

March 28, 1944.

J. W. SAMZELIUS

2,345,007

ELECTRIC SWITCH

Filed Aug. 11, 1942

3 Sheets-Sheet 1

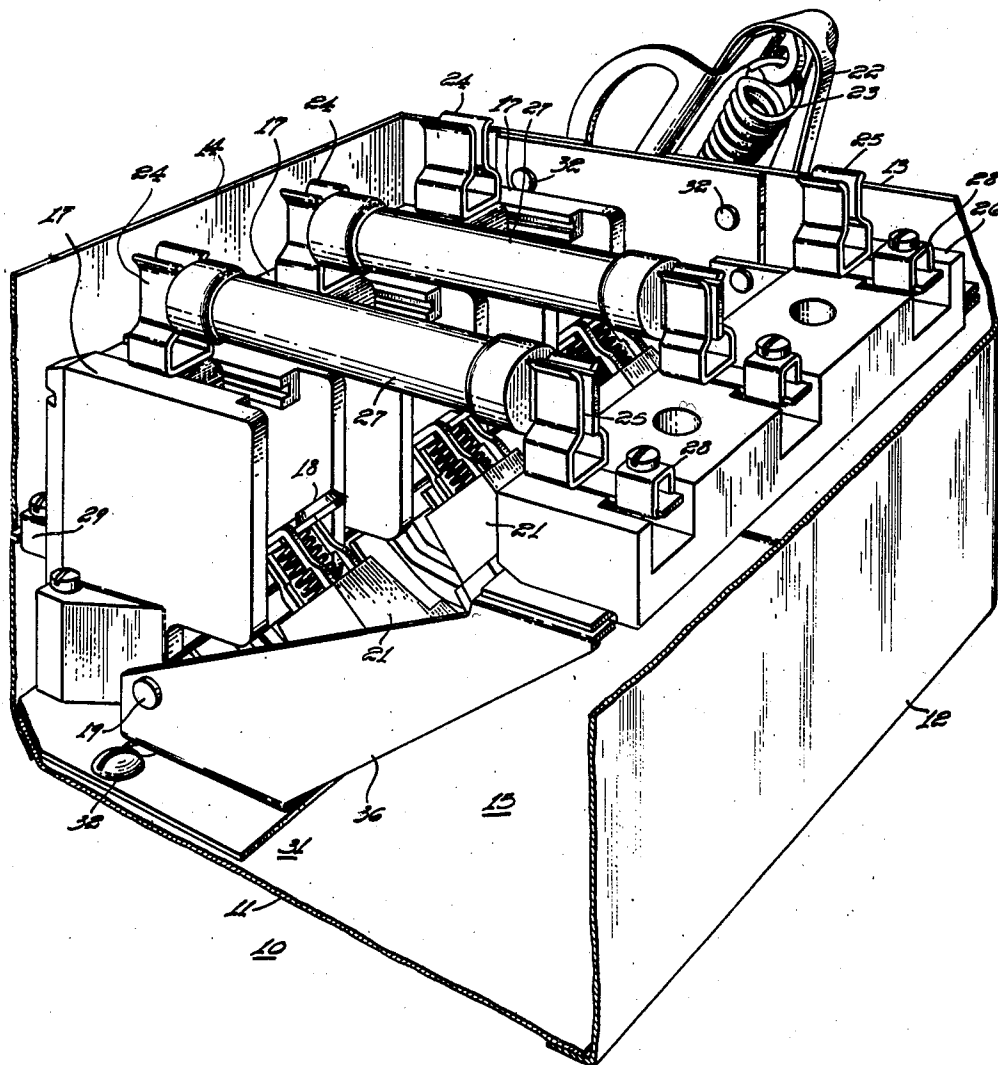


Fig. 1.

WITNESSES:

