COMMITTEE ACTIVITIES

REPORT OF STUDIO LIGHTING COMMITTEE*

EQUIPMENT

The report of the Studio Lighting Committee presented at the Hollywood meeting dealt with the various illuminants that could be employed for motion picture photography. This report supplements the preceding one, and discusses the various kinds of lighting equipment, power supply, and distribution systems and wiring practice, in order to make available the information on lighting equipment and practices employed in producing professional motion pictures.

An analysis of the characteristics of studio lighting equipment is facilitated by grouping them into two general classes: (*a*) those employed for general illumination, and (*b*) equipment particularly adapted for modeling lighting. Lighting units of the first group are characterized by a broad light distribution, 60 degrees or more, and are used to produce a relatively uniform illumination over a considerable area. Into this class fall the Broadside, the Rifle, the Dome, the Scoop, Strip Lights, Backing Lights, Floodlights, and various other devices giving a wide distribution of light.

Modeling lighting equipment gives a relatively narrow beam spread, 2 to 30 degrees, producing high intensities over limited areas. Typical units of this class are the reflector spot (also called sun spot), the lens spot, and the soft spot.

This grouping of lighting equipment is based on their more general usage. However, studio lighting requirements frequently necessitate the use of modeling lights for general illumination, and *vice versa*.

GENERAL LIGHTING DEVICES

Broadside unit.—The broadside unit (Fig. 1), available with both incandescent and arc lamps, is provided with one, but more often two, light sources. The lamp housing has a porcelain enameled steel reflector for redirecting light, that would otherwise be wasted, back to the area illuminated. The housing is equipped with holders so that glass or silk diffusing screens may be used for creating, in effect, a

* Presented at the Fall, 1931, Meeting at Swampscott, Mass.

larger area source, thus softening the light. The light distribution is quite uniform over a vertical and horizontal angle of 130 to 140 degrees. The incandescent lamp broadside uses 1000- or 1500-watt pear-shaped bulb lamps, and the arc type uses two 35-ampere automatic arcs operating in series. Broadsides are mounted on a three-legged adjustable stand, which permits the lamp to be raised from about $4^1/_2$ to 8 feet, and tilted. Means are also provided for attaching the lamp house to the base when light is required near the floor.

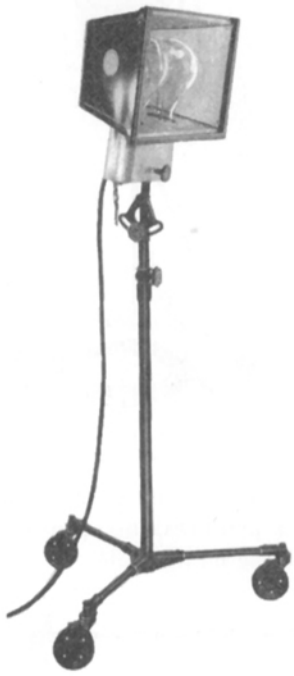

FIG. 1. M-R Type 20. Double side lamp.

FIG. 2. M-R Type 211. Rifle lamp.

The twin arc broadside is still the conventional general illumination unit where arc lighting is employed. The incandescent broadside is being largely superseded by the more efficient "rifle" (Fig. 2) units and floodlights. The broadside is most generally employed as a floor unit for the general lighting of small and medium sized sets. More detailed information relative to its use is given in the section on lighting practice.

Rifle Unit.—The rifle unit is a product of incandescent lighting. It consists of a deep circular reflector about 18 inches in diameter, and a 1000- or 1500-watt, PS-52 bulb lamp is generally used. The reflector

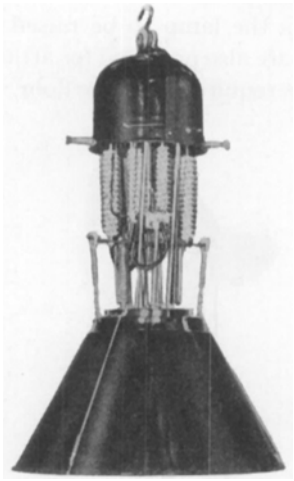

FIG. 3. Fifty-amp. arc dome with silent working mechanism and built-in resistance for 110 volts.

