April 8, 1941. L. D. STRONG 2,237,376

ELECTRIC CHANGEOVER

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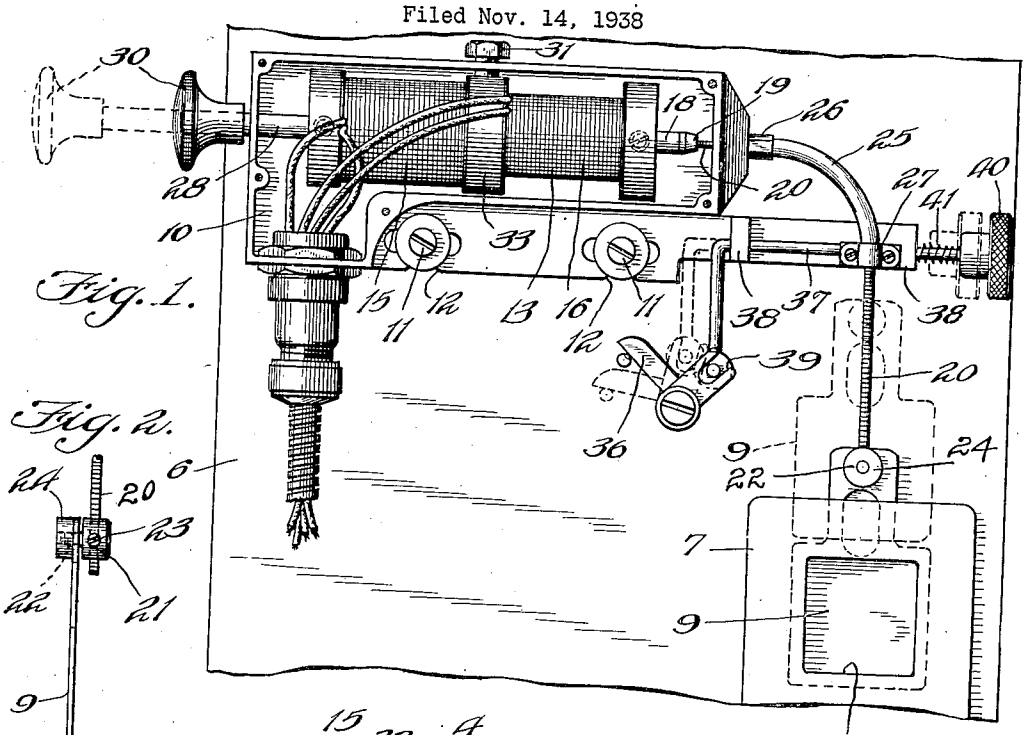

Fig. 1.

Fig. 2.

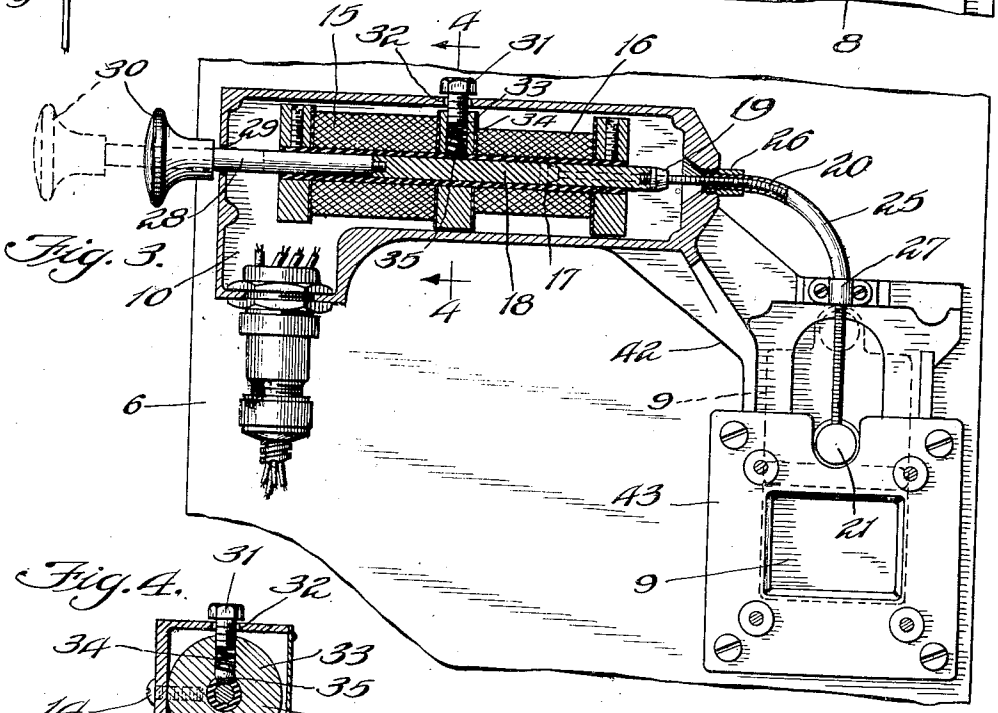

Fig. 3.

Fig. 4.

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ELECTRIC CHANGEOVER

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1 Claim. (Cl. 88—17)

This invention relates to changeovers for moving picture machines or projectors and particularly to the type in which a plurality of projecting machines are each provided with changeover devices and such devices are electrically operated so that when a projection is being made with one machine all of the others will be cut off.

One of the principal objects of the present invention is to provide a changeover which may be readily applied to different makes or types of projecting machines and which may be manually operated to open and close the shutter as well as being electrically operated for such purposes.

Other objects are to provide a shutter with electro-magnetic operating means such as a solenoid or motor for operating the same, said means being adapted to be manually operated; to provide an improved connection between the solenoid and the shutter which will require but little space but will be effective in operation; to provide certain improvements in the solenoid armature and parts connected therewith; and to provide such other improvements in construction and advantages in operations as will appear more fully from the following description.

