NEW MOTION PICTURE APPARATUS*

A MOTOR-GENERATOR FOR THE NON-ROTATING HIGH-INTENSITY ARC**

The following descriptions of equipment were included among the presentations in the Apparatus Symposium at the New York Convention of the Society, Oct. 29–Nov. 1, 1934.

The recent introduction of the d-c. high-intensity "Suprex" carbons has necessitated a new design of projection lamp, and has likewise presented an opportunity for developing a motor-generator for converting the alternating current of commercial power mains into direct current of the proper voltage and regulation for most efficiently utilizing the advantages of the new lamps and carbons.

Until eight or ten years ago the motor-generator that was most widely used was the two-unit series type. Despite its shortcomings, it possessed the advantage that no ballast resistance was required. However, due to the increasing demand for more intense screen illumination, the reflector type of lamp and improved models of the original high-intensity lamps came to be quite generally adopted. At the same time, the new arcs demanded a more stable source of current than the series machine, and the two-unit multiple motor-generator became the accepted standard.

The two-unit multiple machine possesses the requisite flexibility and stability for operating lamps having voltages of 55 or more at the arc. But the advantages of flexibility and stability were achieved rather expensively, for the ballast resistance required to achieve them accounted for a loss of as much as 30 or 40 per cent of the purchased power. In other words, somewhat less than half the purchased power is used, not for furnishing illumination for projection, but in uselessly and wastefully heating the ballast resistors.

The three-unit "Stabilarc-Unitwin" motor-generator was designed to combine most of the advantages of the series and multiple types with as few as possible of their disadvantages. As shown in Fig. 1, the machine consists of two d-c. generators, one for each arc, on either side of and direct-connected to an a-c. motor. Terminal leads for each of the three units are brought out separately into their respective conduit boxes, and all openings are guarded with removable perforated or louvre covers. The shaft revolves in four ball-bearings and ball-bearing flexible couplings connect the a-c. motor with the d-c. generator unit on either side.

The d-c. control panel is shown in Fig. 2. It includes two small field rheostats, one for each generator unit, a voltmeter, and a double-throw toggle switch for connecting the voltmeter in circuit with either generator unit. Fig. 3 shows the

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comparative simplicity of the connections between the motor-generator, panel, and arcs. Each generator feeds directly into its own arc. Only the field and voltage circuits are connected to the control panel, so that the connecting wires may be of the minimum size allowable under local insurance regulations, thus effecting a substantial saving in wiring costs.

Operating without load, the voltage of each generator is about 55 to 60, depending upon the setting of the field rheostat. When the carbons are brought to-

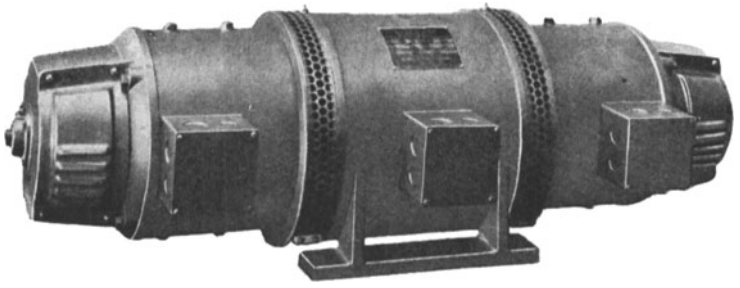

FIG. 1. Stabilarc-Unitwin motor-generator for d-c. Suprex carbon arcs.

gether, so as to strike the arc, the voltage of the corresponding generator unit immediately and automatically drops to approximately 15 volts. The carbons are held together for a moment or two and then slowly separated, without the explosive and sputtering action that is unavoidable when striking an arc fed from a multiple generator, due to the heavy short-circuit current that occurs before the arc is formed. This explosive action tends to destroy the crater and blow out the core of the carbon, apparently having the effect of hurling particles of incandescent carbon and copper against the mirror, and is responsible for excessive reflector repairs and replacements. By means of this "controlled strike," pitting of the lamp mirror is greatly reduced if not entirely eliminated, thus materially extending the useful life of the reflector.

FIG. 2. The d-c. control panel.

