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ELECTRICAL CONTROLLING DEVICE

Original Filed May 16, 1919

Fig. 1.

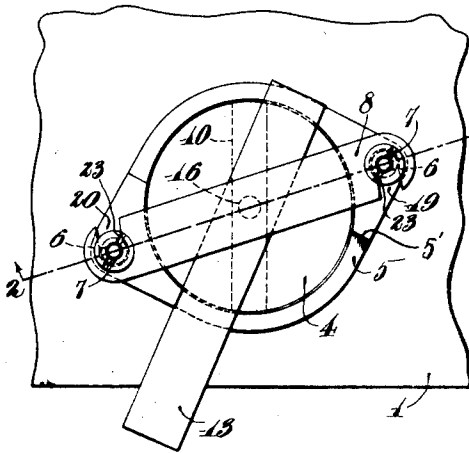


Fig. 2.

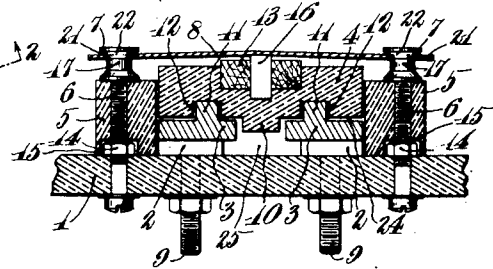
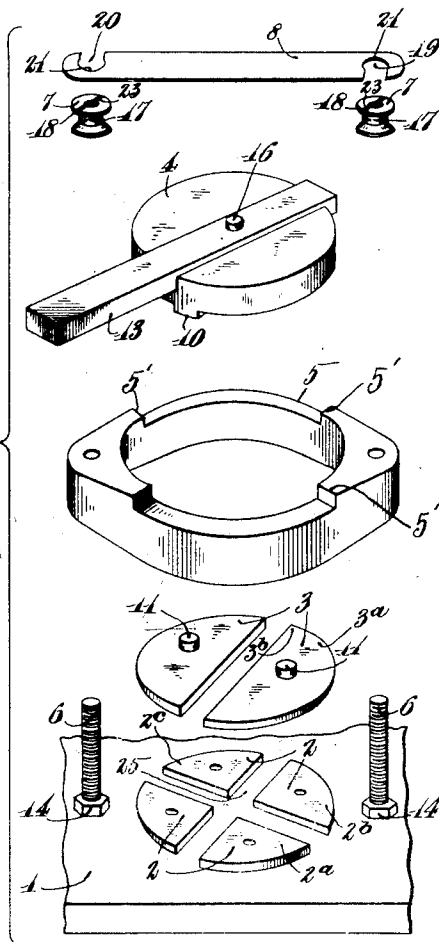


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES W. WYMAN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS.

ELECTRICAL CONTROLLING DEVICE.

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To all whom it may concern:

Be it known that I, CHARLES W. WYMAN, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Electrical Controlling Devices, of which the following is a full, clear, and exact specification.

This invention relates to electrical controlling devices and more especially to a reversing switch.

One object of the present invention is to provide an improved current controlling mechanism. Another object of the present invention is to provide an improved reversing switch which is composed of but few parts which are easily manufactured, easily assembled, and which may be easily disassembled for inspection or repair. Still another object of the present invention is to provide an improved construction whereby the parts of a reversing switch and especially the contacts therefor may be readily accessible to permit a refinishing of the surfaces thereof and whereby, when the parts of the switch are assembled, they are automatically held and locked in operative positions. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawing, I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In these drawings,

Fig. 1 is a plan view of my improved current controlling mechanism.

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

Fig. 3 is a perspective view of the different parts of the switch in one order in which they may be assembled.

