J. DARBY.

MOTION PICTURE PROJECTING MACHINE.

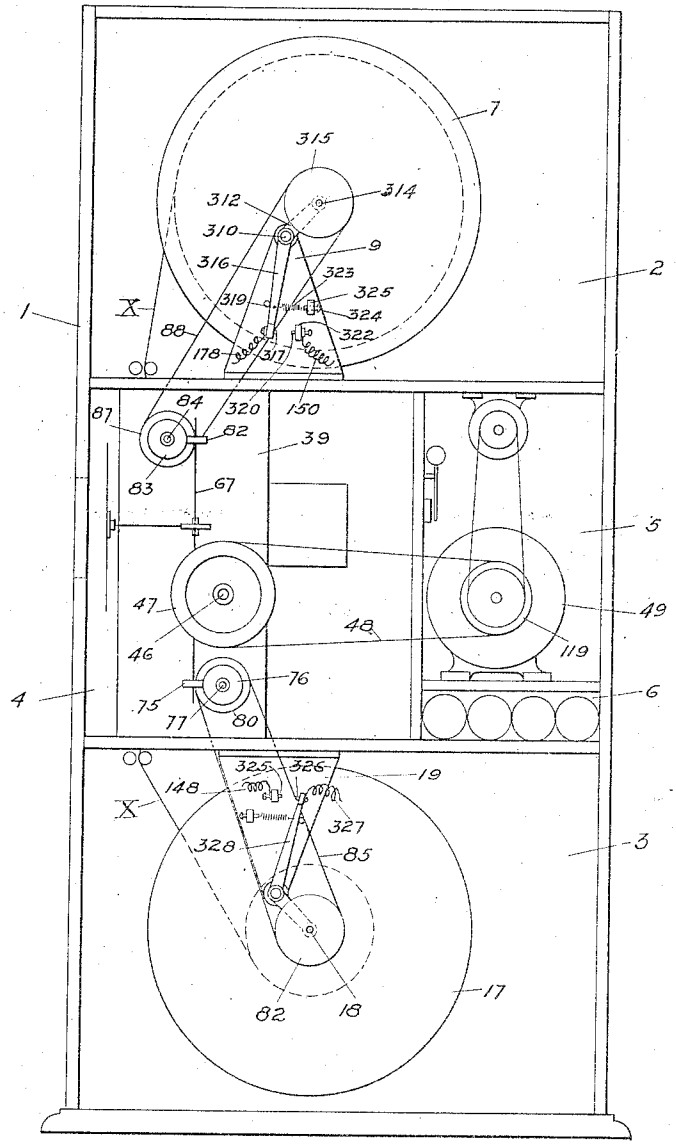
APPLICATION FILED MAY 15, 1919.

1,359,579.

Patented Nov. 23, 1920.

3 SHEETS—SHEET 1.

Fig. 1.



INVENTOR

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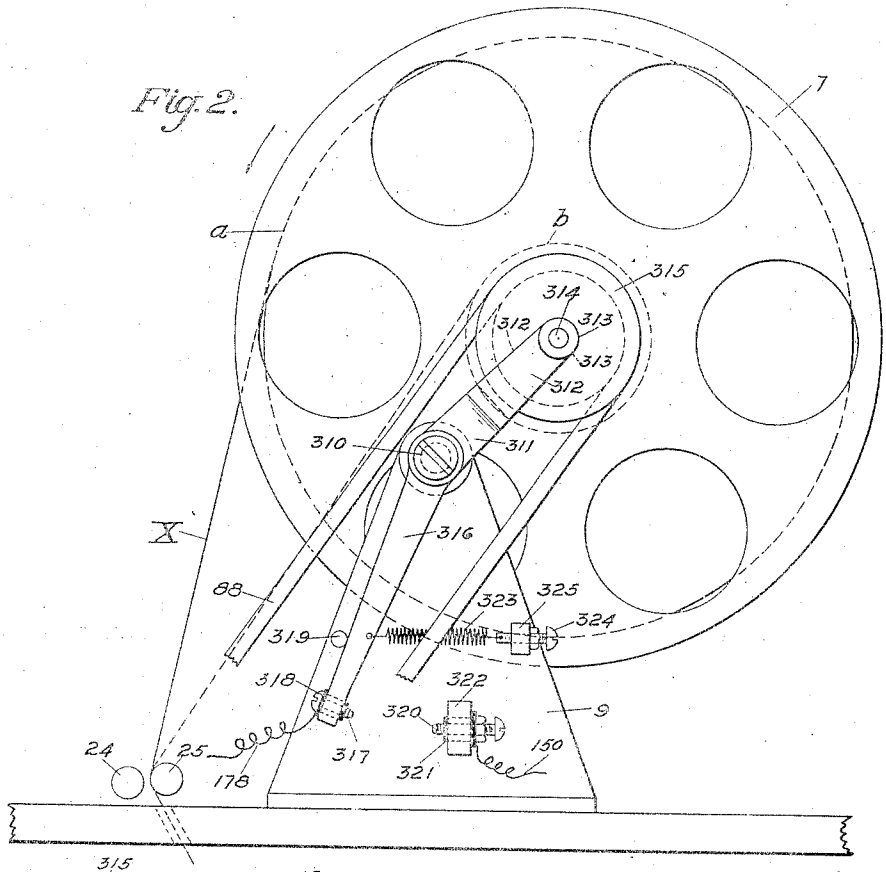
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3 SHEETS—SHEET 2.

