REPORT OF COMMITTEE ON ELECTRICAL DEVICES

YOUR Committee has spent considerable time and thought during the past two years trying to arrive at an understanding as to the desirability of standardization of motor generator and converter ratings for arc projection.

We have found in the first place that there is a wide difference of opinion among the membership as to the desirability of doing anything at present towards such standardization. There is a difference of opinion as to the range of capacities to be considered and there is considerable uncertainty as to the field covered by the arc inasmuch as the incandescent lamp is now being used in its place to an extent, and there is some possibility of the coming of the reflector type of arc such as is used extensively in Europe.

While the Committee is convinced that it is unwise to delay action in matters pertaining to standardization until progress has ceased and the ultimate has been reached, especially in an art where the ultimate may be many years ahead, nevertheless it has deemed it imprudent to recommend any definite action at a time when important changes affecting such standards are in progress or are imminent.

We believe that a brief résumé of the situation today would be of interest and will possibly convey to the membership of the Society a better understanding of the conditions.

The arc lamp is, of course, the time honored source of light for motion picture projection and is used generally in capacity of from 35 to 125 amperes.

Some years ago the incandescent lamp was developed to the point where it too entered the field. Today the standard lamp for such work is the 900 watt, 30 ampere unit. It has been very difficult to get accurate figures on the relative light efficiency of the carbon arc and the tungsten lamp. From various sources equivalents of from 25 to 50 amperes are named as being equal to the 30 ampere tungsten. Taking what might be called the average of the above together with the reports of operators, exhibitors, and of practical engineers, 35 amperes on the standard type direct current arc are practically equivalent to the tungsten lamp operating on a metallic screen with about a 9 x 12 picture.

Using then for the sake of comparison this 35 ampere arc on direct current, the cost of such current, assuming a motor generator set operating at approximately 60% efficiency being used to properly reduce the voltage, and figuring current at 4c, would be 12.8c. The cost of the carbon consumed per hour would be approximately 6c assuming that about two-thirds of the total carbon length is used. This makes a total cost of 18.8c per hour.

With incandescent lamp operating on an A. C. source of current

the conversion loss in the transformer would be approximately 10%, hence the cost of a 900 watt lamp would be 4c per hour and together with a replacement cost of 5½c per hour, the total cost would be 9½c.

With the reflector arc the current equivalent to 35 amperes would be approximately 10 amperes, of which the cost would be approximately 6.7c per hour figuring it as before. The cost of carbons under these circumstances is estimated at approximately half the cost of the standard arc or 3c per hour, hence the total cost would be close to 6.7c per hour.

The ratio of 10 amperes to 35 is not entirely dependent upon the data submitted by the manufacturer, as such a lamp of American manufacture was tested this past winter at Cleveland in comparison with the standard arc and with all the doubts of close observation in favor of the latter, the result showed a ratio of 2½ to one. This lamp was equipped with a mirror of about 105 degrees enclosure and used the standard miniature carbons and not the special carbons designed for this purpose, which are being used in Europe.

One of the European manufacturers, a German, shows a mirror subtending 135 degrees at the arc. The light is carried through a condenser and with this combination it is claimed that 13 amperes will equal 100 amperes in the standard arc. In this lamp the positive carbon faces the reflector while the negative feeds in from below to an angle slightly greater than 90 degrees.

Another model, a French, carries the negative carbon through a hole in the center of the mirror. The American lamp tested was of this type.

The high intensity arc, as already stated, is not made in sizes which could be compared with the above, but is used only in competition with 75 to 125 ampere arcs and for equal ampere consumption has a ratio of about two or two and one-half to one as compared with the standard arc for equal illumination.

Within the past year, a very convenient device has been added to the incandescent lamp equipment, which makes it possible to get the correct location of the filament in the lamp house as soon as it is inserted, diminishing the possibility of poor screen illumination until corrected. The device consists of a cage into which the lamp and socket are inserted. The lamp has a universal movement in its socket and when the center of the filament has been placed in its proper position, as viewed through apertures in the fixture, it is locked and is now ready to be slipped into the lamp house.

A transformer has also been placed on the market to operate on commercial voltages and frequencies. It has an ammeter with a suppressed zero showing readings of only about five points and with a lever for hand regulation, making it very convenient for the operator to maintain his amperes at 30 in spite of line voltage variation. For use on direct current circuits a motor generator set to operate in conjunction with the above described transformer is also being furnished.

JOHN H. HERTNER,
Chairman, Electrical Devices Committee.

REPORT OF THE COMMITTEE ON FILMS AND EMULSIONS

Emulsions

NO EMULSIONS having properties essentially different from those now existing have appeared.

Manufacturers are making every effect to increase the speed of their negative panchromatic emulsion. Emulsions during the past year have been far superior to those of any previous year.

Wear and Tear on Life of Film

Manufacturers are making every effort to produce film having better wearing qualities. Short life of film is a result either of absence of moisture in the film or of maltreatment, either chemical or mechanical. The moisture content of film should be such as exists when film is in equilibrium with an atmosphere of 70% relative humidity. Treatment of the film with glycerine in the laboratory is a great help in keeping the film moist.

Mechanical maltreatment is usually of the nature of corner fractures of the sprocket holes. If the corner of a sprocket hole becomes fractured or torn, if even very slightly, the strength of the film is very much weakened and the life is shortened in due proportion. This maltreatment often occurs during printing as a result of non-alignment of sprockets, imperfect or rough sprocket teeth, or incorrect timing of the printer. Ultra-rapid projection in the inspection room of the laboratory invariably results in corner fractures.

It is the duty of every laboratory to carefully inspect the perforations of the film, if necessary under a microscope, in order to ensure that the perforations are perfect before the film leaves the laboratory.

Desensitizing

A great deal of research work has been done in connection with emulsion desensitizers. These chemicals have the property of diminishing the sensitiveness of any emulsion after exposure without destroying the latent image.

Phenosafranine was the first desensitizer which came into prominence but this has the disadvantage that it stains the emulsion and it is almost impossible to remove this stain.

Recently the desensitizer Pinakryptol Green has been put on the market and this is quite as effective as Phenosafranine and does not stain the emulsion. Investigation indicates that this material shows promises for use in developing motion picture film. With an MQ developer, adding 1 part of Pinakryptol Green per 25,000 parts of developer, after development has proceeded for 1 minute it is possible to inspect negative film with a Series 00 safelight. The film may be

previously bathed in a 1:5000 solution of desensitizer before development, using the regular developer and this procedure is advisable for those plants where the film is soaked previous to development, the desensitizer bath taking the place of the "water soak."

Hypersensitizing

Increasing the speed of Panchromatic film by bathing in a solution of ammonia with or without the addition of other ingredients, is becoming common practice and the speed of the film can be increased from two to three times that of the unbathed film. Monpillard, Bull. Sec. Fran., April 22, p. 90, advises the addition of the silver chloride and other silver salts, to the ammonia solution, while Burka, J. Frank. Inst., 1920, p. 25, uses a solution of ammonia in a mixture of water and alcohol. The safest procedure appears to be to bathe for two or three minutes in an 0.5 solution of ammonia at a temperature as near 40° F. as possible and then dry quickly at a low temperature.

Printing Machines

Manufacturers of these machines are working on methods of controlling exposure mechanically by means of diaphragms and variable aperture plates instead of controlling the light intensity of the lamp by rheostats.

Lawley of England controls the light changes in the printer by inserting two metal staples between the film perforations on opposite sides of the film, the first staple or key staple actuating the light change mechanism, while the distance between the two staples determines the intensity of the printing light. Other workers attain the same end by blocking out perforations by cementing small pieces of celluloid over the perforations and utilizing the blocked out perforations to tip up a sprocket and thus actuate the light change mechanism.

Sensitometers for "timing negatives" such as the one described by Jones & Crabtree in the Society of Motion Picture Engineers, Vol. 15, are being freely adopted, especially on the Pacific coast.

Standardizing of Printing Light

A standard printing light for all laboratories would be desirable so as to eliminate the re-timing of a negative when successive prints are made in different laboratories. As long as printing lamp intensities are controlled by means of a variable resistance it is doubtful if such an object can be attained without an enormous amount of labor. If light intensities were controlled by means of diaphragms or aperture plates the ratio between the various light changes could be standardized. Standardization of the photographic intensity of the printing lamp would then be unnecessary.

It would simply be necessary to so adjust the intensity of the printing lamp that when printing with an aperture corresponding with that indicated on the timing card a correct print was obtained with the particular developer used in the average of time development

adopted by the laboratory. This adjustment would only be necessary for one scene in a set of negatives timed by the same laboratory.

The Cinex Exposure Tester, made by Cinema Machine Co., Los Angeles, Cal. The following is extracted from a description furnished by Mr. L. J. Patterson of that firm:

"The tester we make now and all we have made since that first one has been made with a constant light value but varying widths of shutter opening to give different times of exposure. While it is possible and practical to match up printers with testers of either

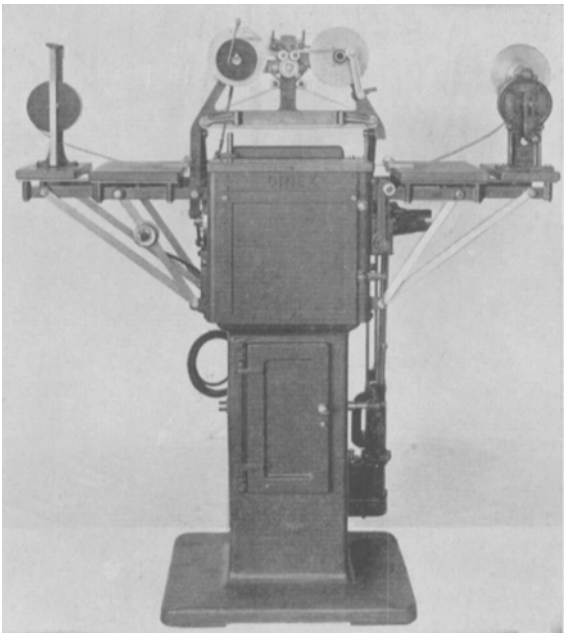


FIG. 1

principle there is still a small difference in the quality of the picture due to contact and variations in time, etc. For practical purposes this variation is not such that it will cause any error in choosing the proper printing light and that is the thing desired. However it cannot be claimed that it is an absolute duplicate of what the printer will put out in every respect. But for the average density it is very exact and our machine does not vary in any respect in successive prints which it must succeed in doing or the machine could not be used.

"The drum shutter of our tester turns on self-aligning ball-bearings, moves 90 degrees, exposes pictures when traveling in one direction; an auxiliary shutter closing opening when returning to start.

"I will describe what happens as you operate the tester. First the control handle is to be rotated one turn to make the exposure so—

after finding the place in the negative where the test print is wanted the negative is framed by holding negative with fingers of left hand down to track and is shifted the distance necessary very easily. A red light shows up through the aperture at all times while at rest so that it is easy to see the picture as well as frame line.

"Notice in the photo the three levers supporting and governing the movement of the gate (as we call it) and notice that they give it a movement that keeps the whole assembly vertical and at the same time it moves up and back out of the way so that you can look

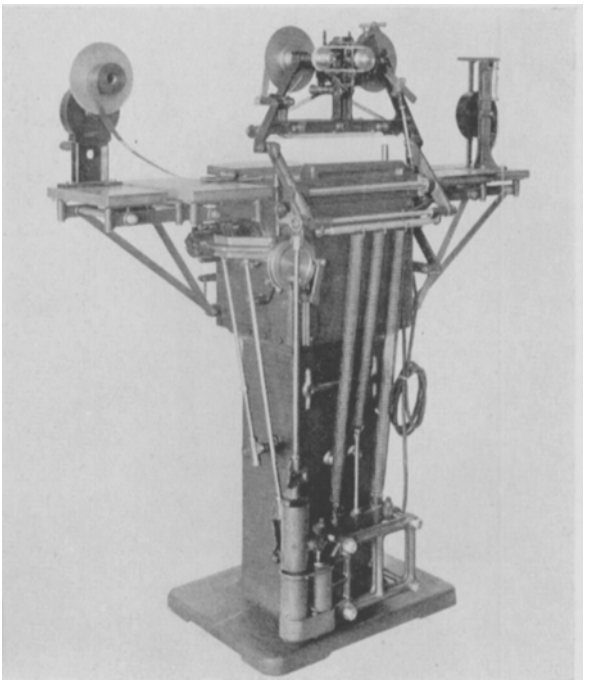


FIG. 2

straight down into the apertures when gate is up. The gate locks when brought down by the first half rev. of the control handle and then nothing happens on the last movement of the handle except that the auxiliary shutter opens and everything is ready for the exposure. The drum springs are pulling on the drum and it is not moving but is at rest so that nothing can alter its speed when released. Then the same catch which locks the control handle at the end of its stroke also trips the catch holding back the drum so that the drum then turns 90 degrees giving the exposure. At the end of the stroke of the drum (shutter) it strikes a very sensitive trigger which allows the powerful springs counterbalancing the gate to act and the gate rises but is retarded from coming up with a bang by an oil dash pot which

operates like a door check and can be adjusted to travel at any speed desired.

