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S. C. WILLIAMS

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SWITCH

Filed April 13, 1920

Fig. 1.

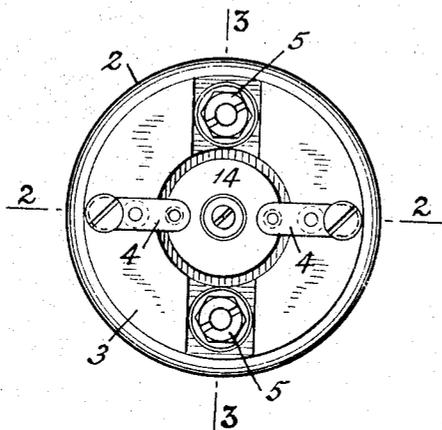


Fig. 2.

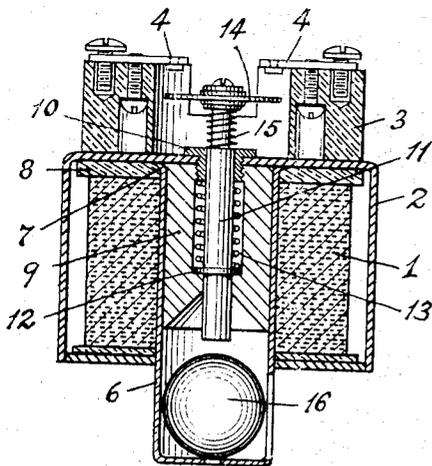
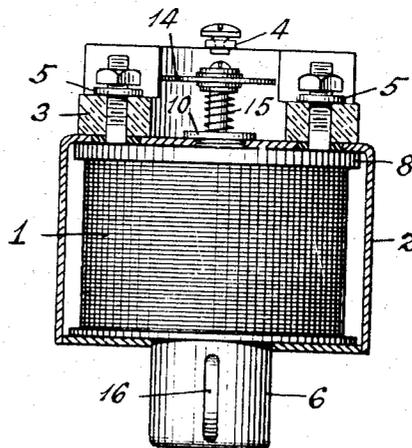


Fig. 3.



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SWITCH.

Application filed April 13, 1920. Serial No. 373,591.

To all whom it may concern:

Be it known that I, STANLEY C. WILLIAMS, a subject of the Kingdom of Great Britain, residing at city of Hartford, county of Hartford, and State of Connecticut, have invented a certain new and useful Improvement in Switches, of which the following is a full, clear, and exact description.

My invention relates to improvements in switches and more particularly in relay switches, and has for its object to provide a new and improved solenoid switch comprising a plunger for actuating the switch plate and a ball armature for actuating the plunger. It further has for its object to provide a solenoid switch having an armature which is free to rotate in all directions.

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

Fig. 1 shows a plan view of a relay embodying my invention;

Fig. 2 is a vertical section on the line 2—2, Fig. 1; and

Fig. 3 is a view partially in section on the line 3—3, Fig. 1.

Referring more particularly to the drawings, 1 is a solenoid having a magnetic casing 2 on top of which is mounted a base 3 of insulating material carrying switch contacts 4 and binding posts 5 connected to the solenoid terminals and holding the base 3 in place. 6 is a nonmagnetic metal cage having a flange 7 at its upper end engaging the face plate 8 of the solenoid and surrounding a magnetic core 9, which magnetic core is held to the upper end of the casing 2 by a screw bushing 10, through which passes a plunger 11 provided with a collar 12. A spring 13 bears against this collar and the lower end of the bushing 10 so as to tend to hold the plunger in depressed position, as shown in Fig. 2. The upper end of the plunger carries a switch plate 14 movable longitudinally upon the plunger and held in elevated position relatively thereto by a compression spring 15. In the lower end of the cage 6 below the lower end of the plunger 11 is a magnetic ball 16 which, when the solenoid is energized, is raised so as to engage the lower end of the plunger 11 and force the plunger together with the switch plate 14 upward until the switch plate comes into engagement with the contacts 4, 4, thus closing the circuit between them, the spring 15

permitting a slight yielding motion so as to insure a proper engagement with the contacts 4, 4. The lower end of the core has a recess 17 into which the ball 16 partially enters, the parts being so proportioned that when the ball is in its uppermost position its center is substantially at the mouth of the solenoid 1, so as to provide the proper lifting force for actuating the plunger.

The operation of the apparatus is believed to be obvious. When the solenoid 1 is energized the ball 16 is lifted so as to raise the plunger and cause the plate 14 to engage the contacts 4, 4 so as to close the gap between those contacts in the circuit to be controlled. When the solenoid 1 is de-energized, the ball 16 falls and the plunger returns to its normal position, shown in Fig. 2.

The lower end of the core acts as a stop for said ball to limit its upward movement.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. In a switch, the combination of a solenoid, a stationary magnetic core therein having a passage extending longitudinally there-through; a plunger carried by said core within said passage and movable relatively to said core, a switch member carried by said plunger, a cavity below said plunger, and a magnetic ball contained in said cavity adapted to be raised by said solenoid when energized and move said plunger so as to actuate said switch member, said ball being mechanically free to revolve in any direction.

2. In a switch, the combination of a solenoid, a stationary magnetic core therein having a passage extending longitudinally there-through, a plunger carried by said core within said passage and movable relatively to said core, a switch member carried by said plunger, a cavity below said plunger, a magnetic ball contained in said cavity adapted to be raised by said solenoid when energized and move said plunger so as to actuate said switch member, and a spring normally tending to move said plunger toward said ball, said ball being mechanically free to revolve in any direction.

3. In a switch, the combination of a solenoid, a stationary magnetic core therein having a passage extending longitudinally therethrough, a plunger carried by said core within said passage and movable relatively

to said core, a switch member carried by said plunger, a cavity below said plunger, and a magnetic ball contained in said cavity adapted to be raised by said solenoid when energized and move said plunger so as to actuate said switch member, said core having a recess in one end for receiving a portion of said ball and acting as a stop for said ball when the center of said ball is at the mouth of said solenoid, said ball being mechanically free to revolve in any direction.

4. In a switch, the combination of a solenoid, a stationary magnetic core therein having a passage extending longitudinally there-
 15 through, a plunger carried by said core within said passage and movable relatively to said core, a switch member carried by said plunger, a cage surrounding said core and extending below said solenoid, a magnetic
 20 ball within said cage adapted to be raised by said solenoid when energized and raise said

plunger, and a casing securing said solenoid core and cage together, said ball being mechanically free to revolve in any direction.

5. In a switch, the combination of a solenoid, a stationary magnetic core therein having a passage extending longitudinally there-
 25 through, a plunger carried by said core within said passage and movable relatively to said core, a switch member carried by said
 30 plunger, a cavity below said plunger, a magnetic ball contained in said cavity adapted to be raised by said solenoid when energized and move said plunger so as to actuate said
 35 switch member, a casing for said solenoid, an insulating block on said casing, terminals on said block for said solenoid, and contact terminals on said block adapted to be engaged by said switch member, said ball being mechanically free to revolve in any direction.

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