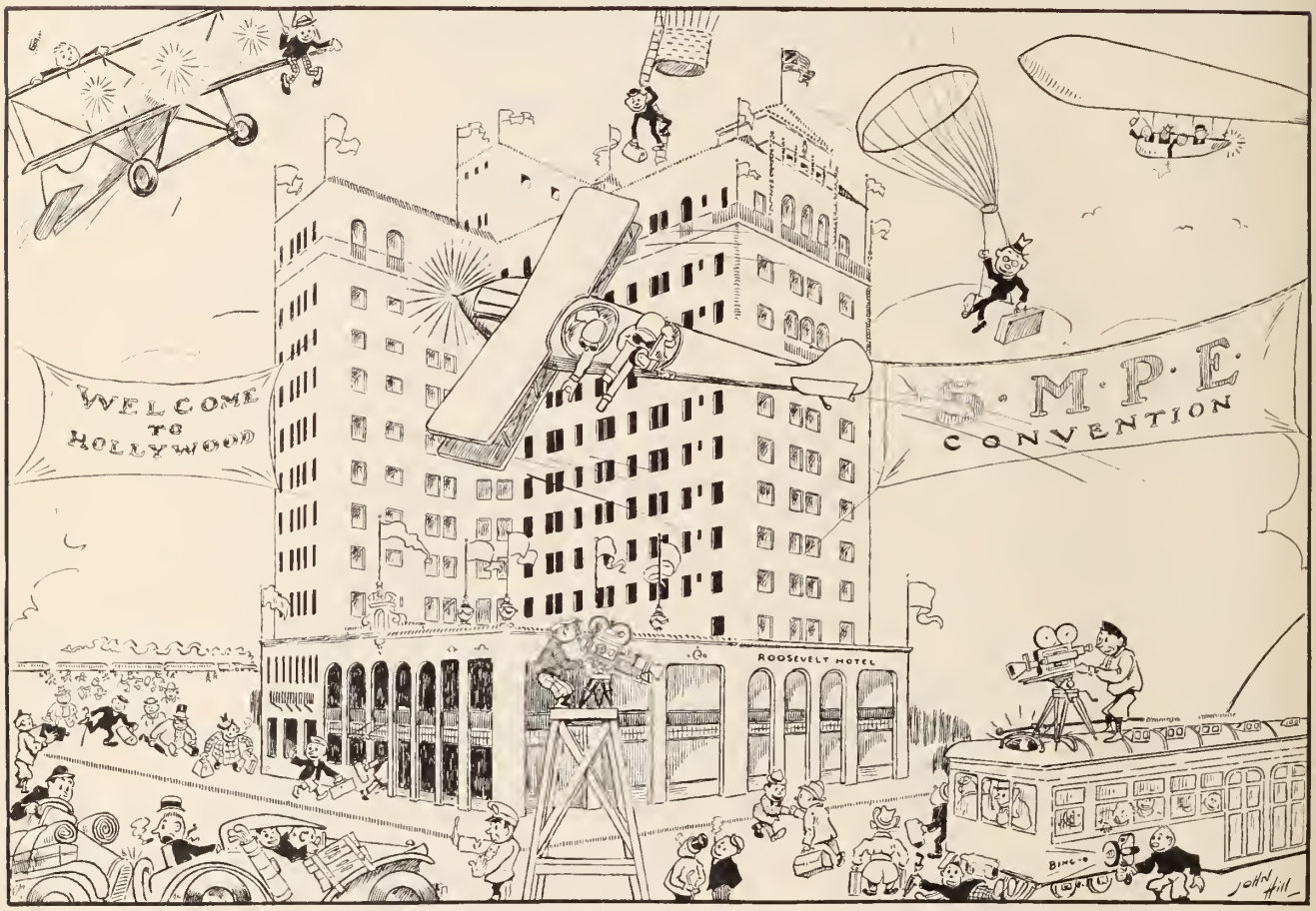
Welcome S. M. P. E.

Program for Hollywood Convention April 9 to 14
Interesting Papers Listed



Scene in the neighborhood of the Roosevelt Hotel, Hollywood, headquarters of the S. M. P. E. when the engineers began to arrive for their 1928 Spring Convention. The cameramen shown in Mr. Hill's cartoon are members of the A. S. C. who extended the official invitation to the S. M. P. E. to visit the World's Film Capital.

PROGRAM

Monday, April 9

10:00 Address of welcome.

Presidential Address by W. B. Cook, Kodascope Libraries, Inc., New York, N. Y.

Report of Arrangements Committee.

"Report of Progress in the Motion Picture Industry" by F. A. Benford, General Electric Co., Schenectady, N. Y.

"Pantomime Picture—Stories by Radio for Home Entertainment" by C. Francis Jenkins, Founder of the Society of Motion Picture Engineers.

12:30 Luncheon.

2:00 Papers:

"A Line Screen Film Process for Motion Pictures in Color" (with demonstration) by J. H. Powrie, Warner Research Laboratory, New York, N. Y.

"Reproduction of Mobility of Form and Color by the Motion Picture Kaleidoscope" (with demonstration) by L. A. Jones and C. H. Tuttle, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"Some Technical Photographic Problems and their Solution" (with demonstration) by J. W. Coffman, Carpenter-Goldman Laboratories, Long Island City, N. Y.

"Some Novel Motion Picture Presentations" (with demonstration) by L. M. Townsend and W. W. Hennessy, projection engineers, Eastman Theatre and University of Rochester, Rochester, N. Y.

6:30 Banquet of Welcome by American Society of Cinematographers, Daniel B. Clark, President.

Address "The Importance of Research in Industry" by L. A. Hawkins, Research Laboratory, General Electric Co., Schenectady, N. Y.

Tuesday, April 10

9.30 Papers:

"Scenario Writing" by Jeanie McPherson.

"The Operation of a Central Casting Bureau" by F. Beetson, Association of Motion Picture Producers, Inc. Hollywood, Calif.

"The Motion Picture Actor" by Milton Sills.

"The Motion Picture Director" by Irvin Willat.

"The Motion Picture Art Director" by Cedric Gibbons and Mitchell Leisen.

12:30 Luncheon.

2:00 Automobile trip—seeing Hollywood and Beverly Hills.

7:30 Paper: "A System of Motion Pictures with Sound" by H. B. Marvin, General Electric Co., Schenectady, N. Y.

Demonstration of motion pictures with sound accompaniment. Courtesy General Electric Co., Schenectady, N. Y.

Wednesday, April 11

9:30 Papers:

"The Technical Status of the Film Laboratory" by L. M. Griffith, Paramount Famous Lasky Corp., Hollywood, Calif.

"Motion Photomicrographs of the Process of Development of a Photographic Image" by C. H. Tuttle, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"Machine Development of Motion Picture Negative Film" by Roy Hunter and J. Guerin, Universal Studios Laboratories, and Chester Bennett Laboratories, Hollywood, Calif.

"Some Notes on the Making of Duplicate Negatives" by J. G. Capstaff, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"Moisture in Motion Picture Film" by V. B. Sease, Director Research Laboratory, DuPont-Pathe Film Mfg. Co., Parlin, N. J.

"Preservation of Motion Picture Film" by J. I. Crabtree and C. E. Ives, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

12:30 Luncheon.

2:00 Papers:

"Color in the Production of Motion Pictures" by R. Nauman, chief electrician, Paramount Famous Lasky Corp.

"Aviation Motion Picture Photography" by Harry Perry, A. S. C.

"Needs of the Trick Cinematographer" Douglas Shearer, A. S. C.

"Method of Producing the Sound Effects to Accompany the Motion Picture 'Wings'" by Roy J. Pomeroy, A. S. C.

"Dramatic Cinematography" by Charles Rosher, A. S. C., and Karl Struss, A. S. C.

7:00 Banquet by Academy of Motion Picture Arts and Sciences, Douglas Fairbanks, President.

Thursday, April 12

9:30 Old and New Business.

Reports of Secretary and Treasurer.

Reports of Papers and Publications, Publicity and Advertising. and Membership Committees.

Reports of Standards and Nomenclature and Theatre Lighting Committees.

'The Aims and Purposes of the Academy of Motion Picture Arts and Sciences" by Frank Woods.

Announcements of New Apparatus by the Following Manufacturers:

Eastman Kodak Co., Rochester, N. Y.

Film Inspection Co., New York, N. Y.

C. P. Goerz American Optical Co., New York, N. Y.

Hertner Electric Co., Cleveland, Ohio.

National Carbon Co., Cleveland, Ohio.

Sentry Safety Control, Philadelphia, Pa.

The above and other apparatus will be on exhibition during the convention.

Open forum—questions and suggestions are invited regarding the welfare of the Society and the Motion Picture Industry.

12:30 Luncheon.

2:00 Visit to motion picture studios.

7:30 Papers:

"Photographic Characteristics of Motion Picture Studio Light Sources" by L. A. Jones and M. E. Russell, Research Laboratory, Eastman Kodak West Coast Theatres, Inc., Los Angeles.

"Lighting and Equipment Requirements for Motion Picture Photography with Mazda Lamps" by R. E. Farnham, National Lamp Works, Cleveland, Ohio.

"Characteristics of Flame Arcs for Motion Picture Photography" by D. B. Joy and A. C. Downes, National Carbon Co., Cleveland, Ohio.

"Some Sugestions on the Use of Incandescent Lamps in the Studio" by E. W. Beggs, Westinghouse Lamp Co., Bloomfield, N. J.

Friday, April 13

9:30 Papers:

"Theater Management" by Harold B. Franklin,

"Continuous Projectors" by J. F. Leventhal, New York, N. Y.

"The Effect of Projection Angle upon the Seating Capacity of the Theatre" and

"Application of the Tandem Condenser to the High Intensity Projection Arc" by Roger M. Hill, Consulting Engineer, Atlanta, Ga.

"The Importance of Good Projection to the Producer" by F. H. Richardson, New York, N. Y.

"Hollywood and the 16 mm. Film" by J. B. Carrigan, Editor, Amateur Movie Makers.

2:00 Automobile trip to Santa Monica and Venice.

7:30 Papers:

"The Incandescent Tungsten Lamp in the Motion Picture Studio" by F. A. Benford, General Electric Co., Schenectady, N. Y.

"The Use of Incandescent Equipment in Motion Picture Photography" by Peter Mole, President, Mole-Richardson, Inc., Hollywood, Calif.

"Report on Experiments on Mazda Lighting" conducted by the Academy of Motion Picture Arts and Sciences.

"The Aperture of Motion Picture Lenses" by J. Dubray, Technical Editor, American Cinematographer.

"Camera Lenses for Motion Picture Photography" by W. B. Rayton, Director of Research, Bausch & Lomb Optical Co., Rochester, N. Y.

Saturday, April 14

9:30 Papers:

"The Acoustical Properties of Rooms" by J. B. Engl, Technische Hochschule, Berlin.

"Artificial Sunlight for Photographic Sensitometry" by Raymond Davis and K. S. Gibson, Bureau of Standards, Washington, D. C.

"American Motion Pictures Abroad" by N. D. Golden, Bureau of Foreign and Domestic Commerce, Washington, D. C.

"An Optical Printing Device for Trick Work" and

"A Short History of Motion Picture Cameras" by C. L. Gregory, Consulting Engineer, New York, N. Y.

"The Measurement of Pulsating Currents" by W. N. Goodwin, Jr., Chief Electrical Engineer, Weston Electrical Instrument Co., Newark, N. J.

"The Fogging Effect of Metals on Developing Solutions" by J. F. Ross and J. I. Crabtree, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"Suggestions for a Technical Reference Work on the Motion Picture Industry" by D. L. and M. L. Mistry, Bombay, India.

"Perspective Considerations in the Taking and

(Continued on Page 21)

EDITORIAL--The Voice of the A. S. C.

On another page of this issue of THE AMERICAN CINEMATOGRAPHER is an outline of a speech made by Mr. William Darling, chief technician of Fox Studios, to his fellow employees.

It is well worth the few minutes required to read it and it should be read and digested by every worker in motion pictures, and this means employer as well as employee.

THE CINEMATOGRAPHER applauds not only the sentiments of Mr. Darling's remarks but also his courage. It is such frank, good-tempered, truthful and constructive criticism that eventually will set in order the House of Motion Pictures.

Mr. Darling is right. The studios are driving like steam engines in their active production operations and everybody from executive to grips is overworked, peevish and getting little out of life save salary and what it will buy, which is not the bigger, better enduring things, by any means.

Just why a common sense and orderly system of production has not been evolved in our beloved industry is not clear as there is certainly no dearth of constructive brains among our executives. Any man (or group of men) who has the genius to produce so wonderful a thing as a great motion picture is able to put order and system into the fabrication of that production so that no person engaged in it may be compelled to work under conditions which upset the harmonious order of his life, if that man (or group of men) will but give the problem thought equal to that devoted to the production of a picture.

Moreover, business men are beginning to complain that motion picture people are autocratic, inconsiderate and discourteous. It is painful to admit that there is some ground for this complaint and the reason for it may be found in this same condition which prompted the comment of Mr. Darling —the drive of production which becomes a ruthless steam-roller, a thing which takes into consideration no man, nor time, nor treasure.

A man who is harrassed by overwork and lack of sleep and whose regular habits of life are disordered is neither a happy nor an efficient worker which, interpreted in dollars and cents, means—waste. But it means more even than this for there is a consideration more vital than economic waste—the loss of our sense of humor. We make comedies, but we do not laugh. We make pictures to entertain the public, but in the process we become nervous, irritable, belligerent and, possibly, discourteous.

A few years ago it was a delight to go to work at the studio. The lot was like the old home and the workers gathered for their daily task like a lot of school children at recess. Everybody worked hard, but his work was like play.

What has come over us? We are very largely the same old bunch. Are we losing our sense of values or is the steam-roller crushing out our humanity? Too many groups, maybe, with the old sense of a big, happy, co-operative family going into the discard.

What is the answer? It would seem to lie in a disposition to ease up a bit on the strenuous efforts now being put forth to evolve what might be called the egoism of group consciousness and to get the spirit of co-operation of the whole, for surely what is good for the writer is good for the cinematographer and what is good for these is good for the electrician, the director, the carpenter, the actor, the still man, the make-up man, the technician, the producer, exhibitor and everybody, exalted or humble, concerned in the making of motion pictures.

The UNIT is the INDUSTRY—and the paramount welfare is the welfare of the WHOLE.

This is the era of re-adjustment. Cannot we all work together to bring about a system of production that will make, not only for efficiency, but for happy conditions of work for us all.

What producer will be first to pioneer in this? —Daniel B. Clark, President American Society of Cinematographers.

Mr. Glen Kershner's letter to the editor on another page of this issue is an evidence that the cameraman is seeking to broaden his activities. No longer is he content to be idle between pictures. When the producer ceases to produce the cameraman turns producer on his own account. Mr. Kershner is only one of many A. S. C. members able to produce his own stuff from scenario to screen. It is a healthy sign.

There may be some pictures on the shelves, but there are no pictures on the shelves because of any A. S. C. member's lack of artistry.

Money for "independent" production need not be so shy. A GOOD picture has a ready market no matter who makes it.

Amateur Cinematography

A Professional's Notes for Amateurs---XVII

By Joseph Dubray, A. S. C.

Concluding Article

The discovery of new kinds of glasses, the patient research on their adaptabilities to the making of photographic objectives and the ingenuity displayed by inventors, soon were applied to the manufacture of objectives presenting very remarkable qualities in their performances.

Several optical companies have been for years bringing forth improvements so as to render their product suitable to special needs.

It must be readily understood that the perfection of an objective is limited by the scope that it is called to accomplish, and the choice of such an instrument shall always be made according to the needs of the operator.

J. A. Dubray

In motion pictures, it is desirable to use objectives possessing the greatest aperture that is possible without sacrificing to any too great extent the depth of focus that is so essential in pictures destined to be submitted to an extremely great enlargement. Fortunately, the smallness of the image which is necessary to obtain, calls for the use of objectives of short focal length and in such a case the use of objectives of an aperture of F/2 and even somewhat larger, has been possible in the hands of skillful cinematographers.

But is must always be borne in mind that what could be called the perfect objective, does not exist in reality, the suppression of one imperfection being always to the detriment of one of its qualities.

Tremendous strides have been made nevertheless during the past few years and the road to progress being constantly open to the advance of Science, there is no end to the possibilities of improvement in photographic objective as there is no end to the possibilities of improvement in any other scientific endeavor.

It would be beyond the scope of this series of articles to give a description of all types of photographic objectives available today for photographic and cinematographic work, and we wish to refer the reader to the numerous and excellent literature that can be had on the subject.

Nevertheless mention must be made of one type of objective which has entered the motion picture field and the application of which is becoming more and more necessary. We refer to the **Teleobjective.**

In the manufacture of photographic objective, the need was soon felt of an instrument possessing a great length of focus and at the same time necessitating a short draw of bellows so as to reduce the bulk of the camera equipment. This need was first felt in the photographing of nature subjects, such as animals and birds in their living surroundings and also in the photographing of architectural motives or places difficult of access.

The general principle upon which the construction of teleobjectives is based, may be expressed as follows:

The image formed by a **positive** system of lenses, is enlarged by a **negative** combination of elements and thus spread over a larger area than the area covered by the positive combination alone.

As the negative element is placed at a certain distance from the positive one, the principal points of the whole combination move away from it in the direction of the object space.

Now, the focal length of an objective is measured from the principal point of emergence to the focal point, and therefore the use of the negative element reduces the back focus of the combination. In other words, the image plane will be nearer the back lens of such combination than it would be if a positive combination of equal focal length was used.

The introduction of teleobjectives was greatly delayed and limited to very special uses due to the loss of speed that was suffered, in comparison with positive objective of same focal length.

The possibility of varying the degrees of magnification with one single objective was so appealing that most of the early teleobjectives were constructed to a great sacrifice of their speed. The reasons for this drop in illumination were mainly the greater area upon which the light flux is spread, and the necessity of correcting by the use of small stops the aberrations caused by the variations of the distance between the two components of the objective. But the limitations thus imposed upon this type of objectives were severely felt. The construction of variable focal length teleobjective was practically discarded and the teleobjective of fixed focus and therefore of fixed magnification, became the quasi-universally adopted objective of this kind.

Opticians began to investigate the possibilities of improving the correction of the several aberrations, namely the astigmatic correction of the teleobjective and their efforts were rewarded by the obtaining of the modern objectives of this type presenting great orthoscopic qualities, together with great apertures up to F/3.5.

Photographic objectives as known today seem to have reached a degree of perfection impossible to surpass. Perhaps the next step in the way of progress will be to render them more and more adaptable to the use of Panchromatic sensitive materials, and for high speed color photography, but no one knows what Science and human intellect keep in store for us.

Perhaps new material will be discovered which will replace the glasses that are in use today. Perhaps mechanical instruments will be perfected so that different and more suitable curvatures will be imparted to the different elements that concur to the making of an objective and thus reduce the problems nowadays involved in their designing. Perhaps different photographic sensitive materials will be discovered which will permit the use of objectives of less aperture and therefore presenting greater corrections. Perhaps chemical agents will play an important part in the future. Perhaps —but why continue? The unknown is in front of us, the great unknown, the great future which always tends towards **progress** which in turn means greater comfort and greater happiness.

[THE END]

The Camera Man's Travelogue

I've made a trip around the world, and seen it all, you bet,
But lemme tell you, it's got nothin' on a movie set.
Topaz dawns at Singapore? Pretty fair, but, bo,
I've seen how they throw the juice, and that ain't half I know.

Sure, I seen a hurricane; got soaked by Baltic waves,
But how about the gusts that blow when Hergesheimer raves?
Sand storms in the Sahara and a blizzard in Quebec
Are good, but we can do a better one when Griffith yells "On deck!"

Notre Dame is quite a hut and so is Pisa's Tower,
But don't forget we'd throw one up at ninety cents an hour.
Took a slant at royalty and vamped a prince or two.
They may have crowns, but none of 'em's "distingy like Menjew.

Harold's glasses have no glass and Buster really smiles,
And all my public thinks that I'm as smooth as bathroom tiles;
So gangway, folks, and leave me room—where all the world is jake—
Back to dear old Hollywood, where everything's a fake.

—Slim Robertson.

Movie Make-Up

A Master of the Art Sets Forth That Make-Up Is the Cinematographer's Best Ally

By Max Factor

[*Max Factor needs no introduction to the motion picture industry nor to the world at large for that matter. Born in Russia, he emigrated to America in 1901 and immediately went into business in St. Louis, where he remained until 1908 when he came to Los Angeles where he located on Central Avenue and worked in conjunction with his near neighbors, at that time the Western Costume Company. For generations his family in Russia had been manufacturers of hair goods, cosmetics, perfumes, etc, and until 1918 Mr. Factor had practically a monopoly on the wig business of the studios and theaters. By that year his make-up business had grown to international proportions and he has since directed the entire resources of his large organization to this activity. For many years the Max Factor home office has been at 326 S. Hill Street, but during the last few years the business has outgrown the Hill Street quarters and the firm recently took over the four-story building at 1666 Highland Avenue, Hollywood, which is now being remodeled to house Max Factor and Company in what they intend to make the finest and most complete institution in the world.*

Max Factor

Mr. Factor will himself answer through THE AMERICAN CINEMATOGRAPHER any questions on make-up our readers may care to propound.—Editor's Note.]

Considering the psychology of make-up, in regard to photographic values, I want to tell you why it is not only the best, but the most necessary and essential ally of cinematography. No matter how fine the quality of photography may be and the lighting effects, or even the finesse of the lenses used for panchromatic filming, without the correct application of make-up there is no method of covering up the defects of nature, and to bring out the true characterizations needed, thus enabling the cinematographer to produce a more natural and finished film.

Make-up at the present time is given more thought and more appreciation by all departments of the Motion Picture field, than ever before. The interest now displayed is not an unusual condition, but is really the climax of tremendous efforts put forth by exponents of the art, to bring to it the appreciation that it deserves, and the realization of the important part it plays in Motion Pictures.

Of course, on the stage the realization and appreciation of the importance, and the scope of make-up is complete. Can one imagine an actor or actress on the stage without make-up! True, the stage must contend with the question of lighting as well as motion pictures, but it must be remembered that on the stage lights tend to subdue facial colors, but in screen work it is just the reverse, for the lights are used to bring more prominence to the face. Therefore, I can safely repeat that make-up is far more important to motion pictures than any other field of endeavor in which it may be used.

Make-up was originally established by means of a mask, which was the only method the actor had of portraying character. This was prior to the Shakespearean era. At a later period the use of a mixture of lard and carmine was probably the first make-up that was then known to the actor.

The lighting system at that period was very crude, and even then make-up was considered necessary, or the characterization fell short of the portrayal. It was the critical period, for it marked the beginning of the drama, and the recognition of the stage and the actor.

Later the actor adapted himself to the make-up then manufactured, and soon became skillful in the art of applying it. Then the character actor came into prominence, for in blending these different shades he was able to produce most any character desired, but as it was also necessary to apply make-up very heavily, the actor would lose all the natural character lines in his face, leaving only the use of the mouth and the eyes to portray emotions. It was hard to register any other movement, as the facial muscles were tense and rigid, much to the discomfort of the performer.

At a later period the pencil came into general usage for blending in the character lines. This sort of make-up was quite satisfactory, just as long as one had an audience to contend with, also because the actor was gifted with a voice with which he carried his message to them, but now, in the period of the silent drama, the emotions have only one method of portrayal, and that is by facial expression, through the medium of photography. This brings the art of make-up to the front, for without it we would have spotted and uneven complexions. Certain facial features would appear too strong or too light in contrast. It is true that the experienced cinematographer can, to a certain degree, eliminate faulty and bring out certain features through the use of lighting, but as the performers usually keep moving about, it becomes a tremendous task to keep the lights properly played on moving features to obtain this result. Only proper make-up allied with good photography can bring about the necessary results.

It has always been my ambition to develop make-up to such an extent, that the aforementioned shortcomings would be eliminated. I always felt that make-up should appear as natural to the eye as it would be on the screen; and that the performer should not in the least bit be conscious of being made up. During my visits on various sets at the studios I had often heard actors complain how make-up hampered their freedom of action and expression.

It was in nineteen twenty-three (1923) that I was able to present to the profession the first flexible make-up that could be applied on the skin very thin, and yet retain all the covering and coloring qualities necessary. I must admit that it was far from perfect but it was the first and only step ever made to accurately improve theatrical make-up to that time.

We went into the field and encouraged every kind of test trying flexible make-up, under every condition. As each fault came to our notice we immediately went about the work repairing it and today, after five years of its use by 85% of the motion picture profession, I feel that in this accomplishment we have progressed with the advancement of the motion picture industry itself.

(Concluded on Page 25)

Monochromatic Light

An Entirely New Field Appears to Be Opened for Investigation In Monochromatic Light Group

Frederick Finch Strong, M. D.

The Cinema is the child of Cinematography and Cinematography is the direct offspring of Light.

Metaphysically speaking, Light is **a state of consciousness** and true light is also Color; white light being the simultaneous consciousness of all colors. Physically speaking, light corresponds to a single octave of electromagnetic vibrations, but this force does not produce light,—it **induces** or **evokes** its manifestations in the consciousness of the man himself.

Whatever we may think of man's true nature it will be conceded that he is neither ether-vibration, retina, nerves nor brain;—he **uses** these. Nor is he any or all of the states of color-consciousness which we call light;—he **experiences** these. The Immortal Spectator and Enjoyer of the Cosmic Cinema—**this** is the REAL MAN!

Dr. F. F. Strong

The language of light is sevenfold—the spectral colors of Newton. But we have to record this language on the tablets of consciousness by means of an occular typewriter having but three keys. The generally accepted "Young-Helmholtz" theory of vision postulates three end-organs or antenna for each retinal nerve unit. These correspond to Orange, Green and Violet. Simultaneous excitation of all three evoke white light in consciousness. Excitation of Orange and Green give subjective Yellow, Orange and Violet give Red, and Green and Violet induce the Blue sensation.

Science has reduced all ponderable matter to units of elecricity—the Proton and the Electron. The electron is a unit of negative charge, groups of moving electrons constituting all types of electrical currents. The Proton is known in the free state only in the form of the Hydrogen Ion. These two are the primitive building blocks of the material universe. According to the generally accepted "Bohr Theory" the atoms of all the chemical elements are miniature solar-systems, each atom consisting of one or more protons as central suns around which revolve various numbers of planetary electrons in definite orbits. Bombardment of atoms by free electrons (electrical currents) cause some of the planetary electrons to jump from one orbit to another. The values of many of these "jumps" have been accurately determined, and the "splashes" they produce in the universal space-filler, the hypothetical ether, correspond to the single wave-lengths, the "Bright Lines" of the spectrum of gases.

What a light-wave really is is still a matter of speculation; about all that we can say is, that while sound waves are in one dimension, and water-waves in two dimensions, light energy is a three-dimensional wave. The phenomena of polarization prove this last statement.

Spectra may be divided into three general classes:—

1. **Continuous Spectra:** Emitted by incandescent solids such as tungsten filament in a "Mazda" lamp. Such a spectrum begins in the Infra-red and extends through all wave-lengths in the visible region up to about 3400 A. U. in the Ultra-violet. Light of this type, when the spectral values are balanced may appropriately be called artificial daylight and would appear to best be suited to the requirements of Cinematography.

2. **Band Spectra:** Emitted from gases heated to incandescence or from electrified **molecular** gases in a "vacuum tube" (all gases except hydrogen and the other monatomic gases). The spectrum of the **flame** of a carbon arc is of this class. (The incandescent ends of the carbons, of course, giving out a continuous spectrum.)

3. **Bright-line Spectra:** Emitted from electrified gases in the **atomic** state. These spectra are formed of chords, or mathematically related single wave-lengths. About the only practical sources of monochromatic light (from single wave lengths) are vacuum tubes containing the monatomic gases Helium, Neon, or Argon at pressures of about 10 mm., excited by a transformer current of from ten to fourteen-thousand volts. By adding metallic mercury to such a tube the electrified gas knocks out mercury ions and the tube then emits the familiar bright line spectrum of mercury similar to that produced by the Cooper Hewitt Arc, but without the large percentage of heat and infra-red rays generated by the later.

The writer has devised a series of sixteen filters for use in connection with these vacuum tubes. The filters consist of various standard colored gelatine films, such as those used in theatrical lighting, in combination, or used in connection with various commercial colored glasses. In this manner it is possible to obtain single-wave monochromatic light in any part of the visible spectrum. Light of the following wave-lengths has been produced:

1. Red, 7032 A. U. (from Neon).
2. Orange, 6382-04 A. U. (Neon).
3. Yellow, 5790-69 (Neon-mercury) or 5876 A. U. (from Helium).
4. Green, 5461 A. U. (Neon-mercury).
5. Blue, 4348-59 A. U. (Neon-mercury).
6. Violet, 4047-78 (Neon-mercury).

To obtain a sufficiently powerful source of light the luminous tubing is formed into a close spiral about 15″ long by 3″ diam. representing a tube length of about fifteen feet. Many uses for this light will doubtless be found in psychological and biological laboratories and very important and interesting results may be expected from future research work.

In order to obtain and investigate the therapeutic effects of monochromatic light the writer has employed groups of adjacent lines in different spectral regions. One filter used with a Neon unit gives a very powerful orange red free from all other colors. It results from eighteen bright-lines. No data is available at the present time as to the physiological and therapeutic properties of this group, but these are being studied. These lines give a dominant hue of about 6300 A. U., corresponding to the first Young-Helmholtz Primary.

A yellow-green group formed from the mercury yellow and the green lines has a dominant hue of about 5600 A. U., corresponding to the Second Primary. This light has been found to be a powerful stimulant to cell reproduction, especially in connection with plant growth. Clinically it has given excellent results in the treatment of redundant scars, and skin diseases where it is desired to induce normal cell production. It promises well.

The third Young-Helmholtz primary is obtained by the use of the writer's "No. 1" Filter used in connection with a Neon-mercury generator. Its visible lines are the Blue 4359-48 A. U. and the Violet double line 4078-47 A. U. Spectrograms made at the Physics Department of the Univ. of Calif. of L. A. by Dr. Ellis show that in addition to the last mentioned visible lines, there is transmitted the powerful Ultra-violet triplet, 3663-44 A. U. The presence of this wave is also demonstrated by the brilliant yellow fluorescence of Willemite and Uranium glass.

Mr. Joseph Dubray has made a series of interesting photographic studies with these three ray-groups which

Light Radiations and Photography

Technical Editor

Under this pompous title, which would presuppose the writing of many volumes, the writer presents a few of a series of photographs taken recently in the cabinet of Dr. Frederick Finch Strong, of Hollywood, under well defined spectral radiations. The illustrations on the opposite page are more eloquent than any written word and a simple description of the conditions under which they were taken will prove undoubtedly more interesting than a long and dry sequence of words without the accompaniment of the visual interpretation of their meanings.

Dr. Strong is an eminent practitioner and has carried on for several years thorough investigations on the therapeutic effects of different kinds of light radiations. His work has led him to the making of some light filters which transmit well defined spectral radiations.

The light units used are either a mercury vapor tube or a Neon gas tube of the type illustrated in the engravings. The filters are of gelatine dyed with carefully selected dyes and their transmission is determined by careful spectroscopic inspection.

The two pictures at the top of the page show Dr. Strong with his small spectroscope, examining the radiations emitted by the lights which in these two cases are: at the left a Blue-violet and at the right a deep red monochromatic radiation.

The lights actually shown in the picture were the sole illuminant used in taking the pictures. Panchromatic plates were used.

Note the difference in value of the draped curtain in the background which was of a rather dark blue color.

The other illustrations present pictures of a chart made of colored woolen materials, the colors corresponding to each segment being readable on the chart itself.

The picture at the left in the middle row was taken with the mercury vapor tubes and the one at the right, in the same row, was taken with the Neon tubes, both lights unfiltered.

The difference of rendition of the color values are so evident that no comment is necessary.

The illustrations of the bottom row are pictures of the same chart taken with lights of the following radiations:

The picture at the left: Blue-violet and ultra-violet end of the spectrum showing the three following lines: Blue 4358 A. U., Violet 4078-47 A. U., Ultra-violet triplet 3680-50 A. U.

The visual dominant hue of the quality of light used in the taking of this picture is at about 4200 A. U. and the photographic energy peak is placed at about 4100 A. U.

The middle picture: Photographed through a yellow-green filter transmitting radiations corresponding to the two lines 5790 and 5461 A. U. with a visual dominant hue at 5500 A. U.

The picture at the right: Photographed through a filter transmitting the red-orange group of the spectrum, corresponding to twenty dominant lines in the Red, Orange and Yellow, from 7063 to 5000 A. U. The dominant visual hue being at about 6350 A. U.

No comment is necessary to emphasize the selective action of the filters and the response of the photographic material to the radiations transmitted by them.

The abridged Transaction of the Society of Motion Picture Engineers by Mr. L. A. Jones on light filters, which is being printed in the columns of THE AMERICAN CINEMATOGRAPHER at this time, treats the technical end of orthochromatic reproductions and distortions so thoroughly and clearly that the writer refers the readers to this transaction for all further information on the subject that he may desire.

Monochromatic Light

By Frederick Finch Strong

(Continued from Page 10)

are reproduced in connection with his article in this number of THE AMERICAN CINEMATOGRAPHER.

Eight months' experience in the clinical use of the "Blue Ultra-violet" Light (the ray-group last mentioned), have developed some surprising facts. It appears to promote all normal vital processes, induce restoration of endocrine balance and adjust abnormal blood-pressure. It does not appear to act biochemically except indirectly, and is quite different from the shorter ultra-violet rays produced by the Quartz mercury arc. Hospital reports show that it allays pain and nervousness and induces natural sleep. It has been of especial value as an adjuvant in post-operative cases.

An entirely new field appears to be opened for the investigation of monochromatic light groups through this novel method of generation.

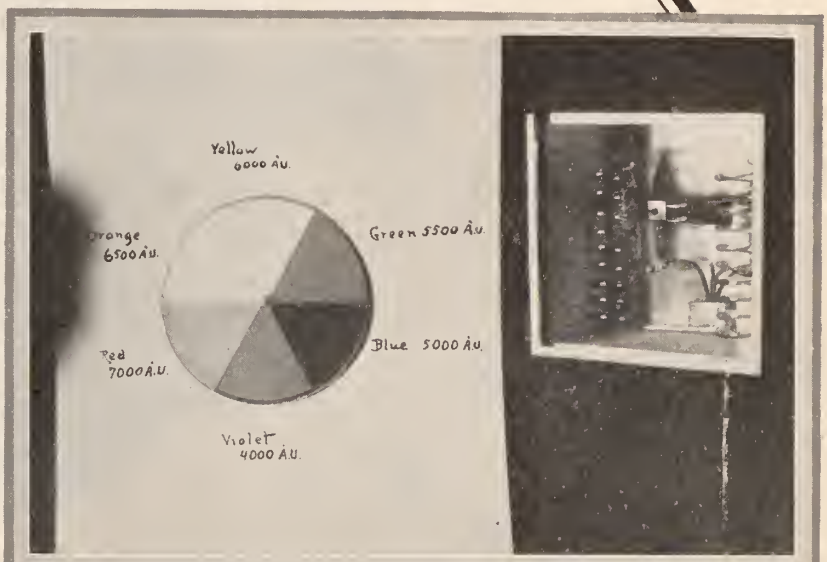
The results obtained with the "Blue Ultra-violet" combination call to mind an epigrammatic statement in an interesting book written in the early seventies:—

* "Light is Life.....Both are Electricity." (footnote)* From "Isis Unveiled", by H. P. Blavatsky; 1877.

Showmanship for Exhibitors

A complete new section of showmanship ideas will be found in the 1928 FILM DAILY YEAR BOOK published by THE FILM DAILY and which is now being distributed. These ideas are grouped so that the exhibitor who has a certain type of production to put over can quickly turn to that section and find countless ideas on how to exploit and sell his picture to his patrons. It has taken months and months to collect and prepare these many stunts for publication and the exhibitor who does not get for himself a copy of the 1928 FILM DAILY YEAR BOOK will be doing himself an injustice. These money making stunts are all practical, they are not just theory as so many stunts submitted to exhibitors are these days. They are presented briefly and clearly so that exhibitors may readily grasp the idea and put it into practice. This is only one of the many interesting features that will be found in THE FILM DAILY YEAR BOOK which is given free with each yearly subscription to THE FILM DAILY whose offices are located at 1650 Broadway, New York city.

Photographed with an open mercuy vapor tube



Photograped with an open Neon tube.

Blue Violet and Ultra Violet radiations

Yellow-green radiations

Red-Orange group radiations.
Photographed by Joseph A. Dubroy A.S.C.

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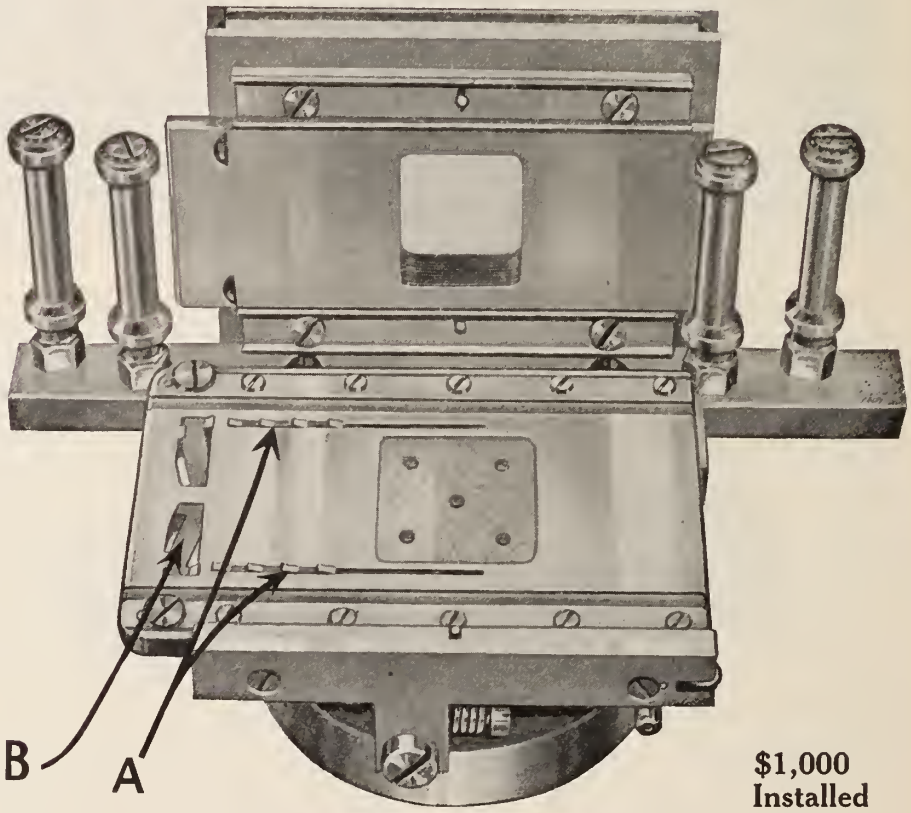

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Note in the illustration (showing film channel open) how (a) the four fingers on each side engage **eight perforations simultaneously.** At the end of the stroke they drop, go back for a new hold. At the same instant the check pawl (b) rises to hold film motionless at aperture, releasing at the exact fraction of a second when the film is again shot forward.

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Light Filters

Their Characteristics and Applications in Photography With Explanatory Diagrams---Part Second

By Loyd A. Jones

Of Eastman Research Laboratories.
Abridgement of Paper from S. M. P. E. Transactions.

When a filter which absorbs some of the radiation to which the photographic material is sensative is placed over the lens of the camera, it is evident that an increase either in exposure time, in the lens aperture, or in the illumination incident on the object, must be made in order to obtain the same exposure on the negative as when no filter is used. If any two of these factors are constant then the ratio of the third factor as required when using the filter, to the same factor without a filter is called the *filter factor* or the *multiplying factor* of the filter. An "eight times" filter is one for which the multiplying factor is 8, etc.

The magnitude of the *filter factor* depends on the conditions under which the filter is used and its determination involves a knowledge of the spectral sensitivity of the photographic material, the spectral distribution of energy in the radiation which illuminates the object, and the spectral absorption of all components of the optical system between the object and the photographic material. In Fig. 7 these various characteristics are shown in graphic form.

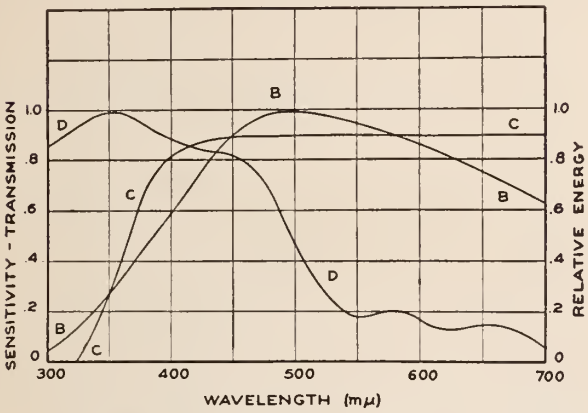

Fig. 7. Spectrophotometric curves showing the relation between photographic sensitivity, *D*, energy distribution in daylight, *B*, and transmission of radiation by photographic objective, *C*.

Curve *D* shows the spectral distribution of sensitivity for panchromatic motion picture negative film, defined as directly proportional to the density which is produced for a fixed development time by the action of a constant amount of energy (ergs per cm. sq.) of the various wave-lengths.

The spectral distribution of energy in *daylight* is shown by curve *B*.

The curve as shown is computed from the data given in the previous communication[1]. Measurements have shown that of the radiation incident on a horizontal plane so placed as to receive radiation from the entire sky hemisphere and from the sun, 80 per cent is *sunlight* and 20 per cent *skylight*. Using the curves representing the distribution of energy in radiation from sun and sky and combining these in the proportion 80-20 the curve *B* in Fig. 7 is obtained. On a vertical plane exposed to sunlight the percentage of skylight is probably only about 10 per cent, but in the shadows a much greater proportion of the radiation is due to skylight so that the above ratio (80-20) is thought to represent a very probable composition of the average quality of natural illumination effective in photography. The curve as plotted shows only relative energy values, the maximum ordinate being arbitrarily adjusted to unity (1.0). It is not necessary in this case to use absolute values since we are interested only in determining the *ratio* of the filter exposure to the no-filter exposure.

In practical work the only other absorbing material of importance between the photographic plate and the object is the lens. This is usually made of three or more pieces of optical glass which may or may not be cemented together with a thin layer of Canada balsam. The absorption of energy by this lens in the visible region is relatively small and constant but in the ultraviolet, wave-length less than 400, the absorption is variable and becomes large as wave-length decreases. The lens, therefore, has an appreciable influence upon the spectral composition of radiation which reaches the photographic material. The spectrophotometric transmission curve of a typical motion picture objective is shown in curve *C*.

Now the relative intensity of radiation of any particular wave-length which reaches the photographic material is proportional to the product of the ordinates of the curves *B*, *C*, and *D*. Multiplying through at each wave-length and plotting the result as a function of wave-length, curve *A* in Fig. 8 is obtained. The total photographic effect produced on the sensitive material is directly proportional to the shaded area and can be determined by mechanical integration using a suitable planimeter.

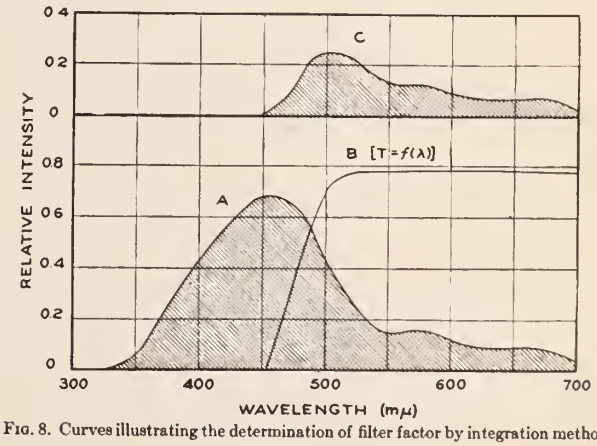

Fig. 8. Curves illustrating the determination of filter factor by integration method.

1:—Lloyd Jones and J. Crabtree "Panchromatic Negative Film for Motion Picture." Trans. Soc. M. P. E., No. 27-131-1927, reprinted in "American Cinematographer" March, 1927.

The area under curve *A* shown in Fig. 8 was found to be 0.76 X *a*, where *a* is an arbitrary constant of integration depending for its value upon the particular planimeter used in measuring the area. Since the same constant appears in the integration of curve *C* the two cancel out and it is unnecessary for our purpose to know the value of *a*.

Now suppose that a filter is to be used and let the transmission of this filter be represented by curve *B* (Fig. 8).

By multiplying ordinates of curve *A* by those of curve *B* at corresponding wave-length the spectral distribution of the energy reaching the photographic plate or film when the filter is used can be obtained. Curve *C* at the top of Fig. 8 was obtained in this manner.

The total photographic effect produced on the sensitive material is directly proportional to the area enclosed under curve *C*, this being represented by the shaded area in the figure.

By using the planimeter the magnitude of this area can be determined. In this case it was found to be 0.23 x *a*.

Now the filter factor is given by the ratio of the area inclosed by curve *A*, to the area inclosed by curve *C*.

By using the values which we have obtained by the use of the planimeter it is found that

$$\textit{Filter Factor} = \frac{0.76a}{0.23a} = 3.3.$$

The treatment of this method of computing the filter factor involving a consideration of the spectral distribution of energy in the illuminant, spectral sensitivity of the material, and spectral transmission of the filter, illustrates forcibly the dependence of the filter factor upon existing conditions. It is obvious from an examination of Fig. 7 if curve *B*, which represents the distribution of energy in daylight, be replaced by the curve representing the distribution of energy in some other source, such as the tungsten incandescent lamp, that curve *A* would have a very different form. The maximum will be at a much greater wave-length and all of the ordinates in the region between 500 and 700 mμ will be appreciably greater than in case of curve *A*. It is also evident that by multiplying the ordinates of curve *B* by this new curve, the curve thus

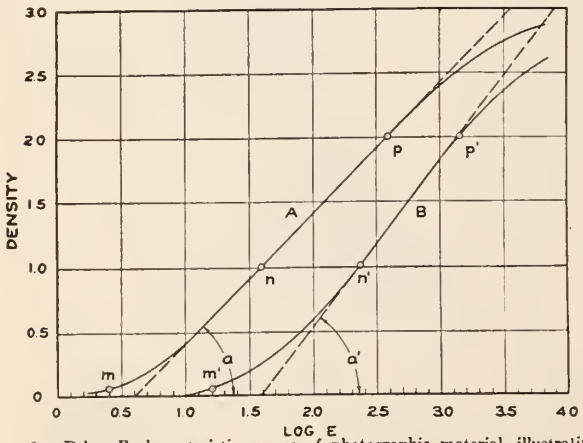

Fig. 9. D-log *E* characteristic curves of photographic material illustrating dependence of gamma on wave-length.

established will enclose a much greater area than the curve shown (*C*). The ratio of the areas enclosed under these new curves therefore will be appreciably less than obtained for the daylight illumination condition. Therefore for a yellow filter such as is represented by the curve *B* the multiplying factor when used on panchromatic motion picture negative film in tungsten illumination will be appreciably less than under conditions of daylight illumination.

As stated previously this method of treatment is particularly adapted to an understanding of why the filter factor depends upon the light source and photographic material. In practice filter factors are determined in a very different manner by a direct sensitometric method. It may be well to discuss this briefly since it will also illustrate one other condition which must be considered in the specification of a filter factor.

The density-log exposure characteristic, frequently referred to as the *Hurter and Driffield (H & D) curve*, is obtained by exposing a sample of the photographic material in a suitable sensitometer, developing, measuring the *density* of the resulting silver deposits, and plotting these densities as a function of log exposure. The multiplying factor of the filter may be obtained by making two such sensitometric exposures, one with the filter placed between the light source and the photographic material and the other with the filter removed. The curves in Fig. 9 illustrate the results obtained in this manner, curve *A* being the density-log *E* characteristic obtained without the filter, with light equivalent in spectral composiiton to *"noon sunlight"* (white light) and *B* that obtained through a deep red filter.

The exposed films from which these two curves were obtained, were developed together under exactly the same conditions as regard development time and concentration of developer.

A considerable portion of the curve is a straight line; its lower portion, as shown, is curved and refers to the *"under-exposed region,"* while the curve upper part refers to the *"over-exposed region."*

Within these limits, *i. e.*, along the straight line, we may consider two points having equal density, such as *p* and p^1, whose density equals 2.0 and drop perpendiculars from them to the exposure axis. These perpendiculars would fall at their corresponding exposure value and we find that:

p^1 corresponds to an exposure equal to log 3.16, and
p corresponds to an exposure equal to log 2.6.

Now, the ratio between the two exposure values will represent the multiplying factor necessary to obtain an equal density in the two negatives, thus

$$\frac{\log 3.16}{\log 2.6} = \frac{1450}{398} = 3.6$$

As these points are near the over-exposure region, the filter negative would match the no-filter negative in the highlight region, but show lower densities in the shadows and half-tones.

Similarly, the factor can be computed for the points *m* and *m'* in the under-exposure region, in which case the filter negative will match the non-filter negative in the *"extreme shadow"* region.

The ratio between exposures for the points *m* and m^1 is found to be 6.3.

(Continued on Page 17)

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Gerstad, Merritt B.—M.-G.-M.
Gobbett, David William—
Gosden, Alfred G.—
Gilks, Alfred—Lasky.
Gray, King D.—
Guissart, Rene—Fox. Elstree Studio, England.
Good, Frank B.—Fox Studio.
Griffin, Walter L.—David Hartford Productions.
Gaudio, Gaetano—Caddo Productions—Met. Studio.
Hallenberger, Harry—Lasky.
Harris, Emil—Universal.
Heisler, Frank B.—
Hilburn, Percy—M.-G.-M.
Hunt, Roy—Lasky.
Hyer, William C.—Educational.
Horne, Pliny—
Haller, Ernest—Robt. Kane Productions, Hollywood.
Heimerl, Alois—
Jones, Allen C.—Universal.
June, Ray—Fine Arts Studio.
Jackman, Floyd—
Jackman, Fred W.—Technical Director, Warner Bros.
Jackson, H. A.—Corinne Griffin, U. A.
Jennings, J. D.—Buster Keaton.
Kershner, Glen—Metropolitan Studios.
Kesson, Dave—United Artists.
Kesson, Frank A.—
Kirkpatrick, H. J.—Universal.
Klaffki, Roy H.—
Kornmann, Anthony—Universal.
Kull, Jacob—Universal.
Koenekamp, H. F.—
Kurrle, Robt. E.—First National.
Linden, Eddie—Universal.
Lloyd, Art—Hal Roach.
Longenecker, Bert—Artclass Prod.
Lyons,Chester—Fox
Lyons, Edgar—Christie.
Lyons, Reginald—Fox
Lundin, Walter—Harold Lloyd, Metropolitan.
Lockwood, J. R.—
Marley, J. Peverel—De Mille.
Mackenzie, Jack—Douglas McLean, Lasky.
Marsh, Oliver—M.-G.-M.
Marshall, Wm. C.—Lasky.
Martin, H. Kinley, Lasky.
Mescall, John J.—M.-G.-M.
Miller, Arthur—De Mille.
Miller, Ernest W.—Chadwick Studio.
Miller, Virgil E.—F. B. O.
Mohr, Hal—Warners.
McClung, Hugh C.—Douglas Fairbanks, U. A.
McCord, T. D.—First National.
McDonnell, Claude—London, England
McGill, Barney.
MacWilliams, Glen—Fox.
Meehan, Geo.—Fox.
Morgan, Ira H.—James Cruse, Metropolitan.
Musuraca, N.—F. B. O.
Milner, Victor—Lasky.
Murray, James V.—Lasky.
McManigal, E. L.—
Newhard, Robt.—
Neumann, Harry C.—Universal.
Norton, Stephen S.—
Oswald, H. M.—

O'Connell, L. Wm.—Fox.
Powers, Len—Hal Roach.
Phillips, Alex—Christie.
Perry, Paul P.—
Perry, Harry—Caddo Prod.—Met. Studio.
Palmer, Ernest—Fox.
Polito, Sol—First National.
Reeves, Arthur—Metropolitan Studio.
Reynolds, Ben F.—
Ries, Irving G.—M.-G.-M.
Robinson, Geo. H.—Universal.
Rosson, Hal—
Roos, Len H.—c/o Pathe Review, Singapore, S. S.
Rose, Jackson, J.—Universal.
Rosher, Chas.—Mary Pickford-U. A.
Ries, Park J.—
Scheurich, Victor—
Schoenbaum, Chas.—Lasky.
Scholtz, Abe—
Shamroy, Leon—Fine Arts Studio.
Smith, Ernest F.—
Smith, Harold I.—
Smith, Leonard—Educational.
Stengler, Mack—F. B. O.
Stevens, Geo.—Hal Roach.
Stevens, Jack—Richard Talmadge, Universal.
Struss, Karl—United Artists-D. W. Griffith.
Stumar, John—Universal.
Stumar, Chas.—Universal.
Sharp, Henry—M.-G.-M.
Smith, W. S., Jr.—
Schneiderman, Geo.—Fox.
Scott, Homer A.
Seitz, John F.—Corrine Griffith, First Nat.
Snyder, Edward J.—Pathe-DeMille. Metropolitan Studios.
Thompson, W. C.—Artclass Productions.
Tannura, Philip—F. B. O.
Tetzlaff, Ted—Chadwick.
Tover, Leo—United Artists.
Todd, Arthur L.—Universal.
Turner, J. Robert—Educational.
Tuers, Billy—
Tolhurst, Louis H.—Microscopic Pictures, Pathe.
Valentine, J. A.—Fox Studio.
Van Enger, Charles J.—Warner Bros.
Van Trees, Jas. C.—First National.
Van Buren, Ned—Eastman Kodak, Hollywood.
Vogel, Paul E.—M.-G.-M.
Wagner, Blake—
Wagner, Sidney C.—Fox.
Walker, Earle F.—
Walker, Joseph—Columbia.
Walker, Vernon L.—Sennett.
Warren, Dwight W.—
Whalen, John P.—Santa Fe Studios (Monrovia).
Wheeler, Wm.—Christie Studio.
White, Ben—Fox.
Williams, Wm. N.—Sennett.
Widen, Carl—Tiffany.
Wrigley, Dewey—Metropolitan.
Wyckoff, Alvin—
Wells, Conrad—Warners Vitaphone Prods.
Wenstrom, Harold—
Whitman, Philip H.—Directing Sennett Studio.
Wilky, L. Guy—
Warrenton, Gilbert—Universal.
Young, Jack R.—M.-G.-M.
Zucker, Frank C.—Harold Lloyd Unit, New York.

HONORARY MEMBERS

Edison, Thomas A., Orange, N. J.
Eastman, George, Rochester, N. Y.
Webb, Arthur C.—Attorney.

SPECIAL PROCESS AND TRICK CINEMATOGRAPHERS

Baker, Friend—
Binger, R. O.—M.-G.-M.
Cully, Russell—Lasky.
Knechtel, Alvin V.—First National.
Emlay, Earl—E.R.L. Studios.
Fulton, J. Phipps—Universal.
Pollock, Gordon B.—Lasky.
Mammes, Ray—M.-G.-M.
Cohen, Eddie—
Edouart, Farciot—Lasky.
Flora, Rolla—Lasky.
Lipstein, Harold—M.-G.-M.
Pomeroy, Roy—Lasky.
Roberts, Oren W.—Lasky.
Shearer, Douglas G.—M.-G.-M.
Stull, William—Stull Prod.
Schlockow, Paul—M.-G.-M.
Smith, Arthur—Lasky.
Smith, Jack—Fox.
Williams, Frank D.—Special Process

AKELEY CINEMATOGRAPHERS

Bennett, Guy M.—
Blackstone, Cliff—Lasky.
De Vol, Norman—Fox.
Dyer, Elmer G.—Universal.
Fetters, C. Curtis—Fox.
Galezio, Leonard T.—
Greiner, A. Leroy.
Hickson, John T.—
Hoke, Ira B.—
Larabee, Nelson—Warner Bros.
Marshall, Chas. A.—M.-G.-M.
Marzorati, Harold J.—M.-G.-M.
Mason, Harry G.—
Novak, Jos. J.—Universal.
Olsen, R. B.—
Ramsey, Ray Lloyd—Universal.
Rand, William—Lasky.
Roberts, Josiab—M.-G.-M.
Shackelford, J. B.—Lasky.
Sickner, William—First National.
Stout, Archie J.—Lasky.
Steene, E. Burton—Caddo Prod.—Met. Studio.

NEWS CINEMATOGRAPHERS

Grimes, William H.—M.-G.-M.
Parrish, Fred—Fox, Colorado Springs.
Staub, Ralph B.—Columbia, Specialties.

STILL PHOTOGRAPHERS

Alexander, Kenneth—United Artists—D. W. Griffith.
Archer, Fred R.—De Mille.
Fryer, Elmer—De Mille.
Kahle, Alexander—De Mille
Mannatt, Clifford—M.-G.-M.
Parker, Robt. M.—Stull Prod.
Richee, Eugene Robert—Lasky.
Rowley, Les—Lasky.
Stapp, W. B.—
Sigurdson, Oliver—Metropolitan Studio.
Thomas, Wm. E.—De Mille.
Van Rossem, Walter J.—James Cruse, Inc., Met. Studio.

SECOND CINEMATOGRAPHERS

Bader, Walter S.—M.-G.-M.
Bauder, Steve L.—M.-G.-M.
Baxter, George—De Mille.
Bennett, Monroe—
Borradaile, O. H.—Lasky.
Chaney, George—United Artists.
Cbewning, Wallace D.—M.-G.-M.
Cunliffe, Donald—Universal.
Davis, Leland E.—
Doolittle, Jas. N.—First National.
Drought, Jas B.—Universal.
Dunn, Linwood G.—Metropolitan Studios.
Dyer, Edwin L.—
Fitzgerald, Edward—M.-G.-M.
Giridlian, Jas. N.—F. B. O.
Greene, Al M.—Tecbnical Art.
Greenbalgh, Jack—F. B. O.
Guffy, G. Burnett—De Mille.
Haas, Walter—
Harten, Charles—New York.
Head, Gordon G.—
Hendrickson, Fred S.—Lasky.
Huggins, L. Owens—
Jenkins, John—
Julian, Mac—
Keyes, Donald B.—Caddo.
Landrigan, John S.—Lasky.
Lang, Cbarles Bryant—Lasky.
Longet, Gaston—F. B. O.
Lanning, Reggie—Lasky.
La Shelle, Joe—
Laszlo, Ernest—
Lindon, Curly—
Martin, Robt. G.—F. B. O. Ralph Ince Prod.
Marta, Jack A.—Fox.
Merland, Harry—Lasky.
Mols, Pierre M.—M.-G.-M.
MacLean, Gordon—M.-G.-M.
Nogle, Geo. G.—
Pable, Ted—
Palmer, Robt—M.-G.-M.
Parsons, Harry—
Pittack, R. W.—Lasky.
Planck, Robt. H.—Columbia.
Prince, Al—Universal.
Pyle, Edwin L.—
Ragin, David—Fox.
Ray, Bernard B.—
Redman, Frank—DeMille.
Reed, Arthur—M.-G.-M.
Rees, Wm. A.—Fine Arts.
Schmitz, John J.—Special Process
Schopp, Herman—Metropolitan Studios.
Shepek, John, Jr.—Educational.
Silver, John—
Smith, Jean C.—De Mille.
Stine, Harold E.—De Mille.
Tappenbeck, Hatto—Fox.
Terzo, Fred—Universal.
Thompson, John—F. O. B.
Unholz, George—Sennett.
Van Dyke, Herbert—M.-G.-M.
Van Enger, Willard—Warner Bros. Vitapbone.
Wagner, Robt—First National.
Walters, Joseph J.—F. B. O.
Westerberg, Fred—De Mille.
Wilde, Harry—
Williams, Alfred E.—Lasky.
Rex, Wimpy—Lasky.
Witzel, E. L.—Universal.

It is evident from the foregoing and the differences found in factors according to the region in which the chosen points are located, that the choice of a method for expressing the *"multiplying factor"* must depend on the requirements of the particular problem.

It is probable that the use of exposure values corresponding to densities of 1.0 (at the points n and n' in Fig. 9) where;

Log Exposure for n' equals log 2.38 = 240, and
Log Exposure for n equals log 1.60 = 40, and

$$\frac{240}{40} = 6$$

most satisfactorily meets the requirements of the great majority of cases in motion pictures work.

This is, in fact, the method usually adopted in the measurement of filter factor.

The case illustrated in Fig. 9 probably over-emphasizes the difficulty in the specification of multiplying factor since the curves shown represent a rather extreme case of gamma differences. The filter used in this case has a very sharp cut narrow transmission band which tends to give the maximum gamma difference. In using "gradual cut" broad transmission band filters such as are employed for obtaining orthochromatic rendering, the gamma differences encountered in using panchromatic motion picture negative film are inappreciable from the practical standpoint. Even with the tri-color filters, which are sharp cut filters transmitting wave-length bands approximately 100 mμ wide, the variation in gamma obtained with panchromatic motion picture negative film is not large for the average case. The possibility of variation in slope (m) and shape of the D-log E characteristic due to spectral composition of the radiation transmitted by a filter and the resultant dependence of filter factor upon the region (highlight, half-tone, or shadow) in which equality of density is required should be understood and recognized by workers in the photographic field who wish to realize to the fullest extent the possibilities and limitations of the light sensitive material.

In making a photograph of an object on a specific photographic material without a filter let the magnitude of the exposure time, lens aperture and illumination be designated as follows:

t_0=exposure time
S_0=area of the lens diaphragm opening
N_0=illumination incident on the object..... ....

Let the magnitude of these terms as required for obtaining an equally exposed negative when using a filter be ta, Sa, Na, respectively. Then:

$$F = \frac{t_a}{t_0} \cdot \frac{S_a}{S_0} \cdot \frac{N_a}{N_0}$$

If $S_0 = S_a$, and $N_0 = N_a$,

$$F = \frac{t_a}{t_0}, \text{ etc.}$$

Since the area of the diaphragm opening is directly proportional to the square of the *stop numbers* or *diaphragm numbers, f,* used in marking and setting the iris diaphragm, it follows that

$$\frac{S_a}{S_0} = \frac{f_a^2}{f_0^2}$$

Hence the value of the stop number may be substituted in if desired.

In motion picture work, since it is necessary to take at a fixed rate, 16 exposures per second, the t factor of exposure can be controlled only by variations in the angular opening of the camera shutter. In using a filter of relatively high factor, it may be impossible to increase t sufficiently. It will be necessary in some cases to increase the intensity factor of the exposure. This can be done by increasing either S or N, both of which control the intensity factor, I, of exposure. The application of the equation to a specific case may be of interest.

Suppose that with I_0 equal to 4000 foot candles, f_0 equal to f:6.3, and t_0 equal to 1/64 sec. (this corresponds to a shutter opening of 90° at standard taking rate of 16 pictures per second), a normally exposed negative is obtained. Suppose further that a filter for which F=8 is to be used. Assuming that the lens diaphragm can be opened only to f:4.5 without undue loss of focal depth, let it be required to determine how much the illumination on the object must be increased or decreased to obtain the same exposure on the negative.

$$\frac{t_a}{t_0} \cdot \frac{f_a^2}{f_0^2} = \frac{210}{90} \cdot \frac{6.3^2}{4.5^2} = 2.34 \times 1.96 = 4.57$$

Since F=8 it is evident from equation (12) that

$$I_a = \frac{8}{4.57} \cdot I_0 = 1.75 \times 4000 = 7000 \text{ foot candles.}$$

If a lens aperture of f:3.5 can be tolerated,

$$\frac{t_a}{t_0} \cdot \frac{f_a^2}{f_0^2} = 2.34 \times \frac{6.3^2}{3.5^2} = 7.57$$

$$I_a = \frac{8}{7.57} \times 4000 = 4240 \text{ foot candles.}$$

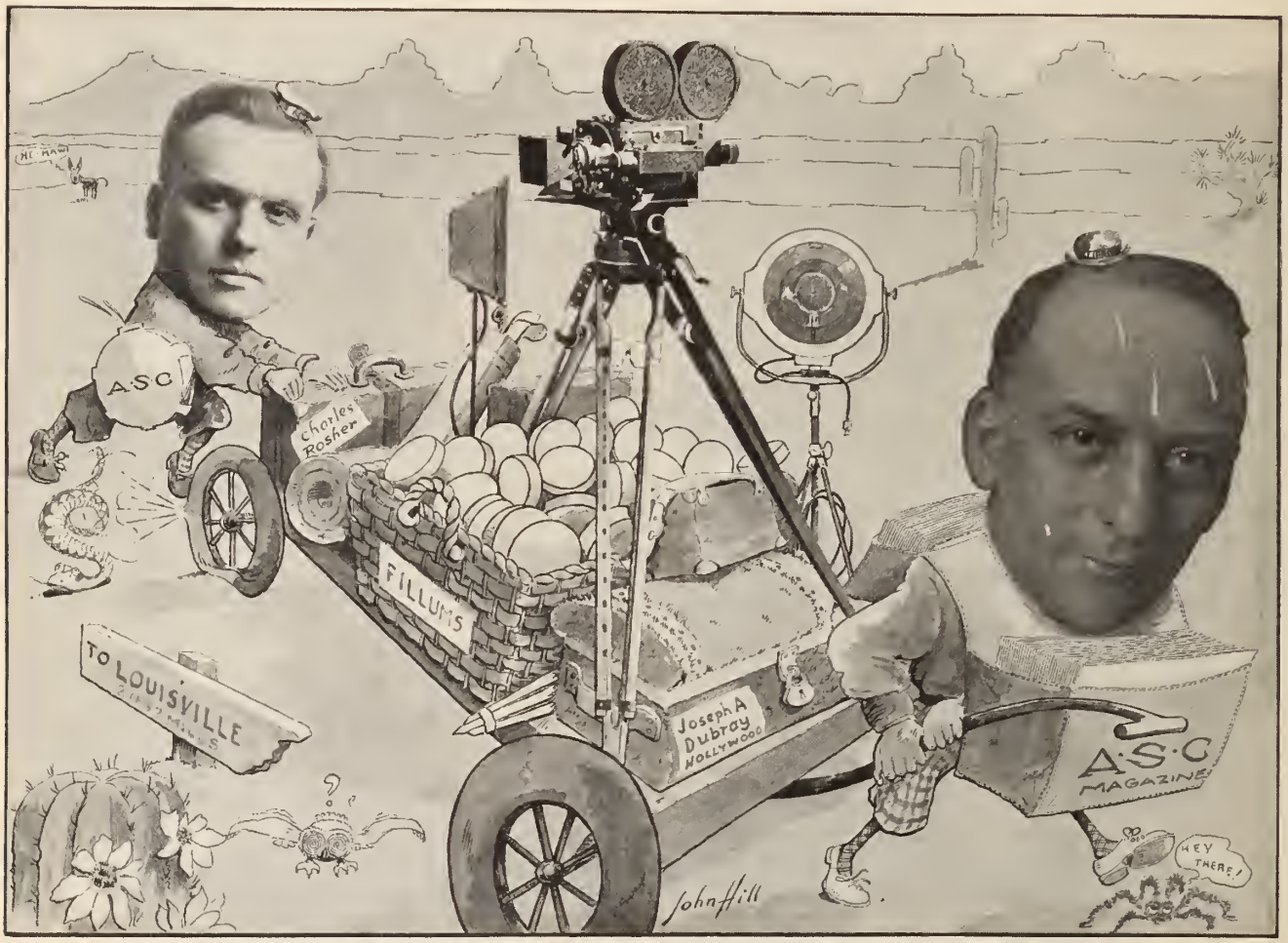
Thus by using the lens operating at f:3.5 and the shutter 210° the "eight times" filter may be used by increasing the illumination on the set by approximately 5 per cent.