"Outside of a few minor conveniences there is one very desirable feature and that is the method of controlling the winding up of the positive film which is wound up on the up movement of the gate.

"By the gate I mean the brass assembly of positive film over top of machine and is called a gate on account of the similarity to a gate in other film machines, etc.

"The whole business goes up and down as you can see by the

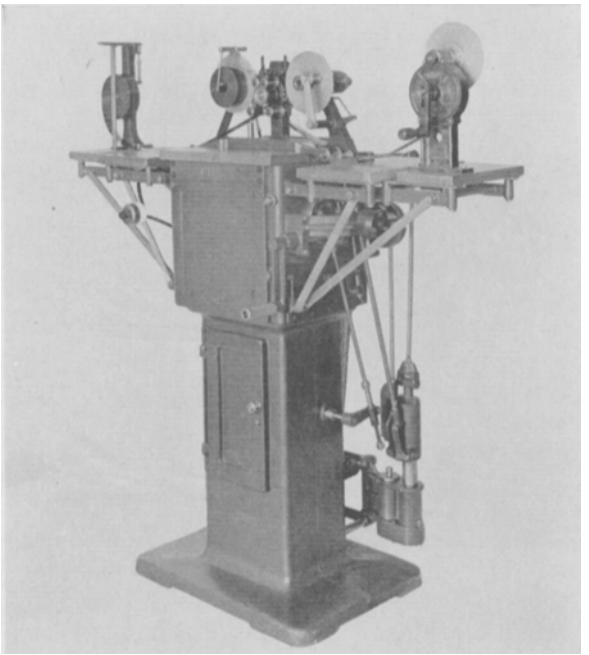


FIG. 3

photo. The feature I wanted to bring out was the one by which the strip of positive that is wound up can be adjusted to wind up anywhere from 10 to 20 pictures simply by loosening the clamp on bar projecting out from the sector which drives a gear and so on to take up sprocket, etc.—and sliding this clamp in or out on the bar and thus changing the angle of movement given to the sector in the up stroke of the gate. The sector ratchets on the down stroke.

"Therefore if the man operating the tester wants to have his prints come out with only one blank frame in between the clamp is slid along until the film moves up just 12 pictures each time. If 3 or 4 frames space is wanted it can be so adjusted in a few seconds.

"At the end of the drum movement a red glass is fixed in the drum to allow the negative to be seen, etc.

"The apertures under the plate glass under the negative are 3/8 inch deep and are all slanted to focus on the filament of the light which must be set central and near as possible to 18 inches down from the film. No ground glass or other filters are used between the light and the picture and it is all so designed that every particle of the filament of the light is exposed to all of the picture and the distance 18" is great enough to allow a large size globe (100 watt) to be used if necessary and still have an angle included by the filament of relatively small degree—the light source is in other words fairly well concentrated."

Dye Toning

Latest reports in this field are covered by the following references to issued patents.

The Agfa interests have taken out a patent for the use of a mixture of quinone and alkaline halide as a bleaching medium for silver images, the resultant product acting as a mordant for basic dyes. Owing to the very objectionable odor of quinone it is doubtful if this method will meet with much success in practice.

Kelley of Prisma, Inc., produces a mordant for acid dyes by bleaching a silver image in a "Bromoil" bleach consisting of copper sulphate, potassium ferricyanide, acid, alum, and an alkaline halide.

The Eastman Kodak Company has issued instructions for dye toned images by treating the silver image with an acid solution of potassium ferricyanide containing uranium nitrate. The function of the uranium nitrate is simply to act as an indicator for the time of bleaching the image.

Automatic Film Processing Machines

The committee lists below those devices which have either been described in public print or reduced to practice.

The inventors or designers of such machines when known and located have been requested to supply descriptions with comments as to their experience with their particular machines.

Spoor-Thompson Machine	Chicago, Ill.	(Tank Machine)
Duplex Machine	Brooklyn, N. Y.	
Lawley Machine	England	(Tube Machine)
Pathe Machine		
Moy Machine		
Jaeps Machine	England	
Erb Machine (Erbograph Co.)	New York, N. Y.	
Gaumont Machine	Flushing, N. Y.	(Tube Machine)

These machines are essentially of two types, one type using tubes and the other type using tanks. Some machines employ double-toothed sprockets while others use sprockets with teeth alternating from one side to the other on successive sprockets. The machines like the Spoor-Thompson have no sprockets at all and depend upon friction and tension to propel the film.

U. S. Patent No.	525,849	E. P. Mackuseck	Sept. 11, 1894
U. S. Patent No.	623,837	A. Schwartz	Apr. 25, 1899
U. S. Patent No.	757,323	Rienekampf & W. Nauck	Apr. 12, 1904

U. S. Patent No. 1,109,208	Geo. C. Dobbs & M. McGregor	Sept. 1, 1914	
U. S. Patent No. 1,141,464	R. Javault	June 1, 1915	
U. S. Patent No. 1,177,697	L. Gaumont	Apr. 4, 1916	(Gaumont)
U. S. Patent No. 1,231,711	F. B. Thompson	Oct. 15, 1918	(Spoor-Thompson)
U. S. Patent No. 1,325,748	J. Marette	Dec. 23, 1919	
U. S. Patent No. 1,377,887	R. C. Hubbard	May 10, 1921	(Erbograph)
U. S. Patent No. 1,385,403	Senton & Jacquet	July 26, 1921	(Senjacq)

Color Photography

The Technicolor Corporation has produced a photoplay entitled "The Toll of the Sea" by their two-color process. The color rendering of some of the scenes is not all that could be desired, though the definition throughout is excellent. The feature of the Technicolor process is the method of preparing the final positive. The red and green images are prepared on separate films on a specially thin film and the two films are then cemented together in register.

A number of two-color films prepared by the Kodachrome process have been exhibited at the Eastman theatre.

An ingenious scheme of three-color motion picture photography has been worked out by Berthon-Kellner-Dorian. The method consists of photographing an object through a single lens covered with

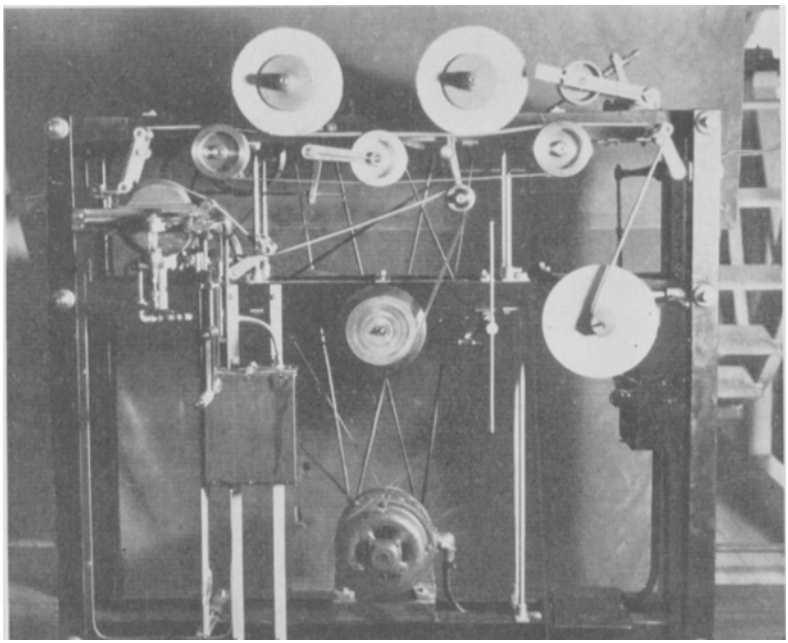


FIG. 4

strips of red, green, and blue filters, on to film which has a number of very small embossed lenses on the celluloid side of the film. The film is prepared by stripping from an embossed roller. In this way each individual lens images the object taken through the three filters so that by projecting the black and white film through a corresponding lens fitted with the necessary filters a color effect is secured.

Reports on this process to date are very favorable though it would appear that the film would deteriorate rapidly in view of scratches and accumulated dirt on the embossed surface of the film.

Polishing Machines

We attach a photograph of the Cinex Polisher. This is made by the Cinema Machine Co., Hollywood, Cal. This machine is in general use in California. Its virtues are its quietness and the fact that it is entirely free of sprockets.

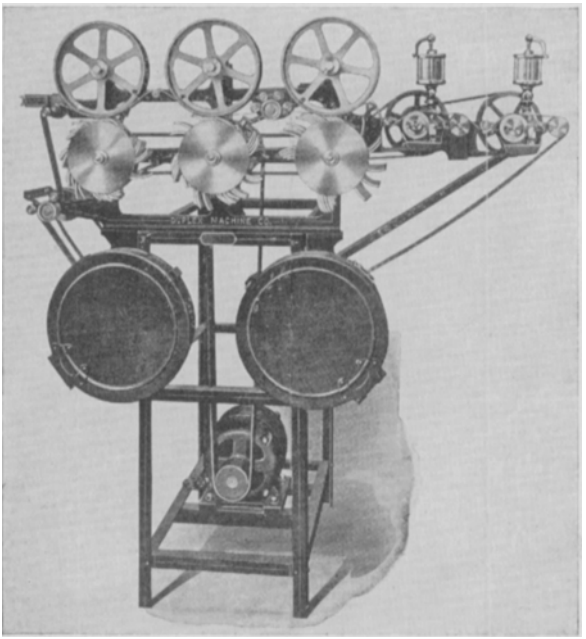


FIG. 5

The Duplex Polisher, made by the Duplex Machine Company, Brooklyn, N. Y., is of the sprocket feed type. Printed circular from that Company is attached.

Elimination of Static

Manufacturers of film are making every endeavor to produce more anti-static films. The present method of backing negative film is proving satisfactory in practice, although there is much room for

improvement in the preparation of an anti-static positive, especially since most laboratories have ceased to perforate their own positive. When perforation was done in the laboratory, the perforating room was well humidified and the film had a chance to absorb moisture, which is the only external static preventive known.

Provided the film is not subjected to friction or strain, static is rarely produced in an atmosphere whose relative humidity is 70% or over.

When the printing machine is out of adjustment, it subjects the film to stress when higher humidity than this is frequently necessary in order to secure the absence of static.

Even when the humidity of the printing room is higher than 70%, the film does not usually have a chance to absorb sufficient moisture before reaching the printing gate, so that it is often desirable to lead the film from the roll over an idler suspended some distance above the printer, so that the film is exposed to the air for a distance of six feet or more in order to enable it to absorb moisture before passing through the machine.

REPORT OF THE NOMENCLATURE COMMITTEE

May 7, 1923

THE following definition was adopted at the Rochester meeting last October and must be confirmed at the present meeting if it is to be incorporated into the permanent nomenclature of the Society:

PROJECTIONIST. A person skilled in the art of projecting motion pictures.

The nomenclature committee recommends the following:

PROJECTOR ROOM. A room or enclosure from which motion pictures are projected.

OBSERVATION PORT. An opening in the front wall of the projector room through which the projectionist observes the screen.

PICTURE CYCLE. The entire series of mechanical operations which takes place between the positioning of one frame of a motion picture film and the positioning of the next frame.

MOVING PERIOD. That portion of the picture cycle during which the film at the aperture is in motion. This period is expressed in degrees of revolution of the fly wheel when 360° is equal to one cycle.

STATIONARY PERIOD. That portion of the picture cycle during which the film at the aperture is stationary. This period is expressed in degrees.

PROJECTION PERIODS. Those periods during the picture cycle during which the picture is projected upon the screen.

NOTE. Projection room recommendation of Committee.
Projector room vote of Society.

Projectionist:

(No objections or discussion being offered, the President declared this definition officially adopted.)

Projection Room:

MR. PALMER: In the studios, the term "projection room" is not used that way. It is a room in which the pictures are shown; a room in which the audience sits.

MR. RICHARDSON: We understand that, but such a room is not properly a projection room; it is a "screening" room. Also this definition is intended for theatre use. The term "projection room" is used in all official trade papers and in the text books. It is designed to provide a standard name for use in architects' plans.

DR. STORY: It seems to me that when the Nomenclature Committee has considered a definition sufficiently to recommend it to the Society, any suggestion of changes toward a form more acceptable to the Society should be made, if possible, at once. Even with such changes it is improbable that a final definition can be written into the records at the first trial, but undoubtedly fewer changes will be needed at the next reading, if there has been a preliminary discussion. It is true that discussions of this kind take a lot of time that might be devoted to the presentation of papers, but after all the obtaining of a proper nomenclature is one of the principle justifications for the existence of the Society—it is one of the few things for which the industry looks to the Society. Great as the temptation to the contrary may be, we must be sure that this part of each convention's work is not sacrificed for other subjects of greater personal interest.

