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H. C. CORNETTA

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PROTECTIVE APPARATUS FOR MOVING PICTURE PROJECTING MACHINES

Filed Nov. 4, 1925

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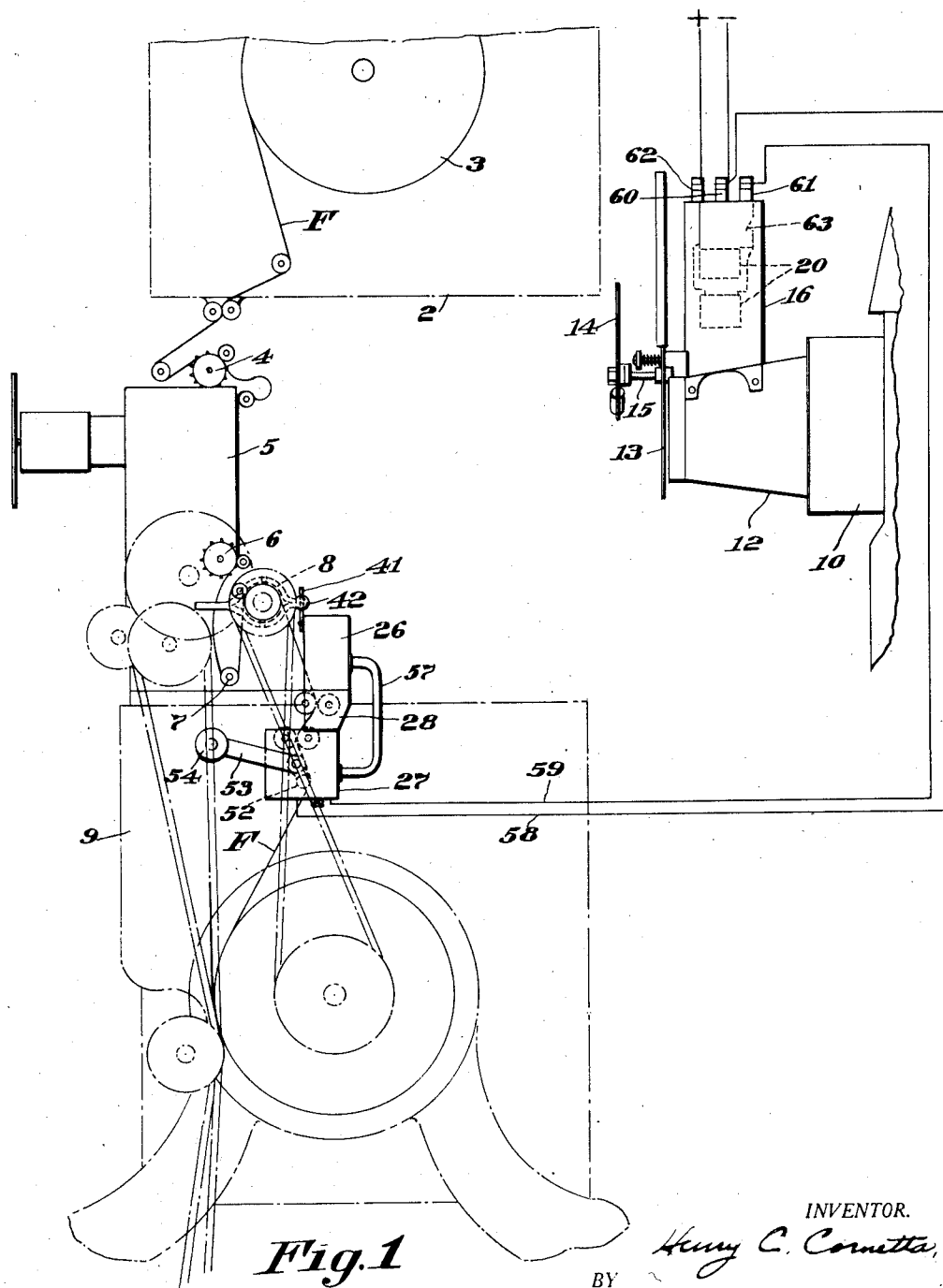


Fig. 1

BY

INVENTOR.

Henry C. Cornetta,

J. H. McCurdy
his ATTORNEY.

July 1, 1930.