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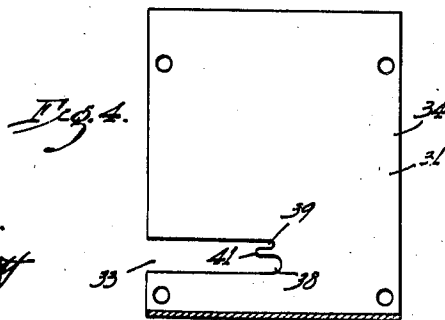
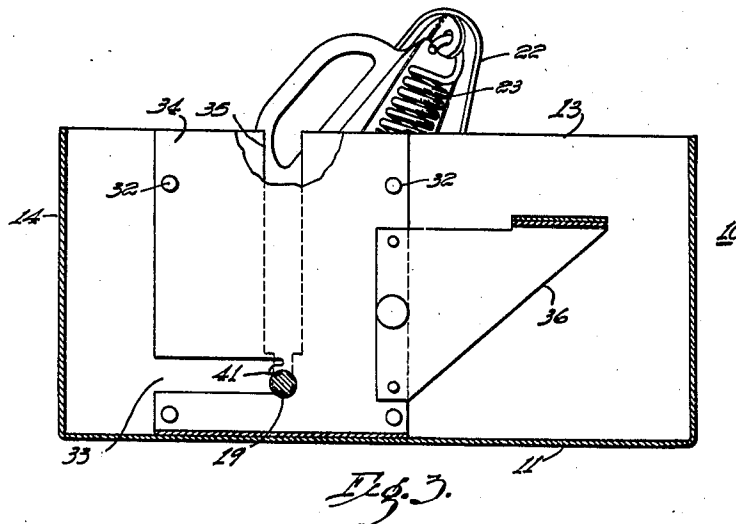
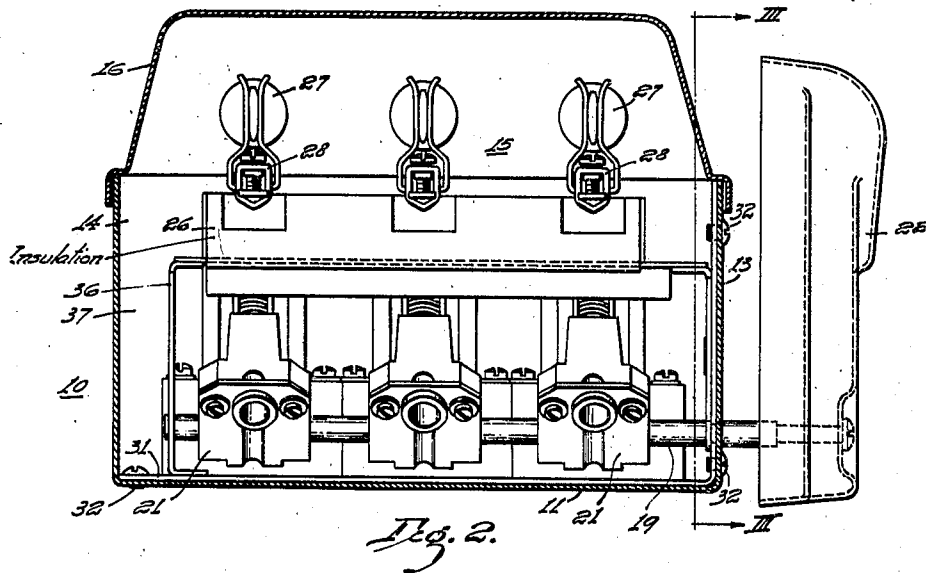
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ELECTRIC SWITCH

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3 Sheets-Sheet 2



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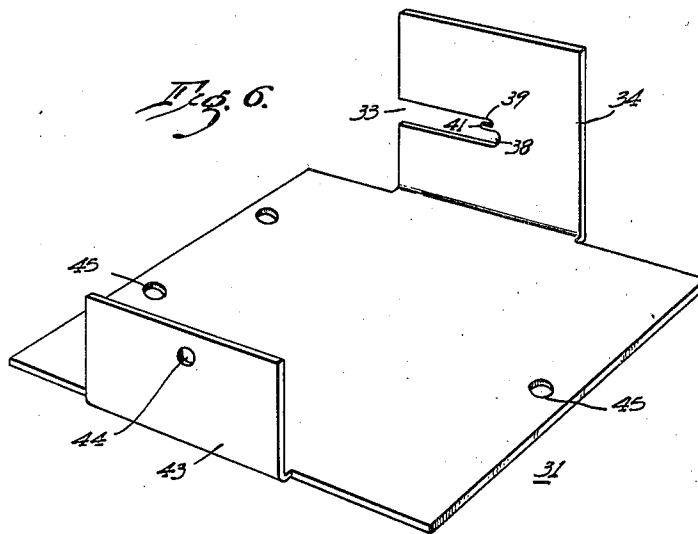
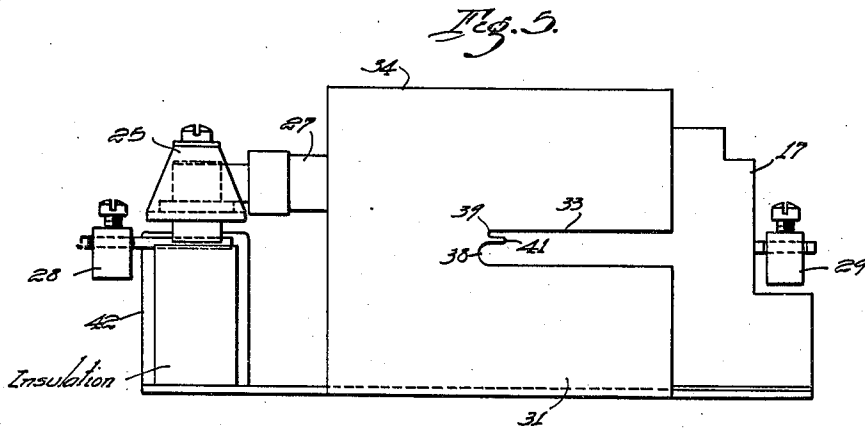
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ELECTRIC SWITCH