On the assumption that you agree with me on the value of this branch of the Society's activity, I should like a further discussion of the term "projection room." From what has been said, it seems that to the theatre manager and to the laboratory man "projection room" means two quite different things. The entire object of our nomenclature is to prevent confusion of this kind. Some distinction should be made, such, for example, as calling the theatre room a "projection booth." Cannot there be some expression of opinion from those most in touch with theatre and laboratory practice?

MR. RICHARDSON: I should call Dr. Story's attention to the fact that Webster is the best authority on this. I have looked up the definition of booth and find that it cannot be applied to a room for showing pictures. It is a small, temporary structure.

MR. DAVIDSON: I still agree with Dr. Story that "booth" is the proper term. Webster wasn't alive in the days of motion pictures and there is no reason why we should not adopt it in the sense used in the industry. I think the definition that is in Webster is not so important.

MR. RICHARDSON: There is another and greater reason why I do not think the term "booth" desirable. If one speaks of a "booth" to a theatre manager, he visualizes some place in a location worthless for any other purpose. If the term "projection room" is used he visualizes a decent place. This applies equally well to the terms machine and operator. The theatre manager will probably laugh at first, if one talks to him about a projector, projectionist, and a projection room but after a little his ideas change and the whole thing is, in his mind, raised to a higher level. That is the real reason for wanting the term projection room. It is because of the psychology of the thing.

DR. GAGE: I suggest that the term "projection booth" be defined as a temporary structure from which motion pictures are projected. I have seen a number of temporary structures built to house the projector. I wish to suggest the addition of the definition for a projection booth.

MR. PALMER: As I understand the definition, it is to define something which exists at the present time. If, in future, they put an improvement in the theatre over the present room, they will make a name for it, but at present it means where pictures are projected. It would be wrong to call the room from which pictures are projected the "projection room."

MR. HILL: It seems that the whole situation revolves around the fact that the name is already in use in another sense. This society deals not only with theatres, but with studios and exchanges as well; in the latter, "projection room" means a place in which pictures are screened. If we want to get away from the term "booth" except for temporary installations, why not call a permanent enclosure for theatre projectors a "projector room?"

MR. RICHARDSON: This would upset the work of years. Books that are going out all over the world use this term and we should have to change the procedure of years in order to establish this new definition. Trade and technical papers have for years been calling it the "projection room." There are 16,000 theaters and only about 100 studios.

MR. CAMERON: There are many more than 100 studios and each studio has one or more projection rooms for viewing the projected picture.

MR. KUNZMANN: The average projectionist whom I have visited on my travels agrees on "projection room" and I think that is what it should be called. We are spending a lot of time on this discussion and in my opinion are in favor of abiding by former decision on term "projection room."

MR. CAMERON: I agree with Mr. Richardson—that we get some term away from "booth" but I know we will run into complications unless we can get the producers and exchange men to change the term projection room to screening room.

MR. RICHARDSON: I haven't run into any complications after thirteen years or heard any protest from exhibitors, who call the room where pictures are screened a "screening room." Others call it the "projection room." I think we better take a vote on the matter.

I am in favor of anything the majority decides on. I move that the term and definition be approved for the present.

DR. GAGE: I second the motion.

MR. DAVIDSON: I amend the motion that it be called the "projector room."

(This amendment was seconded. The amendment and the motion as amended were duly passed. By action of the Society, therefore, it was voted to change the term "projection room" as proposed in the original report of the committee to "projector room."

Observation Port:

MR. RICHARDSON: This again is just to give the standard name for use especially in architect plans. At the present time architects use a large number of different names for indicating this opening.

Picture Cycle:

(No discussion.)

Moving Period:

DR. GAGE: In case one cycle is not 360° (one revolution of the fly wheel), the revolution of some other real or imaginary part of the apparatus is required to measure the moving period. Thus, if the moving period is 120° on the fly wheel but the film moves only every other revolution, the moving period should be expressed as 60°.

Stationary Period:

(No discussion.)

Projection Periods:

MR. JOHN G. JONES: How does this affect the picture getting out of frame?

DR. GAGE: This is taken care of by the definition. We are trying to define what the machine does—the entire series of mechanical operations—rather than what happens to the film.

MR. R. C. HUBBARD: What is the difference between stationary period and projection period?

DR. GAGE: There are generally two or three projection periods during the stationary period if the machine is in proper adjustment. No projection occurs while the film is in motion, but it is possible to project while the film is in motion if the shutter is not properly timed.

MR. HILL: Will these be expressed in terms of degrees too?

DR. GAGE: Not necessarily. It is not an absolute on or an absolute off; it is gradual on account of the diameter of the beam. It is immediately connected with the opening of the shutter. I was going to bring this up—that these periods are measured in degrees, but this would be confusing. If the film happens to be in motion while the shutter is open you get the travel ghost.

Summary

The definition of projectionist which was presented to the Society at the last meeting (Rochester) having received the consideration required by our By-Laws was officially approved by the Society and is now a part of the adopted nomenclature.

Definitions of the following terms have been proposed by the Nomenclature Committee at this meeting (Atlantic City) and according to our By-Laws must remain before the Society for a period

of six months (until the next regular meeting), at which time they may, by action of the Society, be adopted and become a part of the nomenclature officially approved by the Society.

Projector Room
Observation Port
Picture Cycle
Moving Period
Stationary Period

PROGRESS REPORT OF THE SOCIETY OF MOTION PICTURE ENGINEERS PRESENTED AT THE CONVENTION IN MAY, 1923

Vitalux Tubular Film, Camera and Projector

The Vitalux equipment consists of:

Film

The Vitalux film is an endless band 5 inches wide and 18 inches in circumference, each picture being 3/16 inch by ¼ inch. Each film takes 664 separate pictures spirally located on the band. Each band is the equivalent of 119 feet of standard tape film. The positive stock is of the Safety slow burning type.

Film Container

The film container is of metal and so constructed as to open only when in the camera. To charge the camera the magazines are changed.

Camera

The camera consists of a small container 8½ by 11 by 4½ inches equipped with a Goerz Hypar F 3.5-20 mm. Anastigmat lens with Iris Diaphragm and universal focus.

Projector

The projector takes the tubular film, no rewinding being necessary. The illumination is provided by a 250-watt, 110-volt concentrated filament lamp with spherical mirror condensing lens and objective lens, all of which are easily focused or removed for cleaning purposes.

The film is mounted on a metal drum and inserted in the projector. The film can be changed quickly and easily, the framing device being adjusted while the film is in motion. The projector is 12½ x 7½ x 14¾ inches, the machine being either motor or hand driven.

Books

Handbook of Projection for Theatre Managers and Projectionists by Mr. F. H. Richardson, commonly known as the "Blue Book of Projection" contains 934 pages and 374 illustrations, deals with every phase of motion picture projection with detailed illustrated instruction upon the various devices used in connection with motion picture projection, has well illustrated chapters on projection optics, lenses, screens, etc., deals with projection room matters exhaustively including location and construction thereof and appliances used therein.

Four notable publications since our last convention have been issued by James R. Cameron. A complete volume on Motion Picture Projection consisting of approximately 1100 pages issued November 1st, 1922, Motors and Motor Generators consisting of 140 pages issued November 1st, 1922, Electricity for the Motion Picture Operator consisting of 140 pages issued December 1st, 1922. Examination Questions and Answers on Motion Picture Projection consisting of 140 pages was issued December 21st, 1922. The publications are extremely complete covering all phases of motion picture engineering.

Synchronization of Sound and Pictures

Paper to be presented at the Convention by Mr. Lee De Forest.

The following information was received from Mr. A. F. Victor.

While it is true that most modern theatre orchestras follow the action of the play with appropriate musical selections there has been no real endeavor to establish true synchronization such as we believe possible.

The recent experimentations by A. F. Victor have advanced the work considerably and in the right direction. His so-called metronome pictures contained in the lower right hand corner a photographic reproduction of a swinging pendulum which beats out the time in the manner of a Metronome. It was at first expected that this system would solve the whole problem, but, upon actual tests it was soon discovered that this apparently simple method was by no means entirely successful. The difficulties did not occur until the leader attempted to RE-LAY the tempo to his orchestra. A perceptible drag occurred in transmission and it was only by means of many rehearsals that any sort of successful result was obtained.

Since it is obvious that sufficient hearty co-operation by orchestras throughout the country could not be obtained to secure best results Mr. Victor then tried a number of means using among other methods, one which entailed a system of flashes.

To impress these upon the film, presented no difficulty and analysis proved that they were in every way a true indication of the proper tempo of the movements followed. But again there appeared a confusing difficulty in transmission of these markings to the players.

An attempt was next made to time the signals so as to allow for a loss of time in transmission between pictures to musical director and then to the musicians, but still the result was not perfect. A last method was then resorted to. Instead of using moving signals or flashes, numbers were substituted—the result has so far proven to be the best.

Further experimentation has developed that an audible system of signals is to be preferred. Therefore, Mr. Victor is now conducting experiments in which the original indications on the negative are produced photographically and then are audibly transmitted from the positive passing through the projector, to the Orchestra Leader, who appears to have less difficulty in receiving and transmitting the time so obtained.

Transmission of Pictures by Radio

The following information was received from Mr. C. Francis Jenkins:

It will be recalled that in this system the prismatic ring, the new optical shape in glass, is the missing link which binds together apparatus easily obtainable in the open market; binding them together in such an operative fashion as to produce photographs by radio.

Dependable automatic machines are used in the production of the prismatic rings, in 10-inch and 7-inch diameters, machines so carefully designed that a year's operation has suggested no change therein. The product is uniform and of a very high degree of precision.

With perfect prismatic rings our problem was greatly simplified, consisting in the selection of the best out of many different devices for our purpose.

Last fall an official demonstration was made for the Navy, with Navy officers in charge, between the Navy Radio-Air Station, N O F, at Anacostia, and our Laboratory on Connecticut Avenue, Washington, at which latter station some ten high ranking officers watched the reception of the pictures. The demonstration was pronounced a complete success.

Technicolor Process

The following data was received from Dr. Herbert T. Kalmus:

The Technicolor process which has been in the course of development by Kalmus, Inc., Research Engineers of Boston, for a number of years has definitely reached the commercial stage. One five reel photoplay "The Toll of the Sea" has been presented and produced.

The Technicolor process is a two-color system in which both the colors are carried directly on the positive film so that it involves no special projecting conditions of any kind. The method of making the negative is such that there are no color fringes either due to motion or to stereo parallax. The registry of two components is very satisfactory as are the color values as seen on the screen.

Teleview

Promised data covering Teleview was not received at the time the report was rendered nor has it been received since.

Film Storage

The following information was received from the United States Signal Corps:

The Signal Corps has installed a fire-proof brick and concrete vault-structure at Washington Barracks, which is used for the purpose of storing motion picture films. The vault is fitted with fire-proof doors, combination locks and sprinkling system. A watchman is in charge day and night.

ALBERT J. LUBBE,
2nd Lieut., Signal Corps.
O. I. C. Photo. Section, S. C.

Plasticon Pictures

The following information was received from Mr. Leventhal:

Stereoscopic effect in motion pictures or still pictures depends on

the reception by each eye of a slightly different image, these two images having been produced by photographing the scene through two lenses 2⅝ inches apart (the average distance between the eyes).

Mr. Kelley's method consists of printing these two separate images on what is known as double coated film; that is, film that has emulsion on each side. One image being on one side and the other on the other, he dyes one red and the other green in the usual Prizma method. The film is then projected on an ordinary projector and viewed through special viewing glasses, in which one eye consists of a red gelatin and the other of a green. The eye of the observer, looking through the red gelatin, does not see the red image on the screen, but sees the green image as a black and white image. The other eye of the observer looking through the green gelatin, does not see the green image but sees the red as a black and white image. In this way, each eye receives the image it should receive, and the stereoscopic effect is obtained.

DISCUSSION

MR. MANHEIMER: Mr. Little seems to have covered very completely all recent development in the industry. However, there has recently been an installation for the production of stereoscopic pictures. This is called the "Televiewˮ and I am sure Mr. Hammond, the inventor, would be pleased to give a description of the apparatus.

MR. LITTLE: We made several attempts to obtain a description of this equipment but were unsuccessful. I should like to say that Mr. Mayer promised to furnish much more material but was prevented by illness. Much material has been promised which did not reach us.

REPORT OF PAPERS COMMITTEE

I REGRET that this report was not called for earlier in the session as I have some information which I should like to transmit to every member of the Society.

