Nov. 19, 1929. J. SACHS 1,736,370

INCLOSED ELECTRIC SWITCH

Filed Aug. 7, 1923 3 Sheets-Sheet 1

Fig. 1,

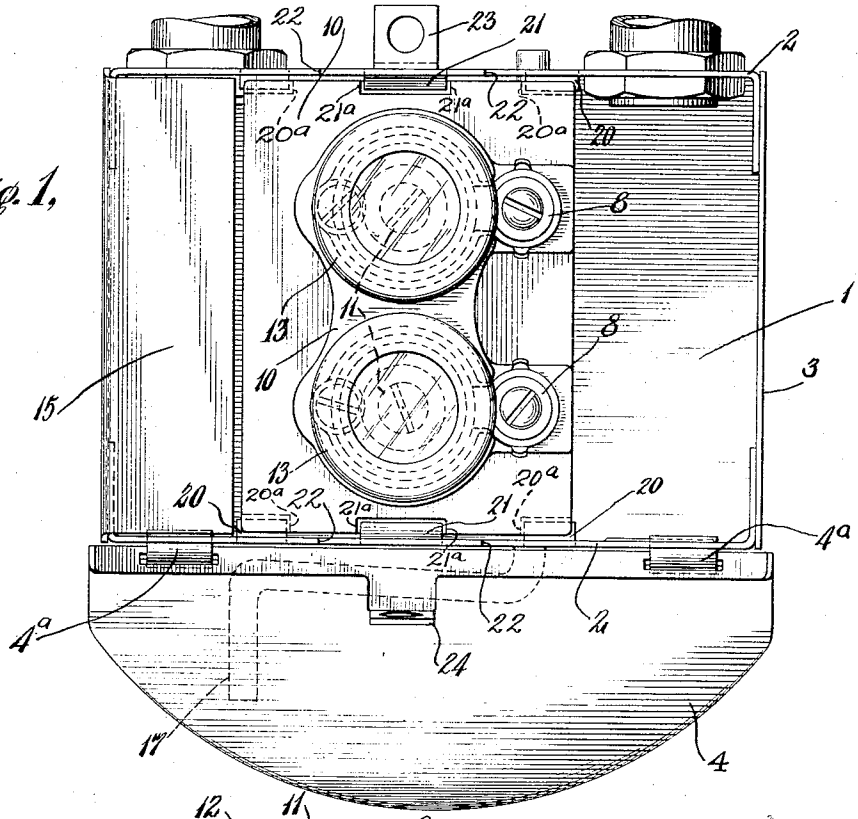
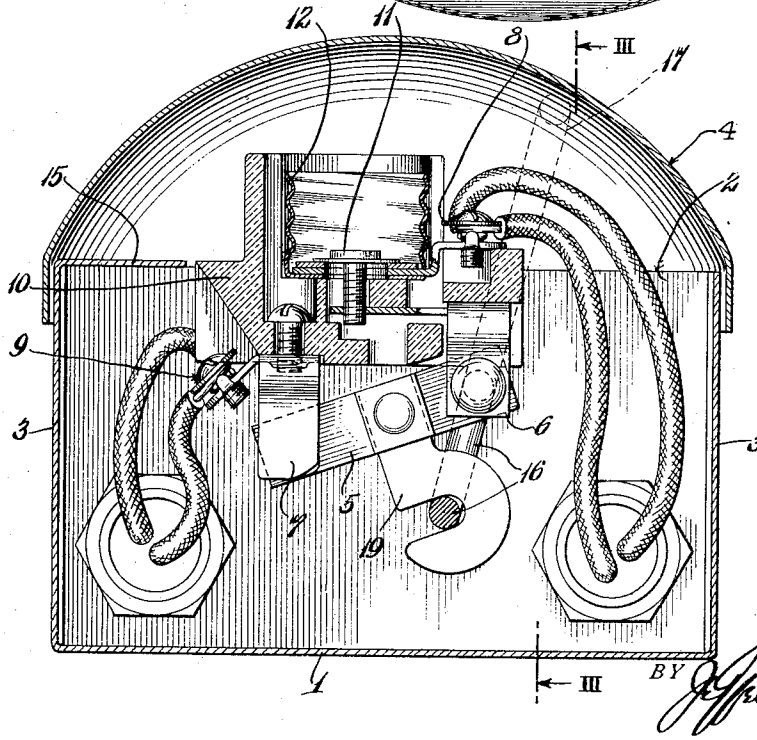