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3 Sheets-Sheet 3



WITNESSES:

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UNITED STATES PATENT OFFICE

2,345,007

ELECTRIC SWITCH

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Pennsylvania

Application August 11, 1942, Serial No. 454,361

10 Claims. (Cl. 200-168)

My invention relates, generally, to electric switches and, more particularly, to switches of the enclosed type commonly known as safety switches.

An object of my invention, generally stated, is to provide an enclosed switch which shall be simple and efficient in operation and which may be economically manufactured and installed.

A more specific object of my invention is to provide a unitary switch mounting and operating shaft bearing plate for an enclosed electric switch.

Another object of my invention is to provide for retaining the operating shaft of an enclosed switch in position in the enclosing cabinet.

A further object of my invention is to provide an enclosed electric switch which may be completely assembled on a mounting plate prior to its insertion in the enclosing cabinet.

Still another object of my invention is to provide for temporarily retaining the operating shaft of the switch in position in the mounting plate prior to its insertion in the cabinet.

Other objects of my invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with my invention, the parts of an enclosed switch, including the arc boxes, contact members, fuses, fuse mountings and operating shaft may be assembled on a unitary mounting plate prior to its insertion in the switch cabinet. Bearings for the operating shaft are provided in the mounting plate and a slot for receiving the shaft is disposed in one side of the plate substantially at right angles to a similar slot in one side of the cabinet to facilitate the assembly of the switch and to retain the shaft in position in the cabinet. Provision is made for temporarily retaining the shaft in the slot in the mounting plate during assembly and testing operations.

For a fuller understanding of the nature and objects of my invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, in perspective, of an enclosed switch embodying my invention, a portion of the enclosing cabinet being broken away for clearness;

Fig. 2 is a view, partially in elevation and partially in section, of the switch and cabinet shown in Fig. 1;

Fig. 3 is a view, in section, taken along the line III-III of Fig. 2;

Fig. 4 is a detail view of a portion of the mounting plate for the switch mechanism;

Fig. 5 is a view, in elevation, of a modification of the switch structure and mounting plate; and

Fig. 6 is a view, in perspective, of the modified form of the mounting plate.

Referring to the drawings, and particularly to Figs. 1 and 2, the switch structure shown therein comprises a cabinet 10 having a bottom wall 11 and side walls 12, 13 and 14 for enclosing a switch unit 15. The cabinet 10 is also provided with a hinged cover 16, as shown in Fig. 2.

As illustrated the switch unit 15 is a three pole switch and comprises a plurality of arc boxes 17, one for each pole, movable contact members 18 which are disposed to engage stationary contact members contained within the arc boxes 17, but not shown in the drawings, and a shaft 19 for actuating the movable contact members 18. The contact members 18 are of the butt contact type and are resiliently mounted in carriers 21 secured to the shaft 19. An actuating handle 22 may be resiliently connected to the shaft 19 by means of a spring 23 for operating the shaft through an operating mechanism which may be of the type described in Patent No. 1,606,801.