Your Committee on Papers has endeavored to obtain papers on as wide a range of subjects as possible. Many letters were written to members asking for suggestions as to subjects which they would like to have dealt with at the convention, but only a few replies were received. If the members are not satisfied with the type of program, the Committee would appreciate having criticism. Our viewpoint may not be the same as yours and the only way we can know what you want is for you to tell us. The Committee wishes to serve the Society, and it is only by co-operation and interchange of ideas and viewpoints that we can efficiently do this. This is your society and you should feel at liberty to ask your Papers Committee for papers on subjects in which you are particularly interested, and I should like to have every member feel free to do so. The Papers Committee is necessarily limited in number and while the members are fairly well scattered over the territory geographically they can not possibly be in touch with all of the developments in the field of motion picture engineering. Those of you who are actively engaged in motion picture work and are in touch with new developments can materially assist the Papers Committee by passing on to them information of interest.

I would like to say a word about the publication of the TRANSACTIONS. One of the chief causes of delay is the tardiness of members in correcting and returning discussions of papers and committee reports. The Society desires to have these discussions printed and those taking part in the discussions should have the privilege of correcting their contributions. You can do your part in assisting to get the TRANSACTIONS out on time by correcting and returning these discussions immediately upon receipt. The Papers Committee has been authorized to correct discussions in case they are not returned in the specified time limit. If you who have taken part in discussions permit us to do this, by not doing it yourself, do not be disappointed if the discussion as printed does not convey the meaning you intended. Very often it is a Chinese puzzle to figure out just what the man intended to say in his discussions.

I should like to make a few suggestions to those contributing papers. You can help your Papers Committee materially by having the manuscript, including illustrations and captions, ready for publication when presented. I should like to emphasize the importance of using illustrations with papers whenever possible. We are all

motion picture engineers and believe firmly in the virtues and usefulness of visual education. We talk it here at our convention and to other people outside, and I think we can materially improve our own convention by applying some of the same medicine. Information can be conveyed more rapidly by taking advantage of visual aids. Practically all of the papers presented to this Society can be made more intelligible by the use of lantern slides. I would therefore like to emphasize the advisability of having lantern slides whenever possible. Your Utilities Committee is always willing to provide the necessary projection equipment. The use of illustrations is of special importance in the description of apparatus and I should like to urge that all those preparing papers for presentation at the next convention make use of graphic methods for the conveyance of information.

In conclusion, I wish to request again that every member give such assistance as he can to the Papers Committee by sending in suggestions relative to the subjects he would like to hear dealt with at the convention and refer the committee to possible contributors.

DISCUSSION

MR. STORY: I should like to ask Mr. Jones what a reasonable time would be for the final publication of the TRANSACTIONS after the last paper is in.

MR. JONES: The Papers and Publications Committees in conference with our president discussed this matter recently, and I think our estimate was ten weeks as the minimum if everyone does his part at once, submitting his manuscript, correcting and returning his discussions within the specified time limit.

MR. DAVIDSON: I don't know whether this is practical—Mr. Jones does not think it is. If a man does not correct his paper in a reasonable time, is there any reason why it should not be left out and published in the following number of the TRANSACTIONS? It probably doesn't amount to half a dozen papers, but I know that the waiting for one or two papers has in the past held up the TRANSACTIONS for a long time. I think if you put this penalty on a man, we should get the TRANSACTIONS. I know this is a serious criticism of the TRANSACTIONS, and I think it is blamed on the Papers Committee. I wonder what the feeling of the Society would be on this.

DR. GAGE: Has it been the policy to send the stenographic notes of committee reports and discussions to the committee chairman? I think this should be done so that he may have an opportunity to edit it.

MR. JONES: The custom has been to send the discussions of the report to everyone participating in it and in the case of committee reports that have been given extemporaneously we have sent transcriptions of these to the chairman. In most cases the chairman of the committee has a written report prepared.

REPORT OF THEATRE COMMITTEE

By F. H. Richardson

THE WORK of your theatre committee is very far from easy. There is so much to do that it is difficult to determine where we should commence and what we should do first in order that our efforts return the greatest possible benefit to this society and to the industry at large.

It would seem that theatre auditorium lighting is perhaps deserving of attention in advance of anything else, because of the vast amount of injury worked, both upon the industry itself and upon theatre patrons, by faults therein.

We base the statement that such injury is worked upon the following:

Improper theatre auditorium lighting operates to set up an unnecessary strain upon the eyes of theatre patrons, which cannot fail to react not only to the injury of the eyes of this generation, but also to the eyesight of generations yet unborn. Not only is this true, but in addition, the discomfort attendant upon straining the eyes operates to very seriously detract from the enjoyment of theatre patrons, with the result that those so affected may not, and probably will not, "go to the movies" as often as they otherwise would. This, of course, has the effect of lowering the box office income of the industry, which is the only income it has.

That the foregoing has firm foundation in fact we believe every one of you will agree; we also think you will agree that it is ample justification for giving theatre auditorium lighting priority in consideration. Our real problem is how to so approach the subject that a maximum of benefit will be derived, and our efforts thus be made to yield the greatest possible return.

It would seem advisable to, first of all, make such analysis of the various points at issue as we may, since unless we have a reasonably clear idea of the nature of the problems we shall encounter, much effort will be wasted.

The problem of theatre auditorium lighting seems to separate itself into certain fairly well defined classes, or items, namely: (A) Lighting with relation to its effect upon morals. (B) Lighting with relation to its effect upon the eyes. (C) Lighting with relation to its effect upon the screen image, and the viewing of it.

Let us first examine into the matter of theatre lighting and its effect upon morals. This subject has received much discussion in newspapers, by professional fault finders, and by various local authorities and lawmakers, but up to this time, so far as we know, it has not been made the subject of any well defined rules by any body

of engineers competent to give the matter enlightened discussion, or to take authoritative action.

This Society has itself given the matter some consideration, but up to this time has taken no action looking to the standardization of theatre auditorium lighting. If the Society of Illuminating Engineers, of which body the Chairman of your committee is a member, has taken action defining what illumination intensity is necessary to prevent the possibility or probability of acts tending to immorality, we have been unable to locate the same, and we know of no other body in this country, other than our own, which might rightfully undertake to create or set up such standards.

In order to proceed intelligently it would seem that we must first define the thing under consideration. Your committee therefore offers for your consideration the following definition of acts tending toward immorality made possible by insufficient theatre auditorium lighting:

DEFINITION. *Acts tending toward immorality may be defined as such acts with relation to the opposite sex as would be considered improper in a fully illuminated auditorium.*

In order that acts tending toward immorality may be prevented, it is necessary that the auditorium be sufficiently well lighted that clear vision may be had for a reasonable distance. The question then resolves itself into the following: (A) What distance is it necessary, for the purpose in view, that there be clear vision in a motion picture theatre auditorium, when sufficient time has elapsed after entry to enable the eyes to adjust themselves to the comparatively low illumination intensity? (B) Exactly what is meant by "clear vision?"

Your committee submits the following for discussion and consideration:

As applied to the purpose under consideration the term "clear vision" shall be understood to mean the ability of a person of average sight to observe any act done openly, such as, for example, a man and woman in an improper attitude with relation to each other.

As to the distance it is necessary that theatre patrons be able to have clear vision in order that there be no probability of acts tending toward immorality, your committee submits the following for your consideration and discussion:

Motion Picture theatre auditoriums should (or shall) be so lighted that patrons may have clear vision for a distance of not less than ten feet in every direction.

Your committee believes that an illumination of sufficient intensity to enable clear vision for a radius of ten feet will serve every reasonable purpose of prevention, and satisfy every one except the professional fault finder; also that illumination of this intensity may be had, if rightly applied, without serious injury either to the picture, or its viewing by the audience.

CAUTION. Let it be clearly understood that both definition and distance is placed before the body merely for discussion, the hope of your committee being that the discussion will enable us to recommend some standard for adoption by this Society, to the end that

authorities and law makers be provided with a standard for their guidance.

Your committee respectfully suggests that when this body finally decides what distance it is necessary that there be clear vision, the Eastman Kodak Company be asked to conduct experiments to determine exactly what intensity of illumination must be provided in order to give that range of view to persons of average eyesight.

Our reasons for suggesting the Eastman Kodak Company is that it has every facility for the making of such experiments, and can have no possible commercial interest in the results; also the conclusions of the Eastman engineers may be accepted by this body as thoroughly reliable and conclusive.

The idea of your committee is to lay down a fixed rule that all parts of a theatre auditorium must be illuminated at a certain, fixed intensity, measured at a distance from the floor equal to the height of the seat backs, plus one foot, in order to satisfy all moral requirements.

Such a rule is, it seems to us, entirely practicable. Its adoption would, it seems to us, tend to standardize theatre auditorium illumination intensity, and the standardization of illumination intensity would make much more practicable the laying down of rules governing the methods of illumination.

EFFECT UPON THE EYES. From the viewpoint of its effect upon the eyes of the audience, and upon the picture upon the screen, auditorium lighting is almost wholly a matter of contrasts, thoug in passing it may be said that a too high illuminating value—an illuminating intensity which makes too many objects in the auditorium too clearly visible—has the effect of detracting from the picture by what may be termed involuntary distraction of the mind from the one object upon which it is concentrated because too many objects are in subconscious view.

Contrasts are, however, the one big thing in motion picture theatre lighting. This we make as a statement of fact. It is a matter which, up to the present time, has received altogether too little attention.

Eyestrain is brought about almost entirely by two things, namely: (A) An over-illuminated screen and (B) what is known as "Glare spots." Years ago a third very serious element entered, namely: "flicker" caused by the rotating shutter of the motion picture projector. This has, however, to all intents and purposes entirely disappeared, but even had it not, it is the purpose of this report to discuss theatre lighting only.

Considering first the item "glare spots," let us examine into exactly what constitutes a glare spot, carefully remembering that eyes vary widely in the matter of sensitiveness to glare, so that what is a glare spot to one may not be to another. This is important in that it points to the fact that we must consider only the effect of glare upon the average eye, and not be guided by the effect upon either those eyes which have little sensitiveness to glare, or by those which are supersensitive to it.

Scientific gentlemen have undertaken the establishment of a

rule that a spot of light of certain intensity in a motion picture theatre auditorium constitutes a glare spot.

Your committee finds itself unable to accept this as practicable, because of the fact that the general illumination strength, the quality (colors) of the illumination and the location of the spot with relation to sight lines all have an important bearing, and must be taken into consideration if we are to arrive at a correct result.

Of late there is some inclination to inject color into theatre auditorium illumination, and this will in itself very largely affect glare, or so it seems to us.

Considering white light alone, however, in a perfectly dark auditorium the flame of an ordinary tallow candle appears distinctly brilliant. One could scarcely look directly at it without discomfort. Place the same light source in bright sunlight, and it is but little more than visible. These two extremes vividly illustrate the effect of contrast. Between them are almost numberless graduations.

In a well-lighted auditorium the white sheet music on a piano, although in the direct sight line of a major portion of the audience, may not be an objectionable glare spot, except possibly to those of very sensitive eyes. In a dark auditorium the same spot of light would be highly objectionable to all except those with eyes having but slight sensitiveness to glare.

The term "glare spot," as applied to motion picture theatre auditoriums, has never, so far as we know, been given an intelligent definition. Your committee proposes the following with the suggestion that it be passed along to the nomenclature committee.

A glare spot is a concentrated spot of light within view of the audience, or some portion thereof, which is uncomfortable to the eyes of all, or to some of those within whose range of vision it falls while looking at the screen. By "uncomfortable" it is meant that the eyes wou d be more comfortable, or the view of the picture more satisfactory and comfortable were the spot of light removed.

Your committee holds this to be a reasonable and practical definition. If the spot of light be an annoyance to the eye, then it is a glare spot, no matter how low its power may be. The practical test to determine whether a spot of light constitutes a glare spot therefore is as follows:

Occupy any seat in the auditorium from which the suspected spot is within view when looking at the screen, while projection is in progress. UNDER NORMAL CONDITIONS OF AUDITORIUM LIGHTING. While looking constantly at the screen (NOT at the spot) have the suspected light extinguished. If the eye is more comfortable, or the picture looks better when the spot of light is removed, then the spot is a glare spot to the eyes of the person making the test, regardless of what its relative intensity may be. It then only remains to have several persons make the same experiment, so as to get the effect on the average eye.

WARNING: In making this test it is necessary that the person shall have been "watching the picture" for several minutes, at no time looking at anything but the picture on the screen.

Another, somewhat more crude way, of making the test is to watch the picture for several minutes, say two or three at least, and

then, still with the eyes fixed on the screen, bring some opaque object, such as a folded newspaper, up in such a way that the suspected glare spot is hidden from the eyes. The better way, however, is to have the light turned off and on two or three times, at say half minute intervals.

Remember that unless the eyes of the one making the test be sensitive to glare, the fact that the spot is not annoying to him is not proof that it is not to others. Have at least half a dozen persons make the test.