Fig. 2,



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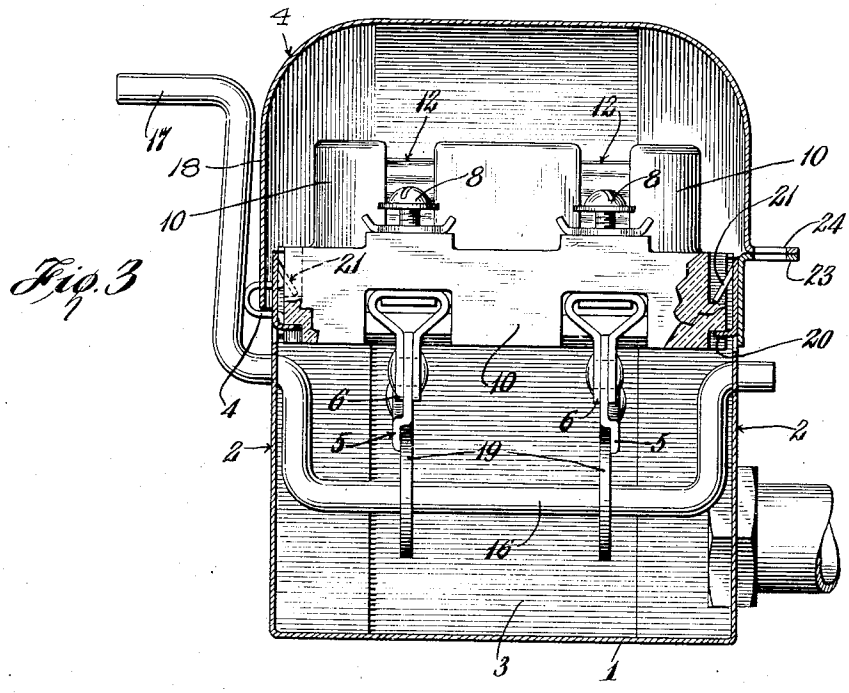


Fig. 3

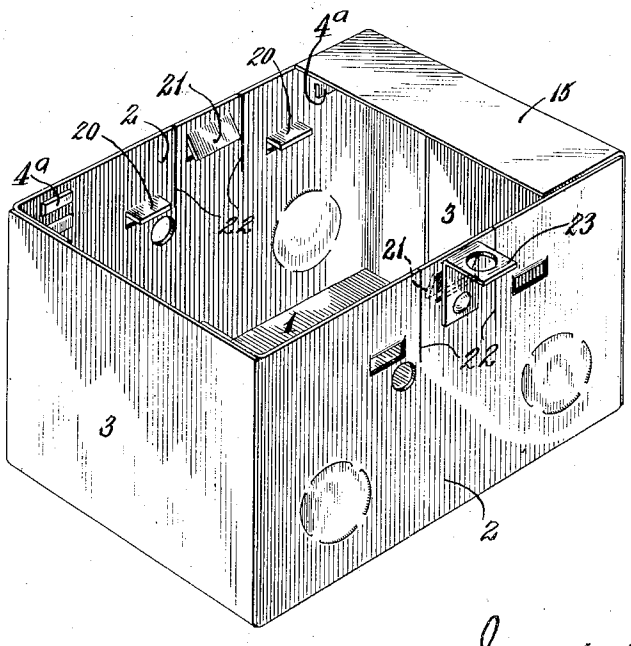


Fig. 4.

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INCLOSED ELECTRIC SWITCH

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Fig. 5.