In this illustrative construction, I have shown a base 1 carrying a plurality of fixed contacts 2 which cooperate with movable contacts 3 in a well known manner to reverse a current, the movable contacts being adjusted relative to the fixed contacts by an insulating cover 4 which is operatively connected to the movable contacts and which closes one end of a switch box the sides of which are preferably formed of a substan-

tially circular, insulating member 5 held in operative position on the plate or support 1 as by bolts 6 and cooperating nuts 7. These parts of the reversing switch are preferably held in assembled operative positions by a resilient means such as a leaf spring 8 which presses the cover 4 downwardly toward the plate or base 1 and thereby presses the movable contacts against the fixed contacts.

In the preferred form of my invention, the base 1 is formed of marble or other rigid insulating material, and the fixed contacts are securely fastened to this base as by bolts 9 passing therethrough and having downwardly projecting ends to which cables (not necessary to show herein) may be attached to connect the switch in an electric circuit. These fixed contacts 2 preferably project above the base 1 so that when the other parts of the switch box are removed, the upper or operative surface of the fixed contacts may be refinished, as by filing them, without the necessity of removing these contacts, the latter being held against movement during the refinishing operation by the base plate which supports them. The movable contacts 3 are preferably formed as separate elements held in spaced relationship by an insulating rib 10 preferably carried by the cover 4, the removable contacts preferably also having an operative connection with this cover. For this purpose I have shown dowel pins 11 preferably carried by the contacts 3 and projecting into corresponding recesses 12 formed in the lower side of the cover, it being apparent that when the cover is rotated, as by means of a controlling handle 13, the movable contacts may be made to connect different pairs of the fixed contacts and thereby control the direction of a current flow through an electrical system. It will be evident that by the provision of cut away portions in the member 5 small shoulders 5' will be produced which will stop the handle 13 in the proper positions. The guiding and retaining bolts 6 are preferably securely held to the base plate 1 as by means of nuts 14 threaded onto these bolts, suitable recesses 15 being formed in the lower side of the insulating wall 5 to receive these nuts.

The reversing switch may be easily as-

sembled in the order shown in Fig. 3 by placing the movable contacts on the fixed contacts, sliding the substantially cylindrical insulating member 5 onto the guiding members 6 until this casing is in contact with the base plate and surrounds and insulates the contacts, the cover and contact controlling member 4 being then inserted in the top of the switch box thus formed with the rib 10 extending downwardly between the movable contacts 3. The spool-shaped retaining nuts 7 may then be threaded onto the bolt 6 and the leaf spring 8 placed in operative position as shown in Figs. 1 and 2 with the center thereof in contact with a pin or stud 16 which preferably binds the controlling handle 13 to the cover 4 and receives the thrust of the spring 8. If desired, the ends of this spring 8 may be provided with slots 19, 20 adapted to receive the smaller diameters 17 of the spools 7, the springs being held against upward movement relative to the retaining bolts 6 by the upper heads 18 of the nut 7. I preferably form one or both of these slots, as 19, arc-shape, the center of curvature of the sides of this slot 19 being preferably the opposite spool 7 to the one with which this slot 19 is adapted to cooperate. When applying the spring retainer, the end of the leaf spring 8 having the slot 20 whose walls may or may not be arc-shaped, is first interlocked with one spool 7 as shown in Fig. 1 and then the leaf spring is swung around this spool as a center until the other end of the spring is in locking position with the other spool 7 with the center of the spring in contact with the stud 16. I also preferably form the inner ends of the slots 19 and 20 slightly enlarged (see Fig. 3) and with beveled surfaces 21 which cooperate with the beveled surfaces 22 of the upper heads of the spool 7 to retain the spring in operative position on the switch box and prevent an accidental removal of the spring, it being apparent that when the spring is applied to the switch box this spring holds the elements in their proper positions and automatically locks itself on the box. If desired, both of the slots 19 and 20 may be formed arc-shaped with the centers of curvature of the sides of the slots at the center of the box and the leaf spring may be applied by first placing the center of the spring on the stud 16 and then rotating the spring to bring the slots simultaneously into contact with the retaining nuts 7.

