NEW MOTION PICTURE APPARATUS

During the Conventions of the Society, symposiums on new motion picture apparatus are held, in which various manufacturers of equipment describe and demonstrate their new products and developments. Some of this equipment is described in the following pages; the remainder will be published in subsequent issues of the Journal.

A NEW CLASSROOM 16-MM SOUND PROJECTOR*

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The new Ampro classroom 16-mm sound projector has been designed to meet the following requirements:

(*1*) *Light in Weight and Easy to Set Up.*—This is important because it is not practicable to keep the projector always set up for use in the classroom and if the instrument is not easy to handle and use, the teacher will be reluctant to operate it.

(*2*) *Simple in Operation.*—It must be sufficiently easy to operate so that teachers and pupils will have no difficulty in using it properly.

(*3*) *Quietness of Operation.*—Noise in the classroom is distracting and makes intelligibility of sound difficult. While a blimp will help to reduce this noise, it involves enclosing the machine and thereby making the component parts less accessible.

(*4*) *Natural Sound Free from Distortion.*—Poor sound will cancel the good effects produced by the picture and make it difficult for the pupils to concentrate.

(*5*) *Brilliant Illumination.*—At best, showing pictures in a classroom where perfect darkness is rarely obtained requires maximum illumination.

The new projector, in a single carrying case $19^1/_2$ inches long, $10^1/_2$ inches wide, and $15^1/_2$ high, has a total weight of 49 pounds, including speaker, cords, and 1600-ft take-up reel. To set up, the projector is placed either on a table or on the upturned bottom half of the carrying case, the reel arms are swiveled into position and connections made to speaker and line current (Fig. 1).

Operating controls are all centered on an illuminated panel. This panel contains starting and stopping switch, lamp switch, volume and tone control and hiss eliminator. The latter is designed to compensate for low line voltages so that full volume can be obtained at all times, within a line voltage range of 100 to 125 volts.

Threading is simplified by using only two sprockets (Fig. 2), the film being threaded in a straight line without film cross-overs. All metal parts in contact with the film are relieved for sound-track and picture areas in order to avoid any pos-

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sibility of scratching. Tension on the film is applied by pressure on its edge and also on that side of the film where the sprocket-holes are located. Thus the line of force of the pull-down movement is coaxial with the film tension, thereby providing steady movement and avoiding excessive strain on the film.

One of the most troublesome details in threading a sound projector is the necessity of insuring an exact spacing of twenty-five frames between the aperture and the scanning beam of the corresponding sound-track. This difficulty is due

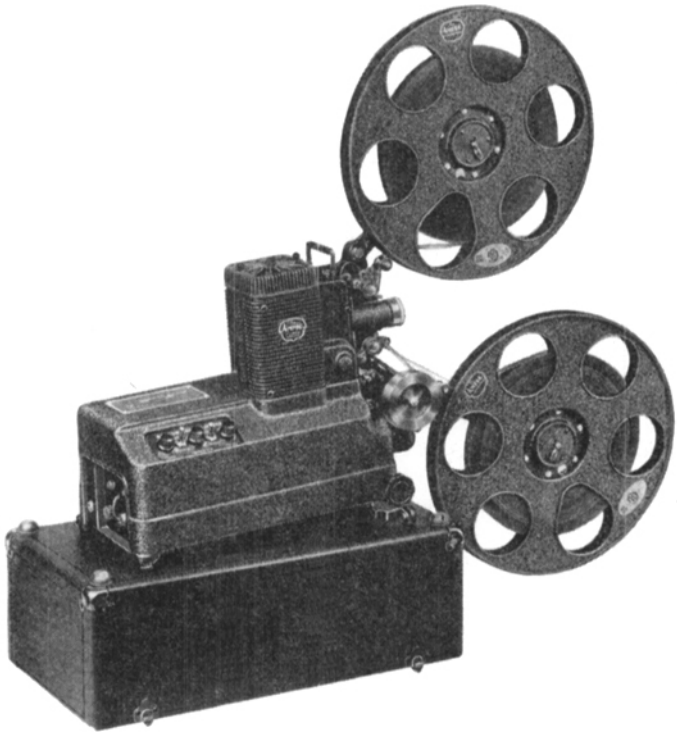

FIG. 1. Projector set up for use, mounted on upturned lower half of carrying case.

to the fact that the lower loop of necessity varies in size (Fig. 3). To avoid this an automatic loop-former has been developed. After threading through the aperture, the film is kept taut before being threaded around the sound-head and then to the take-up sprocket. The automatic lower-loop-former is then released, forming a lower loop of fixed size. In this way there are always exactly twenty-five frames between the aperture and the scanning beam of the corresponding sound-track.

