H. S. MILLS.

MOVING PICTURE MACHINE.

APPLICATION FILED OCT. 3, 1908.

918,884.

Patented Apr. 20, 1909.

2 SHEETS—SHEET 1.

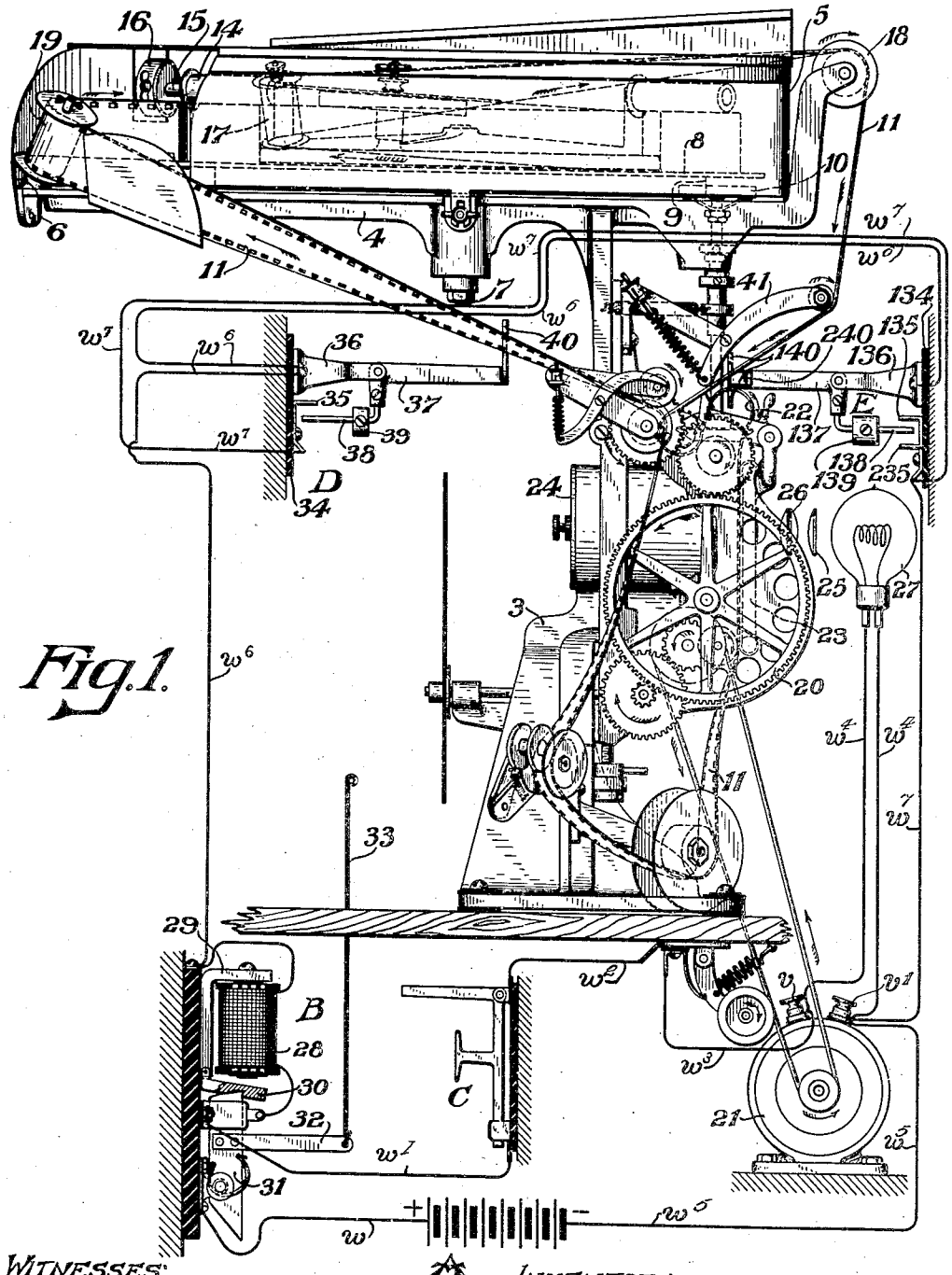


Fig. 1.

