McCLELLAN C. FULLENLOVE.

AUTOMATIC STOP FOR PROJECTION APPARATUS.

APPLICATION FILED FEB. 19, 1921.

1,412,110. Patented Apr. 11, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

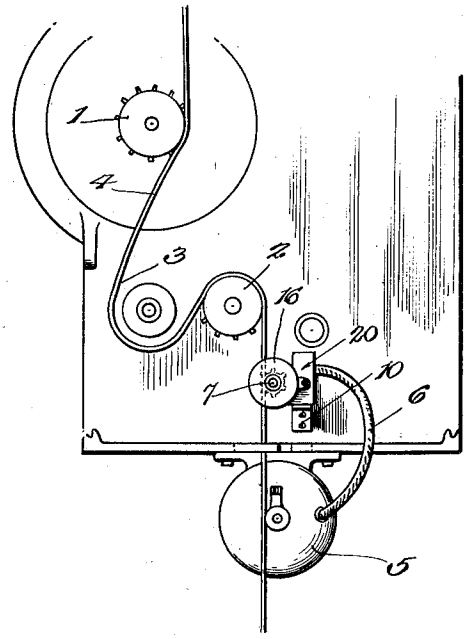
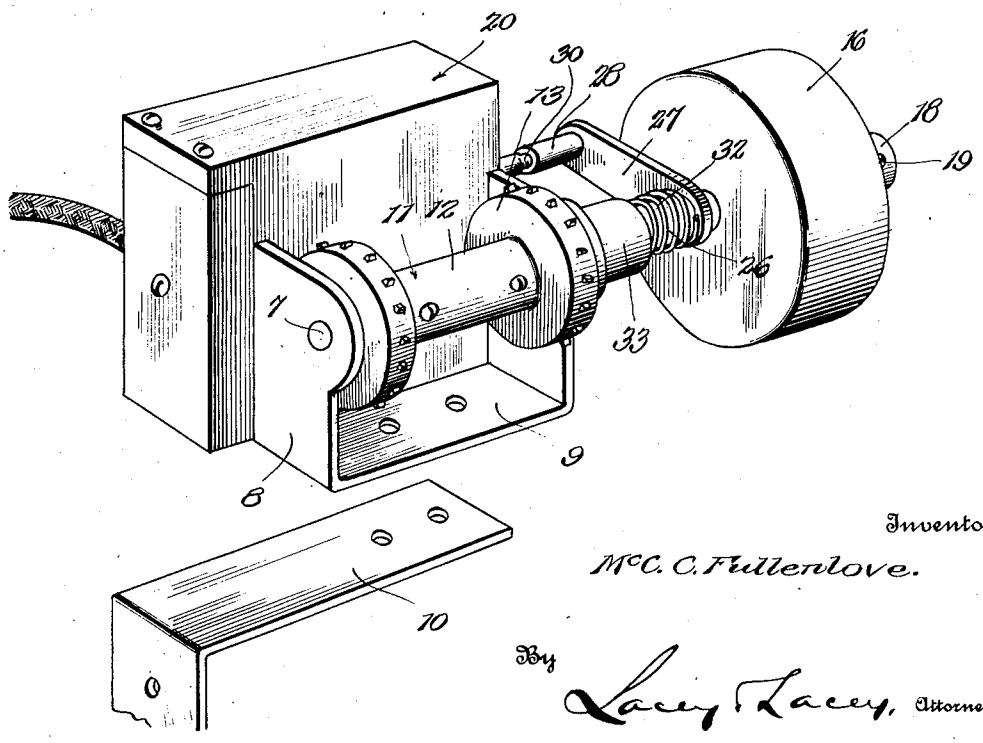