Not only are glare spots more or less objectionable by reason of their brilliancy as compared with the surrounding illumination, but it must also be remembered that location has its effect. A glare spot of given contrast vith surrounding illumination will be very much more objectionable when located vell within the line of direct vision than if so located that it is at a heavy angle with the direct sight line—line from eye to center of screen.

With relation to glare spots, your committee believes it will be good practice to first determine exactly what constitutes a glare spot to the average eye, both from directly in front—direct line of vision—and from various angles of view. This, it seems to us, might be done with at least considerable accuracy, once a standard for auditorium illumination intensity were set up. Until that is done the matter is more difficult.

Your committee respectfully suggests that the Eastman Kodak Company, or such other body as may be selected be requested to make the following tests: (A) Tests as to what constitutes an objectionable glare spot to the average eye, each one of not less than six persons to take part in the tests and communicate their findings without knowledge of the others, when viewed from directly in front, as the sheet music on an orchestra piano, in an auditorium which is perfectly dark, except for light reflected from the screen when a picture is being projected. The same test, increasing auditorium illumination by suitable tests until a maximum general illumination is had, with a report for each step, or test.

(B) The same tests, but with the glare spot located at various angles of view, up to the widest angle which will affect the eye of the spectator.

Our intent in this is to compile a table, or chart which may be used by theatre managers and projectionists for controlling theatre musicians' lights, and other lights which form objectionable glare spots. It is our intent to not only give to them the actual permissible light contrasts allo vable, in candle power, but also to give them a practical test, which any man of average intelligence may apply.

Insofar as has to do with the picture itself, auditorium lighting has several effects, as follows:

Any light striking the screen surface, other than light from the projection lens itself, tends to reduce the picture contrasts by very slightly adding to the brilliancy of the whites and reducing the purity of the blacks, causing them to appear as gray. The effect upon the whites is imperceptible to the eye, if the light be clear white, but the effect upon the blacks is perceptible in a diminution of contrast and a

general weakening of the picture as a whole. The general effect is to cause the picture to look "flat"—washed out.

Glare spots within view of the audience, aside from the eyestrain involved, have the effect of weakening the contrasts in the picture itself.

The eye itself is nothing more or less than a camera. There is a lens which transmits light to and focuses it upon a plate, or screen called the retina. This screen is covered with a multitude of very minute nerve cells. When light strikes these cells the effect is transmitted, through the optic nerve, to the visual center of the brain.

Probably the reason glare spots reduce the contrasts of the picture is because they affect the nerve cells exactly in the same way that stray light affects the picture on the screen, lowering the value of the blacks and causing the impression of gray to be transmitted to the brain. The greater the amount of light from the glare spot, or the more nearly the spot is in the line of vision, the greater the amount of stray, unfocused light will enter the eye and the greater the amount of damage done.

Scientific gentlemen have declared that an illumination brilliant enough to enable the reading of print readily is not injurious to the picture. This your committee questions. So much light striking the blacks of the picture cannot but cause the picture to look "faded." It will not and cannot "stand out" as it would with less light. This is partly because of the direct effect of the light upon the picture and partly because of the effect of so much unfocused light upon the eye.

The lighting of the front of the auditorium is of the utmost importance. Not only must there be no glare spots visible to the audience, but lights must be so arranged and shaded that no direct rays, and as few as possible reflected ones reach the screen. This is very well understood, but is seldom well applied in practice. It is no uncommon thing in a high class theatre where one would expect different things, to notice when, through some accident causing a sudden stoppage of the show, the lower half of the screen very well illuminated by light reflected from the music of a number of stands set directly, or nearly directly facing the screen.

This is unintelligent work. True the audience does not appreciate the damage done, but when the orchestra lights are turned off there is a very appreciable difference in the beauty of the screen image. We are told that the English have a way of placing an apron extending from a point at the lower edge of the screen out over the orchestra, thus preventing all reflected light from the sheet music reaching the screen. This would seem good practice.

Your theatre committee believes that the best possible way of overcoming the orchestra light nuisance would be to have the musicians seated on a platform which may be raised and lowered by hydraulic power. When orchestra numbers are "on," or tableaux which require orchestra accompaniment, the platform would be raised so that the musicians would be in full view of the audience. When the picture is on, the platform would be lowered until the entire orchestra would be hidden from view. It might even be

possible that the lowering of the platform would automatically bring an apron up and out to protect the screen.

Still another way would be to so arrange that when the picture is "on" an apron would be extended out over the orchestra, though this would, we think, be impractical with the orchestra located as high as at present.

These things are, you will understand, merely mentioned as subjects for thought. We would suggest that possible good might come if the President of this Society invite the organization of Architects to appoint a committee to confer with the Theatre Committee of this Society with regard to the possibilities of some such plan as has been suggested for raising and lowering the orchestra and shading the screen from orchestra music lights.

DISCUSSION

MR. L. A. JONES: Mr. Richardson states that he questions the possibility of illuminating the theatre so that a program can be read with ease, without injurying the picture quality. I have a very definite opinion on this subject because I have seen it done. If ordinary sized print is used on the program, a large auditorium may be lighted so that the program can be easily read without in any way interfering with the picture quality. In making this statement I refer to the quality of a black and white picture of average density. For a given amount of scattered light on the screen, the extent of the injury to quality will depend upon the density of the picture being shown. If a positive is extremely dense, so that the screen brightness is reduced to a low level, then less stray light will be permissible than in the case of a picture of average density. We have made exhaustive tests and by a statistical method have established a value for density in the average positive. With such a positive it is quite easy to light the theatre so that programs can be read without in any way interfering with the quality of the projected picture.

MR. RICHARDSON: You said in a large auditorium, but you must remember that the average theatre is not a large auditorium; that's what I'm talking about. Not long ago some one sent me an exhaustive series of tests and wanted me to give an opinion on hem. I wrote back "They are of no value, because they are made in a large theatre."

MR. L. A. JONES: We have made a large number of measurements (the results have been reported to this Society and are published in the Transactions) in a room about 20 x 50 feet with a projection screen placed directly on one of the end walls without any protection. This room was lighted so that a program could be read easily and no serious loss of quality could be detected. The test Mr. Richardson suggests was applied. Persons with long experience in judging picture quality were requested to express their opinion as to the effect on picture quality with the room illumination. They were seated in the room, the picture put on the screen, and the room lights alternately turned on and off. In no case did any one consider that the room light interfered with the quality of the projected picture and some expressed the opinion that the pictures were more pleasing and visually it was more comfortable with the room lights on.

MR. RICHARDSON: That doesn't defeat my argument. The argument of your Theatre Committee is to arrive at what we should have. What that is, I don't know. I merely question that. I didn't say it wasn't true. It may be that that illumination intensity is quite correct; that's what we want to find out.

MR. L. A. JONES: I merely stated that it has been done in some

theatres, and I am convinced that it can be done in any motion picture theatre.

In regard to glare, I think Mr. Richardson is entirely correct. A great deal of fundamental research has been done on the subject of the visual sensations and on the subject of what constitutes glare. I must confess that I believe in many cases the available data while entirely correct have not been interpreted in such a way as to be directly applicable to the problems mentioned by Mr. Richardson. I do not know under uncertain conditions just what surface brightness will produce surface discomfort or glare. If the adaptation level of the observer's eyes be known, it is quite possible to read from available data the surface brightness which will constitute glare spots. We also know something about the size of the bright area, its position in the visual field, and the resultant glare sensation. As I stated previously, a great deal of the fundamental work on this subject has been done, but more is needed to put it into shape for application to practical problems.

MR. RICHARDSON: Would it not be possible for your research laboratory to work it into a form in which it can be applied?

MR. L. A. JONES: Yes, but more experimental work must be done before the subject can be dealt with adequately. I should like to bring out one other point relative to the question of the amount of illumination permissible in a motion picture theatre. The following remarks are based on our experience in lighting the new Eastman Theatre in Rochester. The conditions there have been analysed very carefully, and we know very precisely the value of the existing illumination levels. The illumination system has a capacity such that we can put on a table plane (horizontal plane 30 inches from the floor) about twice as much illumination as is at the present time actually used. With these higher levels of illumination no injury to the quality of the projected picture can be detected. A great deal of objection, however, was expressed on account of the higher visibility of surrounding objects in the theatre, this resulting (in the opinion of many people) in undue distraction of the attention from the picture, and loss of the desired "atmosphere." The art director insisted on lowering the original levels and I do not mean to imply that I consider this procedure incorrect. I simply wish to suggest that there may be and probably are factors other than the stray light on the screen which limit the illumination levels that can be employed in motion picture theatres. In this theatre as it is illuminated at the present time, it is quite possible to recognize persons at a distance of 15 to 20 feet and to read the program with a fair degree of ease. The illumination levels existing on the horizontal plane vary from .03 to .1 ml.

MR. POWELL: I read over Mr. Jones' and Mr. Mott's paper on the lighting of the theatre, and it was my impression that the intensity finally adopted was considerably below .2 foot candles.

MR. L. A. JONES: Yes, it is about half of that value. Our recommendations called for an illumination on the table plane varying from .1 to .2 ml. This was tried but the art director considered the illumination much too high. As I stated before, not from the stand-

point of loss of picture quality, but on account of the too great visibility of persons and their surroundings.

MR. RICHARDSON: This so-called "atmosphere" is what I call "distraction of the mind."

MR. EGELER: The illumination in the auditorium and its effect on screen brightness do not necessarily bear a constant relation to each other, since the amount of light reaching the screen from sources other than from the projector is dependent on the method of auditorium illumination employed. As Mr. Jones has suggested, it is possible to provide a comparatively high intensity at the seats without materially affecting the quality of the picture; in other words, the fundamental consideration is to use lighting units so placed that a minimum of light from them strikes the screen, at least at angles from which it will be reflected into the observer's eyes. With sufficient data we could formulate a table showing the permissible amounts of extraneous light reaching the screen for various values of screen brightness, but the data will be confined to very low values of extraneous light since perceptible illumination of the dark portions of the picture image destroys the contrasts which really make the image a picture. For each type of auditorium lighting, there is, I believe, a relation between the illumination intensity at the seats and the screen brightness necessary for a desirable picture. However, since the usual lighting will be obtained from a variety of types of lighting units placed in a variety of positions, the relation between projected light and extraneous light at the screen would be the more useful. The use of high intensities of projected light to counteract the effects of extraneous light is to be avoided, since the resulting brightness will usually be so great as to cause glare for the patrons in the front of the auditorium.

MR. SUMMERS: We made some measurements a short time ago for one of the colleges using educational films where they have low intensity on the screen and wanted enough light for the students to make notes. With .1 foot candles they could do this, and there was no detriment to the light on the screen.

MR. DAVIDSON: I want to second what Mr. Summers has said. In handling portable machines I have found out that it seems dependent on the amount of stray light on the screen. I have found it easy to have sufficient illumination to take notes, if I was careful that no light fell on the screen.

There is another element entering into this, and that is the interest in your picture itself. You can see objects in your room and glare spots; if the picture is good—they don't mind. We have had experience in this with scratched pictures, but if it is Charlie Chaplin or something of sufficient interest it will get by. Take a film with half the defects but a fraction of the interest and everybody notices them. This, I think, applies strongly to Mr. Richardson's glare spot proposition. Your psychology is bad if you call the attention of your audience to them, they will be disagreeable. Here is the situation we found: We found in putting in a demonstration that if we called it a demonstration the audience noticed all the defects, but if we

told them it was only an entertainment, nobody noticed anything wrong. If you tell him about it, of course, he will be uncomfortable.

MR. RICHARDSON: I might say that I have sat in an auditorium and had tears run out of my eyes. Your psychology problem amounts to this: They were pleased with Charlie Chaplin because they wanted to see him, but if this subject had been unscratched how much better it would have been.

MR. DAVIDSON: Perhaps you are right but they had so little technical knowledge of the defects that they bought the projector and thus showed they considered the demonstration good.

MR. RICHARDSON: We are not going to tell the audience that the glare spot is there, but audiences having any idea of sensitivity will say that their eyes hurt.

MR. DAVIDSON: I question your method of testing for glare spots. I don't think it any better than using foot candle meter.

MR. RICHARDSON: How can they do it?

MR. DAVIDSON: Buy a candle meter and try it.

MR. RICHARDSON: Be as unconscious as you want to, but you can be hurt very badly without knowing it until afterwards. I can't agree at all with the argument.

MR. CAPSTAFF: If I may bring back the question of scattered light on the picture quality, it seems to me that the factor governing this is the lens flare from the projection lens. All projection lenses scatter light. This scattered light or lens flare lowers the quality of every picture projected. I doubt if the maximum contrast obtainable is more than 1.8 regardless of the actual contrast of the film itself. I should say that the permissible amount of scattered light falling on the screen from other sources would be about 5% of the flare from the projection lens.

Mr. Richardson has visited many thousands of theatres—it would be interesting to know which ones he considers most nearly perfect in regard to freedom from glare spots.