The switch unit 15 may be of the type disclosed in the copending application of Lawrence Pierce, Serial No. 454,357, filed August 11, 1942, in which a fuse terminal 24 is mounted on top of each one of the arc boxes 17. Similar fuse terminals 25 are mounted on an insulating base 26 for receiving fuses 27, which may be of the well known cartridge type. Connecting terminals 28 are also mounted on the base 26 for connecting power conductors to the fuse terminals 25. Similar terminals 29 are provided for connecting power conductors to the switch contact members, thereby completing the power connections to the switch.

In order to insure the proper alignment of the switch members and also to facilitate the assembly and the testing of the switch parts, a unitary mounting plate 31 is provided which contains mounting holes for the arc boxes 17 and the operating shaft 19. The mounting plate 31 is secured in the cabinet by screws 32 and may be removed from the cabinet with the complete switch assembly, if desired. Furthermore, all of the switch members, including the arc boxes, contact members, fuses and fuse terminals may

be completely assembled on the mounting plate 31 prior to its insertion in the cabinet 10, thereby greatly facilitating the assembly operation.

As shown in Fig. 3, an open-ended slot 33 is provided in a side member 34 of the mounting plate 31 for receiving the operating shaft 19. A similar slot 35 is provided in the side wall 13 of the cabinet 10. The slots 33 and 35 are disposed substantially at right angles to each other, thereby facilitating the assembly of the shaft 19 in the cabinet 10 and also providing bearing surfaces for the shaft.

During the assembly of the switch members on the mounting plate, the shaft 19 is inserted in the slot 33 prior to the insertion of the mounting plate in the cabinet. When the plate is inserted in the cabinet, the shaft 19 is dropped into the slot 35 in the side wall of the cabinet. Thus, the sides of the slots 33 and 35 function as bearing surfaces for the shaft 19 and retain the shaft in its proper position in the cabinet so long as the mounting plate 31 is secured in position.

In order that the fuse base 26 may be mounted at the proper elevation to maintain the fuse terminals 25 in alignment with the fuse terminals 24, a bracket 36 is provided for supporting the fuse base 26. The bracket 36 may be riveted or welded, or otherwise secured, to the mounting plate 31 and, therefore, maintains the proper relation between the fuse terminals. Furthermore, as explained hereinbefore, all of the switch members, including the fuses may be completely assembled on the mounting plate prior to its insertion in the cabinet. Therefore, the switch may be tested prior to insertion in the cabinet, which facilitates the testing operation as well as the making of any adjustments required.

The provision of the mounting plate 31 and the bracket 36 also facilitates the making of the proper connections to the switch unit, since a space 37 is provided at the end of the bracket 36 for the wires which are connected to the switch terminals. It will be noted that the bracket 36 will protect the wires from the moving parts of the switch after the switch is installed. Furthermore, the bracket 36 provides protection for the moving contacts while handling the switch unit outside of the cabinet, thereby preventing injury to the switch contacts.

In order to facilitate the operation of the switch unit for testing purposes prior to its insertion in the cabinet, a means is provided for temporarily retaining the shaft 19 in the slot 33 prior to the insertion of the shaft 19 in the slot 35. As shown in Fig. 4, part of the slot 33 is considerably wider than the diameter of the shaft 19. Only the inner end 38 of the slot, for a distance approximately twice the diameter of the shaft, is made slightly wider than the shaft diameter. A second slot 39, which extends to about the center of the inner portion 38 of the slot 33, forms a projection 41 in the side member 34 of the mounting plate.

As shown in Fig. 3, the projection 41 may be bent around the shaft 19 by means of a screw driver or other simple tool after the shaft is in place at the bottom 38 of the slot 33. In this manner the shaft will be temporarily retained in its correct operating position, thereby permitting the usual testing operations of the switch mechanism.

While it is not intended that the projection 41 will constitute a bearing of sufficient strength to withstand the service operations of the switch, it is of sufficient strength to retain the shaft in position for testing and demonstrating purposes.

As explained hereinbefore, after the switch mechanism is inserted in the cabinet, the side walls of the slot 35 function as bearing members for the shaft and retain it in its proper position. Should it be desired to remove the shaft from the switch unit, the projection 41 may be straightened out to permit the shaft to be removed from the slot 33.

In the modification of the invention shown in Figs. 5 and 6, in which like parts are designated by the same reference characters as in Figs. 1 to 4, the fuse terminals 25 are mounted on an insulating base 42 which is mounted directly on the bottom of the mounting plate 31 instead of on the bracket 36, as in the construction described hereinbefore. The plate 31 is also provided with an up-turned side member 43, disposed opposite the side 34 and having a hole 44 for supporting the one end of the shaft 19. The other end of the shaft is disposed in the slot 33 in a manner similar to that hereinbefore described.

