NOTES ON FRENCH 16-MM EQUIPMENT*

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In France, la Société des Télephones Ericsson recently introduced their 16-mm projector equipped with the new mercury arc. The projector originally designed for small audiences is now quite capable of competing with standard 35-mm machines. The complete projector draws approximately 9 amperes at 110 volts, and the screen brilliancy compares very favorably with the output of machines equipped with carbon arcs drawing 45 amperes.

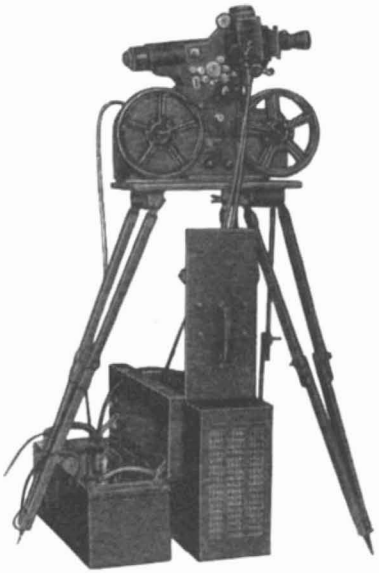

FIG. 1. Ericsson 16-mm projector with mercury arc.

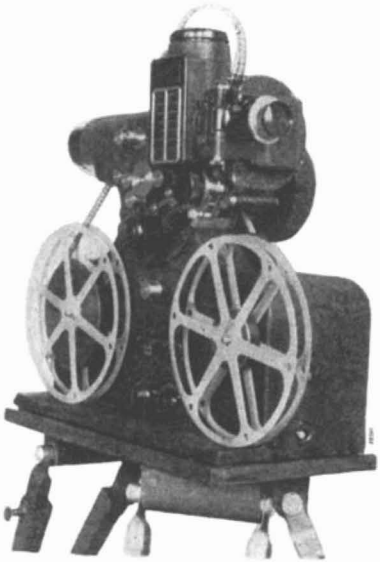

FIG. 2. Mechanism of Ericsson projector.

Some of the advantages claimed are: increased safety-factor as compared to the carbon arc; no smoke or heat, as the lamp is water-cooled; and a minimum amount of space is required for the complete outfit. It can be used without a booth and the equipment is easily portable.

The projector set up ready for operation is shown in Fig. 1. The two cases beneath the machine contain the electric controls and the water-cooling system, respectively. The latter consists of a motor-driven pump and radiator. If,

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for any reason the water supply is interrupted, an automatic control instantly breaks the circuit going to the mercury arc.

The mercury arc lamp is connected to the water supply by shielded rubber hose. The lamp is composed of a thick-walled quartz tube in which are mounted two tungsten electrodes with a drop of mercury between them under a pressure of 100 atmospheres. An outer shell permits cooling water to flow around the lamp.

The Ericsson 16-mm sound projector mechanism possesses some unusual features. Fig. 2 shows the mechanism while Fig. 3 illustrates the arrangement of the parts: *1* is a synchronous motor connected to the drive shaft by a flexible coupling *2; 4* is a worm drive actuating the film feed sprocket *5; 6* fan for ventilating the lamp; *7* flexible coupling; *8* two-bladed shutter; and *9* the cam for the claw movement.

The entire mechanism is scientifically ventilated. An opening properly placed permits the fan 6 to draw cool air past the aperture.

The amplifier and the preamplifier for the photocell are mounted in the base of the ensemble.

The sub-standard Oehmichen (Paris) projector (Fig. 4) is unique in that it em-

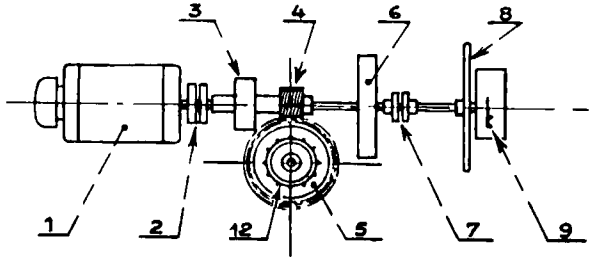

FIG. 3. Diagram of Ericsson mechanism.

ploys no toothed sprockets and provides automatic loop regulation. In Fig. 5, D is a roller having marginal rubber tires the peripheral speed of which is slightly greater than the average speed of the film. The pad roller G_1 is attached to the film-gate and is located at a suitable distance from the roller D.

When film is pulled down by the intermittent movement and the loop B_1 decreases in radius, the pressure of the film against the roller D increases rapidly. As D is moving at a greater speed than the film, the loop is quickly restored. As the radius of the loop increases, the pressure against D is gradually lessened to the point where there is little or no traction.

After leaving the intermittent movement the film passes under the pad roller G_2 and over the rubber-tired roller E, which has a peripheral speed slightly *less* than that of the film, forming the loop B_2. Pad roller G_2 is located at a point near the roller E so as to "strangle" the loop B_2. When the radius of loop B_2 decreases for any reason, the film pressure against E increases and the loop is quickly restored to its normal size.

