

## **SYMPOSIUM ON NEW MOTION PICTURE APPARATUS**

**P**RESIDENT COOK: This morning's symposium on equipment is somewhat of an innovation. It has been under contemplation by the Society for some time, and this is the first convention at which it has been in operation. Upon the success of this feature and its acceptability to the Society will depend whether we continue something of the same sort. I think from the interest shown this morning, this particular occasion has been appreciated and enjoyed by the Society.

It must be distinctly borne in mind that the presentation of any equipment of a proprietary nature at these meetings does not involve the Society's approval or recommendation or even opinion upon such equipment. The Society states in its "Transactions" that it is not responsible for the views of the contributors and never endorses any equipment, process, or description. I am mentioning this particularly because it has been brought to the attention of the Executive that certain approval of a publication by the Society has been claimed or inferred, and I wish to take this occasion to distinctly and emphatically state that no official approval is ever accorded by the Society to anything of the sort. The Society accepts written contributions to the industry and gives them publicity, but does not endorse them. Any such endorsement is entirely erroneous and without the Society's sanction or approval.

### **REFLECTOR ARC DISSOLVING STEREOPTICAN**

**J. H. KURLANDER\***

In anticipation of the pronounced trend toward theater projection apparatus employing moderate currents a dissolving stereoptican lantern has been constructed on the reflector arc principle which uses but a single source of light for supplying both optical systems. The idea of supplying multiple optical systems with light from one source is by no means new, but the particular modification of the principle as used in this device presents new angles which should prove of interest.

\* Brenkert Light Projection Co., Detroit Mich.

As illustrated by Fig. 1, a parabolic mirror, 11 inches in diameter and of 4 inches focal length, is used for the primary interception of light from an electric arc formed between carbon electrodes disposed in the usual horizontal manner.

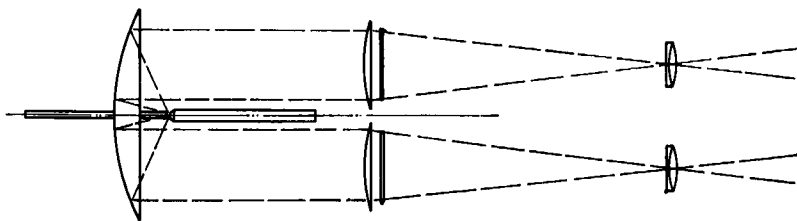


FIG. 1.

The position of the arc crater relative to the mirror is such that a slightly convergent beam issues from the latter to be intercepted by the condenser lenses and projected, as two separate beams of smaller diameter through the slides and into the projection lenses.



FIG. 2. The Dissolving Arc Stereoptican.

The object of converging the primary beam is to make the axes of the two secondary systems meet at the central point of the screen in order to effect the close matching of images necessary to successive slide projection. The mechanical

construction necessary to incorporate these various elements in the single machine is shown by Fig. 2.

A departure from the construction commonly employed in stereopticon lanterns is found in the positioning of the two optical systems side by side rather than one above the other. There is little choice in this respect because the vertical heat stream from the arc seriously affects the steadiness of the screen illumination when the path of the projected light is through the convection currents so established.

This placement of the slide carriers on the same level is really a decided advantage, since the slides are more accessible, there being no obstructions to interfere with their rapid exchange in the carriers.

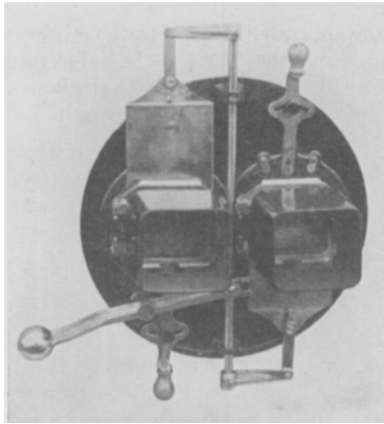


FIG. 3. The Front Plate.

The front plate of the lamphouse is constructed in such a manner that all principal adjustments required to match accurately both screen images are performed at this location rather than at the projection lenses. All working parts on the front plate, including the slide carriers and the curtain change-over shutters form a complete assembly which is rotatably mounted on the front plate (See Fig. 3). Rotation of this assembly permits the slide carrier openings to be adjusted for height.

Each slide carrier assembly in turn is rotatably mounted on the main assembly base, which allows the separate carriers to be corrected for skew.

In general, the arc burner used in this machine is of the conventional type with certain modifications to adapt it to the work at hand. The carbon holders have a travel long enough to accommodate a full trim of 16 inches. An arc control for automatic feeding of the carbons forms a logical part of the equipment, so that this unit represents a distinct step in the direction of easing the burden of the projectionist who gradually is being forced to assume a multitude of duties in the projection room.

It is interesting to note that the size of port opening required for this projector is considerably smaller than hitherto used. In fact, one measuring 8 inches x 10 inches is more than sufficient as may be seen from an inspection of Fig. 4.

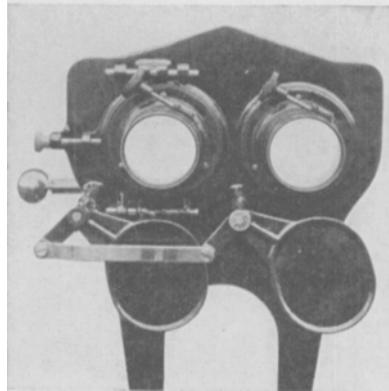


FIG. 4. Shutters and Mounts for Objectives.

Ample leeway has been allowed for in the matter of matching the screen images so that the projection lenses which can be used range from 10 inches focal length up to 36 inches.

## DUPLEX OPTICAL PRINTERS

A. B. HITCHINS\*

The Duplex optical and reduction printer is the result of an insistent demand for improved and more flexible printing methods. Contact printers, it is true, have a very definite place and function in the laboratory and for certain classes of work, such as the production of large editions, calling only for straight printing, they cannot be excelled. In recent years two things mainly have been responsible for the development of the optical printer. The first is in the standard or professional field, where standard 35 mm. negative is reproduced or optically printed on positive of the same width; the second is in the semi-professional field where standard width negative is optically reduced and printed on narrow width positive, which may be 28 mm., 16 mm., or 9 mm., although for practical purposes 16 mm. may be considered the universal and approved sub-standard width. Another application of optical printers that is quite important is the possibility of enlarging sub-standard negative to standard 35 mm. width. Directly we enter the field of optical printing, we open up a practically unlimited range of printing possibilities; every phase of trick and effect photography can be readily accomplished, limited only by the ingenuity of the operator. An optical printer skillfully used is capable of producing more photographic effects than a motion picture camera. To cover properly the full range of this work, two distinct types of Duplex optical printers are made.

\* Duplex Motion Picture Industries Inc., Long Island City, N.Y.

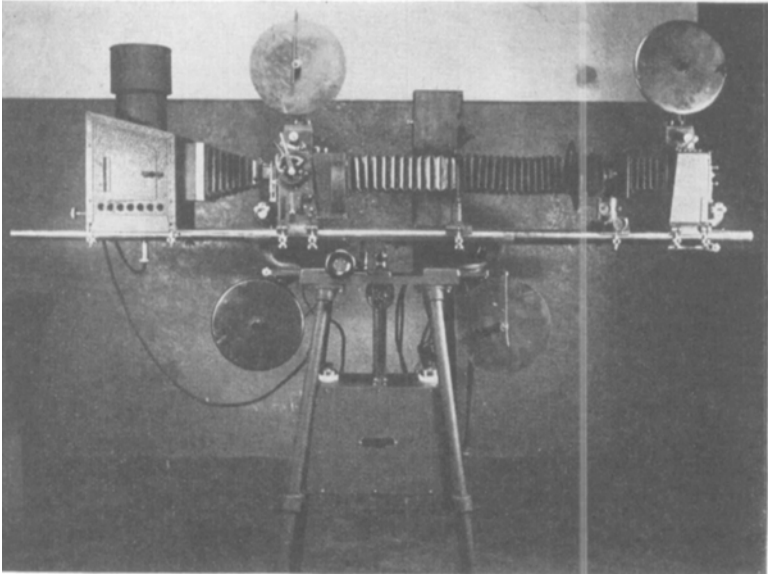


FIG. 1. Duplex Optical Printer Type A.

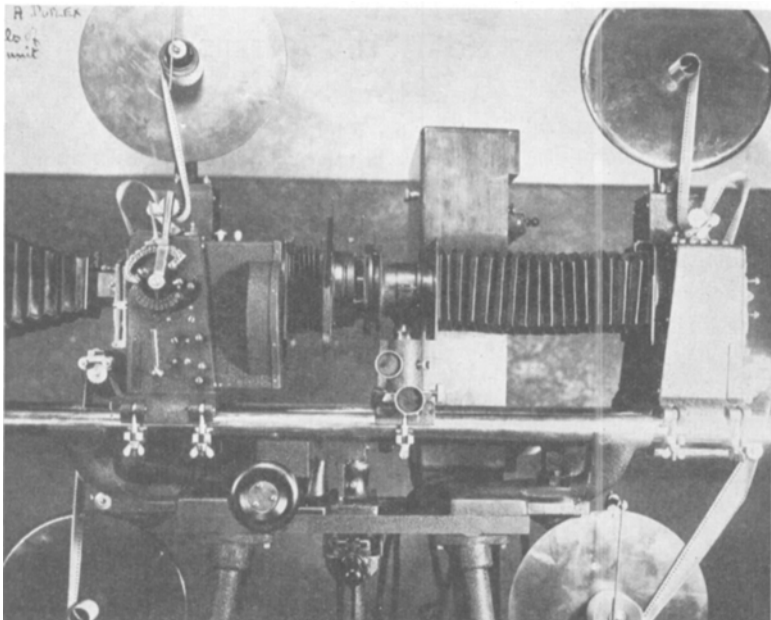


FIG. 2. Type A Optical Printer.