Quietness has been achieved by developing a pull-down mechanism having a cam operating at 1440 rpm, as compared with speeds of 2880 and 4320 rpm found

in other projectors. The design of this cam is such that an $8^1/_2$:1 ratio is obtained between the period during which the film is stationary and that during which it is moving. This results in high light efficiency comparable to that obtained in projectors operating at much higher speeds. Another factor in obtaining quiet-

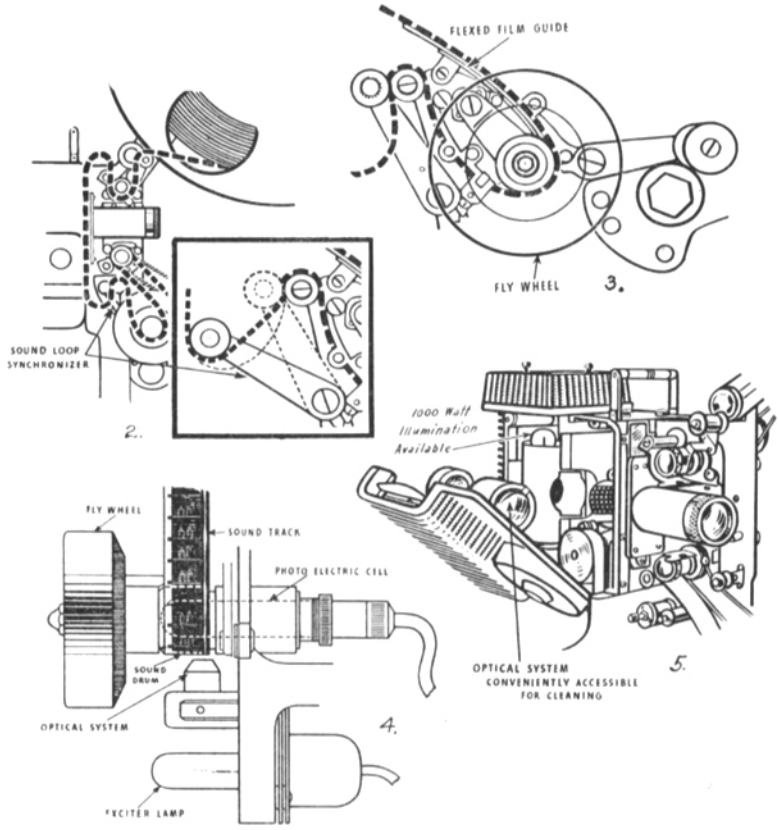

FIG. 2. Showing simplified threading through aperture gate and sound-head.
FIG. 3. Close-up of film path through sound-head.
FIG. 4. Arrangement of sound system.
FIG. 5. Showing optical system mounted in front cover to facilitate cleaning reflector and condenser lenses.

ness is the development of a ventilating fan delivering a large volume of air at a low velocity. By reducing the speed of the mechanism and also the air noises, the operation of the new model is extremely quiet. In fact, without a blimp this machine is quieter than previous models enclosed in blimps.

High-quality sound depends to a great extent upon uniform and steady movement of the film while it is passing by the scanning-beam. Ordinarily, this is ac-

complished by means of a flywheel and an electrical governor to compensate for variations in line voltage. This new model, however, uses a special shaded-pole motor which, for uniformity of motion, surpasses the electrically controlled governor. This is in addition to an accurately balanced flywheel mounted on aeroplane type grease-sealed ball-bearings. The bearings lie between the flywheel and the revolving sound-drum. In this way a balance is maintained, giving excellent dampening action (Fig. 4).

A prefocused exciter lamp is used, which can be instantly interchanged without adjustment (Fig. 5). The path of light from the exciter lamp to the photocell is direct without the use of a reflecting mirror. The sound-head is removable from the projector as a single unit in order to facilitate servicing. The film is guided to and from the rotating sound-drum by curved film-guides, which, by their convex forms, flex the film in constant arcs so as to void lateral vibrations that would impair sound quality.

The amplifier is a class *A* type designed to be used with metal tubes. Four tubes are used. The power output tube is a *6L6;* the driver tube *6N7;* the voltage amplifier *6J7;* the rectifier tube *5W4*. The output obtained is $7^1/_2$ watts with a total harmonic distortion of less than 5 per cent.

The projector is supplied with a standard 750-watt medium base prefocused projection lamp. However, ventilation is sufficient to take care of a 1000-watt lamp. Standard lamp sockets are used so that no special lamps are required.

The loud speaker is contained in the upper half of the carrying case and consists of an 8-inch permanent-magnet dynamic speaker of high-fidelity type. Fifty feet of rubber-covered speaker cable with telephone jacks for easy connection to the amplifier and speaker are provided. Extensions can be added if desired. There is provision for plugging in either a microphone or a phonograph.