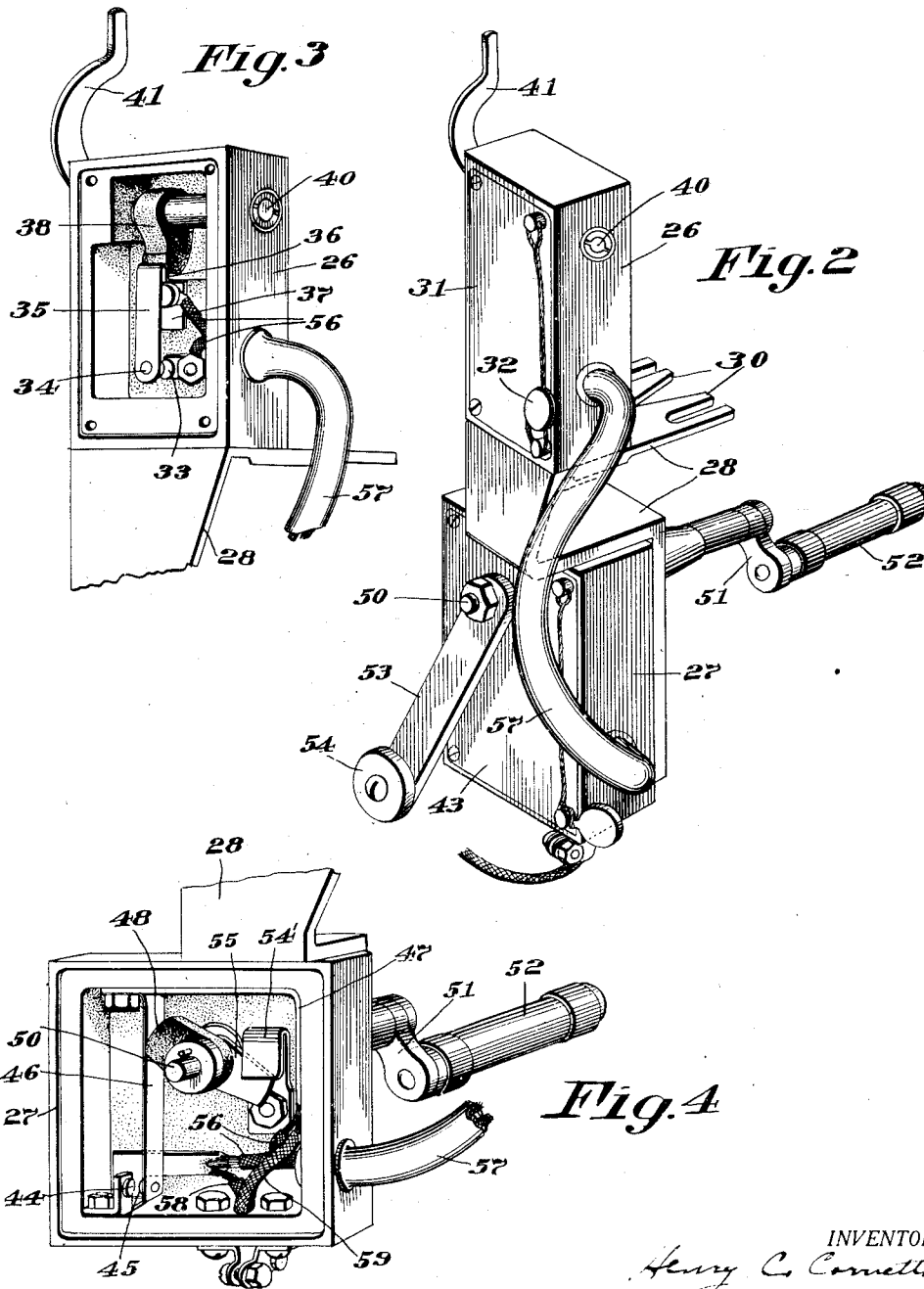
H. C. CORNETTA

1,769,771

PROTECTIVE APPARATUS FOR MOVING PICTURE PROJECTING MACHINES

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4 Sheets-Sheet 2



INVENTOR.

Henry C. Cornetta

BY

H. M. Coady
his ATTORNEY.

July 1, 1930.

