Jan. 13, 1931. W. K. HOWE 1,789,275

SWITCH MACHINE

Original Filed June 17, 1919

FIG. 1.

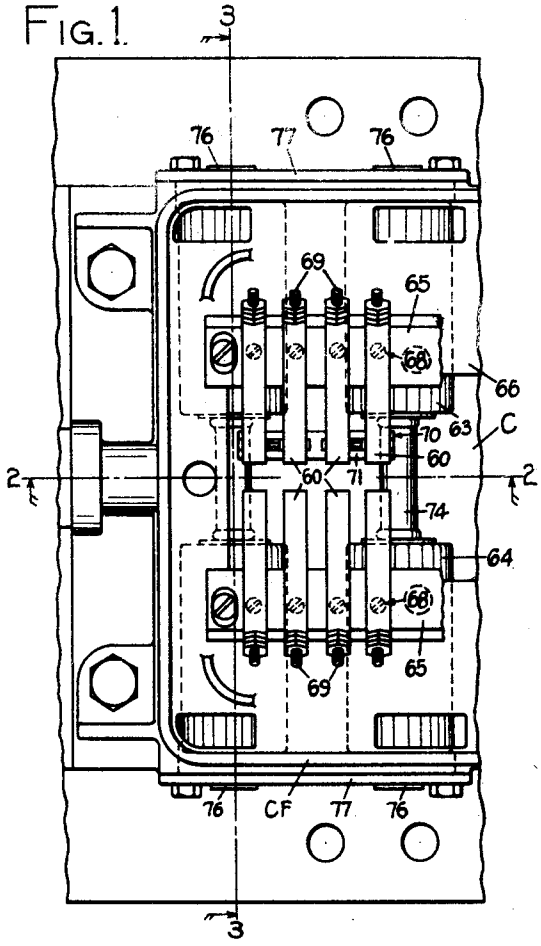


FIG. 2.

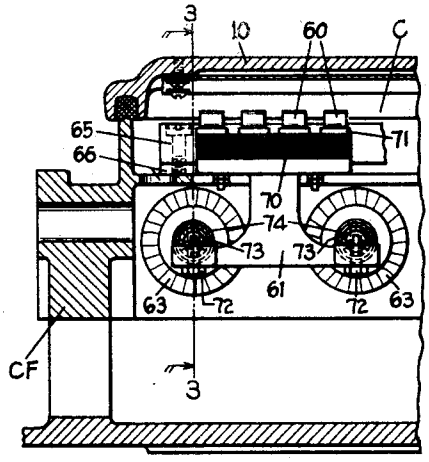
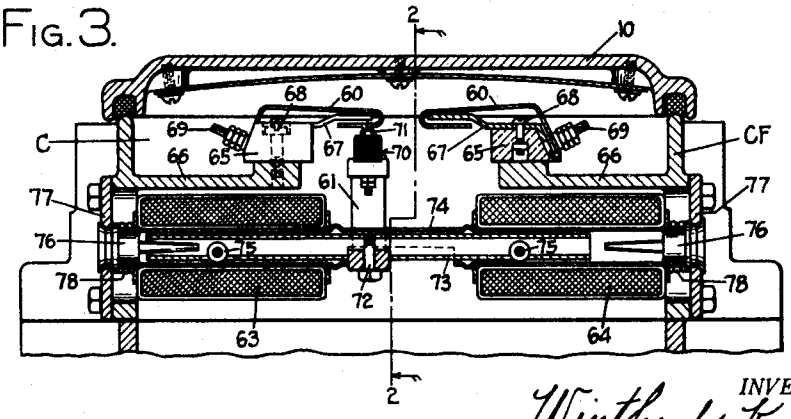


FIG. 3.



INVENTOR.
Winthrop K. Howe,
BY Neil W. Preston,
his ATTORNEY

Patented Jan. 13, 1931

1,789,275

UNITED STATES PATENT OFFICE

WINTHROP K. HOWE, OF ROCHESTER, NEW YORK, ASSIGNOR TO GENERAL RAILWAY SIGNAL COMPANY, OF GATES, NEW YORK, A CORPORATION OF NEW YORK

SWITCH MACHINE

Original application filed June 17, 1919, Serial No. 304,816. Divided and this application filed April 14, 1923. Serial No. 632,083.

This invention relates to electrically operated circuit controllers, and more particularly to circuit controllers of this type especially well adapted for use in connection with switch machines for operating railway switches.