FIG. 5. M-R Type 125. Bowl lamp.

is made either of silvered glass or of chromium plated metal. The reflecting surface possesses spiral flutes which break up striations and irregularities in the illumination; hence the name "rifle."

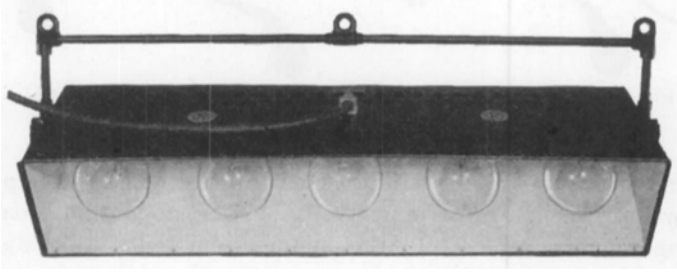

FIG. 4. M-R Type 30. Overhead strip lamp.

This lighting device is employed and mounted in a manner similar to the broadside, the greater part of the light distribution is confined

to an angle of about 60 degrees. The efficiency of the unit is very high and from 50 to 70 per cent of the light output of the lamp is available at the area to be illuminated.

Scoop.—The scoop is similar in general design to the broadside except that the reflector is shaped so as to direct the greater part of the light through a vertical angle extending downward from the horizontal. Since the scoop is designed primarily to be mounted overhead it is not provided with a floor stand. It is available either with the arc lamp

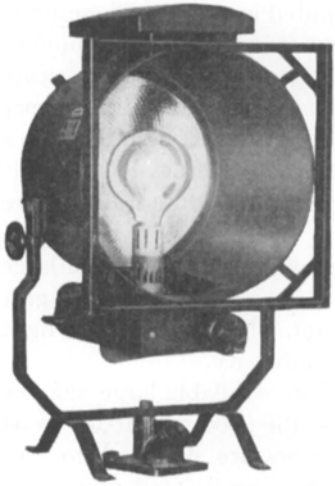

FIG. 6 (*a*). One hundred and fifty-amp. arc illuminator. (Available with facetted mirror and ground glass parabolic mirror.)

(*b*). Two- or three-kilowatt incandescent spot (available with ground glass, facetted, and stippled parabolic mirrors) on spot rail fitting. (Illustration with stippled mirror.)

or with 1000- or 1500-watt incandescent lamps. It is used relatively little in incandescent lighting since the rifle unit can be readily substituted. The greater efficiency of the rifle unit gives it a decided advantage over the older forms of scoop.

Dome Light.—This unit (Fig. 3) is designed primarily to be mounted above motion picture sets and to give a general uniform flood of light throughout the set. In arc lighting practice, domes are available having from one to four lamps. In incandescent practice, domes are used

to a limited extent, and possess usually ten or twelve 1000- or 1500-watt PS-52 bulb lamps.

In incandescent lighting practice, the dome has largely been superseded by an overhead lighting unit consisting of 4 to 12 rifle reflectors mounted on a single suspension device. Since individual reflectors around each lamp are far more efficient in directing light where it is desired than a single large reflector for a group of light sources, this latter device gives far greater illumination intensities for the same wattage than the dome.

Strip Lights.—These (Fig. 4) are an outgrowth of incandescent lighting practice, and they usually consist of a long, porcelain enamel, trough-shaped reflector about 18 inches wide and 60 inches long. Five 1000-watt PS-52 bulb lamps are mounted in a row. These units are available with floor stands, and without stands but with a number of suspension rings. The strip light finds its greatest use as a substitute for the dome unit, and when used in this manner several strips are hung side by side. The strip light is also used to direct light through a doorway, behind columns, *etc.* The greater compactness of this unit over broadsides giving the same light output makes it desirable where it is necessary to use the doorway.