MR. RICHARDSON: That is an impossible question, I could not remember.

MR. CAPSTAFF: Could you tell us one in New York which you consider good? I believe you have been in the Eastman Theatre; does that strike you as being right?

MR. RICHARDSON: The orchestra lighting in the Eastman Theater was very bad; it may be improved now. I couldn't tell you now what theatres I have found satisfactory. In one auditorium in New York City the lighting is splendid, but the effect from the orchestra is so bad that the lower half of the picture is barely visible. There have been theatres, mighty few, though, with a well lighted orchestra.

MR. ROGERS: With regard to Mr. Richardson's paper, the screen may be illuminated so much that it causes much glare and consequently the illumination of the auditorium could be of greater intensity under these conditions.

MR. RICHARDSON: I mentioned this but did not go into it. "High screen illumination" in the report should, however, have been coupled with too low auditorium lighting. Screening from stray light

may be done, but where are we going to get benefit? This report should be referred to some one to go ahead with the work. There are certain definitions we wanted to have considered.

MR. CAMERON: I should like to ask if Mr. Richardson thinks it possible to overcome the reflected rays from the music stands by moving the orchestra up and down. I think we shall meet much opposition from the owners of theatres about this. The Earl Carroll Theatre in New York has this. They lower the stage every night to start off with to the position usual in other theatres and raise it with a spot light on the musicians. They do raise them but don't lower them.

Now, some of the theatres spend more on the orchestra than they do on the picture. In this case, it is necessary to convince the owners, such as Mr. Rothapfel, that he should put the orchestra in the cellar (laughter). Even if we do this, there is the question of the acoustics. Mr. Rothapfel, with whom I had the pleasure of working when he ran "The Four Horsemen" at the Commodore, ran the last reel of that picture no less than eleven times while he walked around that room, listening to the music first in one place and then in another, to be sure that the acoustics of the orchestra were all right. He wasn't worried so much about the screen result. I am afraid that this plan for the same reason would not be practicable.

I didn't see a theatre in England that had such an arrangement although I made quite an extended trip.

MR. RICHARDSON: I believe the general audience would approve of the acoustics if the average orchestra were lowered, but that is one of the matters to be taken up and talked over with the architects' organization. I believe that some modification of the plan can be worked out.

REPORT OF FILM PERFORATIONS COMMITTEE

AT the Rochester meeting of the Society a discussion arose concerning the shape of film perforations, it being suggested that the standard perforation at present in use suffered by reason of its sharp corners from which fractures usually originate, and that the film would probably show better wearing qualities if these sharp corners were eliminated.

Your committee has given the matter careful consideration, and in order to make comparative tests has had special sets of punches and dies made so that perforations could be compared as follows:

1. Bell & Howell standard perforations as now used;
2. Continental and standard perforation having round corners;
3. A modified Bell & Howell standard perforation with the corners rounded; and
4. A new perforation, rectangular in shape, and having round corners.

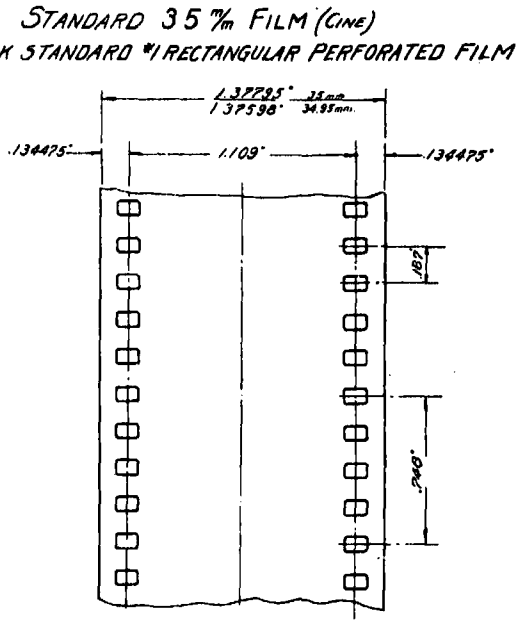
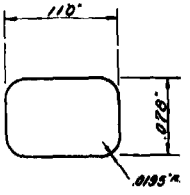


FIG. 1

This new figure 1 perforation has the same transverse gauge, pitch, and length as the Bell & Howell. The width of the perforation

is increased from .073 inches to .078 inches with a corner radius of .0195 inches.



TEN TIMES SIZE.

FIG. 2

Positive film made with these various perforations has been tested for length of life in the projecting machines and has also been used for printing negative film perforated with the standard Bell & Howell perforation, both new and old negative film being used. The tests bear out the anticipations aroused as result of the discussion at the Rochester meeting. On the average, the present standard perforation had the shortest life, the continental standard and the modified Bell & Howell standard with round corners were superior to it, while the new perforation, rectangular in shape with round corners, proved best of all. The tests on a great many different machines showed no difficulty to arise from the change in perforation, and its extra width, indeed, enables it to accommodate sprockets which give interference with the present style of perforation.

The adoption of this modified perforation will involve the use of a special machine for grinding the punches and pilot. Such a machine has been built and there appear to be no difficulties from a manufacturing point of view preventing the adoption of the new standard perforation.

Conclusion

As a result of the experiments and tests reported above, your committee recommends that the new rectangular perforation with the round corners shown in the drawing appended hereto be adopted for positive film in future.

Since this perforation might conceivably give trouble with some cameras now in use, and since the extra wearing qualities are of no advantage for negative film, it is recommended that the perforation of negative film be continued with the type of perforation used up to the present time.

THE COMMITTEE.

DISCUSSION

DR. STORY: The only fault that the Committee on Standards has been able to find with recommendations of the Committee on Film Perforations is that it seems unnecessary to have a different standard sprocket hole for the negative and positive film. It seems that mechanically the film will be more rugged with the new type of perforation and that it will fit all of the present machines, as Mr. Jones has shown. There is no reason for not adopting this perforation for positive film. It is only a question of whether the negative should also have this; that, we have not had time to consider.

MR. KELLEY: Are you recommending it for both negative and positive?

MR. J. G. JONES: We are going to adopt this standard for positive only.

MR. KELLEY: That will give us a great deal of trouble, because we register by the sprocket holes.

MR. J. G. JONES: The perforations in the old and new negative are of standard Bell & Howell dimensions at present. The length and pitch remain the same.

MR. KELLEY: It will give us a lot of trouble with register.

MR. J. G. JONES: The two films are registered by pilots fitting the perforations, are they not?

MR. KELLEY: We would not mind if the change was made throughout.

MR. J. G. JONES: If the negative were changed you would have to make it the same size—seventy-eight thousandths.

DR. STORY: I have understood that this punch is more expensive than the former one. If the camera manufacturers found they had to change to a new form of sprocket, would such a change increase the cost.

MR. J. G. JONES: They would not have to change the sprocket but the pilot pin would have to be increased in width.

MR. RICHARDSON: In practical projection one of the most destructive and frequent troubles is the cracking of sprocket holes. Have there been tests made to show relative actual straining different forms of sprocket holes will stand in relation to the corner of the sprocket hole?

MR. J. G. JONES: by the wear and tear method?

MR. RICHARDSON: No. I mean the pulling surface. What difference in strength would it make?

MR. J. G. JONES: It would make considerable difference.

MR. R. C. HUBBARD: Mr. Jones has given us no figures but simply said that one was better.

MR. J. G. JONES: Between 25% and 50% in the life of the film.

MR. R. C. HUBBARD: About the increased size of the hole: I don't understand why this should add to the life.

MR. J. G. JONES: It reduces the interference of the film on the sprockets. Some film has to be shrunk before it will run without interference on existing sprockets.

DR. STORY: I suggest that Mr. Jones draw a picture indicating the old perforation and the new.

(Drawing made on blackboard.)

MR. RICHARDSON: There is the point. Examined under the microscope in most cases the crack starts here (indicating). Doesn't it stand to reason that with this corner eliminated the tendency to crack has been reduced?

MR. DAVIDSON: What effect might this have on steadiness of picture?

MR. J. G. JONES: It is improved because it holds up longer.

MR. DAVIDSON: I think on a torn film this is true.

MR. J. G. JONES: On all sprocket teeth the edge of the film lands here (drawing); that gives the correct register. The film is being held back by the tension at the gate.

MR. RICHARDSON: That is impractical, because as soon as the tooth wears a little, the projector is no good until a new sprocket is put in.

MR. KELLEY: Do you mind making a drawing of the Bell & Howell perforation and where you recommend the increase?

MR. J. G. JONES: The modified one is like this (drawing) which makes this so small (indicating).

MR. JENKINS: I am heartily in favor of the new shape but confess I don't like to change the width. I think if we keep the present dimensions, we can eliminate the difficulties in printing machines where pilot pins are used to register positive and negative, and I cannot see where we gain anything for if the sprocket should change we must change the film again next year. I am certainly opposed to a change in the dimensions of the perforations although I am heartily in favor of the shape.

MR. J. G. JONES: I don't know of any machine registering by the width of the perforation.

MR. JENKINS: I know I used to do this, but I don't think I am allowed to press this point because we make very few printers, but I am opposed to changes in film standards any time. To change standards is worse than changing the clocks. I think that what should be changed is the sprocket but not the film, so we can make machines by the standard prints in the Transactions. I want the film left standard unless there is some more weighty argument apart from the sprockets not fitting the film. I don't like to see changed the standard used for so long.

MR. KELLEY: I should like to give a little illustration for the benefit of Mr. Jones. He states that the elimination of shrinkage in printing does not involve the width of the perforation. By the method we use, however, the width of the perforation is of vital importance and increasing the width of the positive perforation to eighty-seven thousandths and leaving the width of the negative per-

foration at its present value, eighty-three thousandths, would make it impossible for us to continue using our present method of registration. We could use the new perforation proposed by Bell & Howell but not the one proposed by the Committee.

DR. STORY: I should like to ask Mr. Kelley if he could use that new type of perforation if the width were made seventy-three thousandths in height instead of seventy-eight thousandths.

MR. KELLEY: I think so.

DR. GAGE: When the committee was examining into this, what reasons were there that it was thought there would be a benefit in increasing the sprocket hole from seventy-three to seventy-eight thousandths of an inch?

MR. J. G. JONES: Because of the interference with the sprocket teeth.

DR. GAGE: Why would it be necessary to increase the sprocket holes? Why not reduce the sprocket teeth? If the sprocket teeth were made correctly at first, I think there would be no need for the increase in size of the sprocket holes.

MR. J. G. JONES: It is very difficult to make the sprockets with the precise dimensions required and for the price obtained for them.

DR. STORY: As I recall, the Committee on Film Perforations was directed to determine that perforation which will run most successfully on the existing machines. That this perforation is not the same as the Society standard is most unfortunate in that it shows that the average sprocket has not the proper dimensions for the film for which the sprockets were all designed. If the standard should be changed is there any surety that in a short time the sprocket would not again be the wrong size?

MR. JENKINS: I admit all that, but why change the film? Why not the sprocket? That is my point.

MR. J. G. JONES: If they were changed, it would conform to that perforation.

MR. JENKINS: Surely, it would, and the fellows making sprockets would have it changed while all the film perforation remains one size. It seems so clear to me that I am surprised the recommendation has been made. It is sprocket teeth that give the trouble, not the film. That is the same result without changing the film; it would fit both positive and negative.

MR. RICHARDSON: Cracking at the corners of the perforations frequently occurs after the second run of the film, and I think in many cases this is due to excessive tension at the aperture of the projector, especially in cases where the film sprocket has been used too long and has suffered excessive wear. After the projector has been in use for some time, you will find that the teeth on the intermittent sprocket show excessive wear at the base, resulting in what we may term "under-cutting." Without rounded corners in the sprocket holes, the film suffers. If you do away with the fillet you must and will make the condition worse. I am not interested so much in the laboratory results as in the projection of the film afterwards, and this is the condition we have to contend with.

PRESIDENT PORTER: I think the obvious way to obtain a deci-

sion in this matter is to refer it to the Standards Committee and at a later session they can give us their report.

DR. GAGE: I think we have discussed this to the point where the members present can express an opinion, and I think it is the sense of those present that the report be printed as it is and that we recommend that the Committee on Film Perforations take into serious consideration the possibility of maintaining the outside dimensions at .110 and .073 (as in the present standard), the only change being that the corners are rounded. I think it should be further recommended that the Committee take into consideration the effect of narrowing down the sprocket teeth in the direction of the circumference of the circle in order to prevent the film riding on the teeth. This change in sprocket tooth dimension would take care of the troubles experienced with the present film and permit the new standard with rounded corners to retain the same perforation width.

REPORT OF LABORATORIES COMMITTEE

YOUR Committee regrets that no progress towards the standardization of laboratory practice can be presented in this report.