Referring again to Fig. 1, it will be noted that the three-unit combination is long and narrow, the proportions being similar to those of 3600 rpm. high-speed machines. However, as the synchronous speed of the Unitwin is only 1800 rpm., the peripheral speed is reduced accordingly, thereby very materially decreasing brush, wind, and other noises of rotation. Extremely quiet operation is the result, a very desirable feature when the motor-generator must be placed in or near the projection room.

In the multiple type of motor-generator, the single-generator unit is depended upon to supply one or more arcs in operation while another arc is being started. During the change-over period, the large short-circuit current caused by striking

the additional arc, added to the load already carried by the generator, usually amounts to two to three times the normal rating of the machine, causing a consequent strain upon the commutator, brushes, and other load-carrying elements. In contrast, a Unitwin generator unit never supplies power to more than one arc, and is therefore never overloaded. During change-over, or at any other time when the entire machine supplies two arcs, the burden of the double load is placed where it properly belongs—on the rugged squirrel-cage motor without any current-carrying moving parts.

For the same reason, since each generator unit supplies only one arc, striking

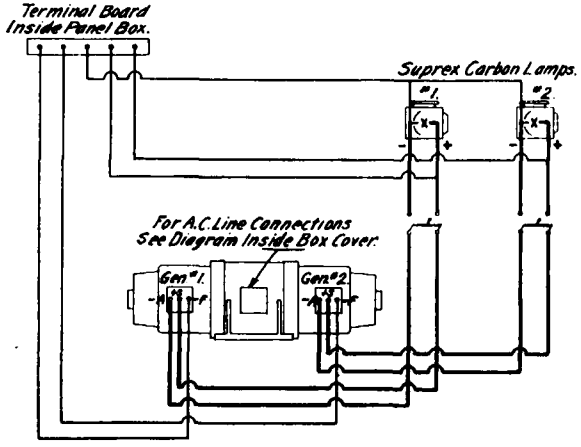

FIG. 3. Wiring connections between motor-generator, panel, and arcs.

the second arc has no effect upon the first arc, and the illumination of the screen is uniform throughout the entire operation.

The characteristics of the Unitwin are admirably suited to the requirements of the Suprex arc. Whether the same three-unit combination can be economically adapted to other types of arcs is a question that can not yet be definitely answered.

THE DAVIDGE DEVELOPING APPARATUS*

The effects of agitation of the developer in relation to the film during the operation of developing motion picture film are fairly well known. The chief effects are (*1*) an increase in the rate of development, and (*2*) a partial offsetting of the effects of the reaction products of development as typified by the "Mackie Line."

With any particular developing equipment, therefore, the developer should be sufficiently agitated, and the agitation should be non-directional so that the current impulses strike the emulsion surface at constantly changing angles, supplying

* Roy Davidge Co., Hollywood, Calif.

new developer and displacing the by-products of development in such a manner as to avoid distortion in density where a heavily exposed area lies adjacent to one of less exposure.

The Davidge developing apparatus (Figs. 4 and 5) consists of a wheel or rotor which acts as a carrier for the film and the spacing apron, the latter comprising a molded celluloid strip having buttons placed alternately at either side which contact the two surfaces of the interwound film at the perforation area. The buttons or protuberances are so elongated as to be incapable of entering the per-

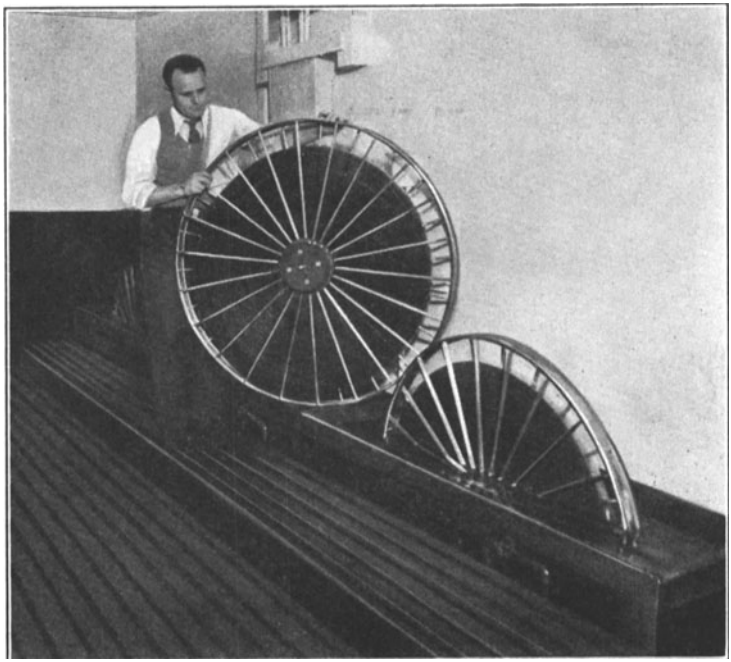

FIG. 4. Davidge developing apparatus: 1200-ft. unit.

