June 5, 1934. L. REICHOLD 1,962,034

ELECTROMAGNETIC SWITCH

Filed March 23, 1931

FIG. 1.

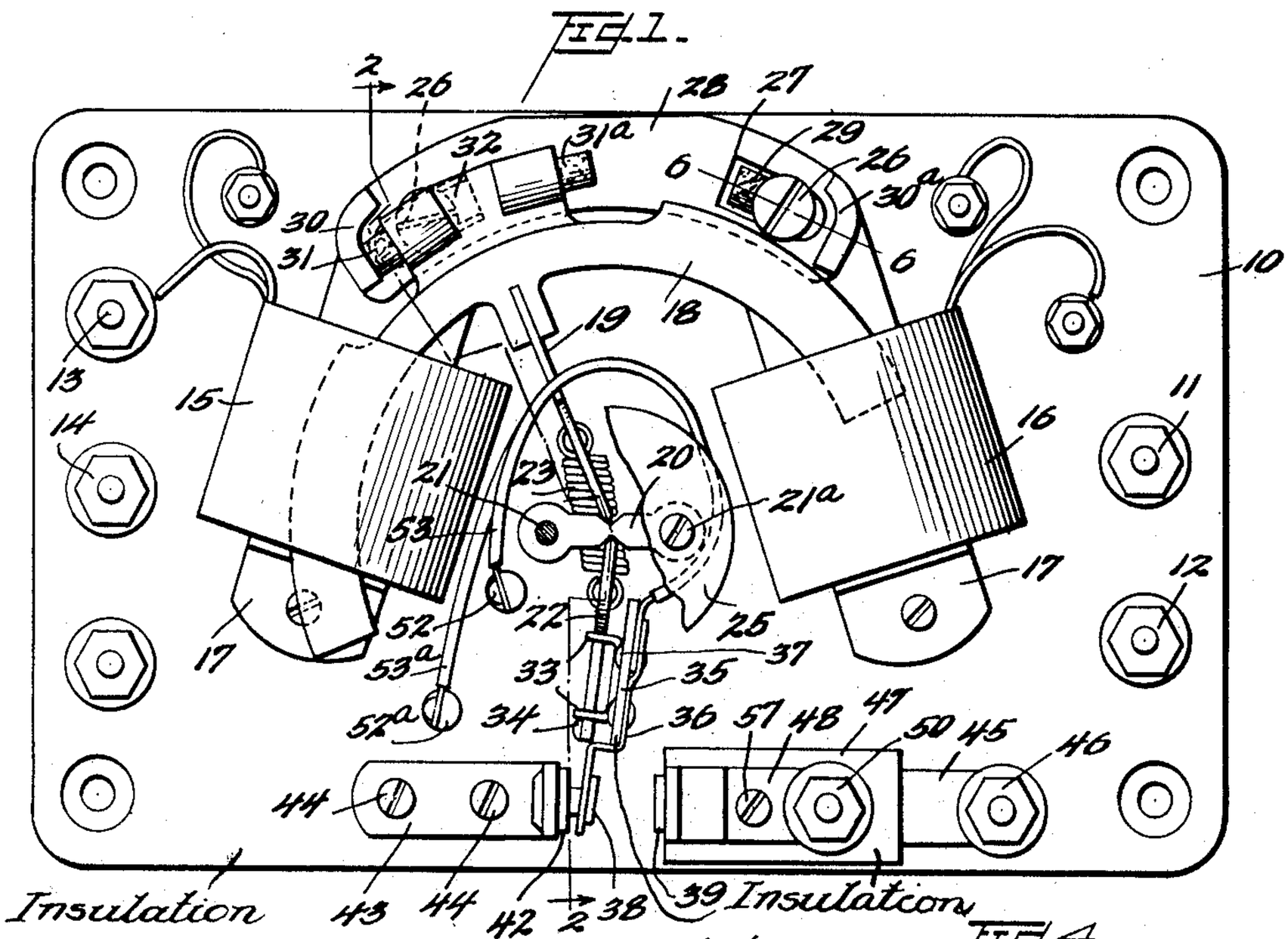


FIG. 2.

