

Aug. 4, 1931.

B. M. LEECE

1,817,155

ELECTRIC SWITCH

Filed July 17, 1926

2 Sheets-Sheet 2

Fig. 5.

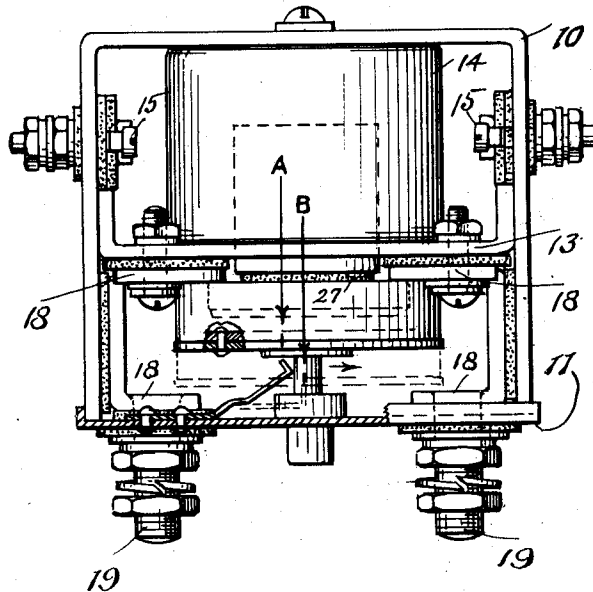
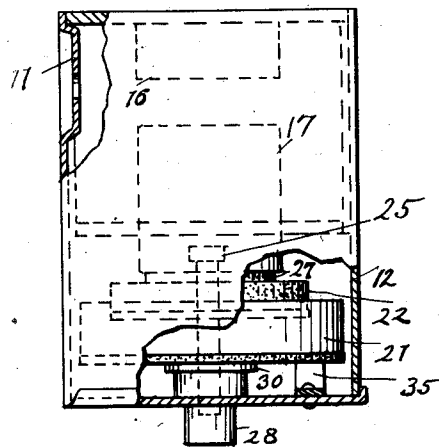


Fig. 3.



Inventor:
Bennett M. Luce
Kerr Hudson & Kent
Attys.

UNITED STATES PATENT OFFICE

BENNETT M. LEECE, OF CLEVELAND, OHIO, ASSIGNOR TO THE LEECE-NEVILLE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

ELECTRIC SWITCH

Application filed July 17, 1926. Serial No. 123,055.

This invention relates to a remote controlled or electrically operated switch and has for its main object to provide a construction having the features of compactness, simplicity and durability.

Further, it is the aim of the invention to provide contacts which will have long life and will be satisfactory in operation over a long period of time.

More particularly in this connection, it is the object to provide a simple but effective means for turning the movable contact or contacts with respect to the stationary contacts as the switch is operated, so that different portions of the movable contact or contacts will engage the stationary contacts and thus prevent, or at least, minimize the likelihood of the contacts being burned, as would be the case if the same portions of the contacts were always engaged.

The above and other objects are attained by my invention which may be here briefly summarized as consisting in certain novel details of construction and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheet of drawings showing the preferred construction, Fig. 1 is a vertical sectional view through the switch; Fig. 2 is a side elevation with the front wall of the casing removed, parts being in section; Fig. 3 is a side view of the same; Fig. 4 is partly a bottom view and partly a sectional view with the section taken substantially along the line 4—4 of Fig. 2; and Fig. 5 is a view similar to Fig. 2 showing the switch closed.

The operating portions of the switch are enclosed in a casing, the top and side walls of which are in this instance formed of a U-shaped stamping 10 which is preferably formed of a magnetic material, inasmuch as portions of the stamping 10 form a part of the magnetic circuit. The back wall and bottom of the casing are preferably formed of a stamping 11 of magnetic material and the front wall by a removable plate 12 of similar material.

Extending transversely across the interior

of the casing is a horizontal partition 13 which engages the sides of the stamping 10 and also forms a part of the magnetic circuit around the magnet. In the upper compartment of the casing is a magnet in the form of a solenoid having a coil 14, the terminals of which are connected to binding posts 15 extending through the sides of the casing and to which conductors may be connected to supply current for energizing the coil.