It should always be kept in mind that the value of a *filter factor* applying to any light filter is vitally dependent upon the spectral sensitivity of a photographic material and upon the quality of the light used in illuminating the object. In using filter factors for the computation of the exposure required the worker should be sure that the value employed applies to the filter as used under the existing conditions. The mere expression of the value of *filter factor* without a definite statement as to the *photographic material* and the *quality of illumination* is quite meaningless.

(To be Concluded in May)

A. S. C. to P. A. of A.

Cinematographers Send Ambassadors of Good Will To Photographers' Convention at Louisville



It's a long, long road to Louisville but the A. S. C.'s Ambassadors of Good Will to the Photographic Association of America made the grade with flying colors.

At time of going to press, telegraphic reports from the Forty-sixth Annual Convention of the Photographers' Association of America in session at Louisville, Kentucky, March 27 to 30, set forth that Messrs. Joseph Dubray, A. S. C., and Charles Rosher, A. S. C., official good-will ambassadors from the A. S. C. to the P. A. of A., were stellar attractions at the Convention and won the enthusiastic plaudits of both the delegates and the press for their interesting talks and demonstrations. The editor was compelled to get his information from outside sources as both our envoys were too modest to send anything direct.

Mr. Dubray, by request, presented a paper to the Convention covering the history and growth of the cinema.

After reviewing in detail the evolution of cinematography from the first scientific recognition of the persistence of vision to the present time and discoursing interestingly upon the duties of the cinematographer and the problems of active motion picture production, Mr. Dubray concluded as follows:

"The modern Cinematographer is a Commercial photographer, a Pictorial photographer and a Portrait photographer all in one.

"The making of a motion picture production involves a tremendous investment of money which is disbursed in an extraordinarily limited span of time.

"Upon the Cinematographer's shoulders rests a great part of the responsibility of wisely disposing of this amount of money.

"A quick adaptability to weather conditions in outdoor cinematography, a surety of operation in the studio, a rapid comprehension of the 'story-telling' quality of the photographic results he must obtain, and almost a genius of improvisation in order to successfully cope with the innumerable problems that confront him in the pursuance of his work, these are the most obvious commercial requisites of the modern cinematographer.

"As a pictorial photographer in either outdoor or indoor work, the cinematographer must have a thorough scientific knowledge of the materials at his disposal and adapt them to the varied conditions which present themselves and to the artistic sense which dictates to him his composition of lines and of lightings.

"The choice of the subject is dictated by the exigencies of the story, and the 'mood' of the story itself stirs his artistic and psychological self to produce the most appropriate results.

"In cinematography it is not possible, commercially speaking, to adapt a title to a subject which has struck the fancy of the pictorial photographer under certain conditions of lightings or composition; but these conditions **must be created** by the cinematographer to suit the title, be it a one-line title, or be it a whole multiple reel picture.

"The very same outdoor location, the very same interior setting are as by magic transformed so as to give the impression that is most suitable to keep the dramatic continuity of the story.

"True, many mechanical means are at the disposal of the cinematographer to overcome difficulties, but all his ingenuity, all his artistic sense, all his knowledge of photography must be displayed by the cinematographer even in the shortest and apparently most insignificant scenes, so as to keep intact the relation between scene and scene, so as to keep intact the pictorial expression that he is endeavoring to inculcate into the mind of the audience, in order to help the telling of all the subtle details which concur to form a motion picture story.

"As a Portrait photographer, the cinematographer confronts some very fascinating problems. In the large close-ups, which condense in themselves the essence of the story that is told, no retouching is possible on the multiple tiny images of the motion picture film. No retouching and yet the urge, the need of beautifying the subject and beautifying it not only in consideration of **one chosen angle,** but under all conceivable angles which are presented to the camera by the diversity of motions and expressions proper to motion picture rendition.

"Make-up and lightings are the two magicians at the service of the cinematographer in this phase of his work. Make-up judiciously chosen and applied, lightings handled as per the dictates of the cinematographer's artistic and creative conceptions.

"Truly, the cinematographer is a 'creator,' a creator of Beauty allied to Truth, a creator of the graphic representation of the sentiments expressed by the story.

"Not that the artistic and dramatic effects of a picture should all be ascribed and credited to the cinematographer, but he is a part and a most important part of unity of production, a unity composed of several creative entities—the Writer whose genius of invention and originality has produced the story or adapted it to the needs of the screen, the Director who models it, shapes it so to speak into screen form, the actor on whom rests the great accomplishment of divesting himself of his own personality and **living** the life and thoughts of the character he is portraying. The cinematographer captures the creative and intellectual efforts of these great entities and molds them into a permanent visual interpretation great in its scope, still greater in its effects."

Mr. Dubray also exhibited to the delegates a film composed of a medley of shots contributed by A. S. C. members from the Fox, Lasky, DeMille, United Artists, Sennett, Hal Roach and Universal Studios.

This film proved to be of tremendous interest to the Convention which received it with enthusiasm.

Mr. Rosher, one of the pioneer members of the P. A. of A. and of the A. S. C., and internationally famous as a cinematographer, made the demonstrations of actual camera work before the convention, using the finest Mitchell camera equipment and photographing subjects, sets, lighting, make-up, etc., and the film was developed and later shown to the convention with entire success. This was probably the big event of the convention.

Mr. Rosher also delivered an address at the banquet giving, at the request of the delegates, a running fire of comment on the eminent stars he has photographed with many human interest stories hitherto unpublished.

Both Mr. Dubray and Mr. Rosher were accorded ovations and given unstinted praise for their skillful work before the convention. It was conceded on all sides that they not only made a profoundly favorable impression upon their hosts of the P. A. of A., but that the A. S. C. is to be congratulated upon the choice of such able, clever and representative ambassadors.

The A. S. C. Mourn Our Departed Brother

Rudolph Bergquist

What Is an Akeley?

By Ira Hoke, A. S. C.

There is a remarkable camera in Hollywood. No, it is not a "new gag", but a camera with a long history of efficient service to its credit. It is the most difficult motion picture camera to operate successfully now in professional use in the Hollywood studios, but with it have been photographed some of the most thrilling action scenes on the screen today.

Its name is "AKELEY".

So named for its inventor, the late Carl E. Akeley, noted photographer of wild animal life in the African jungle, the Akeley camera has brought to the silver screen something of the elementary abandon of impulsive motion heretofore known only to those who have followed the paths of the great untamed into its secret hiding places.

The realistic portrayal of any spectacular movement by the motion picture camera hinges primarily on coordination of speeds. The photographer must so regulate the speed of the camera that when thrown on the screen the picture will carry to the spectator an exact reproduction of every thrill he should have experienced had he actually watched the action. Because the Akeley is specially adapted for this purpose is the reason why this instrument is known through the cinema world as "the remarkable camera". It was designed with the idea of portraying the most elusive and ungovernable speeds in the world; the gaits of wild animals. It is operated in the commercial studios by men who specialize in the photography of moving objects. These men "shoot" no other motion picture camera professionally. They are known as Akeley Specialists. They are specialists in speed, the Akeley camera is their medium of expression.

Mechanically the Akeley differs from other motion picture cameras in two major points. They are the panoram movement and the degrees of shutter opening these points being incorporated in its design with the sole purpose of adapting it to the photography of rapidly moving objects.

The most radical difference is its panoram movement. Instead of the ordinary crank and gear control, the Akeley is swung and also tilted by a pair of controls, which are a train of gears terminating in a small fly wheel which governs the action with a gyroscopic precision. In other words the action of the camera when moved from side to side or up and down can never be jerky. Its movement can best be described as floating.

If we want the spectator to get the full thrill of a daring, whirlwind chase on horseback we cannot expect to get it over by setting our stationary cameras along the roadside and letting the horseman dash jumpily through the scene several times at different locations. But look what we may accomplish with the Akeley camera placed at a strategic point some distance from the horsemen! With the telephoto lens we are enabled to procure a greatly magnified image of the distant horsemen; a "close-up" in fact. The increased distance between the camera and the horsemen allows the latter a wide sweep across the prairie with the camera as a pivot point. The camera with its floating gyroscopic swing can center the moving screen upon the most daring chase as accurately as you point your finger, or watch the movement with your eyes.

Suppose we have a cavalry charge to portray. The best we can accomplish with the stationary camera shows a distant group of seething horses dashing madly through the scope of the picture. With the magic of the Akeley camera and its telephoto lenses we are able to throw our spectator right among the charging brigade. He stays with them, they do not merely dash past. He can see the light of conquest in the eyes of the leader, the frothing horses, a swaying dash of fighting men and beasts so CLOSE that the spectator can imagine himself actually there struggling among the soldiers. The spectator lives that scene because he SEES it.

Now that takes us back to the first mention of speed portrayal. The spectator cannot live a scene if that scene is not photographed as the eye would naturally

record the impressions. Take a horseback chase for instance. If every movement of the horses is recorded clean and sharp, or in other words stopped in action, on the cine negative in a manner considered perfect for a still photograph, it will, when reproduced on the screen, suggest an unnatural stiffness in the movements of the animals. Thus, while it may be perfect for a still photograph, critical movement sharpness of each frame of a motion picture film may prove a serious fault. The screen portrayal will in all probability lack the so termed liquid movement necessary to the reproduction of motion.

In the photography of fast panoram movements encountered in typical Akeley scenes this sharpness is apt to prove distracting because the eye tries to accustom itself to its usual sensations upon observing cross motion.

The Akeley camera was designed with a thought toward lessening harsh cross-screen action by the incorporation of a shutter with an unusually wide degree opening. This is called the plastic movement shutter, and has a full opening of 230 degrees. During the passage of this wide opening before the film quite a noticeable movement takes place in the object photographed. Thus the movement in a single frame of the film is not entirely stopped or "frozen" and when projected rapidly upon the screen the effect is to smooth out the action. The use of the plastic shutter is resorted to by the Akeley cinematographer in cases where extreme speed of cross movements would reproduce better in his estimation if it were "liquified".

For the photography of slower moving objects such as yachts, ocean liners, aeroplanes, etc., the cinematographer usually inserts in the Akeley a shutter adjustable from 180 degrees down to only 20 degrees. Thus the "remarkable camera" once more demonstrates its versatility by allowing the use of a wide angle shutter to liquify sharp movements and a narrower angle shutter to correctly portray movements naturally of a plastic nature.

The Akeley in no way replaces ordinary dramatic cameras, nor is it so intended. It is an auxiliary tool only; a special apparatus specializing in speed portrayal. Whether that speed be slow or fast, the efficiency of the Akeley is unchallenged. It has a field of its own, but a field closely interwoven with the work produced by the dramatic instrument. The director of modern productions interperses Akeley scenes into the regular photographic action for the purpose of "pepping up" sequences which otherwise would drag. It is not unusual for the theatre goer to observe a series of scenes just about to verge on monotony suddenly set out from the story with dramatic vividness by the incorporation of several well chosen Akeley "shots".

The greatest directors in the motion picture industry today recognize in this speed specializing camera one of their most valuable tools in portraying the true motion of the photographic subject in its vital relation to the story.

Akeley Specialist, Ira B. Hoke, operating the combination Akeley and Bell & Howell on the D. W. Griffith picture, "Drums of Love."

Program S. M. P. E.

(Continued from Page 5)

Projecting of Motion Pictures" by A. C. Hardy and R. W. Conant, Massachusetts Institute of Technology, Cambridge, Mass.

12:30 Luncheon.

2:00 Papers:

"Pull Down Mechanisms for Motion Picture Cameras" and "A Spring Driven 35 mm. Camera" by A. S. Newman, Newman-Sinclair, Ltd., London, England.

"Motion Picture Photography at High Altitudes" by J. Noel, Cinematographer, Mount Everest expedition.

"The Magnascope" by H. Rubin, Supervisor of Projection, Public Theatres Corp.

"The Lateral Swelling of Thin Sheets of Gelatin and Photographic Emulsions During Photographic Processing" by S. E. Sheppard and J. McNally, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"Equipping an Animation Studio," by C. Gilette, Eastman Kodak Co., Rochester, N. Y.

"The Control of Exposure in Printing" by C. F. Tuttle, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"A Device for the Accurate Timing of Master Positives in the Printing of Duplicate Negatives" and

"Reduction Printing in Cinegraph Production" by J. G. Capstaff, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

"Dye Toning with Single Solutions" by J. I. Crabtree and C. E. Ives, Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

Bodine With B. & H.

The Bell & Howell Company, manufacturers of professional and amateur (Filmo) moving picture equipment, recently appointed Mr. H. O. Bodine to take charge of their New York Office and serve as Eastern Sales Manager. This position was formerly held by F. A. Cotton, who not long ago met with a very unfortunate accident which proved fatal.

Mr. Bodine needs no introduction to the photographic industry, having been actively and prominently connected with this fascinating profession throughout his entire business experience of 25 years. Dealers and users of Filmo equipment will find Mr. Bodine thoroughly conversant with every factor of the game.

Developing a lively interest in photography in his youth, Mr. Bodine had landscapes and genres accepted and hung in principal photographic exhibits and salons of the world. This successful amateur work led to his entering commercial photography as a profession, in which endeavor he gained a broad, practical experience in commercial, portrait and scientific photography.

The development of the American Photographic Salon was materially aided by Mr. Bodine's ability, as was the organization of the Photographic Dealers' Association of New York, and the Photographic Dealers' Association of America. In the management of the first international Exposition of the Photographic Arts and Industries at Grand Central Palace, New York City, 1914, and of the International Photographic Exhibition, Grand Central Palace, 1913, Mr. Bodine was a prime mover.

His business experience has included the following connections: Sales Manager of Raw Film Supply Company, New York City; Advertising and Sales Manager of the following firms: Wollensak Optical Company, Rochester, N. Y.; Herbert & Huesgen, New York City; Agfa Products, Inc., and Gevaert Company of America, New York City.

Through this intensive experience in photographic activities, Mr. Bodine is exceptionally well qualified for his new position.

FROM THE INCAND

These interesting pictures are engraved from enlargements made directly f
made at the Roosevelt Hotel, Hollywood, on the night of February 10, Ga
erance of lighting equipment

SCENT LIGHT TESTS

the motion picture negative film exposed in the Incandescent Light test Gaudio, A S. C. directing; Donald Keyes at the camera. The prepond- supplied by Mole-Richardson

Movie Make-Up

By Max Factor

(Continued from Page 8)

With the advent of panchromatic film, incandescent lighting brought with it another opportunity that we welcomed. We were able to test out materials under new conditions, and were extremely fortunate to be able to make these tests with the assistance and co-operation of the American Society of Cinematographers.

Certain conditions due to this new type of lighting and film were apparent in the photography of this new make-up, for we found that the least sign of unevenness, or the slightest variation of color was immediately picked up by the camera. We also noticed that certain shades would photograph differently under incandescent lighting than under the arc equipment. This was especially true of pink, while neutral tones photographed best. But our brown panchromatic lip rouge, which was placed on the market some months before, was photographing light in some scenes and dark in others. The eye shadows formerly used were treacherous in estimated color value, and could not be relied upon for safe standard results. Likewise black lines on the eyebrows and under the eyes seemed to stand out exceptionally strong, thus making other features appear pale through their contrast.

We started to test all colors in our laboratories, with the object of determining if it would be possible to bring out what we might term "fool-proof" make-up. We wanted make-up that would result in a reasonable amount of standardization, so that the performer could work under panchromatic or orthochromatic film, regardless of its manufacture, or under any type of lighting equipment, and yet be assured of satisfactory results. If such a thing were possible, we could foresee elimination of most of the make-up worries of the cinamatographer, and the actor and actress, and would create for the make-up exponent a real feeling of accomplishment.

We tested various pigments, and blended numerous shades of gray, green, blue, brown and yellow, and after all found one outstanding and irrefutable condition that we could not break down in our tests. It may seem a simple thing to many, but to me it is the all-important development that proves conclusively that I was always on the right road, in my experimental work, and was not working on a tangent.

I always contended that make-up should duplicate nature, and was happy to find that in all tests that wherever we kept close to neutral tones, we have fairly good results. We then attempted to blend and incorporate pigments into our make-up that would create THE SAME EXACT COLOR OF THE HUMAN SKIN ITSELF. We prepared six different tones of NATURE SKIN COLORED MAKE-UP, and began using them in the last two or three weeks of the tests at Warner Brothers. We had a tone to match every complexion, which we safely listed as six different shades.

We found that when we applied this make-up, it was not necessary to use as much as we had previously used, because the make-up would blend in with the natural color of the skin, and simply become part of the complexion itself. This was gratifying, for it meant that the facial muscles would be freer than ever before and that the slightest movement of the face would be picked up by the camera, and the natural sheen of the skin would be reproduced on the screen, giving the most lifelike appearance.

We found that the same tones of make-up deepened considerably would work remarkably well as an eyeshadow and a lip rouge. Those who were present in the final days of the Warner Brothers' test, will remember the brownish eyeshadow and lip rouge used. The resulting tests have proven that these photograph very well. The eyelid is darkened just enough to form a pleasing background contrasting the eye itself. The lip rouge blends in with the natural color of the lips, and and prevents any hard or harsh lips that may appear too black. We also used only brown dermatograph pencils to outline the eyebrows and to underline the eyes and even these were carefully smudged to eliminate any strong prominent lines.

I would like to call particular attention to the tests made of Donald Keith, in which all of the above mentioned developments were used. I do not remember ever seeing a more natural or lifelike reproduction of a human being on the screen, and the comment that was passed on the result was most pleasing.

Weigh carefully in your minds how important to the profession in general are my statements, if actually true. What relief it will give the cinematographer from worrying about the way the make-ups will photograph. He will be able to determine whether or not the persons will photograph satisfactorily by just looking at them, for they will register the same way on the screen as they appear in natural color.

There are a great many performers and cinematographers who have always relied on my advice, assuring them better results, but I want to convince my readers that the future holds a new and wonderful era for make-up. I will be willing to supply every photographer with sufficient material to make his own tests for the betterment of pictures. Through the courtesy of the A. S. C. we have arrived at a method of being able to do this, and offer this advantageous opportunity to any one willing to make these tests, and prove to themselves that the art of make-up is the cinematographer's closest ally.

Further developments along these lines, and the nature of the tests already made, will be held over for another article which will appear in the May issue of "The American Cinematographer".

More About That Light Transformer

In the March issue of The American Cinematographer a short news item appeared announcing the invention of a new light transformer by the Research Laboratories of National Carbon Co., Inc.

Further information released by this company concerning this new transformer states that it is not to be used as a filter in the same way that ordinary filters are used over the lens of a camera, but that it will replace the ordinary glass screens now being used in front of practically all the studio arc lamps.

This new screen, exactly like all mediums which transmit light, absorbs a certain amount of energy produced by the light source, but differs from all other screens in that the light absorbed by this new screen in a large part is transformed into visible light and not lost as with other screens.

The advent of panchromatic film in the studios is calling for a light stronger in the red, orange and yellow-green portion of the spectrum and has light in the blue, violet and near ultra violet portion. The first remarkable advance in this direction with the carbon arc was the production of the new Panchromatic Carbons, also a recent development by the Research Laboratories of National Carbon Co., Inc. These new carbons are being successfully used in the studios and their use is increasing. The fact that absolutely no change is necessary in the arc lamp equipment used in the studios to burn these new carbons is the cause for their immediate popularity.

With the new transformer now developed, which absorbs all of the ultra-violet and some of the violet and blue rays, the light so absorbed is largely re-radiated in a band from about 490 to 560 with a very considerable peak of energy at about 525 milli-microns, which is in a position in the spectrum where an increase in energy is extremely valuable in photography with panchromatic film.

This new transformer and the new Panchromatic Carbons are to be discussed in a paper which is to be presented at the meeting of the Society of Motion Picture Engineers to be held in Los Angeles April 9th to 14th, 1928.

Pictures While You Wait

A. S. C. Men Learning to Produce Their Own in Leisure Time

Dear Mr. Editor: Some time ago I heard you talking to a couple of gentlemen about cameramen making good directors and I agree with you. There is no man better fitted for that responsible job and I wish all would read President Dan Clark's good article on this subject. It will pep you up like Colonel Lindbergh's ocean flight did for aviation.

The directors who grow from cameramen are all successful because they KNOW the things and the short-cuts that can only be learned from behind the camera.

Many pictures we look at today are sad because of their terrific costs and the amount of negative shot, for there are so many times when the angles used mean nothing but wasted negative, time and money.

When we see a beautifully handled picture and then one that is awful, and knowing the subject could have been handled better it makes me one hundred per cent determined to direct, and yours truly will read Dan's good article again and set my face towards that wonderful goal by starting with short subjects.

Just last week I built a beautiful set in my front yard at very little cost, secured some people and made a pretty little story covering two periods fifty years apart, shooting the entire story in one day and, in future, whenever I have spare time I will make others.

A few weeks ago two of my friends had a contract in a nearby city to furnish a picture for showing on a certain date. On a Tuesday they called on me for help but soon learned their story was too big and impossible to make in such a short time with amateurs, even though I have always found green people easy to work with.

Our first move was to look over the city for every available idea, beautiful homes, railroads, stores and what-nots, to give us sets, backgrounds, and so forth. In the meantime we passed the word around that we wanted a cast and on returning to the hotel they were there, yes, by the score, showing that that magic word "Motion Pictures" was greater than the music of the Pied Piper of Hamelin.

Out of these groups the cast was selected except the two leads, and that night we wrote the beginning of our story.

The next day we visited manicure parlors, drug stores, offices and the high school. We had almost given up in despair, when lo and behold THE GIRL in all her loveliness and long curls came across the campus. Well, it took only the next hour to secure her own, her mother's and father's consent, and after high-powered persuasion her mother was kind enough to play the mother part.

To find what the girl could do in front of the camera I picked the school's star track man and put them through their paces. His hands were large and I'll bet never missed a forward pass, for in trying to make love they persisted in getting in her ears and eyes or unconsciously doing the funniest things you ever saw. But time stops for no one; we were satisfied and the contract specified that we were to make pictures with artificial light in the said theatre as an added attraction. There was no time for more preparations, we must go and we did, and how!

In all our glory with sixty amperes carbon light, AC current of forty cycle, we photographed the theatre and many scenes both on the stage and off, and the crowd went away happy.

Friday morning I found a most beautiful home with sunken gardens. After securing permission to use it, we borrowed fifty couples from the high school and spent the day in making a lawn party (NIGHT), the love sequence and ending in a most beautiful setting—all the time writing the story on my cuff as I went.

On Saturday morning we borrowed hand bags, taxi, bell-hops, chauffeurs, and even the fire department, for

by this time the whole town had the motion picture fever. We made many shots around the railroad station, on the streets and in front of the various stores and by afternoon we were a tired lot for it was necessary to rehearse many times, but with all our rehearsing we had completed a grand total of 250 scenes with little cost. We then brought the negative to Davidge's Laboratory and I broke it down myself at two o'clock Sunday morning for printing.

I cut the story and put in the titles Tuesday, previewed and re-cut to 1900 feet, losing 110 feet of negative by extra takes, then delivered it Wednesday two hours ahead of contract time.

The picture was run three days to packed houses, the title appearing in front on the electric sign. The people were all pleased and the newspapers spoke very highly of it and, in fact, caused more talk than a high-priced picture running at a nearby theater.

This all made me very happy as it had been a lot of hard work, but was good experience for it was necessary for me to direct and photograph it at the same time, and it is my intention, Mr. Snyder, when I am not shooting to spend my spare time in making short subjects, for I feel that cameramen with dramatic ability, coupled with knowledge of construction, light and camera angles are well fitted to make directors.

Sincerely yours,
GLENN R. KERSHNER, A. S. C.

Are Pictures Written

A New York lawyer asked me this question: "When I read a book," he observed, "I like to know who the author is and what he wrote before. When I go to the theatre I am interested in the playwright's name. But when I go to the movies it's different. Too many names are flashed on the screen in too many ways that don't mean anything. And nobody seems to care who wrote a movie. What causes that?"

"Tradition causes that," I told him. "Motion pictures are, or have been, a half-educated craft. But they are looking up. It is beginning to dawn on the producers that motion pictures are not made **with a camera lens,** nor yet with a director's megaphone. The press hasn't realized it yet, nor, of course, the public."

"Isn't that the writers' own fault?" he countered. "How do you expect the press or public to realize who is responsible for a picture when you slip them such stuff as Story by so and so—Adaptation by someone else—Scenario by someone else again, all on the same screen? If you writers won't agree whose work is what, and what to call it, you can't expect anyone else to bother figuring it out."

He had me there.—**Benjamin Glazer, in the Academy Bulletin.**

Fog Holes

By Perry Evans, A. S. C.

Sometime ago I was called upon to shoot the airplane part of "Across the Atlantic" a Warner Brothers production, featuring Monte Blue, directed by Joe Brotherton and photographed by Barney McGill. The aerial part was directed by the Old Veteran Fred Jackman and photographed by yours truly.

After drawing diagrams and entering into a thorough understanding between Mr. Jackman, the various pilots and myself, we took off to work above a high fog, my ship taking the lead in search of a heavy bank of fog which we located about one-half hour from our starting point. I had no more than given the signal that I was ready to shoot when I noticed we were losing altitude and getting down among the fog banks.

Immediately I poked my pilot in the back and motioned for him to go up. To this he came back with an argument in the pantomime language which I found out later meant that one side of his motor was cut out and we were limping along on half power. Judging from the way he banked his ship around quickly he was heading back to the field and I took it something must have gone "hay-wire" under the hood.

Our propeller was turning over slowly and unevenly and looked as if it might stop at any moment, but having witnessed dead-stick landings before I could see no reason for becoming unduly nervous. After ten minutes of feeling our way through a fog so thick we could hardly see the end of the wing, we went down through a fog-hole and I caught a glimpse of what was unmistakably the BIG BLUE PACIFIC. To say that I was petrified is putting it mildly. I tried to "kid" myself into thinking it was Westlake Park I had seen, but on second thought Westlake Park never was as big as what I saw.

In order to make minutes out of what seemed hours we soon crossed another fog-hole. This time my pilot got his first look at what I had seen a few minutes before and he turned to me with a worried look and shook his head. From then on we ran through a series of fog-holes, each time the ocean coming up nearer and nearer to meet us until at last that very welcome shore line appeared through the fog and having only a few feet of altitude to maneuver on, we came down for a forced landing in a rough meadow where we cracked our landing gear, but did not know it at the time. Although somewhat shaken up from the rough landing we made our repairs and in a few minutes were on our way back to the field where in landing we washed out our landing-gear due to force-landing, but fortunately stayed right side up.

Another day we set out for Wilmington to shoot ships and docks down through fog-holes. When within a few miles of Wilmington the fog became very dense and we climbed to 5,000 ft. to get above it. A birdman's view of a fog-bank is a weird but very beautiful sight. One actually seems to see a boiling and changing formation, at other times it can be compared to a huge river of broken ice with giant slabs of ice standing on end, sprinkled with a two inch snowfall. In a back light they look firm enough to get out and walk on. However, I wouldn't advise any one in Hollywood to try it without a parachute. I have often thought as I looked down on a fog-bank that it must have been a scene something like this that Commander Byrd and his crew looked down upon when they dropped Old Glory on the North Pole.

Beginning of the A. S. C.

By H. Lyman Broening, *A. S. C.*
(Reprinted from The American Cinematographer of November, 1921)

The formation of the first motion picture camera club, in America, came about under somewhat mysterious and peculiar circumstances. During the summer of 1913, while employed at the Edison studio in the Bronx, New York city, Messrs. Frank Kugler, Philip E. Rosen and Lewis Physioc got their heads together. These men were operating cameras for the Edison Kinetoscope Company, at a salary of $18.00 per week. The Motion Picture Patents Company group of producers practically controlled the industry, making it impossible for an employee to seek safe employment with independent concerns.

Anonymous notices were sent out to as many cameramen as it was possible to reach, with a request that they reply to a certain office in the Tribune Building. A few straggling replies were received and a meeting was decided upon. The eventful evening finally arrived. Hinebund Hall, at Thirty-fourth street and Eighth avenue, each a stranger to all the others and with no definite idea as to why they were there. After a few anxious moments a waiter came in and distributed a paper to each which read, "This meeting is yours." Then things began to happen. A temporary chairman and officers were appointed from among the small group and they proceeded to get together.

Lest there be opposition by the producers the meetings were secretly carried on regularly for six months and, with the establishing of a friendly interest among the cameramen, "The Cinema Camera Club" made its debut into motion picture society. The expected opposition never materialized, and with a rapidly increasing membership quarters were opened in a building in Columbus Circle.

The next move, in 1915, was to the Times Building where spacious offices were occupied by the rapidly progressing organization with a register of over one hundred and twenty members. The first social event was a ball, held at the Palm Garden Hall, which proved a huge success and added prestige to the Club. A second affair followed a year later—an invitation dance at Pabst Colosium in Harlem.

During this course of events a similar body was formed in California known as "The Static Club." Both were formed for social reasons, for an exchange of ideas and for the general advancement of the cameraman and his work.

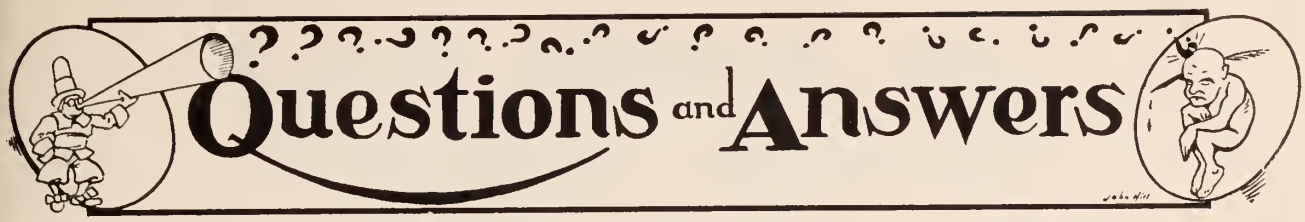
Later on, the "Static Club" changed to the "Cinema Camera Club" and an affiliation was formed with an exchange of membership. In 1916 a house organ, "The Cinema News," made its appearance and for a time was fairly successful. "Static Flashes" was also issued as a representative paper of the western club.

In 1918, at a regular election, Mr. Philip E. Rosen was voted into office as president for a third term of the Cinema Camera Club, but was called out of town and resigned his office. Mr. Rosen arrived in Los Angeles in time to attend the last few meetings of the Cinema Camera Club, of California, which was sadly waning. The membership was badly mixed up and plans to continue were apparently useless. The assistance of Mr. Rosen was sought, by reason of his experience in these matters, which resulted in the appointment of a committee upon re-organization while the Club went through the dissolving process.

Charles Rosher, A. S. C., was president of the Cinema Club at this time and it was largely through his influence that the Club was dissolved and the majority of the membership influenced to join the new organization then in process of forming, which later became the A. S. C.

On Saturday evening, December 21, 1918, a meeting by the members' newly appointed committee of ten, was held at the home of Mr. Wm. Foster. A board of

(Continued on Page 35)



[No questions answered unless accompanied by name and address of propounder.—[EDITOR'S NOTE.]

QUESTION—How should I regulate my exposure—with the lens stops or the shutter?

ANSWER—The majority of our cameramen control their exposures by manipulating the shutter, for the reason the more the lens is closed the more "wiry", unpleasantly sharp, the picture becomes. By using the lens open and calculating the correct exposure with the shutter, the same degree of softness is maintained throughout. However, there are occasions where increased depth of focus is required, in which case the diaphragm of the lens is employed.

QUESTION—What is meant by values, in a picture?

ANSWER—"Values" is a term originally used by painters, denoting the relation of the various elements of a picture, i e., in the composition, certain curved lines. are arranged to give VALUE to straight ones; certain forms are so placed to lend value to others. The term is more generally used as regards determining the juxtaposition of colors or the depth of tones, the relation between the light, shade and shadow of the various objects, and also the distance as related to the foreground. In photography, for instance, selecting the background so that the lighted parts of the head will be relieved by darker areas in the background and the shadow side backed up by a lighter part of the background, is purely a matter of the knowledge of VALUES.

QUESTION—My stuff always seems to be slightly out of focus, being sharper back of the object; how can I correct this without closing down the lens?

ANSWER—There are several difficulties connected with this problem. The modern fast lenses are very difficult to focus, especially in close-ups, the depth being controlled by the speed of the lens; the proportions of the motion picture are so minute, when focusing by eye, that it is difficult to distinguish between the natural softness of the lens and a lack of focus. It is seldom we find a camera whose ground glass registers absolutely with the plane of the film, and again the vision of man varies considerably. Set your scale by actual tests and use your tape; there's no way so satisfactory for balancing the focus for groups.

QUESTION—What is the best form of diffusion to use—the disk, gauze or the soft focus lens?

ANSWER—The disk is generally preferred because it maintains the same brilliancy, the same contrast and does not distort the high lights as much as the other forms. The gauze reduces the exposure, varies the contrast by graying the darks and reducing the brilliance of the lights, distorts the brighter points of light into numerous little crosses of halation conforming to the mesh of the gauze. The soft focus lens is pleasing but is limited to this style work

QUESTION—When was photography discovered and by whom?

ANSWER—The action of light on silver salts was known to the ancient alchemists but it was not until about 1802 that Wedgwood and Davy thought of reproducing images by interposing the outline of objects between light and the surface of paper, leather, etc., coated, first, with silver nitrate and, later, with silver chloride. The camera obscura (pin hole images in a darkened chamber) was known from time immemorial, but it was not until about 1829 that the idea was conceived of fixing the image; at which time both Joseph Niepce and Louis Daguerre were experimenting to this end. Both being unsuccessful entered into an agreement to pool their ideas. Daguerre discovered the process by accident. In removing some of his materials from an old closet, he noticed that a silver plate, lying near the fumes of iodine, had become sensitized with silver iodide which began to change color when removed to the light. From this discovery he developed the daguerreotype, the first commercial photograph.

QUESTION—Should any arc light be mixed with incandescent light in using panchromatic film?

ANSWER—A true artist should not confine himself too strictly to a set formula. He should either select his conditions, wait for them or create them. He may photograph with candle light if furnished sufficient volume but he should insist on the conditions his judgment and experience dictate. The incandescent is a fine general light but a little of the cold light judiciously placed will give brilliancy where it is needed without destroying the panchromatic values in the broader areas.

Faster Camera?

A whirling metal mirror that makes 360,000 revolutions a minute offers a hint that some day photographs can be taken with exposures of a billionth of a second.

Prof. Ernest O. Lawrence, Dr. J. W. Beams and W. D. Garmon at Sloane physics laboratory, Yale University, are using the mirror in studies of extremely short flashes of light. The reflector, whirled by a column of air, cuts a beam of light into pieces so small that the duration of each is computed in billionths of a second.

Application of the same principle to photography, the physicists suggest, may eventually make possible a high-speed shutter that can catch such rapid motions as those occurring in atomic processes.

The device also makes possible measurements of the time taken by light to travel only a few feet. Scientists have usually made their experiments with light speed over comparatively long distances, but the whirling mirror permits such tests to be made in the laboratory.

The physicists believe they may be able to increase the speed of the mirror to a million revolutions a minute, thus making possible still furthur reductions in the duration of light flashes. The scientists point out, however, that as the velocity grows the atoms in the mirror are subjected to such terrific disturbances that they are likely to fly apart, shattering the metal.

To spin the mirror, the physicists place it over a perforated brass cup. Compressed air, passing through the holes, lifts the reflector a tiny fraction of an inch and causes it to whirl. Usual mechanical frictions are eliminated because the mirror does its mad dance suspended in air.

The Mazda Tests

"Grief Committee" Will Have Big Job Finished by April 7th

Left to right: Frank B. Good, A. S. C.; Victor Milner, A. S. C., Paramount-Famous-Lasky Studios; Joseph Dubray, Executive Secretary, A. S. C.; John F. Seitz, A. S. C., M.-G.-M.; Frank N. Murphy, Chief Electrician Warner Brothers Studios; Fred Gage, Superintendent of Laboratory Warner Brothers; Hal Mohr, A. S. C. Warner Brothers.

These gentlemen constitute the Special Incandescent Light Research Committee which had charge of details and operating arrangements in connection with the so-called Mazda Tests conducted recently at Warner Brothers Studios—briefly the experts who assumed the "grief" appertaining to the work. They superintended all tests from the time appointments were made by the individual cinematographers to the finish of the tests on Saturday, March 3rd.

The work involved the care of the film, the checking of the takes, the "picking of the takes," the preservation of the records, the breaking down and projection of the film, the cutting and editing.

It is some job to handle 72,400 feet of film, especially when every inch of it must be examined with the most meticulous scrutiny, for in these tests nothing was taken for granted, and judgment had to be absolutely impartial.

Ather members of the A. S. C. who assisted the "Grief" Committee were Bill Thompson, Nic Musuraca, John Whalen, Roy Klaffki, Ira Morgan, Bob Newhard, Alvin Wyckoff and Dan Clark.

In making selections of the takes the Committee divided the whole into seven classifications as follows:

1. Comparative Tests of Mazda and Carbon Lights.
2. Highest Efficiency in Mazda Lighting.
3. Mazda Light Effects.
4. Color Chart.
5. Make-up Tests.
6. Deficiency in Mazda Lighting.
7. Mixed Lighting-Mazda, Carbon Lights, (White and Yellow) Neon, Cooper-Hewitt.

Cinematographers in attendance at the Incandescent Lighting Tests held at Warner Brothers Studio. All night tests were equally well attended. At camera, left to right: Victor Milner, A. S. C., Daniel B. Clark, President A. S. C.; Lee Garms; Frank Murphy chief electrician Warner Brothers.

WILLIAM FOX STUDIO
HOLLYWOOD CALIFORNIA

March 7th, 1928.

Mr. George Schneidermann,
Fox Studios,
Hollywood, California.

Dear George:

Please accept my congratulations upon the opportunity you have received to lend your artistry as a cameraman to the development of Movietone productions.

I want to express my gratitude and the appreciation of my entire company for your work during the eight years of our association. Critics have spoken of the beautiful photography in pictures like "Four Sons" and "The Iron Horse". The credit is entirely yours, and believe me when I say that the Ford company's loss is Movietone's great gain.

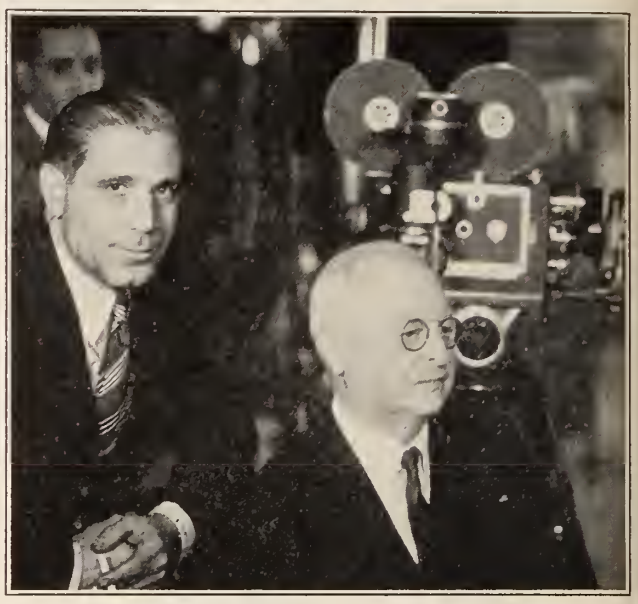
Sincerely,

John Ford

JF:ES

The Committee has been performing the work of assembling the precious film at Paramount-Famous-Lasky Studios, and the work will be completed in time to exhibit before the S. M. P. E. Convention which opens at the Roosevelt Hotel, Hollywood, April 9th, after which the technical facts in connection with the tests can be made public.

In the making of the tests thirty-six first cinematographers, members of the A. S. C., officiated in eighty-five takes, the list complete including the following named artists: John Arnold, Andre Barlatier, Chas. P. Boyle,



Gaetano Gaudio, A. S. C. and George A. Blair, Sales Manager Motion Picture Division, Eastman Kodak Co., at Roosevelt Hotel Incandescent Light test.

Dan B. Clark, Frank M. Cotner, Allen M. Davey, Joseph A. Dubray, Max Dupont, Perry Evans, Arthur Edeson, Edward Gheller, Alfred Gilks, Frank B. Good, Gaetano Gaudio, Floyd Jackman, H. A. Jackson, Glen Kershner, Dave Kesson, Eddie Linden, John Mescall, Virgil Miller,

The entire motion picture world was interested in the Incandescent Lighting tests recently held at Warner Brothers Studio. Here are five notables caught with the camera as they were looking on. Left to right: President Dan B. Clark, A. S. C.; Victor Milner, A. S. C.; Will Hays; Fred Beetson, Executive Vice-President M. P. P. & D. A.; Frank Murphy, Chief Electrician Warner Brothers Studio.

Hal Mohr, Barney McGill, Victor Milner, Len Powers, Alex Phillips, Paul Perry, Chas. Schoenbaum, George Stevens, Karl Struss, Henry Sharp, John Seitz, Ned Van Buren, Wm. Wheeler, Alvin Wyckoff, Ira B. Hoke.

Cold Light Efficiency

Compiled from Bureau of Standard Papers
By Fred McBan
Physicist, Creco, Inc.

[*Cold light is not just a figure of speech; it is visually existant, yet in one sense there is no such thing as "cold light." Light, as we accept it is a radiant heat that will warm any body capable of absorbing it.*—Editor's Note.]

(1) Most sources of light with which we are acquainted are at very high temperatures. A body whose light emission is due to its temperature must be heated to over one thousand degrees to give any practically useful intensity of light photographically. When, therefore, we find sources of light such as fireflies, or rotten wood, phosphorus or the radium paint on our watch dials which are cool enough to hold in our hands and yet give light enough not only to be seen themselves, but to enable us to see other objects, we say that we have a cold light.

(2) If, on the other hand, we concern ourselves only with the character of the radiation itself, we find that monochromatic green light has a heating power sx times smaller than daylight, and twenty or more times smaller than artificial light which appears equally bright to our eyes. Such a light is, by contrast, "cold." In this case we are talking exclusively about the light—not about the substance from which it emanates. Investigations by the late Professor Langley of the Smithsonian Institute and Dr. W. W. Coblentz of the U. S. Bureau of Standards have shown that the light of the firefly is cold, not only in the first sense, as we all know, but in the second as well, the light being limited to a fairly narrow region in the green part of the spectrum. This has led to a very general belief that all low-temperature sources of light are free from invisible radiation, and more than that of ordinary illuminants.

The investigations of the lamp efficiency of the glow of phosphorus, have shown that the efficiency of this particular sort of cold light not only does not exceed that of ordinary illuminants, but falls far below it, being less than one-thousandth of the lamp efficienty of a Mazda lamp.

The firefly is probably more efficient than phosphorus in the production of light, but this does not follow inevitably from the results of the investigations just mentioned. Calculating the efficiency of a source of light from the character of the radiation alone is like computing the profits of a business without taking account of the "overhead." In the case of a Mazda C lamp, there are three known tems of overhead; the heat conducting of the gas, the loss of heat to the supports, and, finally, the heat radiated by the filament but stopped by the bulb. These three add up to a quarter of the energy supplied to the lamp, and would not be taken into account if the efficiency were being computed on the basis of the radiation alone. What constitutes the "overhead" in the case of the light from phosphorus or the firefly we do not yet know, but the amount of it could be figured if data like that of Coblentz were available for phosphorus or if we knew not merely the heat radiated, but also the total head production in the case of the firefly.

Professor E. Newton Harvey of Princeton University has found that for both firefly and Cypridina (a Japanese crustacean) three substances are necessary for the

(Continued on Page 38)

Mr. Darling Speaks Out

[*At a recent meeting of the employees of Fox Studios Mr. William Darling, Chief Technician, delivered the following address upon which comment is made in our editorial columns.*—EDITOR'S NOTE.]

As we all understand, the object of these periodical meetings is to present ideas and suggestions whereby savings can be effected in the different departments of production—also to achieve greater efficiency wherever it seems to be possible. The minutes of the meetings are read by all our chief executives.

As I have opportunity to keep in close touch with conditions it surprises me that, with so many good suggestions already offered, nobody has mentioned the one thing that, to me, is the cause of most of our troubles, and that is the prolonged irregular working hours.

William Darling

I will give you an example. We have a night crew of about one hundred men on sets and half of their time is a total loss because companies shooting won't let them work because of the noise they make, and of course, carpenters are not yet equipped with rubber hammers.

We have no plumber, tinner or blacksmith shop, property room, drapery room, plaster shop, drafting room and what not open during the night hours, and of course there will always be something come up that requires the co-operation of those missing departments. The delays caused on account of these crippled working conditions are very costly.

If we approve of doing a large if not the larger part of our work at night we should run our departments either twenty-four hours or in two or three shifts with the number of men necessary to get results. But—and here we come to the big issue—we do not approve of overtime because we do not get our money's worth for the performance of our workers after prolonged working hours.

Now, if the carpenters, laborers, painters and other workers are not capable of delivering (after regular working hours) labor worth the extra pay, how can we expect men who are called on all day to deliver high speed, specialized brainwork to continue to give it day after day, night after night, with irregular meal hours, never knowing just how long they will be called to continue and not to suffer by it?

When we buy an automobile we select the car within our means that will give us true service for our investment, but we are going to give the car oiling, greasing and overhauling at regular intervals in order to keep up a dependable service from that car or it may fail us in the most critical moment. Why can't we treat our employees with the same consideration as any other of our investments?

Almost all of our workers have families and when a man can give nothing else to his family but his pay check he will be greeted on his return from work with dissatisfaction and discord that will certainly not give him his needed rest. That man won't be able to keep up his spirit of loyalty and good judgment under continuous spiritual depression. He will fail us physically as well as mentally maybe just when we depend on him most.

I do not point my criticism at anybody in particular as it has been a common occurrence for sometime, but I hope to see a change in this system in the near future as I know the demoralizing effect it has in general on everybody affected by it and also I know the undercurrent of dissatisfaction and complaints, which are bound to have a bad effect.

After all we are just ordinary human beings—I dare say the best in the industry—with a wealth of ambition, loyalty, love of our work and a bunch of good will that I consider the greatest business asset my concern

can hope to have, but please let us keep it, as such, for the good of all of us and I am convinced that it can be accomplished as some of our directors have demonstrated. And by giving our employees the necessary time for rest, recreation and home life, without which they cannot give unlimited good service, we shall be able to attend experimental demonstrations for the improvemnet of our working knowledge and keep in line with the others.

Beginning of the A. S. C.

By H. Lyman Broening, *A. S. C.*

(Continued from Page 28)

governors was established, consisting of the ten members present and five more selected. This constituted the beginning of the "American Society of Cinematographers," with the motto of "Loyalty, Progress and Art," and marked the formation of a society of cameramen, whose work and names stood for the highest in the art of motion picture photography, for the purpose of furthering co-operation between cameramen, directors and producers. The rule of membership by invitation was inaugurated.

The second meeting, held the very next evening at the home of Mr. Fred Granville, resulted in the election of these officers: Mr. Rosen, president; Charles Rosher, vice-president; Homer Scott, second vice-president; Wm. Foster, treasurer; Victor Milner, secretary. By the time the fifth meeting was reached the society occupied quarters in the Markham building, Hollywood, its home for several years.

Critics Please Take Note

The attention of West Coast motion picture newspaper critics is respectfully called to the happy way the New York critics have of giving due credit and praise to Hollywood cameramen.

On this occasion our eastern friends rhapsodized over "Drums of Love," the D. W. Griffith's opus recently released by United Artists.

This picture was filmed by Mr. Karl Struss, A. S. C., as chief cinematographer, assisted by Harry Jackson, A. S. C., and Billy Bitzer.

A. S. C. has stood for the highest excellence in motion photography for ten years, but on the principle that "a prophet is not without honor save in his own country," the fact has not always met with recognition.

Quinn Martin, in N. Y. World: "It seemed to me that I had not seen in all my days before cinema screen episodes photographed in so altogether exquisite fashion as these * * * *."

Harriett Underhill, in the New York Herald-Tribune: "* * * So beautiful were the hero and heroine to look upon that the spectators again and again broke into wild applause as they gazed. The photography is beautiful, needless to say, and the titles are much better than usual."

Regina Cannon, in the New York American:"There is so much to be said for the latest Griffith screen product that one is at a loss to know where to begin passing out the praise. * * * With so vivid a background on which to weave a picture pattern, it is little wonder that the pictorial beauty alone of this production is worth the price of admission."

John K. Hutchens, in the New York Evening Post: "* * * a splendid and plausible handling of masses of people, a clear and almost three dimensional photography and a certain resounding pageantry. * * *"

George Gerhard, in the New York Evening World: "Drums of Love is an excellent opus, and one of the most beautifully mounted things ever brought to the screen."

Rose Pelswick, in The New York Evening Journal: " * * * A beautiful production. It has some striking settings and exquisite photography."

Film Daily: "* * * Photography gorgeous."

The Lafograph

By P. K. THOMAJAN

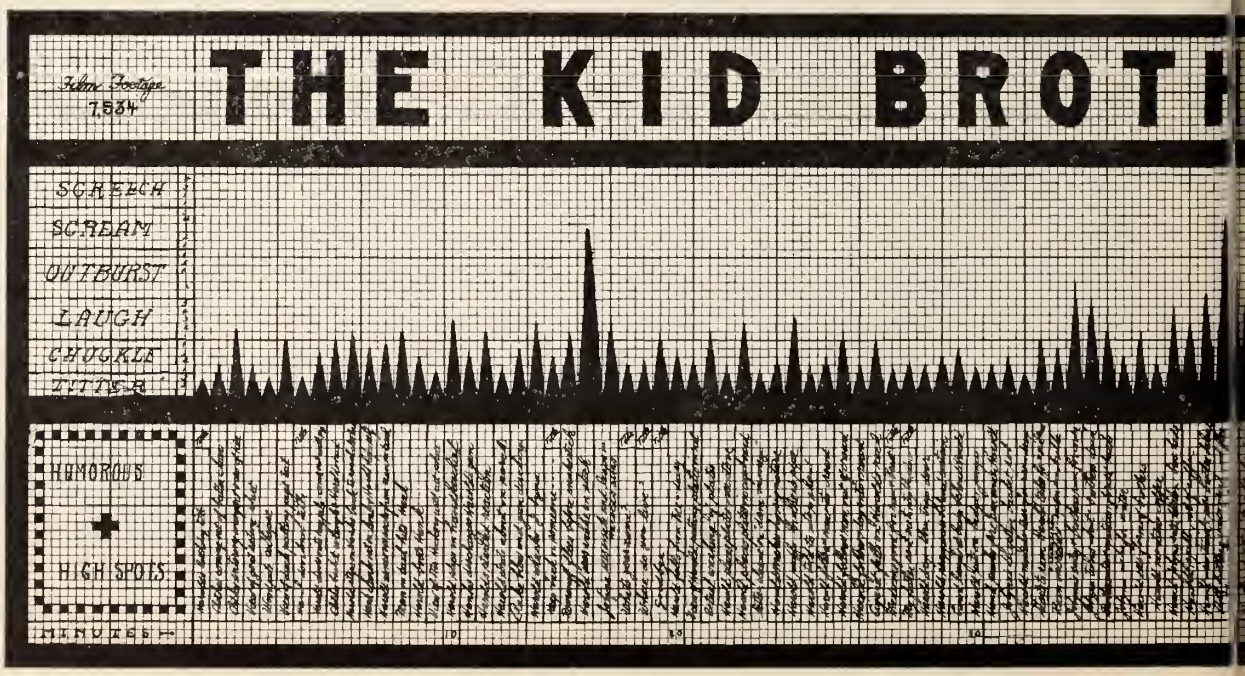
[*The cuts used to embellish and explain the interesting article of Mr. Thomajan pull down the detail of the author's diagram until it is too fine to read without a strong glass, but the general arrangement will give a fair idea of the painstaking manner in which he worked out his "Lafograph." Mr. Thomajan is affiliated with the Harold Lloyd Corporation in a special research capacity.*—EDITOR'S NOTE.]

This is the "Lafograph," a word coined to describe a new invention in the field of comedy. Briefly, it is a marked-down scale of the track of a laugh tornado. The idea for it came about in the course of a protracted study and analysis of comedy and comedy audiences. It was born from the need for a device that would scientifically record and classify the laugh reactions occasioned by a comedy—a complex and elusive understanding.

The task of evolving a suitable diagram was a hair-splitting one, and that of catching and recording the laughs equally brain-racking. It was a job of pinning on paper a hard-to-define intangibility. At least a dozen performances were checked and listened in on with pad, pencil, and stop-watch until an exact evaluation was arrived at for each separate episode. Not a laugh bubble was allowed to vanish without being photographed in writing. The whole thing required a perfect eye-and-ear focus on picture and audience, plus a virtual sixth sense for comedy values in order to quickly distinguish and size up the relative bulk and volume of the various laughs. Six audible gradations of laughter were settled upon: The titter, the chuckle, the laugh, the outburst, the scream, and the screech, the six pretty well covered the range of an audience's degrees of responsiveness. At the bottom of the graph is a time-division scale, showing that there was a smooth and even stream of laughs throughout the entire picture.

P. K. Thomajan

A device of this order applies the acid test to a comedy. It shows in permanent form just how the audience said it with laughs. It exposes the laugh anatomy



of a comedy in bold relief—making every funnybone of its structure stand out. The creation of the "Lafograph" led to the formulation of a series of interesting deductions. Boiled down into epigrammatic paragraphs, they are as follows:

The first few big laughs come the hardest, afterwards the others come with less effort.

There is a sort of audience-mob psychology to laughter. It is highly contagious and can spread from a few individuals to an entire house.

Music with a picture keys up an audience to a higher pitch, and a well-arranged score pre-primes them for oncoming laugh upheavals.

Every person possesses a funnybone; some want theirs lightly tickled by a subtlety, while others want theirs whacked by a broad bit of slapstick.

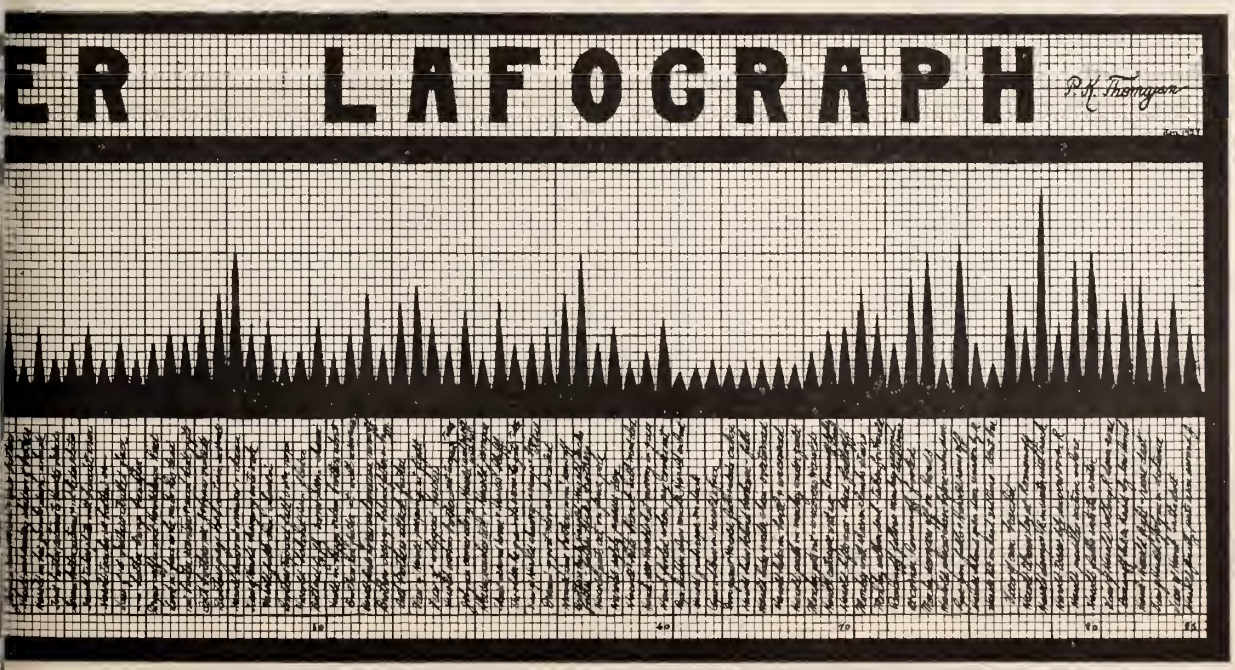
The public's taste for comedy remains basically the same, with the exception of minor changes in the ways and means of presenting effects.

Audiences go to comedies with certain anticipations which they expect to have satisfied. In this high-strung age, people expect a comedy to give a twang or two to their taut nerves, even to the extent of having them jerked or yanked in order to get a new sensation. They revel in stimulation and excitement and enjoy being thrilled and chilled, as much if not more, than being amused and tickled. They expect comedies to exercise their sense of humor, which often gets rusty in the everyday routine of existence. And every laugh helps to limber up their lethargic spirit of optimism. So they must be given speed, snap, fight, in fact anything that will hit them in the solar plexus with a punch, vibrate their emotions, and shake them out of themselves.

A lot of comedies expect an audience to laugh for no reason at all. Too many pictures are shove-tailed, rather than dove-tailed together. Some comedies appeal to the public's sense of stupidity rather than to their sense of humor. Producers should refrain from indulging in practical joking with the public. There may be all-day suckers, but there are no every-day suckers. Audiences are crammed with latently potential laughs that intelligent humor will quickly bring to the surface.

A comedy can be closely compared to an automobile race. It should start off with a bang and maintain a certain speed, with occasional spills and thrills at each bend in the story. Near the finish, there should occur a certain acceleration that terminates in an exciting spurt that puts all spectators on their toes and makes them shout. The thread of the story should always be held tight by suspense while the hero and heroine cross from one plot-side to the other.

Gags should be as finely fitted as piston rings to



secure the proper laugh compression. An expert comedy technician can take a sputtering comedy and make it hit on all six by making certain internal adjustments and by replacing certain worn-out gag parts. With his finger on the public's pulse, he can synchronize a comedy to its tastes so that it will cause its heart to beat faster, and thereby make it click.

A comedy should be a relay of gags, without a single hitch occurring in the progress of the story.

Laughs are put into it, but sometimes laughs come out in the most unexpected spots. Such things are of the most part due to an imperfect audience sense.

A group of Lafographs form invaluable clues as to what the public has liked and what it most likely might enjoy again, in some different manner. They are peep-sights into the past, assisting one in directing a laugh missle towards a dollar-and-cents bull's-eye.

Cold Light Efficiency

(Continued from Page 33)

production of light: the oxygen of the air, an oxidizable substance called luciferin and another substance, liciferase, which because it is not used up on the production of light is called a catalyst, or contact agent. No way has yet been found of separating luceferin and luciferase in a state of purity, but a sort of separation can be affected by extracting the dried and ground-up Cypridina, on the one hand with cold water and, on the other hand, with hot water. In the first case, the oxygen of the air "burns up" all the luciferin; in the second, the hot water "kills" the luciferase. Neither of these solutions gives light when exposed to air, but a mixture of the two glows brightly.

Professor Harvey has found that, in general, the luciferin of one species of animal will not give light with luciferase from another, but in the case of two species of firefly, "photinus" and "photuris," luciferin from one will give light with luciferase from the other. The color of the light emitted by these two is different, and it is an interesting and significant fact that the color of light emitted when solutions of luciferin and of luciferase are mixed depends on the source of the luciferase, the color being the same whether photinus luciferin or photuris luciferin is used.

The amount of oxygen required to give a barely perceptible glow is astonishingly small. Professor Harvey and T. F. Morrison have found that one part of oxygen in 150,000 parts of hydrogen will give light with certain luminous bacteria, and in the Nela Research Laboratory,

Mr. Carpentier has found that even smaller proportions of oxygen, added to purified nitrogen, will give light with solutions of phosphorus in refined cottonseed oil. Elaborate apparatus is necessary to make such infinitesimal additions of oxygen and measure them with any accuracy. In measurements of this character, it is essential to keep the eyes of the observer as sensitive as possible. Exposure for an instant to ordinary daylight, or even artificial light, will destroy the sensitiveness to very faint light, and it takes from a quarter-hour to several hours spent in darkness to recover such sensitiveness. Fortunately, red light has almost no lasting effect on the sensitiveness to very faint light. For this reason, the observers wear tightly fitting goggles with deep red glass whenever it is necessary to leave the dark room or to burn on the lights there. When a little light is sufficient, a ruby flash-light may be used without wearing the goggles.

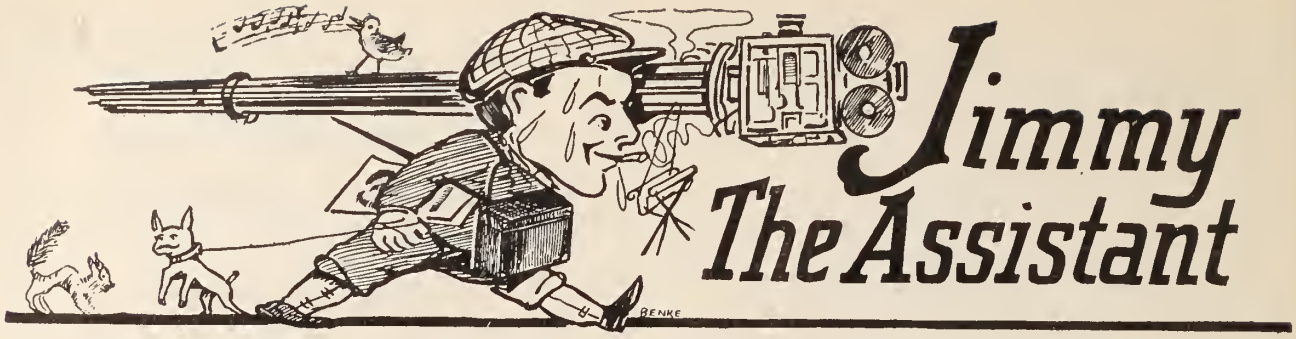
"The Story of the Films"

Edited By JOSEPH P. KENNEDY

"The Story of the Films" is an interesting new book of the Hollywood industry. The book comprises a series of lectures delivered by the leaders of the motion picture industry to the students of the Graduate School of Business Administration of Harvard University.

Every phase of the industry is fully covered, and gives light on the many problems that are incident to the inception, financing, production, distribution and exhibition of a photoplay.

Such a frank discussion of pictures as is contained in "The Story of the Films" should go far toward giving a comprehensive understanding of this popular industry, the motion picture.



The Death Rate

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Mortality statistics ain't as a rule considered interesting. They hide 'em 'way back in the unread part of the newspapers—never on the front page. Yet I think the movie death rate is a kind of a funny thing to look at if you get the right slant on it.

Five years is the expectation of life in pictures, Only five years—and I've got a hunch that figure is a lot too high, small as it seems. How many people do you know that have lived as long or longer in pictures? Don't get me wrong—I don't mean actually living in the sense of walking around and eating and breathing, but being alive as far as the game itself is concerned. Another way of putting the question is: How many people do you know that was considered big five years ago that are considered big today?

The space that would ordinarily be given over to bright remarks by the highly intellectual and internationally renowned author of this department is hereby left vacant of thought so's you can check up on things. In other words, this paragraph is a dud, and you don't have to read it because you're thinking. All set now? Let's go.

The ones you've picked out that's kept alive five years or longer don't begin to balance the huge number of "finds" that whizzed up into immense popularity, dazzled for a year or so, and then disappeared. The average life of a popular success is what? Honest, I ain't got the figures to check up on it, but five years is 'way too high.

Popular success is a thing that is easily explained; but none of the explanations work.

Some extra dub that's bumming around trying to get a check to eat on right now is tomorrow's star. Today's biggest name is right now turning into mud. The guy that said that when the sun is at its highest it is already beginning to decline said a mouthful. And it all hinges on popular success—popular success; that goal of everybody in the world.

Right on the face of it; there ain't no reason why a person who's made the grade once can't keep right on making it. You'd think that a person who's figured a deal out can do it again. Yet they can't and don't. The funniest thing about it all is that it works all the way up and down the line—cameramen included. Who was the best cameraman five years ago? What is he doing now —if anything? Odd, isn't it?

On the square, I think if there could be a law passed that would make it impossible for anyone to read their own publicity the solution wouldn't be far off. To do anything well calls for a lot; and you can't give that lot if you're dead sure that you can't go wrong. Some youngster that **has** to make good or else not eat is bound to beat the lazy effort of a self-satisfied genius.

Prohibit success—that's another way to extend the life of a success. Success brings luxury, laxness, softness, and unfitness . . . and discard. Too bad, ain't it—for lot's of the discards were darned good if they'd only kept on the up and up.

I guess it's a good thing. If the big ones didn't drop there wouldn't be any room for the youngsters that's coming in all the time.

I **do** know this much: it **ain't** the fault of the public. Everybody that dies out in pictures is guilty of suicide in the first degree. The public don't kill 'em—they kill themselves.

This stuff about the public being fickle is a lot of hooey. The public is the same old public—always was and always will be—a bunch of saps if you want to figure it that way, for they'll take most anything that's half way decent and like it. There are certain things that they like and certain things that they don't like; and there ain't an entertainer in the world that don't know which is which and why. There's no mystery about **that.**

They know how to please the public or they wouldn't have succeeded in the first place. Why can't they keep on doing it?

My guess is that they forget that it ain't themselves that the public likes but what they do. There's a lot of difference between a person and his product. Look at any author.

Success is reached by tearing your heart out in great bloody hunks and weaving it into your work. It hurts like hell to do; but it works. Success is bought—not earned; and the price is suffering. It takes a lot of prodding to goad a normally lazy human being into the amount of effort necessary for real success. Hunger is a good prod; 'specially when it is trimmed with despair.

The average highly successful person ain't usually very hungry or very desperate. I imagine that's one of the reasons they slip.

Then again there's another angle. More is expected of an over publicized genius than of an untried kid that's never had a break. One of the worst things that can happen to a fairly good worker is for him to accidentally hit upon a great success that he can't never duplicate, let alone top. More stars and directors have been ruined by making good pictures than bad ones. It forces them up out of their class, and they can't deliver what's expected of them.

I guess it's a good thing, all right. It provides plenty of room at the top for anybody that's willing to pay the price to get there. But there's this much about it: If you **do** make the grade—and the money that goes with it—salt away enough dough to keep you the rest of your life. You've got five years to do it in—five years to do a lifetime's savings—no more. Because five years is a well stretched limit—few stay with it that long.

Gee!—but this was a preachy article.

Akeley Attachment

By Ray L. Ramsey, *A. S. C.*

One of the most essential requirements of any motion picture camera is regularity of speed. To accomplish this end the manufacturers of the leading motion picture cameras have developed a so-called cinemotor. I am thinking of the Bell & Howell and Mitchell cameras which are now used almost exclusively in the photographing of all our big pictures today. One feature, however, that neither of these cameras possesses, is a gyroscopic pan and tilt.

In making this statement I am not overlooking the fact that steps have been made by these same manufacturers to add this feature to their cameras. One other camera was built for the sole purpose of a pan and tilt which could be manipulated in as simple a manner as pointing a gun. This camera is known today as the Akeley camera and was developed by a famous explorer and scientist, Mr. Carl Akeley.

This camera found favor in the motion picture industry due mainly to this feature. This was not anticipated by the manufacturers of the Akeley camera and, although they have tried to keep abreast with the industry in fulfillment of the motion picture requirements, they have not provided a way to "crank" by motor. Therefore it has been left up to the Akeley operators themselves to develop ways and means of accomplishing this.

The Akeley camera man is in a class by himself. He has a place for himself and his camera and is not to be outdone because of the fact that he is hindered in giving his undivided attention to what he is photographing. It therefore behooved him either to have a motor designed for the camera or to find some method of adapting an approved type of motor to the Akeley.

Recently several of the Akeley cameramen got together to consider a so called adapter. A suitable arrangement was decided upon and an adapter made and used by me on my Akeley. This was only a tryout but it proved that such a plan was practical. In pursuance of this idea, I, as a committee of one, went to Mr. W. D. Pearsall of the Aztec Research Laboratories to invite him to consider the perfect design and testing of such an adapter. Mr. Pearsall and his associates gave considerable time to this work and the laboratory shop is now making such adapters.