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

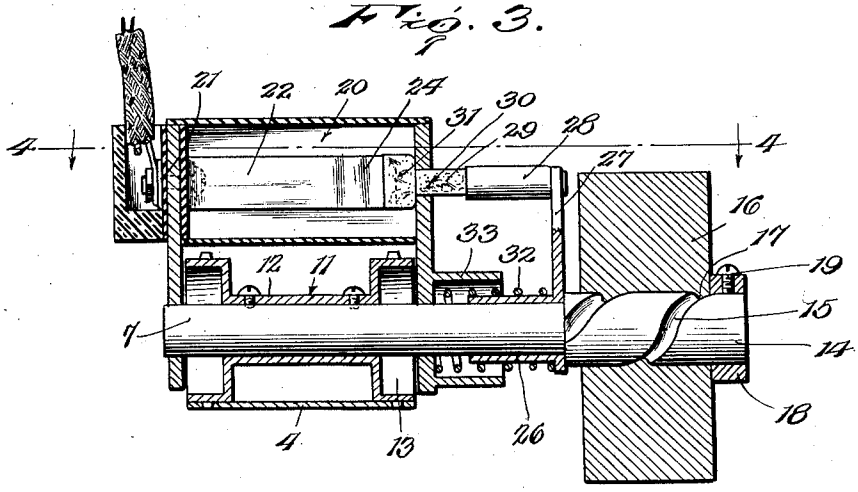
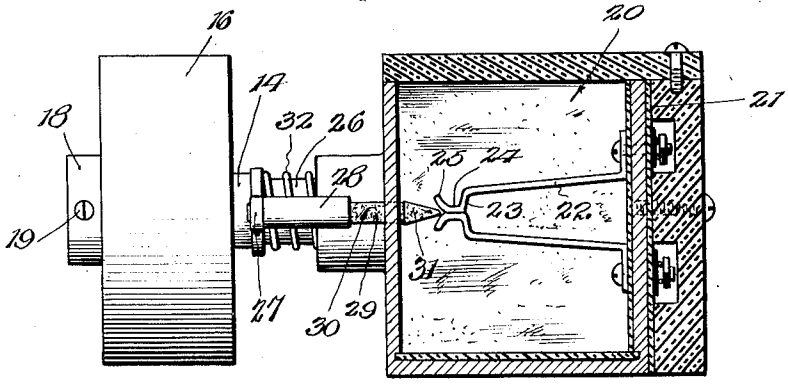


Fig. 4.



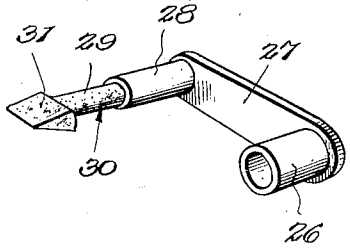


Fig. 5.

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UNITED STATES PATENT OFFICE.

McCLELLAN C. FULLENLOVE, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO LOUISVILLE CIRCUIT BREAKER COMPANY, INC.

AUTOMATIC STOP FOR PROJECTION APPARATUS.

1,412,110. Specification of Letters Patent. Patented Apr. 11, 1922.

Application filed February 19, 1921. Serial No. 446,274.

To all whom it may concern:

Be it known that I, McCLELLAN C. FULLENLOVE, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Automatic Stops for Projection Apparatus, of which the following is a specification.

This invention relates to improvements in motion picture projection apparatus and more particularly to an automatic means for breaking the motor circuit in the event the film for any reason ceases to be fed through the machine. Notwithstanding the fact that motor driven projection machines are provided with the usual fire shutter which is adapted to automatically close when the machine ceases to operate, the presence of such a shutter does not completely insure against ignition of the film under all conditions. For example, if for one reason or another the film ceases to be fed through the machine but the machine continues to operate, the shutter will remain open and the portion of the film which is at such time within the film gate, is set afire with serious consequences. The primary object of the present invention is therefore to provide means for automatically breaking the motor circuit at the instant the film ceases to be fed through the machine, whether this be due to breakage of the film, a torn film, torn or mutilated sprocket holes in the film, or any other cause, so that the machine will be instantly stopped and the fire shutter will instantly close to protect the portion of the film which may at that time be in the film gate.

Another object of the invention is to provide means for the purpose stated which will be entirely automatic in its action and will not require any attention on the part of the operator of the machine either at the time of starting the machine or intentionally stopping the same.

Another object of the invention is to provide means for the purpose stated which may be readily installed within any of the standard makes of projection apparatuses without requiring any material alteration of the apparatus itself and which device will be simple in construction and not liable to disarrangement of its parts.