foration, and also to act as baffles to disperse the current of developer from the space on the opposite side.

The exposed film with the separator is wound upon the rotor in lengths up to 1200 feet, and clipped at the outside. A spacing of approximately $^{3}/_{16}$ inch is attained between each successive turn on the rotor, and the combined film and separator are in no way attached to the rotor, being free to move and change relationship to the impulse fins at every revolution.

The rotor is made of non-corrosive tubular metal, and has a small fin which extends outward from each spoke, 22 on each side for the 1000-ft. rotor. When wound, the unit is placed into the developing solution and revolved at approxi-

mately 20 revolutions a minute. The developing tank also has a baffling device which creates a side-to-side motion of the solution through the wheel. This motion, in turn, is deflected at constantly changing angles by the fins on the rotor. The rotation is mechanically reversed at intervals of one minute during development.

Films developed by the system show readings that are identical on butted sensitometric strips placed throughout the wind.

FIG. 5. Davidge 16-mm. developing unit.

FIG. 6. Moviola film viewing machine, model *C*.

MOVIOLA FILM VIEWING MACHINES*

The Moviola film viewing machine, model *C*, Fig. 6, is now, like model *D*, regularly equipped with a hand rheostat and hand switch for controlling the motor, in addition to the foot controller always furnished with this machine. The hand rheostat and foot controller are in series, and the hand switch short-circuits the foot controller. Therefore, when the hand switch is closed, the hand rheostat controls the speed of the motor; and when the hand switch is open, the hand rheostat controls the maximum speed of the motor attainable by the foot controller.

Fig. 7 shows a Moviola film viewing and sound reproducing machine, model *UDC*, for use with composite film only, and specially equipped with a footage and frame counter. This machine is particularly suitable for checking prints in the exchanges, as each frame on a reel of film can be easily identified.

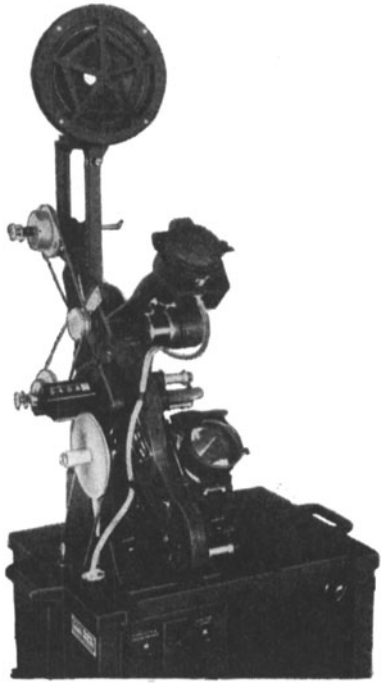

FIG. 7. Film viewing and sound reproducing machine, model *UDC*.

* Moviola Company, Hollywood, Calif.

Fig. 8 shows the front view of a Moviola film viewing and sound reproducing machine, model *UDSL*. This machine is made to be used with a standard 35-mm. picture film and two separate sound films, one for standard 35-mm. film or $17^1/_2$-mm. "split" sound film, and the other for 16-mm. sound film. It includes a

FIG. 8. Film viewing and sound reproducing machine, model *UDSL;* for standard 35-mm. picture film with separate sound-track (full width or split) and an additional sound-head for 16-mm. sound-film.

standard Moviola film viewing machine, model *D*, which contains a reversible, variable-speed motor, a standard Moviola sound-head, model *SD*, belt-driven by a reversible $^1/_4$-hp. constant-speed induction motor, and a Moviola sound-head, model *SL*, for 16-mm. film. Foot control is provided for each of the two motors, and a three-wire attachment cord (including a ground connection) is furnished.