Type A is the standard model, producing 35 mm. prints from 35 mm. negatives. The printing heads and lens mount are movable upon an optical bed and permit an enlarging or reducing range of four times; that is to say, any chosen portion of the negative may be reduced or enlarged up to four times and placed

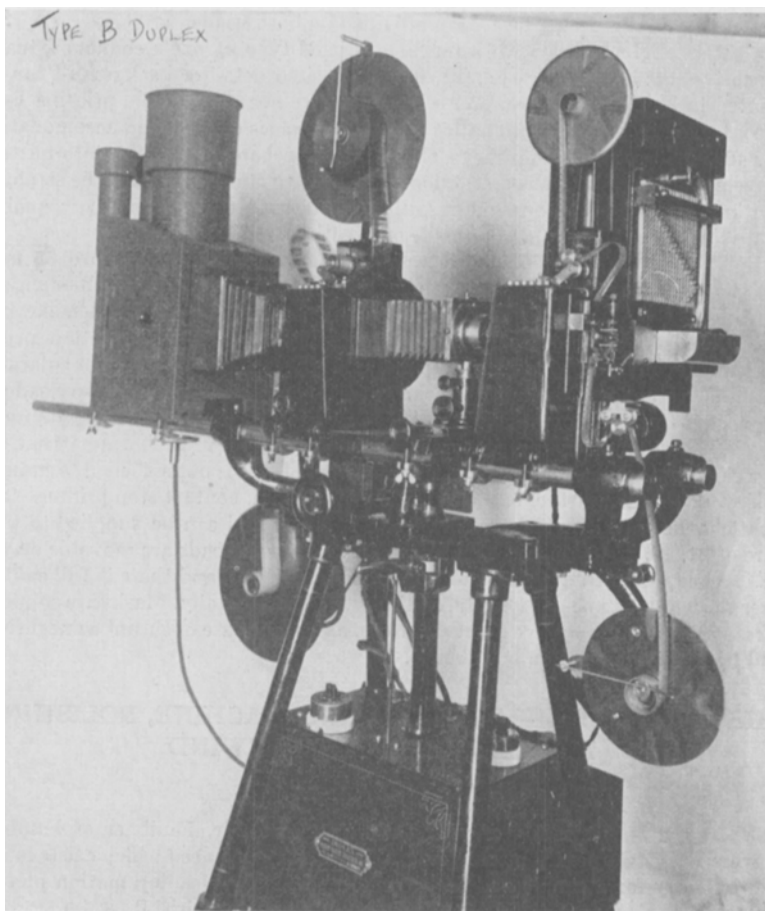


FIG. 3. Duplex Optical Printer Type B.

in any desired position in relation to the positive aperture, the lens mount having a three way movement actuated by suitable controls to accurately accomplish the placing of the image; the negative head is provided with a dissolving shutter that can be automatically closed down or opened up while running, and the length of fade-out or fade-in predetermined; also lap dissolves can be made. A complete trick unit is built into the lens mount consisting of a matte box, multiple exposure device, circular and rectangular vignette, curtain shutter, and blade cut-out. A

footage and frame counter is provided so that when multiple exposure or vision insert work is being done the exact amount of film that has been put through may be seen, and provision is made for winding back the film for the second printing. Both negative and positive heads are fitted with slots to accommodate standard masks, and the accuracy is such that a perfect join up is obtained without gapping or overlapping. Framing levers are provided on both heads.

It is obvious that with a machine of this type at one's command many expensive sets need never be built, for any desired detail or background can be printed in by double exposure or with silhouette negatives. The printing light is controlled by Duplex automatics giving 18 changes of light and accommodating 21, 40, or 60 scenes as desired. The driving mechanism and the intermittent movements are of heavy construction calculated to stand up under the strain of continuous production, and the resulting prints have the characteristic quality that is recognized as being obtainable only with a step printer.

Type B Duplex optical printer is for the reduction of standard 35 mm. negatives to 16 mm. positives but can be furnished also for any other sub-standard width. There are a number of features built into this printer that make it a valuable piece of equipment,—for in addition to producing reduction prints optically it can be used for making 16 mm. prints by contact and also for enlarging 16 mm. to standard 35 mm. Both the negative head and the reduction head are connected to the automatic light change so as to operate both on the standard notch. The 16 mm. contact feature is particularly useful in a laboratory that has occasionally to print 16 mm. negatives and where there is not sufficient volume of this work to warrant the expense of a regular 16 mm. contact step printer. The light change on this model has a range of 18 lights and can be supplied to take care of 21, 40, or 60 scenes. The lens mount and both heads are movable on the optical bed, permitting considerable range in image size, and there is full control over the lens movement, laterally, vertically, and horizontally. Masks are supplied for controlling the negative aperture size so as to take care of shrunken negatives and framing levers are on both heads.

## THE DWORSKY FILM-RENOVATING MACHINE, POLISHING MACHINE, AND FILM REWIND

A. S. DWORSKY\*

At the July meeting of your body last year, Mr. Faulkner of Famous-Players Lasky Corporation told you of the unquestioned need which exists in the film industry for a simple and economical machine for cleaning motion picture film which during projection has become dirty and spotted with oil.

Since that time the Dworsky film cleaner has been markedly improved and its action made even more positive in producing clean, sparkling film such as will give keen pleasure to an audience instead of discomfort and disappointment, so that a better name for the machine than the film cleaner is "Film Renovator."

Briefly, the machine operates on the same simple principle, whereby windows are washed with water and squeegeed, only a non-inflammable fluid such as carbon tetrachloride is used instead.

\* Dworsky Film Machine Corp., New York, N.Y.

The machine is entirely automatic in operation and does not require experienced operators or high-priced help. The film is first passed through troughs containing this liquid. The first trough is for the actual wash. The film then passes through a squeegee and over a piece of felt which removes practically all the dirt before entering the second tank. This keeps the rinsing liquid in the second

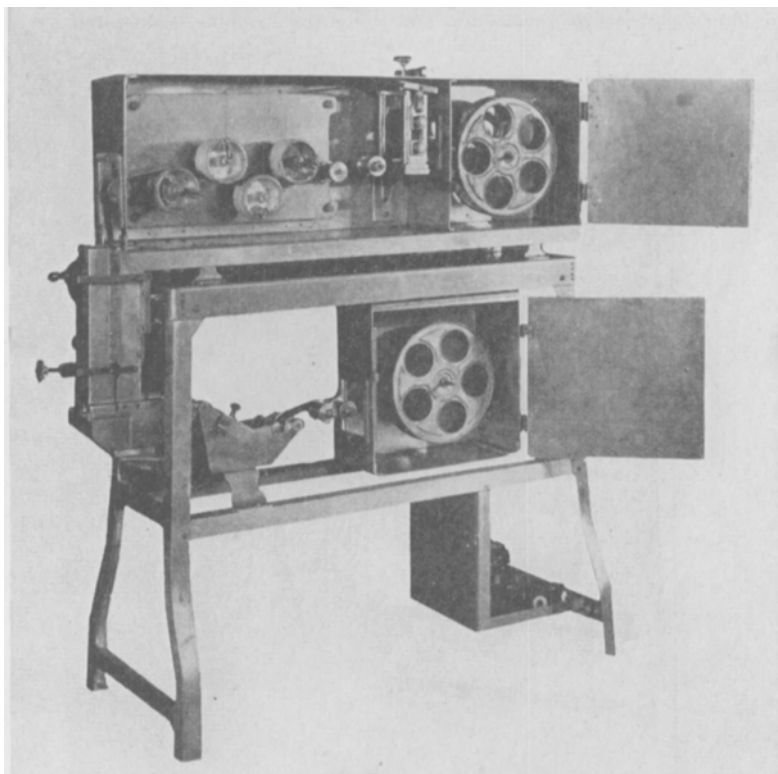


FIG. 1. Renovating Machine.

tank clean. After five reels of film have been cleaned, the dirty liquid in the first trough is drained off, and this trough refilled from the second, or rinsing trough. The second trough is then filled with clean liquid. After leaving the second trough, the film passes over a squeegee with 3 wipers to remove the clean liquid, then through a series of roller buffers which wipe off the remaining fluid which has been carried along in the perforations. The cotton flannel on these buffers is 2 inches wide and 8 inches long and can be reversed and used on both sides. These strips are easily fastened in place on the same principle as a safety pin and are easily removed. Then the film passes between two rubber rollers, which pull the entire width of the film by friction. This method of traction prevents any damage to

the perforations which might result if a sprocket were used. The pressure of these rollers can be released quickly by an attachment on the top of the machine permitting manipulation of the film by hand during threading. The entire operation takes  $4\frac{1}{2}$  minutes for 1000 feet of film. If the film breaks, an idler running on the film operates a lever which opens a switch, thus stopping the machine immediately. There is another switch which can be opened at any time by hand. The film is enclosed in magazines, and the entire machine is operated by one

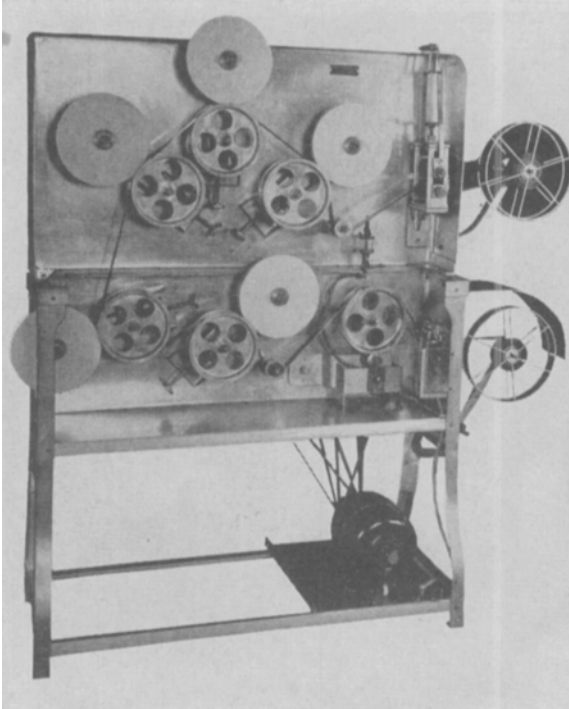


FIG. 2. The Buffing Machine.

$\frac{1}{4}$  H.P. motor. The machine is made of aluminum and measures 50 inches  $\times$  60 inches  $\times$  36 inches and weighs only 95 pounds complete.