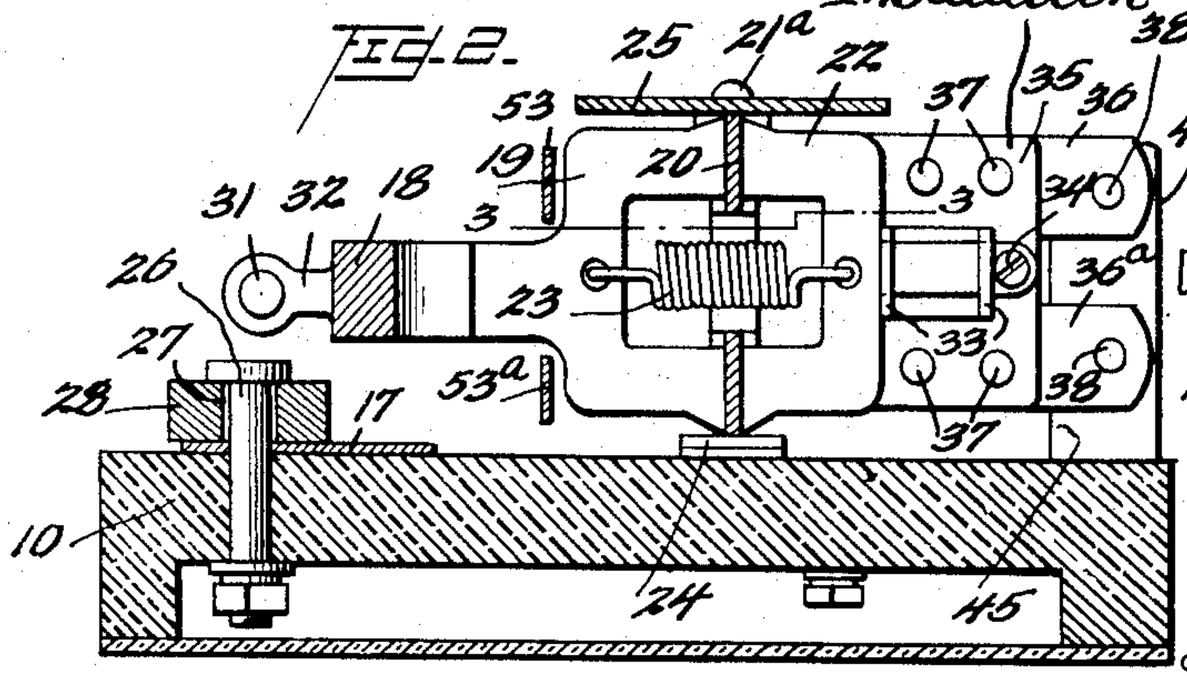
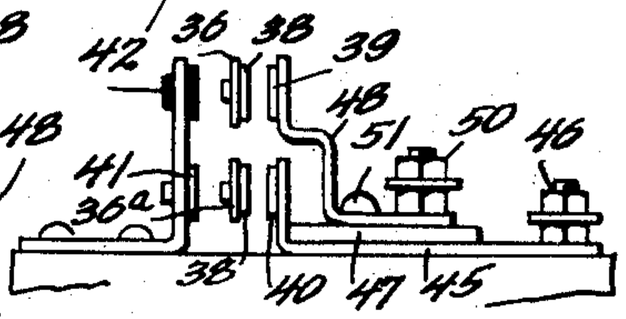


FIG. 4.



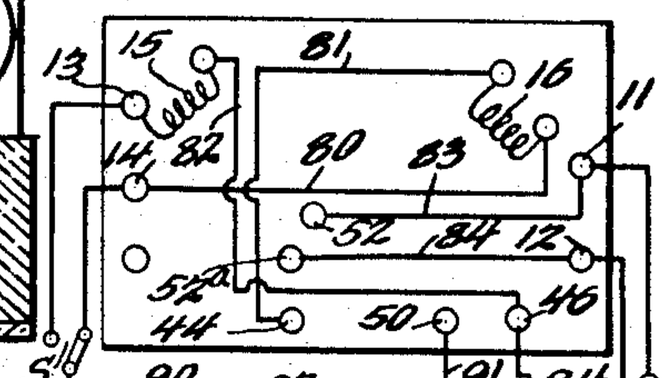


FIG. 5.

FIG. 3.

