

May 17, 1938.

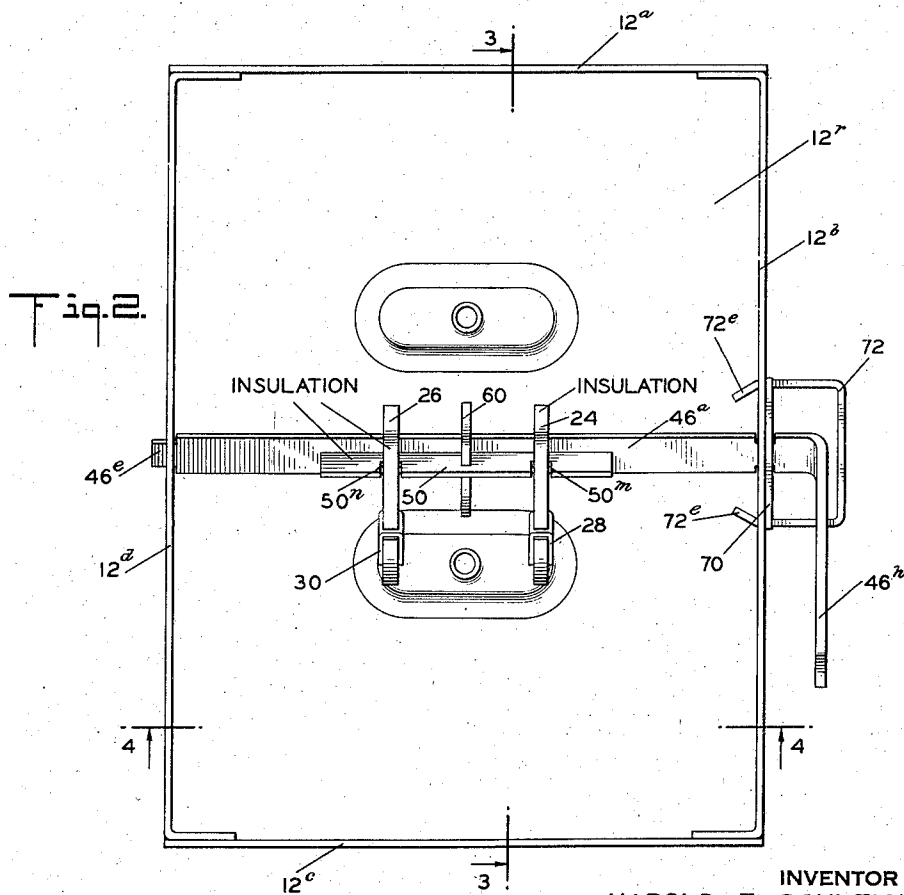
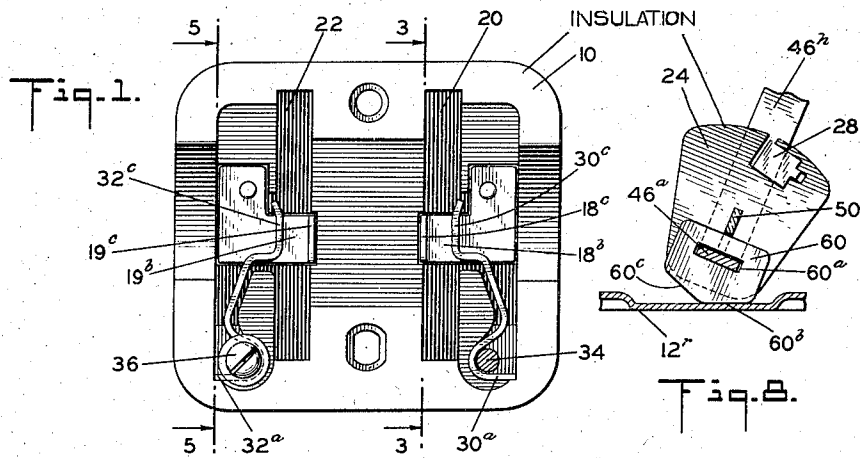
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2,117,987

