

the low-frequency baffle. This operation is facilitated by a screw adjustment on the rear support.

Overall Response.—While it has not proved generally practicable to make sound-pressure measurements in theaters, extensive listening tests show that satisfactory overall results are being obtained.

Conclusions.—Consideration of the foregoing will show that the specifications described herein have been met in detail. This is substantiated by the performance this apparatus is giving in service. It is consequently felt that a very definite step has been made in the progress of sound motion picture reproducing equipment. The author wishes to acknowledge the practical contributions received from many members of the motion picture industry and also, the personnel of the sales, service, and engineering divisions of the RCA Manufacturing Co., Inc., which were of material aid in the design of these equipments.

A HIGH-INTENSITY ARC FOR 16-MM PROJECTION*

H. H. STRONG**

Present-day application has lifted 16-mm projection from the strictly portable classification to that of permanent installation in theaters where newsreel service is supplemented with local coverage; in classrooms, since more extensive film service is available and where safety is an important factor; and in large auditoriums where lectures are illustrated by personal film.

However, where large screens are used, it is necessary to employ the high-intensity arc as a light-source to secure a picture brilliancy and color that is at all comparable to theater projection.

To that end has been developed a high-intensity arc which will project approximately 1000 lumens of light with the projector running. This is sufficient light to project a picture up to sixteen feet in width, with the white-light characteristic of the high-intensity arc. This is approximately three times the light secured with a 750-watt commercial Mazda projector.

In designing a high-intensity arc for 16-mm projection, the limiting factors have been film damage due to aperture heat; the burning time without retrimming; the lamp current consumption; optical speed; physical dimensions and weight; simplicity of operation; safety; costs; and Underwriters' requirements for non-theatrical use.

By experimentation, it was determined that a 30-ampere high-intensity arc produced the maximum amount of light that could be projected without buckling the 16-mm film, even though protected by heat-absorbing filter and air-blast.

Since 50 minutes is the running time of a 400-foot 16-mm sound-reel, a carbon burning time of one hour without retrimming was established.

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** Strong Electric Co., Toledo, Ohio.

To meet the 30-ampere, 60-minute requirements, the National Carbon Company developed a carbon trim which is marketed under the name of *Pearlex*. The positive carbon is 6 mm in diameter and 8 inches long, and the negative is 5.5 mm in diameter and 6 inches long. Both are copper coated.

These carbons, like the *Suprex* used extensively in 35-mm projection, are of the high-intensity type and are very efficient in the production of projection light of desirable quality.

The light-source of a 30-ampere, high-intensity arc is of such an area that it requires a magnification of four diameters to cover effectively the 16-mm film aperture. A reflector $10\frac{1}{4}$ inches in diameter, with a geometric focus of 4 inches, is set 16 inches from the film aperture, resulting in an f value of 1.6, which matches the $f/1.6$ lens commonly employed on 16-mm projectors.

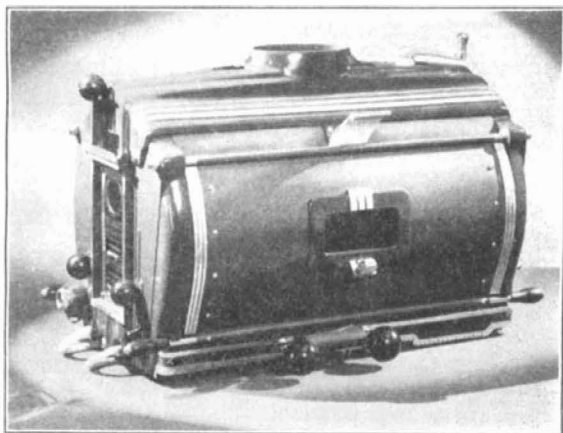


FIG. 1. H.-I. arc for 16-mm projection.

The lamp house follows standard theater practice in design but is built in diminutive proportions. There are horizontal, vertical, and focus adjustments for the reflector; manual controls for the carbon alignment; an adjustable-speed motor for feeding the carbons; an arc imager; an ammeter for reading the current at the arc; and individual supports close to the arc for guiding both the positive and the negative carbons.

The 8-inch positive carbon, which is in horizontal coaxial alignment with the 6-inch negative carbon, the $10\frac{1}{4}$ -inch diameter of the reflector, as well as the control motor, have all determined the physical dimensions of the lamp, which are 23 inches by 13 inches by 13 inches, with a weight of 50 pounds (Fig. 1).

Since the 16-mm projector is usually operated without the fireproof projection booth and by the lay projectionist, the Underwriters have required a switch that cuts off the line current when the lamp house door is opened.

The direct-current power for the 28-volt, 30-ampere arc is supplied by a single-phase, full-wave rectifier in which are used two 15-ampere Tungar tubes.

The live parts of the lamp are effectively insulated from the grounded line current by the use of a separate primary and secondary winding in the transformer. There is also a smoothing reactor which is connected in the direct-current circuit to the arc; this reduces the a-c component and the resultant light flicker to a commercial acceptance.

Within the rectifier are also housed the necessary switches for manual adjustment of the current to the arc; an a-c line voltmeter; overload circuit-breaker; and the line relay, which is connected to the lamp house door switch.

The a-c load or rectifier input does not exceed the 15-ampere limit provided by any 110-volt convenience outlet.

NEW 16-MM RECORDING EQUIPMENT*

D. CANADY**

New models of Canady recorders and film-phonographs are slightly different in design from the previous ones. While some improvements have been added, the basic reason for re-design was to have a film-driving mechanism that would be equally suitable for both 16-mm and 35-mm recorders and film-phonographs.

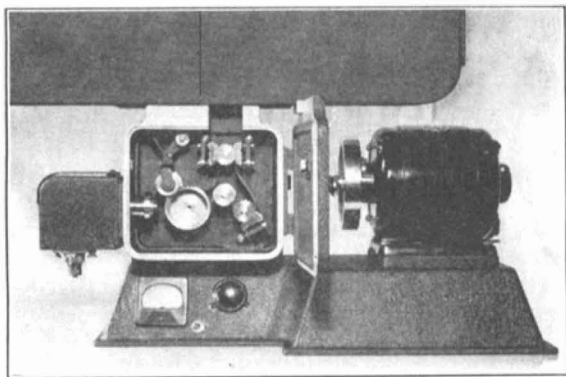


FIG. 1. Film-phonograph unit.

Worm drives of various combinations permit assembly of equipment for any format and for operation on any power supply. The 2-inch scanning drum has been retained for both formats, as scanning drums of too short a radius affect sound quality through light spread at the scanning point.

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** Canady Sound Appliance Co., Cleveland, Ohio.