The adapter is simple, practical, and easily attached by removing shutter adjustment plate and inserting attachment in end of the stop motion crankshaft. This does not hinder the adjustment of shutter and in no way interferes with tilting and panning; in fact, it acts as a balance and gives 100 per cent steady cranking speed.

The M-R "Rifle" Lamp

Mole-Richardson, Inc., pioneer manufacturers of incandescent equipment for motion picture production, have recently developed a new lamp for general and close-up lighting.

This piece of equipment, the M-R "Rifle" Lamp, is very efficient. The mirror has a special curvature and is spirally corrugated or rifled.

When used in conjunction with the 1000- or 1500-Watt Mazda globes this mirror projects a smoothly diffused area of light, to a depth greater than does the regular side lamp.

Cinematographers at the M.-G.-M. and First National Studios, where the lamps are being used on production, are enthusiastic over the results which they are securing with the Rifle Lamp.

New developments in The "Inkie" line of Mole-Richardson, Inc., are a four-globe "Floor Strip" lamp having adjustable wing reflectors, and a powerful condenser spot for use with the new style monoplane filament 2000-Watt Mazda globes.

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FOR SALE—Latcst model DeBrie Tripod, like new, with case, $100.00; Aluminum DeBrie K, four lenses, eight magazines, two sets masks, iris and mat box, two cases and above tripod, $675.00. Outfit practically new. Don Malkames, Hazelton, Pa.

FOR SALE—Graflex 4x5. Rev. Bsck-F.4.5. Lens. 2 Cut Film Magazines. Carrying Case Film Pack adapter. Good condition. Charlie Boyle, Care A. S. C. or GR-1004.

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FOR RENT—Three Bell & Howell 170 Degree Cameras, F. 2.3 and F. 2.5 lenses, Mitchell Tripod legs. Complete equipment. Eddie Linden, 6017 Elinor Ave., Hollywood, HEmpstead 8333 or A. S. C. office, GR 4274, GR 4704.

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BELL & HOWELL—Phone Perry Evans, OL 8797 or Hollywood A. S. C.

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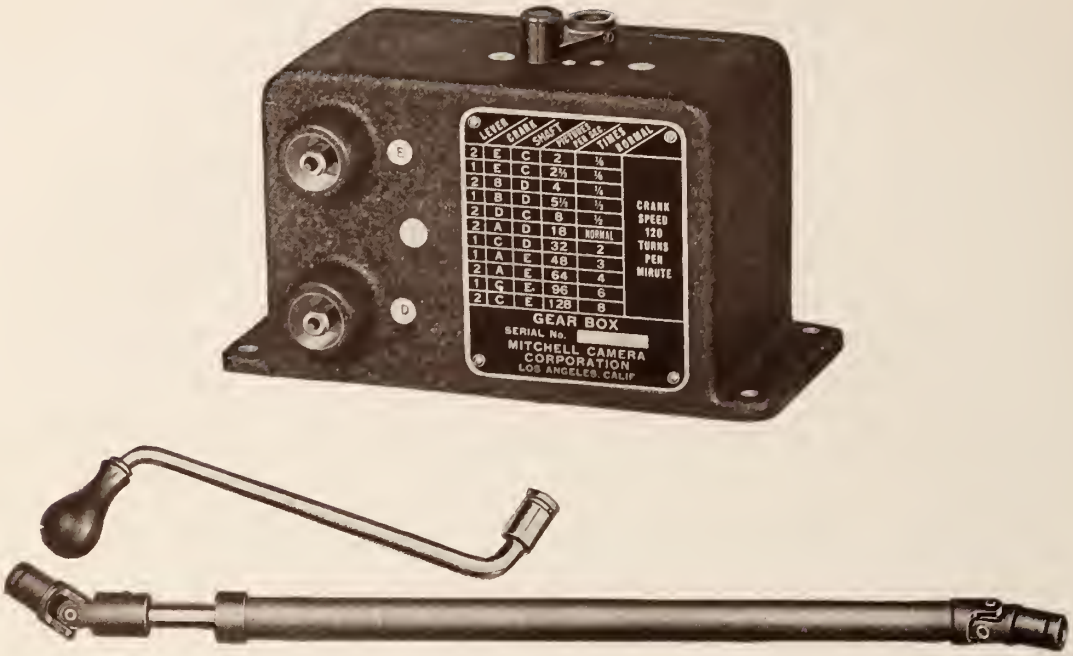

Gear Box and Extension Shaft

On the gear box are three places to attach the crank, and two places to attach the driving shaft. On the top of the box is a gear shift lever. With this arrangement, eleven speed changes are possible, from two, to one hundred twenty-eight pictures per second, the operator turning the crank 120 per second, or normal at all times. In the bottom of the box is a tapped hole to fit a standard still camera tripod.

The extension shaft center has a "V" groove on each side, and corresponding grooves in the outer casing. These grooves form a ball race, and instead of keys we use balls to drive. By this method no end thrust can be transmitted to the camera.

Mitchell Camera Corporation

6011-6025 Santa Monica Blvd. **Hollywood, California**

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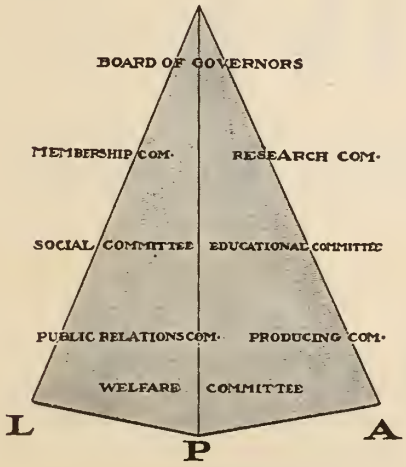

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EDITORIAL--The Voice of the A. S. C.

The Spring S. M. P. E. convention for 1928, just ended in Hollywood, was an event of great importance to the entire motion picture industry.

It was a happy meeting in the first place and the atmosphere of its sessions was fraught with good will and a spirit of get-together.

The convention was the cause of the first pilgrimage of the S. M. P. E. to the West Coast and to the center of world production of motion pictures, and the interest in the meeting was keen, therefore, both on the part of the visitors and of their hosts—the cinema colony of Hollywood.

The personnel of the S. M. P. E. is made up of representatives of all the great manufacturers in the world who contribute to the fabrication of equipment and supplies used in the production of motion pictures, and they brought with them in the form of papers the very last word in the achievements of scientific research and invention to date.

To those interested at this end of the line (and every progressive motion picture worker is interested) the activities of the S. M. P. E. were a revelation. Their transactions brought home to everyone that tremendous forces are at work back there in the east, silently but diligently and determinedly researching, inventing, constructing, improving, refining the materials and equipment essential to motion picture production to the end that the cinema may become bigger and better in every way, a constantly expanding force for good in the world, a great industry, a finer art. And on the part of the Engineers there was manifested a new enthusiasm at intimate contact with the actual processes of motion pictures and the workers (from executive to artisan) who make them. The net result of this contact will mean that the Engineer will go back to his workshop, his laboratory with a wider horizon, a better understanding of the needs of the cinema workers in the studios and a fund of new information which will enable him the better to solve his problems.

Who shall say that from this convention of the S. M. P. E. there shall not be brought forth

Better Films.
More sensitive emulsions.
Better lamps and improved lighting equipment.
Improvements in talking pictures.
Improvements in television.
Stereoscopic photography or its approximation.
Refinements in lenses.
Improvements in color photography.
Greater camera efficiency.

Better laboratory methods and countless betterments in every department of production.

As the cinema of today is superior to the cinema of fifteen years ago, so shall the cinema of fifteen years hence be a thing more glorious than any of our prophets have forecast, and for the reason that the Society of Motion Picture Engineers, The American Society of Cinematographers, the Academy of Motion Picture Arts and Sciences, the Motion Picture Producers' Association, and every wide awake department of motion pictures will be ceaselessly working towards perfection.

It is great to know your fellow workman, for the man you don't like is the man you don't know, and the new spirit of co-operation and sympathetic understanding that has already grown out of this convention is bound to persist and to work steadily to draw all elements closer together. Henceforth the Engineers and their workshops will be real to us away out here in Hollywood, and henceforth the great motion picture studios and the various lots so familiar to us will be real to the Engineers. So shall this great structure be welded into one great smoothly running machine.

Another result of the convention activities was the organization of a Hollywood Section of the S. M. P. E., which began its activities with a roster of sixty members, forty-two active and eighteen associate.

The organization of this Section, which begins its work with extraordinary enthusiasm born of the stimulus of the convention, will in turn have the effect of keeping vividly before the studios the S. M. P. E. tradition of indefatigable work for progress, and much that is new and constructive will also originate in this West Coast Section for the men composing it are entirely worthy to uphold the gonfalon of S. M. P. E.

Particularly will this West Coast Section be of value in co-operation with the proposed research laboratory announced by Mr. Fred Beetson, Executive Vice-President of the Producers' Association, on the occasion of the banquet tendered the S. M. P. E. by the Academy at the Roosevelt Hotel April 11th.

This great innovation will supply the A. S. C., the West Coast Section, S. M. P. E., and the technicians in general of this world cinema center, a medium of expression in terms of scientific achievement and invention, certain to be productive of many advances.

This West Coast Section working with the parent body and interpreting the needs of the local production forces will prove of immense value in bringing about improved conditions and will, therefore, be a tower of strength and inspiration.

On the whole, the entire industry may congratulate iself on the success of the convention and mark this week as the beginning of a new and greater epoch in the history of the motion picture.

The A. S. C., while modestly admitting to being the incubator of the idea of an S. M. P. E. convention in Hollywood, as early as six years ago, most heartily congratulates Mr. Beetson, of the Hays organization; Mr. Woods, of the Academy, and their associates, for their great work in making this event the unqualified success everyone admits it to be.

S. M. P. E. Convention

The spring convention of the Society of Motion Picture Engineers, held in the rooms of the Academy of Motion Picture Arts & Sciences at the Hotel Roosevelt, Hollywood, April 9th to 14th inclusive, was in many respects the most remarkable in the history of the organization.

The attendance was the largest in the career of the society notwithstanding most of the delegates came clear across the continent to be present at this, the first convention to be held in the center of motion picture production.

The program as published in THE AMERICAN CINEMATOGRAPHER for April, was carried out to the letter and the number of interesting papers read has never been exceeded at any previous convention.

Of these several were submitted by members of the A. S. C., notably that on incandescent lighting by the Research Committee of the Society which is herewith published in full, together with a number of abstracts from other papers of peculair interest to the A. S. C. and to readers of THE CINEMATOGRAPHER.

Between sessions the delegates and their wives were entertained in manifold ways by motion picture people in all departments of the industry at theatre parties, luncheons, dinners, beach trips, by little journeys to the orange groves, the mountains, the desert and historic places.

The two great social events of the week were the Spanish Dinner given by the American Society of Cinematographers and the formal banquet tendered the delegates and their ladies by the Academy of Motion Picture Arts and Sciences.

Most of the out of town visitors remained to attend the first annual convention of the Academy which, judging by the interest manifested in it because of its constructive program, will score an unqualified success.

A complete list of delegates and guests at the session of the Society of Motion Picture Engineers is herewith presented:

Banquet tendered the S. M. P. E. Convention delegates and their ladies at the Roosevelt Hotel, Hollywood, Wednesday night, April 11, 1928, by the Academy of Motion Picture Arts & Sciences. The speakers of the evening were: Douglas Fairbanks, Cecil B. DeMille, Frederick Beetson, Milton Sills, Daniel B. Clark, President of the A. S. C.; Louis B. Mayer, Fred Niblo, Willard B. Cook, President S. M. P. E., Dr. C. E. K. Mees, Eastman Kodak Company; L. A. Hawkins, General Electric Company. It was a beautiful function and the sentiments uttered by the speakers were constructive and progressive, the spirit of get-together being the dominant note. In his talk Mr. Louis B. Mayer paid a fine tribute of praise to the technical departments of the industry as having taken the initiative in the cinema's march of progress. President Daniel B. Clark of the A. S. C. spoke on the Society's slogan—Loyalty, Progress and Art.

Aerial Cinematography

By Harry Perry, A. S. C.

During the past six or seven years, scenes involving the making of motions pictures in airplanes have been included in a number of photoplays.

About a year and a half ago, production was started on a war epic of the air which was to be entitled "Wings" and in making this picture many problems in aerial cinematography were solved.

The Government consented to allow the Army and Air-forces to co-operate and give all the assistance which meant the use of Government ground school at Brooks Field, San Antonio, the advanced flying field (Kelly Field) and the use of airplanes and help of their pilots. Also the Government gave permission to build a replica of the terrian of the St. Mihiel Drive at Camp Stanley reservation near San Antonio, together with the help of the United States Army Second Division, consisting of over 5,000 men, including all the different branches—tanks, machine guns, artillery, infantry, etc. This division was the same one that participated during the war in the real drive.

The set laid out for the St. Mihiel drive consisted of a piece of ground about a mile long and one-eighth of a mile wide in the foreground, increasing to about three-fourths of a mile wide in background and was covered with trenches, shell holes, barbed wire and pill boxes (machine gun nests) and all kinds of props, such as broken guns, gun carriages and shells. This set cost approximately $300,000.00 and was made with the idea of photographing the drive from airplanes, but when the actual work was started, it was found that when the action was photographed from an airplane, close enough to the ground to show detail, the speed of the plane was so great that it was impossible to hold anything on the screen long enough to be seen properly, and that when the plane was up high enough to show any part of the scene for a sufficient length of time, detail was obliterated so it was necessary to build a tower 100 feet high with platforms every 20 feet from which the drive was photographed.

Another experiment which was tried but was not successful on account of sway and vibration was the towing of a captive balloon and photographing from a height of about 100 feet.

Here are the members of the new S. M. P. E. West Coast Section, organized in the rooms of the Academy of Motion Picture Arts and Sciences on the night of Monday, April 16th. The officers are C. H. Dunning, Chairman; John W. Boyle, Secretary and Treasurer; Board of Managers George Mitchell, Daniel B. Clark, Peter Mole. Meetings will be held on the first Thursday night of each month in the rooms of the Academy. George Volck was elected chairman of the by-laws committee: Joseph Dubray A. S. C., chairman membership committee. The Section began its career with sixty members, forty-two active and eighteen associates. In this picture the members of the Board of Governors of the S. M. P. E. are posed with the members of the new Section.

A problem which caused quite a little trouble was the photographing from another airplane of the take-off of a group of airplanes in formation for a dawn patrol scene, which had for a background a road on which were marching troops. It was found that too much dust was made by the rising planes and a good formation was almost impossible to get, so that it was necessary to take off first, then circle the field and go down nearly to the ground to get a good shot of the squadron with the desired background.

In making airplane shots—either of single airplanes or planes in formation—unless clouds were used for a background, the appearance of motion was lacking, although quite a few scenes were made without clouds after waiting weeks for them.

Much trouble and risk was encountered photographing what is called a "dog fight" above the clouds. There were usually about ten airplanes taking part in this, five to a side, in addition to two or three camera ships, which would all take off from the field and then climb up about five or six thousand feet or more and go through clouds for fifteen or twenty minutes without being able to see a thing. Finally the planes would break through and find a beautiful empty world full of billowy clouds, but no other airplanes. Then gradually one and then another would appear and at last we would get all the formations together; the signal would be given, usually a dip or dive of the camera ship, and the fight would start, ships flying at each other, some falling down through the clouds in smoke, which was made by releasing a gate in a box containing lampblack attached under the plane body, and finally the sky was again clear of all but camera ships as they had all gone down chasing each other or falling through clouds and so the cinematographer follows in the hope that he has a successful story in the camera.

Some Novel Projected Motion Picture Presentations

Lewis M. Townsend and Wm. W. Hennessy

Projection Dept., Eastman Theatre and School of Music
Rochester, N. Y.

Motion picture projection is taking its place among the dramatic arts. The most recent accomplishments of scientific and engineering progress are made use of in presenting a more pleasing and complete motion picture entertainment. The dramatic effect in a photodrama is heightened by creating a desirable atmosphere in the use of a suitable motion picture introduction. Certain scenes are given emphasis by projection on an enlarged or reduced scale.

In the modern theater the transition from motion pictures to stage acts and the reverse are made smooth and pleasing by the use of special projection and lighting effects devised by the projection department. Animate backgrounds and harmonious lighting are given to stage acts by projection. Elaborate acts are tending to disappear from the motion picture program as the possibilities of motion picture and lighting effects are more fully realized.

Hollywood and the 16mm. Film

J. B. Carrigan, Editor Amateur Movie Makers

Motion picture amateurs were few in number four or five years ago because the only apparatus and processes available were cumbersome and expensive professional ones. The appearance of dependable and inexpensive 16 mm. equipment by which pictures can be made for a small fraction of previous cost has made thousands of enthusiastic amateurs. Not satisfied with making portrait and record films, the amateur has interested himself in dramatic productions. This tendency was foreseen by a film library organization which answered the need by supplying dramas and other matter upon which a well rounded program of entertainment could be built.

A subsequent development was the outright sales of films of various types, although at present the tide seems to be turning toward rental rather than sale of most subjects.

New tendencies are shown in releasing film under various contracts such as a coupon block booking plan, as news periodicals, or as a "film of the month." Advertising films are being loaned upon payment of postage.

One producing company has been formed exclusively for the preparation of subjects for 16 mm. releases. Other producers and distributing companies are looking to 16 mm. distribution for in-

creased return on features which have appeared in the professional field.

Amateur motion picture photography utilizing 16 mm. film is rapidly taking its position in a new field not in competition with professional work in co-operation with it. Those interested in the future of professional photography can give attention to these new developments with great profit.

Report on Experiments on Mazda Lighting Sponsored by the Academy of Motion Picture Arts and Sciences and Prepared by the Research Committee of the American Society of Cinematographers.

Motion picture actors, photographers and producing companies have cooperated with manufacturers of film and of lighting equipment in testing tungsten incandescent lamps for studio lighting. Especially high power incandescent lamps were used in comparison with arc lamps, mercury lamps and daylight. It was decided from the results obtained in the tests that the tungsten incandescent lamp is superior to all other types of light source now in use in the following respects: convenience; economy of power and operating labor; ready controllability; freedom from smoke and dirt; superior color of light permitting correct tone reproduction of colored objects when used with panchromatic color sensitive motion picture film.

A new technique of make-up is necessary when this lighting is used. The usual hideous make-up is no longer used because the tones in a subject are reproduced exactly as they appear. Actors are able to work to better advantage in a scene which has a normal appearance as a result of the use of this quality of light and the natural use of color in make-up and in painting the set.

The incandescent lamp emits more heat than the other lighting equipment but it is expected that this can be taken care of by correct ventilation.

American Motion Pictures Abroad

By N. D. Golden

Bureau of Foreign and Domestic Commerce, Washington, D. C.

The mainttenance of our foreign business in motion pictures is of vast importance to American distributors. More than thirty per cent of the entire revenue from American made pictures comes from abroad and any marked curtailment of this would be felt strongly by the industry. During 1927 about 230,000,000 feet of American motion pictures were sent to foreign markets—an increase of about 11,000,000 feet over the year 1926. Latin America was the biggest importer taking about 80,000,000 feet followed closely by Europe with 70,000,000 feet. The Far East has also increased her takings of American pictures. In 1927 60,000,000 feet were sent to this territory. While Latin America imported from the United States 10,000,000 feet of film more than Europe during 1927, nearly 65 per cent of our foreign revenues come from European countries.

During 1927 it is estimated that about 400 feature films were produced in Europe. Of this number Germany supplied 241, France 74, England 44 with the balance divided between Poland, Austria, Hungary and others.

Adverse legislation affecting American made motion pictures has been established in England, Germany, France, Austria, Hungary and Italy. This legislation is primarily intended to help establish and place the motion picture industry in these countries on a sounder basis and to help the distribution of the home made product.

Theatre expansion is increasing tremendously in Europe. During 1927 about 733 new or converted theatres were added to the already existing 21,000 theatres in Europe resulting in an increase of about 390,000 seats in European theatres.

Latin America and the Far East offer large potentialities for American Made pictures in the future. In Latin America production of motion pictures has met with little success, while in the Far East, Japan and Australia have been increasing their production to such an extent that these two countries may supply considerable competition to American pictures at least within their own borders. With the exception of Japan American motion pictures command about 90 per cent of the showings in these regions.

Photographic Characteristics of Picture Studio Light Sources

L. A. Jones and M. E. Russell

Research Laboratory, Eastman Kodak Co., Rochester, N. Y.

A survey has been made of all types of light sources which are available commercially for motion picture studio lighting. By means of a newly devised photographic method of testing, it is possible to find out directly the efficiency and correctness as to color of light given by different kinds of lighting equipment. The appearance of an object can be reproduced exactly by photography only when a light is used whose quality is correct for the color sensitiveness of the photographic film.

The Reproduction of Mobility of Form and Color by the Motion Picture Kaleidoscope

By Lloyd A. Jones and Clifton Tuttle

By combining a kaleidoscopic prism with a suitable motion picture camera it is possible to make motion pictures in color which show the changing patterns produced when a suitable grouping of colored elements is moved slowly past the end of the prism. Such color film may be used in the theater for the embellishment of the motion picture program. A description is given of an instrument constructed for making such film by the two-color process. This consists essentially of a standard Bell & Howell camera to which is added a suitable holder for the two-color taking filters, a kaleidoscopic prism, a pattern plate of colored gelatin designs on glass, a lamp for illuminating the pattern plate, and the mechanical means for driving the various elements in synchronism. Diagrams are shown illustrating the various types of symmetrical, quasi-symmetrical and unsymetrical patterns formed by the use of various types of prisms. The paper is illustrated by a reel of film showing both the form and the color sequences obtainable.

A Line Screen Film Process for Motion Pictures in Color

By John H. Powrie

Warner Research Laboratory, New York, N. Y.

Motion pictures in natural colors can be made by the use of an ordinary camera in conjunction with a specially made film. Very fine lines are printed on the film photographically and then colored by dye mordanting. The colored lines thus produced, being very fine, analyze each part of the image into the three color components. When this film is developed a negative in complementary color results. From the negative any number of positives can be printed by the use of a similar film. Ordinary projection equipment is used in exhibiting these positives.

Continuous Projectors

J. F. Leventhal, *New York, N. Y.*

In the motion picture projector, one picture after another is brought into position at a rate of 16 to 25 pictures in one second. This rapid starting and stopping greatly strains the perforation holes in the film. As soon as permanent damage is done to these perforations, the picture appears unsteady on the screen. The intermittent motion of the film is eliminated in the "continuous projector," in which the film moves continuously and certain optical parts oscillate in such a way as to keep the picture steady on the screen. This type of machine can be operated smoothly at high speed and on account of its quietness would be especially desirable on projectors used in the home.

Pantomime Pictures---Stories by Radio for Home Entertainment

C. Francis Jenkins

Equipment has been perfected by which its is practical to transmit motion pictures by radio so that they can be viewed in the home with a receiving set which shows an image about 7x8 inches in size. In the broadcasting station a motion picture film is passed through the transmitter which analyses each picture into lines by means of a number of lenses mounted in a disk which rotates rapidly in front of a light source. The light passing through different parts of the picture is of different intensity and is received on a light sensitive cell which sends a correspondingly strong or weak electrical current to the sending station. By the use of a similar disc in the receiver the image is reconstructed for reviewing.

Machine Development of Motion Picture Negative Film

By C. R. Hunter

Universal Pictures Corp., Hollywood, Calif.

The characteristic tendency of this age, to do all kinds of work by machinery has been shown in the introduction into the field of motion picture film finishing, of elaborate machines to replace manual operations. To date, it has always been considered an unjustified risk to process a valuable original negative by machine, but a processing machine built especially for the purpose has been used very successfully for developing negative film. The mechanical perfection of this device has removed danger of accidents so that it is possible to take advantage of the uniform perfection attainable only by machine methods.

Members of the S. M. P. E. Present at Convention

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Incandescent Tungsten Lightings in Photography

By The Research Committee of the
"American Society of Cinematographers"
A Transaction of the S. M. P. E.

The investigation on the adaptability of Incandescent Tungsten filament lamps for the purpose of lighting motion picture sets is still under intensive study and investigation and therefore this communication can only deal upon conclusions of general practical order which have been derived from the extensive series of tests which have been recently conducted by the American Society of Cinematographers under the auspices of the Academy of Motion Picture Arts and Sciences and the Motion Picture Producers' Association.

The American Society of Cinematographers wishes at this time to extend its most sincere thanks and appreciation to all corporations and individuals who, besides the above mentioned organizations, have generously contributed the financial and moral support which have made possible the conducting of these tests.

The investigation carried by the American Society of Cinematographers during this period has been divided into the following main subjects:

First—The Actinic values as to colors of tungsen filament lamps compared with the white-flame arc.

Second—The physical effects of tungsten filament lamps.

Third—The pathological effects of these lights upon performers and operators who are called to be exposed to their radiations for a certain length of time.

Photochemical Effects

Due to the spectral distribution of energy of the incandescent tungsten lamp, only **panchromatic sensitive emulsion** have been taken into consideration.

A chart showing a range of eight colors, Purple, Violet, Blue, Blue-green, Green, Yellow-green, Yellow, Orange and Red, prepared with organic basic aniline dyes, was photographed first without any filter, under a sky-light (noon light from a clear sky), then under a series of Wratten gelatine filters, and finally under Incandescent Tungsten Lamps, Orange Carbons, White-flame carbons, Mercury vapor Cooper-Hewitt tubes and Mercury and Neon Cooper-Hewitt tubes whose radiations were mixed by means of a diffuser in the proportion of two Mercury tubes to one Neon.

All artificial lightings were diffused by means of one Florentine glass, with the exception of the Mercury Neon light, which was transmitted through two white silk diffusers, placed approximately three inches apart, and five inches from the tubes.

Corresponding to each colored section of the chart, a portion of equal area in neutral gray was giving the **visual** approximately relative value of the hue and saturation of the color.

The negatives obtained under these lighting conditions and by as normal an exposure as it was possible to compute, were developed by the time and temperature system.

As it was expected, the negatives obtained by sky-light, white-flame arc and Mercury vapor tube showed a distortaion in the rendition of values mostly evident in the Red and Violet, the former color registering a darker hue and the second one a lighter tone than those represented by the usual gray interpretation of the rendition of these two colors.

The Wratten No. 3 Aero No. 1 filter used in conjunction with sky-light proved to give a fair rendition, the Blue and Blue-Green registering somewhat lighter than the visual interpretation.

The Wratten No. 6 K1 Filter also in conjunction with sky-light gave a less true rendition in the Violet, which color registered noticeably lighter than the visual interpretation.

The Wratten No. 7 K1½ Filter gave a fine rendition from the Red to the Green and registered a trifle too light rendering of the Blue-green and Blue and resumed a fine rendition in the Violet and Purple.

The Wratten No. 8 K2 Filter gave a good rendition of all colors, except the Red which showed a trifle too light.

In regard to the artificial lighting, the Cooper-Hewitt Mercury Neon tubes mixed lights in the proportion above mentioned showed a lack of correction in practically all of the colors and mostly in the Yellow, Yellow-green and Violet, the first two registering darker and the last registering lighter than the visual interpretation. However, as the mixture of Blue and Red radiation of this type of illuminant can be controlled at will, a more thorough correction can be obtained.

The Orange carbons showed a marked difference in the rendition of the Violet, which color registered too light, other colors giving a fair rendition.

The Incandescent Tungsten Lamps gave the following rendition:

Red: Good rendition.
Orange: Registered a trifle darker than the visual interpretation.
Yellow: Registered a trifle darker than the visual interpretation.
Yellow-green: Registered a trifle darker than the visual interpretation.
Green: Good rendition.
Blue-green: Good rendition.
Blue: Good rendition.
Violet: Registered lighter than the visual interpretation.
Purple: Good rendition.

The general rendition is very similar to the one obtained with a W1 Wratten Filter in conjunction with sky-light, and gives a somewhat better rendering of the blue.

To all intents and purposes the Mazda color rendition in conjunction with panchromatic materials can be compared to the color rendition of the K1 filter used in conjunction with day-light, and with the same sensitive material.

The somewhat better correction obtained with the use of the Aero and the K1½ Filters in daylight, would not in our estimation make a marked difference when compared to the rendition of Incandescent Tungsten Lights, in Interior work, and a sufficient matching of color values will be obtained, so that these slight differences cannot be detected except by highly trained experts.

Quality of Rendition

From the foregoing it is quite evident that the quality of photographic color rendition shows a marked improvement on the quality obtained with the white-flame arcs.

The improvement is especially noticeable in the photographing of sets of a highly decorative nature, in the photographing of masses of people in multi-colored costumes, and in the photographing of characters presenting delicate shades of colorings, such as a fair-complectioned subject with blue eyes and blonde hair, or characters which bear a distinct color individuality, such as characters belonging to the different colored races.

It is quite evident that the better rendition of colors obtained with the use of Incandescent Tungsten lightings will require special attention and thorough study of the art of make-up. We have found, for instance, that the rouges heretofore used in the make-up of lips and the several shades used in the "linings," under arc light-

ings, must be modified so that they will correctly respond to the exigencies of the Tungsten Filament lighting system.

The application of make-up will have to be carried with a slightly different technique which in general will prove of greater comfort to the performer.

The most apparent disadvantage found in the use of Incandescent Tungsten Lamps as compared with the Arc lighting system was a lack of penetration in the blacks of the subject which is photographed. It has been found generally necessary, especially when using a so-called low key of lighting, to throw additional light on the black full-dress suit or dress worn by a performer, to avoid a complete absence of the details which are necessary to give luster and life to the appearance of the suit or dress.

The flux of light emitted by the Incandescent Tungsten lamps although possessing less candle-power than the one emitted by the arc lights, under identical conditions as to amperage and corresponding consumption of electric current, has a better actinic influence on the panchromatic sensitive emulsions and this will result in a rather sensible economical value.

It is impossible to give any definite data on this phase of the subject because the lighting of a set or of a performer or group of performers cannot be mathematically expressed. It entirely depends upon the requirements that are needed by the Cinematographer for the photographic rendition of the set or performers in accordance with the interpretation of the subject. These requirements are mostly regulated by the artistic, dramatic and psychological value of the general scheme of lighting.

Supposing it possible to conceive an exact parallel between the two systems of lightings for the obtention of identical results the actinic value of the Incandescent Tungsten lights will prove superior to the white-flame arc system.

Physical Effects

The high temperature emitted by the Incandescent Tungsten lamps will perhaps prove disturbing, especially during the summer months.

It has been stated that the amount of heat emitted by these lamps is not greater than the heat emitted by the arc lights, taking into consideration the heat radiation emitted by the arc itself and the resistance usually placed at the foot of this type of lamps.

Admitting this is true, we nevertheless find that the heat directly emitted by the Incandescent Tungsten bulbs, with the addition of the heat reflected by the housing of the bulb, is more disturbing to the performers and opertors as it is concentrated on the one surface closer to their faces and not distributed throughout a wide area as in the case of the arc lamps.

This uncomfortable heat has provoked several complaints from performers and should attract the attention of designers of the bulb housings. We are informed that housings are being designed and constructed provided with double-barrel arrangements which should greatly increase the ventilation within the housing and thus reduce the ill effects of the heat radiation on the performers.

In photographing a picture, and especially close-ups, it is common practice to diffuse the glare and sharpness of the light, be it Arc or Incandescent flament, so as to obtain a more pleasing rendition of the skin texture of the subject, and to better control the intensity of the general lighting system in regard to the sharper high lights. This diffusion is obtained by the use of glass or silk diffusing screens placed between the source of light and the subject.

It would be advisable to carry an investigation on materials which can be used as diffusers and which would have the property of transmitting a sufficient percentage of the light radiations and absorb or deviate the direct and reflected heat radiation.

It would perhaps be advisable to construct the housing of the bulbs so that a double wall could be provided and the space between the walls filled with some heat absorbing material. A great percentage of heat radiation would thus be absorbed and discharged in a direction opposite to the performer.

The use of ventilating blowers or fans connected with the lamp itself cannot possibly be considered on account of the disturbing noise that is inherent to this type of apparatus.

The proper ventilation of the stages should also be considered.

One of the greatest inconveniences encountered with the Arc system of lighting is provided by the smoke produced by the combustion of the carbons. Currents of air are nowadays carefully avoided on any set because of increase of the volume of the smoke evil and because of the constant danger of having smoke blown into the set and in front of the camera during the taking of the picture. The ventilation of the stages is for this reason reduced to a safe minimum.

The use of smokeless Incandescent Lights will permit a more efficient general ventilation system of the stages, which in turn will prove very beneficial in minimizing the effects of excessive heat.

The most apparent difficulties encountered in the making of the tests during the investigation recently conducted were the impossibility of controlling at will the intensity of the lights used for spotting purposes and the impossibility of obtaining clean-cut, clear, shadow effects.

It has been announced by manufacturers of lighting apparatus that improvements in the building of the housings, the reflecting surfaces, and the filaments are under consideration so that satisfactory results may be expected in a short time in the spotting question.

As per clean-cut shadows, which are very desirable at times, the improvements in the spotting apparatus should at least partially solve the trouble.

This question is, however, of secondary importance, as the impossibility of obtaining clean-cut shadows may not at the end result as serious as it appears a priori, as the visual distinctness of the shadow does not seem to be sufficiently deficient to become offensive.

Pathological Effects

Incandescent Tungsten lightings have not been used as yet to a sufficient extent to make possible a detailed statement on their pathological effects.

The talking-motion-picture producers have had perhaps the best and longest experience on this phase of the subject.

It appears that pathological inconvenience due to the incandescent system of lightings are mostly caused by a lack of precaution in the passing from the warm interior of a stage into a much cooler out-door temperature.

Medical authorities consulted by the Research Committee of the American Society of Cinematographers declare that no injurious effects can be expected from this type of lights.

To cite, word by word, the conclusions arrived at by a prominent physician who has specialized on the therapeutic effects of light radiation:

"Regarding the question as to the effects of Incandescent Tungsten Lights on the eye. I may say "that I have used the thousand-Watts lamps for "therapeutic purposes for the past ten years and "have never noted any injurious effects on the eye. "I have personally worked in the full glare of the "above lamp, backed by a reflector, and have never "noticed any other effect than the natural fatigue "after several hours' work in the powerful light. "These lamps transmit some ultra-violet energy of "the longer wave-length (longer than 3500 A. U.). "My work with selective rays from the mercury spec-"trum has proven that these long ultra-violet waves "are absolutely harmless to the eyes."

These communications from medical authorities are quite conclusive on the subject, although careful data should be collected during a long lapse of time on different subjects and under all possible working conditions.

Practicability

It is quite obvious that the reduction of the bulk of the lamps and consequently the reduction of their weight will prove a distinct advantage in the general operating process of the illumination of a set.

Lighter weight lamps, lighter cables, and the possibility of keeping close control of the intensity of the light by measuring instruments installed on the set itself,

(Continued on Page 33)

A close-up of the

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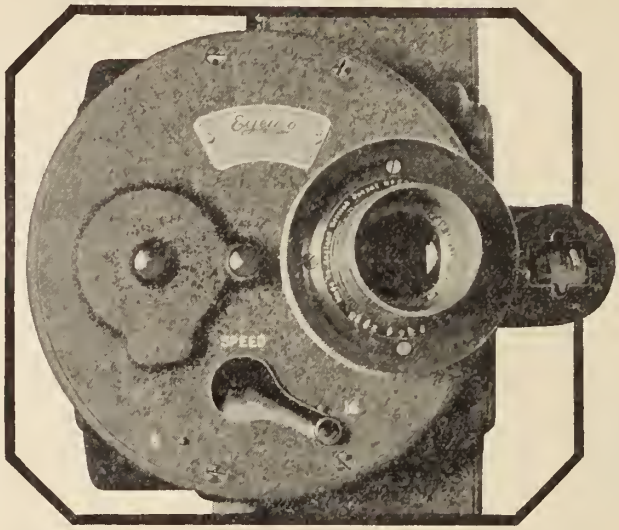

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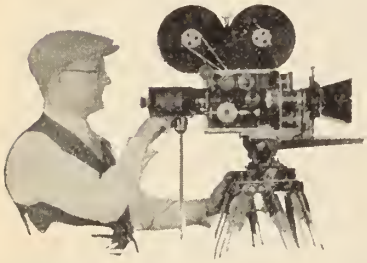

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Light Filters

Their Characteristics and Applications in Photography With Explanatory Diagrams---Part Three

By Loyd A. Jones

Of Eastman Research Laboratories.
Abridgement of Paper from S. M. P. E. Transactions.

In general a collection of objects which compose a scene to be photographed presents to the eye areas which differ in *color*. In fact it is only by differences in one or more of the three attributes of color that objects are distinguishable from each other by the visual process. The three attributes of color are *brilliance, hue, and saturation.*

Since it is impossible with the present photographic process to reproduce all of the attributes of color, we are forced to attempt the reproduction by means of the only attribute at our disposal.

The *hue* and *saturation* contrasts are in photographic reproduction, necessarily zero and in view of this situation, it seems most logical to consider first how closely the attribute *brilliance* can be reproduced.

Panchromatic materials, such as motion picture panchromatic negative film, are sensitive to all wave-lengths of visible radiation. They still possess, however, a great excess of sensitivity, as shown by curve *D* in Fig. 7, to wave-length shorter than 500 mμ and hence in general render the blue-greens, blues, and violets much too high on the visual tone scale relative to the grays and to the warm colors. To obtain correct rendering of the brightness attribute of color it is necessary therefore in some way to modify the effective distribution of sensitivity in such a way that it will correspond more nearly with the visual sensitivity to radiation of different wave-lengths. The correct rendering of the brilliance attribute of color is termed *orthochromatic reproduction.* As used in this sense orthochromatic (derived from Greek roots, ortho—correct, and chromatic—color) has a very different meaning than as applied to photographic materials which as a matter of fact do not give *correct* color rendering but only more nearly correct than a blue sensitive plate.

Orthochromatic reproduction may not in all cases give the most *desirable* or even the most *correct* photographic rendering of visual contrast which is dependent upon three factors, *brightness contrast, hue contrast,* and *saturation contrast.* Orthochromatic reproduction, which means simply the correct reproduction of brightness distribution in the object, must however, be regarded as the general case of which the enhancement or depression of certain definite colors above or below their normal position in the visual brightness scale must be considered as special cases. Certainly a thorough understanding of the principles of orthochromatic reproduction is prerequisite to an intelligent use of methods for producing distorted brightness reproduction.

Orthochromatic Reproduction Theory

In order to compute the spectrophotometric absorption curve of a filter which when used with panchromatic film will give perfect orthochromatic reproduction of brightness it is only necessary to know the distribution of sensitivity for the photographic material in question and the distribution of sensitivity for the eye. These functions are shown graphically in Fig. 10 curve C representing the spectral sensitivity of the photographic material and curve D the visibility function for the eye. Both of these are plotted with maximum ordinate equal to unity. In order to determine the spectrophotometric *transmission* function of the required filter it is only necessary to divide the ordinate of the visibility curve at any wave-length by the corresponding wave-length of the photographic sensitivity curve. Proceeding in this manner values were obtained from which the curve *A*, Fig. 11, was plotted, the scale of transmissions being shown at the left of the diagram. Converting these values to density the spectrophotometric density characteristic of the theotrically perfect filter is shown as curve *D*. The absorption characteristic of the light filter which with a given photographic material will produce perfect orthochromatic reproduction is dependent only on the two functions shown in Fig. 10 and is independent of the spectral distribution of energy in the light source illuminating the object.

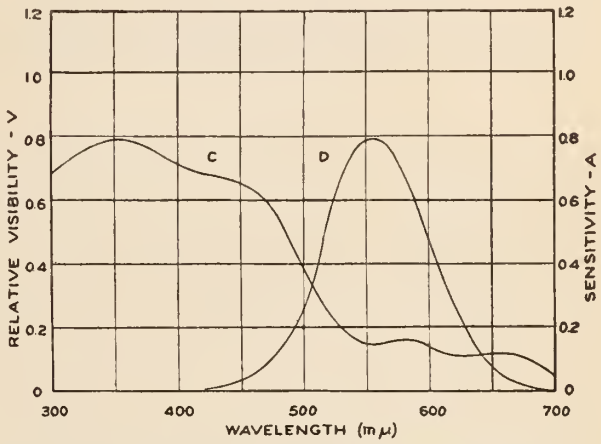

Fig. 10. Spectrophotometric curves showing spectral distribution of sensitivity, *A*; for panchromatic film, *C*; for visibility function of the eye, *D*.

In practice it is found that a filter whicih produces *perfect* orthochromatic rendering is entirely too dense, necessitating a prohibitively great increase in exposure time. It is customary therefore to compromise and use a filter which produces a satisfactory approach to orthochromatic rendering. The filters usually used for this purpose absorb the ultra-violet entirely and a portion of the visible spectrum in the region between 400 and 480 mμ. The Wratten filters of the *K* series represent typical light filters of this type. Of these the *K*-2 (Wratten No. 8) absorbs practically everything of wave-length shorter than 460 mμ. This filter used with panchromatic motion picture negative produces an approximation to orthochromatic rendering and for most purposes is satisfactory from the practical standpoint.

From the theoretical standpoint the same filter (see Fig. 11) produces perfect orthochromatic rendering re-

gardless of the spectral composition of light illuminating the set. In practice it is customary, however, to use a much lighter filter when a set is illuminated by radiation in which the longer waves predominate, such for instance

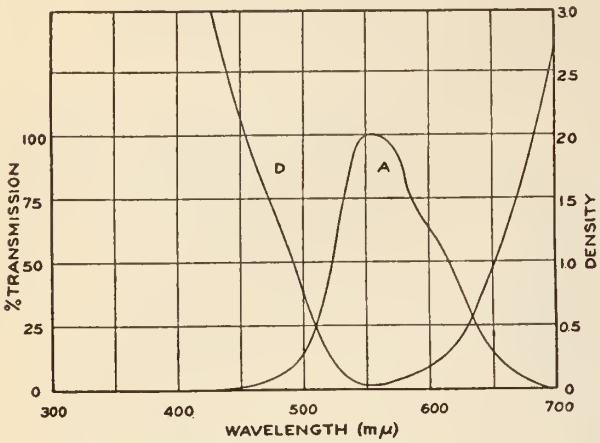

Fig. 11. Spectrophotometric density, *D*, and transmission, *A*, curves of a theoretically perfect orthochromatic filter adjusted to Eastman Panchromatic Motion Picture negative film.

as is the case with the light emitted by tungsten incandescent lamps. This can be explained on the basis of our subjective evaluation of colors as seen under artificial illuminants. Under such conditions red and yellow objects actually appear to the eye much brighter in proportion to the gray scale and to the blues and violets than under conditions of natural illumination. Subjectively, however, they are interpreted as having the tonal value which they would have were they illuminated with white light. In using a lighter yellow filter for working with tungsten we are therefore approaching to the rendition of colored objects on the brightness scale as it would appear to the eye if the colors in question were illuminated by white light.

Distortion of Orthochromatic Reproduction

Remembering now that the total visual contrast between the colors which compose the visual field may be due either to *brilliance-contrast, hue-contrast,* or *saturation-contrast,* it is evident that one or two of these factors may be entirely absent leaving sufficient contrast, due to the third factor, so that objects in the field of vision may be clearly differentiated from each other. Thus it is quite possible, and as a matter of fact this frequently occurs in practice, to have two or more colored areas precisely equal in brightness (brilliance contrast equal to zero) but clearly differentiated from each other by virtue of either hue-contrast or saturation-contrast or a combination of these two factors. Now it may be considered that the primary object in making a photograph is to reproduce the visual appearance and to show structural details of the material within the visual field. It seems therefore that the most satisfactory photographic reproduction is one which reproduces as nearly as possible the *total visual contrast* existing between the various elements of the object rather than the correct reproduction of a *single factor* upon which total visual contrast depends. If brightness-contrast is absent it is necessary to take advantage of the existing hue or saturation-contrast to obtain a photographic reproduction containing the contrast essential for the rendition of the form and detail in the object. For this purpose we have available only variations of brightness-contrast in the negative and hence we must attempt to express by means of this single variable those visual contrasts which depend upon three independent variables. Hence if two areas in the visual field are equal in brightness it is only by destroying this equality that an existing visual contrast due to hue or saturation difference can be made manifest in the negative. Distortion of the correct reproduction of brightness values therefore is a very real necessity in some cases and by the use of light filters practically any desired distortion of this brightness scale can be obtained.

The principles involved in obtaining brightness distortion are relatively simple and once understood no difficulty should be encountered in applying them to practical problems. As a convenient starting point in this discussion let us assume a light filter and photographic material (panchromatic) giving perfect orthochromatic rendering. Now it is obvious if it is desired to render by differences in negative density two areas of different hues but of equal brightness it is only necessary to use an additional light filter which will absorb to a greater extent the radiation coming from one of the areas than it does that from the other. Furthermore, it is evident that either one of the areas can be rendered as lower or higher on the brightness scale by a proper choice of the absorbing filter. Light filters for this purpose are usually termed *contrast* filters since they are designed to enhance the photographic contrast existing between colored objects. The general rules applying to the use of contrast filters for the distortion or enhancement of brightness-contrast may be stated as follows:

To render a color at a point on the brightness scale higher (enhanced brightness) than its normal position a light filter which *selectively transmits* radiation of the wave-length corresponding to the color must be used.

To render a color at a point on the brightness scale *lower* (depressed brightness) than its normal position a light filter which *selectively absorbs* the radiation of wave-length corresponding to the color must be used.

Table 1

Object

Color	Wave-length
Red	600 to 700mμ
Green	500 to 600
Blue	400 to 500
Yellow	500 to 700
Blue-green	400 to 600
Magenta	400 to 500
	600 to 700

Filter to Enhance

Color	Transmits
Red	600 to 700mμ
Green	500 to 600
Blue	400 to 500
Yellow	500 to 700
Blue-green	400 to 600
Magenta	400 to 500
	600 to 700

Filter to Depress

Color	Absorbs
Blue-green	600 to 700mμ
Magenta	500 to 600
Yellow	400 to 500
Blue	500 to 700
Red	400 to 600
Green	400 to 500
	600 to 700

In Table 1 the application of these two rules is shown. In the second column are shown the wave-lengths of radiation corresponding to the colors as designated in the first column. In the third column are shown the filters which must be used with each color in order to produce an enhancement of its visual brightness value. These filters are described by giving the color name applying to them and the wave-length region in which they are transmitting radiation. In the last column of the table are shown the filters which must be used to produce a depression of the brightness value of the color as indicated in the first column. It will be noted that for enhancement, the color of the filter corresponds to the color with which it must be used, while for depression, the color of the filter is complementary to the color with which it must be used.

Filters for the depression or enchancement of brightness, contrast filters, must as a rule be fairly "sharp cut" filters in order to produce effects of sufficient magnitude. Practically all colored objects met with in practice have spectrophotometric reflection characteristics of the "gradual cut" broad absorption or reflection band type. The spectrophotometric curve of two colors which exhibit marked hue contrast, therefore, usually overlap appreciably, that is, each embraces partially the same spectral region. To produce appreciable enhancement of depression of one of these with respect to the other a filter of rather sharp cut is therefore usually required.

Direction of distortion. When two areas of equal brightness but differing in hue or saturation are to be photographed a decision must be made as to which one shall be made darker and which lighter than its normal value. It has been found by measurement and observation that those colors which reflect radiation in the region 550 to 700mμ have in general higher reflecting powers (for the radiation which they reflect) than those which reflect radiation of wave-length shorter than 550. The former include those colors described as red, orange, yellow, and yellow-green and as a group may be referred to as the *warm* colors. The latter, violet, blue, and blue-green, are called *cool* colors. The non-spectral hues, the purples, reflect both red (600 to 700 mμ) and blue violet (400 to 500 mμ). Those in which red (600 or 700 mμ) and blue-violet (400 to 500 mμ). Those in which red predominates, the red-purples, are classed with the warm colors, and in general are relatively high in reflecting power. The purples in which blue predominates, the blue-purples, are classed with the cool colors and tend to have relatively low reflection factor. The best general rule to be followed in deciding the direction of distortion is to make the warm colors lighter and the cool colors darker than called for by orthochromatic rendition. This rule is based on sound psychological reasoning. Since the brightest colors of our past experience have been almost invariably those which fall in the warm classification, and the darker less brilliant ones have been found among the cool colors, in the absence of any hue or saturation factor the subconscious action of memory or stored sense impression tends toward an interpretation of the high brightness as representing a warm color rather than the reverse.

It is interesting to note that the use of ordinary blue sensitive or orthochromatic photographic materials produces a distortion of brightness reproduction which in many cases may tend to the conservation of the contrast between objects of colors which if rendered on panchromatic materials by orthochromatic methods would not show adequate contrast. This distortion, however, is in the wrong direction and always renders the warm colors as much darker than cool ones of equal brightness. There is little doubt that this is undesirable and that the rendition obtained with panchromatic film, with properly chosen contrast filters when necessary, will give more satisfactory results.

The photographic worker who has for many years been accustomed to using orthochromatic film frequently feels when he first uses panchromatic materials that it does not give as much contrast and may criticize the material as lacking in contrast capacity. Measurements show that panchromatic film exposed either in the sensitometer or in a camera to a neutral gray scale gives a D-log E characteristic having a slope, fully as great as the Par-Speed or Super-Speed orthochromatic film. It is probable that the worker being accustomed to seeing all reds and yellows rendered as unduly dark has acquired a false conception as to the actual brightness contrast in the original. Hence the rendition obtained with panchromatic film appears to him as lacking in contrast, while as a matter of fact it may be much nearer to the true visual contrast of the object than that obtained by the distorted rendering given by orthochromatic materials.

Magnitude of distortion. Another problem which must be considered in the distortion of orthochromatic rendering is that dealing with the *magnitude* of brightness distortion requires to compensate for the absence of hue and saturation contrast in the reproduction. The sensitivity of the eye to brightness and brightness differences has been studied with great care and the formulation of the requirements for reproducing precisely this factor is relatively simple. Unfortunately the hue and saturation characteristics of the eye have not been so carefully investigated and these functions for the average normal human eye are not at present established with certainty. No quantitative data are available which may be used to compute just what proportion of the total visual *contrast* in the case of colored objects is due to each of the three components of contrast. It is difficult to estimate therefore just how great a distortion from correct orthochromatic reproduction is necessary in any case to represent satisfactorily the hue or saturation contrast which may exist in the absence of brightness-contrast. However, it seems probable that the subjective contrast between two colors differing only in hue is directly proportional to the number of least perceptible hue steps between the wave-lengths of the two hues in question. On the basis of this assumption it is evident that a blue and red of equal brightness will require a greater separation on the brightness scale to satisfy our requirement of contrast in the reproduction than, let us say, a red and a green or a red and orange which lie closer to each other on the hue scale. The same reasoning is applicable to the magnitude of brightness distortion required to compensate for the presence of saturation contrast in the absence of either hue or brightness contrast.

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The Motion Picture: A Business

(Written for The American Cinematographer)
By J. Homer Platten
Treasurer, Motion Picture Producers and Distributors of America, Inc.

A banker was speaking of the motion picture industry.

"My bank in California," he said, "often lends as much as $7,000,000 at one time to motion picture producers, and we have never sustained a loss in this business. I believe that is an exceptional record which invites the admiration of everybody. When I came to New York, eight years ago, it was easy to get an entree to the executive offices of a motion picture concern; they were looking for the banker. Today, we have difficulty in seeing these executives because there are so many bankers knocking at the door."

I have been quoting Dr. Attillo H. Giannini, president of the Bowery and East River National Bank, as evidence of the changed attitude of business men toward the motion picture industry. Dr. Giannini's experience is, I believe, typical. The motion picture has become a business. Investments today are safe and sound. Banks want to do business with the industry. They have confidence in it and in the integrity of the men who conduct its affairs. More than 63,000 individuals have invested their money in the stocks listed on the New York Stock Exchange.

Once upon a time there might have been some justification for believing that the motion picture industry was operating along haphazard lines. Chaos and a certain confusion did exist. Men were seeking golden opportunities for great wealth and they did come into the industry seeking that wealth. The highest ethical practices probably did not always actuate them. Waste was inevitable before the readjustment stages set in.

But such conditions could not continue for long. Sane and sensible methods of doing business were inaugurated. Executives from other businesses—bankers, business men—were placed in key positions. They were not long about eliminating the feverish nonsense. They couldn't afford to take chances. It takes money to make pictures and to build fine theatres, and producing companies and distributors must be financed. Bankers were not disposed to put their money into futile schemes carried out by fantastic men.

The bankers didn't, of course, expect the companies to standardize their product because motion pictures do not lend themselves to standardization, in the sense that soap and sealing wax and canned goods can be standardized. The motion picture is the product of the mind, and brains cannot be cut to pattern. But they did insist, and rightly, that pictures be made which would yield a just return on the dollars invested, and that the business be conducted in such a manner as to insure, in so far as is possible, adequate profits.

There isn't anything mysterious about the motion picture's development as a business. Romantic—yes, but not mysterious. No wizardry was invoked to place the industry in the position it occupies today as the fourth largest American business. Rather it was due to the unbroken fulfillment, throughout its existence, of the same two demands—first, of the universal demand for recreation and amusement; and, second, a demand always of having that entertainment at a price within the means of all. The industry has consistently offered to consumers a product which has met, and which often is ahead of, current dramatic taste, and it has done so consistently at a reasonable price.

The set-up of the industry today is orderly. The machinery of production running smoothly in Hollywood dovetails in with the machinery of distribution running in thirty-three key cities where exchange centers are located. Film Boards of Trade, operating in these key cities, provide the medium of contract between the buyers and sellers. Boards of arbitration in these same cities, each composed of three exhibitors and three distributors, settle disputes that arise. A Standard Exhibition Contract exists serving to keep down misunderstanding and confusion.

The working of arbitration alone—and it may interest you to know that the motion picture industry, one of the youngest industries, has become pre-eminently the outstanding example of the use of arbitration—the working of arbitration alone is conclusive proof of the industry's stability.

In four years, 50,006 contractual disputes, involving $11,230,298.94 have been disposed of.

Last year, of 15,451 controversies, involving $4,269,752.06, the boards of arbitration disposed of 14,336 cases involving $3,825,636.76.

Four thousand six hundred and seventy-one claims were settled before submission to arbitration. Two thousand three hundred and sixty-eight claims were withdrawn after submission to arbitration. Six thousand five hundred and ninety-three claims were considered by the boards, of which four hundred and twenty-six were dismissed. Thirty-six required a seventh arbitrator. Five claims were litigated before submission to arbitration. Sixty-two were litigated after submission to arbitration. Of these, only nine were court proceedings made to enforce compliance with the awards.

At the end of the year 1927, 1,095 claims remained undisposed of.

"The motion picture industry is setting an example to other trade organizations, and to the business world in general, of the least expensive and the speediest way in which to keep their business relations on an equitable and amiable basis," according to Lee J. Eastman, chairman of the Trade Board of the American Arbitration Association.

This is but one example of how business methods are being employed to keep the keel of the industry level.

Early in 1922, the producers and distributors joined in organizing the Motion Picture Producers and Distributors of America, Inc., which has for its purpose: "The object for which the association is created is to foster the common interest of those engaged in the motion picture industry by establishing and maintaining the highest possible moral and artistic standards of motion picture production, by developing the educational as well as the entertainment value and the general usefulness of the motion picture, by diffusing accurate and reliable information with reference to the industry and by reforming abuses relative to the industry."

The association was, in fact, to function as a clearing house on policy matters relating to the industry and its key-note was, and is, confidence and cooperation between the various branches of the industry and between the public and the industry.

Shortly after the formation of the association, certain broad policies were put into effect. In the matter of general studio efficiency, improvements in working schedules were instituted with the result that the personnel not only functioned more steadily but also more efficiently and, of course, more economically. Excessively competitive bidding between producers for the services of stars under contract to other producers was given attention as well as a careful dovetailing of production schedules to the end that there might be a more consistent demand for the services of both actors and "extra" talent. The previous irregular change from months of production

activity to months of comparative idleness has been succeeded by a year-round production program which is subject to budgetary control. Welfare conditions in the studios have lately been recognized by competent authorities as the equal of those existing in older industries. The studios themselves, both plants and equipment, represent an enormous investment and embody the most up-to-date features of well-managed manufacturing units, in which America excels. As to the pictures themselves, they are being made from the best available material, classical and modern, from the best that the arts of literature and drama have to offer and supplemented by the original creations of the screen's own contribution, the scenario. These works are being picturized by directors who not only have a keen appreciation of commercial values, but also are alive to the influence of the screen on the manners and customs of their times. It is the awakened sense of pride in the industry that is in a large measure responsible for the high average of successful pictures, commercially and artistically, which have been produced in the last four years or more.

Steps were taken by the industry also to see to it that the public was generally informed as to the investment standing of the motion picture business. In cooperation with the American Bankers Association, the Investment Bankers Association, the National Association of Credit Men, and the Associated Advertising Clubs of the World, the industry entered upon a consistent program having for its purpose the placing of the public in a position to discriminate between the soundly financed, well-managed motion picture companies and those concerns which were from time to time promoted by individuals who were not actuated by honest purposes and who sought to obtain the support of the investing public with no real intention nor ability to see to it that the investor received adequate returns for his capital advances.

In conclusion, it is safe to say that the making of a motion picture today is as much of a business as the making of an automobile. There is nothing magical about it; and certainly nothing which resembles a mysterious game.

It is, to the contrary, a definite job performed by a group of experts in various activities, operating under an executive head.

A story is selected because someone who is an expert in judging human desires and wishes in terms of amusement considers that the story will, when well interpreted on the screen, entertain a great many people. It is turned over to an expert continuity writer who selects and outlines the dramatic incidents which can be photographed. Actors, with ability to portray emotions, are chosen for the roles, and the whole is intrusted to a director who is constantly in touch with experts in other directions—with builders of sets, with electricians, with cameramen.

Throughout all of this work, supervision of costs, estimates of returns on the investment, and statistical study of the stars' drawing power all are kept under strict surveillance. When the picture has been completed, it must conform as nearly as possible to the restrictions which sound business methods put upon it.

It Is Now Col. Stuber

W. G. Stuber, president of the Eastman Kodak Company, has been appointed a colonel on the staff of Governor Flem D. Sampson of Kentucky, in recognition, according to the announcement, of his achievements in the worlds of business and photography. Mr. Stuber is a native Kentuckian and it was as such that he was honored.

Colonel Stuber came to the Eastman Kodak Co. in 1894 after building up a photographic materials business in Louisville. The responsibility for the success of the Eastman Kodak Company is in no small measure due to him. From the position of vice-president of the Eastman Kodak Company in charge of photographic quality Colonel Stuber succeeded Mr. George Eastman as president in 1925, when Mr. Eastman became chairman of the board of directors.

Pictorial Composition

Short Cuts to Results Through Study of Methods of Those Who Have Achieved Success

LEWIS W. PHYSIOC

An art student once asked his instructor what was the best way to acquire a knowledge of composition. The instructor replied that it could not be learned, but that it was an inate sense, developed by much experimentation, proper environment and a study of the best works of art. His answer was an earnest one but flavored a little too highly with that tendency, on the part of many artists, to distinguish their high calling by always encouraging the idea of their super-natural endowment, special talent, etc. But we cannot be persuaded to relinquish the belief that even the most talented students can be relieved of a great deal of labor and precious time, if furnished short cuts to results by studying the methods of those who have gained distinction. These hints are well worth while if they do nothing else than excite the mind and stimulate the ideas, as suggested in that instructor's evasive answer.

Lewis W. Physioc

Now, as a mater-of-fact, some very well defined rules of composition, in all branches of art, have been formulated by students, during the various periods of the evolution of art; by dissecting and analyzing the works of the masters, in search of the motives that directed certain effects and the reason for the appealing elements of the great successes. Thus, they have established various schools of proceedure which have aided them in reaching, more rapidly, an encouraging degree of proficiency.

It is interesting to allow our imagination to revert to the time when any ideas of art were first conceived. In our fancy, we see one of our ancient ancestors, whose mind was beginning to emerge from that benighted state of the purely animal existence; when he began to contemplate the marvels and beauties of nature—like old King David, when he exclaimed "when I behold the stars, Thy handiwork." It seems that their first thought was to represent these beauties, in some form or another, that they might inspire their fellows with this same love of the beautiful. There is a kind of primitive simplicity among artists and dreamers to share these mental delights—like a child who rushes to its mother when first it beholds the rainbow.

This ancient figuriste begins to realize the grace and beauty of the human form, and in acknowledgement, hews an image out of marble. He catches the singing twang of his bow-string as the wind vibrates it and gives this gentle tip of Aeolian harp, and he fashions his rude lyre and strums his tunes, that all the world may know the ecstasy of sweet sounds. He wanders beside some babbling brook, hearing all sorts of things in the cheerful chatter of its rippling waters and that none might miss its sweet message, writes his lyric poem. Thus our imagination furnishes us a vision of the birth of fine arts.

Now in studying the expressions of the old masters, we began by selecting what was most pleasing in the arrangement of their work—those portions that seemed to be more easily and accurately accomplished—what we would like to have seen introduced or what omitted, until we have gradually classified a system of technique to aid our future efforts. To illustrate this more clearly, let us imagine our beloved old Bach at one of his improvisations. His fingers wander just a half tone down the scale, which produces an effect that delights him. He writes it down before he forgets it—a little more boldness and he finds himself in another key, and this sudden transposition furnishes a new thrill. Other masters record these same effects, and then come the students who reason, that there must be a law that governs these beautiful effects and they give them such names as the tonic chord, the dominant, and diminished, modulations, etc., and again employ them with perfect success. In the same manner, Vignola classified the five orders of architecture, from the works of the ancient Greeks and Romans.

And, likewise, when we study the great paintings, we observe in one, certain elements and arrangements that agree, very generally, with another. A keen student points these out so clearly that we accept them as rules or formulae and give them names. Thus, we hear a great deal about "Hogarth's line of beauty" or the "sigmoid curve," the "beam of the balance" and many other such terms, and depend upon them, to a great extent, in conceiving our designs.

In applying the rules of composition, we should first define some of these accepted terms.

Composition of Line: That governs the outline of objects and their arrangement.

Composition of Form: The individual outline and modeling of the objects of a picture whose arrangement is controlled by line.

Composition of Notan: A Japanese word signifying the relation between colors and light and dark tones.

These are, likewise, divided into two sections.

Constructive Composition: The elements being invented and arranged independently—an original conception, or a modification of chosen subjects, the grouping of figures, etc.

Selective Composition: Such as in landscape photography, where the subject is sought or chosen to fit, as nearly as possible, the requirements of taste or the knowledge of these rules.

The accompanying sketches may seem very simple and childish, but they are extremely basic in principle and demonstrate, very clearly, some of the common errors and how to avoid them. However limited these suggestions may be, they may aid some one who may be interested in the subject, but who hasn't the time nor the opportunity to study it more seriously.

1. Shows the picture bisected, both divisions being of equal area and like form, and consequently of no pictorial suggestion, for neither furnishes any value to the other. This illustrates a very common error, in locating the horizon of a picture.

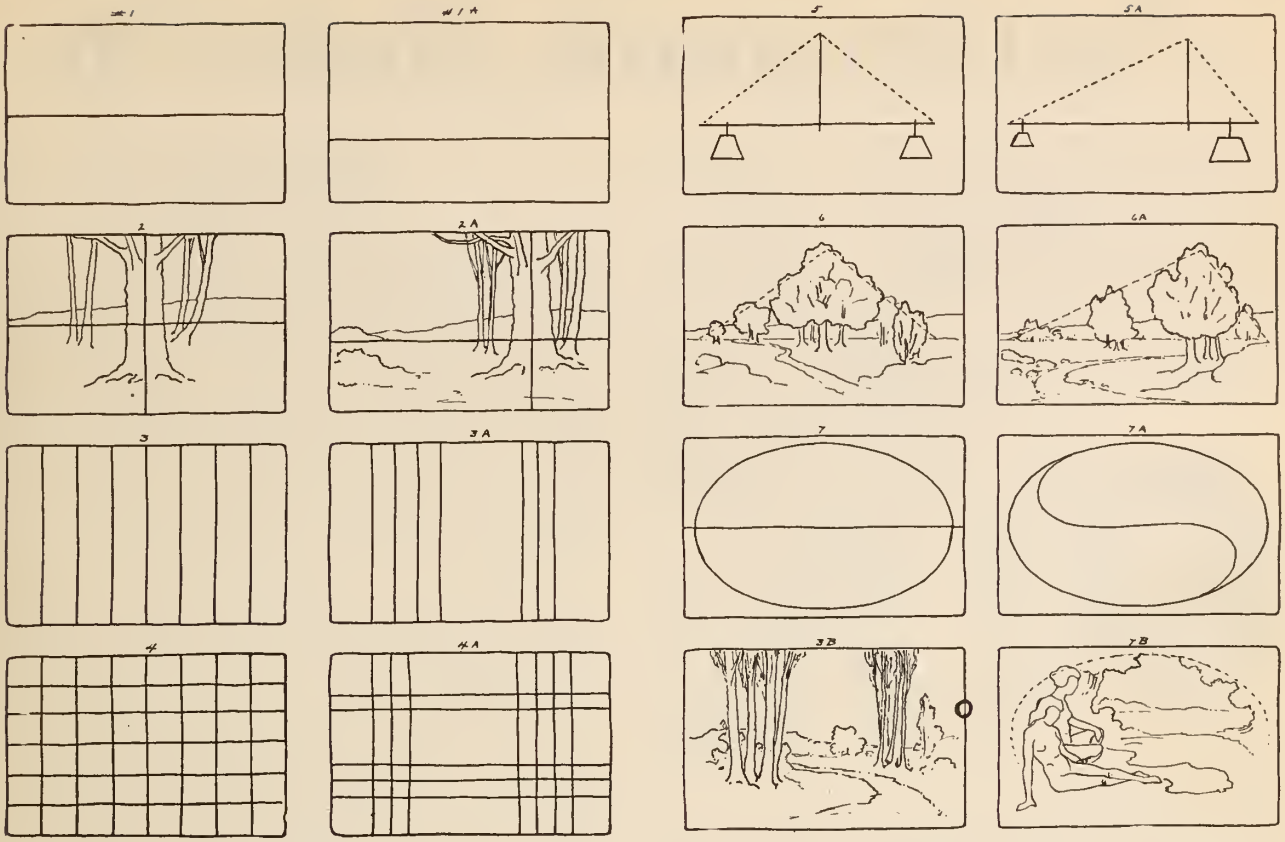
1A. The same frame properly divided, about one third of the area. Some times the area is placed at the top, where great height is required—the rule being, that the horizon rises with the eye of the observer. This frame immediately excites the imagination. We can almost feel the effect of sky and water or a great, flat plain.

2. The frame divided into four sections, and the interest so scattered that the eye wanders from area to area without any relief. The pictorial outlines show another mistaken idea, that craze to center everything.

2A. The same, divided into four parts, but each of a different area and form, consequently, each having an individual interest, the effect is a harmonious interdependence between these areas that leads back to the point of interest and the eye rests, with satisfaction, on the group of trees that seem properly placed.

3. Showing a series of lines arranged without any ideal taste. It appears too silly to consider, but we can point out many instances in pictures where the forms are just as stupidly arranged.

3A. The same number of lines are here displayed with a little more interest. This is merely an attempt to illustrate that the simplest ideas are worthy of the best



treatment; the placing of articles on a table, the arrangement of furniture, the hanging of pictures, etc.

4. Another application of the same principle involved in 3 and 3A.

4A. Demonstrates that even the ancient Scots inherently recognized this thing we call composition or arrangement, by taking the same number of threads, in weaving their plaids, and designing patterns of great beauty.

5. Represents the idea of the balance or the triangular effect so much employed in composition, but made too conventional by an equal division of space and distribution of weight. This scheme is only good for repetitional design.

5A. Shows that the idea of perfect balance may be maintained with the fulcrum well away from the center of the beam; not only a mathematical fact but pictorial tradition. This principle is possibly the most universally used of all the elements of composition. It offers such pictorial possibilities as to be almost an inviolable rule among landscape painters.