H. C. CORNETTA

1,769,771

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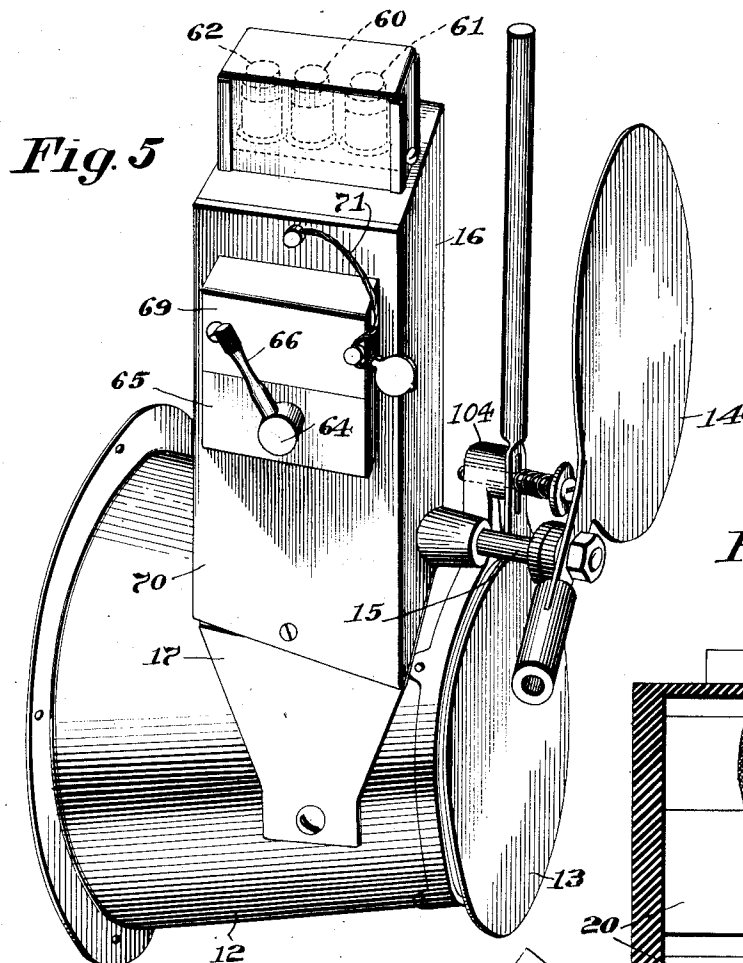


Fig. 6

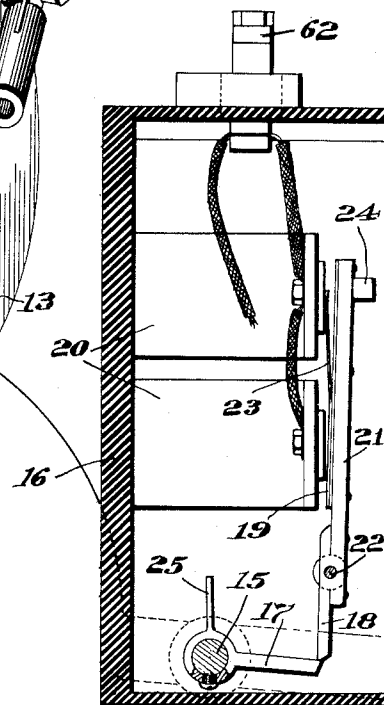
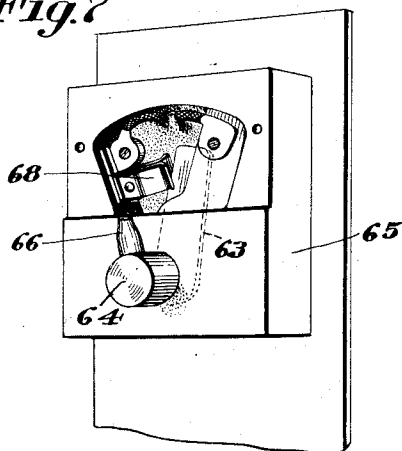


Fig. 7



INVENTOR.

BY

Henry C. Cornetta
J. H. McCord
his ATTORNEY.

July 1, 1930.