We manufacture a number of different machines for the film industry, and together with the film renovator our buffing machine is probably the most valuable. This is also simple, efficient, economical and fool-proof. The buffing machine is intended for the processing of new film by waxing and polishing the emulsion side. First, the film passes over an idler, emulsion side down. This idler rotates another idler in a shallow tank of wax solution, thus passing a thin film of the solution from one idler to the other, and thence to the emulsion side of the film. All excess is scraped from the idler by a knife. The tank is refilled

automatically by a bottle placed above the tank. From this roller the film passes under a small idler and over a large idler, where a buff polishes the film base side, then over four idlers and four buffs which polish the emulsion side. These buffs are made of cotton flannel and rotate at high speed. The shafts run on ball bearings and can be adjusted to compensate for wear of the buffs, so that sufficient force is supplied to the film always. After passing the buffs, the film passes between two rubber rollers as in the renovator. These rubber rollers have the same ar-

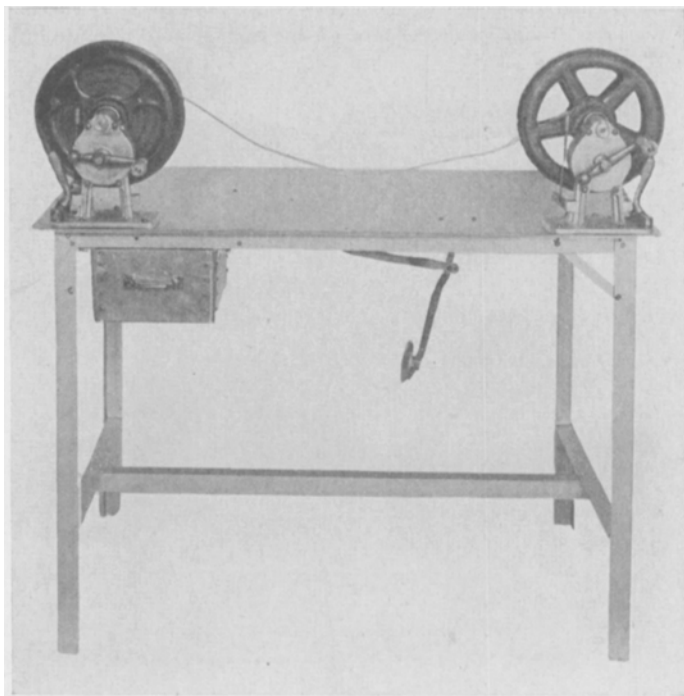


FIG. 3. The Braked Rewind.

angement as in the renovator for removing the pressure from the rollers to permit of hand manipulation. The entire machine is operated by one  $\frac{1}{2}$  H.P. motor, is made of aluminum in natural color, measures 50 inches  $\times$  16 inches  $\times$  40 inches and weighs complete, only 125 pounds. The entire operation occupies approximately  $4\frac{1}{2}$  minutes for 1000 feet of film and can be performed by low priced help.

Another Dworsky machine which will be of interest to you is the braked rewinder. This is a very simple yet highly useful adjunct to your equipment. It is an inspection rewind, equipped with two-wheel brakes similar to those on an automobile except that they are operated by a slight movement of the knee. Both reels stop at the same time and hold firmly in place without running over. Dragging and scratching of the film are thus eliminated. Inspectors can use the

free hand to detect a broken perforation while stopping the rewind, thus preventing a needless loss of time and enabling them to give more than a casual thought to their inspection. At the same time, any possibility of film dragging on the floor of the inspection room and thus picking up grit and dirt is eliminated.

### **THE MODEL B KODASCOPE\***

The Model B Kodascope is the latest development of the Eastman Kodak Company in 16 mm. projection equipment. It has, we believe, all the characteristics of the best 16 mm. projector now on the market and in addition it has

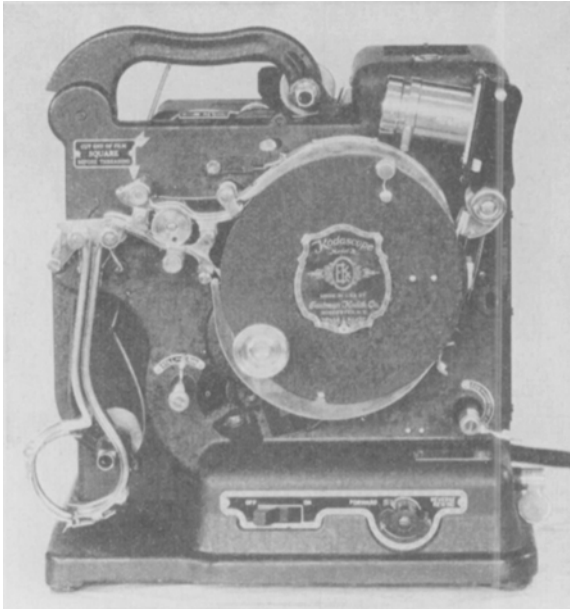


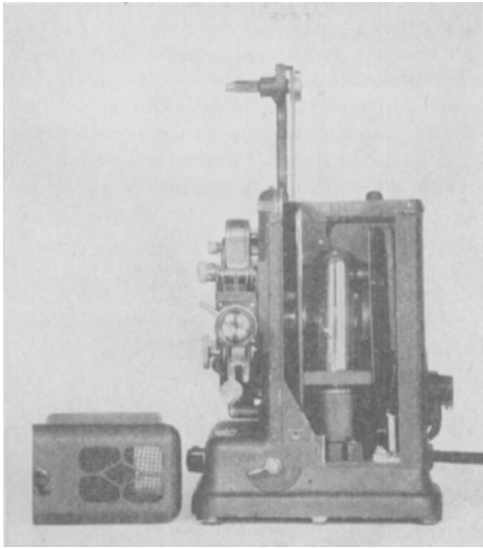
FIG. 1. The Kodascope Model B.

several devices and attachments entirely new to the field. It is evident from the appearance in Fig. 1 that everything has been done to make the projector as compact as is feasible. Its shape ensures maximum stability both during projection and when idle.

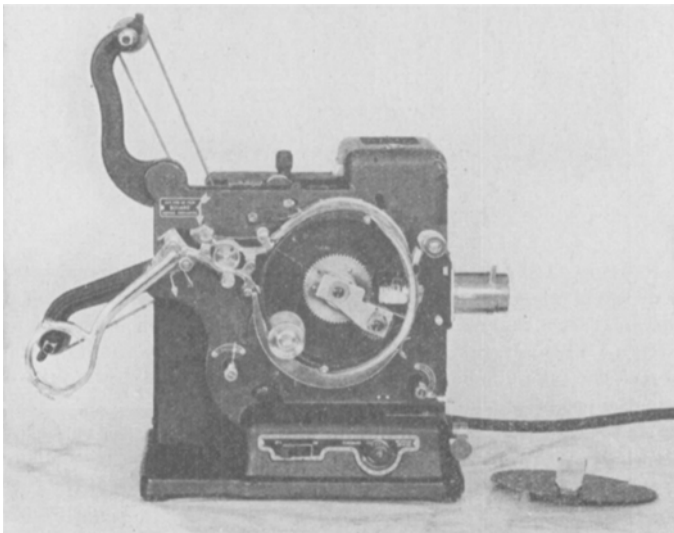
Light is furnished by a 50-volt 200-watt T-10 Mazda lamp in prefocused base, the optical system being such that maximum screen brightness is obtained from this lamp, which is the best available for the purpose. Fig. 2 shows the lamphouse open.

The intermittent movement is a cam operated skipstroke double claw, pull-down being accomplished within 60°. This is shown in Fig. 3.

\* Eastman Kodak Co., Rochester N.Y



**FIG. 2.** The Lamphouse.



**FIG. 3.** The Intermittent Movement.

The self threading feature is the most novel device on the Model B Kodascope. A reel of film is placed on the upper spindle. The end of the film is inserted in a slot in the upper sprocket clamp and the current turned on, as shown in Fig. 4. The perforations automatically engage the sprocket teeth which send the film into a closed channel, or upper loop former, leading to the pull-down. The pull-down leads the film into another closed channel or lower loop former which leads back to the sprocket. The sprocket sends the film to the take-up reel through another channel which, when in threading position guides the film around the

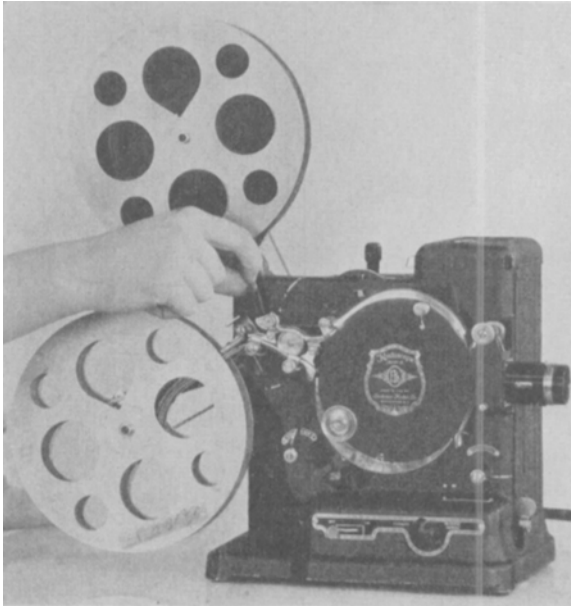


FIG. 4. The Self-Threading Device.

take-up reel core. After the film has entered this channel, the current is turned off and, by means of a lever, the loop formers are moved away from contact with the film loops and the current is turned on again, the picture at once showing normally on the screen. When several convolutions of film are wound around the core of the take-up reel, the take-up channel springs apart automatically, the take-up functioning in the ordinary manner.

Reverse projection is effected by turning a switch to "reverse" position. Normal or reverse projection is accomplished instantaneously. Overrunning clutches in upper and lower reel shafts automatically take care of the reversal.

Single frames may be projected at full brilliancy, the film being protected by a special screen between the condenser and the lamp. This shutter is actuated by a lever conveniently placed directly behind the pull-down chamber. Single frames

may be shown during either normal or reverse projection. The film may be advanced or reversed, frame by frame, by means of a cranking knob.

A knurled knob on the end of the shaft on which the lens mount and aperture plate are mounted operates an eccentric which raises or lowers the frame. It is quick acting and positive and does not require raising or lowering the whole projector to compensate for the shift.



FIG. 5. Rewinding.

Lenses are quickly interchangeable. A flange on the rear of the lens mount slips in or out of flanges mounted on the lens bracket. The lens is held in the bracket by a snap spring.

When a reel of film is to be rewound the end of the film is brought up to the empty upper reel through a break in the threading channel as shown in Fig. 5. The direction switch is turned to "rewind" and the current turned on. Then, when a clutch is let in, the upper reel is rotated at high speed. Sufficient tension to insure tight rewinding is maintained on the lower reel and 400 feet can be rewound in approximately one and one half minutes.

Variable rheostats are furnished for controlling the lamp current and the motor speed. An ammeter shows the current flowing through the lamp (Fig. 6).

All bright parts are chromium plated instead of nicked. This insures better appearance throughout the life of the projector.