The matter of standardizing laboratory methods is one of great importance to the industry as a whole. In the various branches of work leading to the finished motion picture a high degree of technical skill is necessary and standardization is in effect, the laboratories being practically the only branch that work under rule-of-thumb methods; it is of course true that several of the finer laboratories are operating on strictly sound and scientific principles, but the majority work under conditions which are not conducive to uniformly good results. It necessarily follows that such laboratories are operating at reduced efficiency as to quality and out-put, and are also sustaining a wastage and expense which a good many laboratory executives look upon as an unavoidable evil of the business.

About a month ago your Chairman sent out a carefully worded letter to approximately fifty laboratories—the best in the country. The letter was not inquisitive; not seeking after any trade secrets, but merely to ascertain if co-operation would be forthcoming towards standardizing the basic operating principles of a finishing laboratory. The result was most disappointing, only two laboratories replied: Rothacker and Goldwyn. Both of them expressed sympathy with the scheme and willingness to co-operate. Your committee seeks the sanction of the Society to send out a questionnaire in the hope that some details of laboratory practice may be obtained in time for the fall convention report. A suggested outline of the questionnaire follows:

Equipment

Printing Machinery

What type used? (Step or Continuous?) Which preferred?

What speed in feet per minute?

What source of light?

What type of light changing device? (Automatic or semi-automatic?)

How many light changes?

What standard of notching negative? Which side and how far from splice?

What device if any for insuring contact between negative and positive at printing aperture, and what troubles with it?

Developing Machinery

Hand frame or automatic? If both, in what proportion?

What type of machine? (Tube, Deep tank, Flat tank?)

What capacity? What speed in feet per minute?

Approximately how much film immersed in developer?
What standards of temperature?
What drying rate and what air allowances?
What provision for bath circulation?

Splicing Apparatus

What type? (Freehand, Block, or Machine?)
What advantages or disadvantages?
What standard for width of splice?

Polishing and Waxing Machinery

What type and how much used?

Inspection Projectors

What type?
How many feet per minute for inspection?
What source of light?
How many foot-candles or lumens on examining screens?

Product

Average footage?
Proportions of Black and white, tinting, toning, and colored stock?
Average laboratory reprint?
Standards of density?
Classification of customer's complaints and demands?
Laboratory complaints and comments about customers?

Your committee from close contact with the laboratory situation realize how difficult it is to interest the laboratory operators in matters of standardization, almost every laboratory seems to have its own pet formulae and methods, and do not seem to realize that the cut-and-try and print-it-over laboratory will not live long against the automatic machine laboratory or the hand laboratory under proper technical control.

Laboratory Practice at Present

I. *Development of negative:* There has been little change in the past year or so in methods. All negatives are developed on wooden racks by hand operation. Developing agents and formulae are as varied as the colors in David's coat. The most popular are Metol-Hydro, and Pyro.

II. *Preparation of Negative for Printing:* There has been a tendency toward larger rolls due to the introduction of Developing Machines. Splicing has been greatly improved due to the introduction of very accurate splicing machines. Notching for scene changes varies with each type of printing machine. (This is a matter which needs standardizing.)

III. *Printing Machines:* Experimental work has been going on to improve Step Printers but has not reached a consummation. We might say that there is being tested out at the present time in New York a new type of Rapid step printer, which is put out by a well known Chicago concern. We should have a definite report on the performance of the same by the fall convention.

Continuous printers have reached a very refined state, and

when kept in a perfect mechanical condition will print from a new negative at a faster speed and with very good results.

The need today is a machine to print in one thousand foot rolls, with an unlimited number of light changes, and which is as nearly fool-proof as possible.

Also source of light should be improved. Could a lamp be devised which would give a light in which the actinic value would not vary more than ten per cent during the life of the lamp?

IV. *Developing (Positive):* There have been very great changes in the past year or so. Approximately 60% of positive is being developed by processing machine. We find machines of many types. In many cases each laboratory having made their own. This has been induced by the necessity of reducing laboratory costs. Sad to state some of these machines have been designed and built without the requisite mechanical knowledge, and best film engineering practice. However, the start is in the right direction. This is a field of which this society should take cognizance.

The questions of time film is immersed in developer, temperature of solutions, time and air conditions for drying have a very definite relation to quality of products and life of film.

We might state that machines may be classified as,

Tube Straight Line Machine
Deep Tank Straight Line Machine
Deep Tank Spiral Line Machine
Flat Tank Spiral Line Machine

V. *Tinting and Toning:* Tinting has been practically eliminated due to the introduction of colored stock.

Toning is being done much the same and with the same old troubles. Some toning has been done by machine but with what success we are unable to state.

VI. *Splicing:* A great many splices have been eliminated due to the introduction of developing machines. Splices generally are being made more accurately and machinery has been much improved.

VII. *Waxing:* Waxing machines have been introduced into a great many laboratories. What the result to life of film has been, only the Exchange man knows.

VIII. *Inspection Projectors:* The precision Machine Company make a special laboratory Inspection Projector. Whether any other manufacturers put out such a machine we cannot say. However the standard of quantity of light on the inspection screen should be definitely recommended by this Society. We offer a standard of ten Lumen's or foot candles on screens not less than 3 feet x 4 feet or more than 6 feet x 8 feet.

Your committee believes that the activities of the Laboratories Committee and the Films and Emulsions Committee overlap, and that for the future the activities of these two committees should be carefully detailed. At the present time the Films and Emulsions Committee is dealing with several matters which properly belong to the Laboratories Committee, particularly automatic machine development, and some of the things which have been suggested for the Laboratories Committee more rightfully belong to the Films and

Emulsions Committee. The matter of standardizing laboratory methods is unquestionably an important one and it is hoped that this report may arouse the interest of progressive laboratory men and bring forth the hearty co-operation which is desired.

(Signed) ALFRED B. HITCHINS,
Chairman.

DISCUSSION

MR. CRABTREE: I think it is desirable to stipulate more precisely what matters each committee should deal with. I think the Laboratories Committee could handle the work of the Emulsion Committee. There are certainly not enough new developments in connection with motion picture emulsions to justify a special committee for the purpose.

MR. DOOLITTLE: I understand Mr. Jones to say that a standard illumination of 10 foot candles on the screen is suggested.

MR. L. A. JONES: Yes, that is correct. I should like to call attention to the recommendation of 10 foot candles as standard screen illumination. The report, of course, only suggests that that be adopted. It seems to me that the thing to be specified is screen brightness, which includes both illumination and screen surface reflecting power. The foot candle is the unit of illumination and if it is desired to specify brightness another unit should be used, such as the millilambert or *apparent* foot candles. We have found from a good many measurements in some of the larger and better equipped theatres that the screen brightness with the machine running and no film in position averages around 7.0 apparent foot candles, which is almost numerically equivalent to the value expressed in millilamberts.

MR. RICHARDSON: In that connection, how can you standardize screen illumination until you have standardized auditorium illumination? The screen illumination that is bright in a dark theatre may be very poor in a well lighted one. Those are matters of contrast, and you must first standardize the auditorium brilliancy, it seems to me.

MR. PALMER: As I understand the paper, it was meant to apply to screen illumination in a film inspection room, which is always dark, and it could be standardized in a room of this kind without paying attention to the room lighting.

MR. H. C. HUBBARD: In making the recommendation I had in mind that a great many laboratories have their examining rooms with different amounts of light on the screen, and naturally the product will get out with different grades of density, because that is where the laboratory decides whether the film is correct or not, and the suggestion of 10 lumens was only made from my own experience. I believe it is higher than most theatres, but I believe this is necessary because the screen is smaller—why, I don't know.

MR. L. A. JONES: I think Mr. Richardson's point was well taken, because if we standardize the screen brightness in the screening room, the value adopted should be one which will give the same appearance to the picture as when run in the theatre, and that depends on the theatre illumination. I do not mean this should not go in the report, but it should receive further considerations before it is recommended by the Society.

REPORT OF COMMITTEE ON STANDARDS
May, 1923

THE Committee on Standards presented certain recommendations to the Society at its last meeting. Of these it was voted the following be brought up for second action at this convention.

Dimensional Standards

Frame Line

Standard Film—The frame line shall be half way between two successive perforations on each side of the film.

Safety Standard Film—The frame line shall pass through the center of a perforation on each side of the film.

Lantern Slide Mat opening —Three (3) inches (76.20mm.) wide by two and one quarter (2¼) inches (57.15mm.) high.

Recommended Practice

Projection Lens Focal Length—Tolerance not to exceed one per cent of that indicated.

Projection Lens Mounting—Should be such that light from all parts of the aperture shall have an uninterrupted path to the entire surface of the lens.

Thumb-Mark —The thumb-mark on a lantern slide should be located in the lower left-hand corner next the reader, when the slide is held so it can be read normally against the light.

At present the standards of the Society include dimensions of the so-called "Motion Picture Aperture." The Committee has recommended that this be called "Motion Picture Projector Aperture" to distinguish it from the apertures of cameras and printing machines. This suggestion was accepted tentatively at the last meeting, and is now presented for second action.

The matter of film perforation has been discussed during the present session in connection with the report of the Committee on Film Perforations, and been referred back to that committee for further consideration.

There are three items still before the Committee.

(1) Core diameter for raw negative stock.
(2) Dimensions of the apertures of cameras and printers.
(3) Radius of aperture corners.

Opinion on the first of these seems so varied as to allow little hope of any recommendation by the Committee. A general discussion by the Society of these three subjects would be of great assistance to the Committee in its future considerations.

W. E. STORY, JR.,
Chairman.

SUMMARY

The following standards, having been before the Society for a period of six months, were considered at this session and officially adopted by action of the Society:

1. Frame Line—Standard Film.
2. Frame Line—Safety Standard Film.
3. Lantern Slide Mat Opening.
4. Projection Lens Focal Length.
5. Thumb Mark.

"Standard dimensions for motion picture aperture" were offered by the Standards Committee. It was pointed out by Dr. Story, Chairman of the Committee, that it is desirable to specify that these dimensions are intended to apply to the motion picture *projector* aperture, since the dimensions of the camera aperture and printing machine aperture may be different. This excited considerable discussion and by motion of the Society the subject of standard dimensions for all apertures was referred back to the Committee for further consideration.

DISCUSSION

Frame Line—Standard Film:

(No discussion).

Frame Line—Safety Standard Film:

(No discussion).

Frame Line—Lantern Slide Mat Opening:

MR. RICHARDSON: That, I believe, is the same proportion as the motion picture frame, is it not?

DR. STORY: I don't know; I haven't figured it out.

MR. JENKINS: I think Mr. Richardson is right. My recollection is that a committee once figured it out as a ratio of 3 to 4, so if Dr. Story quoted it from a previous report, he is right.

DR. STORY: The dimensions appearing in this standard have been adopted already. It has been brought up again only because the wording was changed slightly and the word "millimeter" added.

MR. RICHARDSON: Unless a stereopticon picture fits the frame it is not right, and I think we must be sure about this.

MR. DOOLITTLE: The two and a quarter by three makes a ratio of 3 to 4.

MR. NIXON: This definition, of course, has in mind the motion picture screen, but I think we should take into consideration that the makers of lantern slides have used two and three-quarters by three, and all tables are figured on this basis.

MR. JENKINS: That is just the reason that we are trying to make a standard lantern slide opening. The lantern slide will then fit the motion picture screen of standard proportions.

MR. NIXON: I understand that but raised the point because you will find that the manufacturers of lantern slides, the Keystone View Company and others, allow cutting off in height, something not altogether desirable in educational pictures.

MR. RICHARDSON: I don't think this an unsurmountable objection. They can make it so that they will include all necessary things and still conform to the motion picture proportions.

Projection Lens Focal Length:

DR. STORY: Some indirect reports from lens makers indicate that this is an almost impossible condition to meet in practice, but officially no information has been secured that would lead us to the omission of this item.

DR. KELLNER: The definition is correct. Projection lenses have been made for several years in accordance with this tolerance.

Projection Lens Mounting:

(No discussion.)

Thumb Mark:

(No discussion.)

Motion Picture Aperture: Standard Film
Motion Picture Aperture: Safety Standard Film

DR. STORY: The Committee recommends changing the above title to "Motion Picture Projector Aperture." There are three motion picture apertures recognized by the Industry—the aperture in the camera, that in the printing machine, and that in the projector. The Incorporated Association of Kinematograph Manufacturers has standardized each of these; the camera having the smallest and the printing machine the largest in order that the screen picture shall have a black border projected with it, as it were. If our Society thinks the advantage gained is not worth the adoption of dimensions for all three of these apertures, it would at any rate seem that the one standardized should be specified.

It is claimed that if such a black border is projected with the picture, any jump of the picture is less noticeable on the screen.

In the camera the English use the smallest of the three apertures, and when they print they use the largest, which makes a black border around each picture on the positive film. The projector aperture being intermediate in size allows part of the black border to be projected. The Committee on Standards would appreciate any suggestions the Society has in this regard.