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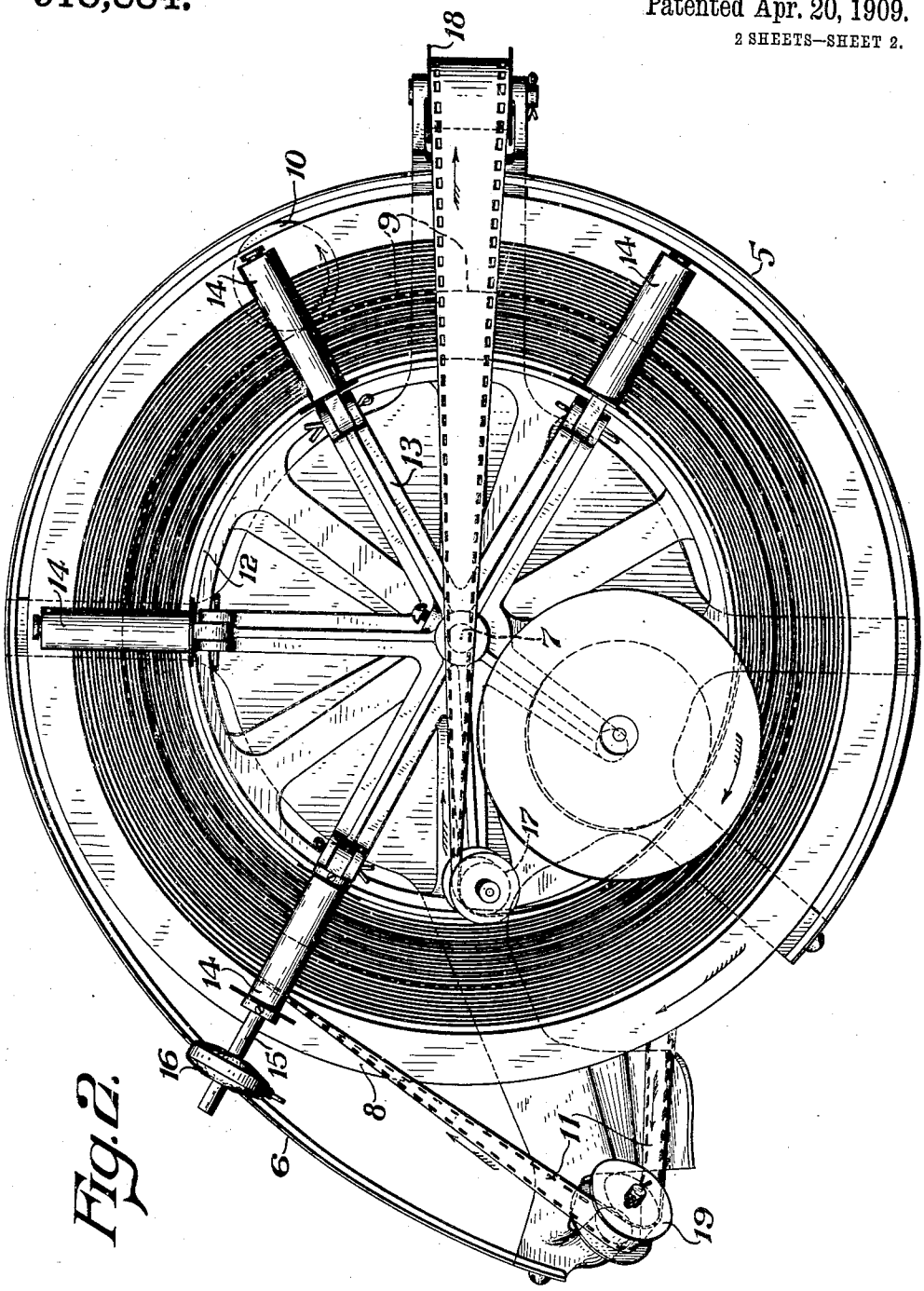


Fig. 2.

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UNITED STATES PATENT OFFICE.

HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

MOVING-PICTURE MACHINE.

No. 918,884. Specification of Letters Patent. Patented April 20, 1909.

Application filed October 3, 1908. Serial No. 456,051.

To all whom it may concern:

Be it known that I, HERBERT S. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Moving-Picture Machines, of which the following is a specification.

My invention relates to an improvement in the class of moving-picture machines in which an electric motor is the power employed for driving the mechanism.

The primary object of my invention is to provide automatic means for cutting out the motor to stop the machine in case of accidental breaking of the traveling picture-film or of its becoming caught.