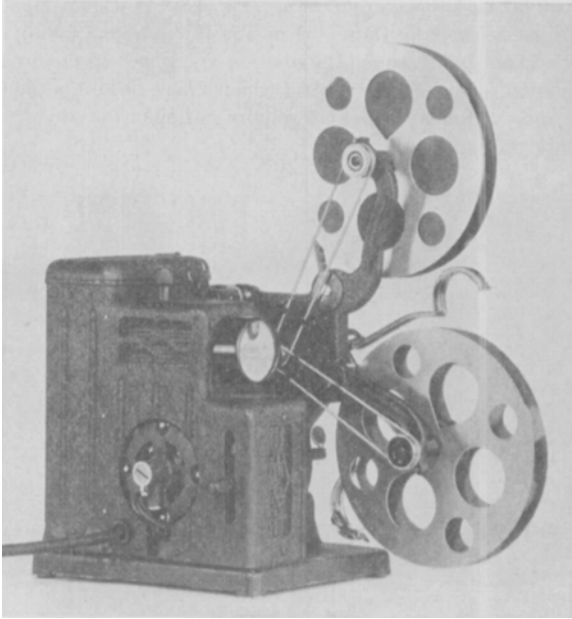


FIG. 6. Rear View of Kodescope.

## DISCUSSION

MR. BAUER: Is the beam projected directly or indirectly through the film?

MR. GREEN: The light is indirect. It is turned through an angle of  $90^\circ$  by a silvered mirror located near the pull-down.

VOICE: What does the machine weigh?

MR. GREEN: Approximately thirteen and one-half pounds

## RECENT DEVELOPMENTS IN THE PREFOCUSED BASES AND PREFOCUSING SOCKETS FOR PROJECTION LAMPS

R. S. BURNAP\*

*Synopsis:*—This paper discusses improvements in the medium sized prefocused base and prefocusing socket for projection lamps and describes the development of a larger size base and socket to replace the present threaded mogul base. The new base will extend the application of prefocused bases to the higher wattage projection lamps.

At the 1925 meeting of the Society at Roscoe, a paper was presented by the author on a new prefocusing socket and prefocused base for projection lamps

\*Edison Lamp Works of General Electric Company, Harrison New Jersey.

which had been developed by the lamp manufacturers to supply a need on the part of projection equipment manufacturers for greater accuracy in locating the lamp filament in projection equipment than obtainable with the medium screw base and socket.

Since it is practically impossible, at least in the present stage of the art, to manufacture projection lamps and to base them with medium screw bases, with the required accuracy for use in high grade projection equipment, projection equipment manufacturers have had to supply adjustable sockets in projection equipment where the maximum optical efficiency was desired. The threaded base adds a further difficulty—that the thread of the base and the socket does not permit of predetermining the plane of the filament with reference to the optical axis without setting the socket individually for each lamp.

Everyone interested in projection problems realizes the difficulties, even for an experienced person, of making lamp and socket adjustments, particularly when the lamp is hot. With the purpose of making lamps as readily interchange-

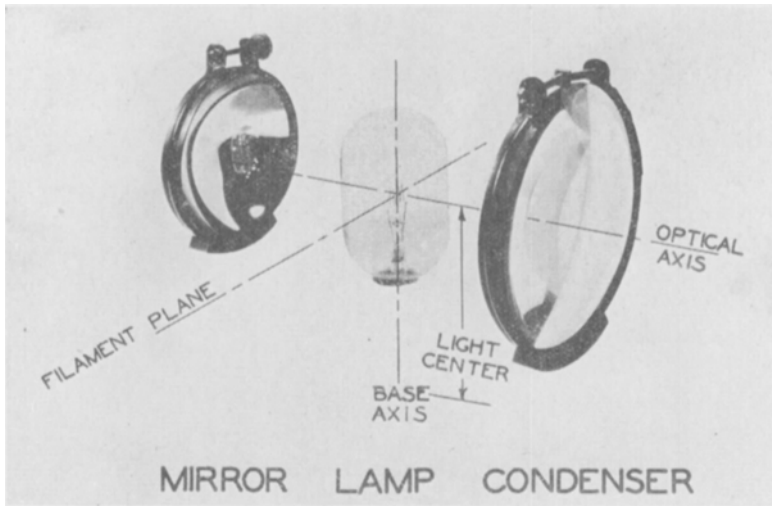


FIG. 1. A Usual Projection Set-up.

able as is now the case in the usual lighting fixture, the lamp manufacturers developed for projection lamps a prefocused base and prefocusing socket which automatically places the light source in the correct position provided that the socket, mirror, condensers, etc., are correctly adjusted in the factory for the lamp. The original designs of the prefocused base and prefocusing socket were made as simple as possible to accomplish the purpose, and were worked out with base and socket manufacturers to insure satisfactory manufacturing conditions. It was the belief of the lamp manufacturers that a satisfactory prefocusing socket and base would bring about standardization and simplification of apparatus, and

thus prevent confusion by having the minimum number of special lamps and bases for projection purposes.

At this point it is desirable to describe again the fundamental requirements for a satisfactory prefocused base and prefocusing socket: (Fig. 1 shows a usual optical arrangement.)

1. Accurate light center
2. Accurate axial alignment of filament and base
3. Positive location of filament plane
4. Definite positioning of filament anchors
5. Correctly aligned socket
6. Correctly aligned optical system

Reducing these requirements to the simplest formula means that the base must be adjustable at the time of assembly with the lamp and must provide positive bearing surfaces to align the filament on the socket axis and at the correct height above the socket. These requirements are covered by providing two shells for

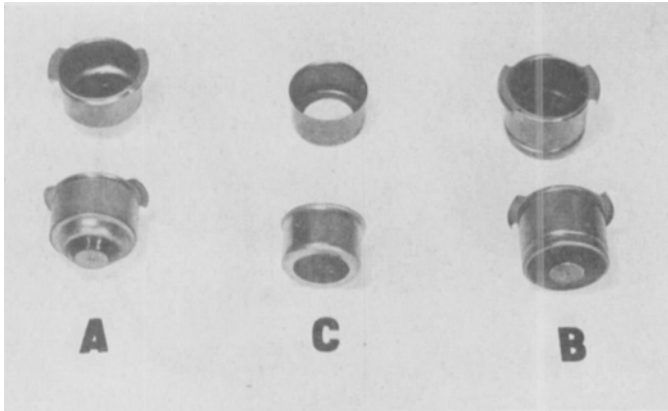


FIG. 2.

- A. Earlier Base Outer Shell.
- B. New Base Outer Shell.
- C. Inner Shell.

the lamp base. The inner shell is cemented to the lamp in the usual manner and is adjustable in the outer shell upward and downward, and with a rocking motion to correctly align the filament with reference to the axis of the outer shell. This operation is done in the lamp factory at the time of manufacture in accurate optical jigs. After the filament is correctly located with reference to the base, the inner and outer shells are soldered permanently together.

The cylinder of the outer shell when placed in the socket shell provides axial alignment. The location of the filament for light center is determined by flanges on the outer shell, which engage with ears in the socket. The position of the filament plane is determined by unequal sized base flanges, which can engage the socket in only one position. All lamps are based by the lamp manufacturers

so that the filament anchors are toward the observer when the lamp is viewed with the 60 degree or smaller flange on the left. The eyelet (bottom contact) on the outer shell and the flanges of the base provide current carrying terminals.

The assembly of the base and socket must be simple. For this base the operation requires only that the base cylinder be dropped into the socket shell and the base flanges passed through the openings in the socket ears. The lamp is then depressed against the retaining spring and turned 90 degrees to a fixed stop. When this is accomplished, the lamp is released and will be heard to click into position. The base flanges and the socket ears are held in positive contact by means of a plunger with a compressed spring, which presses against the bottom contact eyelet.

The base and socket described in the previous paper have enjoyed wide use. As might be expected, the prefocusing base and socket have been subjected to further investigation and improvement as a result of service in the field. The fundamental principles governing the design of these parts have been found to be sound, but changes, with the intent of making parts more reliable in the assembly, more rigid and better adapted to machine production, have modified the original appearance to some degree. All of the changes, however, which have taken place

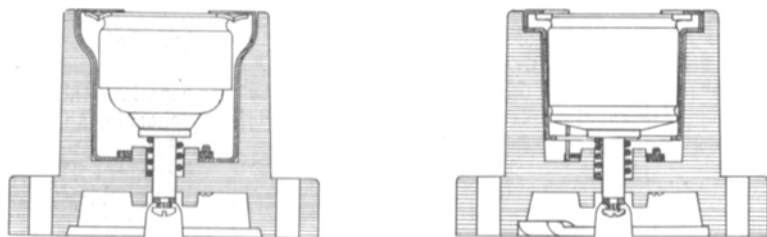


FIG. 3.

Earlier Base and Socket.

New Base and Socket.

have been made so that the sockets and bases of the new design are still interchangeable with those of the old design. Fig. 2 shows the old and new base designs, and Fig. 3 shows the old and new socket part design. The improvements have increased the inherent accuracy of the base and socket assembly. As will be noted in Fig. 3, the outer shell of the base has been lengthened so as to increase the bearing surface in the socket. The socket itself has been changed in design so as to give a longer bearing surface on the outer shell of the base. These two changes limit the back-lash of the base in the socket very decidedly as compared with the earlier design. Fig. 4 shows lamp based with new socket.

The early base design had the corners of the engaging flanges turned downward so as to insure a better meshing with the socket at assembly. The design of the new socket eliminates the possibility of incorrectly meshing the socket and base, so that this feature is no longer necessary. In order to reinforce the flange, a turn-down is now formed on the outer edge. This has the advantage also of stiffening the flanges against distortion for a faulty insertion of the base in the socket and prevents the faulty assembly of a flange above the socket ear. The

elimination of the turn down corners of the early design has resulted in an increased bearing surface between the base flanges and the socket ears for a better seating of the base in the socket.

It will be noted that the first socket shells were made of one piece of metal formed to shape. The new design consists of two parts firmly clamped together.

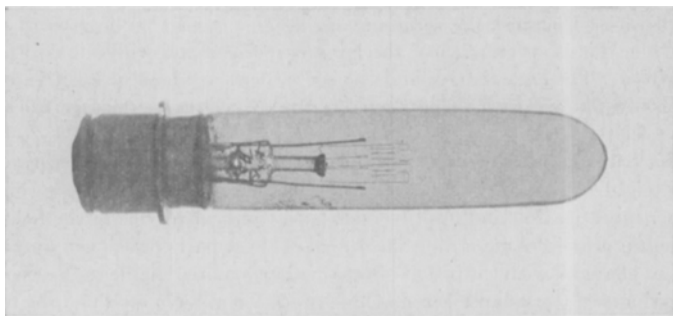


FIG. 4. Lamp with New Medium Prefocused Base.

This construction permits of making each part more accurately and of proportioning the metal thicknesses to the strains incurred.

Improvements, of course, have been made in the first experimental jiggling equipment as production has increased, and additional jigs for checking alignment have been provided in the factory for a final inspection.

