Aug. 5, 1924. 1,503,981

E. R. CARICHOFF

ELECTROMAGNETICALLY OPERATED DEVICE

Original Filed Sept. 18, 1920

Fig. 1.

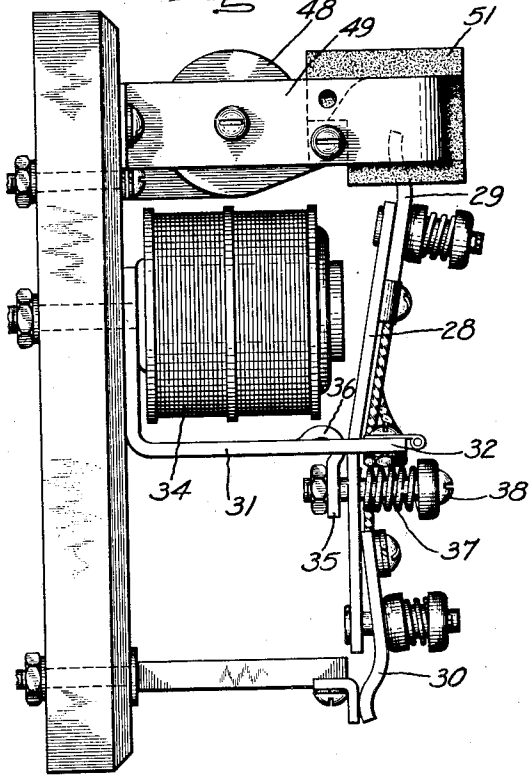


Fig. 2.

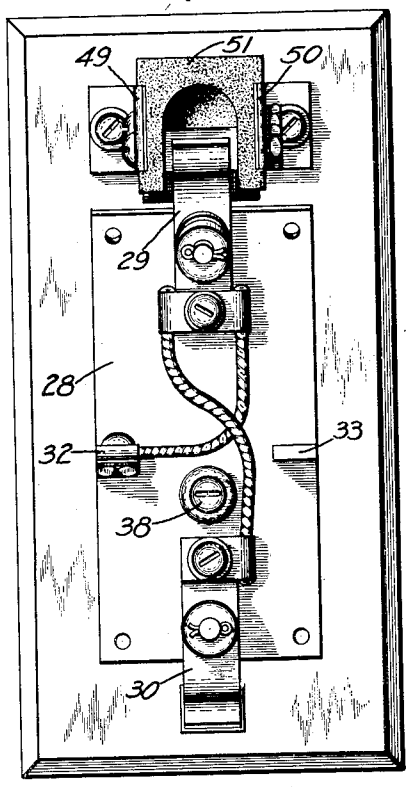


Fig. 3.

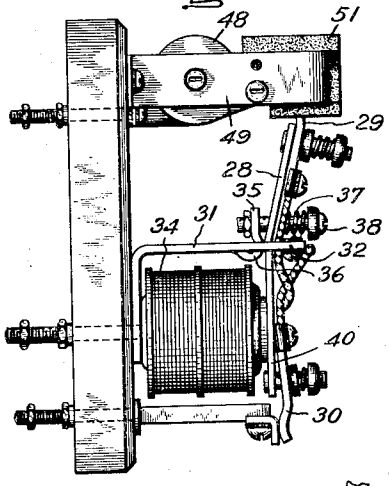


Fig. 4.

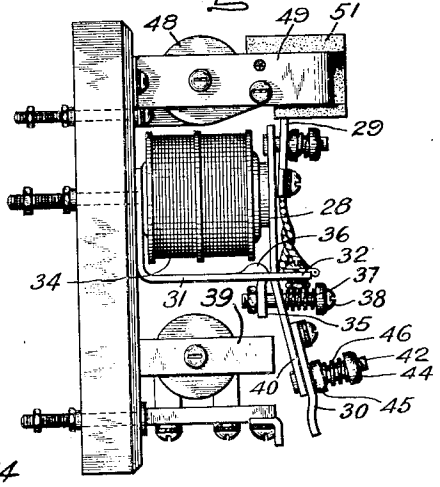
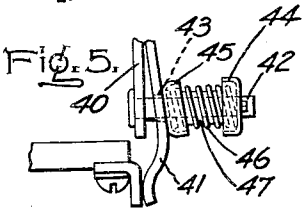


Fig. 5.



