L. W. DOWNES & W. S. MAYER.

RELAY SWITCH.

APPLICATION FILED SEPT. 30, 1915.

1,273,045.

Patented July 16, 1918.

Fig. 1

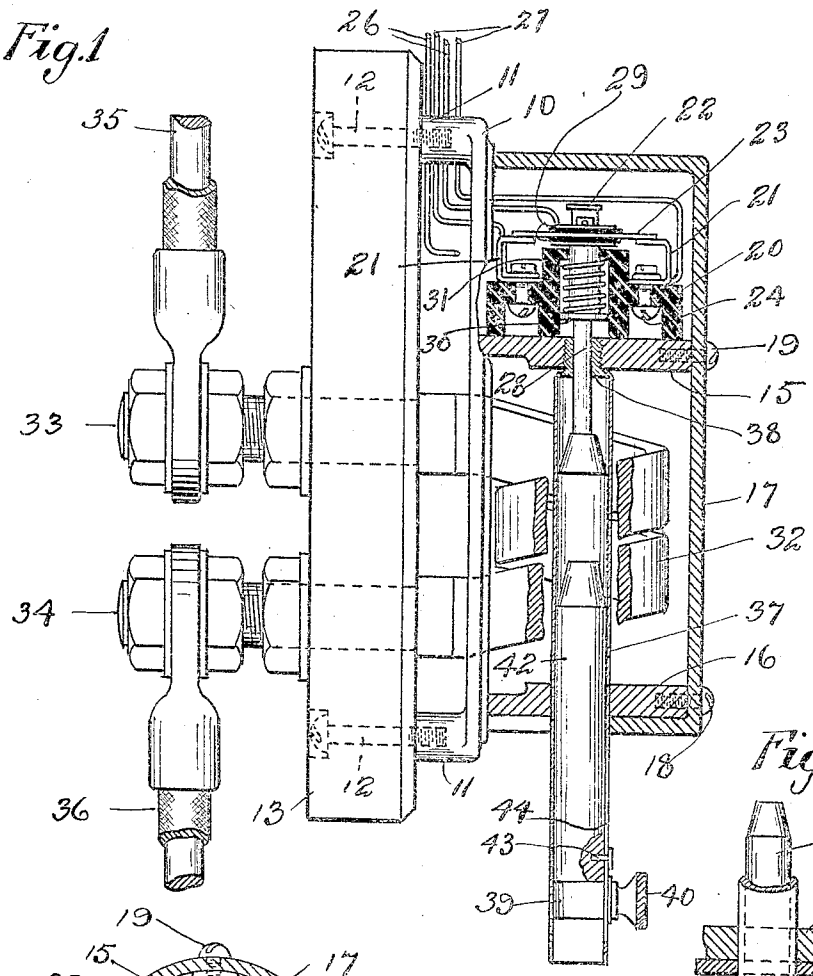


Fig. 4

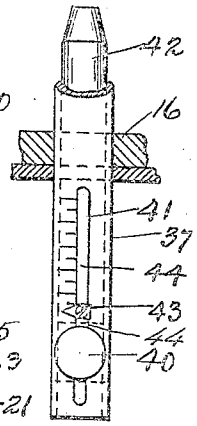


Fig. 2

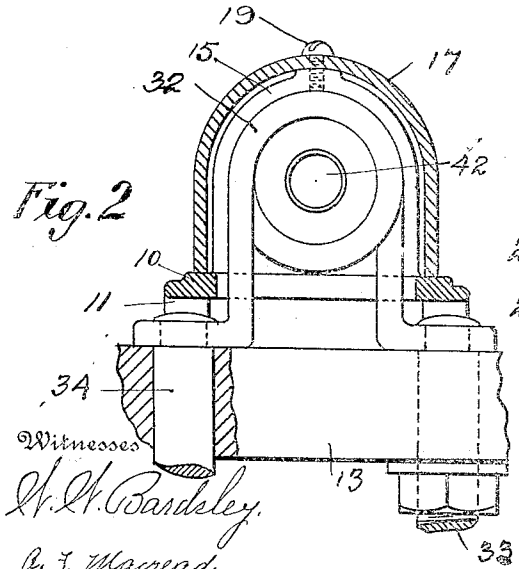
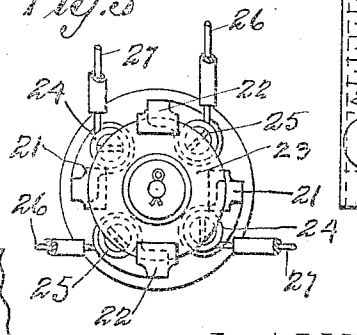


Fig. 3



Witnesses

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UNITED STATES PATENT OFFICE.

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RELAY-SWITCH.

1,273,045. Specification of Letters Patent. Patented July 16, 1918.

Application filed September 30, 1915. Serial No. 53,373.

To all whom it may concern:

Be it known that we, LOUIS W. DOWNES and WALTER S. MAYER, citizens of the United States, and residents of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Relay-Switches, of which the following is a specification.

This invention relates to electric switches of the relay type designed to be connected in the main circuit and arranged to either open or close an auxiliary circuit when an overload or other abnormal condition occurs on the main line. The object of this invention is to provide such a switch of improved construction that is very simple and practical, with its operating parts entirely inclosed and protected, yet of easy access for inspection and repairs.