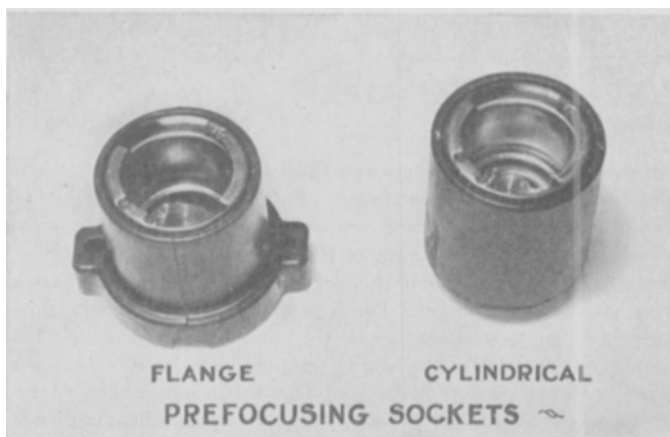


FIG. 5.

Two styles of socket have been developed for use with this base. (See Fig. 5.) One a flange type is designed to bolt directly to some fixed part of the projection equipment. This operation is done by the manufacturer at the time of assembly

of his equipment. The socket should be adjusted to the correct height and position and firmly fixed in place so that the user will not find it easy to move the socket out of adjustment. A similar socket has also been developed, consisting of a cylindrical insulated section in place of the flanged section, which may be set in a split ring and clamped in position. A reference line is indented in the socket to guide assembly. This socket has found considerable use for replacing the threaded base socket in projection equipment. The inner shell parts of both sockets are identical.

At the Roscoe meeting after the prefocusing socket and prefocused base had been described one of the members inquired about the prospects for a mogul prefocused base and prefocusing socket. Since the demand for a mogul

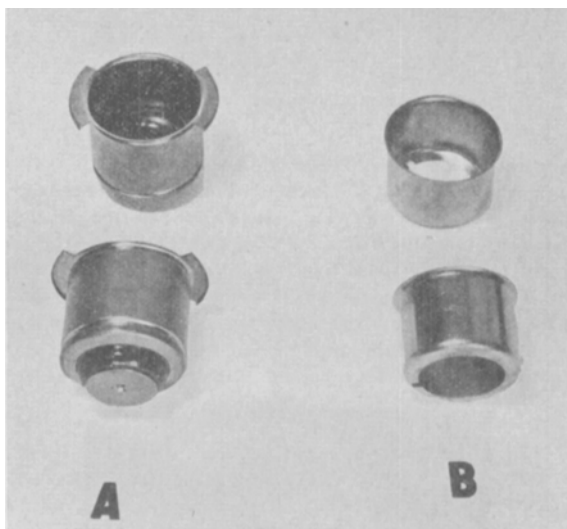


FIG. 6.

- A. Mogul Prefocused Base Outer Shell.
- B. Mogul Prefocused Base Inner Shell.

prefocused base and prefocusing socket is not as great as for a medium type and since the cost of these larger parts will necessarily be considerably higher, progress along this line has been rather slow. However, the lamp manufacturers now have this development actively under way. The mogul prefocused base is in principle and appearance very similar to that used for replacing the medium screw base, except for its larger size and more rugged construction. Fig. 6 shows the base parts. In order to take care of the high temperature at which these bases will operate, the parts will probably be welded together instead of soldered, as for the medium type. Fig. 7 shows a based lamp.

The model of the mogul prefocusing socket shown and described has been worked out as a preliminary design to utilize the mogul prefocused base to the

best advantage, but is not necessarily in the final commercial form. A description of this preliminary design of the mogul prefocusing socket, however, will show the trend of the development.

This design is similar to the cylindrical type of the smaller prefocusing socket. The parts, of course, are heavier, so that the base and the socket make a very substantial and rugged combination. The model is adapted for use either as a cylindrical type to be fastened in a clamp or as a flange type to be bolted to a bed-

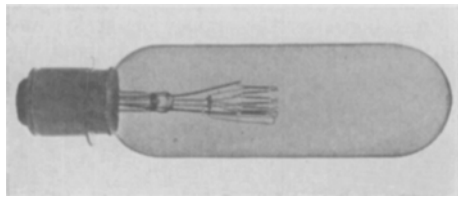


FIG. 7. Lamp with Mogul Prefocused Base.

plate on the projection machine. This dual feature is accomplished by means of a separable cap at the bottom of the socket which protects the lead-in wires and has screw holes for retaining bolts. Fig. 8 shows the external appearance and Fig. 9 is a cut-away section of this socket.

The mogul prefocused base has been designed with a  $\frac{1}{8}$  inch diameter bottom eyelet. The large area for contact which this eyelet offers is taken advantage of in the socket design, so as to give the maximum area of reliable contact. This makes it possible to obtain large current carrying capacity without having to place the contact parts under excessive pressure. This large area of contact

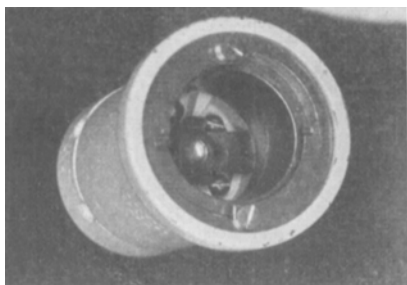


FIG. 8. Preliminary Model of Mogul Prefocusing Socket.

between the base and socket plunger has been insured in this design by using a multiple leafed bottom contact which presses against the outer section of the base eyelet. Current to the plunger and the contact points is carried through a heavy flexible strap so that no current is carried by the retaining spring, thus preventing overheating of this part.

To discuss among users and manufacturers of projection equipment the various fields for prefocussed lamps is perhaps carrying coals to Newcastle.

Nevertheless, the author is going to risk that possibility in reviewing and suggesting applications.

A complete list of possible uses for prefocused base lamps would practically cover the entire field of projection equipment. Perhaps the field of largest interest to the members of the Society is that of the portable motion picture machine. The medium sized prefocused base has already found extensive application in

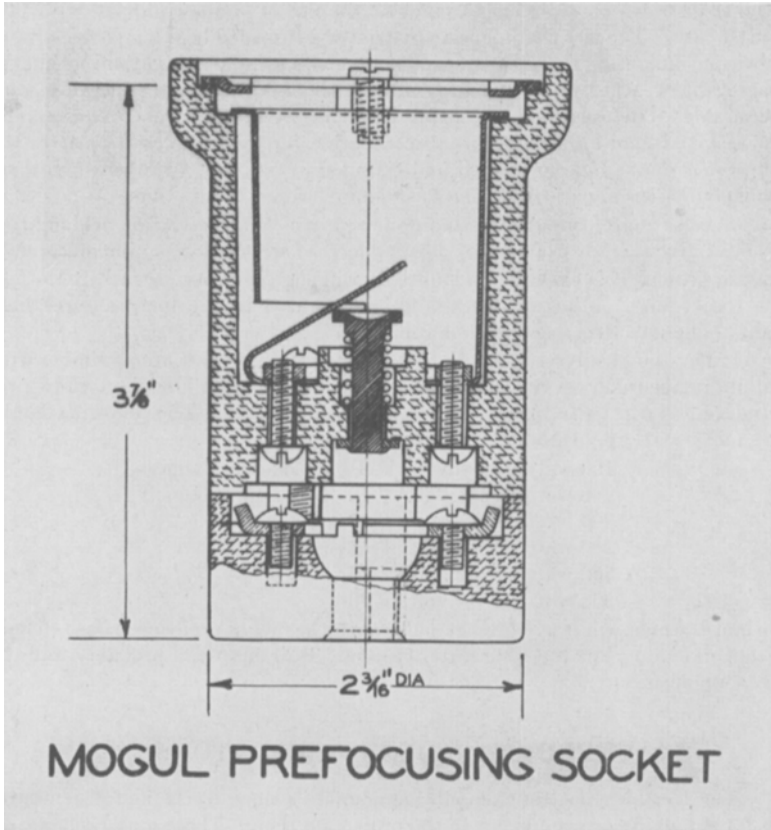


FIG. 9. Sectional View of Preliminary Design of Mogul Prefocusing Socket.

this field. Prefocused bases have application in stereopticons, slide film projectors, theater effect machines, spotlights, floodlights, headlights, signal lamps, searchlights, light house lanterns, advertising projectors, etc.

Since the result of the use of prefocused bases and prefocusing sockets is to make the accurate placement of lamps in projecting equipment as simple as for ordinary lighting service, it follows that these bases and sockets will find wider

application. The conditions which make the use of prefocusing sockets and prefocused bases desirable are necessity for accurate control of projector beam, supervision of equipment by unskilled maintenance men, and saving in time and labor for skilled men.

The problem of lighting aviation landing fields and courses requires projecting equipment with the beams accurately focused and placed. The difficulties of meeting these conditions with unskilled maintenance men, particularly in outlying districts, would seem to point to the use of lamps equipped with prefocused bases. The fact that focusing by trial of a threaded base lamp necessitates knowledge of lighting requirements and skill, must be done at night, oftentimes in disagreeable weather, and at the tops of towers, making a focusing operation very undesirable. The use of the prefocused base and prefocusing socket requires only that a skilled man adjust the initial installation for the best results. After the projector is once properly located and clamped in position, the operation of replacing lamps is comparatively simple and may be done at any time.

The use of prefocused bases and prefocusing sockets in aviation field lighting has been given as an example of a possible case where this equipment should prove desirable. This example undoubtedly will suggest other uses where the fact that the required adjustments can be incorporated in the lamp assures high quality of light control under all conditions.

It may be of interest to note the types of lamps which are available with medium prefocused bases at the present time. In general all medium screw projection lamps can be furnished with the prefocused base. The following lamps have fairly wide application at the present time:

100 watt, 115	volt, T-8½	coiled coil filament
200 watt, 115	volt, T-10	coiled coil filament
200 watt, 50	volt, T-10	
250 watt, 115	volt, T-14	
300 watt, 28-32	volt, T-16	
500 watt, 115	volt, T-20	

The lamps which will prove most popular with the mogul prefocused base remain to be worked out, but the 1000 watt, 115 volt, T-20 lamp will probably find the largest application.

### IMPROVED MOTOR GENERATORS\*

The Hertner Electric Company announces a new line of motor generator sets for supplying direct current to the projection room. These motor generators will be "Type C. P. Transverters."

The distinct feature of these Transverters is the voltage regulation of the generators. The voltage of the usual commercial type of generator will decrease from 10% to 15% when operated with a fixed field regulator over a period of time sufficient for the windings to reach a constant temperature. This means that, in order to obtain satisfactory results with the projection equipment the projectionists must manipulate the field regulator as the generator warms up so as to maintain a constant bus voltage.