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Patented Aug. 5, 1924. 1,503,981

UNITED STATES PATENT OFFICE.

EUGENE R. CARICHOFF, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTROMAGNETICALLY-OPERATED DEVICE.

Original application filed September 18, 1920, Serial No. 411,189. Divided and this application filed July 27, 1923. Serial No. 654,277.

To all whom it may concern:

Be it known that I, EUGENE R. CARICHOFF, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Electromagnetically-Operated Devices, of which the following is a specification.

My invention relates to electromagnetically operated devices, and in particular to double-throw electromagnetically operated or controlled devices which may be manufactured cheaply and be nevertheless effective and reliable in operation. The invention has a particular application to double-throw electromagnetically operated or controlled switches, although the invention is not necessarily limited thereto.

The present application is a division of my former application Serial No. 411,189, filed September 18, 1920, in which the electromagnetically operated device of the invention is broadly claimed to cover a device whether of the single-throw or double-throw form, and wherein a single-throw device having advantageous features of construction and arrangement is specifically claimed.

For a better understanding of the invention, reference is had to the accompanying drawing, wherein I have shown several forms of the invention for the purposes of illustrating the principles thereof.

Referring to the drawing, Fig. 1 is a side view of an electromagnetic switch of the double-throw type having normally open and normally closed switch contacts; Fig. 2 is a plan view of the same; Fig. 3 is a side view of an electromagnetic switch similar to the switch of Fig. 1, and showing a modification in the manner of mounting the switch electromagnet; Fig. 4 is a side view of an electromagnetic switch somewhat similar to the switch of Fig. 1 with the switch in its attracted position and its normally open contacts in their closed position, the essential difference between Fig. 4 and Fig. 1 being in the provision of a magnetic blowout arrangement for both the normally open and the normally closed contacts; and Fig. 5 is a detail showing a resilient stop device used in connection with certain forms of my invention.

Referring to Figs. 1 and 2 wherein my invention is embodied in an electromagnetic switch having normally open and normally closed contacts, the armature 28, which is preferably of a stamping of flat magnetic material, is bent slightly at its mid-position, and the upper end of the armature carries a resiliently mounted contact 29 which is normally in the open position and the lower end of the armature carries a resiliently mounted wiping contact 30 which is normally in the closed position. The magnet frame of the electromagnet, which also serves as the supporting means for the armature, comprises the L-shaped stamping 31 which has a pin and slot hinge connection with the armature 28. This pin and slot hinge connection comprises the pins 32 and 33 which cooperate with suitable slots in the armature so as to position the armature with respect to its support and the operating electromagnet 34. The support 31 is provided with a kicked-up end 35 which is disposed at an angle to the main portion of the support. A rounded surface 36 at the apex of the angle between the kicked-up end 35 and the support 31 provides a bearing surface on which the armature 28 rocks to and fro. The spring 37 cooperates with the kicked-up end 35 and the armature 28, and the bolt 38 secured to the kicked-up end passes through a hole in the armature 28 and holds the parts in place. This resilient means causes the armature to be biased to the position at which the lower contact is normally in the closed position and the upper contact is normally in the open position. When the winding of the electromagnet is energized the armature is attracted to the core of the electromagnet against the strain of the spring 37. The armature 28, the support 31, and the contact fingers may preferably be formed of stampings of flat magnetic material or these parts may be otherwise made, depending upon their size and the practicability of forming these parts from stampings.

The operation is as follows: When the winding 34 is energized so as to attract the armature 28, the armature will rock on the curved surface 36 against the strain of the spring 37. This will cause the contact 30 to move to the open position and the contact 29 to be moved to the closed position.

