Nov. 3, 1942. G. BÖTTINGER 2,300,868

ELECTRICAL SWITCHING DEVICE

Filed June 22, 1939

Fig. 1.

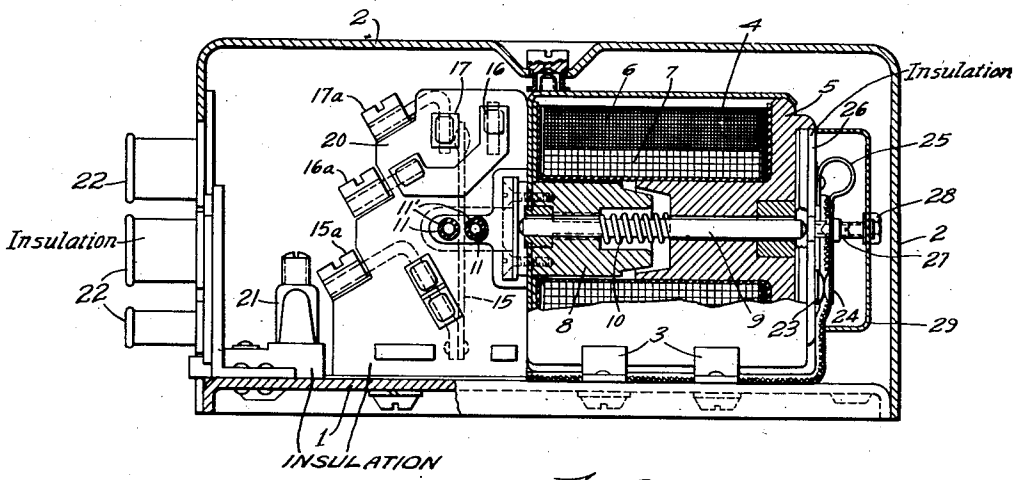
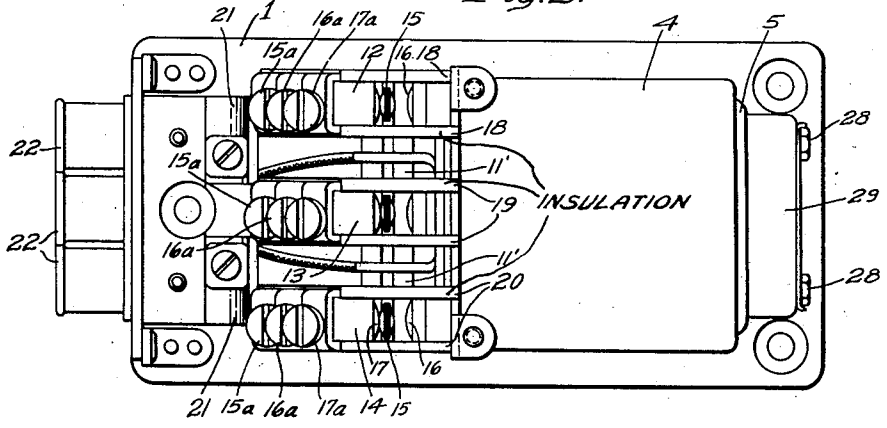



Fig. 2.




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## ELECTRICAL SWITCHING DEVICE

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7 Claims. (Cl. 200—1)

My invention relates to an electrical switch and is more specifically directed to the disposition of the contact members and terminals of the switch so as to afford maximum compactness without sacrificing accessibility from the outside or view of the respective elements thereof.

In electrical switch apparatus, particularly relays for small power, compactness of the relay is of major importance. In making the switch compact, the accessibility to the terminals of the switch and to the contact members has been, in the past, seriously impaired.

An object of my invention is to provide an electrical switch having one or more poles, the contact members and the terminals of which are extremely compact, but at the same time are readily accessible for repair, or view, or for any other similar purpose.

Other objects and advantages will become more apparent from a study of the following specification when considered in conjunction with the accompanying drawing, in which:

Figure 1 is a side view, partly in cross-section, of a relay embodying the principles of my invention;

Fig. 2 is a top view of the device illustrated in Fig. 1 with the cover removed.

Referring more particularly to Figs. 1 and 2, numeral 1 denotes a base plate, numeral 2 denotes a cover plate interfitting with the base plate 1 to form a receptacle for the relay. Mounted on the base plate 1 by means of brackets 3 is an electromagnet 4 which includes a stationary core 5 and a plurality of concentrically disposed windings 6 and 7. Numeral 8 denotes a plunger type armature having rigidly connected thereto a pin 9. The armature 8 and pin 9 are biased to the left by helical spring 10 when the electromagnet is deenergized. Rigidly secured to the armature are a pair of laterally disposed pins 11 which are surrounded by a coating of insulating material 11'.

My invention, which is directed principally to the specific contact member and terminal arrangement, is applicable to either a single pole switch or to a switch having a plurality of poles. Fig. 2 shows a switch having three poles 12, 13 and 14, each of which comprises a movable contact member 15, and a pair of stationary contact members 16 and 17, respectively.

Each movable contact 15 has mounted on both sides at the top thereof contact pieces which are adapted to selectively coact with contact members 16 and 17, respectively. Numeral 15a denotes the terminals for the respective contact members 15, numeral 16a, the terminals for contact members 16, and numeral 17a, the terminals for contact members 17, respectively. The terminals 15a, 16a and 17a are in the same plane as the contact members 16 and 17 and remain so throughout the entire range of movement of the movable contact member 15. The terminals and contact members are arranged in the same plane by virtue of their being mounted on the insulating partition walls 18, 19 and 20 which partition walls are arranged in parallel relation to one another.