6. Is an application of No. 5. The elements of the picture are so placed as to divide the interest. The eye becomes uneasy and roams around, finding no rest but at the apex of the triangle and then is annoyed by shifting back and forth between the two similar areas of sky.

6A. Demonstrates the proper application of the balance idea. Here, the sky is an interesting area in itself, and leads the eye very gently from the distance, at the acute point of the triangle, to the main features of the picture, where it rests with satisfaction.

7. Shows the circular form bisected, equally. This checks the imagination so that it seems hopeless to conceive of a pretty arrangement, except for certain advertising matter with lettering in the lower division.

7A. It is not difficult to choose between this example and No. 7. This beautiful figure is said to have been invented by the ancient Japanese, who have furnished us beautiful examples of composition. This sinuous dividing line was later called the sigmoid curve, from its similarity to the early greek letter Sigma and our S (this view being reversed). This graceful line leads our fancy on and on, beside winding streams, country roadways, folds of draperies, cloud formations. It is the pet line of the figure painters.

7B. Showing how figures may be arranged along this line.

3B. Another application of 3A. Very often, the composition of woodland scenes may be enhanced by shifting the angle of vision. Seen from one point, they may present an unbroken, even row across a flat field, but a different approach may separate them into interesting groups—some furnishing a fine foreground feature and others leading off into the distance.

In conclusion, we should do well to distinguish between merely copying the successful work of others, and a general study of all things beautiful, that we may become more appreciative and keener observers, broadening our conceptions by deep contemplation. When we reason out the solution of a problem we are furnished with the key to innumerable combinations by which we may exercise our individual ingenuity. The greater our knowledge of the various techniques and formulae the more rapidly we can develop a personal style.

There is one great advantage to composition of the camera. We are concerned in representing nature, and nature has mysterious, beautiful moods, bold and dignified in its subjects, divine in its conception, and we can disclose to the world the breadth of our own souls in the manner in which we select what nature offers us.

Bert Glennon, A. S. C., is the newest addition to the ranks of motion picture directors. He just recently signed a contract to direct for F. B. O. pictures and his first production will be one of the company's big specials, "The Perfect Crime," a story by William LeBaron based on Israel Zangwill's "The Big Bow Mystery."

Mr. Glennon has long been one of the leading cinematographers of the industry, having been director of photography on "The Ten Commandments," "Hotel Imperial," "Underworld" and many other outstanding photographic successes. His promotion to a directorship is a just reward for his excellent work in the field of photography.

Panchromatic Make-Up

By Max Factor

[*This is the second of the three papers on make-up to be written by Mr. Max Factor for exclusive publication in the AMERICAN CINEMATOGRAPHER. A careful reading of Mr. Factor's presentation of the make-up problem should help greatly to an understanding of the interesting subject.*—Editor's Note.]

In my last article I covered the subject of make-up in general, touching lightly upon the matter of Panchromatic Make-up but since the last issue of the AMERICAN CINEMATOGRAPHER we have gone into the matter very thoroughly and have been doing an immense amount of experimental work with this type of make-up.

Max Factor

I am more than delighted to state at this time that the results from these tests moreth an exceeded my fondest expectations. As a result of these successful tests, two of the largest studios are now using the Panchromatic Make-up exclusively and a large majority of the others are beginning to use it, having come to the realization that this new type of make-up is a major improvement.

I feel that it would be most advisable for me to go into this matter carefully and to explain just why this new type of make-up is superior to the former type and to give herein a chart of types and shades which we have worked out and found to be most suitable. In my discussion of this phase of the matter, I wish to state that statements which I will make in this article will be frank and honest findings of my organization and I wish to impress upon my readers that they are given with the thought of making this article a frank and unbiased one.

Make-up can be listed under two distinct headings; one is the water base and the other is the oil base. We have been confronted for some time with the problem of which make-up was the best or most successful under every condition. We found, after much study and careful consideration, that the grease paint which has an oil soluble base was the most consistent. The reason for this is that a make-up with an oil soluble base will stand up under almost any condition. The intense heat from the light which I used in the making of Motion Pictures has no effect upon the grease paint and the color pigments are not affected by the strong light. The colors do not fade but keep their natural or original color. Furthermore, grease paint has proved in all of our experience that it will carry a higher degree of natural sheen to the human skin and does not appear flat as that of the liquid make-up.

Grease paint is much more flexible; in fact, if it is properly applied, it should be as flexible as the skin itself. Picture to yourself, just how an actor may feel if there is the slightest tendency to rigidness around the eyes or the mouth. The complete freedom and elasticity of the facial muscles is a necessity and we must at all times bear in mind that, if the actor or actress is in the least conscious of wearing a make-up, we have failed in one of the principle purposes of make-up. We, therefore, state that we are of the honest opinion that the best results in make-up, pertaining to motion picture photography, is only obtained through the use of grease paint together with the necessary sundry items.

The make-up with a water soluble base has the tendency to dry upon the face in such a manner that it does not allow the performer the freedom of muscle movement to give the face the elasticity which is necessery for true rendition of facial expression essential upon the screen. The pigments used in this type of make-up are such that they, unlike the oil soluble make-up, will not stand up under the intense lighting systems used in motion pictures. Then there is still another problem we are confronted with in connection with the water soluble make-up, and that is perspiration. The pigments contained in this make-up have a tendency to darken when coming in contact with perspiration. It is a known fact that certain portions of the human body perspire more freely than others, and we have found this to be true of the forehead and around the eyes and nose. In such cases, if there is a darkening of pigments, it will settle in these spots and not be equally distributed. As a result, the make-up is spotted and uneven. We cannot, therefore, under the circumstances whole-heartedly recommend a type of make-up that has a tendency to become darker or lighter, under certain conditions. In other words, we must have a make-up which can be depended upon under any and all conditions.

Now then, in the development of the Panchromatic make-up, we have disposed of many obstacles in the question of make-up for the screen. In the first place, we have developed the color pigments to such a point that the same ones are used in the powder that are used in the grease paint, making the colors identical in both. We have decreased the amount of make-up necessary to a minimum. But a very small amount of make-up is necessary to cover the entire surface of the face, will blend in with the natural color of the skin and, if properly applied, will appear natural to the naked eye. Heretofore, in the former make-up, it was customary to use a lighter powder than grease paint and with the constant repowdering, which was necessary during the day, the actor or actress did not photograph the same later in the day as they did in the first part of the day. They photographed lighter, but this has also been offset in the fact that powder, the same shade as the grease paint, may be used. The performer may powder as many times as he desires during the day without spoiling the photographic value of his original make-up.

Type	Panchro Gr. Paint	Panchro Powder	Panchro Lining	Panchro Lip Rouge
Girl Juvenile				
Blonde	22	22	21	6
Brunette	22	23	21	6
Dark	23	23	22	6
Men Juvenile				
Blonde	25	25	21	5
Brunette	25	26	22	5
Dark	26	26	22	5
Elderly Type				
Women	22	23	21	5
Men	25	26	21	5

For extreme types the color can be varied to suit conditions.

As I have stated earlier in this article, we have done a lot of experimental work and the Panchromatic Make-Up has been given a very thorough testing under a great number of varied conditions. One of the principal outcomes of such a test was the life-like, natural appearance of the subjects on the screen. In order to retain this appearance, it was necessary to produce different tones of Panchromatic make-up to suit the different types, such as blondes and brunettes. I have, therefore, set forth the combinations that should be used for each type and, if they are followed carefully, the best results will be obtained.

In my next article, I will give an idea as to the purity of make-up and cosmetics in general. There seems to be an opinion among certain people that cosmetics and make-up are injurious to the skin. Therefore, in the next article, I will give a detailed report on this subject.

"Stills Move the Movies"

An A. S. C. Tells How to Remove the Curse on Stills

By Oliver Sigurdson, A. S. C.

Still pictures seemingly have degenerated into a sort of a modern curse inside the production end of the motion picture industry judging by the attitude of cinematographers, stars, directors and executives in general. Practically all of these film workers indicate a pronounced hatred of the so-called "stills." It is a condition hard to understand, particularly when the question is analyzed from all angles.

There is emphatic certainty that stills are the most highly valued and internationally effective form of publicity, advertising and exploitation. They are the one and only medium which requires no translation. Stills tell their own story regardless of all limitations of language. They are actually a tremendous power, yet the treatment they receive is what usually is accorded a pest. Everything demonstrates that stills are not known, not appreciated, not properly managed.

There is no stretch of the imagination which can rightly locate still pictures as being part of production. They are distinctly separate and should never be considered as anything but the finest form of publicity and salesmanship. Still pictures ought to be removed from all authority connected with production and put in the publicity department where they truly belong.

Investigation discloses many reasons for the lack of consideration at present manifested by the production department. It is apparent that making still pictures intrudes into the making of the motion picture film, therefore it can be readily understood that both the motion picture cameraman, the director and all his players are more or less distracted from that which they justly consider their own work. And so long as the making of the stills is in the keeping of the motion picture makers, exactly so long will the stills be cussed, hurried, mistreated and generally classed as an everlasting nuisance.

That entire attitude is all wrong—for no motion picture is a bit better than what it sells for. The best picture ever made is worthless if it is not seen by the public, and the best successes are those which have attracted the greatest number of people.

The general public is expecting advertising, demanding publicity, responding to exploitation. Without these no motion picture has ever developed into a genuine success. But with the right sort of salesmanship many pictures have become veritible gold-mines for their owners and the more effective the still pictures have been the greater the financial returns at the box-offices all over the world.

Good still pictures constitute a far greater advantage than poor stills a disadvantage. Good stills help a good film, or a bad one for that matter. Poor stills will not kill a good film and, unfortunately, will not kill a bad one. But good stills are a mighty valuable accessory to a good picture and an exceedingly efficient agency in producing good financial returns.

Good stills being so important it behooves every

person concerned to produce them. This accomplishment will never materialize in the present line-up. There is only one positive remedy and that is to remove the making of stills pictures from the production department and make it part of the publicity department; then there will be notable improvement throughout.

Once the still pictures become part of the publicity department and are out of the control of the production officials and artisians there will ensue a far more friendly attitude toward stills than that generally exhibited at present. The stars and players could ill afford continually to antagonize the publicity department, as they are indirectly doing nowadays by their intolerance toward stills made under the direction of the production executives. There would soon develop a psychology of assistance and participation which is practically non-existant at this time.

When the still photographer is removed from the authority of the production men and made an important adjunct to the publicity department, then his still pictures will be made with pictorial publicity values ever in mind. These in turn will provide far more effective advertising accessories and in short it will be only a short time until the curse on still pictures is eliminated.

And it would be well to remember that the motion pictures are about the only manufactured product in all

(*Continued on Page 34*)

FIRE EVENT, AT WARNER BROS — BY KEN COFFEY

American Society of Cinematographers
Guaranty Building
Hollywood, Calif.

E. BURTON STEENE

Cinematographer (Since 1912)

3306 North Knoll Drive
Hollycrest, L. A., Calif.
GLadstone 7238

The Ace of Stunts

By Walter E. Fitchman

Dan Clark, President of the A. S. C., has had many hazardous assignments in the course of his eventful career as a motion picture cameraman, during which he cranked first box for all of Tom Mix's great Western productions, but it is doubtful whether the intrepid Dan has ever drawn a more thrilling order than the command of Fox Films officials to take charge of the entire camera crew on the commercial aviation story directed by Howard Hawks and as yet untitled.

During the shooting of this picture Dan Clark estimates he has travelled 30,000 miles.

When Clark left the service of Tom Mix he was told by the executive heads of the Fox organization that they had in store for him the most pretentious undertaking ever suggested for the ace of stunts. Clark smiled. This, to him, was old stuff. If there could be any more thrills in the film world than those he had encountered in the past ten pears he was willing to be convinced that this would be a hard task.

An aviation story such as Hawks is making, however, proved to be literally packed with thrills. In the first place, fifteen cameras were required for the many intricate shots required by Hawks and Clark, in addition to cranking first camera, found it necessary to supervise the activities of some of the finest experts in the business. In constant use were two Mitchells, two Bell & Howells, four Akeleys, two Eyemos, two DeVrys, two still cameras, two Graflex and other camera equipment.

Clark has been shooting six weeks and for the greater part of this time he has been "up in the air." He estimates that he has traveled thirty thousand miles on the wing.

Furthermore Clark was called on by Hawks to instruct the respective actors in the proper use of emergency equipment. Carol and the masculine players were taught to fly weeks before the picture entered production. Mr. Hawks wanted them to do their own stunts. In addition small cameras were attached to their planes.

"At times," said Clark, "we had some interesting and unusual experiences. We found that altitude played some queer pranks on us. At great height it was discovered that the cameras worked too fast or too slowly, as the case might be, and we could never tell in advance what we were going to have in the box. Only the developing trays could unfold this dark secret.

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We Hate to See Him Go

The Cinematographer regrets to announce the departure from Hollywood of Mr. Georges Benoit, one of the veteran members of the A. S. C. and a cinematographer of international reputation. For twenty-one years Mr. Benoit has been a cinematographer, sixteen years of this time in studio service in the United States. He is a master of all branches of his profession and has an impressive background of production to his credit to which he may point with pride. Being a native of France Mr. Benoit feels called upon to return to his mother country to round out his career in the service of the cinema and with his wife and infant daughter will sail for England early in May.

Georges Benoit

While we greatly regret the departure of Mr. Benoit, his host of friends in the A. S. C. are happy to congratulate him on his bright prospects in France and wish him much success and prosperity.

Mr. Benoit will retain his affiliation with the A. S. C. and henceforth will represent the A. S. C. and THE AMERICAN CINEMATOGRAPHER in Europe with headquarters in Paris.

Hail, Georges, and farewell!

Mazda Tests Screened

On Tuesday evening, April 17th in the Auditorium of the Hollywood Chamber of Commerce were presented to the members of the Society of Motion Picture Engineers and to a number of producers the screen results of the extensive tests conducted by the A. S. C. in order to ascertain the photographic qualities of the incandescent filament lamps in connection with motion picture work.

Nine thousand feet of positive film were selected from nearly eighty thousand feet actually "shot" so that the comprehensive exhibition could be condensed in as short a time as possible.

The reels were arranged so that comparison between arc and mazda lights could be made, also a comparison of color rendering under both systems of illumination. This was followed by a reel illustrating the highest efficiency obtained with the present mazda equipment, a reel of "light effects" proving the possibilities inherent to this system of illumination and finally, some of the imperfections detected in the manufacture of lamps and reflecting surfaces were clearly illustrated. These imperfections have already been corrected in the newest type of bulbs and lamps and were presented merely as a historical document.

The gigantic task of editing these reels was conducted by Mr. Frank Good, A. S. C. and his intelligent work won the plaudits of all present and especially of all producers who expressed their appreciation of the value of this climax of the extensive investigation carried throughout the "Mazda marathon."

Motion Picture Research

By L. A. Howland

(International Kinema Research Corporation)

Motion Picture Research as applied to what is shown on the screen covers generally:

1. Buildings, both interior and exterior, and streets.
2. What happens in the buildings and on the streets.
3. The type of people to be shown in the buildings and on the streets, what they wear and how they act.

The producers, after facing the fact that over 3,000,000 Americans have gone into every country of the world during the last seven years, have concluded that it would be an insult to the intelligence of any man, woman or child to depict any country carelessly.

For modern research of Foreign and American subjects, that is, covering a period during the last five to ten years, photographs taken by specially trained operators have been the answer for construction details of buildings, lay-out of streets, etc. The studios demand this special type photograph which is known as a "research photograph" as it is taken without traffic or people obstructing the buildings and thoroughfares.

Wardrobe is a very special item covered by research photographs, that is, the various angles and closeups of costumes, shoes, collars, hats, etc.

The casting departments are depending more and more on pictures of natives of foreign countries and beginning to learn that there are blondes in some parts of Spain and Italy—that shieks are not always the smart and clean looking heart-smashers that the PG (Pre-Griffith) day producers wished us to believe. Also they are learning that because someone (who most likely was a "ten-hours-to-see-each-city" tourist) has said or written that certain types of foreigners are slim or short or fat, it does not make it so. The casting departments must have research photographs of actual people who are typical.

The property departments also use research photographs of the many items of furniture and set dressing. Hearsay no longer governs them.

The location managers match up American-California locations with research photographs of the streets of the foreign country to be shown in the film or scenes of other parts of that country.

In fact, about the time the story is planned, the Research Department, Art Department, Wardrobe Department and Casting and Location Departments are busy determining from research photographs the typical facts of the foreign country and walk of life to be filmed.

When the set is built and dressed and the wardrobe made for the actors who have been selected, then what is known as the "technician" starts his work on the set. He may have been working for the past month with the director and scenario writer, supplying from his mine of information concerning his own country, typical bits of business and atmosphere.

The foreign technician and his American brother technician are ready and willing on the set to show typical manners, methods of walking, salutations, tokens of courtesy actually used in their country and particular walk of life, especially covering servants and military people.

He checks up to see if the actor is correctly dressed. He watches the set to see that there is not too much "Grand Rapids" furniture in the foreign castles or in the North African tents.

A Foreign or American technician who is authentic, is a form of insurance against irritating errors in the picture.

Especially is an authentic technician of use during the filming of war, water or foreign pictures. His knowledge of procedure may help to get the picture over. Alas, several excellent stories when put into motion pictures have had their earning capacity cut down, due to the use of men who posed as authentic technicians but who did not have the experience in the foreign country filmed or who were unable to get along with members of the producing staff. As a result these men have allowed gross mistakes to creep into the picture which, when it was

shown in the foreign country depicted, so prejudiced the authorities that they banned the picture at once.

Scenes which reflect on the military, the police, or the government of a foreign country, naturally handicap an otherwise excellent story picture.

Of course for laugh-gettings episodes some license may be taken with certain established facts, but that does not permit of liberties to be taken with traditions and customs, which, to our foreign friends, are as intimate and personal as gross mis-representations on the part of foreigners of our West Point Academy and its traditions. Why should we expect them to welcome pictures about their country which are apparently deliberate lies put into picture form and which antagonize them. Make pictures authentic and they will earn more money and make more friends for America.

It may be that the bans and quotas are the result of incorrect American made pictures and then again it may be that our pictures of their countries, when sold and exhibited abroad, help us to sell too much of our American made merchandise.

Another very interesting branch of motion picture research is the "Insert Material Division." Everyone in the industry knows how vital small printed forms and documents are. So small an item as a Continental sleeping car ticket, as compared with the ones the Pullman Company issues in this country, is of great importance. Sometimes an authentic insert document will save cutting in a "wise-cracking" title.

I can hear a number saying: "Who cares if the picture is correct in detail, if it be entertaining?"

The people who care are the producers who will make more money when their pictures are not barred due to utterly ridiculous conceptions of foreign life being shown in the pictures. The natives of the foreign country whose life and customs are maligned are also among those who care, and lastly the vast number of Americans who have been in the foreign country shown in the film.

Incorrect details in pictures are an expensive evil. It has been proved again and again that correctness costs less in the long run.

Real life and real things are always more interesting.

Did the best painters, sculptors, etchers and other artists ignore detail? Most decidedly not, and as we call motion pictures an art, let us be artistic enough to be correct in detail.

Has Belasco's reputation for accuracy hurt him?

Historical research, for costume pictures, while perhaps appearing very dull to the unthinking, requires the skill of a Sherlock Holmes or an Arsene Lupin, plus good common sense.

Virgil Miller, who started Bert Glennon's first directorial effort at F. B. O. has been taken off the production to start experiments in connection with the "talking" movies which they are going to produce in connection with the Radio Corporation of America and The General Electric Co. Jimmie Howe takes Virgil's place with Glennon.

Program of Academy of Motion Picture Arts and Sciences

Monday, April 16, at 8 P. M.

Demonstration, exterior location, Garden Court Apartments, Hollywood Boulevard, with **green foliage** background to be photographed exclusively with Mazda lights, with a general invitation to all interested persons to be present. Committee in charge: Fred Pelton, chairman; Dan Clark, co-chairman; W. T. Strohm, Louis Kolb, Frank Murphy, Peter Mole, G. Gaudio, Hal Mohr, Victor Milner, Joseph A. Dubray, Percy Hilburn, George Barnes, John Seitz, George Meehan, Ned Van Buren, Gilbert Warrenton.*

Tuesday, April 17, at 8 P. M.

Screen Exhibition of edited demonstration film and of Monday night's shots to be projected in a theatre or room to be selected later, to which the entire Academy, the American Society of Cinematographers, visiting engineers, all technicians and interested persons are invited. Committtee in charge: Karl Struss, chairman; G. Gaudio, Victor Milner, Hal Mohr and Frank Good.

Wednesday, April 18, at 8 P. M.

Color Values. Papers and discussions on **color values** in relation to incandescent illumination, at an open session of the Academy in the Club Lounge, to be divided under two headings:

(a) **Artists' Make-Up**, 8:00 to 9:30 P. M., with papers by Max Fastor, Lon Chaney and Rod La Rocque, and an open discussion to follow. Special invitation to the entire acting profession, together with motion picture directors and cinematographers. Committee in charge: Joseph Dubray, chairman; Wallace Beery, Lois Wilson and Irving Willat.

(b) **Sets and Costumes**, 9:30 to 11:00 P. M., with papers by J. C. Okey, art director of First National, G. Gaudio, and L. A. Jones, past president of the Society of Motion Picture Engineers. Open forum discussion to follow. Art directors, technicians, cinematographers and motion picture directors especially invited. Committee in charge: Wilfred Buckland, chairman; Vannest Von Polglaze, James M. Leisen and Charles Rosher.

Thursday, April 19, at 8 P. M.

Technical. Papers and discussion, in Academy Club Lounge, with special invitation to all cinematographers and other technicians. Papers by (1) E. W. Beggs on "The Inside Story of Mazda lights," to be read by Bert R. Deleray of the Westinghouse Lamp Co.; (2) D. B. Joy and A. C. Downs, of the National Carbon Co., on "Characteristics of Flame Arcs," and (3) Wm. B. Rayton, Director of Technical Bureau, Bausch & Lomb Optical Co., and Joseph Dubray, A. S. C., on "Lenses and Their Relation to Incandescent Illumination," all to be followed by discussion. Committee in charge: J. A. Ball, Chairman; Joseph Dubray and Arthur Miller.

Friday, April 20, at 8 P. M.

General Meeting of the Academy with special invitation to the American Society of Cinematographers, and all other interested persons. Reports and findings of the demonstration committees, to be followed by discussion and resolution closing the series of Academy demonstrations and researches on the subject of incandescent illumination. Committee in charge: A. George Volck, Chairman; Fred Beetson, J. A. Ball, Fred Pelton and Frank Woods.

*This test was shot by President Dan Clark, First Vice-President John W. Boyle and Second Vice-President Frank Good of the American Society of Cinematographers with many of the A. S. C. members assisting. The editor regrets that the May issue of The Cinematographer must go to press before the transactions of the convention are available for publication.

On To Alaska

Chas. G. Clarke is leaving for Alaska, on Monday, April 23rd, to shoot hunting stuff for a big Fox opus. He expects to return about November 1.

There's Always a Way

By Euclid D. Miller
Cuban Telephone Co., Havana, Cuba

Last year I tried to make a progressive moving picture of some building operations, but soon found out that my limited equipment was not sufficient. However a rifle telescope sight, an old tripod head and a little automatic camera using standard film gave one hundred per cent success with little effort.

For the benefit of cameramen who may have occasion to shoot such jobs I'll go into detail.

The subject was to be the construction of a small office building. I found a location on the roof of an old tenement building that would show the completed building nicely through my two inch lens. I carefully set up the forty pounds of camera and tripod and marked the tripod setting after I had framed the picture to my satisfaction, and made a trial exposure. Next day at noon my assistant and I again climbed up the dark smelly stairs to the roof and, after about thirty minutes I thought I had the developed negative of the former shot which I placed in the gate exactly matched with the conspicuous landmarks within the scene, and shot ten or lfteen feet. When I ran the assembled negatives of about a week's daily climb I saw that there was too much of a jump, and that the negatives were not matched at all.

I robbed a war relic, a sniper's rifle from the Argonne, of its telescope sight and mounted it on an automatic camera which uses standard film and that on an old tripod head.

The procedure was to place the tripod head which was on a block of wood, upon a marked spot on a handy wall. Of course there were only minor adjustments to be made. The scope sight was mounted on an angle to the lense so that when the "picket" of the sight (it didn't use the cross-hair system) was on a distant church steeple, the camera was correctly "framed" on the work to be photographed. I selected this side "site" because the building would gradually come up and block almost everything in the "frame" and all the sky-line. This church steeple was out of the picture just as a gunner's "site" usually is in indirect fire.

However, I had to have a second point to be sure of everything matching. By throwing out the pan gear I could swing the sight around to a second "site" and when I had the camera adjusted for both sides, I swung it back to the church steeple ball, and let ten feet run through. All this would only take half a minute. The janitor would then place the whole outfit in his roof apartment where it was unmolested until he brought it out for me the next day. Every ten days I unloaded the 100 feet roll and had it developed. Needless to say it matched. Later on I tried to shoot when the shadows were at a certain place, which varied a little each day, but maybe that's too much refinement.

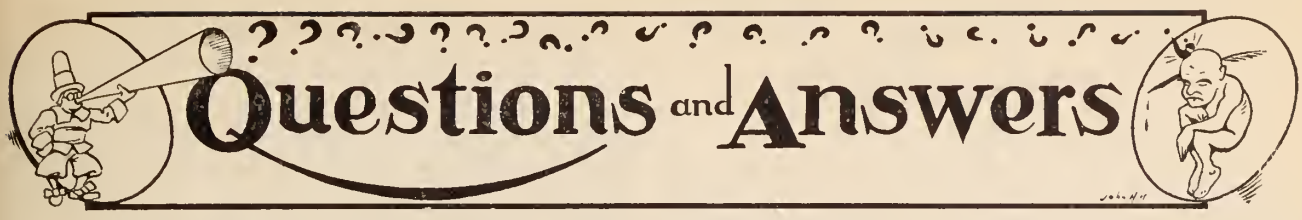
I had occasion to make a newsreel longshot. Improvised a ten inch lens in the automatic camera again. Marked diagonals on my ground film frame and pointed it at a distant land mark, then adjusted the rifle sight to that point, and compared the "field" of the lens to that of the sight and made the shot all right.

Stills for Noah's Ark

Elmer Fryer, A. S. C., formerly under contract to DeMille Studio in the capacity of still photographer, has been signed by Warner Brothers to shoot stills on "Noah's Ark," the forthcoming epic of the flood, on which Hal Mohr, A. S. C. is chief cinematographer.

Fryer has been associated with the Metropolitan Studios for over two years and previous to that time he was affiliated with First National.

Besides the usual still photography for "Noah's Ark,' which Michael Curtiz is directing, Fryer will make all the special art work which this pretentious production embodies in atmosphere and setting.



QUESTION—A number of questions have recently reached this office, concerning the F. values of photographic lenses. This question is apparently of great interest to the amateur and so we devote to it the whole space allotted to this department.

ANSWER—It is quite evident that an optical system must be circumscribed within some physical boundaries which in the case of photographic objectives are defined by the mounting of the system which is circular in form.

The size of the mounting is dictated by the size of the lens elements that combine to form an objective, which in turn are calculated according to the local length of the objective, its angle of view and its orthoscopic qualities, i. e., the degree of correction of the different aberrations necessary to obtain an objective giving the best obtainable results under some specified conditions.

In taking a photographic record of an object, by means of a lens, it is quite evident that of all the light radiations emitted from the object only those radiations passing through the lens will actually concur to the formation of the photographic image and therefore, the larger the area within the boundaries of the lens, the more of these light radiations will pass through it and the more brilliant will be the image that concurs to make an impression on the sensitive material.

It is quite obvious that designers of photographic objectives have been and still are striving to calculate lenses which admit the greatest possible amount of light, in other words of the greatest possible aperture, without destroying the photographic qualities of the objective such as flatness of field, correction of spherical, chromatic stigmatic aberrations, that is to say without impairing the possibility of obtaining a picture of the subject which is as near as possible, a true representation of the subject itself.

It was a logical consequence of the attributes and form of construction of the objective, that it should become imperative to permit the regulating of the quantity of light admitted through it, to form the image. This was accomplished by means of diaphragms or round openings of different size which control the aperture of the objective at will of the photographer.

The most used form of diaphragms is nowdays the IRIS form which, placed within the elements of the lens, permit a change from the widest aperture to the smallest, passing through all conceivable sizes.

This need of diaphragms recognized and put into practice from the very beginning of the advent of photographic objectives, brought about the necessity for an international understanding and accord on a logical principle that all manufacturers could follow in the way of establishing a standard expression of the measurement of aperture, applicable to all objectives and readily read by photographers of all countries.

At the International Convention held in Paris in the year 1900 it was decided that:

First—Each diaphragm be characterized by a fraction of the form F/n in which F. represents the focal length of the objective and n. the number obtained by dividing the focal length of the objective by the EFFECTIVE APERTURE of the objective.

Thus an objective of 2 inches focal length is said to work at F/3.5 when the effective aperture of the objective is equal to inches 2÷3.5, and the same objective is said to be working at F/8 when its aperture is reduced by means of the diaphragm so that its effective aperture equals 2÷8.

It is to be noted here that in a compound objective in which the diaphragm is placed within its elements, the effective aperture is always greater than the actual diameter of the diaphragm. This is due to the fact that the lens element in front of the diaphragm refracts the rays emitted by the subject and striking its surface, so that they assume a conical form in their passage from the front element to the diaphragm. It results that the effective aperture of the objective is given by the size of the original beam, which is evidently rather larger than the actual diameter of the diaphram. To find the effective aperture of an objective, focus on the ground glass of a camera on object at infinity, then replace the ground glass by an opaque screen in the center of which a small round opening has been drilled. Strongly illuminate this opening and place a ground glass against the mount of the lens in front of it. A luminous circle will thus be formed the diameter of which will give the effective aperture of the lens. The ground glass may be replaced by a sensitive material, plate or paper, and after due exposure and development an image of the aperture will be obtained, which can readily be measured.

Second—It was agreed at the Paris convention that markings on the mount of the objective should indicate the size of the diaphragms in a regular progression corresponding for each of its terms, to an exposure double of the preceeding. The progression decided upon was as follows:

F/1, F/1.4, F/2, F/2.8, F/4, F/5.6 F/8, F/11.3, F/16, F/23, F/32, F/45.

Thus an effective aperture of F/5.6 will require double the exposure required by the aperture F/4, and an aperture of F/8 will require double the exposure of the aperture F/5.6.

When an objective is so designed that its maximum effective aperture does not appear in the above progression, this maximum aperture is marked on the mounting of the objective and is followed by the next effective aperture of the progression.

Thus many objectives for motion pictures work are designed to work at a maximum aperture of F/3.5 and this aperture will be marked on the mount of the objective and will be followed by the marking corresponding to the aperture of F/4, which in turn will be followed by the markings F/5.6, F/8, etc.

The illumination, sometimes called the "speed," of an objective, is thus expressed in terms of the F value.

It results quite evident that to each of these F values a definite quantity can be calculated, which is called the coefficient of illumination of the F. value. The coefficients of illumination for the most used F. values are given in the following table:

F/n	Coefficient of Illumination	F/n	Coefficient of Illumination	F/n	Coefficient of Illumination
*1	1	* 5.6	31	*23	529
*1.4	2	7	49	29	841
*2	4	* 8	64	*32	1024
2.5	6	10	100	40	1600
*2.8	8	*11.3	128	*45	2025
3.5	12	14	196	56	3136
*4	16	*16	256	*64	4100
5	25	20	400		

The F/n values marked by (*) represent the regular progression established by the Paris convention, the other being intermediate values frequently used.

The co-efficient of illumination is, as seen in the table, given by the square of the F value, this being due to the fact that the admission of light is controlled by the

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An Erect Image Finder For the Akeley

By Ira B. Hoke, A. S. C.

In the operation of the Akeley panoram camera the cinematographer lines up his scenes through a direct tube magnifier. This magnifier serves not only as a focusing device, but when operated with a secondary lens matched in area with the photographing lens serves also as a view finder. While this finder is absolutely necessary when the telephoto lenses of 12, 15 and 17 inches focal length are in use, an auxiliary finder such as used on the dramatic motion picture cameras is of more practical convenience when lenses of wider angle are used.

Until recently, however, no finder was found which readily adapted itself to the Akeley camera. The reason lay in the fact that the Akeley tube finder shows an erect image, with left and right sides correct. Nearly all the old type of finders show inverted images. Their impracticability was immediately recognized by cinematographers when they attempted to switch quickly from the erect image of the Akeley to the inverted image of their finders. The impulse was always to pan in the wrong direction.

On July 9, 1920, Mr. Pliny Horne, A. S. C., veteran Akeley specialist, recognized the need of a secondary finder in a letter written to the Akeley Camera Company. In part, his letter is as follows:

——"Let me suggest one thing, and that is an auxiliary view finder; one that you do not have to put your eye so close to. I do not mean to eliminate the tube, but to add this sort of finder as an extra attachment."

About this time Mr. J. B. Shackelford, A. S. C., then in New York, also began experiments with a supplementary view finder. His first finder was along the lines of the Pathe inverted image type. This finder he adapted to the use of different focal length lenses by a series of mats, each giving a specified field of view corresponding to the lens for which it was matched. But like all inverted image finders this was tricky to use, and was not universally successful.

Probably the next type of finder experimented with was the Lubin direct image finder. This finder, while it showed an erect, corrected image lacked the accuracy necessary to successful Akeley panoram scenes.

No further progress seems to have been made until the advent of the Mitchell erect image finder in 1927. This finder, while quite large, has the advantage of showing an image of maximum practical size, erect and fully corrected. The margin limits for the various focal length lenses is determined by a series of metal mats which are inserted just in front of the ground glass after the manner of Waterhouse stops. The erect image feature is accomplished by a series of prisms, compactly arranged in a turret behind the objective. These two features adapt the finder perfectly to the Akeley camera as it is quickly fitted to match different focal length lenses, as well as showing an image corrected as in the Akeley tube magnifier.

The finder is mounted on the Akeley camera in two positions to suit different occasions. The first being directly on top of the camera; the second on the left side at lens level.

When mounted on the top of the camera the finder is in the accepted operating position, its objective in a direct line above the photographing lens. The finder is mounted on a sliding clamp which is movable around the periphery of the camera case, thus making the finder center adjustable to any focal length lens that may be used. This position places the image directly above the control bar of the camera and in the most balanced position for accurate observing.

The adjusting clamp furnished with the finder for attaching to the Mitchell or Bell & Howell cameras serves to secure it in position on the Akeley, and furthermore allows its ready removal when it is desirable to place the finder in the position on the left side of the camera. When mounted on the side of the camera the finder serves admirably where the set-up is so low that, if mounted on top, the finder would interfere with free movement. It is adjusted for different distances and focal lengths precisely as though it were used on either of the other professional cameras.

It often happens that the director wishes to look at the line-up or even watch the action as it is being filmed. When not in actual use on top of the camera the cinematographer may properly mat and correctly center the large finder in the side position so that the intended scene is instantly available for the director's inspection without the inconvenience, both to him and the cinematographer, of peeking through the focusing tube. As the finder in this position is several inches to the left of the magnifying tube the director can easily watch the scene as it is being photographed without interfering in any way with the operator.

Chief among the advantages of the new finder is the fact that through its use the Akeley camera becomes the finest machine available to the profession for the photography of scenes from moving vehicles. With the old eyepiece and finder tube a "running shot" was practically impossible with the Akeley because the eye could not be safely held in position. Fitted with the erect image finder the Akeley acknowledges no peer for this type of scene. The gyroscopic control of both pan and tilt movements effectually smoothes out the familiar "jumpy" action so distracting to such scenes when photographed with other types of cameras. Every cinematographer who has made running inserts is familiar with the difficulty encountered centering objects when rounding turns at high speed with the pan crank or slip-head camera to work with. This type of shot is negotiated so nicely with the Akeley that often an actual sensation of skidding around turns is conveyed to the screen. Pliabilitly of the Akeley is also demonstrated in the case of running inserts where room to set up the more bulky cameras often hinders efficiency of actual operation. If necessary, the Akeley is instantly removable from its tripod, after which it can be quickly placed either on a baby tripod or flat-base in cramped positions quite inaccessible to the dramatic cameras.

Prior to the advent of the erect image finder running scenes photographed with dramatic cameras were in most cases limited to moderately wide angle lenses, necessitated in order to keep the photographed subjects in the picture. Since the adaptation of this finder to the Akeley camera cinematographers are able to use the three, four and even the six inch lenses with extreme accuracy in photographing close-up action in running shots.

Several years ago the Akeley camera was considered somewhat of a curiosity, but today the director and producer recognize it as the most versatile photographic equipment obtainable, and there are few modern sets that cannot boast one or two fully equipped Akeley specialists.

Co-operation

The A. S. C. desires to express the sincere gratitude of the Society to the following named studios and A. S. C. members who so unselfishly, enthusiastically and efficiently co-operated in shooting, titling, printing, cutting and otherwise preparing and arranging the special trailers to be exhibited to the Photographers Association of America Convention at Louisville by Joseph Dubray and Charles Rosher, A. S. C., ambassadors of good-will.

Fox Studios—Daniel B. Clark, George Schneiderman, Elmer Dyer.

Edwin J. Snyder, Alvin Wyckoff, Frank B. Good, H. Lyman Broening.

Universal—Roy Hunter.

DeMille—M. Presbry.

United Artists—Charles Rosher.

Consolidated Laboratory.

The total footage shot was something less than 4000 feet and our reports from Louisville are that the film made a great hit with the Convention. The film was assembled under the personal direction of John W. Boyle, President of the A. S. C.

Questions and Answers

(Continued from Page 29)

AREA of the diaphragm and not by its diameter. This coefficient is inversely proportional to the illumination of the image obtained through its corresponding aperture.

For instance, suppose that we know that the correct exposure on an exterior in a sunny day of a certain city street will be correct at an aperture of F/8, and we wish to photograph the interior of a clear room which will require an exposure five times as great (this exposure arrived at by actual measurement of the intensity of the light or by judgment dictated by experience), and we wish to know which aperture will give us such exposure.

The coefficient of illumination at F/8 is 64, one-fifth of 64 is 12.6. The aperture corresponding to the coefficient 12 is F/3.5, which aperture will give an exposure 5 times as great as the F/8.

A very useful application of the table is to be found when using light filters whose multiplying factor is known.

For instance, we wish to use a K1½ wratten filter, whose filter factor is given by the manufacturer at 2, meaning that the use of this filter requires twice the exposure required without it. Supposing again that an aperture of F/8 would give the correct amount of exposure without filter, we would find the aperture to be used in connection with the filter by dividing the co-efficient of illumination 64 by 2. The quotient is 32. The nearest co-efficient in the table is 31 and the aperture corresponding to it is F/5.6, which is in the regular progression of the stops agreed upon by the Paris convention as requiring half the exposure of the next stop, F/8.

The filter K1, whose factor is 1.5, would under the same conditions require an exposure of 64÷1.5=42.6. The most approximate square root of 42.6 is 6.5, which is the F value desired.

As the value F/6.5 will not be found marked on the mount of the objective, the photographer will set the diaphragm by close approximation at about 1/3 the distance between the markings 5.6 and 8.

Reggie's Lucky Escape

Reginald Lyons, A. S. C., of 7538 Hampton Ave., now with Lasky Studios, had an almost miraculous escape recently at Clover Field. Lyons, with Jack Ford, Fox Studio director, was standing by a plane occupied by Vic Flemming, who was about to go up. As he was ready to take off Lyons and Ford started to leave the field when the propellor blade hit Lyons knocking hom down. The wheels of the plane ran over him and he was dragged about thirty feet before he broke loose. Except for torn clothing and minor bruises Reggie was unhurt.

The Louisville Convention

During the period of March 27th to 30th an event of great significance took place. The American Society of Cinematographers was represented at the annual convention of the Photographers Association of America in Louisville, Ky., thus linking together the greatest exponents of the art of photography in America.

Mr. Charles Rosher and Mr. Joseph Dubray were the A. S. C. members commissioned to carry to the P. A. of A. the message of fraternity and good cheer from the A. S. C.

Their report is most enthusiastic both as to the courteous and really fraternal reception accorded to them in Louisville and the results obtained in solving technical problems discussed throughout the convention.

The portrait, the commercial and the motion picture

branches of photography had never had in the past such an opportunity of getting together and in a friendly way discuss their different problems and achievements for the benefit of all concerned.

The portrait photographers especially displayed a tremendous interest in the system of lighting used by the cinematographer and they paid a very high tribute to the artistry displayed in the photographic quality of modern motion picture production.

Mr. Rosher and Mr. Dubray were literally besieged during their stay in Louisville by interested questioners on the several phases of their work.

Several reels of film made in Hollywood, showing processes of production of motion pictures, which were

especially made by the A. S. C. with the co-operation of the Hollywood producers, were shown to the convention and were greatly appreciated for both their artistic and educational values.

Mr. Rosher and Mr. Dubray carried on some very extensive demonstrations by actually taking motion pictures of chosen subjects and of members of the P. A. of A. under the conditions that presented themselves in actual motion picture work.

These demonstrations included the application of

The Photoplay as a Civilizing Influence

The English press lately revealed two quite extraordinary instances, setting forth the ameliorative effect of the motion picture on the sordid side of life, firstly of London and secondly of Edinburgh J. A. R. Cairns, a magistrate who presides over the police court in the meanest part of London lately, in an address in the wealthy west end of London, said:

"If it is the human story told in the human way of virtue and goodness triumphing over vice and filth, that will make for good. I am certain the cinema is the greatest civilizing factor among us. Childhood is introduced into a world of harmonies and beauty, and adolescence and middle age have consolations and vistas of a bigger world than that of work and toil."

Rodney Ross, the chief constable of Edinburgh, lately reported a remarkable diminution in the number of street offences, basing the facts on an examination made by the Street Offences Committee. Mr. Ross said he "did not hesitate to name the cinema as one of the chief contributory causes. Official witnesses stated that prosecutions had declined in Edinburgh from 419 in 1920 to 129 last year, and in Glasgow from 2,700 in 1902 to 283 last year. Well might Dr. Hensley Henson say, 'the diminution was very remarkable,' and clamoured for an explanation. There cannot be the slightest doubt in the minds of reasonable people that the cinemas are a purifying influence on the streets of any town."

Incandescent Lightings

(Continued from Page 11)

will greatly increase the comfort of the electrical crews and of the Cinematographer in charge of a set, which comfort will result in greater efficiency and therefore in considerable economy.

The reduced size of the different lamp units will make it possible to conceal several sources of light throughout a set in small recesses and will result in an improvement in the distribution of the general illumination of the set.

The units used for spotting purposes do not need the constant attention of an operator as the Arc light spots do, and the decrease of weight of apparatus will tend to reduce the cost of construction of the platforms which are usually built to support them.

The greater portability of the incandescent units will facilitate the illuminating of the **trucking shots** so extensively used in modern production.

The operating cost of this lighting will be greatly reduced as it will be possible to dispense with costly generating plants and portable generating outfits.

Cleanliness is another important factor to be considered in the use of the Incandescent System of lighting. The necessity of recarboning the units is dispensed with at an economy of time and the suppression of the carbon dust which is stirred by this process particular to the Arc lights, and again cleanliness will mean greater efficiency in operation and consequently considerable economy in expenditure.

To conclude, it is quite apparent that although the Incandescent Tungsten system of lighting presents innumerable possibilities of improvement, it also presents some definite advantages on the Arc light system, and further study and experiments tending to bring this system of lightings to as near as possible a degree of perfection should be encouraged by producers of Motion Pictures and by Cinematographers.

Such studies and experiments systematically carried will contribute to the evolution of motion picture photography for the greater glory of our art and for its commercial and industrial development.

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make-up, and the improvisation of backgrounds suitable to the subject and to the general scheme of lighting.

Several addresses were delivered to the convention and on numerous occasions the appreciation of the members of the P. A. of A. was extended to the A. S. C.

The M. P. P. A. Research Laboratory

The announcement made by Mr. Fred W. Beetson, Executive Vice-President of the Motion Picture Producers' Association, at the banquet tendered to members of the S. M. P. E., on the night of Wednesday, April 11th, to the effect that the M. P. P. A. intends to establish a research laboratory in Hollywood, has been substantiated by Mr. Beetson.

Fred W. Beetson

A Research Bureau will first be established whose mission will be to study and investigate production problems in Hollywood under all conceivable angles as to their technical and artistic features, and to bring about close collaboration of all branches of the industry in order to improve the quality of their product and increase their efficiency.

The investigation will be extended to all manufacturing concerns throughout this country and in foreign lands, which are contributing the scientific and technical data necessary to the development and evolution of the industry. These manufacturers and their research laboratories have pledged their full co-operation.

From the collaboration thus secured will in due time emerge a laboratory whose mission will be to apply discoveries to actual production practice and to emit ideas of improvements in the technicalities of production, which ideas will be finally developed through the co-operation of all the research laboratories in existence in the country.

This program presents unlimited possibilities of advancement in our industry and the American Society of Cinematographers is looking forward to the creation of this laboratory and the establishing of these contacts with great faith in the greater future.

"Stills Move the Movies"

(*Continued from Page 23*)

the world for which the consumer is required to pay cash in advance before he is permitted to inspect the goods being purchased, therefore, the stills, which can be seen prior to purchase, are the foremost outlines and suggestions regarding the purchase and consequently should be the best obtainable. But they will never advance to their proper position in the industry until they find their proper place of operation—and that place is the publicity department.

"The Ace of Stunts"

(*Continued from Page 25*)

"On the whole, however, it was perhaps the most fascinating job I have yet tackled. I think it was the uncertainty, the constant doubt, the knowledge that we had to be always on the jump and trying, that made this the most unusual of all my camera assignments. It was difficult, but it was gripping, and I think we all enjoyed it to the utmost. Also the crew deserves the greatest commendation. They worked long and tirelessly and always without complaint. I think we have some unusual shots in this picture, made under the most trying circumstances, and I feel that all are deserving of a full share in the honors. I found Mr. Hawks ideal to work with, calm and far sighted, and always considerate of his crew and their co-workers."

Research in Industry

Speech of L. A. Hawkins, Executive Engineer, General Electric Company, at A. S. C. Dinner.

At the Spanish dinner tendered by the A. S. C. to the S. M. P. E. convention delegates on the evening of Monday, April 9, Mr. L. A. Hawkins, executive engineer of the General Electric Company, Schenectady, New York, delivered the address of the evening, choosing as his subject "The Value of Research in Industry."

Mr. Hawkins said in effect:

"Modern manufacturing is mostly engineering, and engineering is the application of the products of research. It has been the gradual realization of this truth that has made the research laboratory a nearly universal adjunct of the modern large manufacturing plant.

"This realization was brought home to American industries by the World War, when, as a result of the British blockade, the industries of all nations were brought to realize the amount of their dependence on the German industrial laboratories. The electrical industry was one of the few in this country which long before the war could see the potential value of the industrial research laboratory, and it has been no coincidence that in all lines of electrical development the United States has led the world. The research laboratories of the electrical industry have long been recognized as leaders in their field.

"The Eastman Kodak Company was also among the pioneers of industrial research in this country. The motion picture industry has been fortunate that it has been so largely served by manufacturing companies which have maintained extensive research activities.

"Both in organization and in nature of work, research laboratories of different industries vary widely. Differences in these laboratories are largely due to differences in the nature and variety of the products of the manufacturing companies that operate them. Any research laboratory, however, may perform any, or all of the three following functions:

"First: The industrial research laboratory is primarily a service department, with the primary duty of assisting other departments of the company in every way to improve the quality and reduce the cost of the product. In our own laboratory a large part of our efforts is engaged in this kind of work, and there are few products of the Company which have not benefited from it.

"Second: A laboratory may help to increase the business of the company that supports it through the development of new devices. About one-third of the total products of the General Electric Company consist of devices originating in the research laboratory.

"Third: Part of the work of an industrial research laboratory may consist of investigations in the field of pure science. It is such investigations that yield the new knowledge on which the development of new devices may be based.

"The relative importance of these three kinds of activities will vary with the nature and variety of the product. For instance, in the General Electric Company the great variety of our product justifies our going further afield in pure science than would probably be permissible in a company with a much more limited range of interest.

"What is the significance of the recent great extension of industrial research to the motion picture industry? Of course it means that the industry may confidently expect from the manufacturers that supply its needs, not only further improvements and refinements in the

AN OPEN FORUM

THE AMERICAN CINEMATOGRAPHER is the voice of the cameramen of the motion picture industry, but the cameramen are not inclined to be at all selfish about it.

It is the technical magazine of the industry and it is heartily friendly to every other department of the industry, for its ideal is that what is good for one is good for all.

THE AMERICAN CINEMATOGRAPHER therefore, here and now, formally and cordially invites producers, distributors, writers, directors, assistant directors, technicians, actors, title writers, laboratory operatives, still photographers, property men, publicity directors, art directors, executives, electricians, projectionists, and everybody else connected with motion picture production, distribution and exhibition and also the allied arts of the cinema to regard

THE AMERICAN CINEMATOGRAPHER

as the OPEN FORUM of the INDUSTRY and it places no restrictions upon communications submitted for publication, except that they be truthful, constructive, sincere and in good humor.

Now, come on with your letters. Get "it" "off your chest" and let's make of the motion picture industry the biggest get together organization on earth.

THE EDITOR.

apparatus it buys, but also new developments applicable to its art, like the talking machine picture and television. But how about research in the motion picture industry itself?

"This aspect of the subject I approach with diffidence, for you know far better than I the needs and problems of the industry. I can do no more than to offer a few suggestions and leave it to you to say whether they are apposite.

"I cannot imagine research in the motion picture industry profitably paralleling the physical and chemical researches of manufacturers, like the Eastman Kodak or General Electric Co. Such investigations require close contact with production in order to achieve maximum success and the motion picture studio is a user, not a producer, of apparatus. It is from the viewpoint of the user, then, that it would seem research should start. Research from that viewpoint is needed if your apparatus is to be best fitted to your special requirements. Without it you can only take what the manufacturer, lacking your special knowledge, has developed and use it as best you can. But with research on the use of apparatus you can tell the manufacturer what you need. And with the advent of new developments, such co-operation between maker and user is imperative for rapid and efficient progress. Take, for example, the talking motion picture. Now I know there are those who can see no future for it. They may be right, but it would be most dangerous for the American industry to agree with them until it has explored every possibility of the new development, for if the possibilities are there they will surely be developed to the full abroad, especially in Germany. And I believe that those who dismiss as negligible the talking motion picture after having seen and heard the first demonstrations have made the same mistake as those who belittled the motion picture itself when it first appeared. Those early pictures were merely crude reproductions on the screen of the more obvious forms of the so-called legitimate drama. No one then could foresee the great new art that was to spring from those humble beginnings. The screen is no longer an imitator of the stage. It has found itself, developed its own canons of art and its own technique, and produces its own marvelous effects of a kind which no other art can approach.

"These effects have been produced through the use of a single agent—light. Now sound is available as well, and the same type of genius that developed cinematography into a new art distinct from that of the spoken drama now has the means of creating still another new art form. The talking motion picture of the future will not be merely the picture of the present, with talk added. It will mean not merely that we may have on the screen Gilbert and Sullivan operas, or actionless plays like Bernard Shaw's, or classic drama like Shakespeare. It will mean not merely that with the news reels we shall hear the crash of the waves in a storm scene or the roar of the motors in an automobile race. Those are the obvious possibilities. What we cannot foresee are those possibilities that only artistic genius can evolve, such genius as that which, working with light alone, has made cinematography the wonderful art it is today, and which in the future, working with light and sound conjoined, will surely produce new art forms as marvelous as they are now unpredictable.

"But to hasten that day, to perfect the new tools with which artistic genius must work, a vast amount of preliminary research work must be done, which can best

be done in a laboratory studio. In making the sound record the acoustics of the set and the best positions of the microphone will involve the development of technique as exacting as are the lighting of the set and the positioning of the camera today. In the theater many acoustic problems are involved in the reproduction. Not only the quality but the volume of the sound must be in keeping with the picture. A big voice coming from a small face is absurd, and yet the voice must be distinctly heard all through the theater. Nor can loud speakers be distributed around the auditorium. The sound must come from the screen, or illusion is destroyed. These are only a few of the more obvious problems.

"And soon we shall probably have television, not the television of today which can transmit only small objects such as can be screened by a high intensity beam, but television which can transmit a prize fight or eventually a foot-ball game by radio. The apparatus for such a feat will undoubtedly be too expensive at least initially for home use, so that it should first find practical use in the motion picture theater as an adjunct to, or as a partial substitute for the news reel, enabling the motion picture audiences to see and hear the most interesting events while they are actually taking place.

"Here again research will be needed, not only in the development of the apparatus but in its use; research such as the motion picture industry itself can best supply. And if research by a manufacturer is imperative today, if he is to keep pace with the extraordinary developments in physical science, and, by embodying the new knowledge in new devices, to keep pace with his competitors at home and abroad, so also the user of the new devices must, it would seem, conduct researches in their use or risk the danger of being outstript in technical equipment by foreign competition. The sole purpose of that technical equipment is to serve the artistic genius which is, and will ever remain, the dominant factor in the development of the motion picture. Genius cannot be created by research, but research can help enormously to improve the tools with which genius must work. And if any genius is deserving of the best tools that science and engineering can produce, it is the genius which has created that great new art, to which the American public turns in every increasing numbers for its entertainment, its instruction, and its cultural betterment, the marvelous art of modern cinematography."

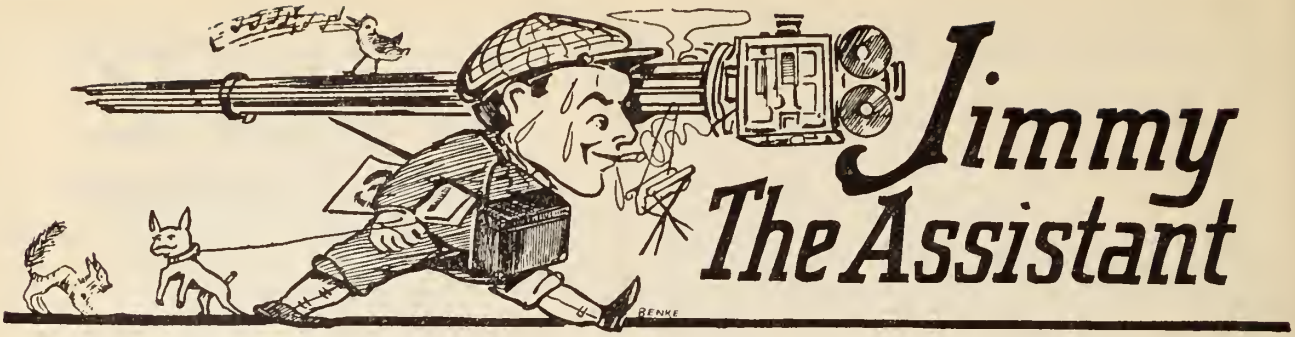
The Aims and Purposes of the Academy of Motion Picture Arts and Sciences

By Frank Woods, *Secretary of the Academy*

[ABSTRACT]

The Academy of Motion Picture Arts and Sciences composed of nearly all important personages of the five creative branches of motion picture production, is a unique experiment in organization engineering, being an attempt to unite the memberships of five creative branches of motion picture production for the common good. It is not a "company union," its main purpose being the advancement of the motion picture as an institution and in all its arts and sciences. It has been obliged, however, to become temporarily interested in employment problems, such as uniform contracts, for the purpose of promoting harmonious relations within the industry, but only as a necessary preliminary step toward unified effort. At the time the Academy was organized it found each studio with its own rules, methods and forms of contracts. Employment relations were without recognized standards. Various abuses existed that demanded correction. In the interest of the industry as a whole the Academy has been able to act promptly in these matters by the friendly cooperation of its branches. There are five of these, actors, directors, producers, technicians and writers, each being equally represented on the Board of Directors. Douglas Fairbanks is the president.

Frank Woods



[EDITOR'S NOTE.—*Jimmy the Assistant is absent for a few weeks and his article for May was evidently delayed in transit. But in order that Jimmy's audience be not disappointed, the editor has gone back into the files of years ago and dug up two of Jimmy's letters which are just as live today as the day they were written.*]

Here is a little story I have written for moving picture use when censorship laws become universal. It is titled "The Rollo Family's Outing, or Virtue Triumphant in the Absence of Evil."

Mr. and Mrs. Rollo have been married just a year and are celebrating their anniversary. Mr. Rollo is standing on the lawn with a box of matches in his hand. These he lights one after the other, at the same time softly shouting "Whee!" He was much pleased for it was his idea of having fireworks to celebrate the day. Mrs. Rollo is standing just as close to him as would be proper, that is, about six feet away. Even so, her mother, who is chaperoning them, frowns slightly at this liberty.

Mrs. Rollo is very happy. Her John is so bold and daring. How fearlessly he strikes the matches!

Suddenly old man Rollo, Mr. Rollo's father, staggers from the house. Terror is written upon his face. "Look at this!" he gasps. Thrusting forth a calendar he points to a date. Horrors! It is Sunday, and John has not only smiled but actually shouted. Mrs. Rollo faints. Her mother goes into hysterics. Father dies, but in such a way as not to offend the censors. Rollo, aware of the gravity of this crime, bears up bravely. He takes the calendar, damning evidence of his guilt, and gazes upon it. Suddenly his face lights up. The date of the calendar is 1983. This is year 1984. Father was mistaken. Today was Monday, after all. He hastily revives his wife and mother-in-law with a draught from a pocket flask containing wh-whey and they join hands in thanksgiving. Father comes back to life in the form of a spirit, and as they are discussing their good fortune, a nurse comes out of the house. "It's a boy," she says. Mr. and Mrs. Rollo look at each other in surprise. Suddenly the truth dawns upon them. While all this excitement was going on a son had been born to them in the house. They both rush into the house to see the new arrival. Fade out.

Fade in. Entire cast in a line with joined hands. They recite in unison:

Censored we are,
Senseless we be,
So all that we can do or say is
tweedly, tweedle dee.

Fade out.

Wages and Salaries

There's an awful lot of difference in them two terms. Look at me, f'rinstance. Here I am, an assistant; I lug the camera junk around and hold a slate and do all the hard work there is around a camera. It's a hard graft and I get wages.

The cameraman I work for drifts into the studio two minutes before the hour on the call, gives orders all day, takes orders from nobody, does pretty much as he pleases, and he gets a salary. I do about 10 times as much labor as he does and he gets about 15 times as much dough as I do.

Now, let's figure it out. I do the most work, but he's worth a lot more than fifty times as much as me to the company. Fifty of me couldn't get the results that one of him gets. He gets a big salary but he earns many times that in not having retakes, doing good work under bum conditions, and in time saved by fast, efficient work.

He gets a salary; I get a wage. The difference between grey matter and a strong back runs into big dough. Brains earns the salary and brawn grabs the honest wage, no matter how low the salary or how high the wage. That sounds kinda funny, but here's the point. When this wage reduction thing really hits the studios, the wage earners will get it in the neck, while the salary earners won't know there was a cyclone.

Just f'rinstance, lets take a big dough wage getter, say a director. An egg who stands in with the Big Boss because he is liked personally, or has a good sellar, or sumthing else. He's making pictures and kinda half getting away with it. A good writer and a good assistant is responsible. The alleged director ain't using his brain none, so he's a wage getter. When profits get skinny the Big Boss is going to look over the sheeps and goats, sharpen up the axe and when we fade in again we see a painful absence of the wage-getting director. He had to be let go to make room for a director who could earn income for the company and a salary for himself. By all this I don't mean that a wage earner lives on graft or pull. Far be it from such. That's only an example of how big dough can be wages, not salary. Any ordinary bird can earn wages by honest work or by graft, but it takes a speshulist to get a salary and hang onto it by force of superior knowledge.

My boss who I spoke of is an example of a man who earns a salary. I know two other birds who get about the same dough as he does, only they gets wages, liable to damage, just like me. One of them is an old-timer. He started in the game way back in 1905. He's not old, but to hear his line of chatter you't think he was personally aqwainted with Noah. He likes to bawl out his director and he wears out about four assistants a year. He knows so much he don't have to think no more. He learned all there was years ago. He smiles at these young fellows with their funny ideas about new lightings, soft focus and special lenses.

The office knows he's a has-was and they keep him on—well, because he used to be a wiz and they hate to adjust the can to him But when it comes to a show down, they're likely to replace him with some comer that did such a good work in such-and-such a picture.

The other one is the guy that photographs Marvel Pulchritude. He's got the poor wren kidded into thinking that he's the only one in the world who can make her beautiful. He thinks so himself. So he slips her the soft focus and lets the rest of the picture go to pot. She's got her own company, so he's pretty safe. But when the public gets sick of her he's going to have to learn a lot about motion picture photography before he gets another job.

A good, efficient cameraman with the rudiments of business knowledge, can knock enough off the cost of a perduction to pay himself a darn good year's salary. The office knows this and when they get hold of such a man they hang onto him. They are not going to cut his salary; they might lose him.

A mediocre, low priced man who flivs a scene occasionally is a dangerous economy. If he pulls a boner on a big day he loses more money for the company than the saving on his salary would amount to in years and years.

The office is hep to this, too, and they are mighty careful what kind of perductions they put him on. They may cut his wages; if he quits they know they can get plenty more as good as he.

Whether a fellow gets docked or not depends upon his class. If he earns a salary he is safe, but if he gets a wage, he's in for it.

Annual Meeting A. S. C.

At the annual meeting of the American Society of Cinematographers Monday night, the newly elected Board of Governors organized by electing the following officers for the ensuing year:

John W. Boyle, president; Charles Rosher, first vice-president; E. Burton Steene, second vice-president; Ira Morgan, third vice-president; George Schneiderman, treasurer; Joseph A. Dubray, secretary; Frank B. Good, sergeant at arms.

John W. Boyle

The retiring president, Daniel B. Clark, was elected to to the Board of Governors. The other members for the ensuing year are John W. Boyle, Joseph A. Dubray, Victor Milner, Al Gilks, George Schneiderman, Burton Steene, Frank Good, John Seitz, Alvin Wyckoff, Guy Wilky, Ira Morgan, Charles Boyle, Fred Jackman, Charles Rosher.

John W. Boyle, the new president, is a resident of Hollywood and has a long and honorable record as a cinematographer with many notable pictures to his credit. With his wife and two boys he lives at 1207 N. Mansfield Avenue and is prominent in the affairs of his community.

It was Mr. Boyle who made Theda Bara famous cinematographically when she was the headliner of the motion picture world as the star of William Fox. He photographed the amazing Bara in all her great pictures and won his spurs forever as an artist of the motion picture camera.

The new president of the A. S. C. takes his place with the highest individual vote ever accorded an aspirant to that office. He is personally popular among the rank and file of the A. S. C. and his administration will have the solid support of the membership.

The new faces on the Board of Governors are Joseph Dubray, Alvin Wyckoff, Charles Boyle and Charles Rosher, all veterans of the Society.

It is interesting to note that all officers were elected by unanimous choice of the voters, which forecasts a smoothly running machine for the ensuing year.

The formal installation of the new Officers and Board of Governors will take place at the Hollywood-Franklin Hotel, 6141 Franklin Ave., corner Vista Del Mar Ave., at 8 o'clock Monday night, April 30th, the retiring president, Mr. Daniel B. Clark, presiding.

To this ceremony all members of the A. S. C. in good standing are invited. A buffet luncheon will be served.

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American Cinematographer

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American Cinematographer

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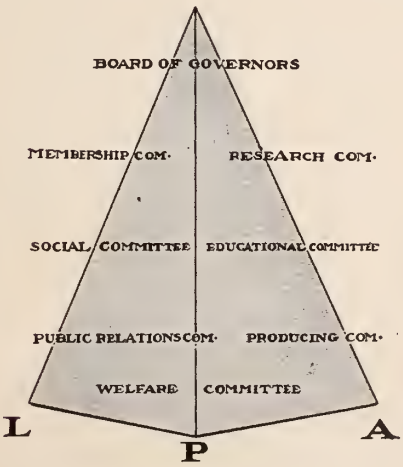

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EDITORIAL--The Voice of the A. S. C.

OUT OF THE PAST—WHAT OF THE FUTURE?

The sound pictures have the entire industry by the ears.

And a lot of incompetent opinion is floating about.

Sheiks and ingenues are talking learnedly of sound pictures.

Producers are up in the air, while technical men are working as never before to solve present problems or to produce something new or better.

It is the chemicalization before precipitation.

Nobody is wise enough to foretell just what will happen, and so, while waiting, it may not be time lost to recall the pioneer days of sound pictures—days forgotten by all, but a very few men who were of the inner councils of the giants of those times.

How many recall the General Patents Company? Will the sound pictures bring about a situation similar to that developed by the Patents Company, which found a compromise among the many claimants by pooling their interests in one great company in an effort to exclude the independents?

What is the present position of independent producers in face of the fact that the modern patents are controlled by the big producers: Vitaphone by Warner Brothers; Movietone by Fox-Case; R. C. S. system pretty well controlled, etc.?

Can the independents subscribe to the heavy licenses these patentees demand?

DO THE INDEPENDENTS KNOW THAT THEY HAVE AVAILABLE A SYSTEM FREE FROM ENCUMBRANCES—WHITSON'S PATENTS?

What will the early pioneers reap from this harvest of sound pictures after years of work and opposition?

What is Mr. Edison's attitude, considering the number of patents he has controlled?

Will history ever reveal the true facts concerning the manner in which he prosecuted his Kinetophone?

Why did he spend nearly a million dollars in perfecting the system and then suddenly withdraw it?

The answers are found in the following suggestions: Opposition to the talkies was illustrated in the manner in which the Cameraphone was harassed by the Patents Company. Doubly opposed first by reason of its being an independent concern, supposedly infringing the motion picture patents; secondly, because the idea of talking pictures was held to be inimical to the regular pictures which even the producers looked upon as a novelty that would soon pass, and they thought to reserve the talkies for a revival of interest when the popularity of the straight pictures began to wane.

In the face of this opposition, Mr. Edison devoted over four years and nearly a million dollars in developing the Kinetophone. When it was ready for the market there resulted a series of moves which startled everyone connected with the business.

The wonderful Kinetophone studio, equipped for the purpose with accoustical provisions, lights and all other accessories, was dismantled and sold, and it may be stated here and now that THE AMERICAN CINEMATOGRAPHER is informed by a technician who worked in the Kinetophone studio with the Edison staff during all the four years of the Kinetophone's formative period,that the Kinetophone was a perfected system and easily equal to any sound picture system existing today. In some points it was superior—in one or two not quite so good—that of efficient motors, for instance, but even here the operation of the system was satisfactory.

This information is broadcast simply in order that the historical record of the development of sound pictures may be kept straight.

The Kinetophone was removed from its own laboratory in New York to Orange and housed in a circus tent, the entire system modified and a new series of pictures made under such primitive conditions (even for those times). These new pictures were all short, silly subjects of no value, while many of the perfected pictures already demonstrated and approved, were shelved. The new pictures were so bad that they were not exhibited and the old ones, which previously had been shown, were called out and demonstrated again.

Now, the reasonable question is: Why was it that the Edison Company, being at the head of the Patents Company, had to resort to the vaudeville houses to get back some of the money invested in the Kinetophone? Why was the system modified after the first sound pictures produced under it had been considered a great feat of engineering?

The answer is in the supposition that the Patents Company probably considered that the Kinetophone would be injurious to the general interests of the Patents Company. If this conclusion be true it left the Edison Company in the unsatisfactory position of having on its hands an expensive experiment. The Edison Company's only move, therefore, would be to exploit the Kinetophone in some manner agreeable to the Patents Company, and this was probably through the medium of the vaudeville.

This was suggested by the fact that at one time Percy Williams, an important vaudeville manager of those days, was enthusiastic about the Kinetophone, but he never became associated with it, probably owing to the fact that he had just sold out to the United Booking Company with the understanding that he would relinquish all interest in vaudeville.