The bracket 36 may be omitted from the present structure since the fuses are not at a sufficient height to require the provision of the elevated bracket member but may be mounted on the base 42 which is in turn mounted directly on the bottom of the mounting plate 31. As explained hereinbefore, the complete switch mechanism, including the fuses and the operating shaft, may be completely assembled on the mounting plate 31 prior to its insertion in the cabinet. A plurality of holes 45 are provided in the bottom of the mounting plate for the mounting of the switch members.

From the foregoing description it is apparent that I have provided a switch structure in which all of the switch members, including the shaft and the operating mechanism, may be completely assembled outside the enclosing cabinet where it is more accessible. The entire switch unit may be readily removed from the cabinet to facilitate making the proper wiring connections when the switch is installed in service. The mounting plate provides a reinforcement between the bottom and the side of the cabinet, thereby precluding the necessity for bracing the cabinet sides as is now required in cabinets of the larger sizes. Furthermore, the mounting plate provides a flat and rigid mounting surface for the porcelain arc boxes that will not warp or twist with the cabinet in case it is installed on an uneven mounting surface, thereby protecting the porcelain against breakage and maintaining alignment of the contact members.

Since many changes may be made in the above described construction and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all the matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members, a switch operating shaft, and a unitary mounting plate for the switch members, said mounting plate having an open ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet to retain said shaft in position in the cabinet.

2. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of sep-

arately mounted switch members, a switch operating shaft, and a unitary mounting plate for the switch members, said mounting plate being removable from the cabinet and having an open ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet and cooperating therewith in retaining said shaft in position in the cabinet.

3. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members, a switch operating shaft, and a unitary mounting plate for the switch members, said mounting plate having oppositely disposed side members for supporting said shaft, one of said side members having an open ended slot disposed therein substantially at right angles to the slot in the cabinet for receiving said shaft and retaining it in position in the cabinet.

4. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members, a switch operating shaft, a unitary mounting plate for the switch members, said mounting plate being removable from the cabinet and having an open ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet and cooperating therewith in retaining said shaft in position in the cabinet, and means on the mounting plate for retaining the shaft in the slot in the mounting plate prior to its insertion into the cabinet.

5. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members, a switch operating shaft, and a unitary mounting plate for the switch members, said mounting plate being removable from the cabinet and having an open ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet and cooperating therewith in retaining said shaft in position in the cabinet, and means formed integrally with the mounting plate for retaining the shaft in the slot in the mounting plate prior to its insertion into the cabinet.

6. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members, a switch operating shaft, and a unitary mounting plate for the switch members, said mounting plate being removable from the cabinet and having an open

ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet and cooperating therewith in retaining said shaft in position in the cabinet, and means disposed at one side of the slot in the mounting plate and formed integrally therewith for retaining the shaft in the slot in the mounting plate prior to its insertion into the cabinet.

7. A unitary mounting plate for supporting a plurality of switch members and a switch operating shaft, said plate comprising a base and a side member having an open ended slot therein for receiving the shaft, and deformable means formed integrally with the plate and projecting into said slot for retaining the shaft in the slot.

8. A unitary mounting plate for supporting a plurality of switch members and a switch operating shaft, said plate comprising a base on which the switch members are mounted and a pair of oppositely disposed side members for supporting the shaft, one of said side members having an open ended slot therein for receiving the shaft, and deformable means formed integrally with the plate and projecting into said slot for retaining the shaft in the slot.

9. In an enclosed switch structure in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members including arc boxes and fuse terminals, a switch operating shaft, a unitary mounting plate for the switch members, said mounting plate having an open ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet to retain said shaft in position in the cabinet, and a bracket secured to the mounting plate and removable therewith from the cabinet for supporting a part of the fuse terminals.

10. In an enclosed switch structure, in combination, a switch cabinet having an open ended slot in one side wall thereof, a plurality of separately mounted switch members including arc boxes having fuse terminals mounted thereon, a switch operating shaft, a removable mounting plate for the switch members and the shaft, said mounting plate having an open ended slot disposed in one side thereof substantially at right angles to the slot in the cabinet to retain said shaft in position in the cabinet, additional fuse terminals, and a bracket secured to the mounting plate and removable therewith from the cabinet for supporting said additional fuse terminals in alignment with the fuse terminals on the arc boxes.

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