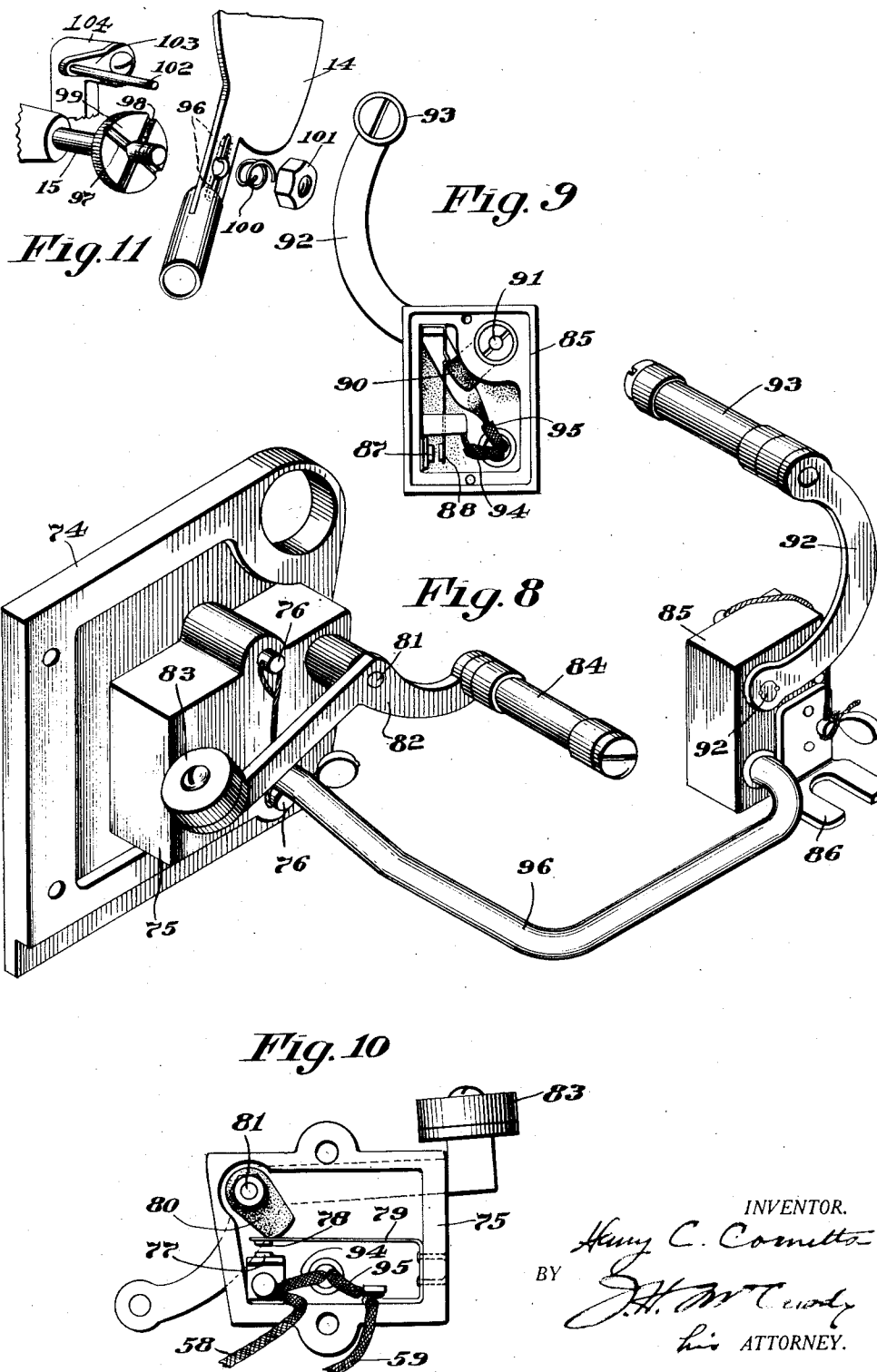
H. C. CORNETTA

1,769,771

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4 Sheets-Sheet 4



INVENTOR.
Harry C. Cornetta
 BY *J. H. McCurdy*
 his ATTORNEY.

