

G. E. PALMER.
SWITCH.

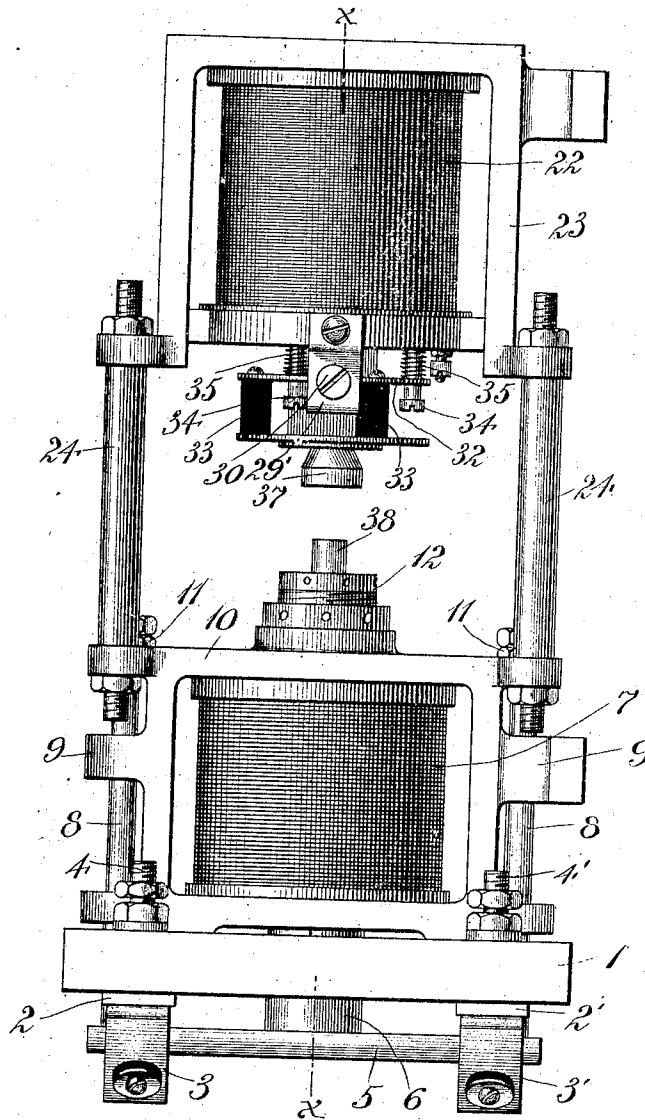
APPLICATION FILED JULY 6, 1911.

1,060,700.