The principal object of this invention is to improve and simplify the construction of electrically operable circuit controllers for switch machines by providing facilities for reducing the friction between relatively movable parts, making the parts readily accessible for adjustment, replacement, inspection and repairs, and arranging the parts for strength, lightness and durability.

The invention consists in the parts and in the arrangement and combination of parts which are more fully set forth hereinafter.

In describing the invention in detail, reference will be made to the accompanying drawings, in which like reference characters designate corresponding parts in the several views, and in which:

Figure 1 is a top plan view of the end of a switch machine casing, having its cover removed, and showing a circuit controller embodying the present invention mounted therein.

Fig. 2 is a sectional end elevation of a portion of the device shown in Fig. 1, with its cover in place, taken on the line 2—2, Fig. 3, as viewed in the direction of the arrows; and

Fig. 3 is a sectional side elevation taken substantially through the axis of one of the hollow cores of the circuit controller operating means shown on the line 3—3, Figs. 1 and 2, as viewed in the direction of the arrows.

This is a division of prior application, Ser. No. 304,816, filed June 17, 1919 for improvements in switch machines Patent 1,466,903, September 4, 1923.

Referring to the accompanying drawings, the circuit controller embodying the present invention is supported and enclosed in a compartment C of a switch machine casing, as shown, and in general comprises an electrically operable circuit controller for controlling the operating and indication circuits for a switch machine (hereinafter termed the operating circuit controller).

This operating circuit controller comprises a plurality of fixed contact fingers or springs 60 arranged in rows along opposite sides of the casing, and a movable contact carrier or block 61 of magnetic material arranged to be shifted back and forth from one side of the casing to the other into and out of engagement with said contact fingers 60. Although the contact carrier 61 of the operating circuit controller when used in connection with a switch machine may have its position selected mechanically by a lock rod and shifted by a locking plunger of the switch machine, as well as having means for operating it electrically, the mechanical means for operating the contact carrier 61 has not been illustrated so as to simplify the disclosure.

The stationary or fixed contact fingers 60 of the circuit controller are carried by two bars of insulating material 65, which are fastened by screws to a bracket or shelf 66 extending along the sides and one end of the circuit controller compartment C, preferably integral with the walls thereof. Referring more particularly to Fig. 3, each of these stationary contact fingers 60 includes, in addition to the contact finger or spring proper, a retaining member 67 of relatively stiff material fastened by a screw-bolt 68 to its insulating bar 65. The contact spring 60 is held at one end by a bolt 69, which has its head secured to said retaining member 67, said bolt 69 being provided with clamping nuts in the usual manner to constitute a binding post to connect wires to said contact finger. The other and free end of the contact spring 60 is doubled over and under the free end of the retaining member 67. The retaining member 67 serves to limit the upward and downward movement of the free end of the contact spring 60, and said retaining member, being relatively stiff, prevents the bending of the lighter contact spring out of its proper position.

The movable contact carrier 61 for the operating circuit controller is formed substantially in the shape of an inverted T (see Fig. 2), and carries a block of suitable insulating material 70 to which a single row of contact pieces 71, connected together in pairs, is fas-

tened, preferably by being moulded therein. As shown, these contact pieces consist of a strip, inverted U-shape in cross-section, which is long enough to span two adjacent contact fingers, and which has its middle portion partly cut away, as shown in Figs. 1 and 2. The lower arms of the contact carrier 61 are fastened by bolts 72 to the two parallel cores 73 of the pole-changer coils 63—64 (see Fig. 2), so that said contact carrier is supported and operated by said cores. The cores 73 and associated parts are duplicates. Each core 73 is hollow (see Fig. 3) and slides in a stationary tube 74 of brass or similar non-magnetic material; and each core is provided with a roller 75 near each end extending through a slot in the core and resting upon the brass tube. The brass tube 74 surrounding each core 73 is supported at its ends by plugs 76 fastened to detachable cover plates 77 secured to the frame CF forming the circuit controller compartment C. Each of these plugs 76 is formed with a tapered spindle (see Fig. 3), which is adapted to enter the hollow core 73, and vary the reluctance of the magnetic circuit for the corresponding pole-changer coil, so as to improve the attractive effort of said coils. The pole-changer coils 63—64 themselves surround the brass tubes 74 and are pressed inward toward the middle of the machine against a circumferential ridge or enlargement on said tubes by springs 78 on the plugs 76. The springs 78 hold the coils in place and prevent them from vibrating and wearing out. The ends of the pole-changer coils 63—64, which are preferably form-wound, are protected by washers; and the brass tubes 74 are cut away to permit attachment of the contact carrier 61 to the cores 73, all as shown in Fig. 2. It will be observed that this construction permits removal of any one of the pole-changer coils by merely taking off the proper cover plate 77 and sliding out the coil, the lead wires being of course disconnected. Underneath the cover 10 of the compartment C is provided an inner attached plate, as shown, to protect the circuit controlling mechanism from water condensation.