\*Hertner Electric Co.

The type C. P. Transverters are designed to deliver within 2½% of the rated voltage under all conditions of temperature and loads (within the rating of the generator). This feature makes it possible for the projectionist to operate the Transverter during the entire show without manipulating the field regulator. As an example the hot and cold voltage ampere performance curves of the type C. P. 300 ampere 100 volt Transverter show the small decrease in voltage of the generator as it heats up.

VOLT AMPERE PERFORMANCE  
300 AMPERE 100VOLT  
MULTIPLE ARC TRANSVERTER  
SERIAL No. 7909

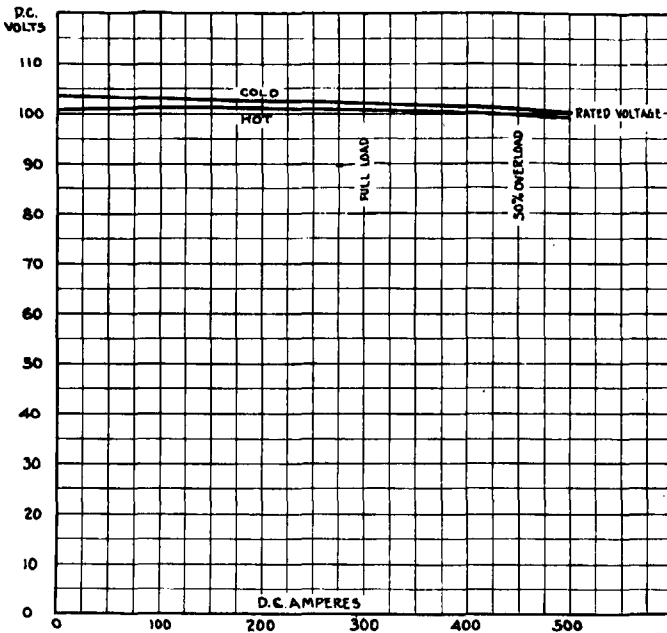


FIG. 1.

These Transverters are rated on a projection room duty basis. The Power Club rating for 40°C. machines is that no part of the machine shall have a temperature rise above the room temperature of more than 40°C. when operated continuously at full load except the commutator, which may have a rise of 50°C. When operated at 25% overload for two hours the temperature rise of the windings should not exceed 55°C. and the commutator 70°C. The projection room duty rating which we have adopted for type C. P. Transverters is the same as the Power Club rating for continuous duty but is on a basis of 50% overload for thirty minutes. This latter rating, we feel is very much more adapted to projection room conditions, as there will probably never be an occasion to operate at an overload for more than thirty minutes in any two hour period.

The type C. P. Transverters are built in the four oil bearing type consisting of a squirrel cage induction motor specially designed for motor generator service direct connected by means of a flexible coupling to the generator. The two units are mounted on a substantial cast iron base. The generator is particularly well ventilated, provision being made to draw air in through the commutator core and also through the rear end of the armature, and discharge it about the field coils. The entire generator is designed with the idea of keeping the voltage variation down to a minimum. This has made it desirable to build the generator as open as possible so as to permit maximum ventilation. The frames are relatively large as compared to the size of frame usually used with a given diameter armature. Sufficient room for the shunt field winding is secured in this way.

The most advanced methods are used in the construction of these machines. The machined parts are finished to a precision beyond usual practice. The shafts are of medium carbon steel and ground to a high finish. The rotating parts are balanced dynamically on a Gisholt Balancing machine, which produces results of the highest accuracy.

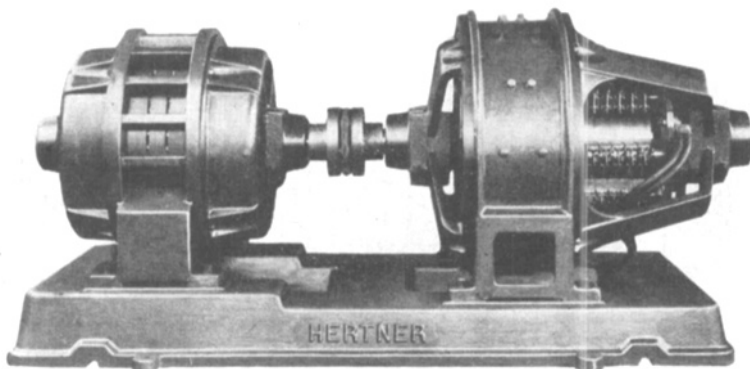


FIG. 2. Hertner Type C. P. Transverter.

The type C. P. Transverters have been designed to deliver 100 volts direct current. It seems to be the consensus of opinion that a D.C. bus voltage of 100 volts is desirable where high intensity lamps are used. However, they can be furnished to deliver 85 to 90 volts direct current if so ordered. The very close voltage regulation will only be obtained when operating at the rated voltage.

The type C. P. Transverter is now offered in continuous capacities of 150, 200, 250, 300, 400, 500 and 600 amperes at 100 volts.

## DISCUSSION

MR. CRABTREE: What is the price of the outfit?

MR. DASH: It is a little higher than the ordinary machine but will approach that of a motor generator set of the same rating. I might mention that we have built one with 1200 r.p.m. instead of 1800, feeling that the exhibitors would pay

a little more for it. In the same length of time the armature doesn't travel so far and consequently doesn't wear out so fast.

DR. GAGE: Could they be built for 120 volts without too much additional expense?

MR. DASH: We are rather a small concern. You all know Mr. Hertner; he and I constitute practically all the engineering force and we have built them for 32, 39, 48, 100, and 125 volts, and one for 128 volts, so that the machines are practically tailored to the job without additional expense.

## AN IMPORTANT IMPROVEMENT IN POWER'S PROJECTOR MECHANISM

HERBERT GRIFFIN\*

This paper has to do with that very important part of a motion picture projector mechanism known as the film gate. For many years past this structure on all makes of motion picture projectors has been of very simple and elementary design and extremely light construction. It was realized that some method must be devised to hold the film in focus and under sufficient tension to keep it steady over the aperture and not a great deal of ingenuity was necessary to construct an assembly along cut and dried methods which would accomplish this result.

In this paper the new film gate on the Power's mechanism will be described. The old gate on the Power's projector was simply composed of a thin brass casting on the front side of which was mounted a fire shutter of very limited proportions and rather doubtful efficiency, and on the inside a tension shoe approximately 3 inches long having polished tracks one on either side of the aperture but each made in a solid piece. This shoe was held under tension by means of two short flat steel springs, no attempt being made to have the tension fixed, reliance being placed entirely on the judgment of the projectionist as to just what tension might be required to keep the projected picture steady. Practically no attention was given to heat dissipation, and the so-called cooling plate on the gate simply served as a slight protection for the tension springs which otherwise would have been subjected to the entire effect of the heat rays in the spot.

The advent during recent years of the extremely intense illuminants for the projection of motion pictures and the tremendous amount of heat generated by them brought about conditions which badly needed attention, and the problem has been satisfactorily solved with this newly designed film gate.

The greatest difficulty was to construct the new equipment so that it might be attached to any Power's projector and at the same time satisfactorily eliminate the objectionable features of the old construction. It is well known that the heat from the high intensity and reflector type of lamp has been doing considerable damage to the gate structures, tension springs, and the fronts of the mechanism themselves, and also innumerable complaints have been received with regard to in and out of focus effects on the screen which have been blamed on the film buckling but which in a great number of instances was really due to the heat removing the tension from unprotected tension springs and again from the method

\*International Projector Corporation, New York City.

of construction of the tension shoes and the manner in which tension was applied to them. Fig. 1 shows the old type gate construction.

In the design of the new gate the following points had to be carefully considered:

1. An adequate and positively acting fire shutter must be provided.
2. There must be plenty of air space between the various elements of the gate to carry away the heat as rapidly as possible.
3. The front section nearest the light must be so designed as to rapidly dissipate heat.

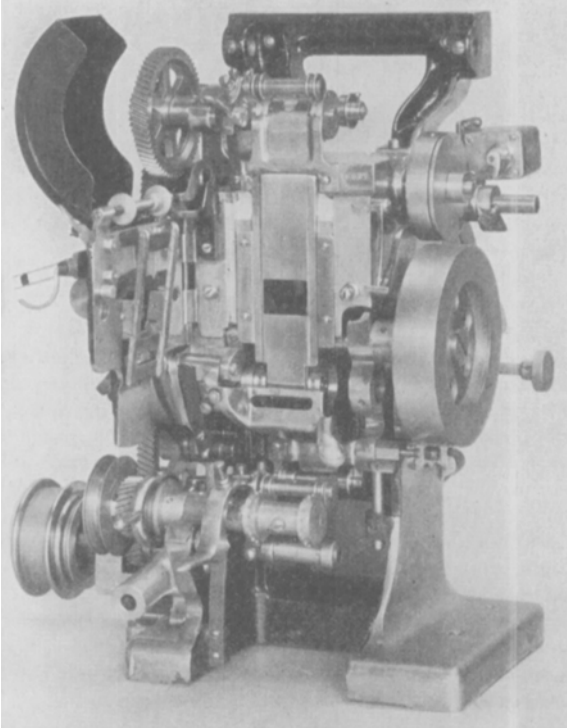


FIG. 1. Old Type Gate.

4. Such parts as are subjected to heat and which must be handled by the projectionist must be heat insulated.

5. The tension springs operating the tension shoes must be far removed from the source of heat and carefully protected so that the temper will not be drawn from them and the tension shoes themselves must be so constructed and arranged that the minimum amount of tension will be required in order to hold the picture steady over the aperture.

Fig. 2 shows the new Power's gate and lower fire shield closed.

While all of these features have been realized in this new equipment, it has taken a great deal of time to develop and place the apparatus on the market. Many metal compositions were tried in order to discover what would dissipate the most heat and at the same time maintain its configuration rigidly under considerable change in temperature. Bronze, aluminum, German silver were all considered, but in the final analysis it was found that cast iron served the purpose entirely satisfactorily and it is from this material that the front and back plates are made. Both of these plates are finned and are similar in appearance to a waffle iron, and this design has been found entirely satisfactory.