In brief, a slight reduction in the radius of the loop brings into play the phenomena which tend to return it to its normal size. This constitutes the principle

of automatic regulation. As no sprockets are used, the film passes through the projector without subjection of perforations to strain.

In "threading," careful adjustment of the loop is unnecessary. Once the machine is under way it assumes control, and maintains loops of the proper size regardless of the condition of perforations or film shrinkage.

The projection room of the Musée de l'Homme at the Trocadero (Paris) is equipped with an unusual outlay of apparatus to accommodate the various formats now in use in France. Destined to be used by scientific bodies in presenting films of documentary nature, nothing has been spared to achieve the utmost in fidelity of sound.

In addition to two 35-mm projectors, the installation includes one 16-mm Kodak projector, one 17.5-mm Pathé projector, and one 9.5-mm Pathé projector, each of which is fitted with a specially built sound head. All substandard projectors are fitted with carbon arc lamps. Film at each aperture is cooled by a strong air blast.

The amplifying equipment is quite comprehensive and includes several racks which are readily accessible for inspection, testing, *etc.* This unusual installation was handled by Film et Radio (Paris) under the direction of an American engineer. Other than certain projectors, all apparatus is of American manufacture.

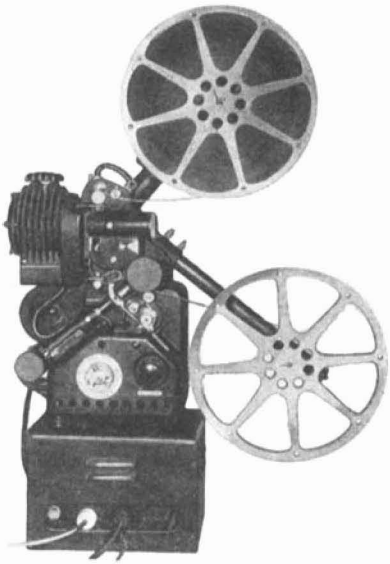

FIG. 4. Sub-standard Oehmichen projector.

ADJUSTABLE ELECTRIC REVERBERATION

Realism in present-day motion pictures is due in no small way to the artistry of cameramen in lighting sets according to the mood or tempo of the scene being filmed. In order to keep pace with photography, sound, too, must be varied from scene to scene to enhance realism.

Sound-stages, in order to reduce troublesome reverberation, must of necessity be deadened by a judicious application of insulating material. After the reverberation period has been reduced to a specified degree, the sound engineer is left with no flexible means of changing the reverberation period to fit the scene being taken.

The reverberation period of the average studio is below that of the theater or concert hall, where a reasonable amount of reverberation is not disagreeable but pleasing to the ear. It is well known that the time of reverberation is not the same at all frequencies, and a curve can be drawn for each studio or auditorium showing the time of reverberation as a function of frequency. It is

the shape of such a curve as much as its average value that determines the "timbre" of any given studio.

Many have studied and searched to define an ideal curve of a studio in terms of its dimensions and utilization. Unfortunately, their findings are not in agreement. One would suppose that this lack of understanding led the B.B.C. in London to build 32 studios, each having a different reverberation curve.

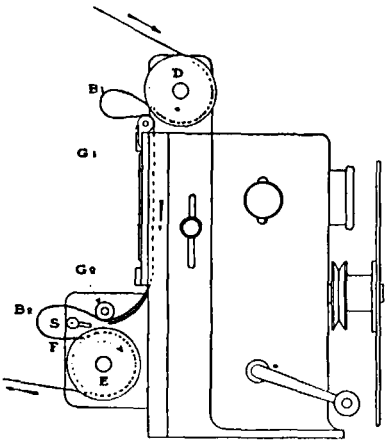

FIG. 5. Automatic loop regulation in Oehmichen projector.

The ideal solution would be a studio in which the acoustics could be controlled at will and instantaneously, within wide limits. The mechanical solutions conceived thus far are complicated, cumbersome, and sluggish in operation.

In view of this lack of control by mechanical means, it was only natural to seek the solution of the problem through electrical methods. Many years of research work in this field under the direction of M. B. Roux of France, has resulted in a practicable method of reverberation control by electrical means. The inventers have conceived and put into practice a system that not only increases the apparent time of

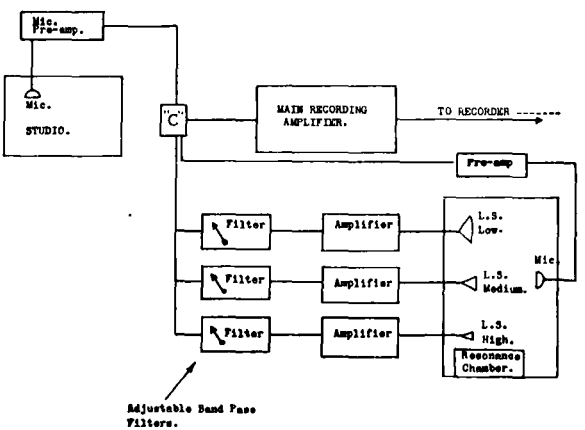

FIG. 6. Adjustable reverberation system.

reverberation, but also permits the reverberation characteristics to be changed at will.