ENCLOSED ELECTRIC SWITCH

Filed Dec. 14, 1935

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

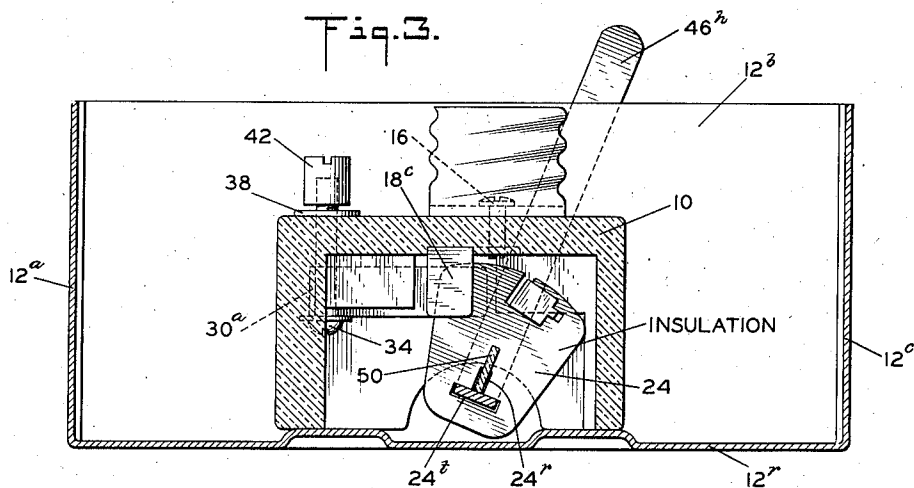


Fig. 4.

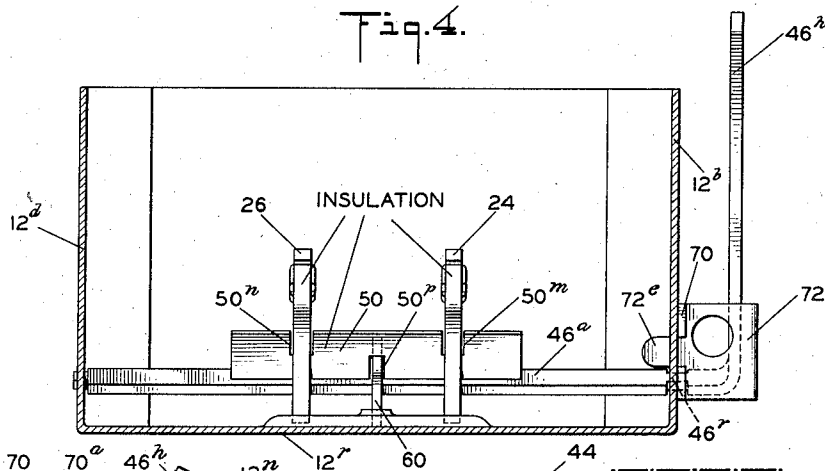


Fig. 6.

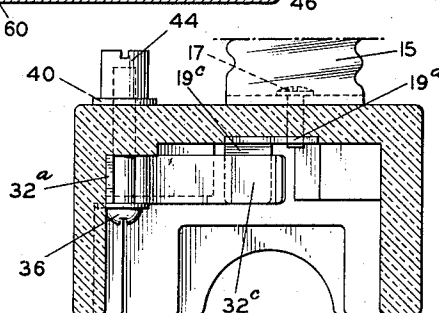


Fig. 5.

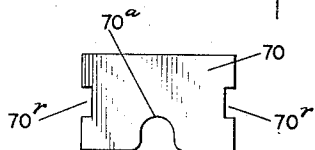


Fig. 2.

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UNITED STATES PATENT OFFICE

2,117,987

ENCLOSED ELECTRIC SWITCH

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Application December 14, 1935, Serial No. 54,482

4 Claims. (Cl. 200—162)

This invention relates to electric switches. More particularly it relates to enclosed electric switches of the type that is usable with a fuse block, although the invention is not limited to use in that connection.