Patented May 6, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

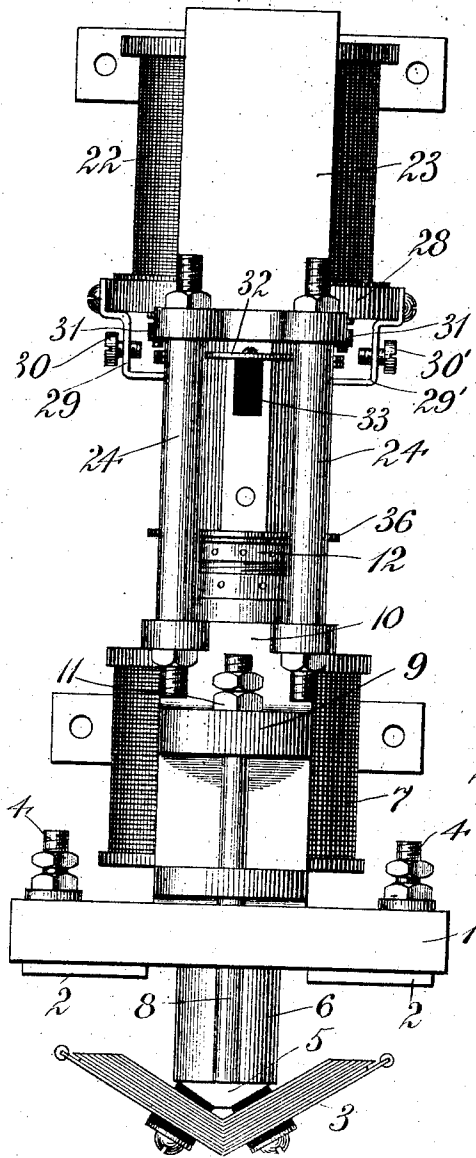
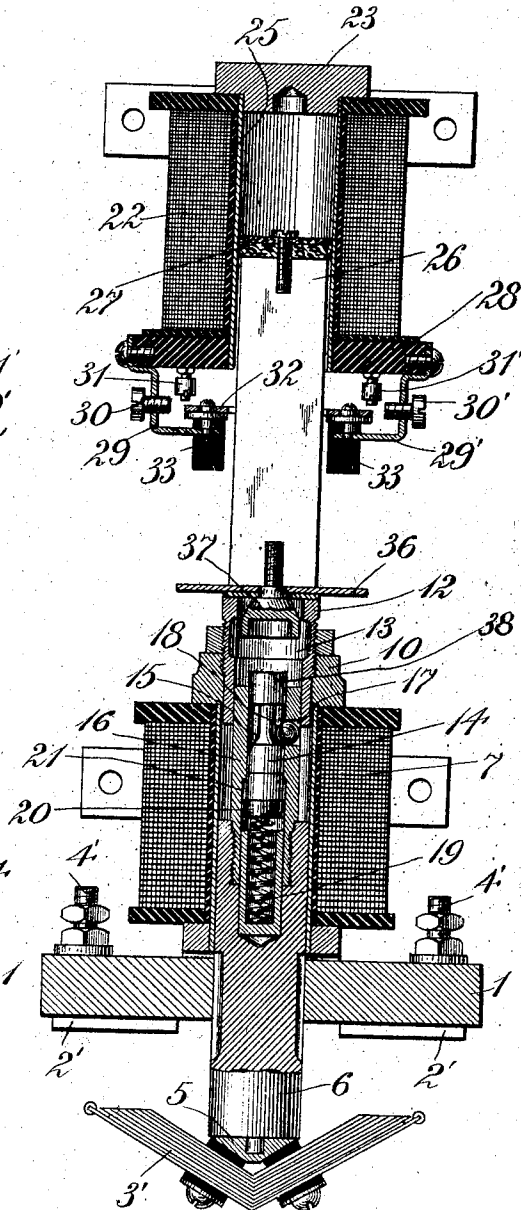


Fig. 3.



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3 SHEETS-SHEET 3.

Fig. 4.

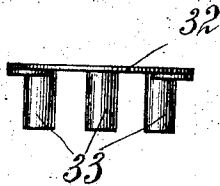


Fig. 6.

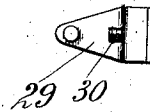


Fig. 5.

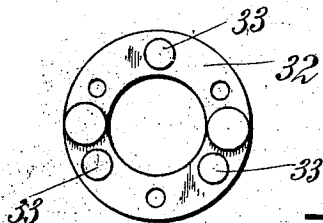


Fig. 7.

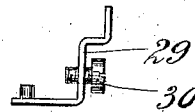
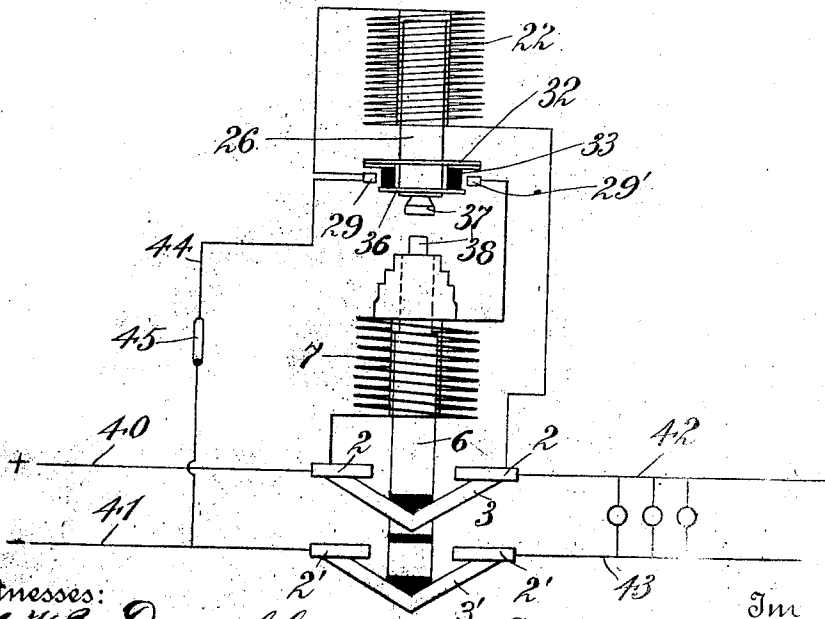


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SWITCH.