In the accompanying drawings, Figure 1 shows a moving-picture machine by a view in side elevation, provided with my improvements contained in an electric circuit represented diagrammatically and including an electric motor for driving the machine; and Fig. 2 is a top-plan view of the film-winding device preferably employed with the said machine.

The moving-picture machine represented is substantially the same as that shown and described in United States Letters Patent No. 890,936, dated June 16, 1908; and the film-winder is substantially the same as that shown and described in United States Letters Patent No. 887,431, dated May 12, 1908.

The frame 3 of the moving-picture machine is surmounted by a support 4 for a stationary cylindrical casing 5 provided with a tangential extension 6. In the casing is centrally pivoted at 7, to occupy a horizontal position, a circular rotary film-carrier 8; and about the base of the carrier is formed an internally-toothed rack 9 engaged by a pinion 10 for driving the carrier, as hereinafter described. A film 11 in an endless annular coil seats about a circular flange 12 on and concentric with the carrier 8 to cause the coil to rotate therewith, and in rotating to pay out the film from the center of the coil and wind it upon the periphery thereof. Anti-friction rollers 14 are hinged to the outer ends of the arms of a stationary spider 13 on the casing, to extend radially across the top of the horizontal film-coil and bear against it for holding it down; and one of these rollers carries adjustably on an extension 15 of its outer end a weight 16 for varying the pressure of the base of the coil against the upper surface of the carrier to bind the convolutions with more or less friction thereto, so that the coil may pay out as rapidly as the carrier rotates or less rapidly, according to requirement of the moving-picture machine. The film passes from the center of the coil about an inclined guide-roller 17 and about a guide-roller 18, and back to the periphery of the coil over an inclined guide-roller 19 after having traversed the mechanism on the frame 3, being paid out from the center of the coil by rotation of the carrier under the driving action of the pinion 10 which is geared to the film-feeding mechanism on said frame, as indicated in Fig. 1. From the roller 18 the film is fed and guided back to the carrier 8 by the mechanism on the frame 3 which is shown and described in detail in said Patent No. 890,936, the same being driven by a master-gear 20 on the frame, geared to an electric motor 21 to feed the film from a loop 22 formed therein past a gate, indicated at 23 in Fig. 1, for clamping the edges of the film, and across the light-admitting end of a lens-barrel 24 on the frame 3, the condensing lenses of which are represented at 25 and 26 on said figure. The feeding of the film across the lens-barrel is effected intermittently, as required in a moving-picture machine, by the ordinary or any suitable Geneva-gear movement (not shown), that illustrated and described in said Patent No. 890,936 being preferred.

The parts of the machine thus far referred to and described need present no features of novelty.

Following is a description of my improvements in the moving-picture machine.

The circuit may be traced in Fig. 1 through a wire w leading from the positive pole of a generator, represented conventionally at A, through an automatic cut-out B and thence through wire w' to an ordinary hand-operated switch C, thence through wires w^2, w^3 to one terminal, v, of the motor 21, and back to the other motor terminal, v^1, through wires w^4, w^4, and an incandescent electric lamp, represented at 27, in line with the aforesaid lenses; and a wire w^5 leads from the last-named motor-terminal to the opposite pole of the generator. A branch-circuit is formed with a wire w^6 leading from the cut-out B and a branch-wire w^7 leading to the motor-terminal v^1; and this branch-circuit contains my improvements for stopping the operation of the ma-

chine in the event of breaking of the traveling film and in the event of stoppage in the feed of the film.

The automatic cut-out B, which may be of any suitable or known construction, consists, as shown, of an electro-magnet 28 supported on an insulated bracket 29 carrying a swinging armature 30 normally engaging, by gravity, with the upper free end of a spring-pressed blade 31 pivotally supported at its lower end, the weight of the armature normally holding the blade in upright position against turning under the tendency of its controlling spring to break the connection made by it in the wires w and w' and thus open the circuit to cut out the motor and stop the machine. For restoring the circuit at that point, the blade 31 carries an arm 32 with which is connected an upright rod 33 extending into a position of convenient access for pulling it upward to turn the blade back into engagement with the armature. The freeing of the blade for opening the circuit is occasioned by attraction of the armature when the magnet is energized.