Fig. 2.



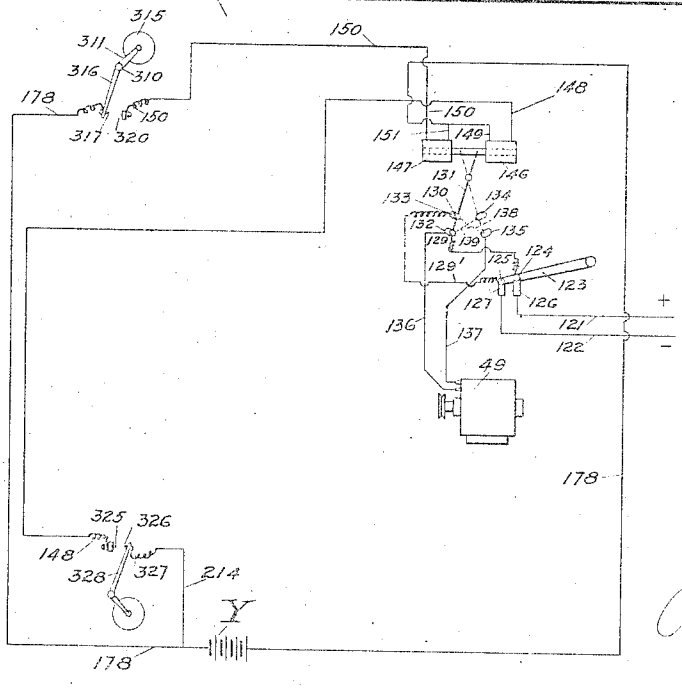


Fig. 3.

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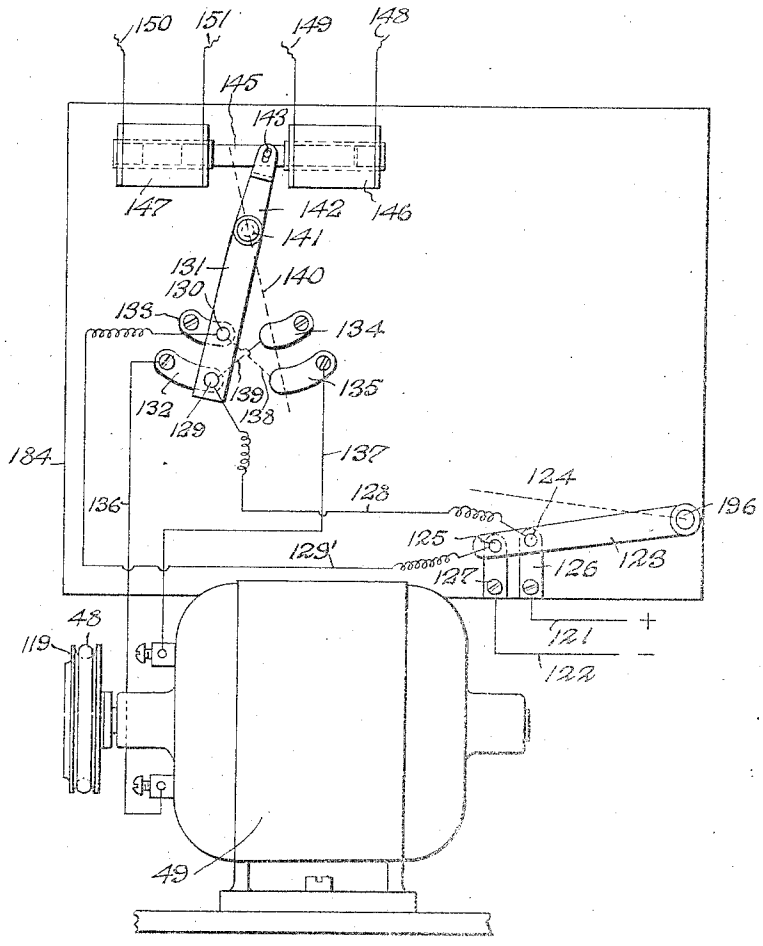
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3 SHEETS—SHEET 3.