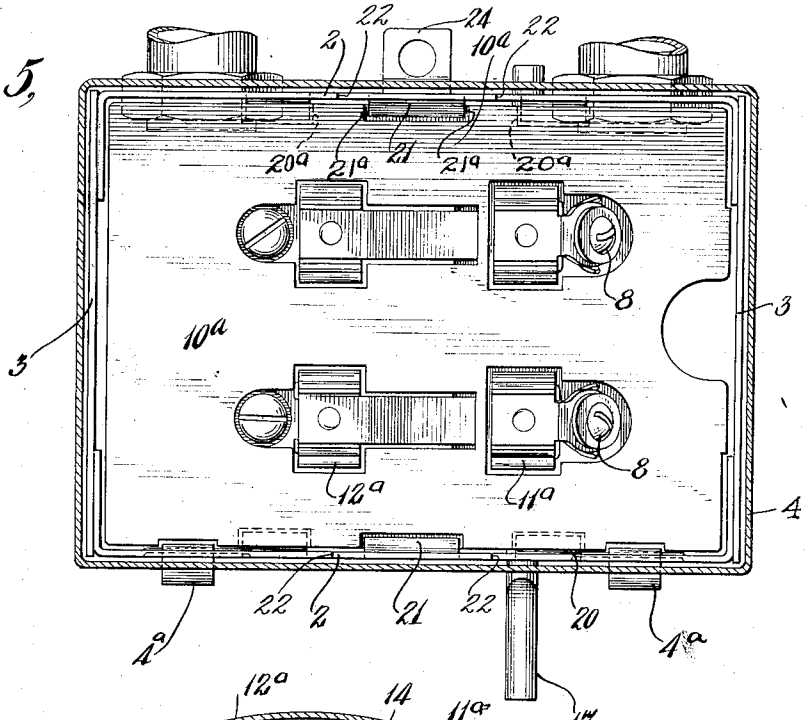
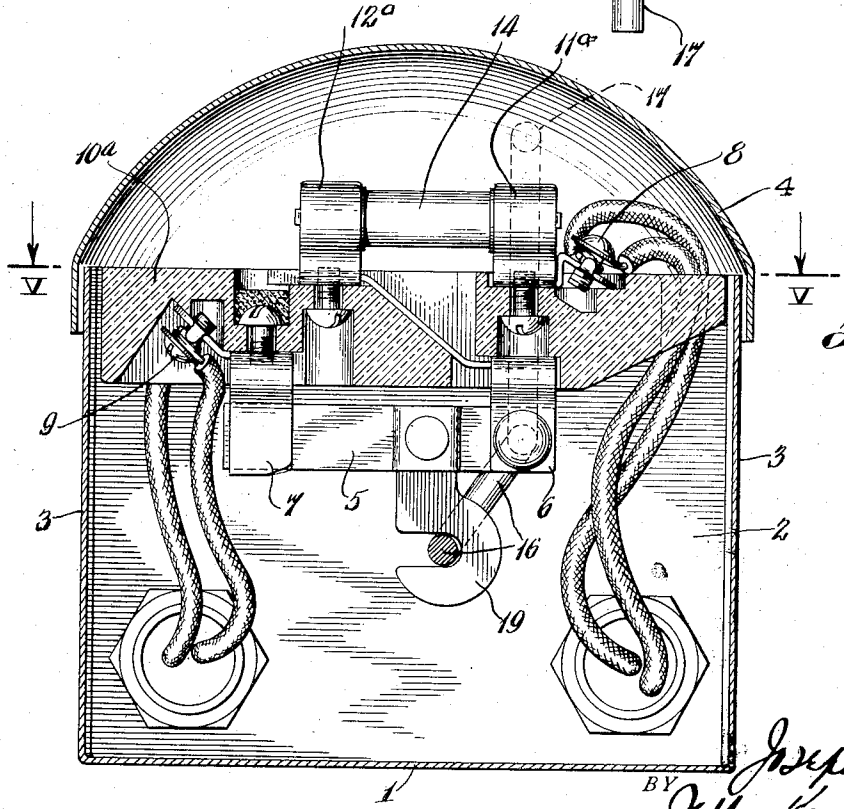


Fig. 6.



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Patented Nov. 19, 1929 1,736,370

UNITED STATES PATENT OFFICE

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INCLOSED ELECTRIC SWITCH

Application filed August 7, 1923. Serial No. 656,183.

This invention is an improved organization of switch mechanism and its inclosure, the object being to simplify such switches and reduce the size thereof and their cost of construction, and to facilitate the process of installing them in circuit and to provide other advantages hereinafter made apparent. To this end one part of the invention contemplates the mounting of the switch mechanism in the box so that it can be attached and removed without the use of screws or other devices likely to become detached and lost or requiring the use of a screw-driver or other tool. Another part of the invention consists in a simplified combination of a box body and a switch mechanism insertible therein as a unit in such relation that the switch base cooperates with a fixed portion of the box body to prevent, or at least obstruct, access to the certain parts of the switch which are carried on the base, this relation being useful independently of other features, either as a measure of safety to the operator of the switch, or, in certain cases, as a means of preventing theft of current, and being particularly useful where the switch is fused and the fuse or fuses are arranged to be accessible to the user of the current only when the switch is open. The invention further involves an organization of switch mechanism and box body, specially arranged to permit the circuit wires to be readily fastened to the switch mechanism while the latter is outside the box and before its insertion and attachment therein, thereby insuring the making of secure wire connections, since this work can now be done in good light and outside of the dark interior of the box. These and other features, present in the structures illustrated herein, by way of example, are not necessarily employed in the same switch but may be individually applied to various other types of switches without departing from this invention, as will be made apparent below.