In the accompanying drawing illustrating the invention,

Figure 1 is a front view showing one form of my improved changeover with the cover removed and showing the same attached to a conventional or diagrammatic motion picture apparatus;

Figure 2 is a side view of the shutter and connections thereto;

Figure 3 is a longitudinal sectional view, also showing certain modifications; and

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

A projection machine housing or body 6 is shown diagrammatically in Figure 1 and is provided with a guideway 7 at the aperture 8 for a changeover shutter 9.

The housing 10 for the changeover operating mechanism is secured to the picture machine in any desired manner, preferably by means of screws 11 which engage with slotted openings 12 to permit adjustment of the housing. A double solenoid 13 is mounted in the casing or housing 10 being held by means of screws 14. The solenoid has two coils 15 and 16 on a common central tube 17 formed of insulating material. The core or armature 18 is slidably mounted in the tube 17 in the usual manner and is made of suitable material to be actuated by the current through the coils. One end of the armature 18 is provided with a tip 19 formed of brass or other suitable non-magnetic material which may be held by being screwed into the threaded end of the armature. The tip provides means for attaching a flexible cable or connecting shaft 20 to the end of the armature. This shaft is preferably made of steel wire and is soldered or otherwise secured to the tip. The opposite end of the flexible shaft is adjustably secured to the cylindrical head 21 of a screw 22, being held therein by means of a set screw 23. The screw 22 engages with a threaded hole in a lug 24 formed integrally with the shutter 9. A curved tubular guide 25 has one end secured at 26 in the end of the housing 10 in alignment with the axis of the armature as shown in Figure 3 and the other end is secured to the frame or housing by means of a clip 27 which is directly above the center line of the shutter. The curved guide makes a turn of substantially ninety degrees and serves as a support and bearing for the flexible shaft 20.

An extension rod 28 formed of brass or other non-magnetic material is secured to the end of the armature 18 opposite from the tip and extends out through a hole 29 in the housing 10 and is provided exteriorly of the housing with a button or handle 30 for manual operation.

The electric connections for such changeovers are well understood and do not form any part of the present invention, the arrangement however being such that when the coil 15 is energized it acts upon the armature to move it to the left as shown in the drawing and open the shutter. When the coil 16 is energized, the armature is moved to the right and the shutter is closed through the action of the flexible shaft which serves to raise and lower the same.

The shutter may also be manually actuated at any time by means of the knob 30 and the parts connected therewith so that my improved device provides an exceedingly simple and effective mechanism for both electric and manual operation of the shutter. The provision of the non-magnetic extensions or end pieces for the armature defines the effective length of the armature so that it will move to predetermined positions upon the energizing of the respective coils and will not be affected by the steel cable connected with one end thereof.

Where a plurality of changeovers are to be interconnected it is desirable to be able to regulate the speed of the opening and closing movement of the respective shutters in order to prevent one from opening or closing in advance of its proper

movement. For this purpose I provide means for adjusting the speed of the armature. This comprises a set screw 31 which extends through a hole 32 in the housing 10 and engages with a threaded hole 33 in the center disc of the solenoid. A spring 34 is interposed between the end of the screw and a ball 35 which is adapted to press against the armature as shown in Figures 3 and 4. By tightening or loosening the screw the pressure on the armature may be adjusted to give any desired speed for synchronizing the respective machines.

In certain models of projectors a fire shutter is provided which is actuated by a toggle or bell crank lever 36 which is mounted on the projector as shown in Figure 1. In order to actuate such toggle I provide a rod 37 which is slidably mounted in bearings 38 on the housing 10 and has one end bent downwardly and then forwardly as shown in Figure 1, to engage with a slot 39 in one arm of the toggle. The rod 37 has a knob or button 40 for actuating the same and a spring 41 is interposed between the knob and the bearing 38 and tends to hold the rod normally projected to the right or so that the fire shutter will be in normal position. If the operator desires to open this shutter as for framing, he merely presses the knob 40 which causes the end of the rod to swing the toggle to an opening position as shown in dotted lines.

From this description it will be seen that I provide an exceedingly simple and effective changeover which may be readily applied to different projectors and which has substantially only one moving part, thus avoiding complicated rod and lever connections to the shutter. This makes the device particularly quiet in operation so that it cannot be heard outside of the projection booth. The provision of means for actuating a fire shutter is also advantageous as it brings the control of the same immediately under the operator's supervision so that he can operate the fire shutter and also manually operate the changeover shutter in a particularly convenient manner. Some models of projectors do not have a shutter guide as shown in Figure 1, for receiving my improved changeover shutter. The device shown in Figure 3 is particularly intended for such models. In this form of the changeover the housing has a bracket or extension 42 with a shutter guide 43 carried thereby so that the shutter will be positioned in substantially the same relationship to the solenoid as above described. In this instance the bracket or extension 42 may be utilized for supporting the changeover, the bracket being secured to the projection machine housing by screws or in any other convenient manner. The operation is the same as described in connection with the first form.

While I have shown preferred embodiments of my invention it will be apparent that the same may be modified to adapt the same to different projectors and therefore I do not wish to be limited to the particular construction herein shown and described except as set forth in the following claim, in which I claim:

The combination with a projector having an aperture, of a changeover comprising a housing mounted adjacent to the aperture, a shutter for opening and closing said aperture, a solenoid in said housing having an armature, a ball engaging with the armature, a screw mounted adjacent to the ball, a spring between the screw and the ball whereby the pressure of the ball on the armature may be regulated, and a flexible shaft operatively connecting the armature with the shutter.

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