Fig. 4.



Inventor:

John Darby

UNITED STATES PATENT OFFICE.

JOHN DARBY, OF SUMMIT, NEW JERSEY, ASSIGNOR OF ONE-HALF TO EDWIN F. FLINDELL, OF SUMMIT, NEW JERSEY.

MOTION-PICTURE-PROJECTING MACHINE.

1,359,579. Specification of Letters Patent. Patented Nov. 23, 1920.

Original application filed March 1, 1918, Serial No. 219,752. Divided and this application filed May 15, 1919. Serial No. 297,191.

To all whom it may concern:

Be it known that I, JOHN DARBY, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Motion-Picture-Projecting Machines, of which the following is a specification.

The invention relates to motion picture machines and more especially to means for automatically reversing the direction of movement of a film strip, in that class of machines, where a film is unwound during projection from a feed reel and wound upon a takeup reel, and must be rewound upon the feed reel, before another period of projection of the film takes place.

The objects of the invention are to provide automatic means for reversing the direction of rotation of the projecting machine proper, and consequently the direction of rotation of the feed and takeup reels, together with the direction of movement of the film strip; such reversing means being dependent upon a variation or change in the weight of film carried by either the feed or takeup reels, as the film unwinds from either of said reels.

These and other objects and advantages will be set forth in part hereinafter, and in part will be obvious herefrom, such objects and advantages being obtained by the instrumentalities pointed out in the accompanying claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

This case is a division of my copending application, Serial No. 219,752 filed March 1, 1918.

Of the drawings:

Figure 1 is an elevation showing diagrammatically, the driving side of a motion picture projecting machine with its driving motor, the feed and takeup reels, etc., as it may be assembled in a case or housing.

Fig. 2 is an elevation of the feed reel as mounted upon a movable arm or lever together with electrical contact points and a balancing spring.

Fig. 3 is a diagrammatic view, showing the feed and takeup reel supporting levers, the driving motor for the machine with its controlling switches and the wiring circuits.

Fig. 4 is a detailed elevation of the driving motor, cutout and reversing switches, actuating magnets and wiring connections.

Generally speaking, the machine proper and its accompanying driving and control mechanisms may be assembled in any convenient form of housing, such as comprised by the casing 1, subdivided into the upper or feed reel compartment 2, the lower or takeup reel compartment 3, the central or machine compartment 4, driving and control compartment 5 and a battery or rheostat compartment 6.

Such a housing would preferably be constructed in a fire resisting manner, either by lining a wooden case with a suitable fire resisting material or by making the case of sheet metal; suitable doors or openings, not shown, being provided to the various compartments for access to the different parts of the machine for inspection and repair.

So far as the film moving means are concerned, they may consist of the usual intermittently moving sprocket roller, the continuously rotating feed and takeup sprocket rollers, together with the necessary guide rolls to maintain the film in proper relation to the sprocket rolls, as disclosed in my copending application to which reference has been made.

The driving mechanism of the machine, as shown in Fig. 1, consists of a main driven shaft 46, which actuates the intermittent sprocket, not shown, and also drives by means of a pair of helical gears, not shown, the vertical shaft 67.