UNITED STATES PATENT OFFICE

HENRY C. CORNETTA, OF EAST BOSTON, MASSACHUSETTS, ASSIGNOR TO CODA APPLIANCE CO. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

PROTECTIVE APPARATUS FOR MOVING-PICTURE-PROJECTING MACHINES

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The operation of a moving picture projecting machine is attended with considerable hazard, due to the danger of the film being ignited in case its feeding movement is stopped for any reason. That is, in ordinary operation the film moves across an aperture or window through which an intense light is directed. The film is highly inflammable and would be ignited by the heat of this strong light if the feeding movement were stopped for even a very brief instant, as for example, for two seconds. Such an interruption of the feeding movement of the film may be caused in various ways, as for example, by the breaking of the film, the tearing of the edges of the film in which the sprocket holes are formed, or the breaking of the belt which drives the film take-up pulley.

The liability of fire originating in the manner just described is well known and widely recognized, and various forms of safety apparatus have been proposed heretofore with the object of reducing, so far as possible, the danger of such fires. Such apparatus, however, has gone into use only to a very limited extent, due to a variety of causes, among which may be mentioned particularly the fact that very few forms of such apparatus have received the approval of the authorities, most of these constructions have been expensive to manufacture and install, and in many cases the apparatus itself has involved certain fire hazards due to the danger of creating sparks adjacent to the film.

The present invention is especially concerned with safety apparatus of the character above designated, and it aims to improve such apparatus with a view especially to reducing the expense of manufacture and installation, making such apparatus absolutely reliable, minimizing any danger from the apparatus itself, and devising a thoroughly satisfactory safety apparatus of this type.

The nature of the invention will be readily

understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

Referring now to the drawings,

Figure 1 is a somewhat diagrammatic view, partly in side elevation, showing the machine known commercially as "Powers Camera-graph Model 6B" equipped with an apparatus embodying this invention;

Fig. 2 is a perspective view of a part of the switch mechanism shown in Fig. 1;

Fig. 3 is a perspective view of the upper switch unit shown in Fig. 2 with the cover of the casing removed;

Fig. 4 is a similar view of the lower switch unit shown in Fig. 2;

Fig. 5 is a perspective view of the dowser supported on the cone of the lamp housing and the parts associated with said dowser;

Fig. 6 is a vertical cross sectional view through the casing for the dowser operating mechanism shown in Fig. 5;

Fig. 7 is a perspective view, with the cover removed, of the controlling switch shown in Fig. 5;

Fig. 8 is a perspective view corresponding to Fig. 2 but showing a somewhat different form of apparatus designed for use with another make of projecting machine;

Fig. 9 is a front elevation of one of the switch units shown in Fig. 8 with the cover thereof removed;

Fig. 10 is a similar view of the other switch unit shown in Fig. 8; and

Fig. 11 is a perspective exploded view showing a modified construction in which the dowser is arranged either for manual or automatic operation.

Referring first to Fig. 1, the machine there shown comprises an upper magazine 2 containing a reel 3 on which the supply of film F to be exhibited is mounted. This strip of film is led over suitable guide rolls to a sprocket

feed roll 4 mounted at the upper end of the casing 5 in which the objective lenses are supported, and the film then travels downwardly across the exposure aperture or window to an intermittently rotating sprocket feed roll 6. From this point the film travels around the loop setter roll 7, thence over another feed roll 8, and into the lower magazine 9 where it is wound up on the takeup reel. The lamp which supplies the beam of light required in the apparatus is mounted in a lamp housing 10 provided with the usual cone 12 projecting from the front thereof. A hand operated dowser 13 is pivoted on the cone 12 where it can be used by the machine operator to turn the light on or off, as desired.

The apparatus so far described is substantially like that of the regular moving picture projecting machine of the make above specified.

The safety apparatus provided by this invention includes an automatic dowser 14, Figs. 1 and 5, secured on a rock shaft 15 which is supported in a casing 16. This casing preferably is made of insulating material and it is provided at its lower end with a bracket 17 which is adapted to be secured to the cone 12. Secured fast on the rock shaft 15 inside the casing 16 is a latch 17, Fig. 6, which normally is engaged by a part 18 secured to the armature 19 of two electro-magnets 20—20. Preferably the armature is made of soft iron and is riveted to a bar 21 of brass or other non-magnetic metal, this bar being pivoted at 22. The part 18 is riveted to the bar 21, and preferably this part and the latch 17 are made of hardened steel. A leaf spring 23 made of phosphor bronze, or the like, is secured to the armature 19 and bears on the pole piece of one of the electro-magnets 20 where it serves to hold the armature in its latch restraining position, as shown in Fig. 6. A stop 24 is provided to limit the swinging movement of the armature.