Inside the coil is a short stationary core 16 which is secured to the top of stamping 10 and a movable core or plunger 17 which is preferably cylindrical in form and is adapted to extend through an opening in the partition 13.

In the lower compartment of the casing are two stationary contacts 18 which are secured by screws 19 to but insulated from the lower side of the partition 13. These contacts which are preferably in the form of substantially U-shaped stampings of good conducting material such as copper, extend down along the sides of the casing and inwardly for a distance along the bottom, being well insulated from these portions of the casing. Rather heavy connector screws 19 extend through the bottom of the casing and are connected to the lower portions of the contacts 18. The cables of the circuit to be opened and closed by the switch are adapted to be connected to these screws 19 which are in this instance provided with cable terminals 20.

In this instance two movable contacts are employed, the main contact being a cup-shaped member 21 of good conducting material such as phosphor-bronze, and the other contact, which is an auxiliary or arcing contact, being a disc 22 of carbon or other suitable material of relatively high resistance and relatively refractory. The disc 22 is adapted to move into the depression of the cup-shaped contact 21 but is normally held in elevated position by a spring 23 arranged between the lower side of the carbon disc and the bottom of the cup-shaped contact 21 there being preferably provided on the lower side of the carbon disc, a disc 24 of conducting material such as copper.

These two contact members are adapted to be moved by the core or plunger 17, and for that purpose they are supported in the relationship shown and explained on a pin 25 depending from the lower side of the core and suitably held or attached thereto at its upper end. The main contact 21 is held from movement endwise of the pin but the carbon disc may move along the pin toward or from the main contact as the switch is opened or closed, the carbon disc having a bearing on the pin consisting of a pair of bushings 26, the inner of which is preferably of metal, and the other of insulating material such as bakelite. The upper ends of these bushings bear against an insulating disc 27 which separates the disc 22 from the core 17, and the lower ends of the bushings bear against the bottom of the contact 21.

The lower end of the pin 25 slides in the socket of a guide 28 secured in the bottom wall of the casing, this portion of the pin being surrounded by a bushing 29 of hard fibre or other insulating material, the upper end of which bears against a metal washer 30 pressed against an insulating disc 31 secured to the lower side of the contact 21, while the bottom end of the pin is peened over against the bottom of bushing 29 so as to hold the core 17, contacts, discs and bushings in assembled relationship.

Normally the switch is mounted with the axis of the solenoid vertical, as illustrated in Fig. 1, the back wall of the casing being provided with ears 32 by which the switch may be secured to a suitable support. However, it is not necessary that the switch be supported in the position just stated, but it is preferable that it be so mounted or supported since in that case gravity assists in the opening movement.

In the event that the switch is mounted in a position other than one in which the axis of the solenoid is vertical, or substantially so, I have provided in a central socket of the core, a spring 33, the lower end of which is shown as engaging the upper end of pin 25 and its upper end engaging the lower end of an adjustable screw 34 which is extended through the top of stamping 10 and through the stationary core 16, its lower end at all times projecting into the socket of the core. This spring will move the core to open position in the event that it is not so mounted that gravity performs this function. When the switch is so mounted that the core has a vertical movement or substantially vertical movement, this spring assists gravity in lowering the core and opening the switch.

When the coil 14 is de-energized the parts occupy the position shown in Fig. 1 but when the coil is energized the core is elevated and drawn into the coil. This first brings the disc 22 into engagement with the stationary con-

tacts 18, and before the movement of the core is completed, the contact 21 engages the contacts 18, the contact disc 22 then moving into the cup or depression of the main contact, compressing spring 23.

When the coil 14 is de-energized the switch is opened with the quick break, principally by the action of the spring 23 but supplemented by the spring 33 and by gravity acting on the core and movable contacts (assuming that the switch is mounted so that gravity can be taken advantage of in the opening movement). When the switch is thus opened the main contact 21 first leaves the stationary contacts 18 followed by the movement of the auxiliary or arcing contact away from the contacts 18 so that whatever arc is established is taken largely by contact 22.