In the drawings, Fig. 1 is a front view of a switch embodying this invention with the cover open,

Fig. 2 is a longitudinal section thereof,

Fig. 3, a partial cross section,

Fig. 4, a perspective of the box body with the cover and base removed,

Fig. 5, a section on line V—V of Fig. 6, showing a modified form, and Fig. 6 is a longitudinal section of Fig. 5.

The switch inclosure is a rectangular box body made of a sheet metal back wall 1, side walls 2 and cross walls 3 made in one piece or of several appropriately united in fixed relation. The box body is provided, in the present case, with a sheet metal cover 4 hinged thereon to cover the fuse or fuses when that is desired. This cover is preferably shaped so as to form an interior chamber adapted to be more or less occupied by the fuses or other parts of the switch mechanism or base which project beyond the limits of the box body proper. It will be understood that the box is intended to be secured to a building wall and the cover is connected to the box by hinges such as 4^a, 4^a, or otherwise, so that it swings or moves in a horizontal direction. The style of cover and its method of mounting on the box, whether by hinges or otherwise, are both optional features but for the preferred form of this invention it is essential that the cover be chambered and hinged to a side wall of the box as shown in the drawings. The box body is provided with the usual knockouts or other openings for the circuit wires which are preferably arranged so that there can be an opening at either or both sides.

The switch mechanism contained in the box comprises one or more hinged connection blades 5 or equivalent movable switching elements, the hinge and rupture contact clips 6 and 7 therefor, and the wire-connecting means 8 and 9 for such clips, all these parts being carried on a single support or switch base 10 which is preferably, though not necessarily, formed of a single piece of insulating material such as the usual porcelain. The switch mechanism may also include, as in the case of a fused switch, fuse-receiving clips or terminals which are also mounted on the switch base 10 and made of any suitable type, according to the kind of fuse intended to be used. In Figs. 1 to 3 the terminals or contacts 11 and 12 are adapted to receive Edison

base fuse plugs 13, and in Figs. 5 and 6 the terminals or contacts 11^a and 12^a are adapted to receive cartridge fuses 14. While these switch and fuse parts may be variously arranged within the scope of certain of the appended claims, they are preferably so mounted on the base that when the latter is secured in the box body at a distance from the back wall 1, the switching element or elements occupy the space on the inner side of the base, that is to say, between the base and the back wall, and the fuses, when present, are on the outer side of the base, where they may be exposed by opening the cover.

The base itself is made wide enough to span the opposite side walls 2 and cooperates with these or other fixed parts of the body to make the space in rear of it either completely, or at least relatively, inaccessible except by removing the base. In Figs. 1 to 4, the switch base forms such inaccessible interior space by virtue of its position spanning the side walls close to the edge of the front wall 15 which wall is a fixed part of the body formed by inwardly bending an extension of the cross wall 3 at right angles to itself. In Figs. 5 and 6 the base 10^a forms a more completely inaccessible interior space by reason of the fact that its size approximates the size of the entire opening in the box body, filling the same to such an extent as to exclude access to the interior of the box. In either case, it will be seen, the switch base cooperates, on three of its sides at least, with the fixed walls of the box body to form the interior space to be occupied by the switch elements and their immediate connections. Where it cooperates with only three walls of the box, as in Fig. 1, such parts are protected only to the extent to which it is difficult to reach them through the open space between the base and the other box wall, but it will be apparent that in any event the interior space directly behind the base on the front wall 15 is not easily accessible and is not exposed to view and that accidental contact with such parts is not at all likely.

The incoming circuit or service wires and their binding screws 9 are located in the protected space in the box. These parts are alive even when the switch is open and they are therefore guarded against contact. The binding screws 8 for the outgoing or load wires may or may not be disposed in the interior space and are preferably placed on the outer side of the base. As thus arranged the service wires are fastened to the screws 9 while the base is outside the box; when the base is placed in the box, they become protected and the load wires may then be attached to the binding screws 8, after the base is in position, although both binding screws may be protected, if desired.