At D is represented an automatic switch on an insulating support 34. It comprises a contact-finger 35 with which the wire w^7 is connected, and a rigid metal arm 36 with which the wire w^6 is connected, said arm carrying pivotally upon it a bell-crank 37 having a contact-finger 38 extending from its shorter arm below and coincident with the finger 35 and provided with an adjustable weight 39; and the longer arm of the bell-crank has a finger 40 of inverted-L shape extending from its free end into the path of the film 11 in its course back to the film-carrier to form a film-bearing. The film passes under the finger 40 which bears against it to resist the tendency of the weight to turn the bell-crank in the direction to contact the finger 38 with the finger 35 and close the branch-circuit, which is maintained normally open at the switch D by the separation of the contact-fingers. Should the film break and thus fail to continue to prop the finger 40, the weight 39, which overbalances the longer bell-crank arm, will turn the bell-crank and contact the finger 38 with the finger 35, thereby closing the branch-circuit and energizing the magnet 28 to attract its armature. Such attraction of the armature releases the blade 31 to permit turning thereof by its spring to open the motor-circuit, with the effect of cutting out the motor and stopping it and the result of stopping the machine and that of extinguishing the lamp. When the film is mended, its engagement with the finger 40 opens the branch-circuit, and the motor-circuit may be restored by raising the blade 31 to normal position through the medium of the rod 33. A somewhat similar automatic switch is provided at E, near the point where the film leaves the carrier. This switch operates to cut out the motor in the event of stoppage in the feed of the film by stripping of its edge-perforations or from other cause. It comprises an insulating support 134 on which is fastened a pair of contact-fingers 135 and 235 in vertical alinement with each other, a rigid metal arm 136 extending from the support and having pivotally secured in its outer end a bell-crank 137 with a contact-finger 138 extending from its shorter arm between the fingers 135 and 235 and carrying an adjustable poising-weight 139, and a fork 140 on the free end of its longer arm in the path of the film, this fork having two parallel fingers and a deflected intermediate branch-finger 240.

The wire w^7 is connected with the fingers 135 and 235 and the wire w^6 is connected with the arm 136. The weight 139 is adjusted to normally balance the arms of the bell-crank and normally maintain the contact-finger 138 separated from the contact-fingers 135 and 235. The film passes from the roller 18 under a spring-pressed tautening-device, represented at 41 in Fig. 1, and is engaged by it, and it passes thence through the fork 140 without bearing against any of the fingers forming it; and the loop-section 22 also passes through the fork beneath the finger 240 thereof but without bearing against any of the fork-forming fingers.

Should the traveling film become caught against continuing to pay out from the coil, the strain of the continued operation of the feeding mechanism of the machine will straighten the film at the section thereof where the tautening-device 41 engages it, thus against the resistance of the latter, and in so straightening the film will engage with the uppermost of the two parallel fingers of the fork 140 and tilt the bell-crank 137 in the direction to cause the contact-finger 138 to encounter the contact-finger 235, thereby closing the branch-circuit to energize the magnet 28 and open the motor-circuit in the same way and with the same results as described in explaining the action of the device D. Like results ensue in the event of stoppage of the film as by its edge-perforations becoming impaired or stripped where it passes about a feed-roller just behind the loop 22. Then the continued operation of the feeding-mechanism would draw the loop against the lowermost of the two parallel fork-fingers to cause the strain thereon to turn the bell-crank in the direction to engage the contact-finger 138 with the contact-finger 135. If the cause of stopping the travel of the film, such as stripping or impairing its edge-perforations, occur adjacent and beyond the lower end of the clamping-gate, the continued feed above the gate will expand the loop 22 thereby backing it up against the fork-finger 240 and causing its engagement with that finger to turn the bell-crank 137 in

the direction to effect closure of the branch-circuit and opening of the motor-circuit, as described, by engagement of the contact-finger 138 with the contact-finger 235.

What I claim as new and desire to secure by Letters Patent is—

In a moving-picture machine employing a traveling picture-film, the combination with film-feeding mechanism, of an electric circuit, an electric motor and an automatic cut-out therefor in said circuit, said motor being geared to said mechanism to operate it, a branch of said circuit connected with said cut-out, a switch-device in said branch-circuit comprising a pair of alining contact-fingers on an insulated support, a pivotal bell-crank on said support having on one arm a contact-finger extending between said alining fingers and on its other arm a fork formed with a pair of parallel fingers and an intermediate deflected finger, the space between said parallel fingers being traversed by a straight section of said film and a loop-section in the film extending beneath said deflected finger, and a film-tautening device bearing upon the film, substantially as and for the purpose set forth.

HERBERT S. MILLS.

In presence of—
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R. A. RAYMOND.