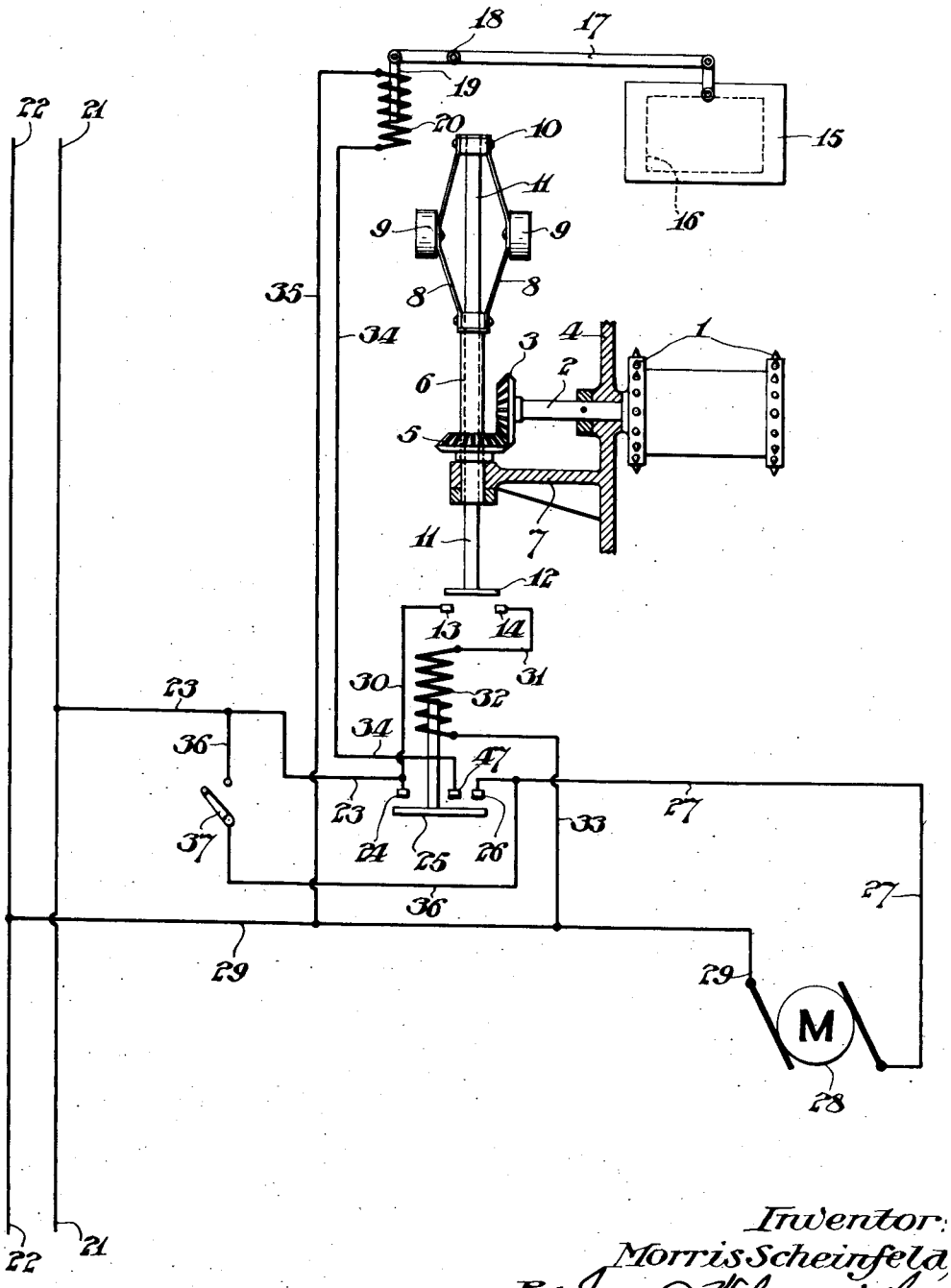
April 17, 1934. M. SCHEINFELD 1,954,844

MOTION PICTURE PROJECTOR

Filed April 23, 1930



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Patented Apr. 17, 1934

1,954,844

UNITED STATES PATENT OFFICE

1,954,844

MOTION PICTURE PROJECTOR

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Application April 23, 1930, Serial No. 446,464

6 Claims. (Cl. 88—17)

My invention relates to motion picture projectors, and it relates more particularly to the provision, in connection with motor driven projectors, of means for automatically stopping the motor and closing the fire shutter in the event of breakage of the film or of reduction of the feed of the film below a certain minimum speed.