If there was ever any controversy as to the nature of the Kinetophone as a form of entertainment this point was eventually cleared by Kinetophone being exploited in vaudeville, for a very short period, it is true, but long enough nevertheless to prove that the Kinetophone was a legitimate and popular vaudeville feature.

The Edison Company, however, must have received considerable revenue from foreign countries where the Kinetophone operated for some time after the apparent collapse of the American issue.

From the manner in which the enterprise was handled it may be assumed that the public never saw the best efforts of the Edison Kinetophone.

Is there, really, anything new, or do we continually work over the old diggings?

Will the shadow of the Kinetophone arise to question the giants of these latter days?

This being the heated term The A.S.C. Magazine for August has cut out much of its heavy technical matter to make room for a lighter vein of text, but our heavy guns will come into action again in September. We are sure our readers will welcome the change.

Enlargements from Single Frame Motion Pictures

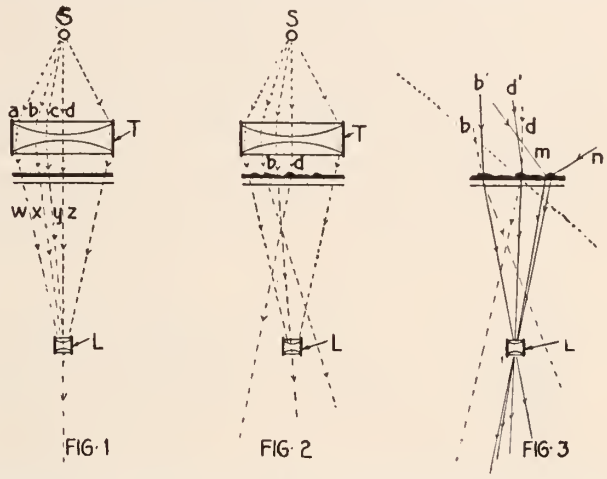
A Transaction of the S. M. P. E.

By K. C. D. Hickman
of the Eastman Kodak Company,
Rochester, New York

A glass rod in spite of its transparency is quite visible. The reflections from its surface and interior and the imaging of other objects by refraction make it easy to see. If the rod is lowered into a glass of water, it becomes much less obtrusive and sharply defined; immersed in glycerine, it is practically invisible. Changing the rod's environment from air having a refractive index widely different from glass to glycerine with the same index as glass has prevented surface reflection and destroyed the power to deflect a light beam and form images.

The essential portion of a finished motion picture film, the picture, cannot be supported in space but must rest in a stratum of gelatin upon a transparent base. The gelatin and base, surrounded as they are by air of a different refractive index, have a visibility and an individuality of their own. However perfect the base, there must always develop minute irregularities and scratches which scatter or deflect the light beam and destroy "quality." In theatre projection, where a number of pictures are superimposed each second, the defects being largely irregular tend to cancel themselves in their effect on the retina. Also, "quality" is subsidiary to "interest" of the film. On the other hand, display enlargements from single frames suffer with every minute defect in the small negative. Particularly unpleasant is the grain pattern found in the half tones of the deposit. Irrespective of care in manufacture, there is a natural and inherent tendency for individual emulsion grains to gather together in clumps, and another possibility is that light exposure may select certain grains in the clump for preferential action. It is still a moot point whether further segregation takes place during processing, but it seems probable that a re-arrangement of grains occur while the gelatin is plastic. The result, however, is that there is a minute but quite definite pattern to the body material of the image. Nothing can be done to kill the pattern, but its effect can be minimized. If one regards a piece of film having a contrasty image or one treated with ferricyanide-hypo reducer, it will be seen that the emulsion side reflects light as perfectly as the base on the parts where there is no deposit. In the region of the image only a diffuse reflection can be obtained, not a scatter due to the silver grains superimposed on the regular reflection of a smooth surface but a complete absence of shininess. This means that the grain clumps, whether by tanning or by the room they occupy, have roughened the surface. The effect of each clump is exaggerated by the slight deflection of the beam on its journey from light source or condenser to lens at this point.

The exaggeration and the defects of the film base can be reduced almost to zero by immersing the film in a liquid of the same refractive index or rather the mean index of base and gelatin. Further improvement is effected by using a wide aperture projection lens which concentrates on one layer, the image, and by using a diffused light source. We will deal first with the question of light source. Consider the perfect negative and condenser system suggested in Fig. 1. Pencils of light proceed from the source S in straight lines a, b, c, and d to the condenser, where they are uniformly bent to new straight paths w, x, y, z to the lens L. If, however, the negative is not perfect but is irregular or scratched on the surface some of the light pencils will be deflected from their paths, as in Fig. 2. Because the pencils b and d do not reach the lens, the points on the negative where their deflection occurs will be projected as dark places. Suppose, now, we substitute for the condenser supplying approximately parallel rays a window of completely diffused light. Each point on the negative is supplied by rays from an indefinite number of directions; hence, though the pencils b and d do not reach the lens, b′ and d′ and also m and n which, if the film were not scratched, would pass through in straight lines to be absorbed in the bellows, become bent to pass through the lens. It is



Figures 1, 2 & 3 indicate the path of light pencils through "perfect" film, and film which is irregular or scratched, demonstrating the improvement when the condenser is replaced or reinforced by a diffusing screen.

obvious, therefore, that the more the light is diffused and the larger the area of the window the better chance there is of rendering the surface inequalities invisible.

Diffusing screens vary in efficiency. To break up the light from a single lamp completely requires such a dense piece of opal glass that the projection of a single frame to give a 12x10 image on bromide paper necessitates a very long exposure. Fig. 4 suggests a method of obtaining fairly good illumination. A ventilated lamp-house A accommodates a 200-watt gas filled lamp B. Two inches from the bottom of the tipless bulb a 7x5 sheet of coarse ground glass is secured, and one and a half inch below

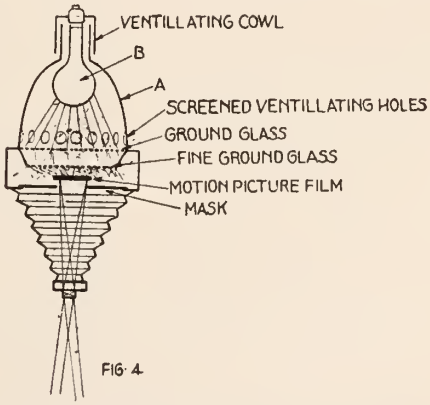


Fig. 4. Diagram of projector designed to minimize imperfections in image and base. Note the large area of diffusing screen and mask isolating a single frame.

this a piece of finer and smaller glass. The latter should bring the film to be enlarged as close to the diffuser as practicable. To prevent lens flare from the relatively enormous background degrading the shadows of the picture, a close fitting mask should be placed in or below the carrier, confining the light to the one frame under treatment.

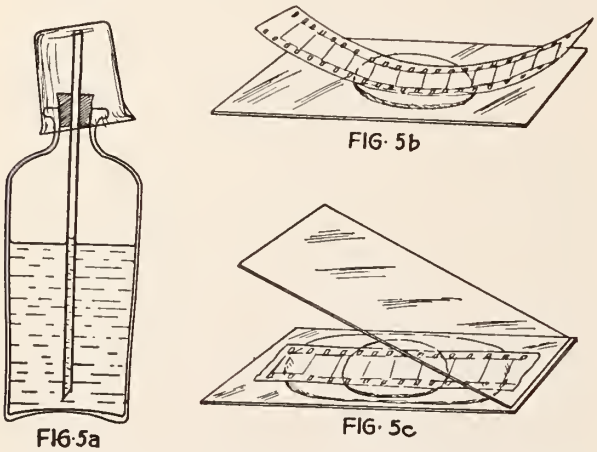
Probably a great many liquids would serve to render the film invisible, but those having a refractive index round about 1.4 to 1.5 with no solvent action on the film are best. A sufficient choice would be:

For dry film { Carbon tetrachloride, Benzene, Chloroform } for use in cell only

For dry film { Xylol, Toluol, Turpentine, Glycerine } for use in cell or between glass plates

For wet film { Glycerine and water, Water }

In the simplest application, the film is sandwiched between two pieces of glass and placed in the enlarging lantern, preferably a vertical projection printer, in which the film may remain horizontal. The sandwiching requires considerable skill. A bottle of pure medicinal glycerine is fitted with a rubber cork and glass tube, Fig. 5A, and kept when not in use covered with a beaker. It is important that the bottle should never be shaken.



Figs. 5a, 5b, and 5c illustrate method of producing a Glycerine "Sandwich."

A clean piece of glass is roughly leveled with a spirit level and a pool of glycerine (perhaps a teaspoonful) poured in the center. There must be not a single air bubble. Onto this pool a strip of three or four selected frames must be lowered slowly and in a convex arc emulsion down-wards, Fig. 5B, until all are in contact with the liquid and glass. A second pool is then poured on top of the film and the cover glass lowered into position. This is best done by placing it in contact with one edge and allowing the other end to fall very gradually. The glasses should be considerably bigger than the picture strip, so that plenty of glycerine may be used without it reaching the edges and making a mess of the slide or lantern. Glycerine is chosen as the cementing liquid because it is sufficiently viscous to stay on the glass while mounting and later in the lantern. After use the glasses should be pulled apart, the film wiped, and then put to wash in running water for a quarter of an hour. This washing is the chief drawback to the use of glycerine, which otherwise gives excellent results.

Where many enlargements have to be made, a cell for holding a volatile liquid may be mounted vertically in the carrier slide of the older type of horizonal enlarger. Xylol or carbon tetrachloride make excellent fillings. The film is immersed, moved about to detach adherent air-bells, and squeezed against one wall by a piece of loose glass and a couple of springs, Fig. 6. After use the film is merely wiped and hung up to dry, a matter of a few seconds over all.

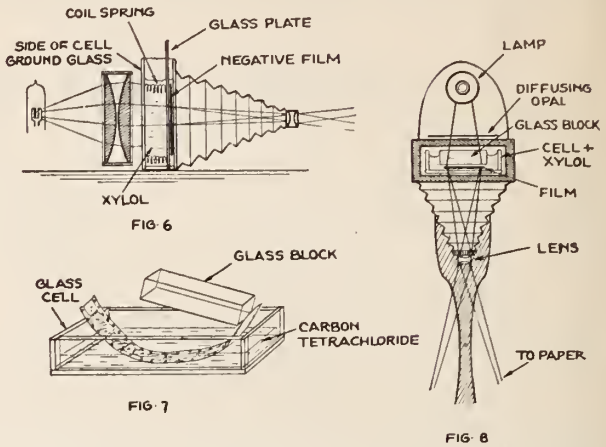


Figure 6 suggests conventional enlarger adapted to take trough of Xylol in place of negative carrier. In Figs. 7 and 8 the same idea is applied to the vertical projection printer, using a glass block to eliminate the top surface of liquid.

A simple method for really rapid work employs a shallow glass trough and a thick glass block, Fig. 7. The trough is filled with a mobile liquid, the film immersed, and the block lowered at an angle till it squeezes the film flat without the intrusion of air bubbles. The trough should be mounted in a wooden drawer which in turn may slide into a square frame located between the lamp house and bellows of an "autofocus" enlarger or projection printer (Fig. 8). The only danger with such condenserless operation lies in overheating, a danger which can be avoided by having the lamp lit merely for arranging the picture and during exposure.

A useful variation if used with caution is the enlargement from wet film. The refractive index of wet gelatin is so near that of water that merely sandwiching the film between glasses under water, wiping the outside of the glass dry, and placing in the lantern will give excellent results. The water should contain at least 1% of formalin and should be in contact with the film for some minutes before subjecting to the heat of the lantern. The wet immersion does not take care so well of the base side of the film, but if the procedure is reserved for samples direct from processing machinery (i. e., before drying), there should be no trouble from scratches or handling marks.

Besides varying the optical arrangements there are additional schemes for improving quality. In scenes where there is little movement the images in one or two chosen succeeding frames may happen to be identical, though the purely haphazard scratches and grain patterns differ. If a number of frames are focused in turn for a fractional time over the bromide paper, a composite picture is built up which develops with improved appearance. The method is tedious and demands the use of a special projector and pull down mechanism.

Another device consists in throwing the image very slightly out of focus. At the great magnifications employed the outlines of the picture are already a little diffuse, and the addition of a further trifle is hardly noticeable. The grain pattern, however, is reduced from obtrusive sharpness to a less objectionable mottling. A similar effect may be secured in quite a different way. A layer of bolting silk or a photo mechanical half-tone screen may be interposed between lens and paper at a distance from the latter varying from actual contact to two inches away. This imposes a regular mosaic, reminiscent of coarse canvas, on the picture which while destroying little of the detail renders defects in quality less objectionable.

Yet another variation consists in moving the film relatively to the paper during enlargement. This can be done by shaking the enlarger or attaching an electric bell to the lens panel. The advantages, however, are doubtful.

(*Continued on Page 39*)

A Clean Scoop

John Dored, A. S. C. Outpost in Northern Europe, Breaks All Records in Reporting Arrival of Wilkins at Spitzbergen

By John Dored, A. S. C.
Paramount News Reporter in Northern Europe

[*John Dored, A. S. C., located at Riga, Latvia, away up on the Baltic Sea, is another cinematographer of our Society's far-flung outposts of whom the A. S. C. is proud. Mr. Dored is a camera news reporter attached to the Paramount News Reel Service and has been in Northern Europe several years. An assignment to travel one to five thousand miles on short notice is a part of his every-day life. He is now at work on the Nobile story in Spitzbergen and vicinity.*—Editor's Note.]

Radio Station in Green Harbour. Extreme right house where Dored met Captain Wilkins and shot the first pictures of the Wilkins flight to Spitzbergen.

On the 12th of April I received instructions by cable from New York to proceed to Spitzbergen and cover the General Nobile North Pole Expedition. The destination I had to reach was Kings Bay. The same evening I took a train from Riga, crossed the Finnish Gulf between Reval and Helsingfors by steamer, thence to Abo by rail,—Abo-Stockholm-Oslo by steamer.

Spending twenty-four hours in Oslo for collecting necessary information about possibilities of my transportation to Spitzbergen, I proceeded northwards by rail to Trondhjem and from there via mail-boat to the Norwegian northern port, Tromso. While in Oslo I kept the wires busy and thus secured my transportation to Kings Bay with a seal hunting vessel of sixty tons capacity which was willing to take me across the Arctic Ocean to Spitzbergen.

Camera Reporter John Dored, A. S. C., on the Wilkins story at Spitzbergen. He writes: "Do not advise anybody to tackle the Spitzbergen snows without the skis."

View of an pack-ice, stretching for a thousand miles and extremely difficult to cross. This is the kind of ice Camera Reporter of Paramount News, John Dored, A. S. C., had to cross in a blinding snowstorm for a distance of about twelve miles in order to reach Captain Wilkins at Green Harbour. This walk was started at 3 o'clock in the afternoon and was finished at 8 o'clock next morning.

The name of my vessel was "Mina." Upon my arrival in Tromso, there was the "Mina" waiting for me, ready to start. She was an old, small motorship equipped with two sails and, being a seal-hunting vessel, had no place for passenger accommodation whatsoever. I got a place with the crew, in one of the holds, dark, dirty and noisome beyond description.

Before continuing my story further I must say that April is an early season for crossing over to Spitzbergen, due to storms and ice. The first steamers of the Spitzbergen Coal Company are leaving Norway before the end of May and, therefore, a passage to Spitzbergen before that time is possible only through a special arrangement with some of the seal hunting vessels usually going to the White Sea at this time. So it was in my case; there was no other or better chance for me to get across except to charter "Mina," which, however, was by no means an appropriate vessel for such trip.

We left Tromso on April 21st, but after being out in the ocean for twelve hours we came into such a storm that one of our sails was blown to pieces, the big seas rolled over the deck and the skipper decided to return to the nearest Norwegian port for safety. Twenty-four hours later we reached the port Towsvang and while there I learned the first news about Captain Wilkins' flight to Spitzbergen and his safe arrival in Green Harbor. I immediately realized the value of this story and made arrangements with the skipper to go first to Green Harbor instead of Kings Bay. After the storm had quieted down a bit we took our course to Green Harbor, reaching it in ten days, or May 1st. These ten days will stay in my memory as long as I live, during which we had some days of nice weather, but the rest of the time we had continual snow and hail storms. The motor of "Mina" gave out and we were depending upon the one

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remaining sail most of the time. There were many moments when nobody thought we would ever reach our destination.

Quite frequently our vessel had to pass through floating ice-fields stretching for miles. This ice is carried by the current from east to west and up north, coming from Sibera, Franz Joseph Land and other easterly islands of the Arctic. In many instances we saw seals reposing on the ice blocks and we shot 35 of them underway. On two occasions when the shot seal was cut open a baby seal crawled out of its dead mother's body.

As a rule I am a pretty good sailor; do not suffer from sea-sickness, but this time it was too much for me. The first two days at sea I stood firmly the heavy rolling, but on the third day I had to give up. Fresh air outside could not be taken due to the seas rolling overboard. One of the big seas hit the "Mina" so hard that it produced the effect that she had run against a rock. She sprang a leak afterwards and I was hard put to it to keep my outfit out of the water.

During that time, by the rolling of "Mina" I was thrown all over the place, hurt my back and arm badly and skinned my knee, producing a four-inch square wound. Such was the passage to Green Harbor. Upon arrival in Green Harbor there was raging a blinding snow storm, making it impossible to see but a few feet ahead.

"Mina" anchored at ice edge. There was no time to lose. I had to find Wilkins and start my journey to the nearest habitation regardless of the storm. The skipper pointed out the direction where the habitation was supposed to be and, taking along the DeVry, I started on my difficult journey. Every step I took my foot sunk in to the snow above the knee, and the drifting snow, carried by a headway wind of great velocity, struck my face painfully.

The habitation proved to be two and a half miles distant and it took me three and a half hours to make it, arriving there absolutely exhausted. Wilkins was there and aware of my coming to Spitzbergen. Green Harbor has the only government radio station. Another two and a half miles further inland from the first habitation I met Captain Wilkins. A heap of cables from New York was waiting me there, giving instructions to cover the story of Captain Wilkins and to return to Norway on first available vessel.

As "Mina" was supposed to await my return but seven hours, after a hurried talk with Captain Wilkins I had to make my way back to "Mina" under the same trying conditions, but I was forced to do it to make new arrangements with the skipper. When this was done I returned again to the radio station and when the journey was over I had made in all ten miles in eighteen hours' constant walking through the deep snow and raging storm. The new arrangement with "Mina" called her to wait for me in Green Harbor three days, bring me up to Kings Bay where I wanted to cover also the arrival of General Nobile's dirigible, "Italia," and to return to Norway afterwards.

However, while I was busy photographing Wilkins, "Mina" got caught by ice and had been carried with it out of sight of Green Harbor and she did not reappear until five days later. In the meantime, the "Italia" had reached Kings Bay. Nevertheless I proceeded on "Mina" to Kings Bay, a trip of 24 hours, took there the first pictures of Nobile, in Spitzbergen, boarded there the M/S "Hobby," which had been in the service of General Nobile since March and was returning now to Norway. A day later the "Hobby" reached Green Harbor and early in the morning, May 10th, we could see in the distance a man walking on snow shoes over the rough packice toward the "Hobby."

It was Wilkins coming to see the captain and to make arrangements for taking him, his flying machine, "Lockheed," and pilot, Mr. Eielson, on board to Norway. The agreement was soon reached and the "Hobby" with Wilkins on board went along the ice edge to look for a suitable landing place on the ice for "Lockheed." Such a place was found near Advent Bay and on May 10th at 10:30 P. M. we noticed the "Lockheed" flying above the beautiful snow and ice-covered Advent Bay mountains. Making three circles in the air around the ship the "Lockheed" made a graceful landing along side of "Hobby." Sharp at midnight they were lifted up on the "Hobby's" deck and at 2 P. M. on May 11th we started our journey back to Norway, Captain Wilkins with a record of his wonderful heroic and historic flight from Point Barrow to Spitzbergen and I with fine and exclusive pictures.

The last good-bye of Wilkins to Spitzbergen was impressive and in a way dramatic. Three Advent Bay inhabitants had come to the "Hobby" on a dog-sled of ten husky Greenland dogs to shake hands with Wilkins and to bid him farewell. When "Hobby" was leaving the ice edge heading towards the south, the Advent Bay-ers, waving their last good-bye, disappeared gradually into the blending, endless ice fjord, brilliantly lighted by the Midnight Sun.

The trip back to Norway on the "Hobby" was agreeable, the weather was fine and we reached Tromso in four days. Such is the life of a cameraman.

To the story I forwarded you from Riga, I want to add the data about the shipping of the Wilkins story to America, as I believe it was unique in the matter of speed in news reel work. The story runs like this: On May 12th, at 2 A. M., the "Hobby" left Advent Bay, Spitzbergen bound for Tromso, Norway, with Captain Wilkins and myself on board. It goes without saying that I had competition on the Wilkins story and, therefore, I had to make all IMPOSSIBLE speed to get my pictures to Paris to catch the Aquitania, leaving Cherbourg on the 19th of May. I did it. Myself and the stuff was in Paris on May 18th at 6 P. M. The film reached New York May 25th early in the morning, thus having traveled the enormous distance from Spitzbergen to New York in but thirteen days and five hours. To make this speed I used for transportation all kinds of means and ruses—the fast Norwegian mail boat, ordinary row boats, autos, fast motorboats, railroads and airplane, making short but straight cross-country cuts wherever possible. It was a mad race.

Later on came the hoped-for news from New York:

"Heartiest congratulations; Wilkins story clean scoop."

This is the greatest reward a camera-reporter can expect to get, and after that all worries, hardships and physical sufferings are soon forgotten.

Fox's New Laboratory

June 29th, 1928, was a great day for Mike Leshing, superintendent of laboratories for the Fox Film Corporation.

It was the occasion of the laying of the corner stone of the new Fox laboratory and the event marked the attainment of one of the ambitions of Mr. Leshing's career—the construction of a laboratory which should be the last word in the scientific evolution of the photographic art.

Such a laboratory is this new Fox improvement, according to this description broadcast by the studio.

"In this new laboratory all of the obsolete methods are to be abandoned. There will be no hand manipulation. The various operations will be automatic and continuous from the time the reel leaves the cameraman's magazine until the finished and dried reel is delivered at the end of the machines to be installed. Time and temperature controls will be automatic.

"Refrigeration and air conditioning plants together with every other device science has designed to maintain perfect conditions for the manufacture of films will be installed in his new laboratory.

"When one learns that last year Fox Films handled more than enough film, if placed in one continuous strip, to girdle the globe at the equator, the task which faces the laboratory equipment and personnel grips the imagination. Two thousand miles of film per month; 25,000 miles per year!

"Under this roof also will be carried forward a large amount of experimental development and productive efforts of that comparatively young child of the cinema family—**Movietone.** Tremendous strides have been made to date, and even greater strides are to be made in the future."

Saved from the Arctic

Ex-Secretary Charles G. Clarke, of the A. S. C., Returns Home After Being Lost in Alaskan Wastes Three Weeks

Captain Robertson (right) and Clarke, A. S. C. (left), just after being found by Nieninen. The latter's plane in background. Eighteen days' growth of beard and lips swollen and cracked from eating snow.

In May, 1928, the Fox Film Corporatoin sent an expedition into Alaska to get local color and to film whaling scenes. In the party were L. Virgil Hart, business manager; Captain Jack Robertson, Alaskan guide and cameraman; Ewing Scott, costumes and properties; Ray Wise (Eskimo), interpreter and camera assistant, and Charles G. Clarke, A. S. C., until recently secretary of the organization.

On May 13th the party departed for Point Barrow in two planes, and late the same day were forced down by fog on a frozen lake. On May 14th the plane piloted by Noel Weingot away with Mr. Hart, but Russell Merrill, the pilot of the other plane, found it impossible to get off and was marooned with Robertson and Clarke.

Clarke and Robertson started to hike back to Barrow, a distance of 100 miles, on May 22nd, but Merrill had stayed by the ship in hopes of getting it off.

From this point we quote from the "DAILY NEWS MINER" of Fairbanks, Alaska:

"Merrill used a funnel to dig a 30-foot runway, but when he opened up the motor the plane nosed over, bending the propellor. The three men believed Wien had never reached Barrow and their only chance was to start out on foot. After Merrill nosed over he carefully drained the oil, covered his engine and with one cup of cooked rice began the long walk. Robertson and Clarke had half a package of raisins and two emergency cans of chocolate rations. Robertson's stomach rebelled against the chocolate, however, and raisins formed his only article of diet. As a matter of fact, all three men soon reached such a point of exhaustion that despite the fact they lived on almost nothing they were not hungry.

Merrill carried a pistol with which he shot nine lemmings, a large species of rodent. These he ate raw and they and the rice made up his larder for ten days. When found he had only half a lemming in his provision can.

Merrill Found

John Hegness had joined the search for the lost flyers. One day he found the tracks of two men in the snow and followed them from Smith Bay. Merrill had also found the tracks and was following them. Hegness drove his dogteam over 100 miles this day.

When he was about 50 miles from Barrow he saw something which resembled a polar bear. Coming closer he saw it was a man and was to learn soon it was Merrill. Hegness was about 200 feet away when Merrill lay down in the snow, and by the time he came up the flyer was sound asleep. He had done this for days—walking until he was exhausted, falling asleep almost in his tracks and then, awakened by cold, trudging forward once more.

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Plane carrying part of the Fox Film party crossing the Endicott range, Alaska. This gives a fair idea of the country in which Clarke and Robertson were lost. A forced landing in the mountains usually means fatal disaster.

Both planes forced down on a frozen lake one hundred and fifty miles from Point Barrow. Wein's plane in the foreground was able to get away with Virgil Hart, but Merrill's plane in background was forced to remain here a month. Robertson and Clarke remained here nine days before starting to walk, Merrill following two days later. Note barrenness of the country.

When Hegness awakened him, Merrill said, "Hello, where are you going?"

"To Barrow," Hegness replied.

"What's the chance of bumming a ride?" asked the flyer.

When, just to see what would happen, Hegness told Merrill he had too big a load to take him in, the flyer seemed discouraged but not surprised, and made ready to resume his hike. Then Hegness quickly explained he was out especially to find the flyers, and after making some soup for Merrill bundled him in the sled. He soon heard the flyer groaning and realized he was becoming snow-blind. Merrill had snow glasses but when walking in fog took them off in order to keep to the trail and this soon affected his eyes. Hegness raced to Barrow as quickly as possible and Merrill was placed in the hospital. He is still weak but will be able to fly his plane out in a few days. While Clarke's and Robertson's faces were made raw and bleeding Merrill escaped this by rubbing over his face and hands some seal oil which he found in a cache on the coast.

CHARLES G. CLARKE

Clarke and Robertson were found before Merrill. On May 29 Wien and Nieminen had flown to Merrill's plane again and when Nieminen was returning he saw two men on the trail. Private Richard Heyser, U. S. Signal Corps, was with him and he landed on a beach. The two men were placed in the hospital, after which Nieminen returned to the beach for Heyser.

The two men had been walking nine days and were so exhausted they were ready to give up hope. The tendons in Clarke's feet had given out and for days they had supported each other as they walked. Both they and Merrill had seen the searching planes several times previously, but despite their frantic signals they were not sighted. Clarke and Robertson were overjoyed when they saw Nieminen swoop down to land.

Bring Plane Out

Two more trips were made to the lake—one to bring out equipment and the other for the plane. Wien, Nieminen and Hart flew to the lake in the Stinson. A propeller left at Barrow by Wilkins was placed on the Anchorage plane and fifty minutes from the time of arrival the plane was in the air. By this time all snow was gone and the clear ice made the take-off easy. The plane is now in Barrow and Merrill will fly it home. Scott and Robertson will go with him to Wainwright and Wien believes that Heyser will also come out.

Their hardships left visible effects on Merrill, Clarke and Robertson. Merrill lost 25 pounds, Robertson 30 and Clarke 40.

Wien, Nieminen, Wise, Hart and Clarke left Barrow Thursday. They stopped at Wainwright overnight, flying the next day to Kotzebue, where they landed in a heavy fog. The flight to Fairbanks was continued with one stop at Ruby.

From the time the flyers reached the Arctic, there were 24 hours of daylight, with the sun far above the horizon at midnight.

The Editor further quotes from Mr. Clarke's own personal diary of the trip, which document is so interesting it is regretted that it cannot be printed in full:

"May 28th: Monday.

"We followed the shore all morning and twice saw stakes set up in a row that seemed to indicate the way across the bay. As we did not know where we were, and ignorant of the method of picking up signs from the posts, we thought it best to follow the coast and avoid a possibility of being lost in the Arctic sea. About noon we saw ahead the signs of a camp with a cache, frames of boats, and several underground igloos. We cut the snow away from the door of one of these and entered. In the last compartment we found a stove, kindling and wood, so we made a fire. There were cooking utensils and some dehydrated onions and potatoes, so I started to stew up a mulligan. Also found some tea, and by washing out a can that had once contained sugar we rescued enough to sweeten our tea a bit. This shelter was like heaven. The Captain had a good sleep—his stomach was sapping him considerably. I had trouble keeping the fire going as the wood was damp and the stove didn't draw well, so I had to stay awake and keep it going—aided by some coal oil, found in a lantern. We washed up and dried out our socks and finally the mulligan was done and it surely tasted great. We stayed here until midnight, and after putting the place in order, as we found it, started out again. It was snowing and cold but we were rested and didn't feel we should linger or delay on the trail when we needed to get help back to Merrill as soon as possible,—so we went on, following the coast, which became less distinct as we progressed.

"May 30th: Wednesday.

"Kept the North coast all day. About 6 A. M. sun came out and was clear and warm most all day. The sun was a great help in keeping the course as there was little else to guide us and the warmth was mighty tempting to lie down and sleep. I had not had a wink of sleep since leaving the place, but I thought it extremely dangerous for either of us to fall asleep, for the other might doze off and we would freeze to death or at least lose some toes and fingers. Captain was dragging way behind now because the food didn't help him any and he was suffering from his stomach. My legs didn't bother me much except when I would rest, which I had to do while Captain was catching up and resting. Then they would stiffen up and I would have to hobble around until under way again. I felt encouraged to know that I had the spirit to fight it out and not lay down and die out there. I felt that this was a great turning point in my life.

"May 31st: Thursday.

"The sun was with us most all night and at midnight it was well above the horizon, due North. Captain seemed to stop longer and more often and I talked to him like he did to me that night when I thought for a while I was out. We simply had to keep fighting,—we had nothing left to eat but the crumbs of the Rye Crysp. I thought that perhaps some warm water might relieve him, so using the rolled-up bits of the cardboard carton that had contained the Rye-Crysp for fuel, I was able to heat up enough snow to make a small can of water. Stirring up some crumbs in this made a palatable gruel which seemed to help him. Once he frightened the life out of me, because after a rest it took me a few moments to get under way, get a compass bearing, wipe out my goggles, etc., so I would generally start a head, and Captain would doze until the last moment. When, at about what I figured, was the edge of hearing distance, I would call him and he would acknowledge by waving his hand. I would then walk on for quite a distance, feeling that he was walking and catching up with me, as he walked faster. One of these times I saw him acknowledge the call so I walked on. After a mile or so I didn't see him, so I slowed up, but kept going. Still he didn't appear. Could he be asleep?—I would have to retrack those hard-earned, painful steps to wake him. I plugged on praying to see him show up. It seemed it must be miles back, and I couldn't go on without him, so I started back and finally I heard a distant "Yoo-Hoo"—God! how I was relieved! It seemed he had delayed until the last minute, and I was not in sight. He saw some posts that I had seen, but as they were too much off the course to the West, I had passed them by. I saw him head for them, so I went back in that direction. I doubled back about a mile and a half, but it was worth it. He stopped at the posts,

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Use of Tachometers

Their Use Becoming General in All Technical Departments of the Motion Picture Industry---Transaction S. M. P. E., Sept., 1927

By Nicholas M. Trapnell

Speed indicators, when first used on projectors in motion picture theaters, were considered a luxury, and were only found in a few of the best first-run houses. The advantages to be gained by the use of accurate speed indicators, or tachometers, soon became apparent, however, and today the projectors in nearly every first-run house are equipped with them.

It is only by the use of tachometers that the modern theater is able to maintain an exact schedule, that the projectionist is able to run his projector at a definite, constant speed which will give the best results on the screen, and that the orchestra leader is able to correctly time his score; but it is not only on projectors that tachometers have made possible improvements in technique which would otherwise have been impossible.

Tachometers are now in general use, or are coming into general use, in other phases of motion picture production and exploitation, such as on cameras, where the importance of a standardized constant taking speed has long been recognized and insisted upon by this body; on film developing and printing machine and where this time must be varied with changes in the strength of the solutions; and more recently, in the two systems of "talking motion pictures," the Vitaphone and Movitone, where the sound recording device must be perfectly synchronized with the camera.

There are probably other phases of the motion picture industry where tachometers are now considered a luxury but where they will soon become a necessity, also there are probably phases where tachometers are not used at present, but where much could be gained by using them. My object in coming to this meeting is two-fold, to discuss present uses of tachometers and to get suggestions and information on new applications of the tachometer in the motion picture field.

There are certain general conditions which must be met by the tachometer manufacturer in nearly all applications of tachometers to motion picture work, and they may be briefly described as follows:

The tachometer must be light and compact. This is especially important on all portable equipment, such as cameras, where any increase in weight or bulk is undesirable.

It must require only a very small amount of power to drive it; because on most motion picture equipment there is very little surplus power available for driving the tachometer. This is true on motor driven as well as hand-driven equipment, since the size of the motors is usually kept to a minimum.

The accuracy must remain constant and must not be affected by wear of the mechanical parts. A tachometer whose accuracy decreases with increased wear of its parts is worse than useless after a short time in service.

It must be reliable and require practically no attention; because most projectionists and cameramen have not had special training necessary to enable them to make repairs on tachometer equipment, if they had the time.

The tachometer readings must often be transmitted to a point remote from the machine whose speed is being measured, as on projectors or remotely controlled cameras, and it is often necessary to have more than one indicator connected to the same machine, as on projectors in theatres where one indicator is mounted in the projection-room, one in the orchestra pit and sometimes a third in the manager's office. The tachometer equipment should be so designed that this can be done easily and cheaply.

We now come to a consideration of the different types, or classes of tachometer equipment available, and the degree to which they meet the above-mentioned conditions; which is a measure of their suitability for motion picture work.

Tachometers may be divided into four general types or classes, according to the principles on which they operate.

First—The mechanical type, which usually consists of a centrifugal device having a rotating mass whose position is dependent on the speed at which it is rotated and which is mechanically connected to a pointer moving over a scale calibrated in revolutions per minute, or other suitable units.

Second—The hydraulic type, consisting of a small rotary pump which circulates liquid, usually an oil or glycerine, through a closed circuit in which is an orifice of definite diameter. The pressure of the liquid in the circuit between the pump discharge and the orifice is directly proportional to the speed at which the pump is driven and the speed is measured by means of a pressure gauge calibrated in revolutions per minute.

Third—The magnetic drag type, in which a rotating permanent magnet tends to deflect an armature hung on pivots. The deflection of the armature is resisted by a spiral spring and the amount of deflection is proportional to the speed at which the magnet is rotated. The armature carries a scale which indicates the speed of rotation.

Fourth—The electric type, which consists of a small direct-current generator or magneto, driven from the device whose speed is to be measured, generating a voltage directly proportional to its speed, and connected by means of wires to a voltmeter calibrated to read in revolutions per minute, feet per minute, or other suitable units.

The mechanical type of tachometer, although it can be built in a very light and compact form, is usually far from being accurate in its reading, due to wear of its parts; and it is impossible to transmit its readings to a point remote from the machine whose speed is being measured. In spite of these defects, however, it is used to some extent in motion picture work.

The hydraulic type, on account of its large size and weight, and the large amount of power necessary to drive it, is never used in motion picture work.

The magnetic drag type is very little used in this work because it is usually necessary to drive it by means of a flexible shaft which consumes considerable power, is subject to wear, and adds materially to the weight and inconvenience of portable equipment.

The electric type is by far the most suitable tachometer for most motion picture work. It can be made very light and compact, its accuracy is not affected by wear of its mechanical parts, it requires an extremely small amount of power to drive it; and when properly designed and constructed requires no attention of any kind after installation. Its readings can be easily transmitted to any distance by extending the connecting wires between the magneto and indicator; and as many indicators as desired can be run from the same magneto.

There are now two classes of electric tachometers available for motion picture work. In the older class the magneto generates a very low potential, about eight-tenths of a volt per 1000 revolutions per minute, has a high internal resistance, about 70 ohms, a low output, and a low resistance in the external circuit, which includes the indicator and connecting leads. This class

has several disadvantages. It is subject to error due to changes in resistance of the external circuit which may be caused by faulty electrical contacts or connections, or extreme temperature changes. Because of the likelihood of error due to resistance changes, the brushes which bear on the commutator of the magneto are made of a soft con-corrosive alloy to prevent corrosion at this contact point, and since this is a poor bearing metal, the brushes soon wear out. The magneto, indicator and connecting leads must all be adjusted and calibrated together and are not interchangeable. The indicators, because of the low output of the magneto, must be very sensitive which makes them delicate and subject to damage due to vibration, etc. This condition is aggravated when more than one indicator is operated from one magneto.

In the newer class of tachometers, the magneto generates a comparatively high potential, 3 to 6 volts per 1000 revolutions per minute; has a low internal resistance, about 20 ohms, high output, and a high resistance in the external circuit, nearly all of this resistance being in the indicator. This class of tachometer, because of its high potential and high external circuit resistance is not so much subject to error due to poor electrical contacts or connections. The connecting wires may be made any length or diameter within reason, because their resistance is a very small percentage of the total resistance of the circuit. The magnetos and indicators require no special adjustment together with the connecting wires and are all interchangeable. The indicators are more rugged, and as many indicators as desired can be connected to one magneto because of the higher current capacity of the magneto.

I will now describe a good example of the latter class. The magneto, which is part of the tachometer, is a direct-current generator having a permanent magnet field and a revolving armature provided with a commutator on which bear the brushes for collecting the current generated in the armature.

The distribution and uniformity of the magnetic flux across the air-gap is governed by pole pieces of proper shape and the permanency of the magnetic circuit is obtained by an exceptionally small air-gap and a magnet made of special steel, specially treated and aged.

The brushes and commutator segments are constructed of special hard, non-corrosive alloy, having an exceptionally long life. The brushes are definitely adjusted for proper position when the magneto is assembled. These and the commutator do not require any attention, except cleaning at yearly intervals, and the brushes are so arranged that they can be easily removed and replaced.

The armature is constructed so as to have unusual mechanical strength and is mounted in self-aligning ball bearings which permit extremely free rotation and which require no lubrication or attention of any kind. These are the only moving parts in the magneto.

The magneto is adjusted to generate an E. M. F. of 6 volts per 1000 R. P. M. and to have an internal resistance of exactly 20 ohms. The voltage generated is directly proportional to the speed; that is the speed-voltage curve is a perfectly straight line. The terminal voltage may be adjusted to an exact value under different conditions of indicator load by means of a magnetic shunt which can be operated from the outside of the magneto case. After making final adjustments the shunt is sealed.

The magneto should be so driven that its normal speed is between 1000 and 2000 R. P. M., giving a normal voltage of between 6 and 12 volts. This can be done by the proper size and arrangement of driving pulleys, gears, etc.

The magneto is compact and light, and can be mounted in any position. It can be driven from the machine whose speed is to be measured by means of belt and pulleys, spur gears, or direct connection to some shaft or rotating part running at a suitable speed. The power necessary to drive it is slightly more than 1/746 horse power (one watt) which is less than the power required to drive any other tachometer at present on the market. Its accuracy is guaranteed to be within one per cent, although the accuracy will be greater than this under ordinary conditions. That this accuracy remains constant has been proven by severe laboratory tests.

The voltmeter indicators used as part of the tachometer are of various forms and sizes to suit different conditions. The form commonly used with motion picture projectors is a fan-shaped instrument having a long and easily read scale and at the same time occupying but little space. It is designed to be mounted on a panel by means of two studs on the back of the instrument case; these studs also act as binding posts for the connecting wires to the magneto on the projector. The indicator has a double scale. The upper scale shows the film speed in feet per minute, while the lower scale shows the time necessary to project a thousand feet of film when running at the speed indicated on the upper scale.

All indicators are adjusted to have a resistance of 500 ohms per volt; thus, an indicator designed to be used with a magneto whose normal speed is 1500 R. P. M. would be adjusted to 9 volts and would have a total resistance of 4500 ohms. This is the large resistance which eliminates the possibility of errors due to poor connections and long connecting wires.

For instance, suppose the connecting wires were No. 14 B. & S. gauge copper, having a resistance of 3.1 ohms per 1000 feet, and that the indicator is at a distance of 250 feet from the magneto. The total length of the connecting leads would then be 500 feet and their total resistance would be 1.55 ohms. This .3 per cent of the total indicator resistance of 4500 ohms and would cause an error of only .3 of one per cent in the indicator reading, which would not be noticeable.

The guaranteed accuracy of the indicators is one per cent. This, combined with the magneto accuracy of one per cent gives a guaranteed overall accuracy of two per cent for the tachometer, although the probable error is much less than two per cent.

In conclusion, I might say that there are probably many new appliances in motion picture work where tachometers could be used to advantage, such as in airplane photography, where several motor-driven cameras could be mounted in different locations on the plane and each camera equipped with a magento. The magnetos could be all connected, through a selective switch, to one indicator mounted in the cockpit. The speed of all the cameras could then be read and controlled from this one point. Another new and advantageous tachometer application would be on ultra-speed cameras used in scientific work by research laboratories, where the exact time of duration of the various motions or events photographed could be easily calculated if the speed of the film was accurately known.

Our Front Covers

The series of front covers reproduced from stills by members of the American Society of Cinematographers is augmented this month, August, 1928, by a beautiful and very unusual photograph caught by the camera of Mr. Curtis Fetters, A. S. C., on the sand-dunes near Yuma, California.

Mr. Fetters is classified as an Akeley camera specialist on the roster of the A. S. C., but, while a skilled operator with the Akeley, he is first of all at heart a pictorialist and nothing so delights him as to discover an unusual picture in nature's art gallery and trap it with his camera.

If THE AMERICAN CINEMATOGRAPHER had thirty times twelve front covers in a year instead of only one a month it could not begin to exhaust the wealth of art pictures produced by the talented artists of the A.S.C., but the policy of our magazine will be to continue presenting these A.S.C. gems on our front covers and the cover for September will be reproduced from a beautiful study by our President, Mr. John W. Boyle, caught by his camera at Venice, Italy.

Jack R. Young, A. S. C., writes from the Yosemite that he is enjoying his vacation immensely. He says the fish up there are about so long.

Projection

In a recent address on the subject of better projection, P. A. McGuire, advertising manager International Projector Cohporation, said in part:

With an extremely limited demand for projectors, we are compelled to manufacture practically one type of mechanism that can be used in the so-called motion picture palace and in the smaller theatres throughout the country. We must design and manufacture projectors that give a clear, steady picture and are dependable under all conditions. The industry demands first—equipment which permits owners to operate their theatres 365 days in the year from early morning until late at night and give a perfect performance under all conditions.

Perhaps the greatest advance that has been made in motion picture projectors in recent years, has been the development of labor saving devices which give the projectionist more time and more opportunity to control the presentation of the picture, and to that extent are a definite step in the direction of better projection. These are the practical problems we must meet and we cannot give too much consideration to ideas which may be of extreme interest from a theoretical standpoint but which cannot be profitably marketed for many years because the industry is not ready to adopt them.

In spite of the fact that we are the oldest and largest manufacturers of motion picture projectors in the world, we are not a large company as compared with many of the picture producing and exhibiting enterprises of this country. Although the motion picture industry, as a whole, has grown to tremendous proportions, the manufacture of projectors is still conducted upon a very limited scale. There is a demand for considerably less than 2,500 machines a year and it will easily be seen that such a low production basis does not permit large scale operation as compared with any other manufacturing lines.

Manufacturers of projectors are severely handicapped by low production basis, and this is largely due to the fact that many theatre owners are unwilling to purchase new equipment until absolutely forced to do so. Even in the repairs and replacements, many large theatre owners who are liberal in other ways are extremely economical when it comes to the projection department. . . . .

One of the greatest mistakes this industry has made is to believe that projection is purely mechanical and to fail to realize that the projectionist must be a highly skilled specialist. No matter how skillful or conscientious the projectionist may be, he cannot be expected to give the best possible results with defective equipment. There are many things responsible for poor projection, but I think you should thoroughly realize that there is seldom any good excuse for inferior screen presentation.

Poor focus,—an unsteady picture,—a flickering image on the screen,—poor illumination,—travel ghost,—film breakage,—improper projection speed,—all these things spoil the illusion. The very smallest defect in projection can be responsible for spoiling the effect we have all tried so hard to secure. For instance: A little dust or oil on the objective lens,—warped film,—the vibration of the projector,—a bent sprocket shaft,—film shrinkage,—imperfect perforations in the film,—unsteady arc,—dirty condensers,—insufficient current,—punch-marked film,—all of these are contributory forces which may result in poor projection and a destroyed illusion.

All these defects are preventable if the theatre owner is willing to take a reasonable interest in the work of the projectionist.

Norman DeVol, A. S. C., assumed the post recently vacated by Ex-President Dan Clark of the A. S. C., with Tom Mix on the latter's new production program with F. B. O. Curtis Fetters will do the Akeley and Still work, and Cliff Thomas will shoot second. "The Pony Express," directed by James Horn, will be Mr. Mix's first vehicle.

Membership of the A. S. C. to Date--July, 1928

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Bridenbecker, Milton—Universal.
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Benoit, Georges—Maurice Tourneur, Paris.
Brotherton, Joseph—Universal.

Carter, Claude C.—Australia.
Cline, Wilfrid—Universal.
Cronjager, Edward—Lasky.
Clark, Daniel B.—Fox Studio.
Cotner, Frank M.—
Clarke, Chas. G.—Fox.
Cowling, H. T.—Eastman Kodak Co., Rochester, N. Y.
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Davis, Chas. J.—Fox Movietone, London.
Draper, Lauren—Sierra Pictures.
Daniels, Wm. H.—M.-G.-M.
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Forbes, Harry W.—Stern Bros.
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Griffin, Walter L.—Metropolitan.
Gaudio, Gaetano—Caddo Productions—Met. Studio

Hallenberger, Harry—Lasky.
Hilburn, Percy—M.-G.-M.
Hunt, Roy—Lasky.
Hyer, William C.—Educational.
Horne, Pliny—
Haller, Ernest—Robt. Kane Productions, Hollywood.

June, Ray—Gotham Prod.
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Jackman, Fred W.—Technical Director, Warner Bros.
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Chaney, George—United Artists.
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Cunliffe, Donald—

Doolittle, Jas. N.—First National.
Drought, Jas. B.—Universal.
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Dyer, Edwin L—M. P. A. Studio, New Orleans.

Fitzgerald, Edward—M.-G.-M.

Giridlian, Jas. N.—F. B. O.
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Westerberg, Fred—De Mille.
Williams, Alfred E.—Lasky
Rex, Wimpy—Lasky.
Witzel, E. L.—Universal.

Our A. S. C. Outposts

The Pageant of the Far East As Caught by the Camera Of a News Cinematographer---Reel III

By Len H. Roos, *A. S. C.*

When I looked out of the porthole of my cabin, at daybreak, I found we were tied up at TANDJOENG PRIOK, JAVA. I was dressing, preparing to go up to Weltevreden, the residential section of Batavia, when I was handed a cablegram instructing me to stop in Java. I hastily packed my baggage and after getting my tickets validated by the purser, disembarked and registered at the Hotel Nederlanden, in Weltevreden, seven miles from the dock. This hotel is situated in Rijswijk and, facing one of the main canals, is a very comfortable place to stop. The food is excellent and the hotel is spread out in one-story rooms and lounging verandas which give the impression of coolness. My room is about one block from the dining room along a palm avenue, and when I first walked from the room to the main part of the hotel it seemed so far I thought at first it must be a sleeper jump.

At any time you can find natives washing clothes in the canals. They beat the clothes on a rough board and spread them in the sun until they are clean. After seeing them do this for the first time you rush back and look over your things to see if they have left any buttons on anything. Anyone visiting Batavia should call on Mr. Van Varda, the director of the Government Tourist Bureau. Mr. Van Varda is a great believer in motion pictures as a means of attracting tourists to his country and will go out of his way to arrange things for the visiting cinematographer.

Storing film in the tropics and being so far from a laboratory, it is necessary to make daily tests. I have tried several test tanks but I find the handiest are two Premo No. 2 film pack tanks. I have two tin cylinders about 1½ inch smaller in diameter than the tanks. One Eastman Premo No. 2 tank powder to a tank of water (temperature 65 degrees) gives average results, developing for twenty minutes. By this I mean that if test negative comes out of the tank in twenty minutes and after fixing looks O. K., then your exposure is pretty right. Over and under exposure can be detected by this time and temperature method. It is a simple matter to shut yourself up in a wardrobe or dark closet and fasten about two feet of test up and down the cylinder by means of paper clips, you will be able to get about seven of these two-foot tests on each cylinder. After twenty minutes of developing you again enter the dark wardrobe and transfer the cylinder to the fixing bath in the other tank. Developing powders for these tanks are easy to carry, and I have found them quite accurate for testing. During the heat of the day a haze arises and it is best to photograph before 10 o'clock and after 3 o'clock.

From two to four in the afternoon nearly every business house closes and everyone goes home and takes a nap. I couldn't see the necessity of this at first as in Singapore they keep regular hours, but after seeing a Java Dutchman eat his lunch the two-hour nap is obvious. He gorges for about one hour on Ryz Tafel and then goes to sleep it off for two hours. A smattering of the Malay language is a necessity if you go about alone as natives speak only Malay and most of the whites speak Dutch. After attempting to read a few of the Dutch signs on the buildings and streets you purchase an English-Malay pronouncing dictionary and keep away from the Dutchmen.

When I cleared my camera at the customs they took the number of every piece and made me leave a deposit of a considerable number of Guilders. All I have to show for four hours' work and a large amount of money is a long paper written in Dutch. They said I would get my money back when I leave—we'll see.

A favored Christian name for a Malay boy is Jesus. I have a Malay assistant whose front name is Jesus and whose ability as an assistant is nil minus 2. After he persists in making the same mistake several times during the day, he thinks I am calling him when I speak his name and add "what an assistant!"

Picture theatres in Weltevreden have two performances a night. The first show starts at seven (for those who want their pictures before dinner) and the second at ten. I went to see "Subway Sadie" at the Oost Java Bioscoop, an open-air theatre with a marble floor, wicker chairs and tables and very good projection, with the exception that they have only one machine and the screen is set at an angle. "Chee-chucks" chase mosquitos and other insects across the screen and birds and bats fly about. If it starts to rain you retire to the rear which is under cover. When the lights went out they ran a slide "Welkom" (everyone is, who pays the one Guilder and eighty cents admission fee). An English news reel followed by a Christie comedy and five reels of the feature made up the first half of the show when they ran another slide saying "Pauz." No one did. The audience kept right on ordering drinks from the boys the same as they do every two reels when the projectionist stops his machine to change. The orchestra, consisting of one piano, is in the rear of the theatre near the entrance. The titles are in both Dutch and English and the audience is made up of Halfcasts and Dutch. The performance finishes about midnight.

I had some shots to do from a car and had to have the wind-shield off. I forgot to mention before that I have the champion horn-blowing driver in all of Java. He can get more notes out of single-reed horn than anyone I have ever heard. There is no stopping him, and when the wind-shield came off I noticed the horn was clamped to the frame of the glass. I figured I would have a little quiet or at least a change as he would have to use the electric horn. Not that boy—No, sir—he took the horn off the wind-shield and put it on the seat beside him and honked it all the way down the road. Its no use; there is no stopping him. Some day I'll try putting water in the bulb.

I had to go to Bandoeng by rail and found the trains quite comfortable. All railway property is marked "S. S.," which means "Stasts Spoor-en Tramwegen" (you pronounce it—I'll stand here). I understand all rolling stock is hauled by American Baldwin locomotives. They have some heavy grades from Weltevreden to Bandoeng and also a very high bridge with a curve in it which I understand is very interesting to engineers throughout the world.

The Homann Hotel, in Bandoeng, is as good as anyone could ask for. I don't think I have ever been in a hotel room with more lights. There are several lights on the gallery (veranda); several in the bedroom and more in the bathroom. All of them were controlled by three double and triple switches and it must have taken five minutes to get all the lights turned off when I decided to retire. I would get one set turned off and start on the next and then turn the switch once too often or something because more would come on. I finally got them all out and went to bed thinking that the hotel office should either supply an electrical engineer with each room or give the guests a short course in electrical

engineering, awarding diplomas or licenses to the applicant after he has shown his efficiency by a test.

As Bandoeng is in the mountains it is cool at night and the water in the bath too cool for comfort. They have what they call a "hot bath." This is a nickled glass appliance, "By Professor Junkers," so it says on the name plate and requires quite as much figuring out as the light switches. When I did get it going a luke warm stream of water dribbled out of its spout. An appropriate name for the appliance would be the first syllable of the professor's name.

I visited the native theatre, which was very interesting. The admission was fifteen Guilders cents (about 6 cents in American money). Inside it was a huge place with an earth floor. Natives walked about and patronized the dozens of eating and native drink stands. On one side a picture was being screened, "Charlie Chaplin's 'The Gold Rush'," and the natives got just as many laughs out of it as any other audience in any part of the world. Farther down the theatre a native opera was being staged and, on the right-hand stage as I went in, I saw native dancers swaying to the peculiar music of the country. The place was jammed and was as interesting a theatre as I have ever seen.

The scenery enroute to Bandoeng is extremely interesting. Rice fields rise in terraces on the hills and the landscape looks like a huge checker-board. It appears as though every square inch of land in Java is under cultivation. Every time they rang the bell of the train (which was quite frequent as they have native engineers and firemen) I expected to hear: "All aboard for Natchez, Cairo and St. Louis!" The bell has exactly the same tone as the one used by the "Two Black Crows." Their record is just as popular in this part of the world as I imagine it is at home.

At all hours during the day native peddlers call at the hotels and attempt to sell a standard line of curios to the guests. They do not bother the male guests much, but concentrate on the "weaker sex." (The bird that coined that phrase never saw a Dutch lady.) The lady in the room across the road from me has frequent set-tos with them, and if a sport writer was asked to cover the affair he would probably turn in copy reading something like this:

"OUT IN THE NINTH ROUND"

"The crowd was on its feet as the boxers sparred for an opening in the center of the ring. For eight hard rounds the battle had raged, points first to one gladiator and then the other. It was anyone's fight when suddenly the White Hope stepped back and———. "In the jargon of the motion picture studios," the scene will now slowly dissolve to———." An European lady seated in a comfortable chair on the veranda of her hotel room in the Hotel Nederlanden, Weltevreden, Java. The scene is the same as the one described above, except there is no crowd and the sparring is between the "Mem" (Lady, Mistress, etc.,) and a native peddler of silks, lace and cross-stitch linen. The "Mem" has her mind set on a certain bit of lace. The argument, over the reduction of one guilder from the price, has been going on for some rounds. The peddler has handed out some snappy left-hooks (adjectives), counter blows of fractions, of a Guilder and is attempting a clinch of the sale. The "Mem" has stood her ground and retaliated with short, straight lefts and rights (Tidas) "No." Time is almost up for the peddler. If he can hold out for the odd Guilder, he is sure of a decision in this round. He changes his tactics and assumes a bored expression at the same time making a movement to repack the display on the verandah floor. The "Mem" counters this lead by picking up a book and leaning back in her chair. The peddler lands a quick chop of ten cents off the disputed Guilder but "Mem" counters this by hooking over a wicked "Pigi" (go—be off—get away). The peddler takes the count and accepts the two Guilders for the lace. The "Mem" smiles as she pays him thinking of the pleasure she will have telling her friends at home of her smartness in bargaining with the native of Java. The native smiles to himself as he pockets the two Guilders. He has had a very pleasant argument and the purse of two Guilders was his original price anyway. I reached the ring, I mean the veranda, at this stage, and might have saved the peddler punishment, if I had reached the scene of battle earlier, by throwing in the towel in the first round as I have watched the "Mem' for several days and know her ability in an argument. The peddler was arguing out of his class, but it must have been a great bout. Tomorrow, the "Mem" will have a six-round, no-decision argument with a seller of brass ware. It should be an interesting and exciting "go" for followers of this sport.

As this about completes my 2500 words for this month, I will strike the arc and display the slide that says:

"PAUZ"—Until Next Month.

Talkie Talk

By Phil Gersdorf

"Unless motion picture producers show more wisdom than they have in the past, the movie will go through the same phase of imitation of the speaking stage with the introduction of talking devices, that it passed through in its early history."

That is the warning sounded by Ralph Block, who is producing twelve of the twenty-eight pictures of the new Pathe program. Block is one of the few producers in Hollywood who came to motion pictures with a mature knowledge of the stage behind him. Before he entered motion pictures nine years ago, he was dramatic critic of the New York Tribune, and was also associated with the New York Theatre Guild in its early history.

"The motion picture is an entirely different form of entertainment from the stage," Block explains. "It has its own laws, its own capacities and limitations and it differs in its vital aspects. Nevertheless, stage technicians who have never had anything to do with the camera are already being imported to Hollywood to produce talking pictures. The result undoubtedly will be, for a while, a long series of movies photographed directly for stage-action, with the introduction of close-ups to provide for mechanical speech.

"Sound and mechanical devices which make dialogue a possible substitute for written titles in a motion picture, only extend the possibilities of the camera. But a lot of bad pictures will be made with dialogue before producers wake up to the fact that they are still dealing with film and camera—because the microphone is as much a camera for sound as the motion picture camera is necessary for vision.

"The idea of talking pictures may be basically sound, but to think of giving up all the advances that have been made by the movies in the past few years in the use of pantomime—which without a doubt early sound pictures will surrender—is to throw away everything of value that has been built by the best minds of the industry. The easiest way, of course, will be to reproduce the scenes, story development and business of stage plays with dialogue inserted in close-ups where it is necessary, but the public will soon tire of this kind of bastard art.

"The use of spoken dialogue certainly will intensify and add to the forcefulness and vitality of motion picture entertainment. This will be especially true when it is used to develop the ideas that the camera itself has established. But it would be unthinkable to give up the fine pantomimic humor and drama that the motion picture camera had developed to such a high degree. The use of dialogue will also decrease the difficulties that motion picture scenario writers now have in building exposition, if it is used with imaginative insight.

"Motion picture technique is no great secret, nevertheless it demands experience in its use. Where the movie will benefit greatly, however, is in the fact that these increased facilities will attract imaginations and creative intellects from among the world of writers who have hitherto refused to become interested in the screen—aside from the money they were able to get from it—because of the fact that the use of spoken language, with all its intonations, inflections and implications was denied to them."

G. E. Talking System

JAMES R. CAMERON

Continued from July issue.

Dr. Hoxie has developed three different pieces of apparatus to meet the different conditions encountered in making and projecting talking motion pictures. These are the pallophotophone, the pallotrope and the photophone. Both pallophotophone and pallotrope record sound photographically on film. The photophone is simply an attachment to an ordinary projection machine, it reconverts the photographed bands on the film into sound.

In the pallophotophone the mirror, vibrated by the speaking or singing voice picked up by a microphone, records sound directly on a film without the aid of a photo-electric cell. In the pallotrope the light from the mirror, actuated by a sound collector, falls first on a photo-electric cell. The fluctuations in current produced in the cell cause a second distant mirror system to oscillate and record light reflections as bands on a film.

Whether the pallophotophone or the pallotrope shall be used is dictated by the conditions that prevail. When it is advisable to record sound at some distance from "location" the pallotrope is the apparatus used. Here it may be mentioned that "pallo" is of Greek origin and means moving or dancing. It is in truth a dancing light that makes the record and reconverts it into sound.

The photophone, which is attached to the projector and which is the sound translator, is small enough to be carried in an ordinary valise. Here a slot similar in size and shape to that of the recording machine is to be found. The film passes across the slot. Light from a lamp passes through the film and falls on the photo-electric cell, after which the loud-speaker does the rest.

Vacuum tube amplifiers, with which millions of radio listeners are now familiar, are used both in recording and reproducing sound. Feeble telephone currents are thus magnified tremendously. Amplification is particularly important in reproduction. The loud-speaker must fill the auditorium or theatre with music of full, natural volume, and only by amplification and a correctly designed loud-speaker can that be attained.

The sound record, as we have seen, appears at one side of the film, and this film is moved intermittently across the projecting lens. Sixteen pictures are jerked in a second past this lens. But music on the film must flow continuously: there must be no jerks. To overcome this difficulty sound is produced from a part of the film which is in continuous movement. Hence the sound record does not appear actually adjacent to the appropriate pictures, but a foot or two away from them.

The secret of Dr. Hoxie's success lies largely in the extraordinary lightness of his mirrors and the parts that rock them and make them reflect beams of light on a film or on a photo-electric cell. So sensitive are the sound collectors and mirrors of the Hoxie machine that whispers can be picked up from a distance of 75 feet and translated into sound bands on the films.

Clearly the direction of a talking motion picture requires a new and very exacting technique. The actors must be perfect before the director shouts "Camera"—perfect in action, perfect in elocution. As the film is unreeled during the making of the picture the director must exercise all the fortitude and self-restraint of which he is possessed. There may be no bellowed instructions. Even the rustling of a piece of paper or the soughing of the wind in the trees is recorded. Yet despite the delicacy of response, the mirror of the Hoxie sound collector is not shaken out of place or deranged by the blaring of a brass band.

It must not be supposed that the apparatus for photographing sounds according to Hoxie's principles froms part and parcel of the camera on "location." The machine for taking the picture and the machine for recording collected music or speech are separate. Both are driven by electric motors, but the motors are acurately synchronized. Two separate negatives are obtained, the one a tenth of an inch wide, constituting the sound record, the other seven-eighths of an inch wide, constituting the action of the scene. The two are printed side by side on a single strip of film. Since sound and action are on one film there can be no mistake either in synchronization or tempo. A reel is projected at the regular speed, the time of the music necessarily be correct.

Announcing New 125 Ampere Kligel Spotlight

The new Kliegl 125-ampere, long range, Spotlight floodlight, and effect projector, completely equipped for white and color lighting, framing, fading, standard effects and spotlight attachments—providing in a single unit everything that may be needed in the operation of the projector; and having all controls centralized, to facilitate speedy, convenient, and easy operation.

A new spotlight, floodlight and effect projector of greatly improved design—with more convenient controls, greater flexibility of operation, and higher lighting efficiency—embodying an entirely new departure in spot-flood control—wherein the arc lamp remains stationary and the lens is made to travel for focusing the light beam—has recently been announced by Kliegl Bros.

It is a 125-ampere, long-distance projector, complete in every respect, providing in a single unit everything required of a projector—spot, flood and color-lighting, framing shutters, effects, etc.

The design is compact, can be accommodated in a comparatively small space, and the hood is lower at the front than at the rear so that the operator's line of vision is unobstructed.

Higher Lighting Efficiency

It projects the light any distance up to 150 feet—and gives anything required from a 4-foot, perfectly round spot to a 50-foot spread—with uniform intensity; providing an intense white light having all the qualities of strong sunlight, bringing out brilliant colors in their true value. Finer adjustments of the arc afford a greater amount of light projection for a given current consumption, and a shield in front of the arc prevents light from the flame entering the optical system—eliminating ghosts and false light.

Centralized Control

All controls, including arc, focusing, shutters, color screens and directional controls, are centralized at the rear of the spotlight, in full view of the operator, and within arm's length of the operating position—affording the greatest convenience, speed and ease of operation.

Arc Lamp Stationary

The arc lamp remains in a fixed position—all focusing is done by moving the lens, causing no disturbance in the adjustment of the arc. Arc control handles are fixed in position and do not protrude more than a few inches beyond the lamp housing.

Arc carbons may be adjusted in every conceivable way—angularly, vertically and horizontally, and the lower carbon holder may be moved independently of the upper carbon, in any lateral direction. Six different controls are provided so that the arc can be quickly and easily centered, irrespective of any condition that may arise, and the arc length and crater adjusted to obtain the maximum effective light. Fibre grips insulate the arc control handles from the heat of the arc and protect the operator against burnt fingers.

Focusing Control

Condenser lens travels on a movable carriage and focuses the light without disturbing the arc lamp. The lens is made to move by simply turning a handle on the side of the spotlight. It travels quickly, smoothly and freely—stays put in any set position without being clamped, and is always ready for instantaneous change of focus.

One lens takes care of the full range from a 4-foot spot to a 50-foot flood. The simple movement of the lens, backward or forward, along the optical axis by means of the control handle, is all that is required. A pointer on the focusing control handle travels over a numbered dial on either side of the spotlight and in plain view of the operator. It indicates the position of the lens and permits setting the lens quickly to any desired focus.

The lens carriage slides on two parallel rods, and is attached to a chain, which passes over two sprocket wheels—one at the front and the other at the rear. The shaft of the rear spocket extends outside the housing and to it is attached the control handle.

To the underside of the chain a counterweight is attached which also slides on two parallel rods, but always moves in a direction opposite to that of the lens and thereby maintains the center of gravity and keeps the spotlight in perfect balance at all times.

The frame in which the lens is mounted, is hinged so that the lens can easily be removed for cleaning or replacement, and is also so designed as to allow unrestricted expansion.

Color Lighting

A color box or boomerang on the front of the spotlight provides means for changing the color of the light beam. It contains four color frames for gelatin mediums, controlled by levers at the rear of the spotlight—and ready for operation at all times. There is a separate lever for each color frame and each lever is keyed to correspond with the color it controls. The position of the handle indicates the position of the color screen and a quarter turn throws the screen in or out of position. The color screen is free of all mechanical connections and may be readily removed by simply raising the cover of the color box and lifting the screen out of its slide grooves; or, if it is to be inserted, simply dropping it into its proper place. Gradual or quick changes of color can be produced and one color blended with another as may be desired.

Framing and Fading

A curtain shutter and iris shutter set in the lamp housing, and independently controlled from the rear, permit light to be framed to flood the stage or orchestra pit, and to fade the light on or off at will. They are quick acting in operation and a quarter turn of the handle is sufficient to operate the shutters from full-opening to

True Ball Tripod Head

Edward Snyder, A. S. C., demonstrating Fred Hoefner's True Ball Tripod Head to his director, Spencer Bennett. The head is shown mounted with a Bell & Howell Camera.

black-out, or vice versa. Guide marks on the back of the housing indicate the position of the shutters and facilitate speedy operation.

All Parts Accessible

All parts and adjustments are easy of access—large, self-closing doors, on either side of the lamp housing, permit access to the arc lamp for changing carbons and making adjustments. Hinged cover over lens compartment gives free and easy access to lens for cleaning or replacing. Hinged cover over color box permits access to color frames, and all external adjustments, clamp screws, etc., are within easy reach.

Well Ventilated and Light Tight

Double wall construction, baffles, ducts and numerous vents insure a free circulation of air, ample ventilation, and comparatively cool operation. Exceptionally large peep-holes in the door, fitted with ruby glass, and provided with a self-closing shutter, permit inspection of the arc in operation, and every precaution has been taken to eliminate light leakage that may be disconcerting to the operator.

Perfectly Balanced

Spotlight is perfectly balanced in every way—it moves freely and easily in any direction and remains set in any position. It "follows" with remarkable ease. A well-designed base and heavy pedestal upright provide a rigid and substantial support for the spotlight—prevent vibration and insure steadiness in the operation. The weight of the spotlight rests on ball bearings and in effect all friction between heavy moving parts is eliminated. Practically no effort is required on the part of the operator directing the light beam.

Spotlight can be set to any desired angle within practical requirements—quickly and easily fixed in position by the turn of a hand screw. It swings through a vertical angle of 67°—45° below the horizontal and 22° above, and turns completely around in the horizontal plane about its central axis. The base is telescopic and permits adjustments in height.

Extra Colors and Effects

The customary slide grooves are provided on the front of the color box and permit the use of all standard effects, color wheels, extra color frames, and special spotlight apparatus.