Shaft 67 is provided at its upper end with a helical gear 82 meshing with the helical gear 83 carried by the shaft 84 supported in bearings provided in the frame member 39. Shaft 84 has a pulley 87 which drives by means of a belt 88 the pulley 315 on the upper or feed reel shaft 314.

Located on the lower end of shaft 67 is a helical gear 75 meshing with a helical gear 76 on the shaft 77 carried by bearings in frame 39. Shaft 77 is provided with a pulley 80 which drives by means of a belt 85, a pulley 82 on the lower or takeup reel shaft 18.

Belts 88 and 85 drive their respective reels

when either of said reels is winding or unwinding the film, slippage between the driving belts and driven pulleys taking place to compensate for variations in speed.

A pulley 47 on shaft 46 is driven by a belt 48 running over pulley 119 on the shaft of driving motor 49.

Means are provided to cause the reversal of the driving motor and consequently the machine mechanism, and also the direction of movement of the film strip X, governed by a predetermined weight of film on the reel.

In Fig. 2, is shown an angled lever arm 316, pivotally supported near its center 310 by the standard 9, the upwardly extending portion 311 of said lever being forked by the two arms 312, 312 which terminate in bearings 313, 313, supporting the reel shaft 314 driven by the pulley 315. On an extension of shaft 314, beyond one of the bearings 313, is rotatively carried the feed reel 7. Extending downwardly from the pivotal point 310, the lever 316 is provided at its lower end with a contact 317, mounted in an insulating bushing 318. Said contact is designed to strike, under certain conditions as hereinafter set forth, the adjustably fixed contact 320, carried in the insulating bushing 321, supported by lug 322 of the standard 9. A pin or stop 319 supported by the standard 9, limits the movement of arm 316 in the direction in which said arm is forced by the weight of reel 7 and the film contained thereon; while a tension spring 323, connected at one end to arm 316 and at the opposite end to an adjustable screw 324 in lug 325 of standard 9, tends to counterbalance the weight of the reel and film and to draw contact 317 toward contact 320.

It will be evident from the structure disclosed, that when the reel 7 is fully wound with the film strip as indicated by *a*, that the weight of the reel and film may be sufficient to maintain the arm 316 against its stop 319; and that the spring 323, may be so proportioned or adjusted as to overcome the weight of the reel and the film, when the film remaining on the reel has been reduced by unwinding to any predetermined point, as indicated at *b*, and cause the arm 316 to rotate about its pivotal point 310 and the contact 317 to strike contact 320. It will also be evident that as the weight of the reel 7 remains constant, movement of the arm 316 with its contact 317, is governed by a change in weight of the film carried by the reel.

Electrically operated means, controlled by contacts 317 and 320, are provided for reversing the direction of rotation of the driving motor, and as disclosed, consist of a switch 131 pivotally mounted at 141, having an upwardly extending forked arm 142, engaging through a pin 143, a plunger 145. Plunger 145 is so disposed as to be drawn in one direction by the magnet 146 and in the opposite direction by magnet 147 as either of said magnets is energized by an electric current.

Line leads 121 and 122 supply current to the motor 49 through a cutout switch 123. Said switch is provided with contacts 124 and 125 connecting with the line contacts 126 and 127. Leads 128 and 129[1] carry the current from switch 123 to the contacts 129 and 130 provided on reversing switch 131. Contacts 129 and 130 are so disposed on switch 131 as to complete the circuit to the fields of motor 49 through the fixed contact 132 and line 136 and the fixed contact 133, cross connection 138, fixed contact 135 and line 137; and cause the motor to be driven in forward rotation.

To reverse the direction of rotation of motor 49, a contact 134 is provided with a cross connection 139 to contact 132 and the fixed contacts 134 and 135 are so disposed as to be engaged by contacts 130 and 129 of switch 131, when said switch is moved to the position as shown by dotted line 140. By the movement of switch 131 from the full line position to the dotted line position, as shown in Figs. 3 and 4, it will be evident that the direction of flow of the line current through the fields of motor 49 will be reversed and will cause said motor to rotate in the opposite or reverse direction.

Suitable connections and a source of electrical energy are provided to energize the magnet 147 upon the striking of contacts 317 and 320 of the film reversing means, and as shown in Fig. 3, are comprised of the line 178, battery Y, line 178 and connection 151, the winding of magnet 147 and the line 150 to contact 320.