By referring to Figs. 3 and 4, it will be seen that my invention readily adapts itself to various forms of switches of this general

character, so that by placing the operating electromagnet below the support for the armature and by reversing the position of the L-shaped support, the upper contact can be made the normally closed contact and the lower contact the normally open contact. It will be observed from this Fig. 3 that the switch is shown with the armature in the attracted position. By referring to Fig. 4, it will be seen that the switch of this figure is substantially like that of Figs. 1 and 2, with the exception that an additional electromagnet 39 is provided for the lower set of switch contacts. The switch in this figure is shown with the armature in its attracted position. It will be observed from this figure how readily my invention adapts itself to various requirements, and that the electromagnet 39 having an independent magnet structure may be added to the arrangement of the switch of Fig. 1 without any alteration of the switch shown in Fig. 1. This electromagnet 39 may be used to hold the upper switch contacts open and the lower contacts closed. Thus, the upper coil and contacts may be used as a line or reversing contactor for a motor and the lower coil and contacts may be used to complete a dynamic braking circuit for the motor and to hold the upper contacts open until the dynamic braking is completed. This arrangement has the same advantage as the arrangement described in connection with Figs. 1, 2 and 3, in that the magnet spool is readily removable from the front of the switch without dissembling the switch. The spool may be removed by simply removing the bolt 38, the armature 28 being thereby freely removable from the front of the switch.

Referring to Fig. 5, the arrangement for resiliently mounting the switch contacts is shown in detail. In this figure the armature 40 carries the switch contact 41, and the armature also carries the pin 42 which passes through an aperture 43 in the switch contact. Between collars 44 and 45 is mounted a spring 46 on a sleeve 47. When the armature is in such a position that sufficient spring pressure is maintained on the contact 41, the collar 45 butts against the end of the sleeve 47, and this sleeve therefore serves as a stop for limiting the relative movement of the contact finger and the armature.

The electromagnetic blow-out device for the upper switch contacts comprises the blow-out coil 48 and the magnetic pole pieces 49 and 50, between which the arc chute 51 of refractory material is held.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An electromagnetically operated device comprising a magnet frame member, an electromagnet within the frame, an armature member biased away from the electromagnet cooperating with the magnet frame to complete the magnetic circuit of the magnet, an integral projection on the end of the first of said members cooperating with an aperture in the second member forming a hinge connection between the said members, the remaining portion of the said end of the first member disposed at an angle to the main body of the first member providing an edge at the apex of the angle between the said remaining portion and the main body of the first member on which the armature member rocks.

2. An electromagnetic switch comprising an L-shaped magnet frame formed of a stamping of flat magnetic material, an electromagnet within the magnet frame secured to one of the legs thereof, an armature formed of a stamping of flat magnetic material carrying a switch contact on each of its ends, integral projections on the said magnet frame cooperating with corresponding slots in the armature to form a hinge connection for the armature between the switch contacts, and a kicked-up projection on the magnet frame between the said integral projections, forming a stop for the armature member and an edge on which the armature member rocks.

3. An electromagnetic switch comprising an armature member carrying a plurality of switch contacts, a portion of which are normally in the closed position and another portion of which are normally in the open position, a magnet frame member for supporting the armature member at a point between the normally open and normally closed contacts, a pin and a slot hinge connection between the said members, one of said members having a portion disposed at an angle to the main body thereof providing a surface at the apex of the angle on which the armature rocks, and resilient means cooperating with one of said members and the said portion disposed at an angle to the other for biasing the switch contacts to their normal positions.

4. An electromagnetic switch comprising an electromagnet, an armature member carrying a switch contact at each of its ends, a magnet frame member supporting the armature at a point between its ends, an electromagnet on one side of the supporting member, a pin and slot hinge connection between the members, one of said members having a

portion disposed at an angle to the main body thereof providing a surface at the apex of the angle on which the armature rocks, and means for biasing the armature member to the position at which one of said contacts is in the open position and the other in the closed position.

5. An electromagnetic switch comprising an L-shaped magnet frame formed of a stamping of flat magnetic material, an electromagnet within the said frame, an armature formed of a stamping of flat magnetic material bent at a mid-position between its ends and carrying a switch contact at each end, a kicked-up end on the magnet frame with a rounded edge on which the armature rocks, integral projections on the magnet frame cooperating with apertures in the armature to form a hinge, and resilient means on the side of the magnet frame opposite the electromagnet cooperating with the armature and the said kicked-up end for biasing the said armature to a position in which one of said contacts is normally open and the other is normally closed.

In witness whereof, I have hereunto set my hand this 25th day of July, 1923.

EUGENE R. CARICHOFF.