Further security against contact with live parts of the switch is provided by interlocking the box cover with the switch operating handle, so that the cover cannot be opened except when the switch and circuit are open, and the circuit cannot be closed while the cover is open. This may be done in a number of ways known to the art, but is preferably and most economically done by using a simple crank form of switch-operating member 16, journalled in holes in the side walls 2, so that the exterior crank arm or handle 17 swings adjacent and parallel to the hinge axis of the cover, and by connecting the switch blade to this operating member in such relation that it is closed when the handle occupies a forward position, as indicated in Fig. 3. In this circuit-closing position the handle obstructs the opening of the cover, as will be obvious, but by swinging the handle to its open position and thereby removing it from proximity to the deep side wall 18 of the cover the latter may be opened, it then being impossible to close the switch without first closing the cover. The fuse terminals and the other exposed or accessible parts are thus always dead when the cover is opened, and, for this reason, the binding screws or wire clamps 8 which are connected to the outgoing circuit or load wires may be safely situated on the outer side of the base, as described. The interlocking relationship between the box cover and the switch operating handle is not herein broadly claimed, this being shown and claimed in my patents for inclosed fused switches, No. 1,721,493, No. 1,721,494 and No. 1,721,495 all dated July 16, 1929.

The handle or operating member 16 is connected to each switch element 5 by means of a hook-shaped piece of insulating material 19 riveted to the element and engaging the crank 16 by its open slot, thus forming an open operating connection between the handle and the switch. When the screws 9 have been connected to the service wires, as above explained, the connection of the switch elements to the operating handle on the box is easily made by simply slipping the hook or hooks over the crank, whereupon the fastening of the base to the body makes the connection permanent.

The base is fastened to the body by resilient means associated with the said base and with two opposite side walls of the box, the said means automatically snapping into engagement when the base is moved to its normal position. The said resilient means may be variously constructed but preferably and as shown it is constructed by providing the box side walls with lugs or tongues 21, 21 which may be punched out of the sheet metal of the wall and bent to project into the interior of the box, and by designing the marginal portion of the base so that it can be engaged by such projections. The tongues 21 are made resilient or are resiliently supported, as, for example, by cutting or punching one or more slits 22 in the side walls, as shown in Fig. 4,

thus permitting the base to be fastened and interlocked in place on the body by the simple act of pushing it into its intended position, and allowing the tongues to snap over the shoulders. There are also provided suitable stops for limiting the inward movement of the base and these may be in the form of inturned lugs 20, 20 formed on the same walls which carry the tongues 21, 21. Thus the stops 20, 20 and the tongues 21, 21 cooperate to prevent the movement of the base either inward or outward. After being secured in place the base can be removed by flexing or spreading the side wall or walls sufficiently to withdraw the tongues 21, 21, or one of them, from engagement with the base, and as a matter of convenience for this operation, the usual padlock or seal hasp 23 is attached to the resilient portion of the side wall to serve as a thumbpiece, facilitating the spreading movement. This hasp matches with the corresponding hasp 24 on the cover, providing the means whereby the latter may be locked or sealed closed, when that is desired.

The openable front cover 4 serves when closed not only to render the holding means for the base entirely inaccessible but it also serves by engaging the outer faces of the side walls to mechanically interfere with the outward manual spreading or flexing of the side walls to release the said holding means. Thus the said base is securely held by the holding means when the cover is closed and sealed but is removable for the inspection or adjustment of attached parts when the cover is open.

Preferably the holding means for the base, that is, the stops 20, 20 and the tongues 21, 21 are utilized not only for normally preventing inward or outward movement of the base but also for preventing endwise movement of the base. To this end the base is provided with shoulders at 21^a, 21^a and 20^a, 20^a for engaging the said holding means at the edges thereof.

From the foregoing description it will be apparent that the base fastening means are permanent or non-removable parts of the box body and therefore cannot drop out of the box or become lost, and their manipulation can be done by the hands alone without the aid of a tool. Their formation as integral parts of the box wall represents an economy of material, but obviously the same conveniences will be afforded whether they are integral or attached, and these fastening means may therefore be substituted by other forms of devices capable of the same general result.