1,060,700.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed July 6, 1911. Serial No. 637,145.

To all whom it may concern:

Be it known that I, GRANVILLE E. PALMER, a citizen of the United States, residing at Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Switches, of which the following is a full, clear, and exact description.

My invention relates to improvements in switches, and has for its object to produce a magnetically operated switch in which, upon the closing of the controlling circuit, the switch is closed and mechanically locked and remains mechanically locked until the controlling circuit is opened or the current therein fails, whereupon it is automatically unlocked and is caused to open.

A further object of my invention is to provide a switch of this character which is particularly adapted for use on alternating current circuits, which, on account of the current pulsations, render it difficult to electrically hold a switch in tightly closed position.

It further has for its object to produce a switch which, if it fails to fully close on the first current impulse, will open and make further attempts to close instead of remaining in a partially closed position.

The following is a description of a modification of my invention, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a switch with the main switch contacts closed. Fig. 2 is a side elevation of the same with the main switch contacts open. Fig. 3 is a vertical section on the line *x-x*, Fig. 1, with the main switch contacts open. Fig. 4 is a side elevation of a detail of the circuit interrupter. Fig. 5 is a view of the same looking upward. Figs. 6 and 7 are plan and side elevations of a contact forming part of the circuit interrupter. Fig. 8 is a diagram of circuits.

Referring more particularly to the drawings, 1 is a base having contacts 2—2 and 2'—2'.

3—3' are laminated switch arms or bridge pieces adapted to engage the contacts 2—2 and 2'—2' respectively.

4—4 and 4'—4' are binding posts connected to the contacts 2—2 and 2'—2' respectively, to which binding posts the circuit terminals of the circuit to be controlled

are connected. The bridge pieces 3—3' are connected by and insulated from a cross bar 5, to which is connected a magnetic core 6 of a solenoid 7 mounted on the base 1. To the cross piece 5 are connected guide rods 8 which pass through lugs 9 on an iron frame 10 surrounding the solenoid 7. The rods 8 have upon their upper ends nuts 11 which, engaging with the lugs 9, limit the downward movement of the rods 8 together with the cross bar 5 and the bridge pieces 3—3' carried thereby.

A mechanical lock is provided for holding the core 6 as follows: Supported by the frame 10 is a stationary abutment member 12 having a recess 13. Carried by the upper end of the plunger is a movable abutment member 14 having a recess 15. Surrounding the movable abutment member 14 and secured to the core 6, is an intermediate member 16, of brass or other non-magnetic material, having one or more perforations 17, each perforation containing a ball detent 18. A spring 19 within the core 6 tends to move the movable abutment upward until the upper surface of a head 20 engages the upper end of a recess 21 in the intermediate member. When the solenoid 7 is energized, the core 6 is raised until the opening 17 in the intermediate member comes opposite the recess 13 in the stationary abutment member, whereupon the spring 19 forces the movable abutment 14 upward, causing the ball 18 to leave the recess 15 and partially enter the recess 13, with the result that the intermediate member 16 is positively locked mechanically to the stationary abutment 12 and consequently the bridge pieces 3—3' are mechanically held in fast engagement with the contacts 2—2 and 2'—2' respectively, as shown in Fig. 1.

The upper part of the device provides electro-magnetic means for breaking the circuit through the solenoid 7 after the core 6 is raised and maintaining that circuit broken so long as sufficient current flows through the controlling circuit, and also provides means for releasing the clutch mechanism which holds the core 6 in elevated position whenever the controlling circuit is open or the current therein fails. This controlling mechanism consists of a solenoid 22 mounted in an iron frame 23, supported by brass rods 24 carried by the frame 10. The solenoid 22 preferably has

core 26 then falls causing the circuit to be reestablished in solenoid 7 whereupon the armature 6 is caused to make another closing movement. The solenoid 7 is made of comparatively low resistance and of sufficient strength to give a fairly strong closing movement to the core 6. The solenoid 22 is of sufficiently high resistance to carry current for an indefinite time without burning out.