As shown in the drawings, the two parallel cores 73 are in their extreme lefthand position so as to cause the contact pieces 71 to bridge two of the pairs of contact springs 60, whereby suitable circuits may be closed. If now the coils 63 at the other end of the circuit controller are energized by suitable current, a certain amount of flux linking these coils passes between the cores 73 and their respective magnetic plugs 76. The presence of this flux causes the cores 73 to be attracted. It should especially be noted that the manner in which the taper spindles cooperate with the hollow cores 73, the reluctance of the magnetic circuit is very gradually decreased so that a fairly uniform force is exerted upon the cores throughout the operating stroke of the circuit controller. Obviously, the rollers 75 decrease the friction between the relatively movable parts to a large extent, and minimize the possibility of the movable mechanism getting stuck at an intermediate point in its stroke.

As heretofore pointed out, the retaining members 67 serve to limit the downward movement of the contact springs 60 when these springs are not bridged by their cooperating contact pieces 71. This is a very desirable feature in a circuit controller, since the movable member of the circuit controller does not need to be provided with insulating material on which the contact spring may ride when not in engagement with the contact pieces 71, thus reducing the friction between the relatively movable parts. The specific manner in which these contact springs 60 and retaining members 67 cooperate combine extreme simplicity of construction with durability, thus resulting in a contact mechanism in which the contact springs may be replaced without in any way interfering with their respective retaining members.

Accessibility of parts for inspection, repairs or adjustment is another important feature of this invention. The wires (not shown) can be arranged in an orderly and accessible way on the shelf 66, so that various wires and their connections may be readily inspected, and in case of trouble the defective connections located. The various contact springs 60 may be easily replaced singularly, or the whole group of contact fingers on one insulating block may be removed for inspection, adjustment, or repairs, without requiring disconnection of the wires. Also, the pole-changer coils 63–64 may be readily removed by taking off the cover plates 77 and sliding out the coils.

Various changes, additions, and adaptations may be made in the construction of the circuit controller without departing from the invention. For example, alternating current may be used instead of direct current for operating the circuit controller.

Although I have particularly described the construction of one physical embodiment of my invention, and explained the operation and principle thereof; nevertheless, I desire to have it understood that the form selected is merely illustrative, but does not exhaust the possible physical embodiment of the idea of means underlying my invention.

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

1. An electrically operable circuit controller comprising, two parallelly arranged sleeves of non-magnetic material each having an opening near the middle thereof, a coil on each end of each of said sleeves, means associated with said sleeves for limit-

ing the displacement of said coil in one direction, yieldable means on said sleeves for yieldingly urging said coils against said last mentioned means, cores in said sleeves, and a bridge of magnetic material extending through said openings and connecting said cores.

2. A circuit controller comprising, a casing, plugs of magnetic material having tapered extensions extending inwardly from opposite sides of said casing, a sleeve of non-magnetic material wholly supported by said plugs, a hollow core wholly supporting a movabe contact and adapted to surround said extensions and wholly supported by and in said sleeves for longitudinal movement therein, and coils on said sleeve, said sleeve having beads thereon for preventing endwise movement of said coils.

3. A circuit controller comprising, coils disposed to have their axes horizontal, a sleeve of non-magnetic material in and extending between, the coils, a core of magnetic material loosely received in said sleeve, and rollers pivotally connected to said core to rollably support said core for oscillatory movement in said sleeve.

4. A circuit controller comprising, two spaced parallel sleeves of non-magnetic material each having an opening near the middle thereof, two parallel magnetic cores relatively supported in the sleeves and rigidly fastened together near their middle by a magnetic bridge passing through said openings contained in said sleeves, coils surrounding the ends of said sleeve, and contact mechanism carried by said cores.

5. A circuit controller comprising, two parallel sleeves of non-magnetic material, two parallel magnetic cores rigidly fastened together near their middle contained in said sleeves, coils surrounding the ends of said sleeves, a roller supporting said cores for reciprocatory movement in said sleeve, and contact mechanism carried by said cores.

In testimony whereof I hereby affix my signature.

WINTHROP K. HOWE.