When the electro-magnets are energized, the upper end of the armature is swung toward the left, Fig. 6, thus releasing the latch 17 and allowing the dowser 14 to swing by gravity into a position directly in front of the cone 12 where it cuts off the light from the film. A stop 25, Fig. 6, integral with the latch 17 engages the housing 16 and arrests the movement of the dowser when it has reached its operative position. Two electro-magnets 20 preferably are used arranged in multiple.

The circuit in which the electro-magnets are connected is arranged to be energized by either of two switches mounted, respectively, in the housings 26 and 27, Figs. 1 to 4. These housings preferably are made of bakelite, vulcanite, or other suitable insulating material, and they are both mounted rigidly on a bracket 28 which is adapted to be bolted to the machine frame at the upper end of the

magazine 9, as best shown in Fig. 1. For this purpose the bracket is provided with rearward extensions 30, Fig. 2, which are slotted to receive the bolts, as clearly shown in said figure. The casing 26 normally is closed by a removable cover 31 secured in place by screws, two of which preferably are arranged to be wired together and sealed by the metal seal 32, Fig. 2, so that the casing cannot be opened without leaving behind evidence of that fact.

Mounted within the casing 26 is a stationary contact 33, Fig. 3, and a movable contact 34, the latter contact being carried by a spring 35 which includes a backwardly curved part 36, and a straight shank projecting downwardly therefrom and secured to a metal plate 37. The portion 36 of the spring is arranged to be engaged by a cam 38 made of fibre or other insulating material secured fast on a rock shaft 40, which projects through the opposite walls of the casing. Fastened to this shaft outside of the casing is an operating arm 41 which is arranged to be engaged by the knob 42, Fig. 1, that is operated by the loop setting roll 7. In the machine shown the connections between the roll 7 and the knob 42 are such that when the loop between the rolls 6 and 8 tightens up and moves the roll 7 upwardly, the knob 42 is swung inwardly, or away from the observer, Fig. 1. This movement operates through the arm 41 to turn the cam 38 about the axis of the shaft 40 and thus cause it to move the contact 34 into engagement with the stationary contact 33. This closes the circuit through the electro-magnets 20 and results in tripping the dowser 14.

The lower switch casing 27 is similar to the casing 26 and normally is closed by a movable cover 43 which is sealed like the upper casing. Inside the casing are stationary and movable contacts 44 and 45, respectively, the latter being carried by a spring 46 which is secured to a metal plate 47. The movable contact is operated by a cam 48 of fibre, or the like, secured on a shaft 50 which projects through the back of the casing and has an arm 51 securely fastened thereon at the rear of the casing. A roll 52 is supported by this arm and is arranged to engage the film at a point in the lower magazine 9, as shown in Fig. 1. Another arm 53 carrying a weight 54 is secured on the rock shaft 50 and holds the roll 52 yieldingly against the film F. When the film breaks the shaft 50 is rocked by the weight 54 thus causing the cam 48 to operate through the spring 46 to close the contacts 44 and 45 and complete the circuit through the electro-magnets 20, as above described. A stop 54', Fig. 4, is arranged to engage a blade 55 secured on the rock shaft and thus limit the motion of the rock shaft.

The contacts of the two switches above described are connected in parallel by conduc-

tors 56, Figs. 3 and 4, which extend through a metal tube 57 that connects the two casings 26 and 27. Additional conductors 58 and 59, Figs. 1 and 4, electrically connect the two contacts of the lower switch with the binding posts 60 and 61 on the top of the casing 16 which, as above described, is mounted on the cone of the lamp housing. Another binding post 62 is provided immediately beside the binding post 60 and the two binding posts 60 and 62 are connected, respectively, to the opposite terminals of the source of supply of current.