It is an object of the invention to provide an improved inexpensive dependable switch mechanism of the type that is usable with a fuse block within a housing.

Another object of this invention is to provide an improved assembly of switch actuating member and movable contacts for use in an enclosed switch, which is dependable in operation and easy to assemble.

Another object of this invention is to provide means for interlocking and spacing the contact carriers and indexing cam upon a switch actuating member and at the same time make possible the assembly of the carriers and indexing cam upon the operating member while the carriers and cam are engaged with the spacing means.

Another object of this invention is to provide an improved method of fixing the stationary contacts to the base of an electric switch of the above type.

Another object of the invention is to provide an improved method of securing the switch handle member in assembled position in the housing.

Other objects and advantages of this invention will occur to those skilled in the art as the invention is described in connection with the accompanying drawings.

In the drawings:—

Figure 1 is a view looking into the bottom of an insulating base or switch block employed in the invention and showing the assembly of the stationary contacts.

Figure 2 is a plan view of the switch housing with the switch base removed to show the assembly of the movable contact carriers upon the operating member.

Figure 3 is a longitudinal section view of the switch base and housing with the section taken along the lines 3—3 of Figures 1 and 2.

Figure 4 is a transverse section view of the switch housing with the switch base removed, the section being taken along the line 4—4 of Figure 2.

Figure 5 is a longitudinal section view of the switch base, the section being taken along the line 5—5 of Figure 1.

Figure 6 is a fragmentary detail view of the interior of the portion of the switch housing around the operating member's bearing.

Figure 7 is a detail view of a member used to

hold the operating member in assembled position in the switch housing.

Figure 8 is a fragmentary detail view showing the operating member, indexing cam, and contact carrier, in assembly with the interlocking member and showing the relation of this assembly to the bottom of the switch housing.

Referring to the drawings, the switch base or block 10 which preferably is made of insulating material, such as porcelain or a composition product, is secured to the rear wall 12r of a conventional switch box, which has parallel end walls 12a and 12c perpendicular to parallel side walls 12b and 12d all of which are perpendicular to the rear wall 12r. The switch base 10 may be hollowed out in its rear face and may have a pair of fuse sockets 14 and 15 of the screw shell type mounted on its front face. The central contacts of the fuse receptacles may be bolts 16 and 17 respectively, which pass through the front face of the base and take into screw threaded apertures in terminal portions 18a and 19a of fixed contacts, of which the contact surfaces 18c and 19c respectively, project perpendicularly from the terminal portions. These terminal portions are in the shape of right angles with the legs 18b and 19b being directed inwardly so as to cause the contact portions 18c and 19c to lie along the innermost or neighboring walls of a pair of parallel spaced rectangular recesses 20 and 22 which are formed in the bottom of the switch base 10 to permit switch opening and closing movement of plate-like contact carriers 24 and 26 of sheet insulation and carrying movable bridging contacts 28 and 30 as hereinafter more particularly described.

Facing the contact portions 18c and 19c and substantially parallel thereto are the contact faces 30c and 32c of other stationary contacts which preferably are stamped from strips of sheet metal in the irregular form illustrated in Figure 1, so as to provide hook or anchoring portions 30a and 32a at their ends which partially embrace the shanks of securing bolts 34 and 36. These bolts 34 and 36 have enlarged heads for engaging the side edges of the anchoring portions 30a and 32a and thereby secure the contacts fixedly in the position shown in Figure 1. In practice the roughness of the edges of the contacts provides sufficient friction when the edges are in contact with the bolt heads, to hold the contacts securely in their proper position. The securing bolts 34 and 36 may extend through the top of the base and may take into screw threaded terminal plates 38 and 40 located on the top surface

of the insulating base 10 and the extending ends of the bolts may provide means for screwing terminal nuts 42 and 44 thereon.