To give long life to the contacts, arrangement is made for turning the contacts 21 and 22 whenever the switch is operated so as to constantly bring different surface portions thereof in position to engage the contacts 18, and this is accomplished in a very inexpensive, simple but highly efficient manner by securing on the inner surface of the bottom wall of the casing a leaf spring 35 having at its free end an upstanding tongue which, when the switch is open, engages the lower side of the insulating disc 31 secured to the bottom of the main contact 21. The arrangement is such that as the contacts move downwardly on the de-energization of coil 14, the spring 35 is depressed and therefore imparts a slight lateral thrust to the contact 21, slightly rotating both contacts 21 and 22 about the axis of the pin 25. The rotating effect imparted to the movable contacts by the spring 35 will be apparent from consideration of Figs. 2 and 5, the former showing the switch open with the spring 35 depressed and the latter showing the switch closed with the spring elevated. On the opening movement as the movable contacts drop, the insulating disc, at the bottom of contact 21, engages the upstanding end of spring 35 when the latter is in the position A, shown in Fig. 5. As the contacts approach the dotted line position, shown in this figure, the upper end of the spring 35 swings through an arc until it reaches dotted line position B. This rotates the contacts in the direction indicated by the arrow in Fig. 5, a distance equal substantially to the lateral displacement of the end of the spring in moving from position A to position B. This action which takes place whenever the switch is operated, gives the contacts a step by step rotation so that the results and advantages stated above, are attained.

While I have shown the preferred construction, I do not desire to be confined to the exact details shown, as the construction may be modified in many particulars, such as in the method of mounting or supporting the

parts, but aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of the invention as defined in the claims.

Having thus described my invention, I claim:

1. In an electric switch, a pair of stationary contacts, a solenoid having a core and carrying a bridging contact mechanism including two annular rotatable contacts, both adapted to engage and also leave the stationary contacts one after the other and means for rotating said contacts step by step as the switch is operated.

2. In a switch, a pair of stationary contacts and an annular rotatable contact adapted to bridge the same, and means for rotating the annular contact when the switch is operated comprising a leaf spring engaging a part of the contact on its movement away from the stationary contacts.

3. In a switch, a pair of stationary contacts, a movable switch member comprising a pair of annular rotatable contacts adapted to successively engage and also leave the stationary contacts, and a pawl acting on one of the rotatable contacts so as to rotate both of them when the switch is operated.

4. In a switch, a pair of stationary contacts, a movable switch member comprising two annular rotatable contacts adapted to successively engage and successively leave the contacts, a spring between said annular contacts, and a spring engaging one of the contacts and serving to rotate the same when the switch is operated.

5. A switch comprising a casing, a pair of stationary contacts in the casing, a solenoid for closing the switch and comprising a coil and a core, a pair of annular rotatable contacts carried by an extension of the core, a spring between the contacts whereby one may yield relative to the other, and a pawl engaging one of the contacts and acting to turn slightly both contacts when the switch is operated.

6. In a switch, a casing having a transverse partition forming upper and lower compartments, a solenoid coil in the upper compartment, a core movable into and out of the coil through the partition, contacts in the lower compartment including two stationary contacts on opposite sides of the core, a main contact and an auxiliary contact carried by the core and rotatable about the axis thereof, a spring between the contacts whereby one may yield relative to the other and cause them to successively engage and successively leave the stationary contacts, a pawl in the form of a spring tongue supported by the casing and having a portion engaging one of said rotatable contacts so as to turn the same when the switch is operated.

an annular rotatable contact and an auxiliary contact located within said rotatable contact, the contacts of said movable switch member being adapted to successively engage and to successively leave the stationary contacts, and means for imparting a rotary movement to said annular contact at each actuation thereof.

8. In a switch, a pair of stationary contacts, a movable switch member comprising a pair of concentric annular rotatable contacts adapted to successively engage and to successively leave the stationary contacts, and means for imparting a rotary movement to said annular contacts at each actuation thereof.

In testimony whereof, I hereunto affix my signature.

BENNETT M. LEECE.