In the accompanying drawings:

Figure 1 is a side elevation of so much of a motion picture projection apparatus as is necessary to illustrate the application of the invention, the device embodying the invention being likewise shown in side elevation;

Figure 2 is a perspective view of the device of the invention removed from the projection apparatus;

Figure 3 is a horizontal sectional view through the device, the parts being illustrated in the positions they will assume while the machine is operating and while the circuit is therefore closed through the electric motor by which the machine is driven;

Figure 4 is a vertical sectional view taken substantially on the line 4—4 of Figure 3 looking in the direction indicated by the arrows and illustrating the parts in the positions shown in Figure 3;

Figure 5 is a perspective view of one member of the device.

In the drawings, the numeral 1 indicates the intermittent sprocket of the projection apparatus, the numeral 2 the lower sprocket, and the numeral 3 the usual loop which is formed in the film 4 between these sprockets, the film being led downwardly from the lower sprocket 2 to the magazine (not shown). The numeral 5 indicates an electric motor which is to drive the machine, and the numeral 6 indicates conductor wires which are in circuit with the motor and with the switch which forms a part of the device of the invention.

The device embodying the invention includes a spindle 7 which is rotatably mounted in the side portions 8 of a bearing frame 9 mounted upon a suitable bracket 10 arranged in any convenient manner within the projection apparatus at a point below the lower sprocket 2. A film sprocket 11 has its hub 12 secured upon the spindle 7 in any suitable manner and is provided at the opposite ends of its hub with the usual toothed heads 13 over which the margins of the film 4 are to pass as the film travels from the lower sprocket 2 into the magazine. At this point it will be evident that inasmuch as the portion of the film below the sprocket 2 is travelling at a uniform rate of speed and continuously, it will, in passing over the film sprocket 11, impart continuous rotary motion to the spindle 7 so long as the machine is in operation and the film is being fed therethrough. On the other

hand should the film for any reason cease to be fed through the projection machine, the spindle 7 will cease to rotate.

One end of the spindle 7 is extended beyond the bearing frame 9 and at its outer portion is preferably enlarged in diameter as indicated by the numeral 14 and is formed in its enlargement with a thread 15 which is relatively sharply pitched. Loosely mounted upon the enlarged portion 14 of the spindle 7 is a relatively heavy inertia wheel 16 having its spindle receiving bore formed with threads 17 fitting the spindle thread 15, as shown best in Figure 3 of the drawings. A collar 18 is fixed in any suitable manner, as for example by a set screw 19, upon the outer end of the enlarged portion 14 of the spindle 7 and serves to limit the outward longitudinal movement of the inertia wheel 16 upon the said spindle. It will now be evident that when the spindle 7 is rotating in one direction continuously and at a uniform rate of speed, the inertia wheel 16 will maintain a position shifted outwardly along the spindle into engagement with the collar 18 but should the spindle 7 cease to rotate, the momentum of the wheel 16 will cause it to rotate upon the spindle, and the threads 17 and 15 will coact to shift the inertia wheel 16 longitudinally of the spindle and away from the collar bearing end of the said spindle. This shifting movement of the inertia wheel under the conditions stated is taken advantage of for the purpose of actuating means which is to break the motor circuit including the conductor wires 6 so that immediately upon cessation of rotation of the spindle 7 the motor circuit will be broken and the operation of the projection apparatus as a whole will cease, whereupon the fire shutter (not shown) will automatically close as in the usual manner.

The switch comprises a casing 20 which is supported upon the frame 9 and which may in itself be of any desired construction and of insulating or other material as found convenient. Secured within the casing as for example to one end wall 21 thereof, and mutually insulated at their attached ends, are coacting switch members 22 which are preferably in the form of resilient flat fingers and which have their free end portions turned inwardly, as at 23, toward each other to provide contact portions 24 and then turned outwardly, as at 25, in opposite directions. Due to the resiliency of the members 22 their portions 24 are normally in contact and therefore the circuit through the motor is closed. This circuit may of course be controlled by an additional manually operable electrical switch of any suitable type. So long as the members 22 are in mutual contact and the circuit is otherwise closed, the motor will drive the projection apparatus but upon relative separation of the members 22, the circuit will be broken and the apparatus will then cease to operate. For the purpose of separating the members 22 and thus breaking the circuit, there is provided a means which will now be described and which is actuated through the inward shifting movement of the inertia wheel 16 upon the spindle 7. The numeral 26 indicates a sleeve which is loosely slidably fitted upon the spindle 7 inwardly of the enlarged end portion 14 thereof, and the numeral 27 indicates an arm which extends radially from one end of this sleeve and is normally located in relatively close proximity to the adjacent side of the inertia wheel 16. A socket 28 projects laterally from the outer end of the arm 27 and receives the shank 29 of a spreader 30. The active portion of the spreader 30 comprises a head 31 which is wedge-shaped and by reference to Figures 3 and 4 of the drawings it will be observed that the shank 29 of the spreader projects slidably through one end wall of the switch casing 20 with the entering edge of the head 31 positioned between the outwardly spread terminals 25 of the switch members 22. A spring 32 is fitted onto the spindle 7 and sleeve 26 and bears at one end against the inner end of the arm 27 and at its other end against the adjacent end wall of the switch casing 20, the latter end portion of the sleeve being preferably housed within a tubular projection 33 upon the said end wall of the switch casing and the outer end of which projection serves as an abutment against which the arm 27 may strike and come to rest when the inertia wheel 16 is shifted longitudinally upon the spindle 7 and so moves the said arm and its supporting sleeve 26.

