No. 855,973. PATENTED JUNE 4, 1907.

J. Y. PORTER.

MECHANICAL MOVEMENT.

APPLICATION FILED MAY 21, 1906.

2 SHEETS—SHEET 1.

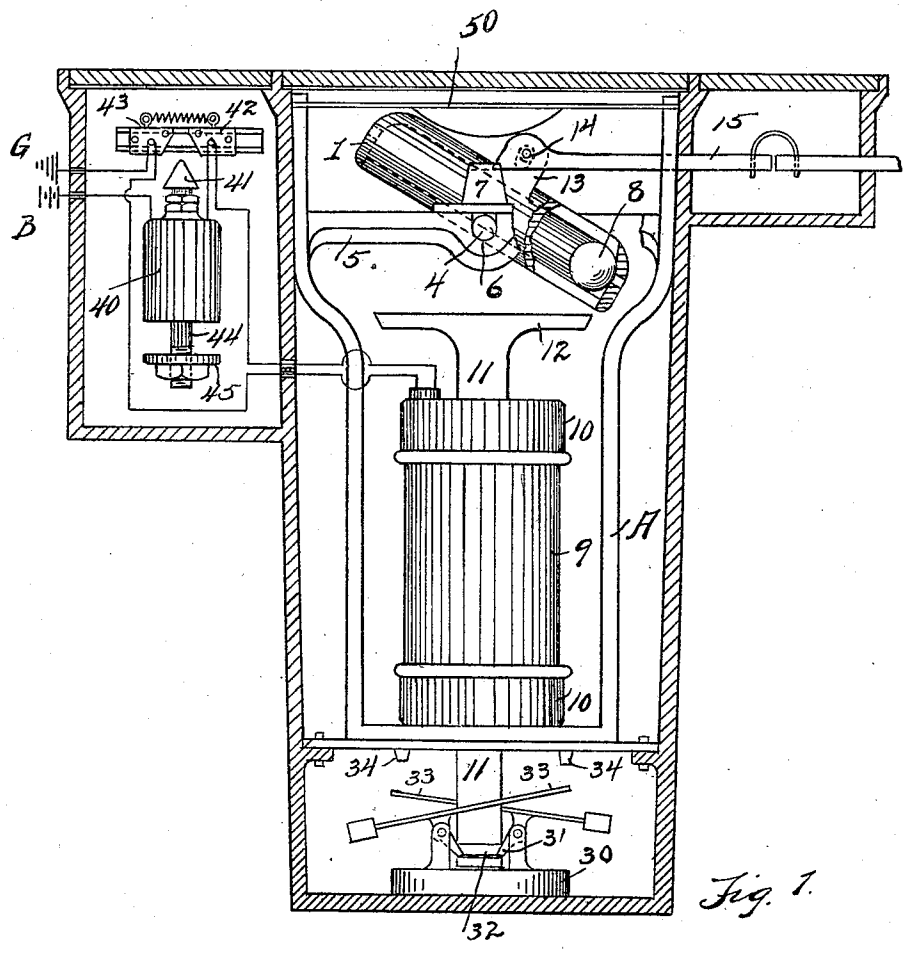

Fig. 1.

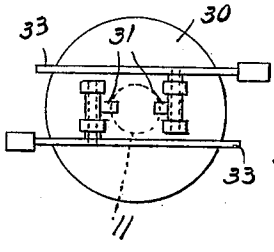

Fig. 5.