When assembling the device as stated above, it is common practice to thread nuts, as 7, tightly on the cooperating bolts to hold the members rigidly in their relative positions and this often results in a sticking of the nut on the bolt and rendering the disassembling of the parts rather difficult. To overcome this, I preferably provide slots 23

in the heads of the nuts 7 and form the spring 8 of such a size that either end thereof may be inserted in these slots 23 and used as a screwdriver to loosen these nuts.

In the operation of reversing switches it has been found that when a movable contact as 3, passes from one pair of fixed contacts 2 to another pair of fixed contacts, the forward end of the movable contact may catch on one of the pair of fixed contacts to be bridged and prevent the operation of the switch. For example, if the parts are assembled as shown in Fig. 3 with the movable contact 3^a bridging the fixed contacts 2^a and 2^b, and the contact 3^a is moved to bridge the contacts 2^b, 2^c, the point 3^b of the contact 3^a may catch on an edge of the contact 2^c and stop the movement of the switch. This defect is overcome in the present invention by applying the pressure of the spring 8 through the cover 4 and the inner walls of the recesses 12 to the ends of the dowel pins 11 carried by the contacts 3, sufficient clearance 24 being provided between the lower face of the cover 4 and the upper face of the contacts 3 to permit a slight movement of the movable contacts 3 about the pivots 11 which receive the pressure of the spring. These pivots or dowel pins are preferably placed centrally in each of the movable contacts 3 so that these contacts are balanced about the pivots 11. This balancing of the contacts serves two functions; first, when the contact 3 is bridging two of the contacts 2 the pressure applied to the movable contact is transmitted equally to the ends thereof which rest on the fixed contacts so that if one fixed contact, as 2^a, should be higher than another fixed contact, as 2^b, the movable contact 3 will be pressed with equal force against each of these fixed contacts, and second, that when one of the movable contacts, as 3^a, is being moved onto one of the fixed contacts 2^c it may cant as necessary to make contact and to slide over the fixed contact.

It is thus seen that I have provided an improved current controlling device which is composed of a very few easily manufactured parts which are easily assembled and are automatically locked in operative position. It will further be seen that the elements of the switch may be easily disassembled for inspection and that the fixed contacts are rigidly held in an elevated position where they may easily be refinished without necessitating their removal from the base plate 1 and the provision of some means such as a vise for securely holding these contacts during a refinishing operation. It will further be seen that the switch box is very compact and that the resilient means for holding the parts in assembled position and for holding the movable contacts in a balanced position relative to the fixed contacts, is outside the

switch box insulating members and is not subject to the electrical current flowing through this switch box or to the heat generated by this current so that the tension of the spring is not weakened by current flow.

While I have in this application specifically described one embodiment which my invention may assume in practice, it is to be understood that this form is used for illustrative purposes only and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent, is:

1. In a reversing switch, a support, a plurality of contacts thereon, a guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, and a unitary element closing the open end of said insulating member and freely insertable therethrough for controlling the movement of said movable contacts.

2. In a reversing switch, a support, a plurality of contacts thereon, a guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, and unitary means for closing the open end of said insulating member and for controlling the movement of said movable contacts, said means having provision for holding said movable contacts in spaced relation operative per se to prevent substantial movement of said movable contacts relative to said unitary means about axes perpendicular to the latter.

3. In a reversing switch, a support, a plurality of contacts thereon, guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, and means for closing the open end of said insulating member and for controlling the movement of said movable contacts, said means having provision for holding said movable contacts in spaced relation and being removable as a whole through the open end of said open ended insulating member.

4. In a reversing switch, a support, a plurality of contacts thereon, a guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, and means controlling the movement of said movable contacts, said means having a pro-

jecting rib for holding said movable contacts in spaced relation.

5. In a reversing switch, a support, a plurality of contacts thereon, a guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, and means for closing the open end of said insulating member and for controlling the movement of said movable contacts, said means having a projecting rib and a dowel pin connection with said movable contacts for holding them in spaced relation and for operating said contacts.

