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ELECTRIC SWITCH

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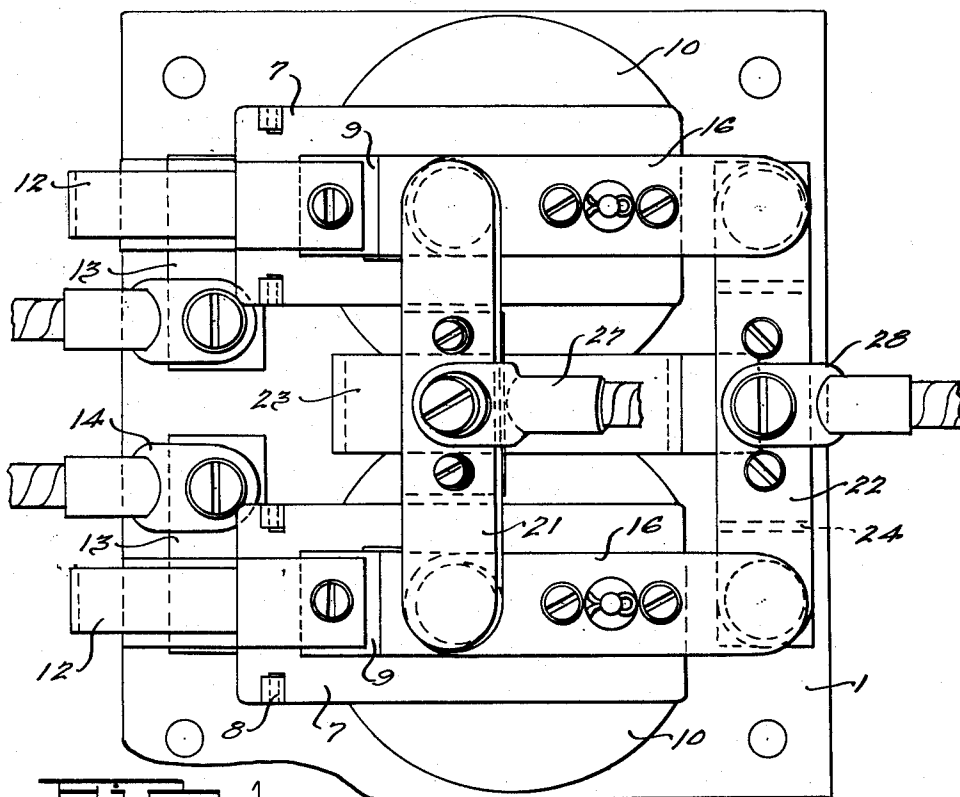


FIG. 1.

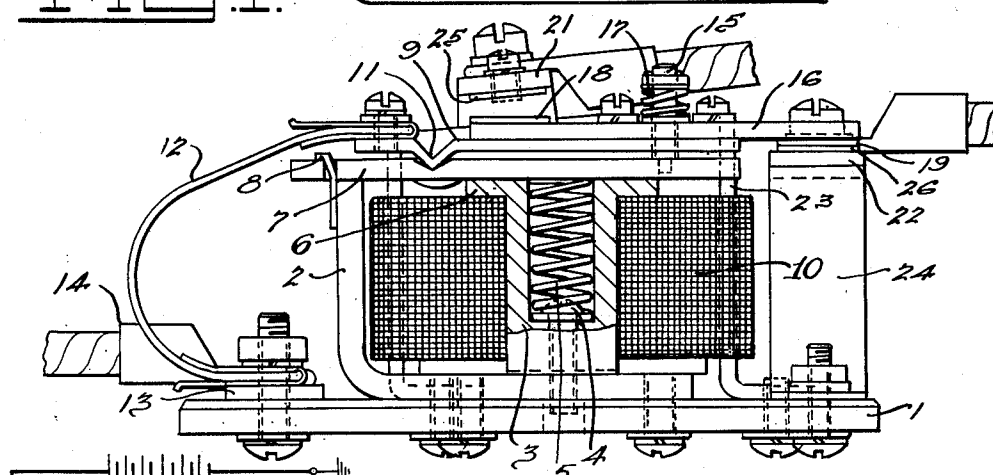


FIG. 2.

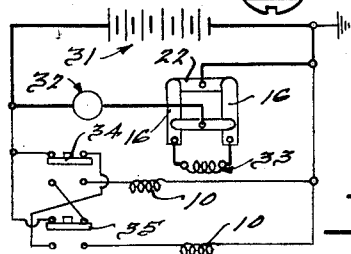


FIG. 3.

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ELECTRIC SWITCH

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7 Claims. (Cl. 200—87)

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This invention relates to electric switches, and more particularly to an electromagnetically operated electric switch for reversing an electric motor.

An object of the invention is to provide a simple and economical reversing electric switch of small size.

Another object of the invention is to provide a reversing electric switch having a pair of contact fingers with front and back contacts individually operated, and with the fingers reversibly mounted to interchange the contact position.

Another object of the invention is to provide a reversing electric switch with a pair of electromagnetic operators having contact fingers individual to the operators, each finger carrying a front and back contact with the circuits completed through the front contact of one finger and the back contact of the other finger.

Other objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawing illustrating certain preferred embodiments in which:

Figure 1 is a plan view of an electric switch according to the present invention.

Figure 2 is a side elevational view of the switch with parts broken away.