The detail construction of the switch mechanism and its electrical connections will be clear enough from the drawings, and is also subject to variation, it being understood that the several parts should be arranged on the base so that the fuse terminals are directly opposite the switching element, so far as possible, because this provides the greatest degree of compactness in the device as a whole. It will be understood that in Figs. 5 and 6 the base 10^a is secured to the body by the same snap-in fastening means as described in Figs. 1 to 4, and that the cover of this switch is also interlocked with the switch handle 17 in the same way. By sealing the base to the box in this form, the switch may be made substantially theft proof, because the only parts which are alive when the cover is open are those parts which are inaccessible save by removing the base.

I claim as my invention:

1. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the box, switch elements and the like carried by the base independently of the box, an openable front cover for the box, and resilient means associated with the base and the last said walls for holding the base in the said normal position, the said means automatically snapping into engagement when the base is moved to the said normal position and the said means being entirely inaccessible when the cover is closed.

2. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the box, switch elements and the like carried by the base independently of the box, resilient means associated with the base and the last said walls for holding the base in the said normal position, the said means automatically snapping into engagement when the base is moved to the said normal position and the said means being manually movable to release the base, and a front cover for the box serving when closed to mechanically interfere with the last said manual movement of the said resilient holding means.

3. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the box, switch elements and the like carried by the base independently of the box, and resilient means associated with the base and the last said walls for holding the base in the said normal position, the said means automatically snapping into engagement when the base is moved to the said normal position and being disengageable by spreading the last said walls.

4. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the

box, switch elements and the like carried by the base independently of the box, resilient means associated with the base and the last said walls for holding the base in the said normal position, the said means automatically snapping into engagement when the base is moved to the said normal position and being disengageable by spreading the last said walls, and a front cover for the box serving when closed to engage the last said walls and prevent the said spreading thereof.

5. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the box, switch elements and the like carried by the base independently of the box, and resilient tongues formed integrally with the last said walls for engaging the base to prevent movement thereof outward away from the said normal position, the said tongues automatically snapping into engagement with the base when the latter is moved to the said normal position.

6. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the box, switch elements and the like carried by the base independently of the box, and resilient means carried by the last said walls for engaging the base to hold it in the said normal position, the said means automatically snapping into engagement with the base when the latter is moved to the said normal position and being disengageable from the base by spreading the last said walls.

7. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, a switch base normally in a fixed transverse position between two opposite walls of the box, switch elements and the like carried by the base independently of the box, resilient means carried by the last said walls for engaging the base to hold it in the said normal position, the said means automatically snapping into engagement with the base when the latter is moved to the said normal position and being disengageable from the base by spreading the last said walls, and a front cover for the box serving when closed to engage the last said walls and prevent the said spreading thereof.

8. In an inclosed electric switch, the combination of a box body having side and end walls respectively opposite each other, base holding means on two opposite walls of the box comprising inward extending fixed stops and inward extending resilient tongues, a switch base normally engaging the said stops in a fixed transverse position between the last said walls and provided with recesses into which the said tongues automatically snap when the base is moved to the said normal position, the said base being also provided with shoulders for engaging the edges of the base holding means to thereby prevent endwise movement of the base, and switch elements and the like carried by the base independently of the box.

9. An inclosed externally operated switch comprising in combination a box body, a switch base removably supported thereon at a distance from the back wall and with three of its sides associated with adjacent fixed wall portions of the box body to form an interior protected space, a switching element and its contacts and wire connecting means mounted on the base, the wire connecting means at one end of the element being within said inaccessible space and accessible only by removing the base from the body, and an external operating handle mounted on the box body and having a readily detachable connection with the switching element therein.

10. An inclosed externally operated fused switch comprising in combination, a box having an openable front cover, a base removably supported on the box walls near the front with at least three of its sides associated with adjacent fixed parts of the box to form an interior relatively inaccessible space, fuse receiving contacts on the front of the base accessible when the cover is open and inaccessible when the cover is closed, a switching means carried by the base and located within the said interior space, the said switching means including a movable switching element and being electrically connected in series with the fuse contacts on the service side thereof, a service wire connection for the switching means mounted on the base within the said space and accessible for manipulation only by removing the base from the body, an operating means having a readily detachable connection with the switching element and manually operable from the exterior of the box, and an interlocking means associated with the switching element and the cover and preventing opening of the cover except when the switching element is in "off" position and preventing movement of the switching element to "on" position when the cover is open.

In testimony whereof, I have signed this specification.

JOSEPH SACHS.