Upon the energizing of magnet 147, plunger 145 is drawn within the core of said magnet, throwing switch 131 from the full line to the dotted line position and reversing the direction of rotation of motor 49 as hereinbefore set forth. By the reversal of the driving motor, feed reel 7 is caused to rotate in the opposite direction from that indicated by the arrow in Fig. 2 and to rewind the film strip X from the takeup reel 17.

Through a similar balancing system in connection with the takeup reel 17, forward rotation of the driving motor to cause a repeated projecting movement of the film strip is brought about.

A reel carrying lever arm 328 is provided with a contact 326 designed to strike the fixed contact 325 when the film in unwinding from the takeup reel 17 has been so reduced that a tension spring, will overcome the weight of film still remaining upon the reel, together with the weight of the reel, and move said arm to strike said points to-

gether. Upon the striking of contacts 325 and 326 a circuit to energize magnet 146 is closed through lines 327, 214, battery Y, line 178, connection 149, the winding of magnet 146 and back through line 148 to contact 325.

By the energizing of magnet 146, plunger 145 is drawn within the core of said magnet and the switch 131 is moved from the dotted line position 140 to the full line position as shown in Fig. 4, causing motor 49 to again rotate in a forward direction, and thus effect the unwinding of the film strip X from the upper or feed reel 7 and the winding of said strip upon the takeup reel 17.

The reversals of the driving motor and film strip will continue to take place as the weight of film remaining on either the feed or takeup reel is reduced to the point to be overbalanced by their tension springs, until such time as cutout switch 123 may be thrown to break the line circuit.

It will be understood from the foregoing that devices have been provided realizing the objects and advantages herein pointed out, together with other objects and advantages.

It will be further understood, that many changes may be made from the precise form of such devices herein shown and described, within the accompanying claims, without departing from the principles of the invention and without sacrificing its objects and advantages.

I claim:

1. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound and means to stop the rotation of said reel actuated by the varying weight of film carried by said reel.

2. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound and means governed by a variation in weight of the film carried by the reel to reverse the direction of rotation of said reel.

3. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound, and means to stop and to reverse the rotation of said reel actuated by varying the weight of film carried by said reel.

4. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound and means to reverse the direction of movement of said film strip governed by the film remaining upon the reel as it unwinds, reaching a predetermined weight.

5. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound and means to stop the rotation of said reel, governed by the film remaining upon the reel as it unwinds, reaching a predetermined weight.

6. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound and means to stop and to reverse the direction of rotation of said reel, governed by the film remaining upon said reel as it unwinds, reaching a predetermined weight.

7. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound, a driving motor for said reel and means governed by the varying weight of film carried by said reel to stop said motor.

8. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound, a driving motor for said reel and means governed by the varying weight of film carried by said reel to reverse said motor.

9. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound, a driving motor for said reel, and means governed by the varying weight of film carried by said reel to stop and to reverse said motor.

10. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound and electrical means governed by the varying weight of film carried by said reel, to stop the rotation of said reel.

11. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said film is wound or unwound and electrical means governed by the varying weight of film carried by said reel, to reverse the direction of rotation of said reel.

12. In a motion picture projecting machine, a movable film strip, a rotating reel upon which said strip is wound or unwound, a driving motor for said reel and electrical means governed by the varying weight of film carried by said reel to stop and to reverse said motor.

13. In a motion picture projecting machine, a movable film strip, a reel upon which said strip is wound or unwound, a driving motor for said reel, a switch to control said motor and electrical means actuated by a change in weight of the film carried by said reel to move said switch.

14. In a motion picture projecting machine, a movable film strip, a reel upon which said strip is wound or unwound, a driving motor for said reel, a switch to control said motor and electrical means actuated by a change in weight of the film carried by said reel to move said switch and reverse said motor.

15. In a motion picture projecting ma-

chine, a movable film strip, a reel upon which said strip is wound or unwound, a driving motor for said reel, a switch to control said motor, magnets to throw said switch, and means governed by a change in weight of the film carried by said reel to energize said magnets and move said switch.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN DARBY.

Witnesses:
CHARLES C. BRESEE,
P. D. JOHNSTON.