The movable contacts 28 and 30 preferably are U-shaped metal stampings having contact surfaces lying on opposite sides of the sheet insulating contact carriers 24 and 26 so that upon movement of the carrier between the contact pairs 18c, 30c and 19c, 32c, the circuit may be made and broken by engagement of the movable contacts 28 and 30 with their respective pairs of stationary contacts. The contact carriers 24 and 26 may conveniently be of substantially segmental shape and provided with apertures having radial portions 24r which are intersected perpendicularly at their lower ends by transverse portions 24t. The transverse portions 24t are provided in order that the contact carriers may be slidably mounted upon a combined operating and handle member for actuating the switch contacts. The actuating portion 46a of this switch operator extends transversely of the switch box and is pivotally supported in the side walls 12b and 12d in a manner to be hereinafter more fully described. The switch operator is preferably in the form of a flattened metal bar having a handle portion 46h bent at right angles to the actuating portion and parallel to the side 12b of the switch box but spaced sufficiently therefrom to permit ready manipulation.

In order to space the contact carriers and to maintain them in their spaced position upon the actuating portion 46a a strip of insulating material 50 is provided with notches 50m and 50n in one longitudinal edge spaced an amount equal to the spacing of the slots 20 and 22 of the insulating base 10. The distance from the bottom of the notches 50m and 50n to the opposite longitudinal edge of the interlocking member 50 is equal to the length of the portion 24r of the aperture in the contact carrier 24 so that when the portion 24r (and a corresponding portion of an aperture in carrier 26) is engaged with the portion of the interlocking member 50 below the notches 50m and 50n, the portion 24t (and a corresponding portion of the aperture in carrier 26) will be left open for the passage of the actuating part 46a of the switch operator. Thus the interlocking member and the contact carriers 50 may be engaged with each other.

In order to provide a snap action of the contacts toward open and closed position and at the same time to provide an indexing means to maintain the contacts in these positions, a sheet metal cam member 60 having an elongated aperture 60a for the accommodation of the actuating portion 46a of the switch operator may be provided in the form shown in Figure 8 and mounted upon the actuating portion 46a. This cam member 60 may lie in a plane parallel to and between the planes of the contact carriers. Its size will be determined by the distance of the actuating portion 46a from the rear wall 12r of the switch box. The cam member 60 is provided with two converging cam surfaces 60b and 60c so that when the switch is in the off position as illustrated in Figures 3 and 8, the surface 60b will lie upon the rear wall of the switch box and when the switch is moved to the closed circuit position the cam surface 60c will lie upon the rear wall of the switch box. In moving between the open and closed circuit positions, the peak of the cam member rubbing on the rear wall 12r compels a slight bending of the actuating portion 46a of the switch operator and provides a controllable

snap action of the contacts in moving from one position to another.

A notch 50p is provided in the longitudinal edge of the interlocking member opposite to the edge in which the notches 50m and 50n are located. This notch accommodates the cam member and maintains the cam member in fixed position on the actuating portion 46a of the operating member relatively to the contact carriers 24 and 26. The cam member may be engaged with the interlocking member 50 and slipped on to the actuating portion 46a with the interlocking member and contact carriers.

The engagement of the contact carriers with the actuating portion 46a is a loose engagement so that the movable contacts are permitted to adjust themselves to slight variations in location of the fixed contact pairs. Thus there is practically no axial stress tending to move the contact carriers and cam member along the actuating portion 46a and the friction between the cam member 60 and the bottom of the box is sufficient to maintain it and the contact assembly in its assembled position during the operation of the switch parts.

The actuating portion 46a of the switch operator is provided with a portion 46e of reduced width at its end which is supported in the side wall 12d, and a reduced portion 46r at the point of its support in the side wall 12b. A circular aperture is provided in the wall 12d for the reduced end 46e. An aperture of irregular shape having a semi-circular bearing portion 12s is provided in the wall 12b of the switch box. This irregular aperture has an enlarged portion 12n of sufficient area to accommodate the full width of the switch operator and permit insertion of the operator during assembly of the switch. When assembled, the end 46e is in its bearing aperture in the wall 12d and the reduced portion 46r is seated in the semi-circular aperture 12s. In order to hold the switch operator in this position, a metallic holding plate 70 of the form shown in Figure 7 is secured to the outside, preferably, of the wall 12b. The holding plate 70 is provided with a semi-circular opening 70a preferably in one edge in position to cooperate with the semi-circular portion 12s in the wall 12b of the switch box to form a circular bearing for the reduced portion 46r of the switch operator. To secure the holding plate 70 in position, there is provided a U-shaped metallic securing member or guard 72 having on its parallel ends extending fingers 72e passing through recesses 70r formed in the side edges of the holding member 70 and also through apertures in the side wall 12b of the switch box in alignment with the recesses 70r. These extensions 72e may be bent to hold the guard 72 and holding plate 70 in their assembled position.