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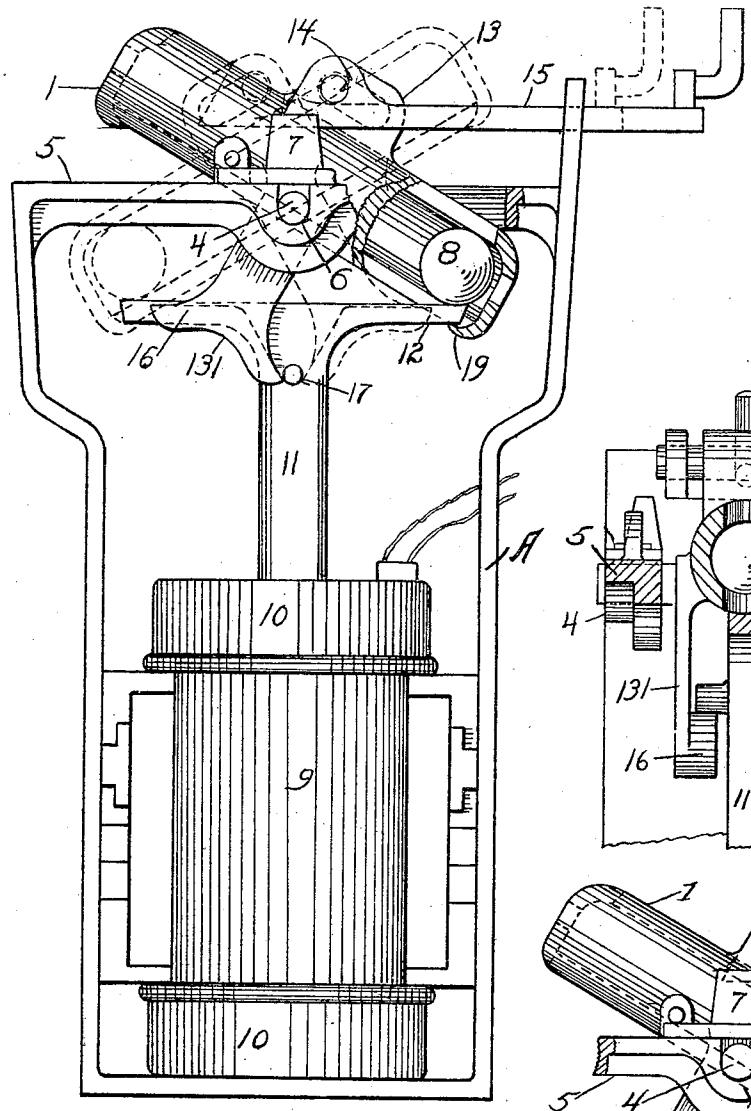

Fig 2

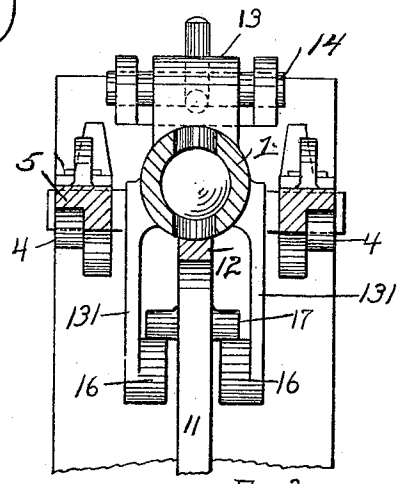

Fig 3

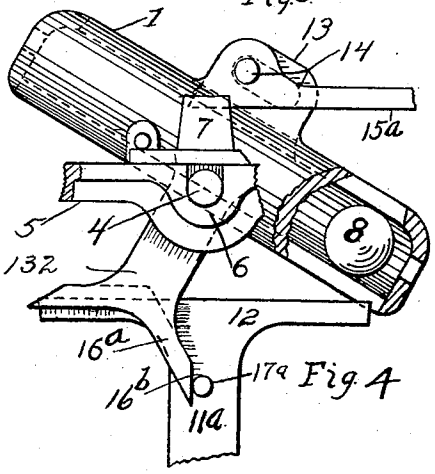

Fig 4

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UNITED STATES PATENT OFFICE.

JOSEPH Y. PORTER, OF DETROIT, MICHIGAN.

MECHANICAL MOVEMENT.

No. 855,973. Specification of Letters Patent. Patented June 4, 1907.

Application filed May 21, 1906. Serial No. 317,947.

To all whom it may concern:

Be it known that I, JOSEPH Y. PORTER, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Mechanical Movements; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to mechanical movements; it has for its object an improved means of changing the direction of rectilinear movement imparted by a driving to a driven member, and of producing on the driven member a full reciprocation for each two reciprocations of the driving member.

The mechanism in which the invention is embodied is especially adapted for use in railway switches of the class which contains devices actuated by some electrically moved member.

In railway switches, it is frequently, if not generally desirable that the tongue of the switch shall assume a position, retain it for a time and be moved from that position by a succeeding impulse of the driving mechanism; that the driving or actuating mechanism shall swing the switch tongue in both directions and shall swing it first under an impulse in one direction and on a succeeding impulse swing it in an opposite direction.