MR. R. C. HUBBARD: Doesn't American standard do the same?

DR. STORY: We have adopted only one motion picture aperture size and have not specified until the present meeting which one it is to be.

MR. RICHARDSON: The black border would have this advantage; A certain amount of dust gathers, with the result that at present we see projected with a picture what looks like brickbats around the edges of the picture although they are really smaller than the head of a pin. It has this disadvantage, however: Some years ago, before there was a Society of Motion Picture Engineers, I started a movement to put a black border around a picture for two reasons: First, that the pictures should overlap an inch or two so that any movement in the picture as a whole would not be visible to the audience; second, to cause the picture to "stand out" better. The present plan, I think, would not be satisfactory. It would prevent dust on the aperture edges from showing on the screen but would make the movement of the picture as a whole more visible. However, projectors are so improved that in the good theatres there is very little movement of the picture on the screen. In theatres where worn mechanism are used, the effect is very visible.

DR. STORY: There would be movement of the picture with respect to the border of the screen, but this method makes the outside of the projected picture black, so that there are no stationary lights near it to make the motion noticeable.

MR. RICHARDSON: With the black edge projected, it will move on the white.

DR. STORY: That is true, but the question is whether the black edge should move as in the English recommendation or whether some parts of the picture should disappear and appear as they go in and out of the black border, as in our practice.

MR. RICHARDSON: That is something I should not like either to approve or condemn until I had considered it. I am only bringing up the points for your consideration.

DR. STORY: One other possible objection is in the case of talking movies; if the edge of the film is ever needed for the photographic record of the sound.

MR. CRABTREE: When the aperture is distorted to correct for non-alignment of the projector and the screen, the black border on the film would destroy this effect.

MR. THEISS: I know from personal experience seven or eight years ago that the aperture of the cameras was one thirty-second of an inch smaller than was at that time considered standard.

DR. STORY: What was the aperture of the printing machine?

MR. THEISS: One thirty-second of an inch larger than the projector.

MR. JENKINS: The point Dr. Story has not brought out as clearly as he might is that the movement is not observed because the eye does not fix on it, and I heartily approve the suggestion. On the other hand, it is easier to maintain the picture in frame with a black border with a frame line. Perhaps some of us remember how pictures were projected in the beginning with no fixed plan—some had a white frame line and others none at all which was visible, but the black frame line is without doubt very desirable. Whether it should be black on the sides is of less importance, but a frame line moves with the picture, so that the eye, having nothing left to focus on, sees less movement than it would otherwise.

DR. STORY: One difficulty is that our projection aperture differs from the English, so we cannot adopt their apertures for the camera or the printing machine. The committee can make no recommendation at present.

PRESIDENT PORTER: What action do you suggest?

DR. STORY: I should like an expression from the Society as to whether it is worth while for the committee to make a recommendation of definite dimensions. It means a good deal of work, but if the Society approves, we shall try to recommend definite standard dimensions for the camera and printing machine apertures.

MR. CAPSTAFF: I suggest that if anything is done to standardize these apertures, that it be made international.

DR. STORY: Unfortunately, we have just adopted a standard different from the English one. This is one of the standards which the Society adopted before the English adopted theirs. I am sure it would be difficult to switch to the English standard for projection machines.

MR. JENKINS: Maybe the doctor will tell us which is the wider of the two.

DR. STORY: The English projectors are .950 inch as compared to our .906 inch, and the height of the English is .725 inch compared to our .6795 inch. Their printer has an aperture width of one inch; in other words, they allow a twentieth of an inch more in the printer than in the projector, whereas the camera is .925 inch; that is, it is one-fortieth of an inch less than the projector width.

MR. RICHARDSON: If you entertain this motion, I think the Standards Committee should be requested to confer with the Society in England and other countries and see if anything can be done toward an international standard.

DR. STORY: I confess I don't think we will get anything out of that, nor do I think we can persuade our manufacturers to change their size. The English societies have done far more in the way of publishing their standards than we have.

PRESIDENT PORTER: It seems to me, gentlemen, that the point is whether we do or do not instruct our Standards Committee to propose standard dimensions for apertures. If any one feels we should do it, will they put it as a motion?

DR. STORY: That is, with a black border, because there is no use in standardizing camera aperture unless it is with a black border projected. Is it the feeling of the Society that we recommend the projection of a black border?

MR. R. C. HUBBARD: I make a motion that the Standards Committee be instructed to prepare a standard.

(The motion was made and duly seconded.)

MR. RICHARDSON: I certainly should not like to see the border approved without more extended consideration. I don't know what the effect of the black border would be. What is the necessity for the black border?

DR. STORY: May I read what is said about this in the publication of the English Society?

(Section read from publication.)

MR. THEISS: I don't think it is clear to all that the black border now on the screen still remains.

MR. RICHARDSON: It seems to me that it is the same effect as projecting the unbordered picture. It doesn't seem to be that the effect would be good, though I may be in error.

MR. COOK: In the early days of the safety standard in order to secure registration of the picture always on the screen, we used this device with the result that we got the dark border always in the projected picture. There are two objections to it not apparent unless you have experienced them. If you do any toning, you will get the same effect in the border that you get in the blacks or shadows in the picture, and another fact is that every projectionist tries to get his picture to fill his already black bordered screen, and so he takes the machine back and the picture goes into the black border of the screen. There is no question that if your border moves with the picture there is not the same effect as if the picture is bordered by the screen. The average projectionist will lose his picture border in the screen border and it results in the magnification of a reduced picture. Those are merely practical applications found in the 28 mm. We abandoned the bordered picture later and took the aperture mask itself forming a part of the printed image as with 35 mm. film.

MR. RICHARDSON: Not only that, but I will wager that if you put that on at the Capitol without Mr. Rothapfel's knowledge, he would say plenty to the projectionist.

PRESIDENT PORTER: There is a motion before the house that

the Standards Committee be instructed to prepare definition and dimensions for the camera projector aperture and the printing machine aperture including the black border. I put the motion therefore. Will those in favor kindly stand?

MR. JENKINS: May I ask, am I voting on instruction on a black border or to have the matter brought up at the next meeting?

PRESIDENT PORTER: It must come before the next meeting.

(According to the standing members, the motion was carried.)

MR. RICHARDSON: I move that the Standards Committee be instructed to prepare this proposition both including the black border and without it, so we may adopt the one we then think best.

(The motion was duly passed.)

DR. STORY: The Standards Committee was directed to submit suggestions on the projector aperture. This depends on the question just discussed and will be brought up with it later, also, on the size of the core around which all negative stock is wrapped. The opinion on the last of these is so varied that there seems to be little hope of arriving at a recommendation. If any one is interested, we shall be very glad to hear from him. It has been before the Committee for a year, and every person seems to have a different idea. Instructions from the Society are requested on this point.

MR. PALMER: This question has some of the same phases as those discussed this morning on films and sprocket pitch. The Bell & Howell Company make a camera with a certain sized spool and the Eastman Kodak Company makes a roll of film which will not fit the spool, and it is a question which one will give in—whether the camera manufacturers give in or the Eastman Kodak Company—and I think we should hear from some of the people here on that question.

MR. J. G. JONES: It seems to me that the Bell & Howell Company should have arranged for a core which would go in place of the core in the film. It has been standard practice throughout in the use of one inch cores.

MR. JENKINS: It goes back to the reason for the adoption of a larger core. I should be happy to see the two inch core adopted for both. The reason is that the slipping pulley or compensating means between the sprocket and film rewind has less change of tension from beginning to end, which I think is the reason the camera men have begun with a larger spool. The tension on the rewind at the beginning is always too much if we have enough to wind up 300 or 400 feet at the end. Beginning with the larger core, the tension can be greater with a larger core. That is why, Mr. Jones, we hope you will wind all the film on a two inch core. Am I right?

(Voices of "Yes, sir!")

MR. THEISS: Are negatives being made in thousand foot lengths?

MR. J. G. JONES: I am not sure. I refer to the positive film.

MR. THEISS: I think it would be well to have a larger core, but if enlarged to 2 inches, a 400 foot roll of film would not fit many of the camera magazines.

DR. STORY: You mean that if you wound 400 feet on a two inch

spool it would not go in the magazine of some cameras made. That is perhaps the strongest argument against the two inch core.

MR. PALMER: I can only say for the Bell & Howell camera that it will go in, and the film in the exposed magazine is wound on the one and seven-eighths inch core. It must go in or the film could not be wound in the exposed magazine.

DR. STORY: The Committee has no recommendation to make relative to this subject. We have had it under consideration for a year and cannot come to a decision.

PRESIDENT PORTER: Perhaps it would be best to relieve the committee of this.

MR. JENKINS: I don't like this. I think it would continue to pester us until it is settled. I move that the Standards Committee recommend to the manufacturers a two inch instead of a one inch core.

DR. STORY: We have never had a recommendation for a two inch; it is one and seven eighths.

MR. JENKINS: That is satisfactory.

(The motion was duly seconded.)

MR. J. G. JONES: Why one and seven-eighths? Some one else will have one and fifteen nineteenths, and so forth, and the Kodak Company has expensive apparatus for getting out the film now.

MR. R. L. HUBBARD: I have noticed many cameramen lately have provided themselves with spools which have springs on them and which are the same size as film spools. These work very satisfactorily and do away with the necessity of rewinding or pulling film out of center of roll.

MR. THEISS: I think that a recommendation of this kind deserves more consideration because film manufacturers are stocked up with cans taking 400 foot lengths, and it is a bigger proposition than is being given consideration at the present time.

MR. J. G. JONES: The last operation on the film is perforating. The Bell & Howell Company adopted the one inch core on their perforators and then used a larger core for the camera. They know the roll of film must fit on the camera core, so I should think it would be up to them to make the change.

MR. RICHARDSON: I do know this: that up to the formation of this society the industry had no standards for anything which condition created a great deal of confusion. I don't think this society should consider what the manufacturer now has. We are not building for to-day alone. Perhaps the man with expensive equipment will change it to-morrow anyway. I think we should adopt that which is right and plan for the future.

DR. STORY: It seems to me very dangerous to adopt standards in that way. If our standards mean anything, they must have a backing in practice and if you adopt a standard behind which there is no practice we have no surety that the standard will ever have a following and without a following a standard means nothing. I think a certain amount of practice is generally necessary before the Society is justified in adopting a standard.

MR. DAVIDSON: I heartily agree with this. Our policy should be to adopt the best practice, otherwise the standards of the Com-

mittee will be considered a joke. We don't want this, and I think we should examine this until the best practice is arrived at.

MR. RICHARDSON: You must remember that I went into motion picture projection writing about fifteen years ago, when there were no standards. After study I set up certain standards. They weren't used at first, but now the manufacturers are using them, although they thought me crazy at the time. If we know a thing is right, we should stand for it. If we adopt what is right, they will take off their hats to us in the end. I don't want to say any more, but I do hold that this society must consider only what is the best practice.

MR. DAVIDSON: I think the fact that the Committee has taken a year to study this and cannot establish anything shows that at the present time we have not sufficient information to decide on it.

MR. J. G. JONES: It seems to me that anything in use for fifteen or eighteen years becomes standard.

MR. JENKINS: For fifteen years we have been tearing off the inside of the film and throwing it away. That is our practical answer.

MR. J. G. JONES: Then, the tearing of the end of the film has become standard practice (Laughter.)

MR. R. C. HUBBARD: Tearing off the film is unnecessary.

PRESIDENT PORTER: Gentlemen, there is a motion before the house that the Standards Committee recommended a one and seven-eighths inch core. Do you wish to discuss it further?

(There being no further word, the motion was lost.)

REPORT BY COMMITTEE ON RECIPROCAL RELATIONS

THE REPORT this year will be somewhat brief. Your chairman has begun a compilation of names of national and international magazines and periodicals dealing with the Motion Picture Industry in order that advertisers and readers may secure in an easy manner a complete list of such publications.

The task seemed an easy one at first, but upon investigation it developed many difficulties. Magazines listed as dealing with the Picture Field did not always do so, many were out of existence and others listed under wrong addresses.

In order that the value of such a list would be unquestioned your chairman has therefore sent for all the magazines about which he has received information and these are in many cases slow in arriving. Rather than to submit a partial list for publication in the present transaction he prefers to wait until the next meeting when he promises a complete list.

In the meantime, he will appreciate any advice from members of the Society as to foreign journals devoted to the Motion Picture Industry and will also be glad to hear from the publishers of such Journals first hand.

Your Chairman again calls to your attention the need of a Library devoted to The Cinema Art. Such a Library should be located in New York City and form part of a larger Library where facilities for reading and research could be obtained.

It is possible that arrangements could be made and it is assumed that a request for donations of privately owned books and clippings would find a ready response.

Very truly yours,

A. F. VICTOR.