In assembling the switch, the fixed contacts may be mounted upon the switch base 10 in the manner described and in the position shown in Figure 1, it being apparent that the securing bolts 34 and 36 for the fixed contacts 30c and 32c may be manipulated from the rear of the switch base by reason of the fact that the underside of the heads of these bolts engage the edges of these contacts. When the other fixed parts of the switch mechanism are mounted upon the base, it is then ready for assembly in the housing with the movable parts of the switch mechanism. In assembling the movable parts, the contact carriers 24 and 26 are engaged with the interlocking member 50 and the cam member 60 is also

engaged with the interlocking member 50 in the manner described and this cam and carrier assembly is then ready to be slid upon the switch operating member. The operating member may then be seated in its bearing apertures in the walls 12b and 12d.

When the contact and cam assembly is in position on the operator and the reduced end 46e is in its bearing aperture and the reduced portion 46f of the switch operator is in the semi-circular recess 12s then the holding plate 70 and guard 72 may be secured in position in the manner described.

From the foregoing it will be apparent that we have provided an enclosed switch device which is easily assembled and may be made from a few parts which are capable of manufacture mainly from sheet stock and therefore the mechanism may be simply and inexpensively made. It will also be apparent that we have provided a novel assembly of the movable contacts and a novel way of mounting the stationary switch contacts with the utmost facility. Many changes within the scope of the invention will occur to those skilled in the art, therefore we do not limit the invention to the exact form of the parts as illustrated.

We claim:—

1. In combination, a switch box having means perpendicular to the back thereof for supporting a handle, a flat metal rod bent to form an actuating member and handle passing through apertures in said supporting means, said member being notched at its points of support, the apertures in said supporting means being formed to accommodate said notched portions of the handle member and one of said apertures having an enlarged portion capable of accommodating the full width of said handle member, a plate secured to one of said supporting means for retaining said handle member with its notched portion in the smaller part of said last-mentioned aperture, and a U-shaped guard having fingers engaging with one of said supporting means and with said plate to hold the plate on said supporting means.

2. A switch assembly comprising a base of insulating material, a contact carrier movable in a plane perpendicular to the face of the base, a movable contact carried by said carrier, a pair of stationary contacts having their contact faces lying in planes parallel to the plane of movement of said carrier, at least one of said stationary contacts being free for substantial lateral movement with respect to said base in a plane normal to the contact face, and means engaging the side edge of one of said stationary contacts and holding it against said lateral movement and in position to be engaged by said movable contact.

3. A switch assembly comprising a base of insulating material, a contact carrier, a movable contact carried by said carrier, a pair of stationary contacts having their contact faces lying in planes parallel to the plane of movement of said carrier, at least one of said stationary contacts being free for substantial lateral movement with respect to said base in a plane normal to the contact face, and a bolt having a head engaging the side edge of one of said stationary contacts and holding said stationary contact against said lateral movement and in position to be engaged by said movable contact.

4. A switch assembly comprising a base of insulating material, a contact carrier, a movable contact carried by said carrier, a pair of stationary contacts having their contact faces lying in planes parallel to the plane of movement of said carrier, at least one of said stationary contacts being free for substantial lateral movement with respect to said base in a plane normal to the contact face, and a bolt having a head engaging the side edge of one of said stationary contacts and holding said stationary contact against said lateral movement and in position to be engaged by said movable contact, said head being situated to enable manipulation from the rear of said base.

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