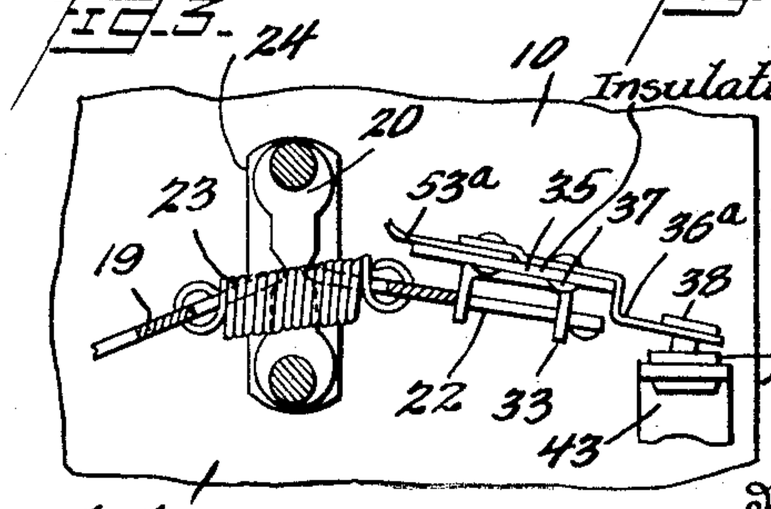
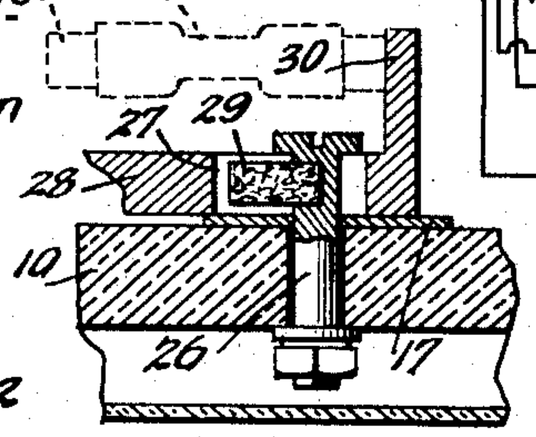


FIG. 6.



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UNITED STATES PATENT OFFICE

1,962,034

ELECTROMAGNETIC SWITCH

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Application March 23, 1931, Serial No. 524,711

6 Claims. (Cl. 200—98)

This invention relates to improvements in electromagnetic switches of the quick action type.

The present invention relates to improvements and modifications of the electromagnetic switch described in my co-pending application, Serial No. 506,770, filed January 30, 1931.

One of the features of this invention is the provision of an electromagnetic switch with cushion devices to absorb the shock of movement of the parts.

Another feature of the present invention is the provision of a toggle switch operating system whereby to produce a quick movement of the switch contacts, and in which the toggle elements are mounted to have a minimum resistance to movement.

Another feature of the invention resides in the particular assemblage of parts, as will be set forth hereinafter.

An illustrative form of construction of a switch according to this invention is set forth in the accompanying drawing, in which

Fig. 1 is a plan view of the switch.

Fig. 2 is a sectional view substantially on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view substantially on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary end elevation showing the switch contacts.

Fig. 5 is a circuit diagram.

Fig. 6 is a fragmentary sectional view substantially on line 6—6 of Fig. 1.

In the drawing, an insulated base 10 is provided with binding posts 11, 12 by which current may be delivered to the switch. Binding posts 13, 14 may be connected by suitable conductors to a current reversing switch or switches S.

The electromagnetic coils 15, 16 are secured to the base 10 by the stirrups 17 and are thus held fixedly in position. A rocker 18 is adapted to be drawn into one or the other of the electromagnetic coils 15, 16 depending on the coil which is energized by the passage of current to the corresponding binding post 13 or 14. This rocker is carried by a radial spoke member 19 which has a knife edge at its inner end engaged in a groove on the standard 20. This standard is held in position on the base by screws 21 which pass through sleeves in the post and through the base 10.

The standard 20 has a second groove preferably opposite the first groove to receive the switch arm 22. The spoke 19 and the arm 22 are bifurcated at their inner ends (Fig. 2) to provide a space within which is located the coil spring 23 which engages at its ends in apertures formed in the spoke 19 and the switch plate 22. Between the standard 20 and the frame is provided a plate 24 which limits the downward movement of the spoke 19 and switch plate 22 while the upward movement thereof is limited by a closing plate 25 which is held in position by the screws 21a.