Figure 3 is a schematic wiring diagram illustrating one manner of operating the switch.

As specifically illustrated in the drawing, the switch of the present invention comprises a base plate 1 upon which are mounted a pair of spaced L-shaped magnetic frames 2 having connected to one leg of each hollow core pieces 3 as by means of studs 4 which also serve to hold in place biasing springs 5. The core pieces 3 terminate in pole faces 6 adapted to be contacted by armatures 7 hinged to frame 2 by hooks 8 passing through slots therein. Springs 5 bias the armatures 7 to their open positions. Individual operating coils 10 surround the cores 3 to energize their respective magnetic circuits and effect attraction of their respective armatures 7. Upon armatures 7 are pivotally mounted conducting carriers 9 having pivotal connections thereto at the nose and groove engagement 11. Flexible straps 12 connect the carriers 9 to stationary terminal plates 13 mounted on the plate 1 and adapted to receive terminal connectors 14. Movable contact fingers 16 are removably mounted on the carriers 9 by studs, as shown in both Figures 1 and 2, so that they are reversible as later explained.

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The armatures 7 carry pins 15 extending through openings in carriers 9 and through openings in movable contact fingers 16 and are provided with springs 17 biasing the fingers 16 and carriers 9 toward the armatures 7. The movable contact fingers 16 carry contacts 18 and 19 forming respectively what are referred to as the back and front contacts for the fingers by reference to their engagement according to the front or back positions of the armature. The structure so far defined is provided in duplicate, as shown at the top and bottom portions of Figure 1.

Common to the two movable fingers 16 are the stationary contact elements 21 and 22 mounted upon the back plate 1 by stationary brackets 23 and 24. The contact elements 21 and 22 are provided with contacts 25 and 26 cooperating with the contacts 18 and 19 on the fingers 16. The contact element 21 is adapted for connection to the terminal connector 27 and the contact element 22 has connected thereto terminal connector 28. Biasing spring 5 supplies contact pressure between contacts 18 and 25 as does spring 17 between contacts 19 and 26.

A circuit in which the switch may be operated is shown in Figure 3 in which 31 illustrates the supply, 32 a motor armature winding, 33 a motor field winding, 34 the switch controlling forward movement of the motor, and 35 the switch controlling reverse movement of the motor.

As shown in Figure 2, the coil 10 is energized and the armature 7 attracted to close contacts 19 and 26. If this is the lower switch element shown in Figure 1, the upper coil 10 will be deenergized and the coil contacts 18 and 25 thereat will be closed. The circuit is then completed from element 22 through the right hand finger 16 in Figure 3, through the series coil 33 of the motor to the left hand finger 16, thence through element 21 and armature 32 to the opposite side of the supply. With this connection, the motor will operate in one direction. Upon actuation of the controlling switch to energize the upper operating coil 10 after deenergization of the lower coil 10, the positions of the contact fingers 16 will be reversed, as will the direction of flow of the current through the series field winding 33, with reversal in the direction of rotor rotation.

In the operation of the motor, it is seen that the circuit is broken at the contacts 19 and 26 and they will accordingly have a large wear compared with that on contacts 18 and 25. However, the elements 21 and 22 are identical so as to be interchangeable and the fingers 16 are symmetrical to be reversible end for end so that upon wear in the

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circuit opening contacts the stationary contact elements can be interchanged and the movable contact fingers can be turned end for end to provide a new set of contact tips at the wear point.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a reversible contact finger removably mounted on said carrier in conducting relation therewith, and a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contacts alternately in the attracted and open positions of the armature.

2. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a contact finger mounted on said carrier in conducting relation therewith, a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contacts alternately in the attracted and open positions of the armature, said contact finger being reversible end to end to associate either of its contact surfaces with said stationary contact element.

3. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a reversible contact finger removably mounted on said carrier in conducting relation therewith, a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contacts alternately in the attracted and open positions of the armature, said armature being mounted on said field magnet by a tongue and slot connection, removal of one of said contact elements permitting the ready removal of the armature and the carrier and contact finger mounted thereon without manipulation of other parts.

4. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a reversible contact finger removably mounted on said carrier in conducting relation therewith, a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contacts alternately in the attracted and open positions of the armature, said field magnet including a hollow core, and spring means in said core operating on

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said armature to bias it toward its unattracted position.

5. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a reversible contact finger removably mounted on said carrier in conducting relation therewith, a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contacts alternately in the attracted and open positions of the armature, and spring means biasing said armature toward its unattracted position and serving to maintain contact pressure between the contact surfaces engaged in that position.

6. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a circuit terminal, a flexible conductor interconnecting said conducting carrier and said circuit terminal, a reversible contact finger removably mounted on said carrier in conducting relation therewith, and a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contact elements alternately in the attracted and open positions of the armature.

7. In an electric switch, an armature element, a field magnet structure, an energizing coil for energizing said field magnet structure to attract said armature, a conducting carrier pivotally mounted on said armature, a circuit terminal, a flexible conductor interconnecting said conducting carrier and said circuit terminal, a contact finger mounted on said carrier in conducting relation therewith, and a pair of stationary contact elements facing in opposite directions, said contact finger having contact faces at its opposite ends facing in opposite directions and cooperating with said stationary contact elements alternately in the attracted and open positions of the armature, said contact finger being mounted on said carrier for ready reversal end for end to associate either of its contact surfaces with either of said stationary contact elements.

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