The invention also relates to incidental features of locking one part with respect to the other, and to incidental features of protection to the driving mechanism, especially to protection from the currents of high voltage which are used for the motors of trolley cars, and which may at times become highly dangerous to the motor mechanism of the switch, unless some protecting instrumentality is interposed in the wiring by which the current is brought to the motor.

In the drawings:—Figure 1, is an elevation of the switch motor, and of the safety instrument. Fig. 2, is an elevation of the switch motor containing some incidental locking features not contained in Fig. 1. Fig. 3, is a cross section of the top part of the instrument shown in Fig. 2. The section is taken at right angles to the view shown in Fig. 2. Fig. 4, is a side elevation showing the top of an instrument similar to that shown in Fig. 2, but with a locking mechanism slightly modified from the locking mechanism of Fig. 2. Fig. 5, is a plan view of a weight shown in connection with Fig. 1.

The motor instrument is a solenoid core 11, mounted to reciprocate in a solenoid inclosed in case 9, and protected from damp, moisture and dirt by caps 10; through one of the caps the solenoid core 11 engages through a practically water tight fitting. The solenoid is mounted in a frame A, upon which there is pivotally supported a cage 1, inclosing a chamber within which there is a freely rolling ball 8. The cage 1, is pivoted on trunnions 4, on the top cross-bar 5 of the frame A, and is held in place by cap 7, which engages over the trunnions 4. The cage itself is provided with a slot on the under side and a slot on the upper side; these slots extend from end to end and form a free opening through the cage, through which the cross-head 12 of the core 11 could freely pass, were it not for the included ball 8, and were it not for the included ball, the cross-head and the core 11 would be free to reciprocate without in anywise actuating the locking cage 1, or the switch throwing pitman 15, which is pivoted to the cage. When, however, the cross-head in it travels upward engages against the ball 8, it is thereby prevented from continuing through the cage and now lifts the cage swinging it on its pivot and causing it to actuate the pitman 15. The ball 8 rolls in the cage with little or no friction, but when engaged by the cross-head 12 it is prevented from rolling, so that it acts as a fixed stop, or lug, for said cross-head to act against.

The cage is provided on its upper side with a slotted ear-like extension 13 in which engages a cross-bar 14, of the pitman 15. The slot in the extension allows the pitman 15 to have a reciprocating motion without binding. An incidental locking mechanism is shown in Fig. 2, in which the cage is provided with hangers 131, and each of these hangers is provided on its inner face or that face which lies toward the core 11 with flanges 16 that are positioned to engage under a pin 17, which projects from the side of the core, and the engagement between the pin 17 and the flange 131, at any time during the swing of the cage before it has reached the limit of its move-

ment in either direction, will lock the core in its then suspended or partially suspended position if the current fail for any reason.

The ear of the cage travels under a bow-spring 50, the lowest part of which is directly over the pivot 6; this spring tends to hold the cage in either position which it may assume.

The core can only drop to its lower position when the cage has reached the limit of its oscillation in either one or the other direction, and not then if the cage has been provided as I sometimes do provide it, with hooks 19 that engage under the end of the cross-head 12, just at the period that the cage reaches the limit of its oscillation in either direction, the core in this case is held suspended and in position to immediately engage with the ball in the cage at all times.

In the form shown in Fig. 4, the hooks 19 are omitted and the hanger 132 is provided at its lower end with a flange 16^a, which at its terminal at either side of the hanger has a face that assumes a vertical position when the hanger reaches the limit of its oscillation in either direction. This vertical face 16^b engages against the pin 11^a, and in this position locks the switch which has been thrown over by the motor to the limit of its oscillation, and which cannot now be thrown back by applying force to the switch tongue itself, but can only be returned to its opposite position by actuating the solenoid core 11^a, and through this means actuating the switch tongue.

I have found that it is sometimes desirable to allow the solenoid plunger 11 to drop to a lower position than the one in which it will immediately engage the cage or its inclosed ball, and that when such a construction is employed it is desirable to prevent the too rapid initial rise of the solenoid core, and to prevent the hammering or pounding which would follow the rapid rise of the solenoid and a blow stroke upon the ball. To produce the desired result I employ a weight 30, provided with catches 31 that engage with an arrow head terminal 32 at the lower end of the plunger.

The catches are arranged to be thrown out of their locking engagement with the neck of the arrow head by levers 33, that strike against some part 34 of the frame when the core 11, is lifted by the electrical force. By this means during the first part of the upward movement of the core 11, its free movement is impeded by the weight 30, and this impediment continues until the levers 33 are brought into engagement with the frame A, and then the weight is dropped and does not act as an impediment to add to the resistance furnished by the switch tongue and its connections which now are engaged by the cross head 12 on the upper end of the solenoid core.