From the foregoing description it will be evident that so long as the spindle 7 is rotating continuously at a uniform rate of speed, the inertia wheel 16 will occupy substantially the position shown in Figure 3 of the drawings and the spreader head 31 will occupy substantially the position shown in Figure 4 thus permitting the members 22 to have mutual contact. However, upon cessation of rotation of the spindle 7, the momentum of the inertia wheel 16 will cause the wheel to be fed longitudinally along the spindle in an inward direction, correspondingly shifting the sleeve 26 and arm 27 and consequently the separator 30. This separator 30 is of insulating material and consequently as its head 31 is moved between the contacting portions 24 of the switch members 22, these portions of the said members will be spread apart and the electrical contact between the same will be broken. The spring 32 of course normally holds the sleeve 26 and arm 27 shifted in an outward direction upon the spindle 7 and consequently when the damaged film has been repaired and the

machine is again set in motion, the inertia wheel 16 will be shifted to the position illustrated in Figure 3 and it will maintain this position so long as the film is being fed through the machine.

Having thus described the invention, what is claimed as new is:

1. In motion picture projection apparatus, the combination with film feeding means, and operating means therefor, of a shaft rotated through movement of the film, an inertia element rotatable with the shaft in one direction and rotatable independently of the shaft through momentum upon cessation of rotation of the shaft, means influencing longitudinal movement of the said inertia element upon the shaft in the last-mentioned rotative movement thereof, and means actuated through such longitudinal movement of the said element for rendering the operating means inactive.

2. In a device of the class described, normally contacting switch elements, means movable to position between the elements to spread the same apart and break contact, a film sprocket, and means operating automatically upon cessation of movement of the film sprocket to so move the separating means.

3. In a device of the class described, normally contacting switch elements, means movable to position between the elements to spread the same apart and break the contact, a film sprocket, and inertia means actuated through rotation of the film sprocket and arranged, upon cessation of movement of the sprocket to act independently thereof to so move the separating means.

4. In a device of the class described, normally contacting switch elements, means for actuation to separate the elements, a spindle, a film sprocket thereon, an inertia wheel upon the spindle rotatable therewith in one direction and arranged to rotate through momentum independently of the spindle when the spindle ceases to rotate, and means for influencing longitudinal movement of the inertia wheel upon the spindle under the last-mentioned conditions, the said separating means being automatically actuated through such longitudinal movement of the said inertia wheel.

5. In a device of the class described, normally contacting switch elements, means adapted for actuation to enter between and separate the elements and break the contact, means yieldably holding the last-mentioned means in position to permit of mutual contact of the said switch elements, and a film rotated inertia means for actuating the separating means to separate the switch element upon cessation of movement of the film.

6. In a device of the class described, normally contacting switch elements, means arranged for actuation to separate the elements, means yieldably holding the last-mentioned means in position to permit of mutual contact of the switch elements, a rotable spindle, a film sprocket thereon, and an inertia wheel having threaded engagement with the spindle whereby the inertia wheel will be rotated with the spindle in one direction and will rotate independently of the spindle upon cessation of rotation of the latter and thereby be fed longitudinally upon the spindle through the threaded connection therewith and thereby actuate the separating means to separate the switch elements.

In testimony whereof I affix my signature.

McCLELLAN C. FULLENLOVE. [L. S.]