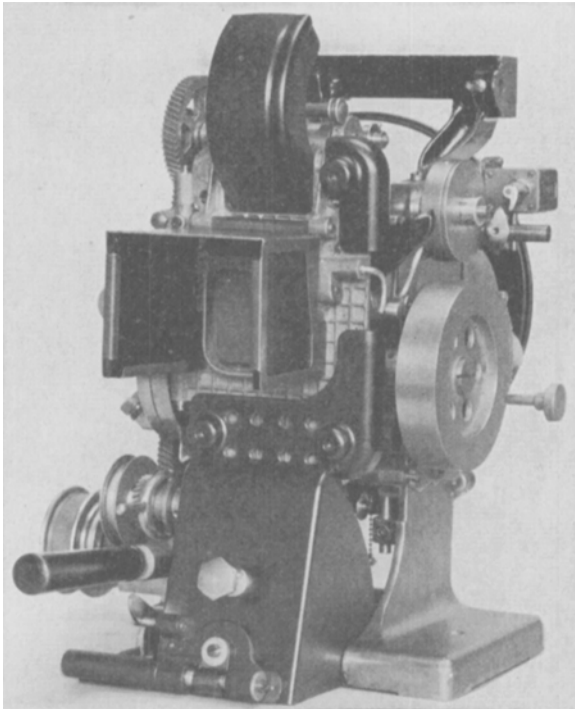


FIG. 2. New Power's Gate Closed.

The fire shutter is composed of a die cast bronze counterbalance to which is attached a heavy steel curtain so mounted as to pivot with the action of the fire shutter governor. This shutter has a positive stop and is so designed as to open and close at a film speed of approximately fifty crank turns per minute so that it is rigidly held open at normal projection speed. Should the spot be left continually on this fire shutter, it is impossible for the film to become overheated or damaged inasmuch as there is approximately  $\frac{3}{8}$  inches of air space between the shutter and

the first plate aperture the fire shutter itself being approximately  $1\frac{3}{4}$  inches from the film. With such a great amount of heat playing on the gate it is, of course, impossible to keep the front plate cool, and as a matter of fact it reaches a temperature close to the boiling point of water. The projectionist's hands coming in contact with such a hot structure would naturally be subject to severe burns, and in order to overcome this undesirable condition moulded bakelite insulating plates have been attached in such positions as to render discomfort to the projectionist impossible. At the same time these bakelite insulating plates, which are entirely insulates from the metal structure, serve as a positive protection for the film inasmuch as under no condition can it come in contact with the heated surface of the front plate. Fig. 3 shows the new type gate and lower fire shield open.

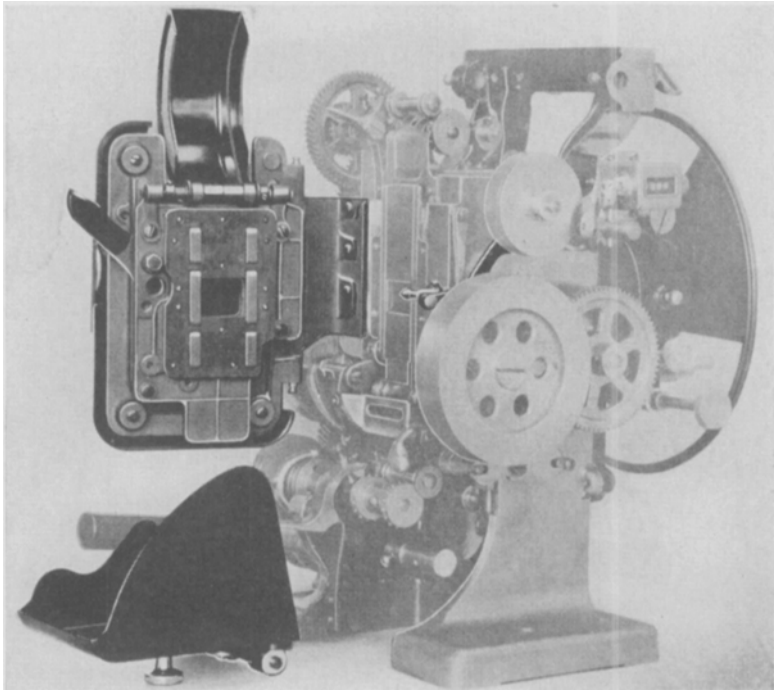


FIG. 3. New Type Gate, Open.

Rigidly attached to this front plate is a central plate to which is attached the insulated trip lever and gate latch, the upper fire shield, the lateral guide rollers, the film pad plate and the tension shoes, together with their respective tension springs. Between the front plate and the central plate, and the central plate and the tension shoe pad plate, considerable air space has been provided so that a rush of cool air at all times is assured, which serves to keep the equipment moderately cool. The film pad plate is of heavy cold rolled steel, to which are

attached the film tension shoes and tension springs and, as before stated, these are far removed from the source of heat and thoroughly protected so that there is no danger of the tension changing due to temper being drawn from the springs. There are six tension pads or shoes, each acting independently of the other, in place of the solid single unit of great length as heretofore used. These pressure pads are of hardened steel, highly ground and polished. These pads are placed on either edge of the film above and below the aperture, and their function is solely to hold the film steady against the pull of the intermittent sprocket. The other two pressure pads are placed one on either edge of the film at the aperture, and just sufficient tension is maintained on them to hold the film perfectly flat and in focus over the aperture. The edges of the shoes are ground to eliminate

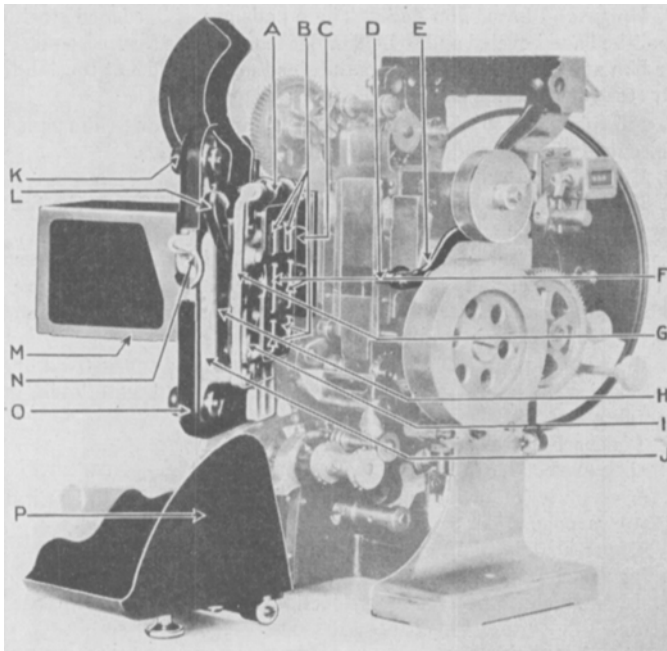


FIG. 4.

danger of scoring the film due to any slight burrs which might otherwise be left upon them, and the tension springs where they come in contact with these pads have a slight radius so that the pads are free to pivot upon them. The pads, therefore, are brought in absolutely flat contact with the film at all times.

The entire gate assembly is supported by an exceptionally rugged hinge securely and rigidly attached to the mechanism frame in such a manner that there is no possibility of lateral or vertical lost motion, and through the addition of a substantial latch the gate when closed is firmly locked in position so that the

pressure pads exert the same amount of tension on the film at all times. In addition to the old gate having been discarded, the old type lower fire guard or shield has also been eliminated, and in its place is a film guard of much more satisfactory design and so constructed that instead of opening laterally it drops vertically entirely out of the way so as to leave the mechanism free from obstructions while threading the film. This guard when in its normal operating position is locked securely in place by means of a gravity operating lock so placed that when it becomes necessary for the projectionist to lower the film shield his finger automatically comes in contact with the latch, readily lifting it from the latch bar.

The lettered parts in Fig. 4 are described below:

*A.* Lateral guide roller.

*B.* Upper and lower film pads. These pads are of hardened steel, ground, highly polished and beveled and so held under tension as to assure a square contact with the film at all times. They are maintained under sufficient tension to insure perfectly steady projection and no adjustment is necessary.

*C.* Film plate pad to which is attached the upper and lower film pads together with the central film pad and their respective tension springs.

*D.* Gate lock screw.

*E.* Fire shutter lift lever. A newly designed link between the fire shutter governor and the fire shutter proper.

*F.* Central film pads. These pads are maintained under lighter pressure than *B*, and their sole function is to keep the film in focus over the aperture. These pads, like the upper and lower film pads, are of hardened steel, ground and highly polished.

*G.* Rear baffle plate. This plate is rigidly attached to the front or support plate and carries the lateral guide roller, upper film shield gate latch, insulated trip lever, gate stop, and film pad plate assembly.

*H.* Air space between *G* and *J*.

*I.* Air space between *G* and *C*.

*J.* Front plate (radiating and insulating heat shield). This plate is designed to eliminate warpage under severe heat.

*K.* Upper heat insulating cap.

*L.* Insulated gate latch lever.

*M.* Light shield to protect the projectionist's eyes from the intense spot on the aperture.

*N.* Fire shutter pivot pin.

*O.* Lower heat insulating cap.

*P.* Lower loop protector.—This newly designed assembly is self-locking and is so constructed that it opens downward rather than laterally as in the former design.

## DISCUSSION

MR. KUNZMANN: I should like to ask in the absence of Mr. Griffin whether the new accessories are adaptable to all models of Powers projectors.

MR. MCGUIRE: They are.

## CARBONS FOR USE WITH PANCHROMATIC FILM

E. R. GEIB\*

At the spring meeting of this Society held at Norfolk, Va., Mr. M. J. Dorcas of our research laboratory mentioned in his paper on the subject "Physiological Effects of Light" that some experimental work was being conducted on carbons for use with panchromatic film. This type of carbon was referred to at that time as the "orange flame" and was later given a number, namely 42661. Since then, additional work has been done, and the National Carbon Company now wishes to announce a line of panchromatic carbons.

By the introduction of certain materials in the cores of carbons, it is possible to influence the characteristics of the light very materially. A series of carbons has now been developed which give the user the advantage of a wide range of lighting effects. This series begins with carbons giving light which predominates in the shorter wave-lengths and ends with carbons giving light rich in the longer wave-lengths. Perhaps the best way to visualize the light which is obtainable from these different carbons is to see several arcs in operation. We have accordingly trimmed six arc lamps with carbons showing the different modifications of light quality which are possible.

### *Demonstration*

Lamp No. 1 has been trimmed with the well known National white flame carbons. The light from this arc you will observe is bluish white. This light is particularly rich in the short wave-lengths; that is, blue, violet, and near ultra-violet. The Bureau of Standards found this carbon to be the closest approach to sunlight of all artificial illuminants.

Lamp No. 2 has been trimmed with an experimental carbon which is a modification of the "white flame" in that while emitting a light which is strong in the blue, violet and near ultra-violet is stronger in the red and green than the "white flame" arc. It will be observed that there is not so much blue in this light.

Lamp No. 3 is trimmed with carbons which emit still less blue, violet, and near ultra-violet and more of the longer wave-lengths of light as evidenced by the yellowish tinge.