The new Spotlights are on display in the showroom of the manufacturers, Kliegl Bros., 321 West 50th Street, New York City.

A South Sea Masterpiece

When "White Shadows of the South Seas" is shown upon the screen as a Metro-Goldwyn-Mayer special the observer will note the names of three cinematographers to whom credit is given for the photographic beauty of the film.

This unusual credit procedure was decided upon because the great camera artistry that went into the filming of this remarkable production demanded that full recognition to be given the men responsible for the effort.

Clyde De Vinna, George Nogle and Bob Roberts, all members of the A. S. C., are the trio whom M-G-M has credited with the exceptional photography to be witnessed in this feature.

Under the direction of W. S. Van Dyke the cameramen and their assistants spent three months in the South Sea islands, battling fevers, climate, jungles and all manner of attending technical difficulties.

And when they emerged they had perhaps the most perfect camera record of any film expedition that ever set forth upon a distant location, far from a "home base" laboratory and where their only resources were their very own.

The camera crew had to carry a complete stock of spare parts for their equipment and to make whatever repairs were necessary when and where they chanced to be needed. They carried with them a generator truck that broke down all the bridges in the swamp lands and had to be motored through the waters of uneven lagoons at the peril of being overturned or being wrecked entirely by the salt water inundation.

The film frequently melted and ruined an entire day's shooting before the cameramen got back to the makeshift "lab" set up under thatched roofs. Ice was almost as scarce as fresh film, but whatever could be obtained was used to pack the film to prevent additional loses.

Over the tortuous mountain trails that cut through the jungle undergrowth the cameramen had to pack in their equipment to shoot the inland scenes that form so great a part of the production. And before they could make a single shot several acres of jungle brush had to be cut away overhead so that sufficient light could get through the heavy foliage.

The most remarkable part of the expedition is that despite the handicaps and almost unsurmountable difficulties that beset their every turn the cameramen succeeded in obtaining something more than just good film. Without a doubt—and critics thus far have agreed—"White Shadows of the South Seas" is one of the most photographically perfect productions ever to be presented on the silver sheet.

New Filmo Motion Picture Cabinets

There has been a very definite need for a long time for a cabinet that would hold a FILMO Camera, Projector, Film Editor and all the other accessories provided for the serious amateur movie enthusiast. To completely fill this need, Bell & Howell have just announced the new FILMO Console Cabinets.

These cabinets come in two styles. First, the Desk Model "G," complete FILMO Cabinet that has the capacity of FILMO Projector, both the FILMO 70 and 75 Cameras and all accessories in general use. The other console, the Model "E" is a slightly smaller cabinet that is especially adaptable to the smaller home or where space is limited.

Both of these cabinets are well designed, sturdily constructed, finely finished and being made of solid walnut veneer, are beautiful pieces of furniture, comparable to the finer radio and phonograph consoles. These cabinets take their fitting place among the finer furnishings of the well planned and beautifully arranged home. The Desk Model "G" is priced at $135.00, the Model "E" at $105.00.

Technique of the Talkies

The Success of Sound Pictures Depends Upon the Proper Assemblage of Their Seven Technical Forces

By Lewis W. Physioc.

They say that the talking pictures, of today, have no school of technique. This is not surprising, nor is it alarming. The technique of the silent pictures represents a development of less than thirty years, and although that may seem a considerable time, it is very little, compared to many of the other arts that represent the development of centuries. Another consideration is found in the fact that motion pictures, unlike many of the other arts, is a combination of many branches; each is burdened with the responsibility of its own technical problems, and the completed picture demonstrates, not only the individual excellence of each department, but a successful co-ordination of all the departments.

The introduction of the talking pictures brings with them the additional art of the spoken drama which in itself, embodies an entirely different technique from the silent pictures. It may not appear so, on first consideration, but there is a great difference between playing a scene in pantomime and enacting the same with related spoken lines, for the latter involves the reading of the lines in character and expression as well as the physical portrayal. Even trained actors, of the stage, must recognize the difference in performing before a large audience and playing to the microphone. It is not surprising, then, that we anticipate a modification of picture technique for the talkies.

The development of technique, in any form of art, is the result of persistent and fearless criticism of our work; we learn by an unreserved acknowledgment of our errors, and the acceptance of the criticism of others—absolute sincerity on the part of the student and the unquestioned authority of the critic.

The talking pictures occupy a peculiar position in the picture business. They have re-entered the field after an interval of many years, and have not, like the silent pictures, enjoyed the same process of development during that period. And further the supplementing of modern scientific equipment probably encourages the idea that there can be very little benefit derived from a study of those earlier experiments. It is unfortunate that the merit of the present achievements cannot be signalized by a comparison with the previous efforts. There is still a mystery suggested in the absolute suppression of the first "talkies," especially the Edison Kinetophone.

We, therefore, depend upon contemporaneous criticism to develop the technique of the talkies. This criticism points out several things worthy of consideration.

1st. We mention the extreme closeup. This feature has been abused and overworked even in the silent pictures and, in the talkies, it becomes an even more important matter, due to the relation between the volume of sound and the size of the picture.

2nd. The amplification of sound is being unduly exaggerated. We see this in all applications of the radio—in the home, etc. They sometimes fairly drive us out of the house, in some instances, even, out of the neighborhood. There is a law that governs this, which should be observed, and may be likened to an enlargement made from the motion picture film; there is a point where smoothness and quality leaves off and coarseness begins. The amplification craze reminds us of a child with a beautiful toy balloon; he keeps on blowing it up to see how far it will extend. It finally loses its symetrical shape, bulges out here and there, purity of color is destroyed by attenuation and it finally bursts. We may further on point out that proper control of amplification bears an important part in talky technique.

3rd. A review of the present talkies suggests an exaggeration of lip gymnastics. This is unnecessary, because of the intimate detail characteristic of motion picture photography, as compared to the legitimate stage declamation. It tends to confuse the most perfect synchronism, by the action of the lips anticipating the emission of the sound. This fact has probably led some critics to assume that the experts have not yet adopted the correct starting point, and which impairs the illusion.

4th. There is a suggestion of the limitations in the recording area, in lengthy dialogues, by players confined to fixed positions. This limits the possibilities of effects, and will soon become monotonous. We cannot be persuaded that the modern developments will not permit of a more flexible application.

5th. It is needless to mention the reading of lines, for we all know the importance of this element. It is an art acquired only after much study. So rare an ability is this that we cite the fact that there are few people who can read the simplest thing gracefully, correctly and in character.

It involves many features, chief among them, one of nature's parodoxes: a fine voice is a rare gift, but we sometimes find it where we least expect it; it is often missing where we expect to find it or where we would wish it. It frequently repudiates what we call "screen personality." It always enhances any personality. There may be also an habitual tendency among legitimate actors to try to reach the audience, rather than merely playing to the microphone. A fine voice, combined with artistic declamation, dramatic ability and physical charms is what produce our few idols of the stage.

6th. The above section introduces a serious item: that of good tone reproduction. This involves microphonic construction and proper recording, the proper loud speaker and judicious amplification. It is by no means a simple combination, and, in the application of talking pictures, must be studied as a combination rather than the individual application of each department. This consideration is suggested by a tendency towards a similarity of all masculine voices. Let us not forget that it is **his** or **her** voice that we like to hear.

7th. Directing and editing will also be modified; which may obviate any startling jump from the spoken dialogue to the printed title, or close-up of lips moving in silence. Cutting will be simplified because of the added possibility of story by means of the dialogue.

The co-ordination of these different departments represents the general technique of talking pictures, and they must be studied and developed, not only individually but collectively. It is the proper assembly of these forces upon which depends the success of talking pictures. This process is far more important in the talkies than the silent pictures and may be likened to the assembly of a great machine; we may assemble the various parts any old way, but unless each part has been carefully fitted and co-ordinated it will not work. This perfect harmony of elements establishes the one vital feature, without which they are worthless, and that feature we call **illusion.**

This is one thing, at least, that the early efforts may contribute to our study of the subject; for no matter whether the system is founded on the phonographic (as was all the early methods) or the sound photography system, the matter of **illusion** is paramount.

Seven years' experience taught the early students that perfect illusion depends upon a proper relation between the picture area and volume of sound, and much study was given to working out these proportions. The eye and ear of man form an unique combination which gath-

ers from experience, beginning from the rational period of babyhood, in building up in the brain a system of comparative values, in estimating the results of the combination of sight and sound. We hear a sound, and this reference system in the brain immediately sets a value upon it: We recognize its source, its character and estimate its distance. We see an object, and our experience reference estimates its nearness or remoteness. In both cases it is merely an estimate and considered individually, this estimate is satisfactory, but the moment we try to associate unrelated values of sight and sound it immediately violates this reference system and the results are unconvincing. To illustrate this further we cite the long practice by ventriloquists, in trying to furnish a voice that will fit their manikins. The success of their efforts lies in trying to furnish the combination that agrees with the experience of the auditors, and this experience refuses the possibility of a deep, gruff voice issuing from the diminutive figure of the manikin. We may also cite the shock to this experience of ours when we hear, for the first time, a man of great stature speak in a delicate, high-pitched voice, or a Lilliputian address us in the deep basso of a giant.

To illustrate the idea of illusion by an extreme example, and one that peculiarly fits the subject, we may recall having attended some vast gathering, listening to a speaker, who stands at such a great distance as to be unable to recognize him, and over our heads is a loud speaker flooding us with a tremendous volume of sound. Do what we may, we cannot associate the sound with the far-distant speaker. But cut off the microphone, and we immediately become conscious of the real effect, although we see or hear very little of the speaker. We stood close beside a director, who was directing a great scene through the microphone and it was impossible to associate the sound, coming from the various loud speakers, with the man at our side.

This introduces a serious point of criticism,—this matter of illusion. We hear on all sides discussions which indicate that the auditors are satisfied that synchronism is accomplished; but that there is a feeling that only at rare times does the sound seem to come from the proper source. They view a medium close-up that appears to fit the sound, there is a gasp of delight audible over the entire audience, the illusion is perfect; then comes a large head, covering the entire screen, the lips move in perfect synchronism with the sound, but there is a sense of disappointment in the audience; then a cut to a long shot, and we begin to get the effect of that speaker in the stadium. We hear the remark, "why can't it all be like that one scene?" It is because that one scene embodies a perfect relation between the picture area and th sound volume,—a perfect co-ordination between the elements of sound and sight that agrees with that reference system furnished by our experience.

This situation is not alarming, for we see sufficient to satisfy ourselves that the scientist has done his part; he has furnished the artist with the means, and it merely remains for the artist to employ these agencies in ultimately developing a refined and perfect product. To accomplish this, both the scientist and the artist are dependent upon sincere and honest criticism rather than prejudice and antagonism.

The only danger we see to the success of the talking pictures lies in the multiplicity of systems now engaging the attention of producers. Standardization is largely responsible for the success of pictures in general. Standardization in the talkies is what now concerns, not only the producer, but more particularly the exhibitor, who has to pay for the expensive equipment. It will resolve itself into the survival of the fittest as regards the various systems. Whether it shall be the phonographic system, the variable area (photographic), the variable density (photographic), or the stylus engraving on the celluloid of the film (phonographic).

But no matter what developments may furnish in the matter of standardization, there will never be any question as to the importance of the technique of the talkies.

Tribute to An A. S. C.

Were he to have achieved no more in the transitory period that constitutes man's life upon this planet than to invent the photographic lens that bears his name, Karl Struss would have been entitled to the plaudits of the multitude. In the design of this lens Struss made, perhaps, the greatest single contribution to the advancement of pictorial photography since Stieglitz initiated his noted revolt against the smug, self-sufficiency of his fellow-craftsmen twenty years and more ago.

The Struss lens brought shockingly different concepts of the photographic art, and its maker promptly was characterized as an anarch and viewed distrustfully by the conservatives. But his device, intelligently utilized, revealed the lyricism latent in even the most prosaic objects. Struss photographs thus became the vogue of captious New York.

When moving pictures began to draft competent artists for service behind the camera as well as in front, Struss became a cameraman. I'm told that he's one of the highest paid and most sought-after in the business. I believe it. His moving-picture photography evidences the same intimate knowledge of pleasing composition and the value of light and shade that won for his photography such widespread acclaim.

But though his vocation is with the films, his avocation continues to center about pictorial work. Seldom does he resort to the conventional, in subjects, and if he does, he deviates so far from the conventional practices of photography that the ultimate result becomes very different. His knowledge of the potency of light is little short of phenomenal. By the use of appropriate filters he photographs with the red, the yellow or the blue rays of the sun's light, in accordance with the demands of the subject.

When Touring Topics inaugurated its pictorial section, Struss was one of the first among pictorial photographers to contribute. Few issues have appeared in which he has not been represented. He ventures afield on every occasion, and when he returns he brings to us a group of engaging prints, a friendly gesture of co-operation to the Automobile Club of Southern California, which he so much admires.—Touring Topics.

George Meehan, A. S. C., is doing a series of children's pictures for Smitty Productions at Tec-Art. George Marshall is the producer.

Charles Schoenbaum, A. S. C., holds the A. S. C. record for continuous employment with one production organization in motion pictures. He started with Lasky in 1916, his first picture being "The Girl Who Came Back," starring Ethel Clayton, directed by Bob Vignola. His last was "The Water Hole" by Zane Gray. On his last two pictures Mr. Schoenbaum used Mazda lights exclusively for interiors. He did his first work in pictures with D. W. Griffith in the lab. September 5, 1914. Mr. Schoenbaum has made an intensive study of sound pictures and is now at liberty to undertake contracts for this kind of production.

Elmer Fryer, A. S. C., is the luckiest still photographer in Hollywood! Having recently affiliated himself with Warner Brothers Studio, Fryer shot the stills and special art studies for Warner's million-dollar production, "Noah's Ark," starring Dolores Costello with George O'Brien in the leading male role. His second assignment was Al Jolson's Vitaphone special, "The Singing Fool." For twelve weeks Elmer Fryer listened to the peerless voice of Jolson and was paid for it! It is hard to imagine anything more pleasant than receiving one's weekly wages and at the same time having the opportunity to hear Al Jolson's repertoire as only he can sing it. Fryer will have to get along without listening to Al Jolson's "Mammy" singing for a while as he has started work as still man for "The Redeeming Sin," Howard Bretherton's next directorial assignment for Warner Brothers, starring Dolores Costello.

Advance of the Mazda

Assimilation of Incandescent Lighting Equipment by Motion Picture Studios

More than a year has elapsed since the introduction of incandescent lighting equipment units, designed especially for use in motion picture photography. Since that time there has been considerable discussion, many tests and large quantities of film made with this form of light.

All, who have followed the development of this method of lighting, feel that the incandescents have established a place for themselves. The profession in general will probably be interested in seeing to what extent the new apparatus is being acquired by the studios.

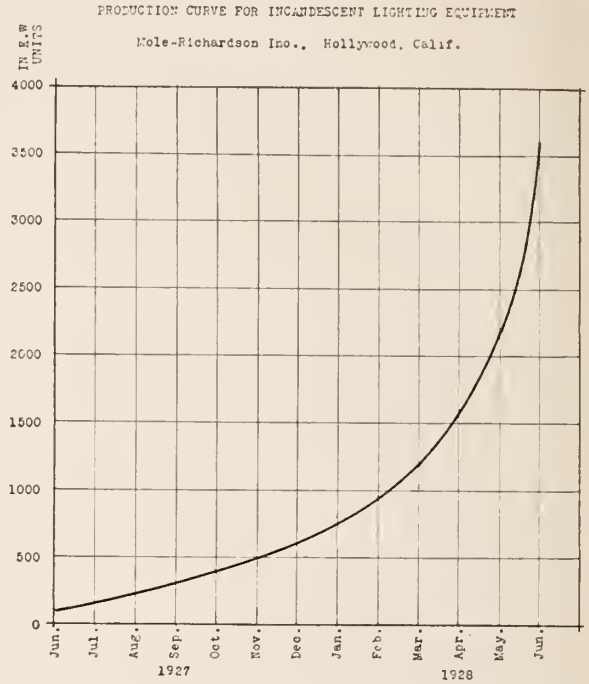
PETER MOLE

The past year has been what we might call a more or less dull period in picture making at some studios. Others have not had the time to make shifts in lighting methods, due to interruption of schedules, however, you will note that a steady and healthy accumulation of Mazda equipment is taking place.

We have gathered our information from reliable sources and feel that the data and figures given herein should be a fairly accurate summary of the situation at this time.

A Mole-Richardson production curve covering equipment sold and delivered monthly during the year ending June 31st, 1928, shows a gradually increasing demand for incandescent lighting.

We have used the KW lamp capacities of the various units as a basis for tabulating our information. In addition to their own equipment, the studios have kept a rental stock; available at this time and amounting to approximately 1000 KW in lamp capacities in almost constant use.



The following is an incomplete list of pictures made or being made with at least 90 per cent incandescent lighting:

Producer	Star	Director	Cameraman	Title
		FIRST NATIONAL		
Ned Marin	Billie Dove	Alex. Korda	Karl Struss	Night Watch
John McCormick	Colleen Moore	Mervyn Le Roy	Sid Hickox	Oh, Kay!
Ned Marin	Mulhall-Mackaill	William Seiter	Lee Garmes	Waterfront
		METRO-GOLDWYN-MAYER		
	Dane-Arthur	Harry Franklyn	John Arnold	Detectives
Harry Rapf	Greta Garbo	Fred Niblo	Bill Daniels	War in the Dark
	John Gilbert	Victor Seastrom	Oliver Marsh	The Devil's Mask
		METROPOLITAN		
Howard Hughes	All-Star	James Cruze	Gaudio-Perry	Hell's Angels
Howard Hughes	Thomas Meighan	Reed-Hughes	Joe Morgan	The Mating Call
Howard Hughes	Thomas Meighan	L. Milestone	Tony Gaudio	The Racket
		PARAMOUNT		
B. P. Fineman	Fay Wray-Cooper	Roland Lee	Al Gilkes	First Kiss
B. P. Fineman	Bebe Daniels	Marshall Neilan	Roy Hunt	Take Me Home
	Baclanova-Brooks	Schertzinger	Roy Hunt	Forgotten Faces
J. G. Bachman	Emil Jannings	Frank Tuttle	Vic. Milner	Sins of Our Fathers
	Bebe Daniels	Clarence Badger	Roy Hunt	Fifty-Fifty Girl
		UNITED ARTISTS		
Samuel Goldwyn	Banky-Colman	Fred Niblo	Geo. Barnes	Two Lovers
Samuel Goldwyn	Gilda Gray	Fred Niblo	Geo. Barnes	Devil Dancer
Samuel Goldwyn	Ronald Colman	Herbert Brennon	James Howe	The Rescue
Samuel Goldwyn	Vilma Banky	Victor Fleming	Geo. Barnes	The Awakening
Joseph Schenck	Norma Talmadge	Henry King	Oliver Marsh	Woman Disputed
		UNIVERSAL		
	Hersholt-Joyce	Melville Brown	John Stumar	13 Washington Square
		William Wyler	Charles Stumar	Shake Down
	All-Star	Ernst Laemmle	George Robertson	Phyllis of the Follies
	All-Star	Harry Pollard	Gilbert Warrington	Show Boat
	J. Schildkraut	Paul Leni	Harry Mohr	Last Warning

The Vitaphone films of Warner Bros. and the Movietone Features of the Fox studios are made with incandescent equipment.

In addition to the pictures listed, incandescent lighting has been used for 90% of the close-up and foreground work in virtually every recent production. Its natural effectiveness in color value reproduction, its pronounced economy and other good qualities recommends its use wherever possible.

The advent of voice and sound reproduction in motion pictures makes it absolutely essential that every foreign noise be eliminated during the shooting of a set. Arc equipment, due to its noise, except when used at considerable distance from the microphone, had to be abandoned. Incandescent lighting has quietly appropriated this field of service and can be found in the "talkie" studios effectively meeting their requirements for a noiseless and all sufficient light medium.

There has been a constant and ever increasing demand for incandescent equipment and many requests for information covering the line manufactured by Mole-Richardson, Inc. The requests have come not only from the United States and Canada, but from many points in Europe, Asia and Australia.

We have shipped some equipment to Europe and have felt it expedient to establish a representative in London.

It hardly seems necessary to go further into the subject. We in Hollywood, engaged in motion picture work, know that incandescent lighting is an accepted fact as far as the studios are concerned.

Those engaged in similar work have but to give this new method an honest test and we feel sure that they will find it exceedingly interesting, more profitable and a most decided advance over old methods.

Saved from the Arctic

By Charles G. Clarke

(*Continued from Page 10*)

which proved to be the corner posts of four oil claims. On three of them hung cans with the claim papers inside. They were filed in 1921 and the only thing we could gain from them was that the district in which the claims were located was known as "Tangent Bay" or "Tangent Point." But we were together again. You can bet that thereafter I saw that Captain was on his feet before I got away very far. Plodded along the rest of day and night on the North course."

On Friday, June 1, Clarke and Robertson heard the whirr of a plane and succeeded in attracting the attention of the pilot, Matt Nieninen, of Anchorage. He made an excellent landing on a sand bar and the two lost men were overjoyed to learn that he had come to find them and that he had room for both in his cabin. By 5 P. M. they were in the hospital at Point Barrow, where they received every possible attention.

Clarke arrived in Hollywood July 1, almost completely recovered and within three days was back on the Fox lot, where he is chief cinematographer for John Ford.

While Clarke and Robertson were lost the A. S. C., through President John W. Boyle, started the machinery of the U. S. Government to search for them, but they were brought in before any definite arrangements could be made.

Mr. Clarke says he and Robertson would have made Point Barrow all right, but their rescue by Nieninen saved them two to three days of terrible agony, weariness and pain.

Through the entire terrible experience Clarke conducted himself like the true man he is and in accordance with the best traditions of the A. S. C. The Society is proud of Clarke and hails him as an ornament to the profession.

Mr. Harry Perry, A. S. C., flew from Los Angeles to San Francisco and return the other day, leaving Los Angeles at 10:30 in the morning, arriving at Oakland 1:30 P. M.; he left Oakland at 1:35 P. M., arriving back in Los Angeles at 5:30 P. M.

He went up in a Western Air Express, 3-motor Fokker plane, and returned in a Pacific Air Transport Co. Boeing plane; 6½ hours was the total flying time.

Rolla Flora, A. S. C., has joined the Wm. Fox forces.

Gilbert Warrenton, A. S. C., has gone back to Universal to make "The Show Boat." The story is from Edna Ferber's "Mother Knows Best." Harry Pollard will direct.

Frank C. Zucker, A. S. C., New York City, is now connected with the R. C. A. PHOTOPHONE, Inc., of New York.

Chas. J. Davis, A. S. C., of Brooklyn, N. Y., is now in London, England, for an indefinite period, working with the Fox Film Corporation.

Paul Perry, A. S. C., is with Director George Melford at F. B. O.

Alfred Gilks, member of the Board of Governors of the A. S. C., but recently finished for Paramount-Famous Lasky a picture entitled "The First Kiss," from the Saturday Evening Post story, "Four Brothers," and directed by Roland Lee. The picture was shot with Mazda lighting away down on the eastern shore of Chesapeake Bay. Mr. Gilks is now back at Long Island City, where he is making tests for sound pictures on the new stages recently finished for the purpose by Paramount.

Samuel Goldwyn views with particular pride the fact that while producing two or at the most three pictures a year—of the ten directors named as the "Best of 1927," his organization has three, i. e., Fred Niblo, director of "Two Lovers;" Herbert Brenon, director of Ronald Colman's "The Rescue," and Victor Fleming, graduate of the A. S. C., director of Vilma Banky's "The Awakening."

Marking the entrance of filmdom's greatest musical "ace" with active service for pictures using VITAPHONE and MOVIETONE effects, Dr. Hugo Riesenfeld leaves Los Angeles within the next few days for New York to conduct an orchestra of one hundred and fifty in the making of complete music scores for Samuel Goldwyn's production, "TWO LOVERS," and for John Barrymore's "THE TEMPEST." It is announced that these will be the first, last and only sound device musical scores for United Artists pictures to be made in New York. Dr. Riesenfeld goes there at this time pending the erection of special sound device stages at the United Artists studio.

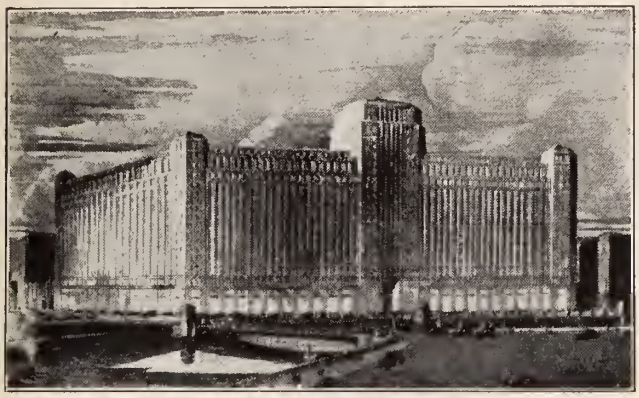
Peverel Marley, A. S. C., photographer of many of the most noted Cecil B. DeMille productions, insists that the greatest "lens hound" he has ever encountered is Bozo, a dancing duck which figures in "Show Folks," a Pathe production on which he is now in charge of camera work and which Ralph Block is producing and Paul L. Stein directing. A lens hound is studio parlance for a player addicted to doing any and everything which will bring him in the best range of the camera, preferably when a close-up is in progress.

E. Burton Steene, A. S. C., is reported to have done some wonderful Akeley work on "Hell's Angels," sometime to be released by Caddo.

Cost $30,000,000

Chicago is to have a gigantic Merchandise Mart housed in its own building, which will be twice the size of the largest business building in the world. This mammoth structure, two city blocks in length, 18 to 23 stories high, is planned for the service and convenience of merchandize buyers of the United States and to achieve for Chicago a still greater prestige as a Great Central Market, it was declared today. It will cost $30,000,000. Construction will begin immediately.

The building will extend 724 feet on Kinzie street, 577 feet on the river front and 324 feet on Wells street, with a diagonal frontage facing Orleans and Franklin streets.



It will be set back from the river about 80 feet to accommodate a broad upper level drive extending from Wells to Franklin.

On all floors of the Mart will be great corridors, with all the appearance of boulevards, more than 650 feet in length, on either side of which will be the shops displaying their varied lines—veritable "business streets." These great corridors will be impressively treated architecturally and with the large space available it will be possible to house the selling activities and warehousing of many allied concerns on one floor, thus attaining the advantages of concentrated groupings.

Connection will be made with the Illinois Tunnel Company's system of freight transportation, which has more than sixty miles of tracks beneath the streets and buildings of the city, reaching all other railroad terminals. A river dock for vessels will connect with the south freight elevators of the building.

One of the interesting features planned for the Mart will be a Merchants' Club in the tower of the building, with lounging rooms, reading and smoking rooms, where the retailer may relax and meet his friends. The Mart will provide the retailer with everything but a place to sleep. He can go direct from the train to the Mart with his baggage. Here his hotel reservations will be taken care of, his baggage transported to his hotel and placed in his room. Restaurants, lunch rooms and grills in the Mart will further economize his time.

Rochester, N. Y.—Because a little amateur movie reel showing Rochester's trolley busses in operation was made on short notice and traveled across the country in record time, Salt Lake City, Utah, is going to begin a similar transportation service about August 15, according to information received here recently. The Salt Lake City Commission was hesitant to permit "trackless trolleys" without an opportunity to see them in operation in some other city. With five days left before the franchise hearing, the Utah Light and Traction Company telegraphed to Rochester, where a film was made of the trolley bus operation here. The picture reached Salt Lake City by air mail in time for the hearing and the franchise was granted.

Charlie Clarke and His Friends Can Laugh About It Now.

Film Capital's Industry

Output Runs $25,000,000 Exclusive of Films

An industrial survey being made by the Hollywood Chamber of Commerce and the Hollywood branch of the Los Angeles Realty Board reveals that there are more than 300 wholesale and industrial firms operating in the Hollywood area.

The Manufacturers' Directory of the Los Angeles Chamber of Commerce for 1927 lists 182 industrial firms in the Hollywood district. In the additional list of 125 names, there are numerous branch stores and a number of new industries located here since the compilation of the directory. These are being checked in order that the total output, pay roll and number of employees may be obtained.

An estimate of $25,000,000 yearly output (excluding the motion picture industry) seems conservative in view of the fact that the Hollywood realtors on a recent visit to this industrial district found the combined output of three firms—the Hollywood Paper Box Corporation, the Hollywood Casket Company and the Good Humor Ice Cream plant—totaled $3,000,000 for the year 1927.

There are thirty-two firms handling products necessary for the making of motion pictures. It is said $115,000,000 will be spent on the making of pictures during 1928, and it is to be expected that a large part of this will be expended in Hollywood.

Building materials are handled by forty-two firms; twelve manufacture or handle wrought iron and metal; there are seven large wholesale plumbing houses; eight manufacturers of ice cream and five of candy; six firms manufacture furniture. The printing industry is represented by thirty-one concerns.

More than 100 plants manufacture pianos, radios, mattresses, caskets, lamps, pencils, art statuary, trunks, violins and other necessities and luxuries of modern life.

Chas. Boyle, A. S. C., has just finished the camera work on "The Candy Kid," directed by David Kirkland. It was crook stuff with lighting in keeping with the story. Rex Lease, Pauline Garon and an all-star cast were featured. Mr. Boyle recently made some important shots on "Hell's Angels."

Victor Comes to Hollywood

A large plot of ground in Hollywood, Cal., situated a short distance from the studios of several important motion picture companies, has been purchased by the Victor Talking Machine Company as a site for a plant in which it will carry on its work of sound synchronization for films, it was announced today by E. R. Fenimore Johnson, executive vice-president of the company. Work will start immediately on a record-pressing plant and in the near future a studio will be erected in which actual scenes from photoplays may be "shot" at the same time voices of players or other sound accompaniments are being recorded.

The purchase of this ground is a step in the development of sound synchronization which Victor inaugurated a few months ago. It is not the intention of the Victor Company in any way to compete with the film producing companies. It will be strictly a service company, providing picture producers with sound accompaniments for their photoplays, either in the form of complete synchronized scores arranged and recorded by Victor's expert staff and made after the feature films have been cut and edited, or in sound effects recorded during the actual photographing of the films. It will also make records for any company which does its own recording. This latter work it has done for some time for the Vitaphone Company.

In addition to its plant in Hollywood it will maintain trucks equipped with recording apparatus which can be quickly moved to any studio or location where sound is to be recorded. Recent experiments with a portable apparatus to record the sounds of an airplane motor in flight have proven the practicability of the scheme.

Two feature films have already been given synchronized scores by Victor. They are "Wings" and "Warming Up," both Paramount productions.

Filmo Vignetting Mattes

Add Professional Atmosphere to Amateur Films.

We are all familiar with the "shots" shown in professional films where the subject is photographed through mattes (sometimes known as masks) cut in the shape of a heart, keyhole, binoculars, etc. You can get the same effect with the FILMO 70 Camera by using the newly developed FILMO Vignetting Mattes just announced by the Bell & Howell Company.

These mattes come in sets of twelve—six objective mattes and six corresponding units for the viewfinder. The objective mattes are designed to fit into the groove on the front of the FILMO Iris Vignetter, where the Vignetter Color Filter is ordinarily used. The matched viewfinder mattes slip over the viewfinder objective, making it possible to center the object properly and accurately on the film.

There is a set of FILMO Vignetting Mattes in the shape of a heart which is generally used on close-ups, especially for the finale of love scenes. Then there is a set for keyhole view which fits in wonderfully well with detective stories, mystery plays and the like. Sometimes mattes of this sort can be used effectively in comedies. The cloverleaf mattes are good ones to use in Irish plays or where one wishes to convey the feeling of verdant fields and lawns. It helps to put over these impressions to an audience easily. And then there are mattes in the shape of a triangle that can be used in triangle plays or for cutting out unwanted overhead back-ground in any scene. Sometimes there is a place for mattes of this sort in mystery plays.

The FILMO Vignetting Mattes has certainly enlarged the field of amateur work, placing still more professional effects at the beck and call of the amateur.

Significance of Jewels

The Influence of Rock Crystals and Other Stones on Mankind Said to Be Anything But a Dream

By Mrs. Emma Cecilia Fleming

Emma Cecilia Fleming is a gem expert, with offices in the Broadway Central Building, Los Angeles, who has made a profound study of jewels and rock crystals not only from the material and commercial point of view, but from the hidden or occult angle, and whose findings will, I feel sure, prove of interest to all classes of intelligent readers. This story which, under ordinary circumstances, would be out of place in a technical periodical like THE AMERICAN CINEMATOGRAPHER, is of peculiar interest just now because of information that has reached the editor regarding researches with the camera now making in the realm of precious stones and which promise amazing results. It may be the camera after all that will reveal the unseen, paradoxical as this may seem.—Editor's Note.]

We stand at the beginning of a new age. Much knowledge of a material nature has been gathered in the age that is past. Much knowledge that has been occult, that is to say, hidden, will be brought to light for man's use in this age that is dawning. This knowledge will come to us in various ways—by research, by intuition, by the revival of the mysteries and it will be knowledge that can be used here and now, since the coming age will be the physical age in its best and truest sense. The knowledge gained will not be, as used to be said of our religious teachings, exclusively for use in the worlds to come, but for our use now. Everything that has grown, that has evolved is for use. For a time we stressed the transitory nature of things physical to a marked degree.

It is true that the Physical life is transitory but so is the astral that follows upon the physical. So, in point of fact, are all succeeding lives. So might we not make use of what knowledge we have to make our lives now more livable—that our wisdom may not be like the charm, the cantrap of the hero in one of our forbidden books; this charm that was given to him by a very wise man was only good to get out of hell with.

What is the power of precious stones?

From the earliest times jewels have held a fascination for mankind. Among the ancients (as we speak of the races that preceded ours) this was more than mere fascination. Many of the earlier races understood even better than we how to take full advantage of all the hidden, the occult forces in nature, and our remote ancestors understood the peculiar quality of jewels to act as a focusing point to attract to them whatever power they wished to use.

The age just drawing to a close is the age of Mercury—the age of the concrete mind—the age of the man who scorns intuition, sensitiveness, as mere imagination. Even in this age there has been a sort of desultory interest in jewels apart from their commercial value, but this interest was considered to be only seemly in romantic young ladies—or classed with the children's fairy tales. The Jewelers' Circular of May, 1927, in complaining of our American list of birth-stones, which does not coincide with the European or that of the Orient, naively remarks: "Of course, Mr. Steele F. Roberts, late president of the Jewelers' Association, when he compiled the list of birth-stones had in mind solely their sales value and gave no thought whatever to ancient or astrological lore." I shall agree with the writer at once—in fact, there is no argument.

When the average man or woman who scorns all things not of the concrete mind begins to look about for stones with a view to purchasing, the first thought is of diamonds. In one sense this is well. The diamond brings no ill consequences to its wearer. Neither does it (unless your temperament is attuned to the diamond) bring much that is good. It does give a sort of a "moreness," and for those who care for that sort of thing, social position. To a very highly evolved person, on what Theosophists speak of as the Power Ray, the diamond would act as a focusing point to bring more power to the person wearing it. I personally have a theory that the real Power Ray person should wear a diamond almost bluish white—a sort of a very, very light violet in color—as this is the color of the First Ray proper. This diamond, by the way, is as rare as the real Power Ray person.

Before very long the vibrations of jewels and their power will be so well understood that people will no more wear the wrong jewel than they now will have loud, clashing and garish colors in their homes. Some of you may remember the atrocious red dining rooms of an earlier day. We do not see these now. We are fast approaching the time when

"Color is heard like music
And music like color is seen."

SAPPHIRE: Chastening, cooling, emblem of chastity and wisdom. Warriors in olden times when they had to go and leave their young wives behind would present them with a rope of genuine sapphires. This was thought to keep the wives true to their husbands in their absence. Whether this was effective or not, it was certainly not to be despised as a gift. The sapphire was the stone of Joseph, the dreamer, Joseph, the wise and efficient one who manfully resisted temptation, but got in wrong anyway. It is sacred to all teachers.

EMERALD: The stone of intelligent activity and action for the benefit of humanity, service. This stone has been highly prized in all ages as far back as can be traced; it is one of the sacred stones of the Atlantean races. It is said to be effective as a stone of healing, especially if worn around the neck. It was sacred to the tribe of Levi in the time of Israel. The name Levi means attached or joined. In this case to the altar. The Christians cherished the emerald as an emblem of the resurrection. It has a tendency to make its wearer charitable and benevolent.

RUBY: The stone of royalty in various periods in history. It has also been called the emblem of devotion. It is, however, the devotion that makes the devotee one with his deity—devotion which permits him to approach his Creator with his head up, not cringing. It has been the stone of the priest-kings in earlier times, showing its devotional properties.

PEARL: From observation and study, I personally believe the pearl to have the highest spiritual vibration of all. It is said that one must be cultured to love pearls at all, so even in the material world it stands for highest refinement. When people of coarse temperament come into possession of a pearl for its monetary value purely, trouble to this wearer nearly always follows. The vibration of the pearl is not for the coarse, the gross, the materialistic. In cases of this kind the pearl avenges herself by making the wearer miserable. Hence the belief that pearl brings tears.

OPAL: This stone has also caused much controversy, something like the pearl. There is, in fact, something akin — some sort of affinity between the two stones. Both are non-mineral, the opal a vegetable substance and the pearl an animal, so both are in advance of their mineral brethren. It would be difficult to imagine anything more beautiful than a fine opal. It has in its depths all

that we can conceive of beauty, the sunset and moonrise, the green-blue of the sea and the sea's foam; the exquisite coloring of the most beautiful flowers. In fact, a beautiful opal is a poem, "Shining like a sunbeam-smitten tear, fugitive flame and water of secret springs." This stone should never be given by a lover to his sweetheart. It will make her fickle. The opal is primarily the stone for the artist, the unconventional one, also for one who has attained to love for all that lives, as present from a relative, from father to daughter, or from husband to wife, if they have been married long enough to become acquainted. It brings good fortune.

AQUAMARINE: Stimulates the intuition as well as the intellect—makes the wearer quick-witted. Is one of the gems that can be worn by nearly everyone with profit, the other two universal gems being beryl (a cousin to the aquamarine) and the tourmaline.

TOURMALINE: Comes in several colors, some say seven. I have seen five of these. This is the universal stone and has been called the peace stone. It has very strong vibrations which can be noticed by anyone who is even slightly sensitive, when the stone is held in the hand. The green tourmaline is especially good for people engaged in business, it attracts success. The pink attracts love and liking from the people around you. If you ever find yourself in a place where you are unpopular get yourself a pink tourmaline.

TOPAZ: Attracts friendship, not love. Topaz is also an aid in solving abstruse scientific problems.

CORAL: Is considered sacred among many people. In the middle ages every child born was given a chain of corals to wear around his neck, if his parents and relatives could afford it. This stone is said to make women beautiful and to prevent one from growing old. Not many years ago the Dalai Lama, of Thibet, had a beautiful ceremonial vase made of coral in Paris, France, which he placed in the temple at Lhasa.

BERYL: It seems to assist clairvoyance. In almost prehistoric times this stone was used as a globe for crystal gazing. Is said to give the wearer dominion and authority. It brings dissension and misfortune when given by a man to his sweetheart or wife, or by a wife to her husband. It is splendid for single women, especially those who are engaged in business and particularly if they want to remain single.

PERIDOT: If there is a stone at all in the category of gems that brings ill luck, it is the peridot.

LAPIS LAZULI: Brings wealth and good fortune—especially to those born in November or December.

HYACINTH: Is also one of the gems highly prized by the ancients—that we hear very little of nowadays. It is a sacred stone among the ancient Assyrians—also in the early middle ages.

JADE: There is so much to be said about the jade that it would take a whole lecture to cover it. This stone of powerful benevolent vibrations—was sacred in Atlantis, as will be seen by the remnants of jade found near the temples of Yucatan. It is believed among the Chinese that this gem has very high occult properties. In China the first wife wears jade while the second wife must content herself with diamonds.

AMBER: Prolongs youth. In olden times when a warrior grew too old to fight, instead of investing in goat-glands he took to wearing amber. We are told that it was effective, perhaps as effective as our modern methods.

AMETHYST: The gem of the coming age. Has the highest vibration of all the gems, vibrating at the rate of 42 trillions per second. Gives judgment and discrimination, protects from violence and theft; worn by a man it will attract to him the love of beautiful and high-born as well as famous women.

SARDONYX: At St. Alban's, in England, this stone was used to give relief to women during child-birth.

The true value of birth stones from the viewpoint of the occult with their correct assignments as to the birth date is as follows:

January 20th to February 20th: Onyx and Crystal.
February 20th to March 19th: Coral and Amber.
March 19th to April 21st: Amethyst and Almandine.
April 21st to May 22nd: Emerald and Carnelian.
May 22nd to June 23rd: Aquamarine.
June 23rd to July 21st: Pearl and Moonstone.

July 21st to August 22nd: Ruby and Jade.
August 22nd to September 21st: Tourmaline.
September 21st to October 23: Sapphire and Hyacinth.
October 23rd to November 22nd: Agate and Malachite.
November 22nd to December 21st: Lapis Lazuli and Chrysoprase.
December 21st to January 20th: Beryl.

People whose 25th, 34th, 43d, 52nd and 61st birthdays fall in 1928 will find the Amethyst unusuly helpful this year.

Talkies for Christie

Al and Charles Christie's deal with Western Electric for talkies is going ahead with immediate realization in their first feature this season for Paramount "The Carnation Kid," starring Douglas MacLean. Charles Christie just returned from New York, sent word ahead that all arrangements were completed and that in addition to the thirty-two two-reel Christie short features which will have sound effects and in some cases actual talking, "The Carnation Kid" will be synchronized from opening to fade out.

Although Los Angeles theatre-goers remember MacLean as the leading man at the famous star-incubator, the Morosco Theatre, fans the world over will discover for the first time that he has an exceptionally good speaking voice, and one that is to be put to good use in "The Carnation Kid."

The spoken lines and the detailed description of the sound effects have just doubled the size of the script for "The Carnation Kid." Al Cohn's story has already been scenarized by Henry McCarty, with fully as much attention to that which will be heard as to that which will be seen. From the atmospheric marine scenes permeated by the low moans of tugboat whistles, through the dialogue of raucous voices checking off cases of illicit cargo, to the heart of the story where the roar of election night will mingle with the sputtering of machine guns, "The Carnation Kid" will make a bid for a definite place as the first story ideally planned and fitted for sound. Jack MacKenzie, A. S. C., will photograph the production.

The Cine-Kodak Scores

Moving picture films taken with a Cine-Kodak among Aztec and Mayan ruins in Mexico have been bought without solicitation by the visual education division of the Board of Education of San Diego, California.

They are the records of Mexican and Indian life among ancient ruins taken by Emma-Lindsay Squier while gathering legends for her recently published book, "The Bride of the Sacred Well." Miss Squier took the pictures for non-commercial purposes and was not aware of the market for them until she was approached by school authorities after a showing at the San Diego museum of natural history.

The films were specially edited into four reels, each double standard length and entitled:

1. Mexican Children and Pets.
2. Mexican and Indian Customs.
3. Mexico, Ancient and Modern.
4. Ruins of Ancient Mexico.

Miss Squier is now in the very primitive panhandle section of Guatemala, among Mayan caves in the neighborhood of Lake Peten, tracking down legends for a sequel to "The Bride of the Sacred Well" and taking moving pictures of modern Mexican and Indian life in their ancient settings with special consideration of their use as educational films.

Questions and Answers

Q. What are the photographic qualities of gold, brass, copper, gold leaf, bronze, etc., on regular stock? On panchromatic stock?

A. It is impossible to answer the question as the photographic condition of these metals depends not only on the quality of film used, but also on the quality of the light under which they are photographed, on their degree of polish, on the angle under which they are presented to the light, etc.

Q. Is it possible to take first class titles with sunlight and no artificial lights? If so, will you describe and diagram the apparatus and method?

A. Yes, it is possible to take titles under either sunlight or diffused daylight. No special apparatus is required, the only requirement being that the title card be evenly illuminated and the camera so set that the axis of the lens is perpendicular to the title card surface at its center.

Q. At the beginning of the first reel of a film, is a certain number of blank film allowed for threading the projector?

A. Yes. Some three to five feet of blank film is always left at the beginning of each reel for the purpose of threading the projector. An equal length of blank film is usually spliced at the end of the reels, also.

Q. How many feet is allowed from the last title ("The End"), to the actual end of the film?

A. The title ("The End") is always faded out. A good length of the title would be 2 feet in full and 4 feet for the fade, making a total of 6 feet.

Q. Is there a blank footage, or footage of any sort, allowed at the beginning and end of reels between the first and last reels?

A. A blank footage is spliced at the beginning and end of every separate reel. The customary length of every reel is 1,000 feet. At times, 2 reels are spliced together so as to make one of 2,000 feet. If such is the case a piece of blank film is spliced at the beginning and another piece at the end of the 2,000 feet roll.

Q. Is this extra footage referred to in the last three questions included in making a "reel" 1000 feet, or is this miscellaneous footage included besides the 1,000 feet of "picture?"

A. Reels of film are not necessarily exactly 1000 feet in length, in fact, they always are either somewhat shorter or somewhat longer. If this question is prompted in reference to cost of laboratory work, the leader, as the pieces of blank are called, are, of course, charged at a much different and much lower price per foot than the actual pictures.

Q. What was the general decision reached by you professional gentlemen about the use of incandescent lighting in the experiments held, I believe, at Warner Brothers?

A. The economic advantages and the photographic results obtained by the use of Mazda lights have been proven worthy of serious consideration through the experiments referred to. The American Cinematographer has published in its May issue, a report on this subject which has been presented to the Society of Motion Picture Engineers by the Research and Educational Committee of the American Society of Cinematographers.

Q. Will you give a list of books, or trade journals from which one can pick up professional knowledge of the mechanics and workings of the industry?

A. Books and Trade Journals treating on Cinematography are so numerous that it is impossible for this department to give a list of them. If you happen to be in Hollywood, drop in our office and we will be very glad to help you out in this matter.

Q. Why are reflectors with gold paper used instead of the silver kind? Is this because panchromatic stock is being used?

A. Yes. Gold leaf reflectors are very effectively used in connection with panchromatic film. These reflectors absorb a great deal of the blue and violet radiation of the sunlight and thus the reflected light is more appropriate for good chromatic condition.

New Simplex Stand

The New Simplex Stand, which is amply covered by patents, represents a radical advance in motion picture projector design and unquestionably meets many of the requirements created by the present demand for better projection. At one time, progress in the Technical Departments of the motion picture industry was greatly hampered by ignorance and indifference, but with a greater realization of the importance of projection has come a willingness to take an interest in this subject and to pay for worth while improvements.

The introduction of the High Intensity Lamp some years ago gave a great impetus to the movement for better projection and there has been a noticeable improvement of projection illuminants. The development of the High Intensity Lamp, however, brought new problems to the projectionist and one of the most serious of these was the unsteadiness caused by the weight of the lamp and its manipulation. The elaboration of projection presentation through the use of Movietone, Vitaphone and other notable projection novelties with special equipment now being placed on projectors are subjecting them to demands and strains which could not very well have been anticipated in the original design.

Attempts to overcome unsteadiness resulting from this additional equipment were at best mere makeshifts and weight and bulk were largely depended upon to maintain balance. The Simplex Pedestal as originally designed and the five-point pedestal which was later used served for a period, but even these proved inadequate. Various braces were manufactured and used but such devices have their limitations. While it is true that the defects of the earlier designs were partially overcome by these substitutes they were unsatisfactory because they failed to supply true balance and rigidity. Modern requirements demand that the Projector shall have rigidity and balance and these have been fully secured in the New Simplex Stand solely through design, based upon mechanical principles and without the aid of supplementary devices.

While there is some slight resemblance between the front of the new Simplex Stand and the former Simplex Pedestal in all other particulars they are different. The Base, as with other assemblies of the New Model M Stand, should not be considered as a mere modifying improvement, but one of a series of revolutionary changes making a harmoniously designed unit, totally unlike any other Pedestal or Stand, and overcoming many of the difficulties heretofore encountered by users of Motion Picture Projectors.

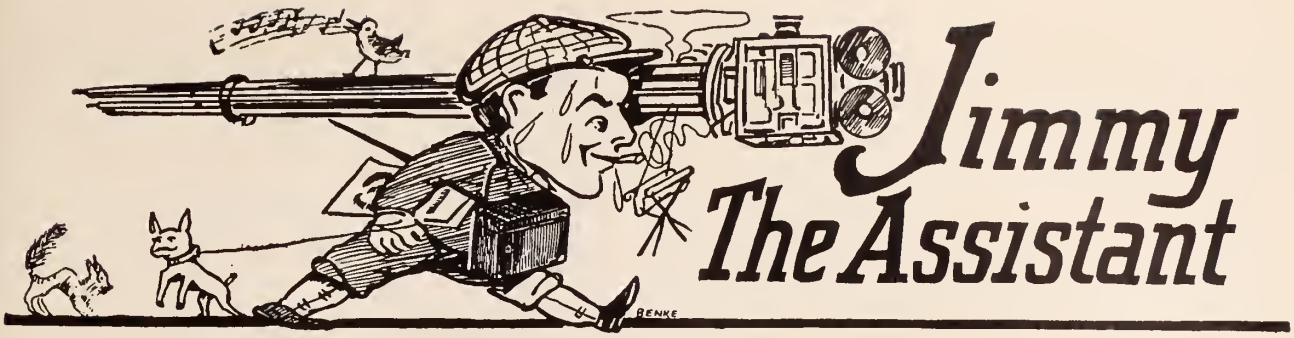
S. M. P. E. Pacific Coast Section

On the evening of Thursday, June 14th, the Society of Motion Picture Engineers, Pacific Coast Section, held its monthly meeting in the rooms of the Academy of Motion Picture Arts and Sciences.

A dinner preceded the meeting and was followed by an interesting discussion on the properties of the water of Los Angeles and adjacent communities in reference to motion picture laboratory work. Mr. A. R. Maas, of the Maas Chemical company, lectured on the subject.

Two pictures of very unusual interest were shown, one presenting the evolution of aviation in re U. S. Navy, and the other illustrating the first lap of the flight of the "Southern Cross." This picture created great enthusiasm because of the perfection with which all preparations for the historic flight were shown and for the extremely interesting shots taken during the flight to Hawaii by Mr. Ulm, co-pilot of the plane.

The meetings of this S.M.P.E. section are always well attended and prove a source of real interest to all members.



Talking Pictures

Deer Mr. Editor:

I don't know when I've had anything upset me like the sudden epidemic of talking picture fear that's sweeping the whole industry. Here I go away on location for four months leaving everything running as smooth as it ever does; and no sooner is my back turned when they break out into a regular rash about Talkies. And what do I see when I get back? Everybody scared—just downright scared. Don't let anybody kid you—that's what's under all this excitement about the talkies. Perducers—let alone actors—ain't sleeping good because they're scared some other perducer will get an edge on 'em on something or other in equipment; and all down the line you get the same uneasy feeling of having all the underpinning swept away and everybody wondering where they're goin' to light.

Actors are worried about their voices; directors wish they'd had stage training; cameramen are reading up on everything radio from crystal sets up. Every blessed soul in this business is just scared green for fear they ain't going to fit into the talkies; and it makes me so (deleted) mad about the whole (deleted) business and the (deleted) sap-headed attitude of everybody connected with the (deleted) affair that I could just darn near cuss!

In the first place the panicky rush into talkies is just going to set our dear little picture business back about two years. That's one thing to be mad about. In the second place the helluva rush to beat the other fellow in getting talking pictures out is going to mean lousy pictures—no two ways about **that**. And the total result is that we'll get punk regular pictures and punk talkies and the first thing you know the public'll start staying home. Lord knows they're hard enough to get out as it is, without discouraging them any more.

And I mean it, too. Let 'em holler all they want to; the real situation is that talking pictures is a long way from being a satisfactory proposition. There's a lot left to be done. Tecknickelly they're all right; but tecknickel correctness never yet meant anything to the box office.

I ain't doubting that perducers try hard enough; but the fact remains that they're first class saps sometimes. They always do the obvious—never seen 'em miss yet. And what's the obvious in talkies? Reversion to stage tecknick, of course. And what a fool thing **that** is. It tears the very heart and soul out of a beautiful art.

It took 'em fifteen years to learn that naturalism is the secret of success in pictures. It took 'em three centuries before that to learn that artifishality is the secret of success on the stage. One is truth, the other illusion. One is like a oyster on the half shell—raw, naked, and real. The other is like a fancy ice cream, the skilled blending of a dozen ingreedients. Each is good in its proper use. But mix 'em and you get an oyster sundae—which is a good parallel for what we're in for in talkies if somebody doesn't pull an unexpected miracle.

Go to any talking picture, shut your eyes, and if you don't get exactly the same effect as in a theater there's something wrong that somebody's gonna get heck for. For the ideal they're working for in speech from the screen is to duplicate as far as possible the stage voice quality, the stage spacing of words, the stage delivery of speech, and the stage construction of sentences. All of which is the rankest kind of hooey—for pictures. Now reverse yourself and stop your ears, and see if you don't see the punkest kind of movie action you've seen in all this world. Now, just to cinch the argument, take a look at any talkie news weekly, and if it don't top anything else on the program both as for sound and sight, it's just a sign that you ain't no judge of entertainment.

Naturalism is IT so far as pictures are concerned. Talkie news weeklies are nothing if not natural. Natural in their unrehearsed action and their unplotted speech. And they're the high spot of any bill. Weeklies **have** been audience getters ever since they started; but it's only recently that perducers have woke up to why.

The simpler a thing is the harder it seems to be to understand. Take the simple frase "moving pictures." There, in two words, is the whole essence of the business. The name carries with it the formula for success. Moving pictures that are **moving pictures—moving**—meaning just what the word means—**pictures**—meaning just what the word says—click with the public. Anything else flops. Lots of good money has been wasted trying to make acting, names, mobs, sets, size, stories, authorship, trademark, and I don't know what else, take the place of MOVING pictures. And just as sure as you're alive there's going to be just the same old story over again, only told in a sadder strain, of exhausting every other possibility before coming down to the bed-rock fact that talking moving pictures are talking moving pictures.

And what a weary old road it's going to be! And all to reach so clear an end. First we got to put up with voices instead of actors. It'll take 'em a long time to learn that a well trained, beautifully modulated voice ain't **all** there is to waking up emotions. The voice of the elocutionist will be heard in the land and will remain until the public starves 'em out. Tecknishians will take the place of artists at the camera. The stage will be raided for its actors, its plays, its directors, and its necessarily following tecknick. **That's** all got to be gone through with. The poor (deleted, deleted, deleted) saps!

Then, after a combination of starvation and bankruptcy drives them to it, they'll wake up to the fact that what is really the thing to do is to make talking pictures, not vocalized still pictures, not photographically recorded plays, not anything else but good moving pictures made better by the addition of words and music.

Don't ever kid yourself into thinking that the talkie will be one thing and the movie another. Not a chance. In the first place, talkies **are** moving pictures—or should be; only they're moving pictures with about a thousand times the outlet for expression that the old movie had. And in the second, and overwhelming last reason, they make it possible to give a better show for less money. Less money from everyone—the perducer, the exhibitor, the public. And that's all you have to know to decide whether they're going to be IT or not. They ARE—and how! Regular movies won't disappear, of course. I understand many of the older families still have stereoscopic views for the guests on the what-not.

Cheap, good entertainment rakes in the berries every time. Always has and always will. Ever since the game started the perducers been climbing up the ladder on little pictures that could be made, sold, and exhibited cheaply and going broke on big artistic successes. Cheap, good entertainment is IT, I tell you, and that's exactly what the talkie is and that's why it's going to cop everything.

The talkie's so much cheaper than the movie that there ain't no comparison. Maybe you think it ain't, but it is. You got to look at any business as a whole and not as a part, and in the picture business the cost of making the picture is just a starter. It don't amount to one-two-three with the total cost—the real total cost of the picture.

Say a picture costs a hundred thousand. That's your start—NOT your finish. Onto that tack your exploitation cost, slip a little something to the exchange boys, pay a slice of the operators salary in the thousands of theaters it will be shown in, together with ushers, organist, orchestra, prolog, theatre cost or rent, taxes, interest—all multiplied by the number of theatres used—and gee whiz!—the first thing you know you won't be able to find that measly hundred thousand under the mess of really good sized figures that's piled up on top of it.

You'll never see these figures because they ain't put out—at least, not that way. You just get results. You hear that a picture only grossed $25,000 a week at a certain theater and lost money. Or made money. Anyway, that picture cost somewhere around $25,000 to put on at that theater, didn't it? And what's **that** but picture cost? All right, multiply **that** by your cities and see if it means anything.

It means just this: The heavy jack is juggled by the exhibitor, not the perducer. All the money invested in the producing end, from the home office building, the studio building, all equipment and salaries and stories and everything is piffling compared to the money laid out in theatres, exchanges, and salaries for the hundreds of thousands of employees to run them. Why, there's single theatres that have got more dough tied up in them and cost more to run than lots and lots of entire producing companies I could name.

Now what I'm getting at is this: If you whack off a few hundred thousand or add a few hundred thousand on to your studio costs it don't mean such a heluva lot; but if you trim off a few hundred **dollars**—not thousands—from your exhibition costs that saving multiplies and pyramids itself into a tremendous saving, because it works not in one place but in thousands of places.

All right now. Let your sound equipment and slower production set the studios back a little if it will. What it will save when it gets out is nobody's business.

If I told you that a regular movie is usually shown with a two hundred thousand piece orchestra and fifteen thousand organs accompanying it you wouldn't believe me; but it's not only true—collectively—but I'm underestimating the number considerably. Just take that one item and lift it out of the red and see what a boost it gives to the black. Now, as another nice exercise in single picture cost and profit computation let's be modest and only lift a measly million over onto the black side through dropping prologs just for one picture. Think that's too high? All right. Figure it out yourself. Multiply number of people used in the prolog by the number of theatres showing prologs; then get their salary cost per performance and multiply THAT by the number of times the picture is shown and see what you get.

Maybe you think they won't drop prologs. That entitles you to another think. Who's going to bother with third rate talent when they can get the best? And what sane manager is going to pay thousands for an inferior article when he can get the best for hundreds? Don't be silly!

Sound pictures offers the same glorious advantage that pictures do—that one, grand peculiarity that belongs to pictures alone and which five or six people in the industry are beginning to realize; which is: Get it good once and you've got it forever. No matter how much it costs or how much time it takes, if you get it **good** just once!—only once!—then you can go die if you want to, but that once will live always. Talking pictures can give the world's greatest of everything in entertainment.

No two audiences ever see exactly the same stage play. Stage performances vary always. But a screen play never varies; and there lies its strength. Two Forks sees the same show that New York got. And Two Forks will see and hear the same show that New York got. There lies the strength of sound pictures. They can and eventually will offer the best entertainment in the world caught at the moment of its best performance.

There's nothing on the horizon of the world that offers a rival for such a combination as that. And even if there were, it couldn't compete; for the sound picture can undercut any comparable entertainment by a matter of dollars.

Don't kid yourself about the solidity of the talkie. It's got everything.

BUT—as I was saying—the poor, helpless movie industry is in for two years of tooth-cutting, measles, house-maid's knee, growing pains, green apples, poison ivy, whooping cough and all sorts of childish woes. For they WON'T be sensible. They've got talkies, and they're going to make 'em talk or die; and it won't be until they've talked a few million customers out of the theatres that they'll commence to figure that maybe they'd better ease down on the dialog and stick in some action.

It's going to take a lot of staying away from the theatre on the part of the public to show the perducer that stage diction and stage delivery belongs on the stage but not on the screen. Pictures are natural; the stage is artificial. Natural pictures require speech; but it's going to be a long weary time before Our Little Nell stops talking with tone-color, voice-placing, inflection and emphasis.

And the plays—Oh, Lord, the plays! We've got all THAT to go through with. Plays written for the stage, with all its limitations, are just about inevitable. The perducers will do their usual stunt of following the obvious; and now that the screen has got a voice they'll grab all the stage perducers and stage directors and uplift the art of the speakies. We'll get Belasco and Shaw and Shakespeare and O'Neill and Ziegfeld and all the rest until Two Forks puts a stop to it by refusing to pay for something they can't understand.

In short, we're in for a new deal, and the game is dated right back to the rules of nineteen-fifteen. Thirteen unlucky years of penalization just because we went forward a step. We got 'em all to live over again, only we'll do it faster since we know the road.

In 'fifteen we had a scourge of stage directors. They flopped; because the better a stage director is for the stage, the worse he is for movies. Then we got a lot of names from the stage and had a company—Famous Players—who did the stunt of exploiting 'em. They flopped, in favor of nobodies who were great picture actors. Perducers dropped both these liabilities to keep from going under financially; but they made a desperate effort to keep wrong just the same, so we had a spasm of eminent authors. **They** flopped; and the game was kept alive by unknown **picture** writers. Then we had master mind directors; and **they** passed out. Then the star system struggled along to a hard dying. Eventually, after having been bumped hard and often by trying to avoid making moving pictures the perducers just had to stop fooling and go to work making good moving pictures in order to keep alive. And now, just as they're going good, this (deleted) (deleted) thing has to happen.

It's good or bad according to how you look at it. I've often wished I could start all over in pictures with what I've learned about them; and now here's the chance. There's no doubt about what they are going to be—in a few years. They're going to be our regular moving picture with the added advantage of words and music, and they're not going to be anything else. Anybody that can cash in on that ought to do so. But it's going to be hard to do. The perducers are going to have to be absolutely forced to accept the inevitable just like they were forced to before; and a lot of them will go down with the wrong colors flying, just like they did before.

Guess I'd better not go away any more.

Yours for louder and better pictures,

JIMMY.

THE Film DAILY
Sunday, July 1, 1928 29

TEN BEST CINEMATOGRAPHERS

IN an effort to focus the spotlight of attention on the deserving cinematographer, THE FILM DAILY, with the 1928 Directors' Number, inaugurates a ballot for the ten best cameramen.

Leading directors in Hollywood were asked to submit a list and from these ballots the results presented below have been compiled.

There have been many notable achievements in photography in recent years. There is no reason why recognition should not be accorded them. For years, the American Society of Cinematographers has been waging a consistent campaign to secure for its members, among whom are to be found the ace cinematographers of the industry, some of the credit to which their artistic efforts entitle them.

This publication has long been in sympathy with this aim. It is hoped that through the medium of the ten best cameramen's ballot, which will be a feature of each succeeding Directors' Number, that impetus will be given to the work of the A. S. C.

Cameraman	Votes	Cameraman	Votes
George Barnes	22	Arthur Edeson	12
Oliver Marsh	19	Robert Kurrle	8
Karl Struss	16	Peverell Marley	8
Charles Rosher	14	Victor Milner	8
Tony Gaudio	13	Ernest Palmer	8

Some Notable Productions of the Ten Best Cameramen

GEORGE BARNES
Two Lovers
Sadie Thompson
The Dark Angel
The Magic Flame

OLIVER MARSH
The Enemy
Sadie Thompson
Camille
Annie Laurie

KARL STRUSS
Drums of Love
Sunrise
Sparrows
Meet the Prince

CHARLES ROSHER
Tempest
My Best Girl
Sunrise
Little Annie Rooney

ARTHUR EDESON
Stella Dallas
Patent Leather Kid
The Gorilla
The Bat

ROBERT KURRLE
Sadie Thompson
Ramona
Resurrection
The Tender Hour

PEVERELL MARLEY
King of Kings
Chicago
The Volga Boatman
Dress Parade

VICTOR MILNER
Way of All Flesh
The Wanderer
The Showdown
Three Sinners

TONY GAUDIO
The Gaucho
Two Arabian Knights
Graustark
The Temptress

ERNEST PALMER
The Street Angel
Seventh Heaven
East Lynne
No Other Woman

The Directors Who Voted

Atkins, T. Carlyle
Beauchamp, Clem
Bell, Monta
Brenon, Herbert
Capra, Frank R.
Chaudet, Louis Wm
Clift, Denison
Darling, W. Scott
Davis, Al
Del Ruth, Roy
Dixon, Denver
Fejos, Paul
Fitzmaurice, George
Flood, James
Fox, Finis
Griffith, D. W.
Herman, Al
Howard, William K.
Kelly, Albert
Kirkland, David
Lang, Walter
Lipton, Lew
Moomaw, Lewis
Murnau, F. W.
Newfield, Sam
Newmeyer, Fred
Raymaker, Herman C.
Reed, Luther
Roberts, Stephen
Rock, Joe
Rogell, Al
Saunders, Richard D.
Storm, Jerome
Taylor, Sam
Thomas, Richard
Tuttle, Frank
Waters, John
Wellman, William A.
White, Jules J.
Wood, Sam
Yaconelli, Frank

Enlargements from Single Frame Motion Pictures

By Dr. K. C. D. Hickman

(*Continued from Page 6*)

In conclusion, it may be stated that contrary to general opinion the most pleasing result for display purposes can be secured by using a contrasty glossy paper. This gives the picture such snap and brilliance that the lack of quality becomes subsidiary. The heavy surface matte papers, while burying many defects, do not throw the subject into sufficient relief.

There may be those who doubt the utility of such elaborate precautions for securing single frame enlargements. Most of the advertising material in the motion picture business is admittedly artist drawn or made from "still" negatives. The necessity for the latter, however, lies in the appalling quality of the single frame enlargement. There is no doubt that for subject matter and action the picked single frame must be superior to the posed still. It is hoped that this short paper will induce at least some of those whose business lies this way to try the experiment of making two enlargements from motion picture film, one "straight" and the other using the "glycerine sandwich" in conjunction with diffused lighting.

Al Gilks, A. S. C., writes from Long Island City that he will remain there indefinitely at work on sound pictures for Paramount.

Frank B. Good, Billy Tuers and Bill Sickner, all A. S. C's, are on location at Cheyenne, Wyoming, shooting a series of pictures with Ken Maynard, from the famous "American Boy" stories.

Elmer Dyer, A. S. C., has just completed the Akeley shots on Buck Jones' latest starring vehicle, "The Big Hop," an aerial picture produced by the Buck Jones Corporation. James Horne directed. Jobyna Ralston played opposite Mr. Jones.

Class Room Films

An Experiment in Their Development From Scenario to Screen---A Plan to Test Their Value---Part II

[Abridgement of an address delivered by Dr. Thos. E. Finegan, Education Director of the Teaching Film Department, Eastman Kodak Co., before the Society of Motion Picture Engineers, Lake Placid, N. Y., September 28, 1927.—Editor's Note.]

pictures should deal with situations, activities operations, processes, etc. With these restrictions in their use there is an inexhaustible field of service for the motion picture. The subject selected for filming should fall within these limitations. Certain subjects may be represented as well and even better by still pictures than by motion pictures. A program of motion pictures should not invade the still picture field. In the activities and processes of every avenue of human effort and interest are subjects of vital relation to society which can be accurately represented by the motion picture only. In developing films to be used in the Eastman experiment the limitations herein prescribed for motion pictures have been respected.

This experiment is designated as one in the development of classroom films. What are classroom films and how do they differ from other films?

The name itself denotes a special and definite use, and therefore a distinct type of film. The name implies a film used in the classroom by a teacher giving instruction to his pupils. This type of film is therefore simply a classroom agency in the hands of a teacher. It is to be used by him when needed, similarly to the use of other classroom aids or apparatus. It is not a substitute for the teacher nor for the text book. It is just a tool to clarify his work and make it more impressive. It should be adapted to specific lessons and to definite grades.

The classroom film should be distinguished from the general assembly or auditorium film. The auditorium film is one intended to be used for a general audience of varying ages, grades, and interests. It is used to provide entertainment or to give mass instruction. There is no competition between these two types of film; one does not serve the legitimate functions of the other. A film which is developed on pedagogical lines to illustrate a fundamental principle or to clinch some central truth which the teacher is endeavoring to develop in the minds, for instance, of a class of sixth grade pupils is seldom adapted to the use of the general assembly. On the other hand, a film which will provide instruction or entertainment for the auditorium is not generally adapted to the more limited and specific purposes of the classroom.