In the operation of motion picture machines of the motor driven type, it frequently happens that when the film breaks between the upper and lower intermittent sprockets, and the motor continues to run, the film will be fed from the upper magazine and, not being fed into the lower magazine, will coil itself around various parts of the machine, and in some instances become ignited.

It also frequently happens, due to various causes, such for example as damage to the perforated portion of the film, that the film will not be fed properly, and when the rate of feed thereof falls below a certain limit, the film will often be ignited by the intense heat of the beam of light which passes through the aperture.

The object, therefore, of my present invention is to provide, in a motor driven motion picture projector, means for automatically stopping the motor and closing the fire shutter whenever the film breaks or the feed thereof is reduced below the safe minimum speed.

The nature and characteristic features of my invention will be more readily understood from the following description, taken in connection with the accompanying drawing forming part hereof, in which apparatus embodying the main features of my present invention is diagrammatically illustrated.

It will, of course, be understood that the drawing and description herein contained are illustrative merely, and that, by reason of various types of motion picture projectors being now in common use, certain changes and modifications may be made in the structure without departing from the spirit of my invention, in order that the invention may be applied to said various types of projectors.

Referring to the drawing, in the particular embodiment of my invention therein shown, 1 is a sprocket over which the motion picture film passes. The sprocket 1 is operated by the passage of the film over the same, and the actuation of said sprocket is entirely independent of the driving mechanism of the motion picture projector.

The sprocket 1 is mounted upon a shaft 2. A bevel gear 3 is mounted upon the end of the shaft 2. The shaft 2 is suitably journaled in a portion of the housing or framework 4 of the projector. The bevel gear 3 meshes with a bevel gear 5 which is mounted upon a sleeve 6.

The sleeve 6 is journaled in a bracket 7 extending from the housing or framework 4 of the projector. The upper end of the sleeve 6 has the lower ends of governor springs 8 secured thereto. The governor springs 8 carry weights 9 midway their extremities, so that, as the sleeve 6 is rotated, the springs 8 will be distended in radial planes and shortened in their longitudinal extensions.

The upper ends of the springs 8 are secured to a collar 10, which in turn is secured to the upper end of a rod 11. The rod 11 extends through the sleeve 6, and carries a contact disk 12 at its lower end. The contact disk 12 is adapted, when the governor mechanism reaches a predetermined speed of rotation, to establish an electrical connection with contact members 13 and 14, to establish a circuit therethrough.

A fire shutter 15 is adapted normally to fall by gravity or to be otherwise impelled to a position to close the aperture 16, and thus shut off the beam of light which passes through the film when the picture is being projected upon the screen. The fire shutter 15 may be mounted in any preferred manner, being, for the purpose of illustration, carried at one end of a lever 17 which is pivoted as at 18 to any stationary portion of the machine.

The other end of the lever 17 carries a solenoid core 19, which is adapted to be actuated when the coil 20 is energized by the passage of the current therethrough, thereby to raise the shutter to the open position.

21 and 22 are the main power leads. A line 23 extends from lead 21 to a contact member 24, which is adapted under certain conditions to be engaged by contact bar 25 of a relay, to be hereinafter again referred to. Contact bar 25 of the relay is also adapted to engage a contact member 26, which is connected by line 27 to one terminal of the motor 28 which operates the motion picture projector. A line 29 extends from the other terminal of the motor 28 to the other lead 22.

A shunt line 30 extends from line 23 to contact 13. Contact 14 is connected by line 31 to one end of the coil 32 of the relay hereinbefore referred to. The other end of the relay coil 32 is connected by line 33 to the return line 29 extending from the motor 28 to the power lead 22.

The relay is also provided with a contact member 47, connected by means of line 34 to one end of the solenoid coil 20 which serves to oper-

ate the fire shutter 15. The other end of the solenoid coil 20 is connected by line 35 to the return line 29 which extends from the motor 28 to the lead 22.

A shunt line 36 extends from line 23 around the relay, to the line 27 which extends to the motor. A normally open switch 37 is interposed in the line 36. This switch is preferably located on or about the projector for manual actuation by the operator.

The operation of the device may now be explained. The film being threaded through the projector in the usual manner, and the lamp being turned on, the operator first closes the switch 37. In this manner, current will be permitted to flow from lead 21 through line 23 to the shunt line 36, passing through the switch 37, thence to line 27, passing through the motor, and returning to lead 22 by line 29. The motor will thus be started.