The screws 26 in the base plate 10 have their shanks passed through apertures 27 in a inertia cushioning member 28, with their heads extending beyond the slots to prevent movement of the member 28 away from the base 10. Each of these screws is provided with a felt cushion piece 29, which pieces are directed toward one another and located within the slots 27. The member 28 has the upturned end portions 30, 30a which lie in the path of the cushions 31, 31a carried by a projection 32 of the rocker 18.

The switch arm 22 carries a stirrup 33, which fits between the shoulders on the bifurcated portion on the switch arm 22 and a securing screw 34 whereby radial movement of the stirrup 33 is prevented. The stirrup 33 in turn supports an insulating plate 35 which has the two switch blades 36, 36a fastened thereto by the rivets 37. It is preferred to offset the outer ends of the switch blades 36 (Figs. 1 and 3) so that they are substantially in the line of the switch arm 22. The switch blades 36 carry the contact members 38 for engagement with the stationary contacts 39, 40, 41, and 42, of which 42 is illustrated as being of insulating material so that no current flows to the upper contact member 38 when in the position shown in full lines in Fig. 1.

An L-shaped strap 43 is secured to the base plate 10 by screws 44 and carries the contacts 41, 42 on its upturned portion. A second L-shaped strap 45 is secured to the base plate 10 by the binding post 46; and carries the fixed contact 40. An insulating plate 47 is mounted on the horizontal portion of the member 45 and in turn receives thereon a bracket 48 which supports the fixed contact 39 and is held in position by a binding post 50 and a screw 51 which pass through insulated sleeves (not shown) to avoid electrical contact with the lower L-shaped member 45.

Upstanding posts 52, 52a on the base plate 10 are connected to the ends of pigtail connections 53, 53a (Fig. 1) which are curved around the standard 20 and are secured at their other ends to the switch blades 36, 36a, so that electrical connection to these switch blades is assured regardless of the position of the moving parts.

The circuit diagram of Fig. 5 shows the electrical connection from the control terminal 14 by conductor 80 to the winding of the electromag-

netic coil 16 with the return by conductor 81 to one of the screws 44 and thence to the fixed contact 41 (Fig. 4). The other control terminal 13 is connected to the winding of electromagnetic coil 15 and thence by conductor 82 to the terminal 46, and thus to the L-shaped member 45 and to the fixed contact member 40 (Fig. 4). Current from the terminal 11 is led by conductor 83 to the post 52, while terminal 12 is connected by conductor 84 to the post 52a.

In operation, with the parts in the position shown in full lines in Fig. 1, the closure of the control member S establishes a circuit from terminal 12 by conductor 84 to post 52a, and thence by pigtail 53a to the lower switch plate 36a to fixed contact 41, by conductor 81, to the coil 16, with the return by conductor 80 to terminal 14 to the circuit closure member, with a return by conductor 90. The coil 16 is energized and attracts the sector 18 and causes a movement of the spoke 19 in a clockwise direction in Fig. 1, with a tensioning of the spring 23. After the spoke 19 has passed beyond a position in extension of the switch arm 22, the spring causes the switch arm to be rapidly moved in a counter-clockwise direction until the contact 38 is engaged with the fixed contact 39 while opening the aforesaid circuit closed between lower contact 38 and fixed contact 41. Thereupon a circuit is established from terminal 11 by conductor 83 to post 52, pigtail 53, switch-blade 36, fixed contact 39, bracket 48, terminal 60, conductor 91 switch 92 (illustrated as an oven switch and to control the heater elements 93) with a return by conductor 90. Also, a circuit is established from terminal 12 by conductor 84 to post 52a, pigtail 53a, switch blade 36a, fixed contact 40, L-shaped member 45, terminal 46, conductor 94, the switch 92, the heating elements 93 with a return by conductor 90 as before. In this way, a three wire supply system is connected to the oven switch and the heating elements are energized.