6. In a reversing switch, a support, a plurality of contacts thereon, a guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, means for closing the open end of said insulating member and for controlling the movement of said movable contacts, and means detachably secured to said guiding and retaining means for holding said closing means in operative position.

7. In a reversing switch, a support, a plurality of contacts thereon, a guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, means for closing the open end of said insulating member and for controlling the movement of said movable contacts, and resilient means detachably secured to said guiding and retaining means for holding said closing means in operative position.

8. In a reversing switch, stationary and movable contacts, means for insulating and controlling said contacts, and elastic means for detachably retaining said elements in operative relationship, said elements being freely detachable in the absence of said elastic retaining means.

9. A reversing switch comprising a member, a plurality of fixed contacts in raised position thereon, a plurality of movable contacts having projecting dowel pins, and movable contact controlling means comprising a member having recesses adapted to receive said dowel pins loosely to permit angular movements of said movable contacts about intersecting axes, said member also having means for maintaining said movable contacts spaced from each other.

10. A reversing switch comprising fixed contacts, movable contacts, and an inclosure therefor comprising a base to which said fixed contacts are attached, an open ended member surrounding said contacts and

closed at one end thereof by said base, and movable contact controlling means closing the other end of said open ended member and movable through the end thereof away from said base.

11. A reversing switch comprising fixed contacts, movable contacts, and an inclosure therefor comprising a base to which said fixed contacts are attached, an open ended member surrounding said contacts and closed at one end thereof by said base, movable contact controlling means closing the other end of said open ended member and removable through the last mentioned end thereof, and means for adjustably retaining said open ended member and said controlling and closing means on said base.

12. In a reversing switch, a plurality of fixed contacts, a plurality of movable contacts, stationary means supporting and enclosing the fixed contacts, a pivoted carrier for the movable contacts, and elastic means fixed at its ends and in the form of a bowed spring whose ends are fixed relative to said stationary means for imparting a pressure to said pivoted carrier adjacent the axis thereof, said elastic means and said contacts being insulated from each other.

13. In a reversing switch, a supporting member, insulating means supported thereby, means for holding said insulating means on said supporting member, a plurality of relatively movable contacts, resilient means cooperating therewith to press said contacts into close engagement, and cooperating means carried by said resilient means and said holding means whereby the holding means may be operated by said resilient means.

14. In a reversing switch, a support, a plurality of contacts thereon, guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, means for closing the open end of said insulating member and for carrying said movable contacts, and means extending between said guiding and retaining means and cooperating with said last mentioned means to effect close en-

gagement of said fixed and movable contacts.

15. In a reversing switch, a support, a plurality of contacts thereon, guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means and providing abutments arranged at angles to each other, a plurality of movable contacts, and means controlling the movement of said movable contacts and limited in its movements by said abutments, said means having a projecting rib for holding said movable contacts in spaced relation.

16. In a reversing switch, a support, a plurality of contacts thereon, guiding and retaining means carried by said support, an open ended insulating member surrounding said contacts and held in position on said support by said guiding and retaining means, a plurality of movable contacts, and means for closing the open end of said insulating member and for controlling the movement of said movable contacts, said means having a projecting rib and a dowel pin connection with said movable contacts for holding them in spaced relation and for operating said contacts, and said member and second mentioned means being provided with cooperating means for limiting the movement of said means relative to said member.

17. In a switch mechanism, a base, contacts carried thereby, a movable member carrying contacts adapted to cooperate therewith, and means for holding said contacts in operative relation including a spring extending across said member and supported operatively by said base.

18. In a switch mechanism, a base, a closure member mounted thereon, stationary contacts disposed therein, a movable member carrying contacts to cooperate with said other contacts, and means for maintaining said contacts in operative relation including a spring extending across said member and radially supported by said enclosure member.

In testimony whereof I affix my signature.
CHARLES W. WYMAN.