The electro-magnets 20—20 are connected in multiple to the binding posts 62 and 61, as best shown in Fig. 1, this connection being made through a switch 63 which may be manually operated to control the entire apparatus. This switch comprises a blade 63, Figs. 1 and 7, secured on a pivot 64 which is supported in an insulating casing 65 fastened to the side of the casing 16. An operating handle 66 is mounted on this pivot outside of the casing. The blade 63 may be swung into or out of engagement with a stationary split contact 68. The removable covers 69 and 70, respectively, of the casings 65 and 16 are secured by screws, certain of which are connected by wires 71 and sealed, as clearly shown in Fig. 5. Obviously a double pole switch may be substituted for the switch 63, if desired.

It will now be evident that if the film should break above the intermittent sprocket 6, this sprocket and the takeup sprocket 8 would continue to feed the film, and the film would be taken up by the lower reel with the result that a broken end would be fed past the roll 52. If this should occur, or if the film should break below the sprocket 8, the dowser would immediately be operated by the closing of the lower switch in the casing 27, as above described. Also, if the sprocket holes should be stripped in the film so that the sprocket 6 could not feed the film, the takeup sprocket 8 would continue to feed, thus taking up the slack in the loop between these two sprockets, lifting the loop setting roll 7, and thus closing the switch in the upper casing 26. This also would result in tripping the dowser and cutting off the light.

The breaking of the film at the points above mentioned, or the stripping of the sprocket holes, are the most common causes of fire originating in the projecting apparatus, and the mechanism provided by this invention effectually prevents fire from either of these causes. The apparatus is entirely automatic in its action. All of the contacts are completely enclosed so that if a spark should be produced by any operation of the switches, as, for example, accidental operation in threading up the machine, or making repairs or adjustments, there is absolutely no danger of such a spark igniting the film.

Furthermore, the connections between the switches are completely housed in the tube 57 so that any danger of creating a spark due to breaking these connections is absolutely eliminated. This tube also gives mechanical rigidity to the switch assembly.

The apparatus may be operated either by direct or alternating current, a suitable step-down transformer being employed when a source of alternating current is used. It is preferable to connect the conductors from the binding posts 60 and 62 across the power lines that run to the motor or the arc lamp and inside of the fuses, so that if the fuses protecting either the motor or the arc lamp should blow, the safety apparatus would also be cut out. This avoids the necessity for separate fuses for the apparatus provided by this invention, which might be objectionable.

It will be observed that the apparatus is of a very sturdy and substantial construction, is extremely reliable, and will give a long period of service without requiring care or attention of any kind. At the same time it can be manufactured and installed economically. The switches are so designed that a very slight movement of the rock shaft permits a large and quick opening movement of the switch contacts so that destructive arcing is avoided.

Slightly different embodiment of the invention is shown in Figs. 8, 9 and 10 which illustrate a switch apparatus adapted to be used in place of that shown in Figs. 2, 3 and 4 in installing this mechanism on a Simplex projecting machine. This apparatus comprises a bracket 74 to which a switch casing 75 is secured by screws 76—76. Mounted within the insulating casing 75 are two contacts 77 and 78, respectively, the latter contact being supported on a spring arm 79. A fibre cam 80 is arranged to engage this spring and is mounted on a rock shaft 81 which carries an arm or lever 82. A weight 83 is mounted on one end of this arm, and a roll 84 is supported by the opposite end, the roll being designed to bear against the film in the lower magazine. The switch contacts are connected to the conductors 58 and 59 above described.

Another switch casing 85 carries a bracket 86 by means of which it is secured to the machine. The contacts 87 and 88 of this switch are arranged to be closed by a cam 90 supported on a rock shaft 91 and having an arm 92 secured thereto. The Simplex machine does not include a loop setting roll, and consequently, a roll 93 is mounted on the arm 92 and is positioned in the loop between the intermittent sprocket and the takeup sprocket. The contacts of the two switches just described are connected in parallel by conductors 94 and 95 which are housed in the tube 96 that mechanically connects the two switch casings 75 and 85 and holds them in their spaced relationship.

The switch apparatus shown in Figs. 8, 9 and 10 operates exactly like that shown in Figs. 2, 3 and 4.