To protect the solenoid from excessive electrical currents I provide a second solenoid 40. The solenoid within the case 9 is wound to be actuated by a current of comparatively low voltage and when so wound would be liable to be injured, should the voltage rise to one that is higher than that for which it is wound, and should there be no protection interposed.

The solenoid 40 is mounted to be actuated by a current that is somewhat in excess of that which may be safely passed through the coil of the solenoid in the case 9, and when actuated, its core, which is terminated with an arrow head 41 engages between terminals 42 and 43 and short circuits the current passing either the whole or a part of the current through the short circuit back to the main line. The solenoid 40 is within a casing of magnetic material, which becomes a magnet when energized, and the lower end of the core 44 is provided with an adjustable armature 45 which may be adjusted up or down on the core, and after the core has been reciprocated to bring the armature 45 into contact with the magnetic casing, the core will remain in its elevated position so long as any current is flowing through the coil.

The arrow head part 41, of the core is preferably of non-magnetic metal, but of a good conducting metal which forms contact with the two terminals 42 and 43.

When a smaller current is employed from any source B, as for instance the trolley line such current passes through the windings of the coil of the solenoid 40, thence through the terminal 42, and through the solenoid within the casing 9, back to the terminal 43, and thence to the return wire or to the ground G. Should there be an excess of current sufficient to actuate the solenoid 40, the arrow-head 41 comes into contact with the terminals 42 and 43, and the current passing through the solenoid 40 to the terminal 42 passes directly across the terminal 43 and to the return wire or the ground, thus short circuiting the current and preventing it from doing injury to the coil in the casing 9.

What I claim is:—

1. In a mechanical movement and as a means of producing a complete reciprocation of a driven member, with two reciprocations of a driving member, the combination of a reciprocating driving member and a reciprocating driven member, a rocking cage engaged to the driven member, said driving member being adapted to pass by said cage without contacting the same and a movable part upon said cage adapted to move thereon by gravity and to interpose itself to constitute a lug between the driving member and the cage, substantially as described.

2. In a mechanical movement, having in combination as a means for changing the

direction of motion, a driving member, a driven member, and an intervening rocking member, a catch on the rocking member adapted to engage the driving member to restrain the motion of the same, substantially as described.

3. In a mechanical movement for changing the direction of rectilinear movement, in combination with a driving member and a driven member, and a rocking member interposed between the driving and driven members, a hanger depending from the rocking member adapted to engage under a projection on the driving member, substantially as described.

4. In a safety appliance for electrically actuated solenoids, in combination with a member adapted to be actuated, an electrical motor for actuating the same, a safety switch adapted to be brought into action by the actuated part at the close of its stroke, and means for retaining the actuated member at its assumed position, substantially as described.

5. In an electric switch thrower, in combination with an actuating lever, and a solenoid core adapted to actuate the same, a weight, and means for attaching said weight to the solenoid core during the first part of its movement and before its engagement with said lever, means for detaching the weight automatically, substantially as described.

6. In a switch throwing device, in combination with a rocking lever, and a solenoid adapted to actuate said lever, a weight adapted to be engaged with said solenoid core during its initial movement and to be detached therefrom during its period of engagement with said lever, substantially as described.

7. A safety appliance for electrically actuated solenoids, having in combination with the switch throwing solenoid a second solenoid interposed in the electric circuit in series with the first named solenoid, and means whereby upon increasing the current beyond a predetermined limit the second solenoid produces a short circuit of the current, substantially as described.

8. In a device for throwing a switch by an electric motor, in combination with the motor, a second motor interposed in the electric circuit in series with the first named solenoid and adapted to close a contact and short circuit said circuit, when the current thereof rises above a predetermined amount, substantially as described.

9. In a device for throwing switches, by an electric motor, in combination with a motor wound to have efficient action upon a current smaller than that to which it may be exposed, a second motor in the line of the current wound to be actuated with a larger current and when actuated to close a short circuit thereby cutting out from the main motor circuits of dangerously high voltage, substantially as described.

In testimony whereof, I, sign this specification in the presence of two witnesses.

JOSEPH Y. PORTER.

Witnesses:

CHARLES F. BURTON,

MAY E. KOTT.