Experience has shown that the core 6 is usually locked in position when raised once, and if such locking does not then take place is practically always locked when it rises the second time, the reason being that if the alternations of the current upon the first closing of the switch 45 were not proper to fully raise the core 6, they are practically always sure to be in proper relation to fully raise the core 6 upon its second upward throw. In this way the difficulty of using a mechanically locked magnetically operated switch on an alternating current circuit is obviated. This result is accomplished by making the cores 6 and 26 mechanically independent, practically speaking, and by making the solenoids 7 and 22 electrically independent, except in so far as the switch devices controlled by each of the two solenoids controls the other solenoid. Thus it will be seen that the main switch, through its bridge piece 3, controls the solenoid 22 in such a manner that the solenoid 22 is cut out of circuit whenever the main switch is open and is in circuit whenever it is closed. In a similar manner the switch plate 33, actuated by the solenoid 22, controls the circuit through the coil 7, with the result that the coil 7 is put out of circuit whenever the coil 22 is in circuit.

The core 26, when it falls, causes the projection 37 to hit the projection 38 a hammer blow. When, however, the core 6 rises, the bridge piece 3 engages the terminal plates 2-2 before locking action takes place, with the result that the projection 37 is lifted by the action of the coil 22 out of the way of the projection 38 so as not to interfere with the locking action of the clutch members carried by the core 6.

The invention permits of various modifications and may be modified in various forms without departing from the spirit thereof and of the scope of the appended claims.

What I claim is:

1. In a switch, the combination of two solenoids, a normally open switch arm controlled by one, and in series with the second, a lock for said switch arm, a normally closed switch arm controlled by the second, and in series with the first solenoid, means for releasing said lock when said second solenoid is deenergized.

2. In a switch, the combination of two switch arms, two independent solenoids for

actuating the same, respectively, the switch arm actuated by each solenoid controlling the circuit through the other solenoid, one switch arm being opened and the other closed by its respective solenoid when energized, a lock for the switch arm of the switch closing solenoid, and an opening device for said lock controlled by the switch opening solenoid.

3. In a switch, the combination of a base, terminals thereon, a switch arm for said terminals and normally tending to open, a solenoid for closing said switch arm, a lock for said switch arm, a second solenoid controlled by said switch arm, a core therefor adapted to release said lock when said second solenoid is deenergized, a circuit controller for said first solenoid, opened by said second solenoid when energized, circuit connections for said solenoids and a local circuit controller for said circuit connections.

4. In a switch, the combination of a base, stationary contacts thereon, a switch arm adapted to engage said contacts, but normally tending to move away therefrom, a core connected to said switch arm, a solenoid for said core, a lock for said core, a projection by which said lock can be released, a second solenoid controlled by said switch arm, a core within said second solenoid normally tending to engage said projection so as to release said lock, a circuit controller in series with said first solenoid and opened by said second core when said second solenoid is energized, circuit connections for said solenoids, and a local circuit controller for both of said solenoids.

5. In a switch the combination of a base, stationary contacts thereon, a switch arm adapted to engage said contacts but normally tending to move away therefrom, a core connected to said switch arm, a solenoid for said core, a detent carried by said core, a stationary abutment cooperating with said detent, a projection by which said detent can be released from said abutment, a second solenoid controlled by said switch arm, a core within said second solenoid normally tending to engage said projection so as to release said detent, a circuit controller in series with said first solenoid and opened by said second core when said second solenoid is energized, circuit connections for said solenoids, and a local circuit controller for both of said solenoids.

6. In a switch the combination of a base, stationary contacts thereon, a switch arm adapted to engage said contacts but normally tending to move away therefrom, a core connected to said switch arm, a solenoid for said core, a detent carried by said core, a stationary abutment cooperating with said detent, a projection by which said detent can be released from said abutment, a second solenoid controlled by said switch

arm, a core within said second solenoid normally tending to engage said projection so as to release said detent, a circuit controller in series with said first solenoid and opened
 5 by said second core when said second solenoid is energized, circuit connections for said solenoids, and a local circuit controller for both of said solenoids, said solenoids being electrically independent.

10 7. In a switch, the combination of a base, terminals thereon, a switch arm for said terminals and normally tending to open, a solenoid for closing said switch arm, a lock for said switch arm, a second solenoid con-

trolled by said switch arm, a core therefor adapted to release said lock when said second solenoid is deenergized, a circuit controller for said first solenoid, opened by said second solenoid when energized, circuit connections for said solenoids and a local circuit controller for said circuit connections,
 20 said solenoids being electrically independent, and said cores being mechanically independent.

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