Under some circumstances it is advisable to eliminate the switch 63 so that any possibility of the operator's leaving the switch open, and consequently rendering the apparatus inoperative, will be eliminated. Under these circumstances the safety apparatus preferably is wired in on the motor or lamp circuit behind the fuses, as above described, a suitable step-down transformer being used if the supply of current is alternating, and a fixed resistance of proper size being connected into the circuit in series with the apparatus if direct current is used. When so connected the apparatus will always be in operative condition so long as the projecting machine is being operated, and the operator or machine attendant has no control whatever over the operation of the protective apparatus provided by this invention. The mechanism thus is rendered entirely "fool-proof".

Under some circumstances it is preferable, also, to eliminate the manually operated dowser 13 and to arrange the dowser 14 as shown in Fig. 11. The shank of the dowser has lugs 96 punched in it to enter grooves 97 or 98 in the collar 99 which is pinned on the shaft 15. A spring 100 bears against the face of the dowser opposite to the collar 99 and is backed up by a nut 101 which is threaded on the end of the shaft 15. With this arrangement the dowser 14 can be manually operated exactly as is the dowser 13 without disturbing the latch or electro-magnetic means. This operation is permitted by the fact that the dowser can swing relatively to the shaft 15. The grooves 97 and 98 and the lugs 96 hold the dowser in either its operative or inoperative position. At the same time the dowser can swing with the shaft 15 when it is tripped automatically in the manner above described. The dowser thus combines the functions of an automatic and a manually operated dowser. A pin 102 projecting from an arm 103 which is secured to the bracket 104, Fig. 5, will engage the shank of the dowser if it is attempted to swing the dowser in the wrong direction for the purpose of turning on the light.

While I have herein shown and described the best embodiment of my invention that I have so far devised, it will be understood that the invention is not limited to embodiment in the precise form shown.

Having thus described my invention, what I desire to claim as new is:

1. A safety apparatus for moving picture projecting machines comprising, in combination, two switch casings, an electrical switch mounted in each of said casings, electrical connections between said switches, a metal tube connecting said casings and hold-

ing them in spaced relationship to each other and housing said connections, and devices for engaging the film in said machine at spaced points and arranged to operate said respective switches under predetermined conditions.

2. A safety apparatus for moving picture projecting machines comprising, in combination, a supporting bracket adapted to be secured to one of said machines, two switch casings rigidly mounted on said bracket, two electrical switches enclosed, respectively, in said casings, electrical connections between said switches, a tube connecting said casings and housing said connections, and two rolls operative to engage the film in said machine at spaced points, and arranged, respectively, to operate said switches under predetermined conditions.

3. In a safety apparatus for moving picture projecting machines, the combination of a closed switch casing adapted to be secured to one of said machines, relatively movable contacts mounted in said casing, a removable cover for said casing, a spring arm on which one of said contacts is mounted, a cam arranged to engage said arm, a rock shaft on which said cam is mounted, said rock shaft extending through said casing, and an arm secured on said rock shaft outside of said casing and arranged to be operated by a part engaging the film of said machine.

4. In a safety apparatus for moving picture projecting machines, the combination of a closed switch casing adapted to be secured to one of said machines, relatively movable contacts mounted in said casing, a removable cover for said casing, a spring arm on which one of said contacts is mounted, a cam arranged to engage said arm, a rock shaft on which said cam is mounted, said rock shaft extending through said casing, a weighted arm secured on said rock shaft outside of said casing and carrying a roll arranged to engage the film in said machine.

5. In a safety apparatus for moving picture projecting machines, the combination of a bracket adapted to be secured to one of said machines, a hollow insulating casing secured to said bracket, a removable cover plate for said casing, a switch completely enclosed in said casing and comprising relatively movable contacts, a spring arm on which one of said contacts is mounted, a cam of insulating material engaging said arm, a rock shaft on which said cam is secured, said rock shaft being mounted in said casing and projecting outside of the casing, and an arm secured on said rock shaft and carrying a roll to engage the film in said machine.

6. In a safety apparatus for moving picture projecting machines, the combination of a rock shaft, a casing having a bearing in which said shaft is supported, a dowser

mounted on said rock shaft outside of said casing, a latch secured to said rock shaft within the casing and spaced from said dowser axially of said shaft, an electro-magnet within the casing, a pivoted armature normally restraining said latch but arranged to be operated by said electro-magnet to release the latch, and a spring for holding said armature normally in its latch restraining position.

HENRY C. CORNETTA.