Briefly, the plan of the experiment is as follows: The school authorities in twelve cities of the country were invited to cooperate in the experiment. To give the experiment the benefit of varied interests and viewpoints in education and to make it expressive of national interests and conditions, cities were selected from various sections of the country. The following cities were chosen:

1. Newton, Mass.
2. Rochester, N. Y.
3. Detroit, Mich.
4. Chicago, Ill.
5. Lincoln, Neb.
6. Denver, Colo.
7. Oakland, Calif.
8. San Diego, Calif.
9. Kansas City, Mo.
10. Atlanta, Ga.
11. Winston-Salem, N.C.
12. New York, N. Y.

Four schools have been designated in each city for experimental work. Three of these are elementary schools and one is a junior high school. Two groups of children will be under instruction—the control group or those given instruction without the use of films; and the experimental group or those given instruction with the use of films. Each of these groups will represent children coming from similar home environments and social conditions in life. They will be given tests to determine that they are on the same intellectual level. In each city there will be at least 320 pupils receiving instruction in the same area of the subjects included in the experiment. There will be 160 receiving instruction with the use of the films and 160 without the films.

In six of the cities it has been planned to use 1,000 pupils in classes instructed with the use of films and 1,000 in classes without the use of films. In each of these six centers 2,000 pupils will be included in the experiment. It is believed that an experiment of this character, with approximately 14,000 pupils in twelve leading cities in the various parts of the country will be adequate to obtain reliable and convincing evidence on the problems involved in this experiment.

Three subjects in the school curriculum have been chosen and films are being produced on topics outlined in the curriculum for classroom consideration. These subjects are geography, general science, and health.

In geography thirty films will be produced. They will be limited to the United States and will, of course, be correlated with the subjects as treated in the curriculum. They will be adapted to children of the fifth and six grades. In general science fifteen films, and in health five films are being produced. These films will be adapted to the pupils of the first and second year of the junior high school and will be correlated with the selected subjects treated in the curriculum.

It has already been stated that the scenes in motion pictures should denote action and that the films in this experiment are of such type. The following names of some of the geography films are given as evidence on this point:

Panama Canal, Bituminous Coal, Anthracite Coal, Iron Ore to Pig Iron, Pig Iron to Steel, Deep Sea Fishing, Wood Pulp, Wheat, Flour to Bread, Corn, Cattle, Wisconsin Dairies, Hydro-Electric Power in the Appalachians, The Overland Route, The Oregon Trail, and The Mohawk Valley.

In general science these are some of the films:

The Water Cycle, Water Power, A Municipal Water Supply, and Purifying City Water.

This group of films on water affords sequences upon a common subject which is a necessity of life. There is no agency through which the interrelated interests and processes of these subjects could be so accurately and effectively presented to a class of pupils as through the motion picture. One of the problems of the class-room is to coordinate subjects in the curriculum in such a way that pupils may get a broader knowledge of these interrelations. For instance, A Municipal Water Supply is primarily a general science film. It has direct relation, however, to the subject of health and is a fine example of a film in the field of civics. Through no agency either still picture or text, could this correlation of interests be so explicity shown as through the motion picture.

We now come to the technical aspects of the development of a film program. The first step is, of course, the preparation of a scenario. A scenario for a class-room film, as already stated, should be correlated with the curriculum. It should deal specifically with the subject matter presented through printed text and oral instruction in the classroom which is intended to illuminate and clarify. It should call for material which will be within the intellectual grasp of children of the age and grade for whose instruction it is intended. It should deal strictly with its main thesis and should seldom go into digressions or upon excursions into other aspects of the subject. These collateral aspects should be treated in scenarios pertaining to their peculiar interests. It is not possible nor is it necessary, to present in a film all the material bearing upon the subject to which it is related. Mere information or tabulated material should not be included. A scenario should never be padded. The basic features only, which are picturable and essential to a fundamental knowledge of the subject should be presented.

The scenes called for in the scenario should be limited

of course to subjects, situations and processes which it is proper and suitable to present to a class of children. The scenario should be based upon sound principles of the psychology of childhood which scientific research has made available. The approach to a subject and its development in the scenario should conform to the practices of the classroom which are generally accepted in the teaching profession. The scenario should call for a film which should always be regarded simply as an aid to the teacher in his regular daily class-room instruction.

The continuity of a scenario should be clear and without a break. The wide gaps which may be allowable in a film for mature minds are not permissible in a classroom film for the instruction of children. The continuity may sometimes be strengthened through the judicious use of titles. On the other hand, too many titles often interrupt the continuity of thought. They should not be used when the continuity may be expressed and the scenes properly interpreted without them. Titles should be short, clear and expressive. Each title should generally contain not more than a single idea. This policy of using titles should be in keeping with the sound teaching principle that a child should not be told that which he may be able to see or discover for himself. Furthermore, there is an economic aspect to this feature of a film. Titles run rapidly into footage and the more titles are used the less footage will, of couse, be available for scenes.

It follows from these specifications that the writer of a scenario should be a teacher of broad and deep knowledge in the field which it covers. He should be experienced in the science of education and the art of teaching. He should be a scholar and teacher of creative power. He should be endowed with imagination and the genius of an artist. He should be a master in the organization of material and should be skillful in presenting it in logical order and by effective methods.

The Eastman Kodak Company, in the selection of scenario writers, chose teachers of known interest in the field of visual education, who have had large experience in teaching the subjects on which films are to be prepared. For instance, teachers of university training who had taught geography in public schools for 10 to 20 years and are recognized by their profession as leading teachers in that subject, were chosen to aid in the preparation of the geography scenarios. Two of these are teachers in large city school systems and one is a teacher of geography in the training department of a State Normal School. This group of experienced teachers sat in conference with the staff of the Eastman Kodak Company for several days discussing the place and purpose of the film and the underlying principles of scenario construction. Each member of the group then prepared a general outline of a film. Each of these outlines was considered in conference by the staff and these teachers. After such conference each teacher revised his scenario and the revised product was the subject of another general conference. These processes were repeated until the Eastman staff and the scenario writers were in unanimous agreement on the scenario. These scenarios have generally passed through seven to ten revisions.

The scenarios were then edited by the Editor-in Chief of the Eastman Staff. They were then submitted for criticism to two of the leading psychologists and specialists in education in this country, Dr. Frank N. Freeman, of the University of Chicago, and Dr. Ben D. Wood, of Columbia University. These men have the esteem and confidence of the educational workers of the nation. Each of them suggested modifications which, in his judgment, would remedy defects discovered, or would otherwise improve the scenario. The scenario was then given final editorial approval and was ready for the photographic division. The same detail of procedure has been followed in preparing the general science and the health films.

In obtaining some of the scenarios for this experiment we followed a plan which has been of much interest. We suggested to the superintendent of each city in which the experiments are to be operated, that the teachers would have a greater appreciation of the value of the film in classroom instruction and a clearer understanding of its application to the subject to which it relates if they were to write a scenario for one of the selected topics. The teachers in each of ten cities prepared a scenario under direction of the Editor-in-Chief of the Eastman Kodak Company. In several of the cities some of these teachers showed unusual ability in writing scenarios. They expressed themselves as being delighted with their experience and were eager to try a hand in writing another scenario.

(*To be Continued*)

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FOR SALE—CAMERAS

FOR SALE—One Universal 200 ft. Camera in excellent mechanical condition, used slightly, with new 50 m. m. B. &. L. F. 3.5 lens. Price, $200.

One 400 ft. Willart Professional Camera, nearly new, with B. & H. tripod. Has two extra magazines, automatic dissolve, magnifying focusing tube direct to film; film punch; footage indicator; also special footage indicator for scenes; trick crank, 1700 degree shutter, 50 mm. B. & L. Tessar F. 3.5 lens, level Has excellently smooth cranking qualities. Price, $395. Address Has Excellently smooth cranking qualities. Price, $395. Address G. Russell Carrier, Gen. Delivery, Akron, Ohio.

FOR SALE—Debrie Slow Motion Camera, 15 feet per second; two magazines; two lenses; two leather cases; tripod, almost new. Cost $2300.00. Want $1500.00 in cash or will trade; what have you? Prefer vacant lot or trust deed. PHONE GLendale 7969W.

FOR SALE—New Bell & Howell outfit with all latest equipment and lenses. A very unusual bargain for cash only. Also Akeley outfit like new. Don Malkames, 458 West Broad Street, Hazleton, Penna.

FOR SALE—Bell & Howell Camera No. 536. Inside Prizm and matt box; six magazines; Camera and Magazine case; also miscellaneous case with filters, gauze, etc. Thalhammer Iris. Outfit cost $3200.00. Will sell complete for $1500.00. Terms. Chas. E. Schoenbaum. OX-2771.

FOR SALE—8x10 Corona Camera, Wollensack 8x10 12-inch F.4.5 lens, 6 plate holders and tripod, $90.00. Also 2¼x3¼ Grafles, Bausch & Lamb F.4.5 lens, $40.00. $125.00 if sold together. To be inspected at A. S. C. office. GRanite 4274.

FOR SALE—Bell & Howell, excellent mechanical condition; six magazines; three cases. Brand new Astro F 2.3-50 mm Goerz 75 and 40 mm B. & H. tripod with Mitchell legs. Large single arm iris with B. & H. shade box, 4-way matt box, Gauze matt holder and two inch glass filter holder. $1,375 cash. Vernon Walker, 601 W. Fairmount St., Glendale, Cal., or A.S.C. offices.

FOR SALE—Cash only. $1,250.00 Bell & Howell Camera, No. 490.00 Astro lenses, fully equipped. Perfect mechanical condition and late model B. &. H. tripod. Edgar Lyons, 593-160—4377 Camera Ave., Hollywood.

FOR SALE—MISCELLANEOUS

FOR SALE—Four slightly used Mitchell Matt boxes at $40.00 per set. Call Chas. Glouner at Universal Studios. HEmpstead 3131.

FOR SALE—Bell & Howell, excellent mechanical condition; six magazines; three cases. Brand new Astro F 2.3-50 mm. Goerz 75 and 40 mm. B. & H. tripod with Mitchell legs. Large single arm iris with B. & H. shade box 4-way matt box. Gauze matt holder and two inch glass filter holder. $1,375.00 cash. Vernon Walker, 601 W. Fairmount St., Glendale, Calif., or A.S.C. offices.

FOR SALE, CAMERAS—B. & H. Camera No. 576 with 50 mm. B. & L. F.2.7 40 mm. Goerz Hypar F.3.5 and 75 mm. Zeiss Tessar F.3.5. Mitchell Tripod, 6 magazines, Universal big finder, brand new Matt box and countless other things for sale. Call John Stumar or Chas. Glouner at Universal Studios. HEmpstead 3131.

FOR SALE—Bell & Howell Camera, 170 degree. Whole outfit new. Latest serial number, 794. Equipped with fastest Taylor Hobson Cooke lenses. Write for complete list of equipment and price. James Matthews, S.M.P.E., 225 West Seventh St., Long Beach, Calif. 648-166.

FOR RENT—CAMERAS

FOR RENT—Two Bell & Howell cameras, Mitchell tripods, large finders, all F/2.3 lenses. Also Cinemotor and friction head for Akeley work. Frank Cotner, 6273 Selma Ave., HOlly 5046.

FOR RENT—170 deg. Bell & Howell, 3" F 1.9 Dallmeyer, 3" F 3.5 Goerz, 2" F 2.3 Astro; 40 m.m. F 3.5 Goerz, Mitchell tripod with Bell & Howell head, baby tripod, six magazines and prism. Call TErrace 9152.

FOR RENT—Mitchell Camera No. 97 with latest high speed movement, high speed gear box and cable, complete, for high speed work, with or without operator. Equipped with Astro 40 m.m. F.1.8 Astro 50 m.m. F.2.3 Astro 75 m.m. F.1.8. Eight magazines and Stumar matte box with filter holders and sun shade. Mitchell Camera No. 85 with regular movement. Astro 40 m.m. F 2.3 Astro 75 m.m. F 2.3 Ruo 50 m.m. F 1.25. Eight magazines and Stumar matte box with filter holders and sun shade. Eyemo Camera with Hoefner tilt and pan. Pliny W. Horne, 1318 N. Stanley Ave., Holly 7682 or Mitchell Camera Co., Holly 3946.

FOR RENT—Bell & Howell, complete. Fast lenses, magnified finder, Mitchell tripod and Tilthead prism or Goerz upright eyepiece. R. DeGrasse, 595-533. 4312 Ambrose Ave., Hollywood.

FOR RENT—Three Bell & Howell 170 Degree Cameras, F. 2.3 and F. 2.5 lenses, Mitchell Tripod legs. Complete equipment. Eddie Linden, 6017 Elinor Ave., Hollywood, HEmpstead 8333 or A. S. C. office, GR 4274, GR 4704.

FOR RENT—Camera equipment: 1 Mitchell Camera, 1 Mitchell Speed Camera with attachment, new. 1 Bell & Howell, 1 Akeley (Full Equipment). Ted Tettzlaff, Phone GR 9255. 1724 N. Western Ave., Hollywood.

FOR RENT—Complete Mitchell outfit, with Astro Lenses—Phone Mitchell Camera Co., HO-3496 for equipment of John Silver, A. S. C.

FOR RENT—Four Bell & Howell Cameras, one cinemotor and friction head for Bell & Howell; 2.3 Astro lens, large Prismatic Mitchell finders and Mitchell legs. Special built-in side Prisms. Baby tripod, extra tripod; six inch lens in mount. Richter Photo Service, 7764 Santa Monica Blvd., GL-7804; at night HE-1780, or B. B. Ray, 591-331.

FOR RENT—Three Mitchell and two Bell & Howell Cameras, Astro lens equipment and large finders. Mitchell tripods. Complete equipment in perfect condition. Also Mitchell Motor, Friction Tilthead, extra magazines and lenses. J. R. Lockwood, 861 Seward St., Hollywood. GLadstone 6115. Res. 523 N. Orange St., Glendale. Glend. 3361 W.

FOR RENT—Complete Mitchell outfit with astro lenses, six magazines, by Al Gilks, HE 1490.

FOR RENT—To reliable party, one Bell & Howell camera with Mitchell legs; Astro Lens F. 2.3., Fl. 8. 6 magazines. Fred Hoefner mat box. In perfect shape and fully equipped. Joe LaShelle. ORegon 6730.

FOR RENT—CAMERAS, ALL KINDS. Akeley, Bell & Howell 170%, also Speed DeVry Graflex, Still (late model Anscos). For rent by day or week to responsible parties. Ries Bros., Ries Bldg., 1152 No. Western Ave. Phone GRanite 1185; Residence, HO-1055.

MITCHELL and Bell & Howell cameras. F.1.8 and F.2.3 lens equipment. All kinds of lenses and equipment for rent. John S. Stumar, 3602 Cardiff Ave., Palms, Los Angeles. Phone: Culver City 3512, or call C. Glouner, Camera Dept., Universal City, HEmpstead 3131.

ONE DE VRY Motion Picture Camera. Complete outfit. Alvin Wyckoff, Phone Care A. S. C., GRanite 4274.

BELL & HOWELL. Victor Milner, 2221 Observatory Ave., Los Angeles, California. 596-944.

BELL & HOWELL—Phone Perry Evans, OL 8797 or Hollywood A. S. C.

BELL & HOWELL, 170, with 30, 40, 50 and 75 lens equipment. Baby tripod. Also B. & H. Cine motor. Charles Stumar. GRanite 9845. 7501 Lexington Ave., Hollywood.

FOR RENT—MISCELLANEOUS

FOR RENT—One Cinemotor with Veeder counter in first class condition. Baby tripod; extra tripod. Mitchell friction heads for Bell & Howell camera. Six inch lens in mount. Richter Photo Service, 7764 Santa Monica Blvd., GL-7804; at night, HE-1780.

FOR RENT, LENSES—Trick lenses of all descriptions for rent by day or week. Call George Meehan, A. S. C. Phone GR 3830, 744 North Curson Ave., Hollywood, California.

FOR RENT—STILL CAMERAS

FOR RENT 1 8x10 Still Camera, focal plane shutter, complete. 1 Mitchell Friction Tripod, new, for B. & H. 1 Eyemo Camera with special lock. 1 4x5 Graflex B. & L. lens. 1 B.-H. Low Boy to fit new style B.-H. Tripod head. Joe LaShelle, 639 N. Sierra Bonita, ORegon 6730.

FOR SALE—LENSES

FOR SALE—4 inch F 2.7 Carl Zeiss Lens. Brand New. Make an offer. Ray L. Ramsey. GLadstone 2466.

FOR SALE, LENSES—Carl Zeiss, F. 3.5, 50 mm., mounted in latest B. & H. mount. Looks like new. Perry Evans, 413 No. Mariposa Ave., Hollywood, California.

FOR SALE—50 m.m. Goerz Hyper lens F. 3.5 in B. & H. mount, $25. 50 m.m. B. & L. lens F. 2.7 in B. & H. mount, $45. J. N. Giridlian, Phone TErrace 9152.

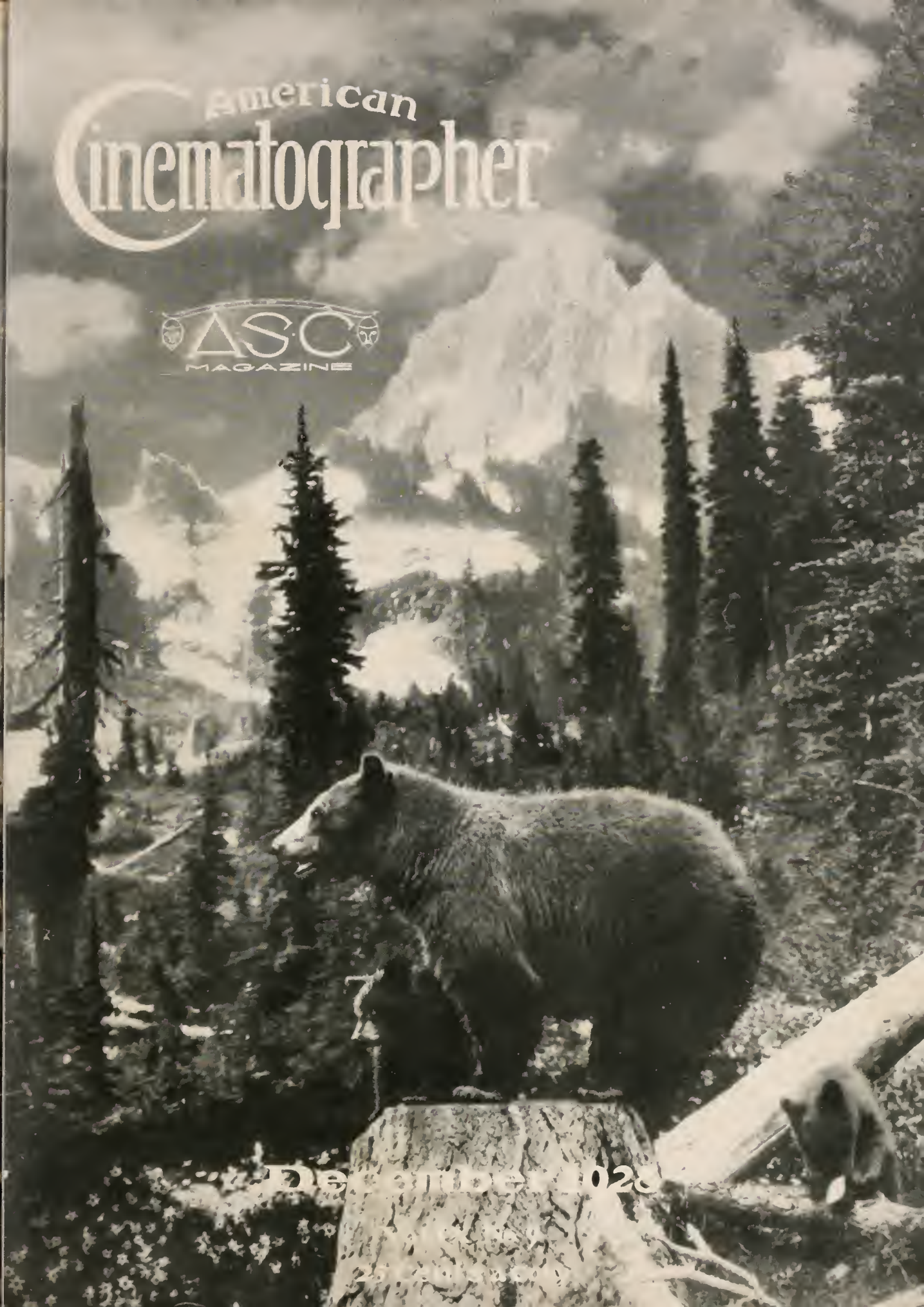
ONE two-inch Bausch & Lomb F.2:7; one Dahlmeyer Pentac 37 mm. F.2:9. Georges Benoit, care of American Society of Cinematographers, Hollywood, California.

WANTED—MISCELLANEOUS

WANTED—Will buy Bell & Howell cinemotor and a 32 M. M. Lense. Call Herman Schopp, HOlly 4735 or care A. S. C. office, GR. 4274.

NEWS and Tropical Motion Picture Work done for any News company. Write full particulars, offer and requirements, Ardeshir Choksi, 603 Girgaum Road, Bombay, India.

American Cinematographer



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The Voice of the A. S. C.

"TO HELL WITH PHOTOGRAPHY! WHAT ABOUT SOUND?"

In the October bulletin of the Academy of Motion Picture Arts and Sciences, mention is made of a discussion on "The matter of standardizing equipment and methods." During the discussion, Mr. Fred Pelton asked:

"Who is the King Pin in production, the cameraman or the director?"

"The one that talks loudest," replied Mr. Edmund Hansen, sound engineer with the Fox-Case organization.

This was generous of Mr. Hansen, for he might have said: "The sound engineer."

This brings up in a friendly way a matter that sooner or later must seriously occupy the attention of the production chiefs of the studios, for upon its proper settlement may depend the evolution of the pictures along the line of beauty, which essential element has been painstakingly built into production through many years of research, devotion to ideals and the expenditure of treasure in time and money so vast that it would build a fleet of battle cruisers for the United States navy.

The question is: Shall the beauty of the film be sacrificed to the exigencies of sound as they exist according to present-day sound picture technique? This technique, in so far as it affects the cinematographer's work, was outlined briefly in an article by Mr. Fred Westerberg, A.S.C., published in THE AMERICAN CINEMATOGRAPHER for November.

Mr. Westerberg does not attempt to go into all the phases of the subject, but upon the points he touches he makes his case conclusive.

Now as to beauty in films, which is absolutely dependent upon the cinematographic art, both the producers and the public will attest that it is, along with the entertainment value of the story, the sine qua non of motion picture production. If you don't believe this just recall the films of twenty years ago and ask yourself if you could endure this kind of art (or beauty) in your pictures of today.

The good, the true and the beautiful are still the three graces—the three ideals of art—and the last is not the least of this triad. Beauty, it may be said, is the enchantment of the picture and to permit anything to impair it would seem to be throwing away treasure beyond price.

Sound is in the pictures to stay. Beauty in cinematography is essential to the popularity of the films and upon them both depends the success of the cinema.

The motion picture industry has grown to its present importance by means of the silent picture embellished with the beauty placed in the film by the artistry of the cinematographer, and is this great artist to be treated like an intruder in his own house because zealots of the more mechanical department of sound technique assume a superiority which exists only in their own minds.

Cooperation! In that sign shall the sound pictures triumph and that means that both cinematographer and sound engineer shall be put and maintained in his proper place.

And this brings us to the heading of this paragraph. In a certain large Hollywood studio, a few days ago, the cinematographer in charge of the set was discussing the problems of getting better photography in the sound sequences, when the arbiter of sound gave voice to this expression. The cinematographer might have come right back with a reversal of this phrase, but he did not.

The A.S.C. magazine does not believe the producer feels that way about it and it is equally certain that the "cash customers" out in front of the screen are not going to share in such a sentiment.

TEN YEARS OLD

At 8 o'clock on the night of Saturday, December 21, 1918, at a meeting of cameramen held at the home of the late William C. Foster, in Hollywood, The American Society of Cinematographers was born, its motto being "Loyalty, Progress and Art."

For ten years this Society has persisted through many periods of storm and stress, some of which slowed up its progress, while others threatened to destroy it, but out of all difficulties it has arisen triumphant, the while strictly adhering to its ideals of loyalty, progress and art.

It had been hoped to celebrate this tenth anniversary in the midst of revelry and with all the trappings of victory and magnificence, but the unsettled conditions in the industry have counseled delay and the Board of Governors of the A.S.C. will defer the observance of this event until such time as it can be staged in a manner consonant with its importance.

In the meantime the A.S.C. starts upon the second decade of its history in the faith that it will not only continue as one of the essential units of the motion picture industry, but also that it will achieve new honors in research and pioneering in the field of cinematography.

OUT OF THE CHAOS

Out of this great chaos brought about by the advent of the sound pictures there will come order and it is likely to come more speedily than many people expect. The cameramen are rapidly equipping themselves for eventualities and the writers, for the first time in motion picture history, appear to be entering into their own. THE AMERICAN CINEMATOGRAPHER rejoices to see this as the writers certainly have not hoofed the rosy road. In regard to the new conditions, the Screen Writer's Bulletin says in part:

"And yet the mechanical problems presented constitute only a small part of the producers' troubles. The ramifications reach every branch of the industry and affect every worker in it. The actor, the director and writer must possess novel qualifications and develop a new technique or retire from the industry. The writer will be least affected, for his art has never been appreciated or even understood. Essentially the mechanics and the technique are separate problems. The mechanical is swiftly revolutionary; the artistic is deliberately evolutionary.

"The public demands novelty in its amusement and responds instantly to the blatant and bizarre, while the development of artistic appreciation is so slow as to be almost imperceptible. In the flurry and excitement over sound devices high priced dramatists and novelists, with little or no knowledge of picture-making, will be employed—with the usual results. As between high salaried dramatists and novelists who know little of pictures and experienced scenarists who know less of higher literary art, the producers will eventually choose the latter. Hollywood writers have nothing to fear."

A Night Before Christmas in Southern California—from the Camera of Mr. Fred Archer, A.S.C.

Sound Film Recording With the Light Valve

By Donald MacKenzie

Bell Telephone Laboratories, Inc., New York, N. Y.

The sound records I am about to describe are of the variable density type, and the method of making them is that developed by Bell Telephone Laboratories.

It is not difficult to specify the requirements of this type of sound film. So far as possible the exposure of the negative must be kept within the straight line portion of the Hurter and Driffield curve for the emulsion chosen, and the print must be timed with the same restriction. The development of the negative and of the print must result in a positive where the transmission of each element of length is proportional to the exposure of the corresponding element of the negative.

The light modulator must be supplied with undistorted power from the recording microphone and amplifier. When the positive is projected, the striations of the sound track must be enabled to modulate the illumination of a photo-sensitive cell to retranslate the photographic effect into electrical current which shall be fair copy of the microphone current generated by the original sound. From this point on the problem is the familiar one of sound re-enforcement, the film and cell having taken the places of the sound source and microphone.

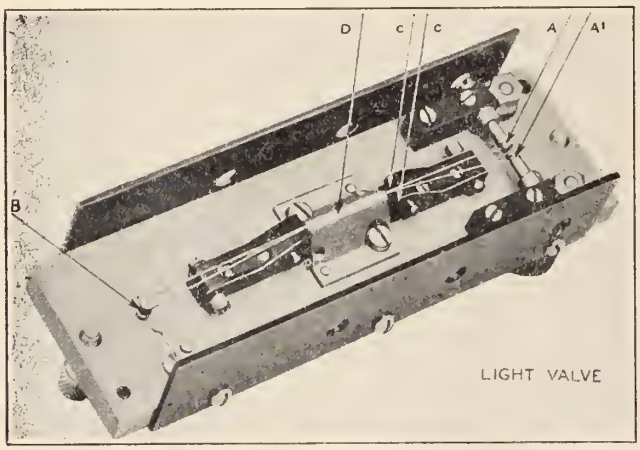


FIG. 1.

Figure 1 shows a photograph of the light valve, invented in 1922 by Dr. E. C. Wente of the Bell Telephone Laboratories. Essentially, it consists of a loop of duralumin tape suspended in a plane at right angles to a magnetic field. The tape, 6 mils wide and 0.3 mil thick, is secured to windlasses A and A^1 and stretched tight by the spring-held pulley B. At points C and C^1 insulated pincers confine the central portions of the tape between windlasses and pulley to form a slit 2 mils wide. Supporting this loop and adjusting devices is a slab of metal with central elevation D, which constitutes the armature of an electromagnet. The central portions of the loop are supported on insulating bridges to lie 3 mils above the face of D; here the sides of the loop are centered over a tapered slot, 8 mils wide by 256 mils long in this plane, opening to 204 mils by 256 mils at the outside face of the armature. Viewed against the light, the valve appears as a slit 2 mils by 256 mils.

The electromagnet core has a similar elevation opposing D across on air gap of 8 mils which closes to 7 mils when the magnet is energized from a 12-volt battery. A tapered slot in the magnet core begins 8 mils wide by 256 mils long and opens with the same taper as the slot in the armature. When the assembly of magnet and armature is complete, the valve constitutes a slit 2 mils by 256 mils, its sides lying in a plane at right angles to the lines of force and approximately centered in the air gap. The windlasses A and A^1, one of which is grounded, are connected to the output terminals of the recording amplifier. If the magnet is energized and the amplifier supplies a sine wave current from an oscillator, the duralumin loop opens and closes in accordance with the current alternations.

When one side of the wave opens the valve to 4 mils and the other side closes it completely, full modulation of the aperture is accomplished. The natural frequency of the valve is set by adjusting the tension applied by the pulley B; for reasons which involve many considerations the valve is tuned to 7000 cycles per second. Under these circumstances about 10 milliwatts of A.C. power are required for full modulation at a frequency remote from resonance; about one one-hundredth of this power at the resonant frequency. The impedance of the valve with protecting fuse is about 12 ohms.

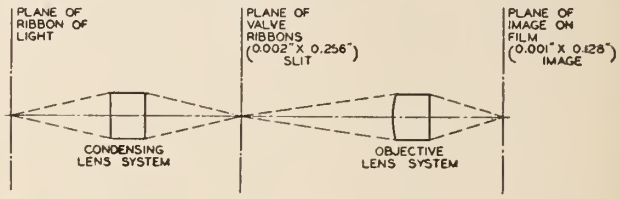


FIG. 2.

If this appliance is interposed between a light source and a photographic film we have a camera shutter of unconventional design. Figure 2 shows a diagram of the optical system for studio recording. At the left is a light source, a ribbon filament 18 ampere projection lamp, which is focussed on the plane of the valve. The light passed by the valve is then focussed with a 2 to 1 reduction on the photographic film at the right. A simple achromat is used to form the image of the filament at the valve plane, but a more complicated lens, designed to exacting specifications by Bausch and Lomb, is required for focussing the valve on the film. The undisturbed valve opening appears on the film as a line 1 mil by 128 mils, its length at right angles to the direction of film travel. The width of this line varies with the sound currents supplied to the valve, so that the film receives a varying exposure: light of fixed specific intensity through a varying slit.

Figure 3 shows a studio recording machine with the door of the exposure chamber open. In this machine the film travels at 90 feet per minute, and the sound track is made at the edge away from the observer. The line of light, the image of the valve, overruns the perforations by 6 mils, extending toward the center of the film 122 mils inside the perforation line. The right-hand sprocket serves to draw film from the feed magazine above and to feed it to the take-up magazine below; this sprocket is driven from the motor shaft through a worm and worm wheel. The left-hand sprocket engages 20 perforations and is driven through a mechanical filter from a worm and worm wheel similar to that driving the feed sprocket. The mechanical filter enforces uniform angular velocity of the left-hand sprocket which carries the film past the line of exposure; the focussed image of the valve; balancing of the flywheel which forms part of this mechan-

This article was originally presented at the Fall convention of the Society of Motion Picture Engineers held at Lake Placid, N. Y., September 24-28, 1928.

FIG. 3.

ical filter holds the angular velocity constant to one-tenth of one per cent, despite the imperfections of the driving gears.

So far we have provided a means for driving the film and a means for modulating the light thereon, but we have not chosen the average illumination about which the modulation is to take place. The maximum exposure corresponds to the maximum opening of the valve and is therefore double the average. Choose now the contrast to which the negative sound record is to be developed and draw the Hurter and Driffield curve for this contrast for the emulsion chosen for the negative sound record. The maximum exposure should correspond to the beginning of over-exposure, the average should be half this. The Hurter and Driffield curve will give the density of the over-exposure point for the chosen contrast and the density for half this exposure. Let the machine run to expose film to light through the unmodulated valve for several values of the lamp current. Develop the film and measure the densities due to the various values of lamp current. Select, by interpolation if necessary, the lamp current which corresponds to half over-exposure. With this current in the lamp the machine is ready to make a sound record, since the focussing of the valve has already been done and manufacturing specifications insure that the line of illumination shall lie, within 3 minutes of arc, at right angles to the direction of film travel.

Consider at this point the procedure in the recording studio. Adding sound to the picture introduces no complication of technique other than to require sufficient rehearsing to make sure of satisfactory pick-up of the sound: microphone placement must be established and amplifiers adjusted to feed the light valve currents which just drive it to the edge of overload in the fortissimo passages of music or the loudest utterances of speakers.

In Figure 3 the photograph shows a photo-electric cell mounted inside the left-hand sprocket, which carries the film past the line of exposure. Fresh film transmits some 4 per cent of the light falling on it, and modulation of this light during the record is appreciated by the cell inside the sprocket. This cell is connected to a preliminary amplifier mounted below the exposure chamber, and with suitable further amplification the operator may hear from the loud speaker the record as it is actually being shot on the film. Full modulation of the valve implies complete closing of the slit by one side of the wave of current; this modulation should not be exceeded or photographic overload will abound.

One or more cameras and one or more sound recording machines are driven by motors electrically synchronized from a common distributor. Speed control and synchronization of these motors are described in Mr. Stoller's paper. At the beginning of the day's work a check is made of the operation of the driving motors, and the tuning and spacing of the valves is verified.

Figure 4 is a schematic diagram of the studio equipment for sound recording. Provision is made for combining, if desired, the contributions of several microphones on the set. This combination is under the control of the mixer operator in the monitoring room, viewing the set through a double window in the studio wall. The mixer controls also the gain of the amplifiers for the recording machines.

The diagram shows relays which permit the mixer to connect the horn circuit either directly to the recording amplifier or to one or the other of the monitoring photo-electric cells in the film recorders. The direct connection is used in preparing the sound pick-up in the studio: the program is rehearsed until satisfactory arrangement of microphones and of amplifier gain is effected. The electrical characteristic of this direct monitoring circuit is so designed that the sound quality heard in the horns shall be the same as the quality to be expected in the reproduction of the positive print in the theater. Acoustic treatment of the walls of the monitoring room secures the reberberation characteristic of the theatre, and the monitoring level is so adjusted that the mixer operater hears the same loudness that he would wish to hear from the theater horns. It is capitally important that the operator judge his pick-up on the basis of sound closely identical in loudness and quality with that to be heard later in theatre reproduction.

After the pick-up has been established on the direct monitoring circuit, the output of the recording amplifier is applied to the light valves and the monitoring horns are connected to the photo-cell amplifiers on the recording machines. With no film in the machine and at a convenient lamp current a complete rehearsal is made to verify the operation of the valves at the proper level. Film is then loaded, cameras and sound recorders are interlocked and starting marks made on all films by punches or light flashes.

A light signal from the recording room warns the studio, which after lighting up signals back its readiness to start. The machine operator starts the cameras and sound recorders, brings up the lamp current to the proper value, and when the machines are up to speed, signals the studio to start. During the recording the mixer operator monitors the record through the light valves, thereby assuring himself that no record is lost.

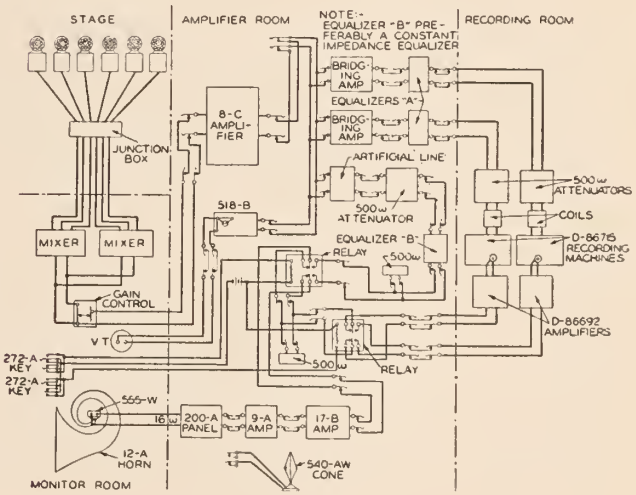


FIG. 4.

In the choice of emulsion for the sound negative, the usual designation of speed may be disregarded, because it is desired to make the exposure of the unmodulated track many times the under-exposure of the emulsion used. The advantages of positive emulsion for the sound negative have come to be generally recognized; positive has been used by Bell Telephone Laboratories since 1924. The scale of Eastman positive film is about 20 to 1; we

adjust the recording lamp current to give an illumination on the film for the unmodulated track of 10 times the under-exposure. After one lamp has been calibrated as described before, it may be replaced when necessary by another in which the wattage in the ribbon filament is the same; the light emission is very closely correlated with the wattage. Where the unmodulated or average exposure is ten times the under-exposure minimum, 90% modulation of the light can be permitted without running into under-exposure on the faint side of the wave. For sound currents reaching 100% modulation of the light, 90% of the wave is free from distortion; if the average light were halved, still 80% would be free from distortion. There is, therefore, considerable latitude in the average exposure, and the negative is satisfactory if the transmission of the unmodulated track lies between fairly wide limits.

The choice of the negative sound gamma is determined by the practice of the laboratory in regard to picture development. It is usual to see on the screen pictures whose overall gamma considerably exceeds unity. On the sound track the overall gamma should equal unity, and the development of sound negatives should be uniform, though that of picture negatives is left to the judgment of the finisher.

Theoretically, it should be immaterial what combination of reciprocal values is chosen for the negative and positive sound gammas. Practically, we have to recognize the existence of ground noise in all records and take precaution to minimize it. No matter how excellently we reproduce the fortissimo passages, our record is unsatisfactory unless the ground noise is low enough for a wide volume range, that is, a wide range in level between fortissimo and pianissimo. Whether our negative sound record is made on negative or positive emulsion, there is always the danger that in reproduction we shall encounter variations in transmission from point to point due to local variations in the celluloid base, to local action of the developing agent, or to a developer excessively granular in action. The photo-electric cell is able to recognize variations of 1/10 of 1 per cent, whereas the eye ignores contrasts under 2 per cent. These local variations in transmission, continued to the positive print, constitute the ground noise.

The remedy is, in part, to chose a developer which produces a minimum graininess. In part, to insist on machine development of the sound film with thoroughly agitated developer. Further, to carry the sound development to a high gamma; this obviates, to a large extent, flow marks of the developer, and goes a long way to escape local variations in the base by developing the negative striations to be conspicuous in comparison.

In 1924 we concluded that the optimum choice was positive emulsion developed to unit gamma for both sound negative and sound print. This is feasible for sound records separate from pictures, but a compromise must be made for the combination of sound and picture in a single positive print. Here the positive development required for a satisfactory picture is always to a gamma far above unity.

It is customary to develop picture negatives by inspection, having in mind the uniform positive development to be undergone by the prints from these negatives. The gamma of these positives need never exceed 1.8; the sound negative then should be developed to 0.55. In order not to disturb the practice of the film laboratory, we ask that the positive development be standardized and its gamma ascertained, the reciprocal of this gamma then arranged for in the standardized negative development. A negative gamma above 0.5, together with the precautions of careful handling, permits the realization of an adequate volume range.

It is beyond the scope of this paper to discuss the details of manipulation and of choice of developer, but I wish to acknowledge the cooperation of Mr. J. W. Coffman in the solution of such problems. The problem is the reduction of ground noise, and its seriousness is not to be diminished by choosing a different recording method.

In printing the sound negative, a uniform density for the print of the unmodulated track is desired. The volume of reproduced sound for a given reproducing light source, varies directly with the average transmission and the per cent modulation of this average. This average density should be on the straight line portion of the positive Hurter and Driffield curve, far enough to keep the denser negative portions from reaching the under-exposure region. For Eastman positive film a suitable transmission of the unmodulated portion of the sound print is 35%, referred to air, for the usual values of positive gamma: 1.4 to 1.8. At this average transmission only the peaks of the recorded sound will encroach on the region of under-exposure. For the reciprocally developed negative track the region of under-exposure will have been reached by occasional peaks on the other side of the wave, and such photographic distortion as exists will be balanced between positive and negative.

Here we appropriately consider the photographic distortion as it occurs in variable density records. If the entire negative exposure has been confined to the under-exposure region of the emulsion chosen, a huskiness will result in the reproduction which cannot be corrected by any known technique. But if the unmodulated negative transmission, for a gamma of 0.55, is about 16% referred to air, 90% of the wave will be clear of under-exposure, and experience shows that the ear detects no distortion. In telephonic terms, everything at a level 1 TU below full modulation will be free from distortion, and the peaks will be substantially perfect. The same may be said of the positive printed to an average transmission of 35%, provided the overall gamma approximates unity.

It has been calculated that if the overall gamma departs from unity by 0.2 in either direction, a harmonic of 5% amplitude of the fundamental will be introduced. Experimentation has shown that a 5% harmonic is the least detectible. We state then the tolerance on the overall gamma for the sound track as 0.8 to 1.2. Variation of corresponding amount in the contrast of a picture print is intolerable; therefore greater latitude in contrast is permissible in the sound record than could be tolerated in the accompanying picture.

In printing these sound negatives in combination with pictures for projection in the theatre, it is customary at the present time to print one negative, masking the space needed for the other, then run the positive again through the printer with the other negative, masking now the space already printed. In printing the picture negative, light changes are made as usual; for the sound negative

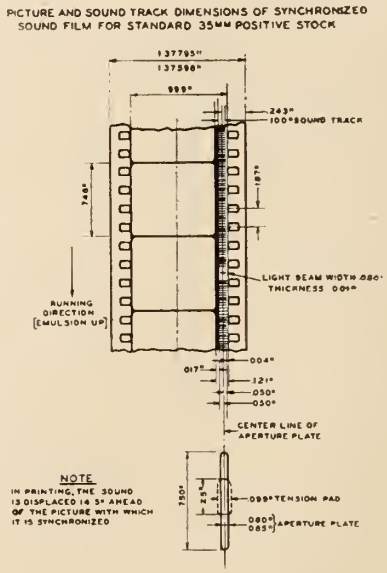


FIG 5

the light is regulated to result in 35% transmission of the unmodulated track after positive development. Provision of suitable masks in the camera has been made to show in the finder and expose on the film only the portion which will be available for picture projection.

In the theatre projector, the sound gate is located 14.5

inches below the picture gate, in order to project the sound record at a point where the film is in continuous motion. Therefore, in the printing, it is arranged to print the sound negative displaced along the length of the positive enough to bring the sound 14.5 inches ahead of the corresponding frame. The printer apertures are chosen to give a dark no man's land 17 mils wide between picture and sound track; the latter at the outside is separated 4 mils from the inner perforation edge.

Figure 5 exhibits the present practice for the finished positive. It will be seen that the sound track covers 100 mils clear, and is illuminated in the projector by a line of light 80 mils long, 1 mil wide, centered on the striations. This gives a margin of 10 mils at each end of the reproducing line, an allowance for lateral shifting of the film on the sprocket teeth.

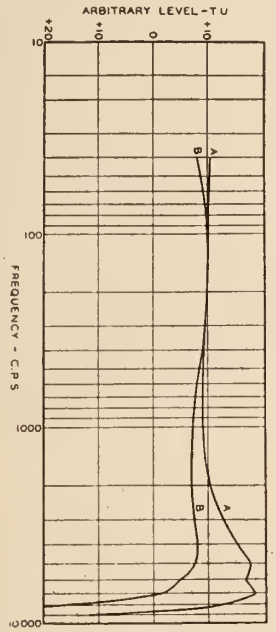


FIG. 6.

In conclusion, let me estimate the quality of the sound record to be expected. Assume that the recording lamp current has been set to within 5% of the theoretical optimum, the overall gamma held between 0.8 and 1.2, and the final average positive transmission is between 32% and 38%. Then the distortion of wave form due to photographic handling is so small that the ear cannot distinguish the record from a theoretically perfect one. The frequency-amplitude characteristic of the reproduced sound remains to be stated.

Due to the fact that the element of illumination, both in recording and in reproducing, is 1 mil wide instead of infinitely narrow, the final print will not reproduce the higher frequencies as efficiently as the lower. For example, at the standard speed of 90 feet per minute, the line of illumination covers on the film an entire cycle length of the frequency of 18,000 cycles. This frequency is therefore extinguished completely. The drooping characteristic resulting from this effect, called the film transfer loss, may be largely offset by judicious choice of electrical characteristics and by taking advantage of the mechanical tuning of the light valve.

In Figure 6 I show in curve A the light modulation by the valve in recording for constant sound pressure of various frequencies at the transmitter; in curve B the overall characteristic of the reproduction in terms of electrical power delivered to the loud speaker for constant sound pressure at the transmitter in the studio.

The difference of curves A and B is the uncompensated part of the film transfer loss. Experience shows that curve B is close enough to flat; the success of the recorl, as of the picture, depends on the director.

Motion Picture Studios In France

Name	Address	Phone
Albatros Studio—	52, rue du Sergent-Bobillot, Montreuil-sous-Bois (Seine)	Inter-Montreuil 0:57, 2:70
Studio de Billancourt—	49, Quai du Point-du-Jour, Billancourt (Societe Generale de Films)	Auteuil 50:12
Studios des Cineromans—	20, Avenue du General-Galliení Joinville-le-Pont (Seine)	27:46 Diderot 48:69
Eclair Studios—	10, rue du Mont, Epinay-sur-Seine (S. & O.)	Nord 59:99 61:93
Film d'Art— Vandal & Delac—	14, rue Chauveau, Neuilly-sur-Seine (Seine)	Wagram 94:06 74:54
	Paris Offices: 11 Boulevard des Italiens	Louvre 08:46 08:25
Gaumont Studios— Paul Martel, Director.	53, rue de la Villette, Paris (XIX)	Combat 09:33
Gaumont Studio— Gabriel Mareschal.	42, Avenue Saint-Augustin, Nice (A. & M.)	50:26 Nice
Studio de Joinville—	7, rue des Reservoirs, Joinville	Diderot 42:40
Studio des Lilas—	Rue de Villegranges, Les Lilas (Seine)	
	Paris Offices: 132, rue du Faubourg-Saint-Denis	Nord 58.44
Studio Alex Nalpas—	39, rue Leplc, Paris (IX)	Marcadet 43:54 Central 05:79
Rex Ingram Cine Studios— Harry Lachmann.	St. Augustin, Nice (A. & M.)	50:08 Nice
Roudes Studios—	3 bis & 5, Boulevard Victor-Hugo, Neuilly-sur-Seine	Wagram 94:21
Studios Reunis (Natan)—	6, rue Francoeur, Paris (XVIII)	Marcadet 17:27 18:17

List of German Studios

Name	Address
Emelka Studio	Geiselgasteig bei Hunich
Europaische Film-Allianz	Cicerostrasse 2 /6, Halensee-Berlin
Filmwerke Staaken	Staaken bei Berlin
Glashaus-Film	Borussiastrasse 45 /49, Berlin-Templehof
Grunewald-Film Studio	Am Konisweg 148, Berlin-Grunewald
IFA Studio	Schonholz-Reinickendorf
Johannisthaler Filmanstalten	Berlin-Johannisthal, Flugplatz
Mayfilm A.-G.	Berlin-Welssensee, Franz-Josef-Strasse 5 /7
Maxim Film Association	Ebner & Co., Berlin S.W. 29, Blucherstrasse 32
Muto-Gross Studio	Berlin-Lankwiz, Zeintenstrasse 10
Phoebus-Film A-G	Berlin S 59 Hasenheide 21
Rex Film A-G	Berlin N 39, Mullerstrasse 182 /183
	Berlin-Marienfelde
Terra-Glasbaus Studio	William-von-Seimens-Strasse 46 /47
Universum-Film A-G	Betrieb Neubabelsberg, Neubabelsberg bel Berlin
Universum-Film A-G	Betrieb Tempelhof, Oberlandstr. 27 /34

Filming A National Political Convention

[*This interesting little sketch by Mr. Nichol was lost in transmission. It was scheduled to appear in the August Cinematographer.—Editors Note*]

[*Note the crows' nests for the camera crews on the columns up near the roof.*]

By Raleigh B. Nichol
Western Editor, Pathe News, Los Angeles, Calif.

Just received a wire with a Muncie, Ind., date line from the boss, assigning me to assist in covering the Democratic National Convention at Houston, Texas, on June 25th. Wonder what he is doing in Muncie? Understand he has a farm in the Hoosier state and probably wants to know what the crop outlook is.

We clamber aboard the "Sunset" on the morning of the 23rd and arrive in Houston early the second morning. Hear bands playing as we pull in, but for arriving delegations—not yours truly. No one there to meet me. Don't know where the Pathe News headquarters is. There are some still men shooting arriving delegates—maybe they know; yes, the Auditorium Hotel. Bellhop grabs the Akeley and my bags and ushers me into the lobby. Boss has room reserved and everything ready. Rooms practically all taken by photographers and newspapermen. Guess they are all in the lobby when I arrive. Some I remember when I worked in the East years ago. Glad to see the boss again.

Everything pretty well set for the opening session on the morrow. We have our own laboratory here, moved a portable plant down from Chicago. Film laboratories in places such as Houston are not so good—cannot give speed or service. Maintained merely for local theatre trailers, etc. Boss has rented a house, installed telephone, telegraph, a radio and all modern film conveniences. Most compact plant I ever saw. Can all be packed in four large trunks. We go over to the convention hall to get the lay-out. About half way up the supporting columns are platforms which resemble crows nests on a ship. This is where the cameramen will be. Must climb ladders and haul the cameras up with ropes. The lights are being installed, six sun arcs on the floor and two spots in the crows nests. Understand the light men have their first check from the party, so they are rarin' to go!

Up early the next morning and ready for the big show. I am assigned to pillar No. 3 on the left with a competitive newsreel man and a still man. Haul cameras up and find flags obscure portion of the view. Get men from the firse station next door and with long poles they get flags out of the way. In so doing knock over still man's big bertha which has a 25-inch lens. Only damage is to still man's disposition. One of our boys from New York is sore because he has to work in the same crow's nest with Movietone. Claims they take up all the room. His fears, though, were for naught when he learned that Movietone is not working on the opening session inside the hall. Our crew consists of the boss and two camera men from New York, our own political man from Washington, three men from Chicago, five other men from the state of Texas and the writer, from Los Angeles. Our political man is on the speaker's platform and works the bell for the lights. The hall is rapidly filling with delegates and visitors. The Governor of Texas arrives bearing the flag of his state and receives tremendous ovation. The temporary chairman mounts the platform with gavel in hand. "Mac" pushes the button, one of the lights flashes up and the others follow suit. The chairman pounds with his gavel and calls the convention to order. Slides are pulled, shutters click and cranks are turned. But the convention does not seem to want to come to order. Those on the floor are all talking and milling around. So the chairman must continue to pound. Glad he is pounding as we need the additional footage. Finally they come to order and we get the shots we want of the delegates and visitors, numbering about 25,000.

A beautiful creature in pink sings "The Star Spangled Banner" and a local minister reads the invocation. Someone makes a motion to adjourn. The motion is carried and we are to meet again at 7:30 that night. We clamber down from the crow's nest with magazines in hand and run around the corner to the lab. One of the other cameramen is already there with his stuff. Said he found an unused door. Everything is ready in our house-laboratory. The titles were made up in advance and the boys were on their toes ready to go. The developer takes our film and starts putting it through. The third man comes

in with his and that is also soon in the soup. About two-thirds of the first release is already made up. Which consists of close-ups of those prominent in the party, arrival of delegates, etc. Ah! The negative is coming off the drum—the boss goes into the cutting run and selects the scenes he wants. The titles are dropped in and splices made.

Now the timing is done and the printers start to work. The first session was over at 12 o'clock and at 3:30 we are on our way to the postoffice and express office with the back of our car filled with prints. In addition to this, had negatives to ship to New York, Chicago, Pacific Coast and other important centers where our laboratories printed for their particular localities. The air mail left at 4 o'clock and we learned years ago that your Uncle Sam does not hold his mail planes for newsreels or anyone else, so we had to step on it.

Back at the convention hall for the evening session. The boss has assigned me to cover the floor of the convention hall tonight. So up in the crow's nest to get the outfit. One of my competitors helps me down with it. The hall is being filled quickly and we are looking for a good location. Difficult to find a suitable spot. Can't set up in front of people. Would mean a bawling out and a possibility of being thrown out by some one of the many assistant sergeants-at-arms. Finally select what seems to be a good place alongside one of the lights. Stand on box with tripod legs fully extended to shoot over the heads of the crowd. A speaker mentions a prominent candidate. The crowd goes wild and stands up on the chairs which absolutely blocks my view. And that means that this location is the bunk. See some empty seats in one of the band stands. No, can't set up there—these seats are for late-arriving bandmen.

At last find room in rear of press box. Set up and get some good close-ups of keynote speaker, using 12-inch lens—also more crowd stuff. Keynoter mentions name of candidate who later receives nomination. Wild demonstration begins. Delegates grab flags and banners and start parade around the hall. Dignity is cast aside. Seemingly everyone is yelling as hard as possible, and waving flags and banners. All of this lasts about twenty minutes, despite efforts of the chair to maintain order. It sure made good film.

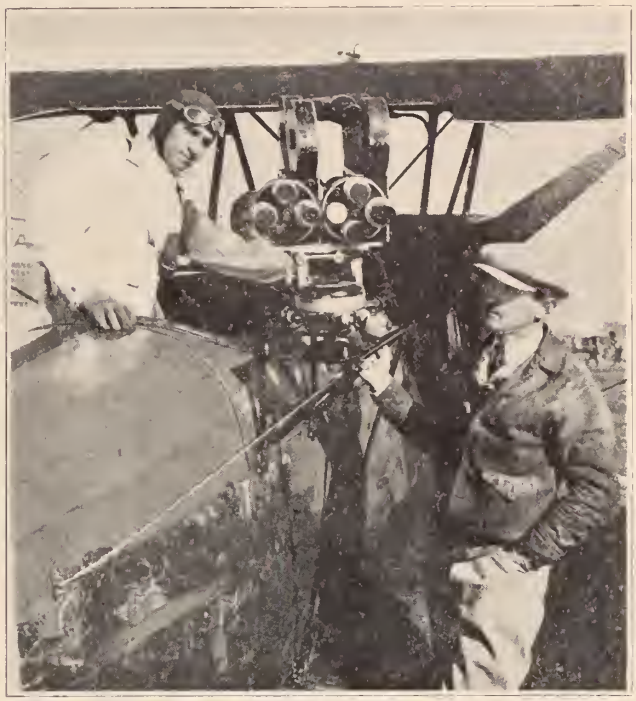
Convention adjourns until tomorrow morning. We rush our film into the lab. and the boys develop it that night. Our man who was crabbing about Movietone finds there is plenty of room in the crow's nest with them.

The next day's session finds us set up near the broadcast boys. Their work is very interesting to me; but I can't stay there long as one of the ushers tells me I am blocking the view of some of the dignitaries who are seated back of the speaker's stand. I have already made a couple of shots, so do not mind moving. I go to the opposite end of the hall and set up in one of the band stands.

This band seems to have its own concessionaire and I am invited to participate in the cold drinks, which are more than welcome. Another demonstration takes place and I get some good long shots. Adjournment seems to be in order so we strike the outfit and back to the lab. The heat is awful and the boys are working in their B. V. D's and we follow suit. We have so many prints to ship each day we keep the boss broke in buying air mail stamps. We are short of cans. The boss telephones to New Orleans. Yes, they will send us 200 right away. Shipping boxes are running low, also. We hotfoot it to a local box factory and in about two hours return with the back of the car filled. One of our boys had bad luck. He was leaving the hall with his magazine when someone knocked the magazine from his hand and it fell open on the ground, ruining the film. He had some good stuff in it, too. I always keep my magazines taped.

Each session is about a repetition of the one preceding it. Speeches and demonstrations. Shooting and making prints. A photographer cannot take as much interest in the proceedings as he would like to—he must take his pictures and get them into the laboratory as soon as possible. Speed is the essential thing.

100 Percent A. S. C.



Here is a shot from the Oakland Airport, where Harry Perry, A.S.C., and his able lieutenants, E. Burton Steene, A.S.C., and Elmer G. Dyer, A.S.C., have been busy for several weeks doing aerial work for Caddo's epic of the air, "Hell's Angels." The picture shows Mr. Dyer at his battery of cameras ready to go aloft, while Chief Perry is giving final orders. Gaetano Gaudio, A.S.C., was chief cinematographer on the dramatic sequences of this never-ending masterpiece. The picture is therefore 100 per cent A.S.C.

Sound Hits Hades

The Hollywood citizen had just arrived in Hades. "Where can I find a picture show?" he demanded of a native.

"The Brimstone Theatre is just over there behind the Asbestos Works," grinned the native.

The H. C. bought a ticket and sat down to enjoy himself. There was an orchestra, an organ, a jazz band and a lot of canned vaudeville. The film entitled, "Pandemonium," was full of spoken subtitles and sound effects but there were no pictures on it. The H. C. grew restive. After a while he called an usher.

"Are you tryin' to kid us," he asked with acerbity.

"Whaddyamean kid you?" countered the usher.

"They ain't no pictures on this here film," sobbed the H. C.

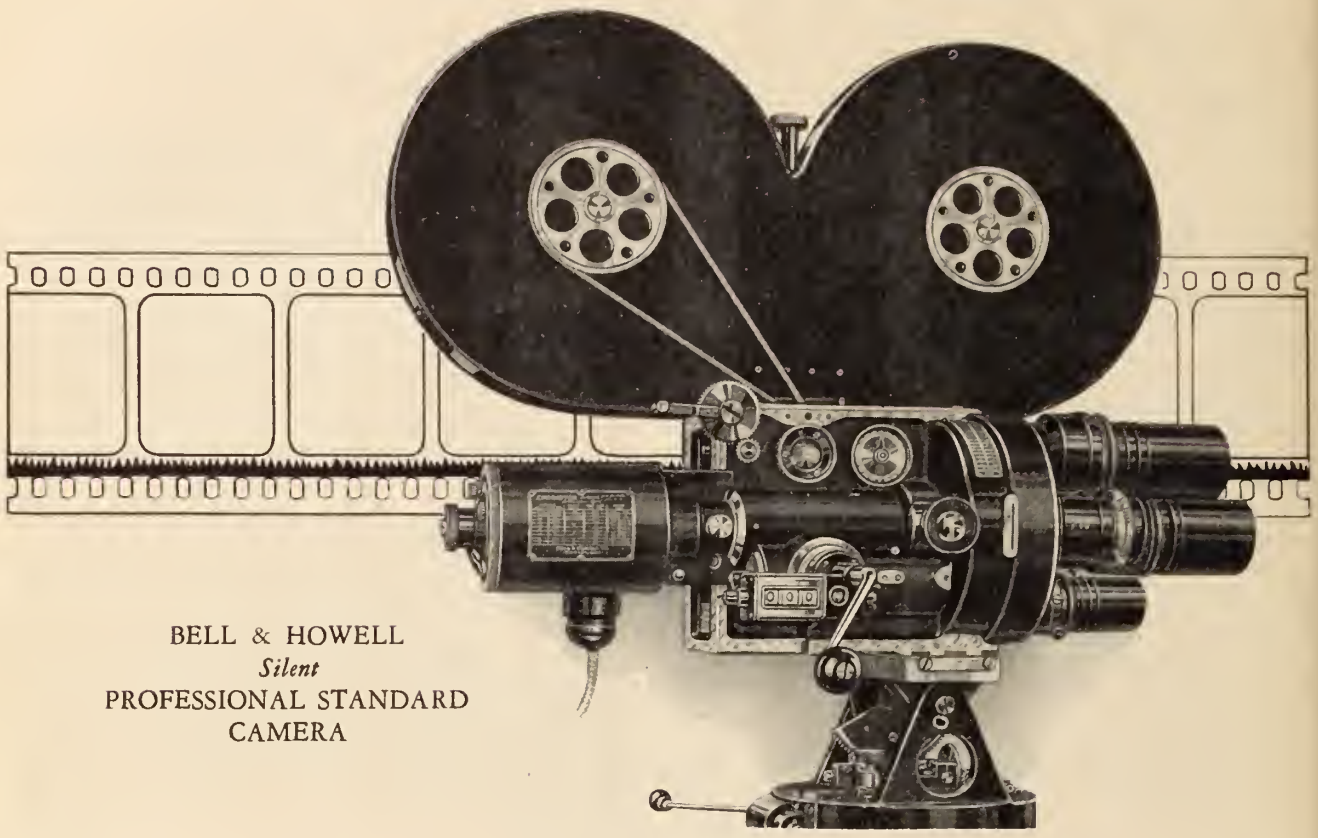
"Pictures? Whaddye expect for $1.65," yelped the usher.

"Ya mean to say ya got nothin' but sound here," wailed the H. C.

"Sure. We strive to be up to date," smiled the usher with great complacency.

And as the H. C. stumbled out the little devil in the box office thought she heard him mumble: "This IS Hell."

Oliver Sigurdson, A.S.C., has moved his still outfit from the Pathe Studio to Metropolitan. Oliver is one of the great artists of the still camera in the cinema world.



BELL & HOWELL
Silent
PROFESSIONAL STANDARD
CAMERA

THE INDUSTRY'S CHOICE
for Sound Recording Purposes

FOR over thirty years "silent" movies have advanced irresistibly toward perfection. Great minds have given their best, with results that surprised the world. Standardization of film and film machinery, so largely sponsored and made practical by Bell & Howell engineers, played an indispensable part in moviedom's reaching the great heights which it holds today. The vista still looks upward. Greater heights are just beyond. Movies synchronized with sound first amused the world as a passing experiment—then astounded the world with their mechanical perfection. The "Talkies" have arrived.

In the same *pioneering* spirit of twenty-one years ago Bell & Howell were first to make cameras for sound recording purposes. For more than five years Bell & Howell engineers have been experimenting, refining, perfecting, and collaborating. Bell & Howell Standard Professional Cameras for sound recording purposes have been made so *silent* that some studios dispense with soundproof booths in operating them.

In short, so successful have been the results that the following leaders in development and production of talking pictures use Bell & Howell Cameras almost exclusively:

Bell Telephone Company
Bristol Company
DeForest Phonofilms, London and U.S.A.
Fox-Case Corporation—Producers of Movietone
General Electric Company
Hal Roach Studios
Metro-Goldwyn-Mayer
Paramount-Famous-Lasky
Powers Cinephone Equipment Corporation
R. C. A. Phototone, Inc.
Universal Pictures Corporation
Western Electric Company
Westinghouse Electric & Mfg. Co.

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1805 Larchmont Ave., Chicago, Ill.
New York, 11 W. 42nd St. **Hollywood, 6324 Santa Monica Blvd.**
London (B. & H. Co., Ltd.) 320 Regent St.
Established 1907

Motion Photomicrographs of The Progress of Development Of a Photographic Image

By Clifton Tuttle and A. P. H. Trivelli*

An account was recently published by E. P. Wightman and one of us[1] concerning the development of silver bromide grains. Motion photomicrographs of the progress of development were made at that time by E. P. Wightman, using a four mm. water immersion objective immersed in a drop of dilute developer placed on a single-grain layer plate. The optical resolution obtainable by this method leaves much to be desired, and the presence of so much liquid between the objective and object slide gives rise to difficulties resulting from vibration and striation. Recently a method has been devised which permits the use of a 1.8 mm. oil immersion objective. The consequent resolution is considerably enhanced and the difficulties of the former method are minimized.

For the purpose of this study, single-grain layer coatings of a pure silver bromide emulsion are made on microscope cover glasses 0.18 mm. in thickness. A 15 mm. hole is drilled through the center of a microscope object slide and over this hole is cemented a coated cover glass. The slide is placed on the microscope stage with the emulsion layer downward toward the substage condenser. The objective is oiled to the upper surface of the cover glass and the grain images are brought to an approximate focus on the film aperture of a motion picture camera. A drop of very dilute developer* is placed on the substage condenser which is racked up until the liquid comes in contact with the emulsion surface.

Developer Formula

*Elon	0.5 grams
Sodium sulfite	7.5 grams
Sodium carbonate	2.5 grams
Potassium bromide	0.15 grams
Water to make	150 cc.

Although a slight adjustment is necessary after contact is made between developer and emulsion, it is found that the image can be brought to a sharp focus before any appreciable action has taken place. The motion picture record thus shows almost the entire progress of development. The preliminary focusing is accomplished by red light (No. 25 filter) to prevent excessive photodecomposition of the grains. The exposures are made by light of shorter wave-lengths (No. 49 filter) to increase resolving power.

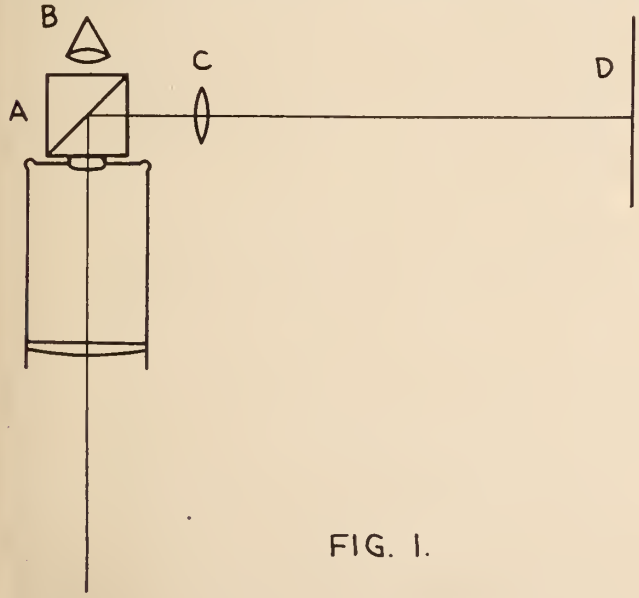

FIG. 1 View finder and focusing device for use in motion photomicrography.

It was found necessary in this work to have the image under constant inspection throughout the course of development. The plane of sharpest focus is constantly shifting because of the change in thickness of the silver bromide grains as they are converted to spongy metallic silver. The means which is used for observation is illustrated in Fig. 1.

A beam splitter A composed of two prisms whose interfaces have been silvered by cathode sputtering is placed over the ocular of the microscope. Optical contact between prism and eyepiece is made with a drop of cedar oil. About 10 per cent of the image light is transmitted to the eye at B while approximately 85 per cent is reflected to the motion picture film at D. The light which enters the eye is approximately parallel and the observer focuses on a virtual image at about 25 cm. distance. The reflected parallel light is brought to a focus in the plane of the film by a simple lens (C) of the correct power. In this case, a 4.5 diopter lens is used at C and the distance from C to D is adjusted so that the real image focus is identical with the virtual image focus. A 10X hyperplane eyepiece was used and the magnification on the film was about 900X.