A further object of the invention is to provide a unitary structure, or one that is self-contained, and which may be attached to a main base or switch-board without disturbing the relation of the operating parts.

A further object of the invention is to provide an electromagnet adapted to be connected in the main circuit and having an armature provided with means whereby its position may be adjusted relative to the magnet so that the amount of current required to move it is varied, and to so mount a switch that it is adapted to be operated directly by a movement of the armature for opening and closing one or more auxiliary circuits.

A still further object of the invention is the provision of means controlled by the armature adjusting means, for indicating the different amounts of current which are required to operate the armature from different adjusted positions.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1— is a side elevation partly in section of our improved relay switch.

Fig. 2— is a sectional end view showing a portion of the switch.

Fig. 3— is a top view showing the wire connections, contacts and contact plate for opening and closing the auxiliary circuits.

Fig. 4— is a front elevation of the plunger tube showing the graduations thereon.

Referring to the drawings 10 designates the rectangular shaped frame with its center portion removed, the same being supported on four corner legs or bosses 11 which are drilled and threaded to receive the screws 12, whereby the whole is secured to the base or switch-board 13. These legs or bosses also serve to raise the frame above the base to permit the wires 26 and 27 of the auxiliary circuit to enter and be connected to the switch contacts as hereinafter described. Supported on this frame and preferably cast integrally therewith are two spaced apart plates 15 and 16 which are preferably curved on their outer edges to receive and support the correspondingly shaped cover or casing 17 which is secured thereto by means of screws 18 and 19.

Secured to this upper plate 15 by screws (not shown) is a sub-base 20 of insulating material, the same being shown as supporting two pairs of contact fingers 21 and 22, the contacts 22 being above the contacts 21, whereby when the contact plate 23 is raised it breaks the circuit through one pair and completes another circuit through the other pair. These different contact fingers are secured in position by suitable binding screws 24 and 25 to which the two sets of wires 26 and 27 of two auxiliary circuits shown are connected. The contact plate 23 is shown as being in a disk form and is mounted upon the pin 28 and insulated therefrom by insulating washers 29. This pin is provided with a collar 30 against which the spring 31 acts to press the pin downward and to normally hold the plate 23 against the lower set of contacts.

To operate this contact plate to make or break the different auxiliary circuits by the passing of an excessive current through the main, we preferably provide a coil or solenoid 32 whose magnetic action is controlled by the passage of the current therethrough but other forms of electromagnet may be employed if desired. This solenoid is provided with terminals 33 and 34 which are connected in series with the main circuit wires 35 and 36. Passing through the center of this coil is a plunger carried in the tube 37 whose upper edge is bent inward over the flaring edge of the plug 38. This tube is provided at its lower end with an

adjustable plug 39 which is adapted to be moved vertically and held in the desired position in the tube by means of the thumb screw 40 which is threaded into the same through the vertically disposed slot 41 in the tube.

A plunger of soft iron is mounted to move vertically in the tube 37 and this plunger is provided at its lower end with an index pointer 43 which coöperates with the graduations 44 on the tube at the edge of the slot to indicate the amount of current required to attract and raise the plunger when in different positions. The upper end of said plunger is preferably tapered, as shown, to prevent binding of the plunger when the end thereof becomes upset by the constant hammering against the lower end of pin 28.

We have shown and described two auxiliary circuits and one arrangement of switch contact, whereby one circuit may be broken and another completed by the raising of the contact plate 23, but these contacts may be arranged in any suitable manner to control as many different auxiliary circuits as may be desired.

By the construction shown it will be seen that when an excessive current of a predetermined value passes through the main circuit the coil is energized to raise the plunger 42 which immediately acts directly upon the pin 28 to raise the contact plate 23 to break the circuit through fingers 21 and complete the circuit through fingers 22.

In some cases when it is desired to operate an indicator when an underload occurs in the main line the normal current is caused to act upon the plunger and hold the same, together with the contact plate in up position, and when the current decreases a predetermined amount, the plunger will fall and the spring 31 then moves the contact plate to either make or break a different circuit.

We have shown and described one form of relay switch, but we do not wish to be restricted to any particular form or arrangement of parts as various modifications may be made without departing from the spirit and scope of our invention.

We claim:

1. A relay switch comprising a base, a frame attached to the base and open at its center, a solenoid coil attached to said base and extended through the open center of said frame, spaced apart plates carried by said frame, a cover attached to said plates, a core for said solenoid, and a switch operated by said core.

2. A relay switch comprising a base, a frame having legs attached to said base to support the frame in spaced relation with respect to the base, said frame being open at its center, a solenoid coil attached to said base and extended through the open center of said frame, spaced apart plates carried by said frame, a cover attached to said plates, a core for said solenoid, and a switch operated by said core.

3. A relay switch comprising a base, a frame attached to said base and open at its center, a solenoid coil attached to said base and extended through the open center of said frame, spaced apart plates carried by said frame, a guide tube supported by said plates and inclosed by the coils of the solenoid, a solenoid core movable within said tube, and a switch operated by said core.

4. A relay switch comprising a base, a frame attached to said base and open at its center, a solenoid coil attached to said base and extended through the open center of said frame, spaced apart plates carried by said frame, a guide tube supported by said plates and inclosed by the coils of the solenoid, a switch carried by one of said plates and having a movable member extended into said tube, and a solenoid core movable within the tube to operate said switch.

In testimony whereof we affix our signatures in presence of two witnesses.

LOUIS W. DOWNES.
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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."