No. 735,531. PATENTED AUG. 4, 1903.

O. M. LACEY.

SWITCH FOR SYSTEMS OF REMOTE CONTROL.

APPLICATION FILED OCT. 16, 1902.

NO MODEL.

Fig. 1.

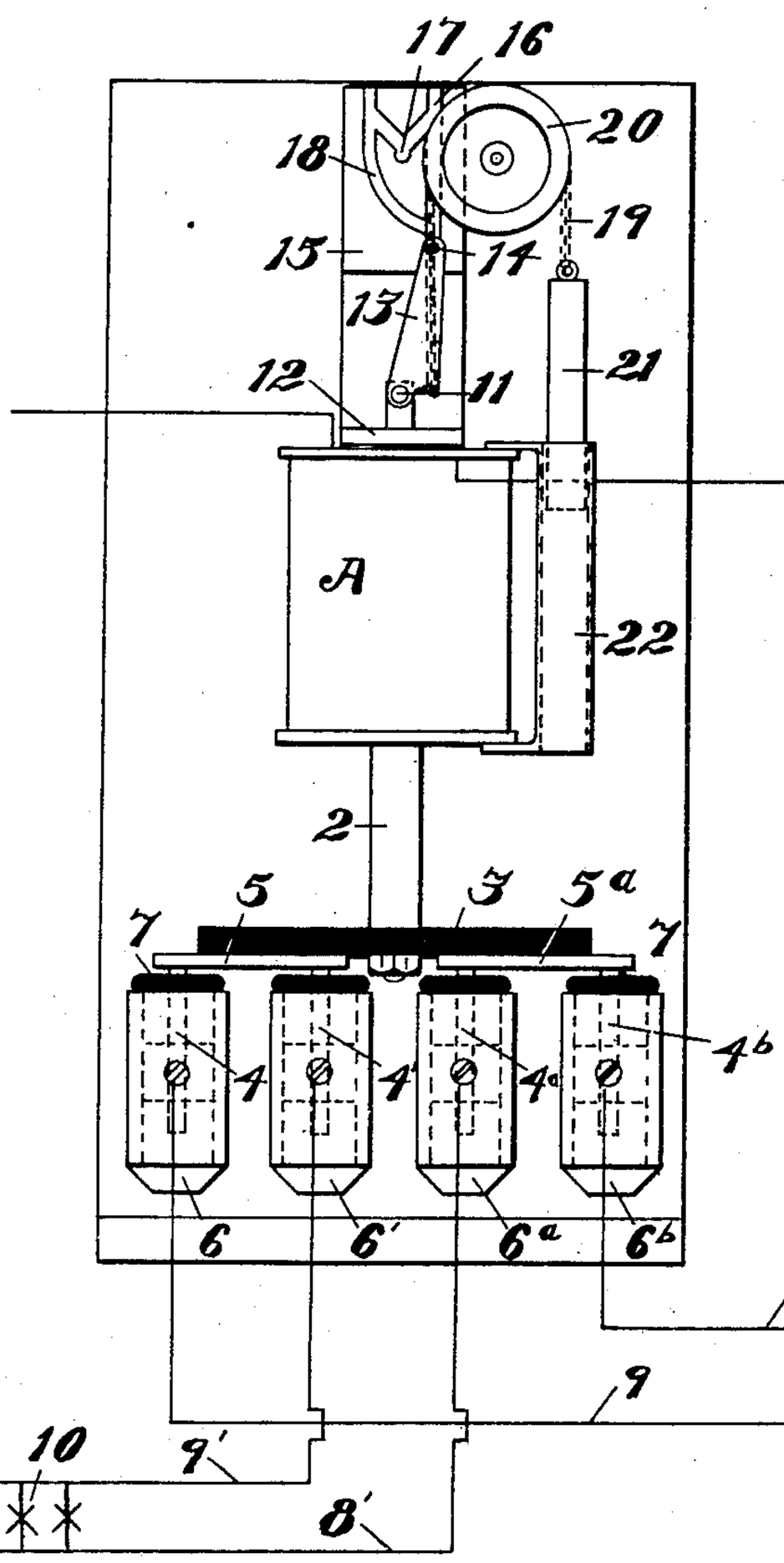
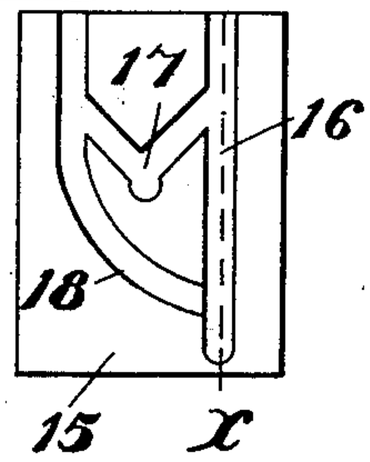


Fig. 2.