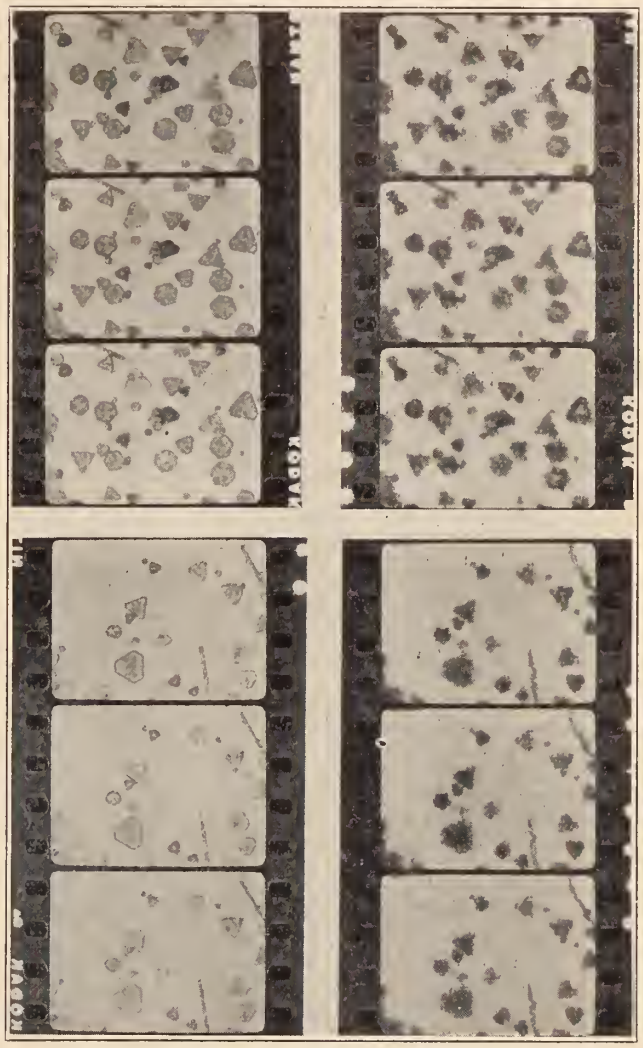

FIG. 2 Silver bromide crystals before (left) and after development.

It was found that light of sufficient intensity could be obtained from the 6-8 volt, 108-watt ribbon filament lamp overvolted to operate at 20 amperes. Pictures were made at the rate of four per second (one-fourth normal

Concluded on Page 27

* Communication No. 341 from the Kodak Research Laboratories.
1 Photography through the Microscope, by E. P. Wightman and A. P. H. Trivelli. American Annual of Photography, 1928, page 11.

Sound Film Processing

By J. W. Coffman

Vice-President Carpenter-Goldman Laboratories, Inc., Long Island City, N. Y.

The West winds bring us tidings of an art that is newly born—sound pictures have made their advent, and Hollywood is telling the world in its usual hearty way. Apparently not all the celebrants wholly enjoy the festivities, since we hear of players' frantic efforts to be vocal and of directors who find pantomime rather cramping to their style.

But notwithstanding the present lusty cries from the cradle, the art need not long remain in swaddling clothes, as all the elements for rapid growth are at hand.

The stage will teach the players how to talk, and revengeful players teach directors the fine art of pantomime. The telephone industry offers thorough knowledge of speech and its reproduction, while radio can solve the problems of studio technique and design. And forty years ago the basis for solution of the photographic problems involved was laid by Hurter and Driffield, whose methods a number of our own members have helped perfect.

Up to the present, sensitometry, as outlined by Hurter and Driffield, had not received the attention it deserved from the industry, and for enforcing that attention now, the sound film will probably earn the eventual gratitude of the laboratories.

Today, sensitometric tests to determine developer characteristics are an important part of routine sound film processing, particularly in the case of records made by variable density systems.

Unit overall contrast, or gamma, of the sound print is the goal at which are aimed all efforts at control of the processing of variable density sound tracks. Needless to say, the accompanying picture must be conformable to accepted standards for regular motion picture prints. Overall contrast considerably greater than unity is usually desired in the picture so the picture negative is ordinarily developed to a higher gamma than is the sound negative. Normal development of silent picture negatives is to a gamma of approximately .80 and normal development of the prints is to the vicinity of 1.80 so that the overall gamma of the usual silent picture seen on our screens today is approximately 1.4.

If the picture negative and print are to be developed according to these silent picture standards, then the accompanying sound negative should be developed to a gamma of approximately .56. Overall gamma being equal to the product of negative gamma by positive gamma, development according to these specifications would give an overall sound track gamma of unity and an overall picture gamma of 1.4.

Negative gammas as low as that indicated for the sound track have not been frequent in silent picture practice, and the "old timer" is inclined to consider a sound negative of these characteristics very "weak" or under developed. But quite satisfactory variable density sound prints have been produced when these factors were used. It is probable, however, that the trend of laboratory technique will be in the direction of higher gamma for picture negatives, particularly if there become available negative emulsions permitting of higher gammas without the high density now associated therewith. Such emulsions should, of course, retain the wide latitude and fine grain structure of the present negative emulsions. They should possess low exposure inertia, since most sound pictures are photographed with relatively low intensity incandescent lighting, and should preferably be panchromatic. An emulsion with these characteristics is admittedly much easier to define than to produce. But if obtainable, it would make practicable the development of picture negatives to a gamma considerably higher than that previously stated. The sound negative could then be developed to a higher gamma, producing a denser negative than that now being obtained. This would tend to reduce the level of negative ground noise by reducing the ratio of base density to overall density. In a sufficiently dense sound track negative, variations in base density become insignificant as compared with variations due to modulation of the track.

Cameramen vary widely in the lighting of sets, depending upon the laboratory to modify the original contrast to that value which produces the most pleasing pictorial result. This makes it difficult to standardize on the gammas to be used unless the cameraman's technique is well known. It is frequently advisable to develop the picture negative first, securing what would be considered a good negative according to straight pictorial standards. Test prints are then made to determine the most satisfactory time of development for the print, pictorially considered. Sensitometer strips are printed on each of these tests and the gamma of the most satisfactory print is determined by measurement of the sensitometer strip densities. The reciprocal of this print gamma is the gamma to which the sound negative should be developed.

For example, a certain cameraman is inclined toward rather flat lighting of his sets. His negatives, developed to a gamma of .80, require prints of a gamma of 2.00 in order to give what he considers satisfactory results. Unity divided by 2.00 gives .50 as the indicated gamma to which the sound negative should be developed.

The same technique can be applied to the determination of the most satisfactory gammas for the various negative and positive emulsions which may be used. The sound track can be given its theoretically perfect photographic characteristics without causing picture quality to suffer in the slightest if these relatively simple precautions are observed.

These observations apply only to variable density sound-films in which the sound and picture impressions have been recorded on separate films and combined to make a single print. If separate prints of the two records are to be made, or if a print of the sound record is desired, then the simplest and most satisfactory technique is to develop both the sound negative and the print therefrom to a gamma of unity. The picture is treated as any silent film would be, except that care must be exercised to prevent breaks and splices. Where sound and picture impressions are recorded on the same negative, it is necessary to develop them together, both as negative and print. Some compromise with quality is apparently unavoidable under these circumstances.

The variable width system of sound recording is not so dependent for quality upon accurate sensitometric control of development processes, but even here it would seem desirable to have sensitometric data always at hand. The positive sound track should have the maximum possible overall gamma, while the picture quality should remain unaffected. While definite values for gamma need not be prescribed, the requirements indicate the advisability of developing the sound negative to approximately gamma infinity, and the combined print to a relatively high gamma. The picture negative should then be developed to a rather low gamma to prevent the overall picture contrast from going too high.

Methods and equipment for sensitometry are not within the scope of this discussion:—suffice it to say that neither in point of time nor money are sensitometric methods costly to the film laboratory. Actually, the saving in cost of reprints and the improved quality of the product should amply compensate for all the necessary expenditures.

Machine processing is rapidly coming to the fore, and with its ally, sensitometry is forcing a rather hasty retreat by the "old timer" with his racks and tanks, his secret formulas, and his undisputed good judgment. Machine processing is almost essential to the controll-

This article was originally presented at the Fall convention of the Society of Motion Picture Engineers held at Lake Placid, N. Y., September 24-28, 1928.

ing of development and the securing of uniformly satisfactory results.

It is true that the exercise of extraordinary care, fair negatives and prints of any type of sound film can be produced by rack-and-tank methods, but the extreme painstaking requirements and the difficulty of controlling the results give rack-and-tank methods a poor efficiency rating as compared with machine methods. At best, rack-and-tank prints will hardly equal the quality of routine machine prints, because some imperfections, due to splices, rack marks, and developer variations, inevitably appear on the rack-and-tank product.

The disc system of sound synchronization make fewer demands for modification of laboratory technique than do the film systems, but even here the machine has great advantages, for the entire reel can be processed as a unit, eliminating splices with their attendant dangers to synchronization. Bearing in mind that scratches, dust spots, finger prints, etc., cannot be cut out of these negatives and prints without replacing the sections removed, the superiority of the developing machine becomes even more evident.

Developing machine design should provide for complete control over all factors affecting quality of product. Reserve developer tanks should be of the largest practicable capacity in order to keep to a minimum those variations due to developer exhaustion. Continuous circulation from these tanks into the developer tanks of the machine is, of course, to be provided for. Thermostatic control of developer temperature, within limits of one degree is highly desirable. A thermostat in the machine developer tank may be arranged to control a two-way valve in the developer feed line so that a rise or fall in temperature will cause the valve to bypass some of the developer through cooling or heating coils as may be required.

At least three developer circulation systems are needed:—one each for sound negative, picture negative, and prints. Print developers generally used in developing machines are too contrasty and contain too much Potassium Bromide to be of use in developing sound negative on positive stock, hence the necessity for the separate developer for this purpose. Sound negatives recorded on the same film as the picture are necessarily developed in the picture negative bath.

High concentration developers are desirable for sound-film work in all its phases, for they produce more nearly uniform results and require strengthening or renewal less frequently. Potassium Bromide, since it tends to alter the contrast relationships of the various intensities of exposure, should not be used in negative developer formulas, and should be held to a minimum in print developers.

The less-basic alkalies should be used in most developer formulas, and the concentration kept relatively low, thus permitting higher concentration of the developing agent and longer time of development. Both these factors tend toward greater uniformity of result. Modifications of the Eastman Borax developer formulas have proven very satisfactory for negative development, for both sound and picture negatives.

The borax developers tend to produce a fine-grained negative which is especially desirable on the sound tracks, since the high-frequency limit is established by the limit of resolution of the film, and this, in turn, is largely dependent upon grain-size.

It has been found desirable to use a stop-bath in the rinse-tank, through which the film passes immediately after development. Otherwise the developer is not entirely removed from the film, and tends to drain down from the sprocket holes upon the sound track, making stains scarcely visible to the eye, but picked up by the photo-electric cell in the reproducer as a distinct ninety-six cycle hum. No trouble from this source is experienced when the stop-bath is used.

Efficient printing is one of the greatest problems now confronting the sound film laboratory. The sound track must be printed on a continuous printer while the picture may be printed on either continuous or step machines. Present practice usually involves separate printing of the two impressions whether or not they were recorded on the same film. The apertures are complementary to each other, the one making the section through which the other prints. This necessitates two runnings through the printer, as now arranged. To secure the maximum sharpness in the very fine lines representing the higher frequencies, it is necessary to reduce the aperture slot to very narrow dimensions, and this, in turn, produces a marked fluctuation in lighting of the sound track due to gear and belt back-lash, etc. This could be overcome by installing a mechanical filter on the printer sprocket drive, thus smoothing out the small irregularities of speed. A filter of this nature should be connected to the printing sprocket by a positively acting clutch, thus permitting the starting and stopping of the film without the handicap of overcoming the inertia of the filter flywheel. Addition of a mechanical filter would tend to eliminate also the flicker now frequently noticed in pictures printed on continuous printers.

Mislights are very troublesome in sound prints, usually meaning the reprinting of the entire scenes. Since scenes are usually much longer than in the silent pictures this is a rather costly operation. Light-shifts now in use are not wholly satisfactory from this standpoint, having varying degrees of propensity for mislighting, and being hardly rapid enough to shift the lighting of the sound track without a density change which will be reproduced as noise.

Light-shifts which depend upon a change in the resistance of the lamp circuit tend to cause a slight change in the gamma of the prints, the lower wave-lengths tending to produce higher gamma due to their deeper penetration of the emulsion. This variation is not large enough to be of serious moment; but it is probably better to look toward a light shift in which the actinic qualities of the light remain unchanged. These defects in existing sound track printers may be fairly easily overcome; but it would seem expedient to redesign the entire printing machinery now while the industry is new. Practically all the requirements are known—and the laboratories cry for assistance.

In adapting existing continuous printers for sound track printing, care should be taken that the aperture masks make contact with the film along the side as well as at top and bottom; otherwise light may leak from the picture aperture to the sound track, and cause many strange noises. Identification marks should be eliminated from the sound track side of the print for the same reason. These light leakages are seldom apparent to the eye, but they are very distinctly apparent to the ear. It seems best to mask off the sound printing aperture one or two mils from the line of sprocket holes; otherwise refracted light from the edges of the perforation sometimes affects the sound track, producing the characteristic ninety-six cycle note, or "sprocket hole hum."

In printing, it is necessary to displace the sound track on the print to compensate for the separation of the sound and picture apertures. There seems to be a tendency to agree on a fourteen-and-a-half inch advance of the sound track as the standard displacement. A convenient laboratory device holds the original synchronization mark by sprocket pins at this distance from a film punch, which is operated to make the new start mark. This is only one of a series of minor laboratory appliances which the new art is bringing in. The list includes synchronous rewinds, butt-joint splicers, negative splice punches, positive splice blackers, film hooks, and various other strange-sounding devices.

Inspection of first prints should be under conditions approaching those of the theatre as nearly as possible. This requires a completely-equipped sound film projection room with a screen room of adequate size and correct acoustic characteristics. The inspector needs have an ear for tone quality as well as an eye for visual quality. Routine inspection of subsequent prints may be carried on with a simplified equipment consisting of projector with sound pick-up, a small amplifier, and headphones. This inspection is not primarily for tone quality, but for defects such as volume variations, "sprocket hole hum," dust or splice noise, etc.

It comes as something of a shock to the laboratory man to discover that he can no longer depend upon his eyes to judge the quality of laboratory work upon a sound film. Sound tracks frequently appear to be perfect to

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Putting It Over

Minneapolis, Minnesota,
November 22, 1928.

John W. Boyle, President,
American Society of Cinematographers,
Suite 1222 Guaranty Bldg., Hollywood.

Delivered two lectures here today and tonight one before the student body of the University of Minnesota and one before the faculty, advanced students and various scientific bodies stop Was extended most enthusiastic reception and given many assurances of appreciation stop The special film so kindly contributed by A.S.C. members in the Hollywood studios was huge success and we held the floor over five hours during the two sessions stop President Coffman of the University and J. C. Lawrence his assistant were most gracious and afforded me every possible facility stop I am sure this contact will prove of the greatest benefit to the A.S.C., to the industry and to cinematography in general. Regards to all,

JOSEPH DUBRAY.

Board of Editors Revived

At a recent meeting of the Board of Governors of the American Society of Cinematographers, the Board of Editors, an advisory body to work in connection with the Editor-in-Chief of the American Cinematographer, was revived with Victor Milnor, Chairman, John Seitz, Hal Mohr and Alvin Wyckoff associates.

To the South Seas

George Schneiderman and Daniel B. Clark, respectively treasurer and member of the Board of Governors of the A.S.C., will depart soon for the South Seas under sealed orders to film a special opus for Fox. As they expect to be away indefinitely their official places will be filled during their absence by Hal Mohr and Al Gilks. Mr. Mohr is new to the Board, but Mr. Gilks is a former member. Mr. Schneiderman has long been treasurer of the Society and Mr. Clark preceded John W. Boyle as president.

the eye, but to the ear are horrible examples, full of distortion and extraneous noises, all of which can be remedied by correct laboratory procedure. On the other hand, a sound track may be very discouraging to the eye, full of seeming scratches, rack marks, printer flicker, etc., and yet it is reproduced as a nearly perfect auditory record, clear and undistorted, with an almost imperceptible noise background. These reversals of customary standards of judgment are sometimes discouraging, but they add to the thrill of the laboratory man's existence and carry to him forcibly the conviction that "To measure is to know."

The Conference Habit

The Great Bunk Institution of the Motion Picture Industry

By James H. Collins

Author of "Human Nature in Selling Goods," "The Art of Handling Men"

[*This applied to the motion picture industry, so long a sufferer from conferencitis, would accomplish wonders in the way of efficiency, while saving endless irritation and unfriendly feeling. Mr. Collins' article is a reprint from the Lion's Magazine—Editor's Note.*]

At 10:00 A. M. they told him Smith had not arrived, so he said he would look in again later. At 11:15 they said Smith had come in and gone out again. At noon they told him that Smith could not be seen—he was in conference.

The visitor said that he thought Smith would be glad to know that he was in the office. Would they telephone his name in? But subordinates were firm. The idea of interrupting a conference! So the visitor said he must try to see Mr. Smith some other time, and left his card and departed.

When Smith came out of the conference and saw that card, he went through the ceiling. For the visitor was purchasing agent for a large western company and had dropped in to see Smith on his way home from a buying trip, because he liked the kind of fellow Smith was and the cordial letters he wrote—which were very different from the stereotyped "Mr. Smith can not be interrupted—he is in conference."

Do you suffer from the great American conference habit?

This habit has been growing amazingly the past ten years. Originally it started with the very good idea that because business organizations were spreading out and personal contact difficult to maintain, teamwork could be promoted by bringing the men together every so often from departments and branches.

But nowadays, wherever two or three are gathered together in everyday routine talk, that is sanctified by the term "conference." And a man in conference is supposed to wear a cloak of inaccessibility. Nothing else on earth counts.

In most cases, this is pure camouflage!

Nine conferences out of ten are debating societies and rest cures. They are debating societies because, when more than two or three men undertake to discuss business matters without the strong control that ought to mark a real conference, they simply talk around the bush, and destroy concentration. And, because not one conference in ten is held to a strict program by an executive who knows where to start and when to leave off, the net result usually is a letting down of mental efficiency that makes the conference restful, but nothing more.

The most efficient business nation in the world, undoubtedly, is England.

The American lands in London, anticipating a series of world-beating conferences, and is told that at 2:10 P. M. Wednesday afternoon Sir Charles Smith will see him for nfteen minutes. The appointment is sacred. Sir Charles is waiting, and promptly turns out the previous visitor, and finishes with the American on schedule. All the facts must be summarized so that Sir Charles may give his decision. It may be a matter of millions involving concentrated affairs on the other side of the world. It is decided with a clearness and definiteness that makes the American head go round—and thus Sir Charles is able to spend Friday noon to Tuesday morning at his country home.

Not long ago a new manager took charge of a business so hypnotized with the conference idea that it was falling to pieces. Able men were quickly lost because they could get nothing done. No matter what project was proposed, the conference crowd held an autopsy on it. The bigger it happened to be, the greater the necessity for careful consideration, they said. A preliminary conference debated the matter, and clearly brought out all the objections against it, and reduced initiative and energy to doubts and delays. Then all the misgivings were handed over to sub-committees, who held other conferences upon them, until finally the project was set aside altogether, to wait until times got better or the weather changed. That business had degenerated into an organization of debating clubs.

What the new manager did was very simple. Going back to first principles for debating societies, he applied ordinary parliamentary rules to hold discussions on the track and run it on schedule, and wielded the gavel on anybody who tried to wreck the train or lead it off on a ramble through the woods. He cut down the number of conferences, and made those that were necessary thoroughly unrestful by humorous and caustic comment for the fellows who doubted and dissembled.

When a subordinate attended one of this manager's conferences, he got enough things to do to keep him busy a week, with full authority to carry them out and the obligation to come into the next conference bringing results.

Best of all, he utterly destroyed the myth about the sanctity of a conference. No western buyer ever showed up in that office to see their Mr. Smith and found Smith inaccessible. Five minutes before a conference started, the manager's secretary took her station in the general reception-room. She was there to represent the manager—and nobody who ever had business with that concern slipped out of her memory. She knew faces and names, and would recognize a voice over the telephone a year after she had last heard it. She was even more solicitous about a stranger than in taking care of some visitor she knew.

Had that Westerner turned up to see Smith, she would have called Smith out. Better than that, she often sent the visitor into the conference room, and there he saw his man and met other men of importance in the company, and perhaps brought live information and a fresh outside point of view upon the matter they were conferring about.

Two Boy Adventures Make Trip Around World

Two youthful nomads, sons of wealthy parents, on a trip around the world in a fifty-foot sailboat, on which they start this month, will make complete motion picture studies of the entire cruise, using only the portable type DeVry cameras. The boys, both about 25 years of age, are Daniel C. Blum, of Chicago, and Stephens Miranda, of Los Angeles, California. They will sail to every principal seaport in the world and in and out of every navigable stream in a voyage that they plan will take them from three to five years to complete.

The young adventurers are now in Seattle, fitting up the boat for this thrilling trip. They have purchased a Norwegian double-ender sailing yacht, The Valkyrie, from Count Holstein-Rathlou, a Danish nobleman, of Victoria, B. C. The craft has been re-christened "The Nomad" and is being altered to suit the youthful globe circlers. They will sail from San Francisco as soon as the craft is revamped to suit their specifications, making the cruise under the sponsorship of the St. Francis Yacht Club of San Francisco.

Fox's First 100 Percent Talkie

It has just been discovered that modest George Meehan, A.S.C., was the cinematographer who photographed Fox's first one hundred per cent sound picture, "The Ghost Talks." This is the first Movietone feature production. It was directed by Lou Seiler and featured Helen Twelltrees, Charles Eaton, Earl Fox and Carmel Myers. This picture will be up for unusual inspection and criticism and Mr. Meehan's work will do much to put it over. He was also the cinematographer on the Fox Movietone short that has been stopping the show wherever it has been shown— Chic Sale, in "Marchin' On." This picture, though a short, has received the most favorable comment of any talkie to date and is ballyhooed by the exhibitor like a feature.

A Photographic Paradise

There Are Still Places on the North American Continent Where Wild Things Are Unafraid and the Camera Is Only Weapon Used

By Alvin Wyckoff, *A.S.C.*

President International Photographers of the Motion Picture Industry

British Columbia and Alberta, western provinces of the Dominion of Canada, are vast territories, conceded by many photographers to be the photographic paradise of the North American continent.

In this wonderful area of the Dominion there are vast level plains and mountains as yet unsurveyed, waiting to be introduced to man and his ways, which will remain in their present state for several generations.

The plains of Alberta are impressive, teeming with the life they have always known and nourished, while the mountains of both provinces are sublime in their grandeur, affording "Gardens of Eden" for the native animal and bird life that have reared their kind undisturbed for ages past, without fear or want save that which is generated among their kind. Man—a strange animal, is met with amazement and curiosity, and in some instances (as with the Grizzly bear) with resentment.

On the plains roam thousands of wild horses that have never experienced the touch of a hand, and many that have never viewed other than their kind; antelope, swift, graceful and curious; badger, wolf, and coyote mingle together undisturbed.

Here, also, is found the native man of this continent, holding forth his religious ceremonials in the appointed festive seasons—the Indian—in all the majesty of his past romance—gathering from distant reservations, reviving and performing the rites of old, erecting council lodges, conducting inspiringly his ancient rituals of homage to the Supreme Spirit of his creed.

Wild flowers of gorgeous beauty and simplicity, with here and there a riot of color that seems to awaken with the early dawn of each new day, heralded by the glorious sunrise, and again to go to rest with sunset of golden glow.

Rivers, born high up in the mountains at the base of glaciers that have given them life for centuries, sending them roaring and tumbling down over precipices and through dark gorges, spending their power against mighty granite cliffs till they come to rest in the vast plains below, winding on till they are lost in the big inland lakes to the east or mingling their waters with the Pacific on the west.

Famous Alpine and native guides will conduct you safely to the heights above the famous resorts of Lake Louise and Banff Springs, where you can behold the wonders of the work of the Almighty, touched here and there by His Mind through the agency of man's handiwork.

Beautiful, idyllic mountain lakes, fed by springs of sweet water, reflecting on their surfaces high snow-capped peaks that keep them within bounds, in turn giving a home to the gamest fish to be found anywhere in fresh water.

Canadians, Englishmen and Americans, all mingling together, extending a hospitality that cannot be experienced in greater sincerity anywhere else in the world.

At Calgary, in the province of Alberta, a holiday season is declared each year in the month of June, known far and wide as "The Stampede." Throughout the year this festive season is planned and talked of by good British subjects and other nationalities all over the world, and drawn to this focal point each year are the champions of the earth, representing present and past days of frontier life—to compete and carry off rich prizes and honors offered. Products and handiwork of the western Dominion are on exhibition, proving the riches and opportunities of an empire waiting to be developed in greater abundance, under the guidance of a handy and prosperous people. Here is throbbing life and vivid color, not to be found at any other time or place in all the world. Indians in wonderful gala attire, ranchmen, soldiers, stockmen, cowboys and the Royalty of the Realm; wild cattle and wild horses; bands of music; wonderful entertainments, and peoples of all the world renewing acquaintances of past meetings at this same celebration.

It was the writer's good fortune to be selected to fill the position of chief cinematographer in charge of all photography by the British-Canadian Pictures, Limited, a company formed for the purpose of making a feature production for British release. With the unlimited resources placed at the disposal of Mr. Guy Wedick, of Calgary, appointed general manager, he was able to deliver one of the most interesting and artistic photographic productions which has come out of Canada in some years.

The cast of the acting company was made up of carefully chosen artists, among them, as leading lady, was Miss Barbara Kent, a little lady of wide popularity and a most pleasing personality. The company was organized in Hollywood with an entire cast of British born subjects, there being a stipulation in the arrangements that seventy-five per cent of the people employed must be British born. The company left Los Angeles May 14th and returned the last week of July following. During the making of the production the company travelled over the greater part of the southern territory of Alberta and British Columbia, transportation being furnished by the Canadian Pacific Railway whenever it was possible to use rail connections. Most of the traveling was carried on by automobile and pack horses.

The influential people of these provinces vied with each other in their endeavors to contribute whatever assistance they could command that would add to the success of the enterprise and it was due to this action on their part that the management was enabled to overcome obstacles that would otherwise have minimized the splendid results achieved. The command of the Royal Northwest Mounted extended courtesies that were most pleasing, as did also the great Hudson Bay Company and the Government agencies in charge of Indian affairs aided in giving us contact with the Blackfoot tribe of Indians.

Delightful days afforded us excellent opportunities to include beautiful scenes on the immense ranch owned and controlled by H.R.H. the Prince of Wales, and we were permitted to use specimens of his blooded stock. From an eminence commanding a view of the ranch buildings in the foreground backed by mountains thirty miles distant and ever changing cloud formations, we were able to record scenes seldom surpassed for artistic beauty.

The equipment used in photographing this production was the latest improved Mitchell Camera complete with all accessories including a full line of filters for correction in use with panchromatic emulsions of the Eastman laboratories; Astro lenses ranging from 25mm to 12 inch were mounted for the camera; one 8x10 view camera, one 5x7 Graphic, one DeVry automatic and one late model Debrie.

John Hill

Top to bottom, left: Breaking a wild horse; Alvin Wyckoff filming a stampede of wild horses, there are 8,000 to 10,000 in this drove; A good idea of the country; Packing Camera equipment. Top to bottom, right: One of the gorgeous bits of scenery; The Prince of Wales' own ranch; Chief Wyckoff and his gang; Throwing a wild horse.

Shooting Sound in England

By Charles J. Davis, *A. S. C.*

Many articles on sound pictures have appeared in print of late, written by acoustic and sound engineers on the subject of recording. As the eye of the public has been trained to artistic photography, companies must not make the mistake that sound is everything. Both works of art must be united to make talking pictures a success.

In this new field, we add to the technical staff the very important sound man, who by working hand in hand with the cinematographer, can place before the public an interesting entertainment. Since incandescent lighting is being installed in sound studios, many worries of the expert who balances the voice of the artist have been eliminated and the improvement made in silencing the camera is another achievement.

In the Warner Bros. studios, Brooklyn, New York, three years ago where I was first engaged in experimental work on sound pictures, our cameras were set up in what we called a "padded cell." This was a sound-proof booth and, after making a ten-minute number, we would stagger out into the open as if coming from the hot room of a turkish bath. Then to our dismay the sound man would cry: "Too much camera noise, and lights 15 and 18 were noisy."

For the past eight months I have been assigned to London, England by the Fox-Case Movietone Corporation and can safely say that my sound man, Mr. Ralph Bitner, and myself, have made history in England by being the first to photograph and record on the same strip of film for the world at large to see and hear such notabilities as His Majesty King George V and His Royal Highness the Prince of Wales; Mr. Lloyd George, one of England's most prominent statesmen and Sir Arthur Conan Doyle, the noted spiritualist.

Of course, sitting in a luxurious theatre seeing and hearing His Majesty King George of England talk to the people of Newcastle-on-Tyne at the opening of the new cantilever bridge, no one could realize the difficulties of taking this subject. We arrived on location on Tuesday morning and commenced preparing our recording apparatus.

In the first picture, the place where the King was to stand was too far back under a canopy for good photography and it is difficult to imagine how many officials had to be interviewed before consent could be given to make any changes in the location from where the address was to be delivered. Then the microphone question had to be decided upon. It was found necessary to run 500 feet of cable from where the recording equipment was located, to the microphone. This sounds easy, but it was impossible to put the wiring overhead owing to two high tension tram-car wires, therefore, the microphone line had to be strung under the bridge from one side to the other.

It was just one hundred feet to the river below. I hated to see my buddie, Bitner, go over the side and crawl along the girders under the bridge. One slip and it would have been the end of a perfectly good sound man. In due course of time things were hooked up, but to make things worse it began to pour rain and wet everything. However, on the first test the apparatus worked to perfection. The following morning when the event took place the weather had cleared and for the first time the voice and picture of the King of England were recorded simultaneously.

Our interview with Mr. Bernard Shaw at his estate was very pleasant. He was quite inquisitive about our equipment and its workings. We were more than pleased when he decided to talk for us. Being a great wit his speech was very amusing. Before returning to London Mr. Shaw

Byrd's Farewell

Al Gilks, A. S. C. and Com. Richard Byrd, at Paramount's Long Island studio, at the finsh of a sound film of Byrd's career, on the day of his departure for the Antarctic.

requested that we join him at tea, which is a good old English custom.

On arriving at Mr. Lloyd George's estate our equipment was loaded into a trailer and a good old horse was used to pull it through some very soft ground to a location where Mr. Lloyd George talked on the cultivation of area lands on his estate which are now fine orchards. On returning to his home we were introduced to Dame Margaret and Miss Megan Lloyd George, all of whom spoke before the Movietone camera. On completion of these numbers a delightful luncheon was served. Mr. Lloyd George remarked that in case of a siege he would be able to supply the table with everything from his own farm.

On the following day a very noted character was to talk for Movietone and on arriving at the palatial home of Sir Arthur Conan Doyle, we secured a very interesting talk on "Spiritualism," which I am sure will be of great interest to everyone.

These are just a few of the interesting people we have photographed in sight and sound while in England.

The Filmoscope

This is the name given by Mr. Andre Bartlatier, an A. S. C. member, to a clever little contrivance of his creation which, although not a motion picture appartus, seems to be destined to interest motion picture folk.

It is a stereoscope designed to view pairs of stereoscopic pictures printed upon motion picture film. Mr. Barlatier has adapted to the Filmoscope, which is so compact that when folded one can carry it in his vest pocket, a very ingenious system of carrying pins which, engaging in the film perforation, permit the change from one view to another by the simple pressure of one finger, thus avoiding the inconvenience and loss of time and bother involved in changing the views as in other similar apparatus.

Mr. Andre Barlatier, A.S.C.

The series of pictures are so distributed over the film that, although keeping the proper distance between each pair of stereoscopic pictures, the views are alternately printed in close succession so that all of the film surface is made use of. This permits the printing of 24 stereoscopic pairs of views in about three feet of film, the number of pictures being limited only by the length of the film used.

It has always been claimed, and all fans well know, that stereoscopy affords the most fascinating and, perhaps, logical, mode of photographic reproduction, which is not more popular because of the somewhat cumbersome apparatus essential to this method.

A Universal Star with the first model of the Filmoscope—Note what a handy little affair it is.

Mr. Barlatier has eliminated all cumbersomeness and the lightness and ease of operation of the apparatus makes one appreciate still more the realization of depth

The Captain of the Crew

At a meeting of the Technical Division of The Academy of Motion Picture Arts and Sciences recently, J. A. Ball, Director Technical Bureau M.P.P.A., in an informal talk made the following statements which are of interest to every cameraman. The quotation is verbatim and is published with the permission of Mr. Ball:

"A motion picture director in lining up a scene has a dramatic effect to get over. He must rely on his technical crew to handle the scene technically so that the dramatic effect does 'get over,' not only to the director's eye, but to the camera as well.

"In the past, photographic requirements have been the controlling factor so that the cameraman may be said to have been the captain of the technical crew.

"Now with the arrival of sound, the effect must get over not only to the camera but to the microphone as well. In this new set-up, who is to be captain of the crew?

"At present there seems to be a tendency to stress the problems of the microphone and ignore those of the camera. If this is so it is only because the microphone is the new arrival. I believe eventually the two must receive equal consideration and then the captain of the crew will be the man who knows both instruments. In the endeavors to attain this position I believe the cinematographer has a better chance than the radio broadcast man who enters the industry as a microphone expert. The latter will have to overcome a desire to have the actors "broadcast from the screen"—he will know nothing about the dramatic effects nor the pvschology of actors and directors, nor is very much yet known about the 'art' of placing and handling the microphone.

"So I say the cinematographer will find himself in a favorable position to advance himself provided only that he is progressive, adaptable and a student."

Our Cover for December

The beautiful picture which adorns the front cover page of THE AMERICAN CINEMATOGRAPHER for December, is a reproduction from the work of an unknown camera artist whose name we regret cannot be blazoned upon his handiwork. The locale of this picture is evidently in the great Northwest, probably in Washington, where brown bears are still very much at home. The picture has a delightful atmosphere of Yuletide about it and if any other magazine in the industry can show a cover as thoroughly charming and appropriate, THE AMERICAN CINEMATOGRAPHER will bow to it. Until that time we claim the championship of the world.

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or third dimension which is so lacking in usual still photography.

Mr. Barlatier has organized the Filmoscope Company of America, which will not only distribute the Filmoscope but also prepare and edit series of films, which, sold at a nominal price, will undoubtedly soon find room in every home, office, laboratory and what not.

The first series will include series of stereoscopic pictures of motion picture stars.

Can you imagine the delight of the fan, getting for practically the same cost, twenty-four pictures instead of one of his favorite star, and to see that star with the added attraction of the third dimension with all the vividness of almost real life.

Mr. Barlatier is busily arranging series of these film strips, which he calls "Filmograms," covering subjects of interest to all—scenic, industrial and scientific pictures —which illustrate fields of action in every walk of life, and will have their particular educational or commercial purpose. The compactness of the apparatus, which, when folded, measures 5x2½x½ inches, its attractiveness and its extremely low cost, will undoubtedly make it very popular and we feel in duty bound to congratulate our member for having found time in addition to his numerous motion picture activities, to produce a refreshing novelty which will amuse, instruct and be useful in many ways.

General Principles of Sound Recording

By E. C. Wente

Bell Telephone Laboratories, Inc.,
New York, N. Y.

That sound as perceived by the ear is the result of a disturbance in the air was known to the ancient Greeks, and that objects are set in vibration by intense sounds must have been observed by primitive man, but it was not until 1857, or less than a century ago that the first instrument was constructed for making a graphical record of sound waves. In that year Leon Scott patented in France an instrument which he called the phonautograph. In Fig. 1 is shown a picture of this instrument. A piece of smoked paper was attached to the cylindrical surface of a drum, which could be rotated by hand and moved forward by a screw. The center of a diaphragm was attached to a stylus through a system of levers in such a manner that the stylus was moved laterally along the surface of the cylinder when the diaphragm vibrated. Over the diaphragm was placed a barrel-shaped mouthpiece. When the drum was rotated, words spoken into the mouthpiece caused the stylus to trace a wavy line upon the smoked paper. This wavy line was the first known record of sound vibrations.

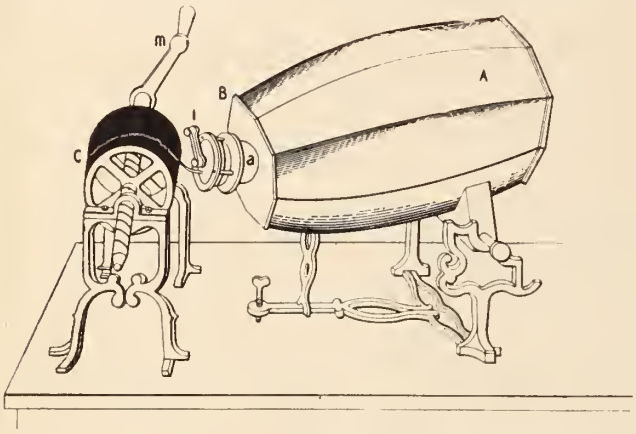

FIG. 1 Scott's Phonautograph

It was twenty years later in 1877, that Edison brought out an epoch-making invention. Edison constructed a machine very similar to the phonautograph but differing in two important details. The smoked paper was replaced by a sheet of tinfoil and stylus was attached directly to the diaphragm, so that it traced an impression of variable depth when the diaphragm vibrated, instead of a wavy line as in the case of the phonautograph. After such a record had been made the drum was set to the starting point and with the stylus in place was again rotated at the same speed as before. The recorded sound was then intelligibly reproduced. Thus Edison gave us the first phonograph.

In subsequent models the tinfoil was replaced by a wax cylinder. For many years the wax record, either in cylinder or disc form, was used almost exclusively for the recording and reproducing of sound. Although many other methods of recording have been suggested, it is only in the last few years that records made photographically have come into the commercial field as competitors. Both the wax and the photographic records are now being used in conjunction with motion pictures.

Photographic records are now being made by many different types of apparatus. But they may be divided into two general classes. In one of these classes the record is a trace of constant photographic density but of variable width, while in the other it is a trace of constant width but of variable density. An illustration of each of these is shown in Fig. 2. In one or two proposed methods the record is a combination of both types.

FIG. 2. Types of Photographic Sound Records.

In almost all systems experimented with today there is at least one element in common with the phonautograph, viz.: a diaphragm which is set in vibration by the sound to be recorded. As in the phonautograph, the diaphragm may be mechanically connected to the engraving mechanism or recorded; or, again, it may be connected electrically as in most modern systems. But in practically all of them the diaphragm forms an essential element.

Unfortunately a diaphragm does not in general have the same response at all frequencies. A favorite experiment in lectures on elementary physics is to sound a tuning fork and with it, through the air, set in vibration a second tuning fork. In this experiment it is important that the pitch, or the resonant frequency, of the two forks be very nearly the same, otherwise the motion set up in the second fork will be too small to be observable. Diaphragms, and in fact almost any other type of mechanical system, will have at least one resonant frequency, which means that, under the action of sound waves, the response will in general be much greater in this region than at other frequencies.

In the older methods of recording resonance was purposely introduced in order to obtain records of sufficient amplitude. The frequencies lying in the resonance region were then much overemphasized. The sound reproduced from such records and a blasting and metallic quality, and well deserved the title "canned music."

Because of the complex nature of speech and music and of the great amount of distortion introduced into the early recorders and reproducers, it is not surprising that the quality of reproduction was poor, but it is really astonishing that the reproduced sounds were at all intel-

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ligible. In fact, it has been suggested that, had the complex nature of speech sounds been generally known at the time, the invention of the telephone, which preceded the phonograph, might have been delayed for many years since its inventor probably would have dismissed his ideas as altogether impracticable.

Although considerable distortion may permissibly be introduced by the recording and reproducing systems before the character of the sounds is so changed that they can no longer be recognized, it is equally true that, if all classes of sounds are to be reproduced to a degree of fidelity where the ear cannot distinguish them from the original, the amount of distortion must be kept extremely small. It is therefore necessary to diminish the distortion by the diaphragm to a negligible value.

Primarily that a diaphragm giving a uniform response may be used and that a record of sufficient amplitude may still be obtained, the electrical method of recording has been developed which is today widely used in the production of commercial sound records. In this method the pick-up diaphragm is made a component part of the recording microphone. Here we can content ourselves with a small amplitude of motion and amplify the voltage generated to an amount sufficient for operating a rugged and distortionless recorder. It may be of interest here to compare the amplitude of motion of the diaphragm in the Edison recorder with that of the microphone used in the majority of present recording systems. In the former the maximum amplitude required for the loudest sounds is about 0.001 inch, whereas in the latter under ordinary recording conditions it is only about one-tenth as great and the weight is only one-twentieth as great. It can thus be seen how the problem of design of a pick-up diaphragm is greatly simplified in the electrical method.

It is, of course, important that the rest of the recording system shall also be free from distortion. However, if a microphone of uniform response is available, the design of a distortionless recorder is made comparatively easy, for its sensitivity may to a large extent be disregarded, inasmuch as the required power can in general be obtained by the use of vacuum tube amplifiers.

In the electrical method. extraordinary improvements have been made over the older systems in the elimination of distortion.

The problem of developing recording apparatus is in many respects identical with that of developing a high quality radio transmitter. In the former, however, there is the additional problem of distortion introduced by the record itself. If, for instance, a record is run at a speed of ten inches per second, and a tone having a frequency of 5000 cycles per second is recorded, the length of one cycle on the record will cover a distance of only 0.002 inch. In the case of wax records the needle must have a very fine point; and in the photographic record the width of the light beam as measured along the direction of motion of the film must be extremely small. At whatever speed the record may be driven, there will always be some frequency beyond which all tones will become more and more attenuated. While the loss of the higher frequencies does not in general impair the tone quality to the same extent as does the presence of sharp resonance regions, yet it reduces the intelligibility of speech and the richness and brilliancy of musical sounds.

There is another type of distortion commonly present in reproduced sound, which is frequently designated as non-linear distortion. This type of distortion is introduced when the excursion of any element of the system is not proportional to the stimulus. For example, a pure tone, which is of sine wave form, such as is shown in Fig. 3, a, may be reproduced so as to have a wave form similar to that shown in b. Physically, distortion of the wave form in this manner is equivalent to the introduction of extraneous frequencies. If the magnitude of these extraneous frequencies is too great, the tone quality will be very disagreeable. However, a small amount of distortion of this kind is not noticeable, for the reason that the primary will mask the extraneous tone. It is a well known fact that a tone must be much more intense to be heard if another tone is sounded simultaneously.

Another type of distortion peculiar to recording is that introduced by a non-uniform speed of the medium

on which the record is engraved. This may not always be serious, but, in certain cases of sustained tones, speed variations cause a disagreeable flutter and in some types of music a decided harshness of tone.

One of the most serious problems with which the radio engineer has to contend is static interference. This also

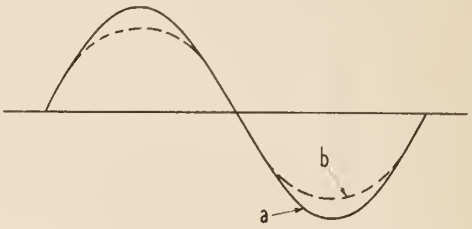

FIG-3 NON-LINEAR DISTORTION OF SINE WAVE

has its counterpart in sound reproduction from records. As the ether through which the radio waves are sent is non-homogeneous because of extraneous electrical disturbances, so the sound record is non-homogeneous on account of the non-uniformity of the material on which it is engraved. The noise resulting from these irregularities is often designated as surface noise. In the case of the wax record, an appreciable part of this noise has its origin in the minute irregularities of the material and, in the case of the photographic record, in the finite size of the grains forming the photographic image. The difficulties of eliminating this noise arise from the fact that the physical intensity of audible sounds covers an exceedingly wide range. Fig. 4 shows curves published by Wegel * on the sensitivity of the ear. The lower curve gives the threshold of audibility and the upper

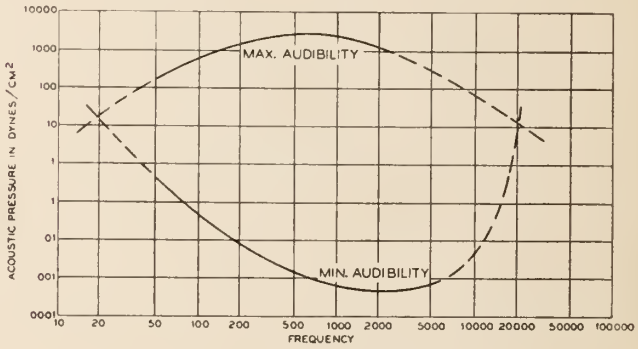

FIG-4 SENSITIVITY OF THE EAR

curve the feeling level, i.e. the level of intensity of of volume were to be recorded the amplitude of the loud-sound which becomes painfully loud. The ratio of pres-is about ten million. If a record of this extreme range sures of the maximum to the minimum of these curves est tone would have to be ten million times as great as for the faintest tone. There is, in general, a maximum amplitude that a record can accommodate, which, for instance, in the case of the wax record is about 0.002 inch. If a tone having an intensity near the feeling level is recorded at this amplitude, then the amplitude of a tone just audible would be only 0.000,000,000,2 inch. It is difficult to get a material having a degree of homogensity corresponding to this value. A similar condition obtains in the case of photographic records, where the pattern is formed by grains in the emulsion which have a magnitude somewhat less than .001 mm., depending upon the type of emulsion used. The range of volume considered here is extreme. Practically it is not necessary to record a range of this extent, but it serves to illustrate the extraordinary requirements placed upon the recording medium. When the range of frequencies that are to be reproduced is increased, the surface noise effect becomes greater. As in the case of the different

Welcome Film Editors

On Wednesday evening, November 21, at the Hollywood Chamber of Commerce, approximately one hundred motion picture film editors assembled for the first regular meeting of an organization to be officially known as "Film Editors." It is intended that the association shall be a non-profit, mutual benefit group, and strenuous endeavors are outlined whereby every film editor in the industry will soon be enrolled.

For several months less than a dozen men have been working toward the formation of Film Editors. Their efforts were so surprisingly successful that the first regular meeting was about twice as large as originally expected. And it is a boast which will long be remembered in the annals of Film Editors that their first meeting was graced with the presence of almost every first-class film editor in the profession. There is certainty that the general idea has found wide response, all of which indicates that the new unit will be exceptionally strong in membership.

The first regular meeting was devoted mostly to election of fifteen governors, this body, in turn electing from their own number a chairman, three vice chairmen, secretary and treasurer.

The complete Board of Governors is composed of Edgar Adams, George Arthur, Hugh Bennett, Edward M. McDermott, Stuart Heisler, Hal Kern, Frank Lawrence, Irene Morra, George McGuire, Lloyd Nosler, Desmond O'Brien, Edward Schroeder, LeRoy Stone, Grant Whytock and James Wilkinson. The body immediately held an election whereby Stuart Heisler was made chairman, Frank Lawrence, Lloyd Nosler and George Arthur, vice chairmen; Edward McDermott, secretary; and LeRoy Stone, treasurer.

Regular meetings are planned the first Wednesday in each month, at 8 p. m. sharp, in the Hollywood Chamber of Commerce.

Motion Photomicrographs

Continued from Page 13

speed). The usual time of development was about one minute. When projected at normal speed, the scenes last about fifteen seconds.

In Fig. 2 are reproduced two sets of pictures showing the grains at the beginning and end of development. In these reproductions, the blackening of the grains and change in general appearance are pronounced. In the motion picture projected on the screen a number of other interesting phenomena can be seen. The development with Elon in most cases starts distinctly from centers on the grain. During development, the grain is in constant vibration as a whole. This movement, though it is very small (of the order of 0.00001 inch), is plainly visible in the magnified image on the screen. During development, the grain throws out thread-like protuberances which likewise are in rapid movement. It is the appearance of these streamers which has given rise to the idea that some grains explode upon development. Different developing agents show marked difference in the type of action. In general those of high reduction potential such as Elon show rather violent action and almost complete change in the exterior conformation of the grain. Developers of low potential such as hydroquinone, however, result in less change of the grain outline.

Further work using the same method to picture the deposition of silver sulfide sensitizing specks is in progress.

The writers wish to acknowledge the help of C. A. Morrison, of this laboratory, who assisted materially in developing the technique which has been described.

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types of distortion discussed above, the difficulties to be met are increased as the quality of reproduction is improved.

Bell Telephone Laboratories, Inc.,
New York, N. Y. September 17, 1928

*The Physical Examination of Hearing and Binaural Aids for the Deaf—R. L. Wegel. Proceedings of the National Academy of Sciences, vol. 8, No. 7, July, 1922.

What Is Success?

John F. Sinclair Tells How One Man Won It and What He Did With It.

Terry Ramsaye, brilliant biographer, once said that if "the whole of George Eastman's life were to be run through a white filter paper, there probably would not be a tint or trace of abandon or recklessness."

In an age of supreme adventure, with many of the greatest fortunes made by wild speculation, George Eastman of Rochester pursued the even tenor of his way, said little, held fast to his own rules, experimented within limits, worked hard and landed on top with one of the largest private fortunes in history.

"Let's see. Just how much, Mr. Eastman, are your benefactions to date?" asked an indiscreet but ambitious reporter recently of the kodak manufacturer.

No answer. Discreetly silent, pleasant, courteous, but still no answer. And there will be no answer, for George Eastman is not given to personal "tooting." Not, at least in the direct, positive, cards-all-on-the-table way. Most of his donations are anonymous.

Recently I read a private letter disclosing an Eastman contribution unknown to the public at large of $50,000 a year, for ten years. It was given toward a public endeavor of great merit, but not one that the public is accustomed to think of.

Some say George Eastman is the greatest anonymous philanthropist in America. And his known gifts by now must total close to $60,000,000.

George Eastman was born at Waterville, N. Y., on July 12, 1854. So he is now past 73 years of age. When George was six years old his parents moved to Rochester, where a year after his father died, comparatively poor. His mother was forced to work, opened a boarding house and kept George in school until he was 14.

By that time his mother could do no more. George went to work at $3.00 a week. He moved ahead, kept his eyes open, and in seven years he had saved $3000.00.

Often one's whole life is changed by a small happening. It was so in the case of George Eastman. When he was 24 he decided to take his first vacation, a trip to San Domingo. A friend suggested that he take a camera along. He purchased one, and gave one of the two camera photographers in Rochester $5.00 to teach him how to handle it.

Eastman found the camera was awkward, unsatisfactory and complex. He decided immediately to simplify it. That's the way his mind worked. He cancelled his trip to San Domingo, took a shorter one and gave all his time to his new interest.

He read everything he could find on the subject. That wasn't much. He fixed up a room in his mother's house and built his own ideas into camera equipment.

The dry plate came first. With his $3000.00 Mr. Eastman started business. He made a great supply of dry plates during the winter and then found them all spoiled. He saw his savings melt away. But he held out for dear life while he was finding out why the plates spoiled. Go now to the gigantic Eastman plant in Rochester and one finds experimental work there on a vast scale. In 1880 it was a different story.

In 1889 came the film for kodaks, eliminating the breakable glass plate. Thomas Edison heard about it and sent William Kennedy Dickson to Rochester for a sample. Within two weeks the motion picture was born in the Edison laboratories at West Orange,

The market for films used for motion pictures grew by leaps and bounds. Eastman, cool, practical, careful, experienced Yankee that he is, saw his big opportunity and he never let go. From that time on the story of Eastman in a business way has been well known.

Three years ago Mr. Eastman turned over to his employees his vast enterprises worth hundreds of millions. He has given away many millions to the Rochester University, and a great school of music to the city of Rochester and has endowed it liberally. He has also given a fine theatre to Rochester. Excellent productions may be seen there at prices within the reach of all. But the half has never been told.

Mr. Eastman is again big-game hunting in Africa. I asked him before he left about his life and some of his thoughts about success. It was the day before he sailed.

"We all look at life out of the depths of our own experiences," he said. "Our lives are vastly influenced by our surroundings, our environment, but I think, much more by our ancestors.

"The picking of good ancestors, especially parents, has something in its favor," continued the mild-mannered philanthropist, with a smile. "It seems to be one of the prime requisites for a successful life in this highly competitive age. Other things are important, of course, but one must have the real thing within before results begin to show without."

The telephone rang, Mr. Eastman asked if I would answer it for him, as he had no secretary with him. It had to do with passports. Mr. Eastman wanted the telephone caller to come and arrange the passports with him personally.

"This is an age of speed and machinery, an automatic age," he observed to me. "People have more idle time now than when I was a boy. That is why I am interested in music. People must have something to fill the time and fill it emotionally," declared this big-business bachelor.

"Personally, I know very little about music. But I like to hear good music. So does the public, music that cannot be abused."

In his own home, George Eastman, living alone in quiet elegance and luxury, has his meals served to the accompaniment of the sweet strains of a richly toned pipe-organ.

Again he was asked his ideas of success. He is reluctant to speak his ideas on lines of a personal nature.

"I really don't know what success is, unless it is just attempting to do well, one thing after another," he replied. "That has been my experience in life. I have tried with what ability I have plus the experience gained to master each problem that presented itself to me. I don't know whether that is success or not.. But that's all I have ever done."

Simple, unaffected, no frills or fuss, orderly, thoughtful, diligent, far-seeing, successful, George Eastman comes of a stock which performs brilliantly, but which is accustomed to speak softly of its personal achievements.

Three years ago a luncheon was given in New York to celebrate the birthday of Thomas Edison. Mr. Eastman arrived early. So did Mr. Edison. Strange to say, they had never met. Someone introduced them.

"I've heard a lot about you," said Mr. Edison, as he extended his hand. Mr. Eastman was ready.

"I bought a dynamo from you in 1885," he answered with a broad grin.

"Was it good?" asked Mr. Edison, beaming.

"Pretty good machine," Mr. Eastman replied, "I've got it yet, and it will still work."

"That's fine," Mr. Edison said. "And say, your film is pretty good, too."

GEORGE EASTMAN

Born at Waterville, N. Y., July 12, 1854, the son of George W. and Marie Kilbourne Eastman. Educated in public schools of Rochester, New York. Became an amateur photographer and perfected a process for making dry plates, manufacturing them on a small scale in 1880. Invented the kodak. Chairman of the Board, Eastman Kodak Company. Leader in business and philanthropic movements. Has given away a fortune estimated as high as $50,00,000 to institutions of higher education, art and music. Is a bachelor.

Einstein Theory and the Fourth Dimension

By H. Gernsback

Member American Physical Society
Editor Science and Invention
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(Continued from November). Once we admit the Lorentz-Fitzgerald contraction theory, we must also accept another equally astonishing one, and that is what we call the theory of **local time.** Take two clocks running together in perfect accord. If one of them is placed upon a moving platform, or if both of them are placed upon such a moving platform, their times will not be the same any longer, but will vary, in order to vindicate the Michelson-Morley experiment. Thus while the clock which moves keeps perfect time, yet the seconds it ticks off are longer than those of the clock at rest. We have thus two different sorts of time! So far the Lorentz-Fitzgerald contraction theory has not been confirmed. It is doubtful whether either will ever be actually proven by experiment.

How Are the Airplanes Moving:

We now come to another aspect of relativity. Consider two airplanes passing one another, each moving at the rate of 200 miles per hour. This gives us a relative of 400 miles per hour considering both of them. We also find the astonishing result first laid down by Einstein, viz., that it is impossible for an observer on a moving body to ascertain the speed of the other moving body by any means or by any instruments known to science.

For the two airplanes, moving at a relative motion of 400 miles per hour, **are moving in many other directions** as far as the earth, or rather the universe, is concerned. For while the airplanes are moving at a certain speed, the earth's surface, which carries the planes, is moving at a different speed. Again the earth moves itself. We first have the axial rotation of the earth from west to east at a speed of 1,039 miles an hour. But, while the earth is spinning like a top, it also moves forward in its orbit around the sun at a speed of 65,533 miles an hour; but this is not all. We still have the cosmic drift whereby the earth as well as all the other planets and the sun itself are carried forward in space in a sort of huge spiral. In other words, **the earth is moving in three directions all at once:** first, axial rotation; second, orbital motion; third, cosmic drift.

But let us revert to the airplanes. It now seems hopeless to figure out not only at what speed they are really flying, **but in which direction they are going.** You see, everything is relative in this world. When you take a train from New York to San Francisco, you have every reason to believe that you are moving from east to west at the speed of the train, which let us say is sixty miles an hour. You are quite certain you are going west. You do nothing of the sort. **You are going due east,** because the earth revolves from west to east, and, while you move west at the rate of 60 miles an hour, **you are really going east** due to the rotation of the earth at a speed far exceeding many times 60 miles an hour. In other words, while you think you are going west at the rate of 60 miles an hour, you are really going east at nearly ten times as great a speed. This is another instance of relativity.

This brings us to the fourth dimension. As we have just seen, everything is moving. Nothing really stands still. Anything that we can imagine really moves, whether it is stationary on earth or anywhere in the universe. Heretofore we said that an object, let us say a cube, had length, width and depth. This is our classical three dimensional body, but in Einstein's world, we must now add another dimension, the fourth dimension, viz., TIME-SPEED. If we move a so-called stationary body, this body, which let us say is a brick, at a speed of about 100,000 miles per second, we find that it contracts somewhat. While moving at a speed of about 175,000 miles per second—in other words, almost as fast as light itself—we find that our brick has contracted sufficiently to almost form a cube. Thus our rectangular brick, while at rest, shortens or contracts in the direction of its axis when speeding at a tremendous speed. Inasmuch as this contraction or shortening only takes places while the brick speeds on, and because you cannot have speed without time, the fourth dimension of this brick is now termed time-speed. This is an astonishing result, but it probably comes nearer the truth of what the fourth dimension really is than any of the older theories in vogue heretofore. It is rather difficult for us to comprehend just what this fourth of the four dimensions, viz., length, width, depth, time-speed, really means because on earth, as far as we ourselves are concerned, there are no such speeds as 186,000 miles per second, or even 100,000 miles. We simply cannot comprehend such speeds.

Yet every time we have ourselves X-Rayed, the particles that are shot off from the anode of the X-Ray tube travel precisely at such tremendous speeds and, due to their speeds, produce such extraordinary results.

Light Is Four Dimensional:

Take a ray of light traveling 186,000 miles per second. Interpose a cube of glass that may be a yard thick between yourself and the ray of light. Although glass is one of the hardest and densest substances known, the light ray passes right through it as if the wall of glass were not there. Yet we have reasons to believe that light really has substance. In other words, the particles which make up light are just as solid and real as the brick mentioned before, but in moving at such a tremendous speed, these particles undergo certain physical changes, of which as yet we are ignorant because these particles truly move in the fourth dimension and, as such, are subject to entirely different laws from those which we know now.

The same is the case of radium. We know that radium shoots off highly charged alpha particles at a speed approaching that of light. These particles, which are just as real as those which make up a brick, are hurled right through glass, metals, a human hand, and most other substances as if these substances did not exist. These alpha particles, moving as they do, have a real fourth dimension; otherwise they could not and would not do what we know them to do.

The Pressure of light:

Once upon a time it was thought that light was simply a wave motion of the ether without having any substance. We are, however, slowly reverting to Newton, who steadfastly asserted that light is corpuscular, in other words, made up of small particles, and recent investigations tend to show that Newton was not altogether incorrect. We know, for instance, that the sun exerts a certain amount of pressure on the earth, amounting to over a hundred tons. This pressure is just as real as if fine streams of water shot from the sun were pressing upon the surface of the earth. This pressure of the light is proven most effectively by the comet's tail. The tail of a comet, as we know, is always turned away from the sun, no matter where the head is located in its orbit around the sun. As is well known, the tail of the comet, which is made up of thin gases, is moving in a vacuum. As the tail is sprayed with the rays of the sun, a certain amount of pressure is brought to bear upon the gas particles, and they thus move away until they encounter the least resistance, which is right behind the comet's head. The comet's tail in this case behaves exactly in the same man-

Concluded on Page 31

Akeley Has Wide Range of Adaptability

By Ira B. Hoke, *A. S. C.*

In the early days of specialized Akeley cinematography when the gyro camera was first brought from its intended field of operations, the African veldt, to the studios of Hollywood, leading directors and producers immediately recognized in it an instrument admirably adapted to photograph difficult scenes from hitherto inaccessible places. From those days, through years of efficient service, the Akeley camera has proven the justification of their expectations.

With the advent of the so-called "German Influence" several years ago the first camera to be called into service in the production of creative angles was the Akeley. Because of its light weight, facile leveling device and gyroscopic control, directors found chimerical ideas efficiently screened by this remarkable camera. The Akeley specialists were called upon to lash their instruments high on the masts of ships, on the arms of derricks, or to be still different, in deep holes looking up.

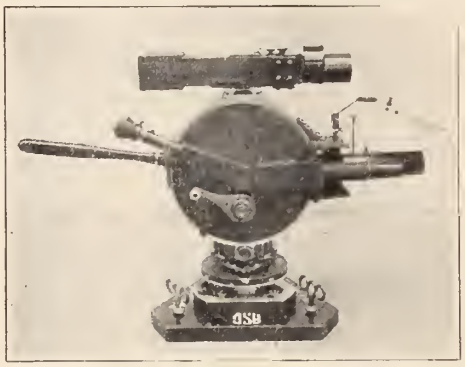

Figure 1. Illustrating lowest position possible to successful operation of the Akeley camera. The base of 6-ply laminated hardwood is capable of supporting the camera rigidly in any position.

Now they said of old that necessity is the mother of invention and certainly that adage applies to the Akeley specialists in their design of the two appliances illustrated with this article. No matter how carefully the cinematographer may make a temporary set-up in a difficult position the camera often proves unsteady, and, of course, the scene cannot be so photographed. Now in view of the unusual set-ups required of Akeley specialists all of them recognized the necessity of being able to dispense with the time honored tripod occasionally and still secure the camera in position so firmly that the controls worked freely while the machine retained its required steadiness.

The first tripod substitute consists of a triangular base having a three-point contact with both the camera and whatever object it is desired to attach the camera upon. This device blossomed out simultaneously among a number of specialists, so no credit can be given its inventor. The base is constructed of laminated pine, nine thicknesses in all, with crossed grains. This makes a strong, light base which is capable of supporting the Akeley camera safely in normal or in vertical positions as well as affording an extremely low position if the camera is to be placed on the ground or in a camera pit. The base is quickly secured to the camera by three knurlled-head machine screws, and to the supporting object by lag screws or long-shank stage screws.

This triangular base is also used successfully in photographing running inserts wherever iron railings are provided on the insert car. A plank is secured across the railings in such a manner that it makes a flat table-like surface. To this the camera is secured by lag screws. A set-up of this kind obviates the danger to the cinematographer from slipping tripod points, as it makes the camera an integral part of the car.

By far the most complete and adaptable device of this kind is the combination baby tripod designed and built in the machine shop of John S. Stumar, A. S. C.

At the request of Akeley specialists of the Universal Studios, Mr. Stumar designed this tripod to allow the Akeley camera to be placed at any height from the stage desirable. The tripod at its fullest extension comes just below the regular Akeley tripod height when closed. From this extension any height is obtainable down to an actual set-up on the floor or ground. This latter set-up is accomplished in a celver manner by attaching the tripod base, by means of a standard tripod thread, to the cone-shaped adapter used by the Bell & Howell and Mitchell cameras in low set-ups.

When the tripod is used standing on its legs, at any stage of extension, a stout hook takes the place of the cone base so that the tripod may be securely fastened to the stage with a chain and turnbuckle. The tripod being only 20 inches in height when closed allows the Akeley to be placed in numberless places where, with more bulky tripods, cameras could not be operated.

About the time the Akeley specialists found means of fitting the condensed camera into difficult positions two other problems presented themselves. First, they found the eyepiece, or focusing tube, was often in an inaccessible position for observation of the action to be photographed. This was a knotty problem, and it was not until the introduction of the Mitchell correct vision viewfinder that the solution was presented. This finder mounts either on top or on the left side of the camera, thereby giving two positions to suit conditions of various set-ups.

Secondly, the specialists often found ideal locations for their cameras that were unusable because, by no amount of gymnastics were they able to wrap themselves around the camera into a position for cranking. Mr. Ray Ramsey, veteran Akeley specialist, solved this problem by a clever adaptation of the Bell & Howell Cinemotor to the Akeley camera. The motor is quickly attached and affords even shutter speeds under the most trying circumstances.

With the aid of the devices outlined, the field of the Akeley has increased until it has become an outstanding instrument for the photography of difficult angles, running inserts and most important of all aeroplane photography. With its wide range of long, focal-length lenses and the steady motor-driven shutter, close-ups from one aeroplane to another while in flight become possible, and their immense value to a production is illustrated by the thrilling scenes so photographed in two of the current feature flight releases.

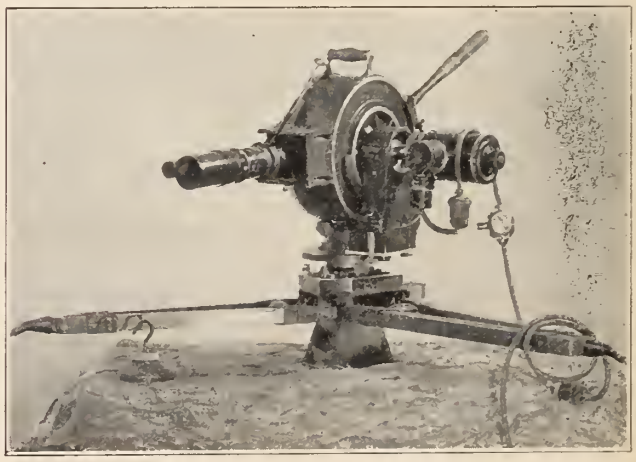

Figure 2. Showing baby tripod extended to allow use of hollow cone base in extremely low positions.

Thus it is that once again the Akeley specialists have given to the progressive directors and producers of today a photographic instrument with such a wide range of adaptability that every type of picture of the future will benefit materially by the inclusion of special scenes made with this remarkable camera.

No Strike of Cameramen

In a recent issue of a Hollywood film periodical a story was published which seemed to infer that a strike of cinematographers might be impending.

The AMERICAN CINEMATOGRAPHER is in a position to state on supreme authority that no such thing as a strike is considered by the cameramen and they have no thought except to cooperate with the producers in every possible way.

Mohr Shoots 'Broadway'

Hal Mohr, A.S.C., is preparing to shoot "Broadway," Universal's next big sound special. It will be all talkie and directed by Paul Fejos. Glen Tryon will be featured with the original stage cast.

A. H. Boradaille, A.S.C., has been assigned to the sound picture department at Lasky studios.

I. B. E. W.

The Studio Electricians Local 40 I.B.E.W. will hold their Benefit Frolic and Ball at the Biltmore Hotel Ball Room, Los Angeles, December 28th, 1928.

Both women's and men's fashion show, vaudeville entertainment, and the Stars of Filmdom will be there.

Entrants are being received for the Queen contest to decide who will be Goddess of Electricity. Local 40 is offering an Essex Coach as a prize to the Queen.

Many beautiful awards will be made to those present at the ball. Contest office has been opened at 6250 Hollywood Blvd., Hollywood.

"Hell's Angels"

Alvin Wyckoff, A.S.C., and Victor Milner, A.S.C., have been making special shots for Howard Hughes, director of "Hell's Angels" at Caddo. Among these was a series of the interior of a Zeppelin, showing the mechanism for bombing. Caddo has forty men on this picture at Oakland airport.

Acknowledgement

It being the custom to wish everybody a Merry Christmas and a Happy New Year THE AMERICAN CINEMATOGRAPHER hereby cheerfully does its duty and heartily conforms to custom, but it makes a gesture of especial cordiality toward those advertisers who have so heartily supported our little journal through the eight years of its existence and thereby enabled it to grow into the full stature of an internationally recognized technical magazine. For this encouragement THE AMERICAN CINEMATOGRAPHER is enduringly grateful.

Einstein Theory and the Fourth Dimension

Continued from Page 29

ner as a weather vane, which always places itself in the line of least resistance, pointing with the arrow to the direction whence the wind is blowing strongest. The pressure of light has been verified by many experiments on earth as well. In one of them a light ray coming from a distant star is deviated by the gravitational field of the sun. This experiment has actually been proven on a photographic plate. (See "Electrical Experimenter," January issue, page 887.) If the ray of light in this experiment was merely a wave motion of the ether, it is inconceivable how it could possibly be deflected by the sun's gravitational field.

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