Backing Lights.—The backing of a motion picture set is the large curtain that often surrounds three sides of the set and is used to give the effect of sky or to produce a background. It is necessary to light this backing very uniformly and to a high intensity.

In incandescent lighting practice there are available large shallow chromium plated metal reflectors that use the 5000- and 10,000-watt incandescent lamps (Fig. 5). These reflectors are designed to give a very wide uniform distribution so that they can be used quite close to the backing.

Floodlights.—In arc lighting practice high intensity arc lamps either in their housings but without reflectors, or the bare lamps themselves, are commonly used. Where space is available large numbers of broadsides or floodlights are used, especially to give a high intensity of illumination near the floor.

There are also available a number of small miscellaneous lighting devices, some consisting of only a socket and a semi-cylindrical metal reflector. These devices usually employ the 1000-watt, 115-volt tubular bulb projection lamp. They are primarily used to secure a high intensity of illumination over a limited space, such as behind statues, clocks, vases, *etc.*

FIG. 7. M-R Type 324. Twenty-four inch "Integral Inkie" sun spot.

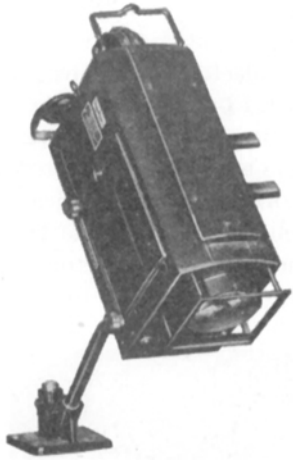

FIG. 8. Twenty-five amp. arc spot on spot rail fitting.

FIG. 9. M-R Type 26. Two thousand-watt "Integral Inkie" studio spot.

MODELING LIGHTING DEVICES

Reflector Spots.—The most generally used modeling lighting devices are the reflector spot lamps. For arc lighting practice they are available with 18-(Fig. 6), 24-(Fig. 7), 36-, and even 60-inch reflectors, and in incandescent practice 18-, 24-, and 36-inch reflectors are used. The reflectors are generally mirrored glass of a parabolic contour.

Mirrors employed for incandescent service usually have a shorter focal length than those of the same diameter used with arc lamps. The incandescent reflector spots operate with beam spots having spreads varying from 7 to 30 degrees. The arc spots vary from 2 to

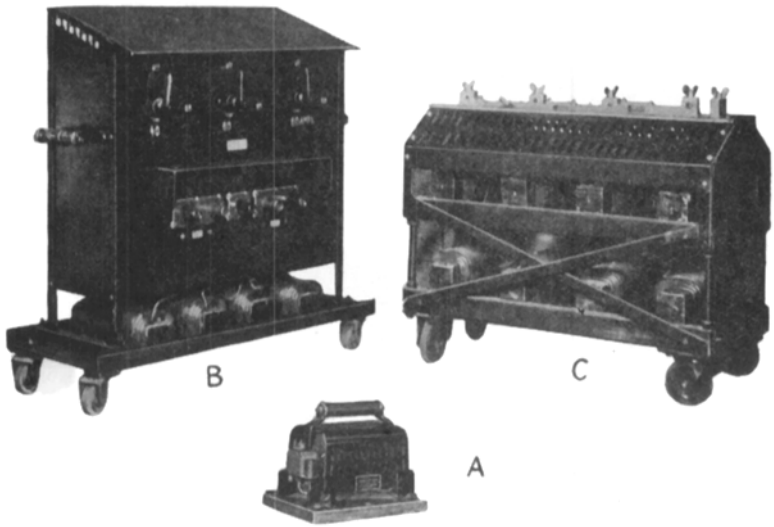

FIG. 10 (*a*). Fifty-amp. choke. (*b*) Resistance and choke combined for 150-amp. sun arc. (*c*) Three hundred amp. choke for 300-amp. arc lens. or two 150-amp. suns, or four 75-amp. arcs.