Sound in the studio is picked up by a microphone and amplified by a preampli-

fier (Fig. 6). The output of the preamplifier is divided at *C*, one part going to the main recording amplifier and the other part to the adjustable reverberation equipment. This consists of a series of band-pass filters and amplifiers, the output of each of which being fed to a suitable loud speaker located in a special resonance chamber. A microphone located in the resonance chamber picks up the combined output from the loud speakers and after passing through a preamplifier, this current is fed into *C* where it is mixed with the output of the studio microphone and then passed on to the main recording amplifier, The principle of using a small resonance chamber is not new. Since the chamber is small, it produces without echo, a long duration of apparent reverberation.

The new principle, as developed under the guidance of M. Roux, is based upon

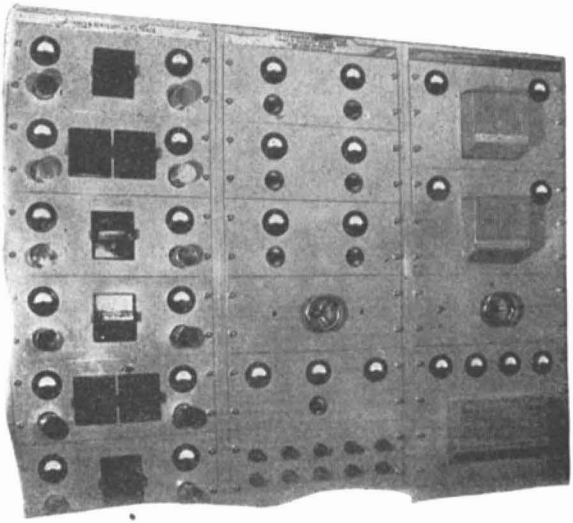

FIG. 7. Adjustable reverberation control installation.

the use of a group of filters which, theoretically, affect each frequency. In actual practice however, the audible band of frequencies is divided into three groups or bands. The intensity of each band is adjustable, which enables the "mixer" or recordist to vary the apparent duration of reverberation. All sorts of reverberant sound can be simulated at will, such as empty auditoriums, theaters, concert halls, churches, railway stations, effects of distance in rooms, and distance in open air. The new system permits the quality of voices to be changed. Special effects can be produced such as ghostly voices, *etc.*

The quality of the sound increases the realism of the scene showing the action. When a character goes from one room to another, the acoustics should change. Dialog in a boudoir has a reverberant quality different from that in a gallery of a museum. This electrical reverberation control, qualitatively and quantitatively adjustable, permits the simulation of acoustics most suitable to the sound or dialog being recorded.

A typical installation is shown in Fig. 7. The rack on the left supports six filter-amplifier units. The filters are of the plug-in type, removable from the front. This permits filters of different band-widths to be quickly changed for certain effects.

The middle rack supports three preamplifiers and a control panel for selecting one of two special control consoles furnished with each installation. Fig. 8 depicts a standard control console which includes everything necessary for remote control of the system.

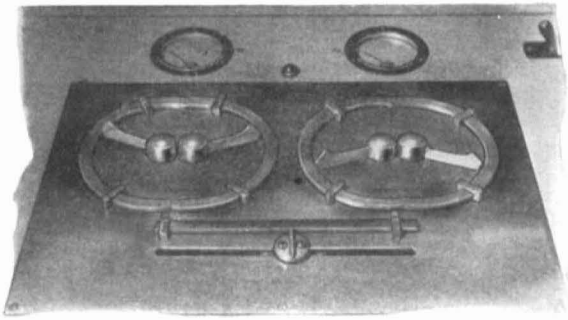

FIG. 8. Remote control console for adjustable reverberation control system.

The rack on the right (Fig. 7) supports three a-c operated power amplifiers which are connected to their respective loud speakers in the resonance chamber. These units have been designed to cover their particular frequency ranges with the utmost fidelity. Generous design precludes the possibility of distortion due to overload, and the hum level is considerably below the accepted level for normal reproduction. The loud speakers also are of special design. Each unit is capable of reproducing its corresponding band of frequencies with a minimum of distortion.

MGM PORTABLE DOLLY CHANNEL*

C. S. PRATT**

The original sound installations in most of the major studios were of the so-called central station type. At the time they were put in there was an entire absence of suitable portable equipment and, moreover, the number of stages to be supplied was generally quite small. Portable apparatus continued to be unavail-

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** Metro-Goldwyn-Mayer Studios, Culver City, Calif.