Lamp No. 4 is trimmed with carbons which give a deeper yellow light than No. 3 indicating a greater amount of light in the long wave-lengths.

Lamp No. 5 is trimmed with carbons which produce an orange colored light. There is more of the red in this light than in that given by the carbons used in lamp No. 4.

Lamp No. 6 is trimmed with carbons giving a reddish orange colored light.

Thus, it will be seen that by changing the ingredients in the cores of the carbons we can vary the light to a marked degree. Any one type or grade of these carbons can be supplied in sizes to meet the requirements of the high powered arc lamps now in use in the production of motion pictures.

\*National Carbon Co., Cleveland, Ohio.

## DISCUSSION

DR. GAGE: Do any of these carbons correspond to some of the older and well known carbons? The first is like the white flame; does another correspond to the yellow flame or are they all different?

MR. GEIB: No. 1 is the white flame; No. 4, if I remember correctly, is the so-called yellow; No. 5, the orange, and No. 6, the red. There may have been changes in the chemicals, but I believe those are essentially the colors.

MR. RICHARDSON: I believe this demonstration means a great deal. Ten or more years ago when I made the statement in print that this very thing could be done, I was derided and even laughed at. I believe it only remains for carbon manufacturers to make this method of light tone modification available to motion pictures to enable us to have exactly the light source we need. The whites are now altogether too "chalky" on our screens. The high intensity light source is not well adapted to color projection; also it has objectionable features for black and white.

When I was in Baltimore many years ago I visited a small theater in which a most unusual screen illumination was obtained from an AC light source. I was advised by the projectionist that it was a result of soaking the carbons several days in a strong salt solution. I immediately advised the National Carbon Company of what I had seen and of the reasons ascribed by the projectionist. The company advised me that it was extremely unlikely that light tones could be materially changed by impregnation of the carbons with substances designed to give that result because of the fact that they would be volatilized instantly by the terrific heat of the crater. Notwithstanding the ideas then held, we all know that the National Carbon Company has accomplished much in that direction already and probably will accomplish very much more. We need a light source better adapted to projection than anything we have as yet been offered, and in my opinion this demonstration points the way.

## MAZDA LAMPS FOR MOTION PICTURE PHOTOGRAPHY

R. E. FARNHAM\*

The ability of panchromatic film to render various colors to a very much better advantage has resulted in its general use for motion picture photography. To derive the full possibilities of this film, however, it must be used with a light source which has a greater proportion of red, orange, and yellow than of blue and violet. The light of incandescent tungsten at a temperature of from 3000 to 3250 degrees *K* possesses color characteristics which make it particularly well suited to bring out the full value of panchromatic film, with the result that most of the larger studios are turning to the use of incandescent lamps. There will shortly appear pictures produced by the various studios made on panchromatic film and lighted by mazda lamps.

The particular points of advantage which the studios find are:

1. The greater control of the light flux and the higher efficiency of utilization that can be obtained

\*National Lamp Works, Cleveland, Ohio.

2. The very small staffs which suffice for handling the light
3. The instant availability of the light
4. The opportunity to increase the intensity of light by change of voltage during the action and the maintenance of a perfectly clear atmosphere at all times.

All of these have a definite effect in expediting the work on a picture and in reducing the cost of production.

In order to determine the lighting requirements in making motion pictures, the lamp engineers have gone into the studios and have obtained data which will permit the design of the most efficient and satisfactory lamp and suitable equipment.

For the purpose of lamp and equipment design, the lighting of the greater proportion of the "sets" can be grouped under two headings: a general or "soft" illumination and the modeling or "hard" lighting. In the general lighting of the set, a uniform flood of illumination is directed to all parts of the set. This lighting should not model the subject in any way but should provide a general even illumination to serve as a foundation for the modelling lights. This form of lighting is usually accomplished by the use of "broad-sides" and overhead units. The "broad-sides" are required to provide a uniform illumination through an angle of approximately 60 to 90 degrees. These units are generally placed across the front of the set. The overhead lighting is provided by the use of "scoops" and "domes" and supplements the "broad-sides" in illuminating the rear of the set.

The 1000-watt and 2500-watt PS-52 bulb clear lamps have proved most satisfactory for this service. Most of the studios are at present using equipments which are adaptations from old units but more efficient lighting results can be obtained with the use of equipment designed particularly for the incandescent source. The mistake should not be made of using a higher priced concentrated filament lamp for this source when the less concentrated types are better.

After a general illumination has been provided, a light of some two to four times the general room intensity is directed on to the actors usually from the rear and sides and frequently from the front for the purpose of producing high lights and stronger contrast so as to give depth to the picture and make the actors stand out. This lighting is accomplished by the use of spot lights, and for this purpose the 2000-watt G-48 bulb and 5000-watt G-64 bulb lamps with concentrated filaments have proved themselves satisfactory. These lamps are generally used in search light type units with accurately ground parabolic reflectors. Where very strong high lights are required, such as would be obtained from sunlight, the 10,000-watt in a 24-inch parabolic reflector unit has given considerable success. Equipment which will redirect light efficiently within the proper angle and suited especially to the physical characteristics of Mazda lamps is now being developed.

## DISCUSSION\*

MR. RICHARDSON: What is the candle power of the lamp?

MR. FARNHAM: The mean spherical candle power of the ten-kilowatt lamp is approximately 23,000. In a direction perpendicular to the plane of the filament it is 35,000 candle power.

MR. CUFFE: Do you have to light it through a rheostat?

MR. FARNHAM: This lamp should be "warmed up" at from 40 to 70% rated volts for about 20 seconds before the full line voltage is turned on.

DR. GAGE: What is the color temperature of the filament?

MR. FARNHAM: It is about 3000° Kelvin for the 10-kilowatt lamp.

MR. RICHARDSON: What is the degree of vacuum?

MR. FARNHAM: These lamps are gas filled to a pressure of about 600 mm. as compared to atmospheric pressure of 760 mm.

MR. RICHARDSON: What is the vacuum of an ordinary incandescent lamp; what percentage is the evacuation?

MR. FARNHAM: The vacuum lamp has a pressure of about 1/10,000,000 of a millimeter. In other words, only about 0.00000013% of air remains in the lamp.

MR. BAUER: What is the life of the lamp?

MR. FARNHAM: The rated life of the 10-kilowatt lamp is 100 hours.

MR. BAUER: We had a few of these at the Famous-Players studio and they didn't last more than 10 hours.

MR. FARNHAM: The 10-kilowatt lamp was originally developed for lighting of aviation landing fields, and it was found to have a useful application in motion picture photography; hence, the lamp has been used to some extent for this work. However, the different operating conditions which the lamp encounters in studio service has resulted in many early failures. The lamp manufacturers are altering the design of this lamp so as to make it practical for studio work.

MR. CUFFE: How does this compare with the straight arc on the tilt?

MR. FARNHAM: Tests which we have made of the broadside arcs show it to give about 13,000 candle power directly in front of the unit. The maximum power of 10-kilowatts is about 35,000. However, this is without any reflecting equipment used in conjunction with the lamp. The side arc and the 10-kilowatt lamp can hardly be compared because their applications in motion picture photography are widely different. The 1000 and 2500 PS-52 bulb lamps, when used in conjunction with suitable equipment, give even greater light output than the side arc.

### THE MODEL 3 VICTOR CINE CAMERA\*

The latest Victor product, designated the model 3 Victor cine-camera, incorporates with the usual features deemed standard for amateur cameras several new and useful accomplishments. Foremost among these is an adjustment for speed of the mechanism, permitting the taking of slow-motion and normal pictures alternately on the same film. The ultra speed for slow-motion is regulated in the stock camera to 4 times normal, this being determined the practical speed for amateur-made slow-motion pictures. A half turn of the operating button accomplishes the change from one speed to the other. The speed may also be regulated to half normal. The operating button may be locked down on normal speed to permit the operator to enter his own picture. Also it may be locked in non-operating position to prevent running film accidentally when the camera is not in service.

\*Victor Animatograph Co., Davenport, Iowa.

The Victor camera is driven by a duplex spring motor, three windings of which will run through 100 feet of film. The spring winds very smoothly and quickly with the same crank which serves for operating the camera by hand. Automatic stops prevent excessive winding or unwinding. Starting and stopping even when set at high speed is accomplished very silently and smoothly and without vibration. The shutter covers the aperture when the mechanism stops.

Provision is made for using interchangeably the several makes of lenses now offered the amateur trade for 16 mm. cameras. This list includes the several focal lengths between one and six inches, and the varying speeds up to  $f/1.5$ . The exposure meter is built into the door. The correct diaphragm settings of the usual average scenes under varying light conditions are given by a direct-reading movable indicator.

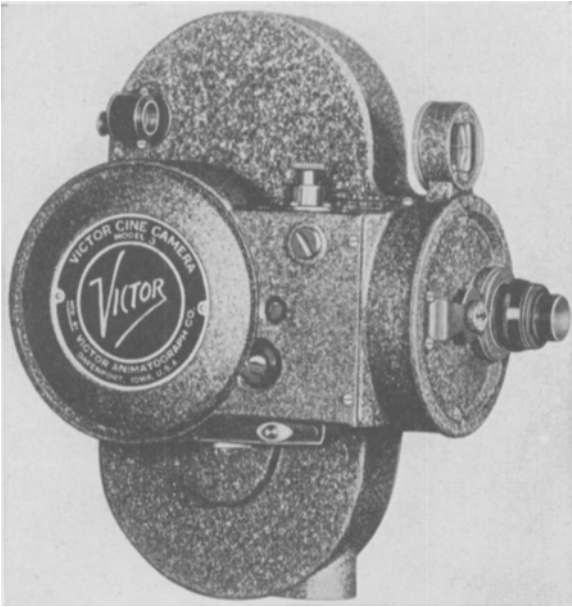


FIG. 1. Victor Cine Camera Model 3, Side View.

Another innovation is the compensating view finder of the telescopic type. The sight is adjustable for distance to correct the angle of error between the finder and taking lenses. This eliminates the need of supplementary finder attachments for use with telephoto lenses.

To prevent the taking of "up-hill" pictures, a pendulum level registers with the vertical etched line of the finder lens.

An automatically set film measure registers the footage of unexposed film in the camera.

The film driving mechanism has been very greatly simplified. A single claw action is permanently synchronized with the shutter. One feed sprocket only is used.

The convenient location of the view finder and operating button makes the Victor cine-camera very easy to hold and operate.

The instrument is constructed of die cast aluminum; the weight complete is  $4\frac{1}{4}$  pounds; the size is  $3\frac{1}{4}$  by 8 by 6 inches.