30 degrees. Practically all the arc lamp reflector spots use the 150-ampere, high intensity arc lamp with rotating electrode. For incandescent lighting, the 2000-watt, 115-volt G-48 bulb monoplane filament lamp is used with the 18-inch reflector; the 5000-watt, G-64 bulb with the 24-inch spot; and the 10,000-watt, 115-volt, G-96 bulb lamp is used with a 36-inch mirror.

Control of the beam spread is obtained by moving the light source from the focal point where maximum concentration is obtained toward the mirror. The great advantage of this type of lamp is that the

mirror intercepts light through an angle of 120 to 140 degrees, thus utilizing a relatively large proportion of the available light. These reflector spot lamps are usually provided with mountings so that diffusing glass doors or prismatic lens doors, giving a horizontal beam spread, can be attached. There have recently been made available a number of metal mirrors, usually chromium plated, designed to give some diffusion so that the illuminated spot produced has a high intensity center, and the illumination gradually falls off toward the edges.

Lens Spots.—The lens spot lamp employs a plano-convex lens 6, 8, 10, and 12 inches in diameter (Figs. 8 and 9). The particular advantage of the lens spot is that all the light emitted is contained within the beam and there is no spill light; also, the beam spread can be controlled with great uniformity, through a wide range at all times. Its particular disadvantage is that the light is intercepted at the lens in a small angle, 30 to 45 degrees, and hence the volume of light contained within the beam of a lens spot is much less than that of a reflector spot of equal wattage. In arc lighting practice, lens spots are available using both open and the high intensity arc with 70-, 80-, 100-, 120-, and 150-ampere ratings. Incandescent lamp lens spots employ either the 1000- or 2000-watt, monoplane filament, 115-volt lamps. A spherical mirrored reflector placed behind the lamp is always employed with incandescent spot lamps for redirecting into the beam much of the light that would otherwise be wasted.

Soft Spot.—The soft spot is another outgrowth of incandescent lighting, and consists of a glass reflector of a modified parabolic contour, in some instances the surface of the reflector being stippled. The illumination is produced by a fairly well-defined beam having a high intensity center that tapers off at the edges. Movement of the lamp in and out of the reflector produces some control of the beam spread. The soft spot is largely used in close-up work.

CHOKE COILS

Various types of rugged induction coils have been developed for use in series with d-c. arcs for filtering out commutator hum. Three types of these are shown in Fig. 10.

DISCUSSION

PAST-PRESIDENT CRABTREE: Has any practical application been made of photometers for measuring intensity in studios?

MR. PALMER: No. We have tried to use photometers, and have spent a great deal of time in the effort to do so, but have always encountered the diffi-

culty that photoelectric cells are not constant in their reactions, and that a reading obtained from a certain cell one day does not check with the reading obtained under the same conditions the next day.

PAST-PRESIDENT CRABTREE: A cameraman in Hollywood suggested that, if a rheostat or some means of controlling the intensity were attached to each lighting unit, it would be of great assistance to him in his work.

MR. FARNHAM: In one of the West Coast studios, a number of banks of semi-portable rheostats have been made up, that can be moved to the set and into which various lighting units can be plugged, so as to obtain various dimming effects.

MR. PALMER: Mr. Crabtree's suggestion is to apply a control unit to each individual lamp. We frequently have occasion to dim a single lamp, and find it necessary instead to put on another diffuser or, perhaps, two more diffusers, in order to soften the light. A simple, light, easily worked device for reducing the voltage of the individual lamps would certainly help in many cases, and would save a lot of time in the studio.

MR. MOLE: The banks to which Mr. Farnham referred were made only for effects; for certain sunrise effects or to dim the entire set and the like. The cameramen always wanted a control at each lamp, instead of having to apply diffusers. But a great deal of equipment would be required, and, if any more gadgets are connected to a lamp, difficulties will result. We have found that in studios the simplest equipment, having the least number of connections, is the successful equipment. The personnel is not as well trained as that in the projection room where the equipment remains in one spot and where it is not difficult to add auxiliary parts to supplement the main equipment.