When the speed of the film becomes sufficiently great, the rod 11 will be depressed by the actuation of the governor, whereupon the contact disk 12 at the lower end of the rod 11 will close the circuit across the contact members 13 and 14. Current will then flow from lead 21, through line 23, thence through line 30, through contact disk 12, to line 31, passing through the relay coil 32 and energizing the same, thence passing by line 33 and return line 29 to lead 22.

When the relay coil 32 is thus energized, the contact bar 25 will bridge the contact members 24, 26, and 47. The current will now flow to the motor from lead 21, through line 23, to contact member 24, contact bar 25, contact member 26, and line 27, returning by means of return line 29 to the lead 22.

The operator may now permit the switch 37 to open, as the motor circuit is established through the contact bar of the relay, and this circuit will be maintained so long as the motion picture projector functions in the proper manner.

When the relay coil 32 is energized as aforesaid, the current will pass from the contact bar 25 thereof to contact member 47, thence through line 34 to the solenoid coil 20, returning by line 35 and line 29 to the lead 21. When the solenoid coil 20 is thus energized, the lever arm 17 will be actuated, whereupon the fire shutter 15 will be opened and the light permitted to pass through the film.

However, should the film break, or be reduced in speed below a safe minimum, the sprocket 1 will no longer be rotated, whereupon the governor will quickly be reduced in speed, and the contact disk 12 will be raised out of contact with the contact members 13 and 14. In this manner, the relay coil 32 will be de-energized, thus permitting the contact bar 25 to open the circuits extending to the motor and to the solenoid coil 20. The motor will thus be stopped, and simultaneously the fire shutter will fall to the closed position.

It will be seen that, by the foregoing arrangement, the motor will be automatically stopped and the fire shutter closed, whenever a condition occurs which would render it dangerous to continue the operation of the machine, thus greatly reducing the fire hazard, and eliminating feeding of the film from the upper magazine whenever the film breaks.

I claim:

1. In a motion picture projector of the motor driven type, a sprocket actuated by the film passing thereover, a governor actuated by said sprocket, a motor, a circuit in which said motor is included, means actuated by said governor for maintaining said motor circuit closed during the normal operation of the machine, a shunt circuit for independently supplying current to said motor, and a normally open manually operable switch in said shunt circuit whereby the motor may be actuated independently of the governor actuated means.

2. In a motion picture projector of the motor driven type, a sprocket actuated by the film passing thereover, a governor actuated by said sprocket, an electrical circuit maintained closed by said governor during the normal operation of the machine, a relay included in said circuit, a motor circuit, said motor circuit being closed by the energization of said relay, a fire shutter, and a circuit independent of the motor circuit for controlling said fire shutter, said fire shutter controlling circuit also being closed by said relay.

3. In a motion picture projector of the motor driven type, a sprocket actuated by the film passing thereover, a governor actuated by said sprocket, an electrical circuit adapted to be closed by said governor, a relay included in said circuit, a motor circuit, said motor circuit being closed when said relay is energized, and a shunt circuit extending around the relay and having a normally open manually operable switch included therein for arbitrarily closing the motor circuit.

4. In a motion picture projector of the motor driven type, a sprocket actuated by the film passing thereover, a governor actuated by said sprocket, a fire shutter, electro-magnetic means adapted when energized to raise said fire shutter, an electrical circuit in which said electro-magnetic means are included, and means actuated by said governor for closing said circuit when the speed of said governor reaches a certain rate.

5. In a motion picture projector of the motor driven type, a sprocket actuated by the film passing thereover, a governor actuated by said sprocket, an electrical circuit adapted to be closed by said governor, a relay included in said circuit, a motor circuit, said motor circuit being controlled by said relay, a fire shutter normally tending to move to the closed position, electro-magnetic means for moving said fire shutter to the open position, and a circuit in which the shutter moving means is included, said circuit being controlled by the relay.

6. In a motion picture projector of the motor driven type, a sprocket actuated by the film passing thereover, a governor actuated by said sprocket, an electrical circuit adapted to be closed by said governor, a relay included in said circuit, a motor circuit, said motor circuit being controlled by said relay, a fire shutter normally tending to move to the closed position, electro-magnetic means for moving said fire shutter to the open position, a circuit in which the shutter moving means is included, said circuit being controlled by the relay, and a shunt circuit having a normally open switch included therein for arbitrarily closing the motor circuit.

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