Each of the poles 12, 13 and 14 is surrounded by a pair of partition walls 18, 19 and 20, respectively, hence the partition walls, also form, in effect, arc chambers, thereby isolating the arcing at the contact members of one pole from another. Terminals 15a, 16a and 17a are staggered relative to one another in the form of a step as shown in Figs. 1 and 2. Consequently, when the cover 2 is removed, any of these terminals is readily accessible from the top, such as to a screw-driver or any other suitable tool. Not only are the respective terminals 15a, 16a and 17a readily accessible and open to view, but the contact members 15, 16 and 17 are likewise readily accessible and open to view.

A terminal 21, which is grounded to plate 1, also is shown and serves as a ground terminal. A plurality of insulating bushings 22 accommodate lead-in wires which are connected to the various terminals.

On the opposite side of the electromagnet 4 there is arranged a pair of auxiliary contact members 23 and 24. Contact member 23 is rigidly secured to an insulating plate 26 which, in turn, is rigidly secured to the stationary core 5, and contact 24 is secured to a leaf spring 25 which, in turn, is secured to an insulating plate 26 which, in turn, is rigidly secured to stationary core 5.

Leaf spring 25 has mounted thereon an adjustable setscrew 27. When the electromagnet is energized, thereby moving the armature and pin 9 to the right, pin 9 will abut setscrew 27 and will overcome the contact closing force of leaf spring 25, thereby separating auxiliary contact members 23 and 24. This separation will occur slightly before the completion of the movement to the right of pin 9. When electromagnet 4 is deenergized, the force of leaf spring 25 will bias the stationary contact members 23 and 24 in contacting relation thereby shunting one of the coils 6 or 7 (depending upon which coil it is desired to shunt out), which coils are connected in se-

ries. However, as soon as contact members **23** and **24** are separated due to energization of the electromagnet, the coil is no longer shunted, hence the full resistance of the coil will be added in series to the resistance of the other coil, thereby increasing the total resistance and reducing the amount of current flowing through the electromagnet. By this feature, the current consumption of the electromagnet during its continued energization is reduced.

Suitable bolts **28** are shown which are used to hold a cover **29** surrounding the auxiliary contact members in place.

I am, of course, aware that others, particularly after having had the benefit of the teachings of my invention, may devise other devices embodying my invention, and I, therefore, do not wish to be limited to the specific showing made in the drawing and the descriptive disclosure hereinbefore made, but wish to be limited only by the scope of the appended claims and such prior art may be pertinent.

I claim as my invention:

1. An electric switch comprising a pair of fixed contact members, and a movable contact member disposed between the fixed contact members and thus adapted to be moved into contact with either of said fixed contact members, a terminal for each of the three aforesaid contact members, said terminals being disposed in a row and said contact members being disposed in a separate row, angularly disposed with respect to said rows of terminals and in the same plane with said terminals throughout the entire operation of the switch, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

2. An electric switch comprising, in combination, a pair of fixed contact members disposed side by side, a movable contact member disposed between the fixed contact members, means for moving said movable contact member to move into contact with either of the fixed contact members, a terminal for each of the three aforesaid contact members, a step-like support having ledges upon which ledges are mounted, said terminals and contact members being disposed in separate, angularly disposed rows, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

3. An electric switch comprising, in combination, a pair of fixed contact members disposed in two spaced parallel planes, a movable contact member disposed in a plane between the two planes of the fixed contact members, a terminal for each of the aforesaid contact members, said terminals being disposed in three parallel planes parallel to the planes including said contact members and said contact members and terminals being disposed in angularly disposed rows located in substantially the same plane transverse to the planes including, respectively, the contact members and terminals, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

4. An electric switch comprising, in combination, a side wall support, a stationary contact member mounted thereon, a movable contact member also mounted thereon in alignment with the stationary contact member, a second stationary contact member also mounted on said support, means for actuating said movable contact member to make contact with either of said stationary contact members, and three spaced terminals, one for each of said contact members, disposed in a row, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

5. An electric switch comprising, in combination, a support, a stationary contact member, a movable contact member mounted above the stationary contact member as viewed when the support is mounted on a side wall, a second stationary contact member mounted above the movable contact member, means for actuating said movable contact member to make contact with either of said stationary contact members, and three spaced terminals, one for each of said contact members, disposed in a row above the contact members which row is angularly disposed with respect to said row of contact members but in a common plane therewith, and side walls of insulating material for the contact members forming an arc chamber for the contact members, the open side of the arc chamber being on the side from which said contact members and terminals may be readily inspected, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

6. An electric switch comprising a pair of fixed contact members, and a movable contact member disposed between and in alignment with the fixed contact members and thus adapted to be moved into contact with either of said fixed contact members, an insulation block having a pair of side walls between which the contact members are disposed, said side walls forming an arc chamber through the opening of which the contact members may be readily inspected, and terminals, one for each of said contact members, disposed in a row coplanar with said contact members and angularly disposed thereto adjacent the opening of the arc chamber, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

7. An electric switch including, in combination, a plurality of fixed contact members, movable contact means in alignment with said fixed contact means, means for moving the movable contact means in circuit relation with selected ones of the said contact members, terminals one for each of the fixed contact members and each of movable contact means, an insulation block, all of said terminals and fixed contact members and movable contact means being disposed in angularly disposed, coplanar rows which are disposed generally at one side of the insulation block thus to be in view from one point of inspection, and side walls on said insulation block forming an arc chamber for said fixed contact members and movable contact means, and said contact members and terminals being juxtaposed so as to be readily visible and accessible for repairs from one and the same approach position.

GÜNTHER BÖTTINGER.