Fig. 3.



Witnesses,
J. B. Howse
Dudley Moss.

Inventor,
Ora M. Lacey
By Dewey Stronghtbo.
Atty

No. 735,531. Patented August 4, 1903.

UNITED STATES PATENT OFFICE.

ORRA M. LACEY, OF HANFORD, CALIFORNIA.

SWITCH FOR SYSTEMS OF REMOTE CONTROL.

SPECIFICATION forming part of Letters Patent No. 735,531, dated August 4, 1903.

Application filed October 16, 1902. Serial No. 127,509. (No model.)

To all whom it may concern:

Be it known that I, ORRA M. LACEY, a citizen of the United States, residing at Hanford, county of King, State of California, have invented an Improvement in Switches for Systems of Remote Control; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in electric switches by which lamps, motors, and the like may be conveniently controlled from a point remote from the installation. Its object is to provide a device of few parts and one which is economical in manufacture and simple and positive in operation.

It consists of the parts and the construction and combination of parts hereinafter more fully described, having reference to the accompanying drawings, in which—

Figure 1 is a front elevation of my invention. Fig. 2 is a vertical section of guide-groove plate on line $x\,x$, Fig. 3. Fig. 3 is a front view of same.

A represents a vertically-disposed solenoid-magnet, in which a soft-iron core 2 is reciprocable. The movement of this core is adapted to make and break a circuit in the main line to connect or disconnect a motor or a lamp or lamps. In the present instance I have shown a cross-head 3, of non-conducting material, attached to the lower end of the core, from which is pendent the rods 4 4′ 4^a 4^b, electrically connected in pairs by bars 5 5^a.

6 6′ 6^a 6^b are mercury-cups, in which the respective rods 4 4′, &c., are movable. The latter are insulated from the cups, except when submerged in the mercury, by means of the porcelain sleeves 7.

8 9 represent the line-wires conveying the current for the lamps in the circuit to be controlled by the switch. The wire 9 connects to one cup of one of the pairs of cups, as 4, and 8 to a cup of the other pair, as 4^b. The continuations of these wires are represented by wires 9′ 8′, leading, respectively, from cups 4′ 4^a. Between wires 8′ 9′ are the lights 10.

In operation when the rods 4 4′, &c., dip in the mercury in the cups 6 6′, &c., the line-circuit is closed and the current from wire 9 passes through cup 6, rod 4, bar 5, rod 4′, cup 6′, wire 9′. From 8 the current passes through cup 6^b, rod 4^b, bar 5^a, rod 4^a, cup 6^a, wire 8′ to complete the circuit through the lamps. By lifting the rods out of the mercury the circuit is broken and the lights are extinguished.

My invention has mainly to do with the manner of effecting and controlling the reciprocation of the core 2 in order to make and break the connections, as above indicated. The upper end of the core has an extension 11, of non-magnetic material, as brass, slidable in a guide 12 and to which is pivoted a plate or arm 13. The arm has a lateral projection or boss 14, which is movable (as the core is reciprocated through the energizing or deënergizing of magnet A) in the irregular guide-groove of a stationary plate 15. This groove while suggestive of a heart shape is shown as having a longer vertical portion 16 deepest at the bottom end, which is closed to form a stop for boss 14. Near the upper end the groove branches horizontally to form an irregular or, as here indicated, a V-shaped portion 17, which runs into a portion 18, connecting at a point below the point of the V with the portion 16. The portion 18 where it joins with portion 16 is shallower than the latter is at this point of junction, so that as the boss 14 travels upward in portion 16, with its end bearing against the bottom of said portion and pressing against the side of said portion adjacent to 18, the boss will ride safely over the opening, Fig. 2. On the other hand, the bottoms of the portions 16 and 17 at their point of juncture are in the same plane, so that the boss may be easily shunted off into the horizontal portion 17 when the core is reciprocated in the opposite direction. Suitable means are provided to exert a pressure on plate 13, so that the boss will constantly press upon the same side of the guide-groove and will always move through said groove in the same direction, for the reason shortly to be noted. The means employed to effect this movement is here shown as follows: A chain or cord 19, passing over a pulley 20, has one end connected to plate 13 and the other end attached to a counterbalance, so that the tendency of the plate is to tip and make the boss press in the manner above indicated. The weight 21 is slidable in a suitable guide, as 22, and is for the two-fold purpose of exerting the pressure on plate 13 through chain 19 and of counterbalancing

the weight of the core and its connections, so that a smaller current through A will suffice to lift the core. The latter is just enough heavier than weight 21 as to fall by gravity on the cessation of the current. The coil A is energized through wire 23, carrying sufficient current only to effect the reciprocation of core 2. The return-wire is not here shown.