At the same time a branch circuit is also established leading from the terminal 46 by conductor 82 to the coil 15, terminal 13 to the control element. Hence, when this control element is moved from the position shown in Fig. 5 to close the circuit to terminal 13, the coil 15 is energized and attracts the sector 18 and causes the movement of the switch parts back into the position shown in full lines in Fig. 1 and opening the oven circuits.

When a two wire supply system is employed, the upper terminals in Fig. 5 are connected together in the manner shown in my aforesaid copending application.

The switch is characterized by the simplicity of its parts in that the support 20 is provided with an aperture to receive the spring 23, while the bifurcated ends of the spoke 19 and the switch plate 22 straddle the spring and are engaged in the grooves on the standard. Further, the double cushioning devices permit also of a braking by the inertia effect of the member 28.

It is obvious that the invention is not limited to the particular form of construction illustrated but that it may be modified in many ways within the scope of the appended claims.

I claim:

1. A circuit closer comprising a frame, a pair of electromagnets on said frame, an oscillatable armature adapted to be moved selectively by said electromagnets and pivotally supported on said frame, contact means connected to the armature and to the frame to be selectively closed upon the movement of said armature, an inertia member and means on the frame to guide said member for loose oscillating movement substantially about the center of movement of said armature, interengaging means on said armature and said inertia member whereby the armature will encounter said inertia member during its movement in either direction, and cushion devices on said inertia member to absorb the shock of impact between said armature and inertia member upon encounter when the armature is moving in either direction.

2. A circuit closer comprising a frame, a pair of electromagnets on said frame, an oscillatable armature pivotally mounted on said frame to be selectively moved from one end position to another by said electromagnets, an inertia member mounted for loose guided movement on said frame and having portions extending into the path of movement of the armature as it approaches the end positions, cushion pieces interposed between said inertia member and said armature to absorb the impact blow in either direction of movement of the armature, and switch devices opened and closed by said armature as it moves from one end position to the other.

3. A circuit closer comprising a frame, a pair of electromagnets on said frame, an oscillatable armature pivoted on said frame to be selectively moved from one end position to another by said electromagnets, a slotted inertia member, means passing through the slots to hold the member to the frame while permitting the loose guided movement of said member upon the engagement of said armature therewith as the latter passes toward either end position, a cushion supported by said means in a slot of the inertia member for limiting the movement of the inertia member, to absorb the impact blow in either direction of movement of the armature, and switch devices opened and closed by said armature as it moves from one end position to the other.

4. A circuit closer comprising a frame, a pair of electromagnets on said frame, an oscillatable armature pivotally mounted on said frame and adapted to be selectively moved from one end position to another by said electromagnets, an inertia member having angularly directed end portions extending into the path of movement of said armature, means for guiding the inertia member in its movement when encountered by said armature, cushioning means interposed between the armature and inertia member to absorb the shock of impact of one upon the other, further cushioning means interposed between the frame and inertia member to limit the movement of said inertia member and to absorb the impact blow in either direction of movement of the armature, and switch devices opened and closed by said armature as it moves from one end position to the other.

5. A circuit closer comprising a frame, a pair of electromagnets on said frame, an oscillatable armature adapted to be moved selectively by said electromagnets, contact means connected to said armature and to the frame to be selectively closed when said armature is oscillated, and an inertia member loosely mounted on said frame in the path of movement of said armature and presenting retarding means engageable by said armature following movement in either direction whereby said armature will encounter said inertia member in its movement so that the inertia member may produce a braking effect upon the

armature and bring it to a standstill after a predetermined movement in either direction, and cushioning means between the armature and the inertia member to assist to absorb the shock of impact between the armature and the inertia member.

6. A circuit closer comprising a frame, a pair of electromagnets on said frame, an oscillatable armature adapted to be moved selectively by said electromagnets, contact means connected to said armature and to the frame to be selectively closed when said armature is oscillated, and an inertia member loosely mounted on said frame in the path of movement of said armature and presenting retarding means engageable by said armature following movement in either direction whereby said armature will encounter said inertia member in its movement so that the inertia member may produce a braking effect upon the armature, and means on the frame to guide the inertia member in its movement, and cushioning devices between the inertia member and the frame to limit the movement of the inertia member and to absorb the shock of impact between the inertia member and the frame, and further cushioning means between the armature and the inertia member.

LUDWIG REICHOLD.