MR. BARTON: Does not the actinic value of incandescent lamps change rapidly in the useful range, so that the effect of the resistors may be to decrease the actinic value considerably without decreasing greatly the apparent brilliancy?

MR. PALMER: That is one of the difficulties that would be encountered if we should dim a lamp by using a resistor. But experience quickly teaches how much dimming is necessary, and how much difference a slight change will make in the photographic value of the lamp. The new film is quite sensitive to red and yellow light, so that the introduction of a resistance into the lamp circuit would not necessarily render the lamp useless.

PAST-PRESIDENT CRABTREE: Are the studios taking advantage of the increased sensitivity of the film? Are they reducing the intensity of the lamps, or are they using the same number of lamps and simply adding a few more diffusers?

MR. MOLE: When the new film first came to Hollywood, many cameramen used it in tests and found that excellent results could be obtained with about fifty per cent of the former illumination. It appeared as though half the number of lamps would be needed, and half the wattage. The studios were very much encouraged over it, as they felt that it was going to cut down their expenses.

But actually, in a production, the cameramen do not have the time to adjust each light. They cannot take the time to fuss around with the adjustments, as the saving achieved in using less wattage or fewer units would not warrant the additional time required to shoot the picture.

After a few months, it was found that, although the wattage was reduced to about seventy-five or eighty-five per cent of the former value, the number of units was about the same. No appreciable reduction in lighting expense was noticed. However, the new film is being used in many productions; I should say that seventy per cent of the productions in Hollywood are being made with the new film.

MR. FARNHAM: I wonder if the cameramen are not stopping down the lenses more, improving the photographic quality, and thus taking advantage of the new film in that manner, instead of endeavoring to reduce the wattage?

MR. MOLE: That depends on the cameraman; some feel that sharp photography is not artistic photography and would not prefer the sharp pictures to the so-called artistic pictures that are continually being produced.

MR. MITCHELL: I think the question is not so much that of saving light, as in having a sufficient number of point sources of light to permit satisfactory adjustment of the shadows, or to obtain the requisite detail in the shadows; in many cases, and, in fact, in most cases, these requirements involve quite a number of sources of light. By using the same number of lamps they can be controlled by diffusers, reducing the over-all illumination, but keeping the general illumination unchanged—that is, the balance of the illumination. If the lens is stopped down, the desired effect is entirely lost.

PAST-PRESIDENT CRABTREE: Could not someone deal with one particular treatment? In the matter of lighting, the conception of the artist is definite. He has a picture in his mind of what he wants or at least he should have, before photographing the set. It is purely a matter of technic in getting the result, and I wonder if someone could not outline in black and white how to get it.

MR. MOLE: The same result can be obtained using various technics. The cameraman can obtain about the same results with entirely different forms of lighting. A paper written on such a subject would describe Mr. Jones' lighting; another would describe Mr. Smith's lighting; and so on. That is their stock-in-trade, and the cameraman cannot be expected really to disclose it or publish it. I dare say you could place every lamp in the same manner that he does, and shoot the picture; and you would not get the same result that he does. There is some individual touch that he has, in painting that picture with light, in being able to obtain certain effects that another cameraman would not obtain with the same set-up.

PAST-PRESIDENT CRABTREE: I disagree with Mr. Mole. If the lamps were placed in the same position, with the same intensities and at the same angles, under the same conditions the results would be identical.

MR. MITCHELL: I agree with Mr. Mole. I have seen a cameraman photograph the same scene that another cameraman had previously photographed, with lights approximately in the same position, and the results would be entirely different. They develop, through experience, an uncanny sense of light. The cameraman may put a diffuser on, or move a light back two feet, and although the change may not be noticeable to the eyes, it makes a difference in the photography of the picture.