The flow of current through wire 23 is governed by an ordinary switch-arm 24, conveniently located at the point whence the lights are to be controlled.

By throwing switch-arm 24 to turn on the current the coil is energized to lift the core, carry plate 13 and boss 14 upward, and lift the rods 4 4′, &c., out of the mercury in cups 6 6′, &c., thereby interrupting the circuit through line-wires 8 9 8′ 9′ and extinguishing the lights in the circuit under control. In this movement the boss 14 travels upward through groove portion 16 beyond the point of intersection of portion 17.

As the energizing-current is necessary only while the switch is being opened or closed, the current is turned off and the core falls by gravity, but in so doing the boss 14 is shunted off into the V-shaped groove 17 and rests in the bottom of the V with the ends of rods 4 4′, &c., still out of contact with the mercury.

So long as the boss rests in the V the core is hung up and the lights in the circuit remain extinguished. When it is desired to light up again, the switch-arm 24 is thrown to allow a current to pass through coil A and lift the core, causing the boss to ride up the V into groove 18. The current is then cut off and the core drops by gravity, and as no stop is interposed to boss 14 the rods 4 4′, &c., once more dip into the mercury and complete the line-circuit.

One advantage of this switch over others ordinarily in use is that a single operating-wire is sufficient where two are usually employed, one to open the switches and the other to close them. With my device the opening and closing are done through the one wire, which of course has its suitable return connection with a source of energy.

These switches may be used singly or in series, and it is obvious that certain modifications could be made in the mechanism herein described by which spring-actuating means could be substituted for the gravity-actuating means, but in which the principle of an arm traveling in a substantially heart-shaped guide-groove would be observed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a device of the character described, the combination of a solenoid-magnet, a core reciprocable therein, contact-points carried by said core, fixed contact-points in relation to which said first-named contacts are movable, electrical connections of said coil with a source of energy, and means including a cam-grooved plate by which said movable and fixed contacts may be held separated on alternate intervals between the energizing of the coil.

2. In a device of the character described, the combination of a solenoid-magnet, a reciprocable core, fixed and movable contacts operatable on the reciprocations of said core, a wire connecting said coil with a source of energy, means operated by a current passed through said wire energizing the coil to separate the contacts, and means operated by a current sent subsequently through the same wire to bring said contacts again into connection, said means, in both instances, including a cam-grooved member.

3. In a device of the character described, the combination of a solenoid-magnet; a reciprocable core therefor; fixed and movable contacts; a wire connecting said magnet with a source of energy; and means including a cam-grooved member by which the make and break of said contacts may be controlled.

4. In a device of the character described, the combination of a solenoid-magnet, a core reciprocable therein, fixed and movable contacts, a pivoted arm in connection with one end of said core, a projection on said arm, a plate having a guide in which said projection is movable, and stop means in said guide by which the length of the reciprocations of the core are varied.

5. In a device of the character described, the combination of a solenoid-magnet, a core reciprocable therein, fixed and movable contacts, a movable arm in connection with one end of said core, an endless circuitous guide, a projection on said arm movable in said guide, and means by which said projection is made to travel always in the same direction in said guide.

6. In a device of the character described, the combination of a solenoid-magnet, a reciprocable core, fixed and movable contacts, a plate having a substantially heart-shaped groove, and means connected with the core engaging said groove for the purpose set forth.

7. In a device of the character described the combination of a solenoid-magnet, a gravity-actuated core reciprocable therein, fixed and movable contacts, a plate pivotally connected with the core, a projection on said plate, a substantially heart-shaped guide in which said projection is movable, and a counterbalance-weight connected with said pivoted plate.

In witness whereof I have hereunto set my hand.

ORRA M. LACEY.

Witnesses:
S. H. NOURSE,
JESSIE C. BRODIE.