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This invention relates to electric switches and more particularly to switches used in connection with electric ranges, or wherever it may be necessary to mount the switch body behind a panel with the operating member in front thereof.

Switches of the sort to which this invention relates often have to be removed from their mounting for repair or replacement. Due to high labor costs and to the prior complicated panel and switch arrangements, it has been troublesome and expensive to remove and repair such switches; and it has ordinarily been beyond the ability of the user to substitute one switch for another.

One object is to provide an electric switch and mounting combination in which the mounting is located behind the panel and the switch may be readily removed from and replaced in the mounting without removing the panel.

Another object is to provide a switch of the foregoing type in which the switch, as a completely assembled unit, may be plugged into, and removed from, a sub-panel mounting.

Another object is to provide, in a device of the foregoing type, for covering or shielding all the live parts so that when the switch unit is not plugged in, accidental contact by anyone with its live parts will be prevented; and likewise, when the switch is in place, for covering all the live parts of both the switch and its mounting.

Another object of the invention is to provide an improved construction for a device of the foregoing type wherein the parts are compactly arranged, providing a comparatively shallow structure as well as a structure that can be economically manufactured and installed.

Other objects and advantages will become apparent as the invention is described in the accompanying drawings.

In the drawings—

Fig. 1 is a section view through mounting, panel and switch units embodying the invention with the mounting and switch unit separated and with the handle removed from the switch unit.

The section through the mounting is taken along line 1—1 of Fig. 4; and the section through the switch unit is taken along line 1—1 of Fig. 6.

Fig. 2 is a bottom view of the switch unit when removed from its mounting.

Fig. 3 is an elevational section view of the switch unit when removed from its mounting in the receptacle base, the section being taken along line 3—3 of Fig. 6.

Fig. 4 is a plan view, partly broken away, of the invention on a panel.
sageways may be filled with wax (not shown) in conventional fashion. The number of receptacle contacts, pockets and terminals will depend on the circuit arrangement which the switch is to control. For illustration of one preferred form, Fig. 4 shows three line terminals 10, 12, 17 and four load terminals 18a, 18b, 18c, 18d. If desired, the middle line terminal 16 may be offset from the plane of the other line terminals. For this purpose the pocket or recess, for its associated receptacle contact, may be more deeply molded into the bottom surface of the receptacle body. A ledge 24 against which the terminal 20 may lie, may be formed in inwardly offset position relative to the plane of the bottom of the receptacle body.

Preferably the top surface of the receptacle will be planar so as to lie against or adjacent to the under surface of the panel P.

To economize on molding material and to provide space for the portion of the switch unit which contains the indexing means (hereinafter described) the central portion 14c of the receptacle and certain other portions 14a, 14b extending therefrom may be hollowed out more deeply than the remainder, with the result that the receptacle contacts 20 appear to be located beneath the surface of ledges 44.

The switch unit S comprises a body 50 of generally cylindrical shape molded from insulating material. The body 50 is hollowed out from its upper surface to receive the fixed and movable switch operating parts.

For operating the switch, a disc shaped insulating handle or operating member 50 completely covers the open top of the insulating body 50. The operating member 50 has molded into it, so as to turn therewith, spindle 62. The spindle 62 has in its mid portion a square section 64 passing through a square aperture in a circular contact operating cam member 66 molded from insulation. This member seats and slides rotatably upon a platform 68 rising in the center of the floor of the body 50. On the under side of the cam 66 are concentric circular cam tracks 69 and 70 having cam surfaces on two or more different levels. These cam tracks are adapted to engage cam portions, 72, 74 lanced upwardly out of a parted parallel resilient leaf spring contact strip 76, 78 which extend tangentially across the switch body 50 on opposite sides of the spindle 64 (Figs. 1, 3, 5). These leaf spring contact members are secured at one end (the right end in Fig. 5 or the left end in Fig. 6) upon low ledges just above the floor, while their other ends bear contact buttons such as 76c which can engage and disengage fixed contact buttons such as 80c located on the underside of stationary contact members 80 and 82. Members 80 and 82 may be identical and located at opposite sides of the body 50 on ledges of the body at a level above the ledges on which the contact springs 76, 78 are supported. Portions of said contact members 80 and 82 extend over the ends of the movable contact springs 76 and 78, and contact buttons are mounted on both top and bottom surfaces of said contact members.

An additional pair of movable contact members 80b and 80c are located above and parallel to the previously described movable contact springs 76 and 78. These upper contact members are actuated in a similar manner to the lower contact springs, that is by means of concentric cam tracks. These tracks are molded upon the underside of the operating disc or member 60. The springs 80b and 80c are riveted at one end (the right end in Figs. 5 and 6 and the left end in Fig. 1) to identical terminal members 80 and 82 stamped from sheet metal and secured upon ledges at a level above contact members 80 and 82. The other ends of the springs 80b and 80c have contact buttons on both their upper and lower surfaces. The buttons on the lower surfaces are adapted to engage and disengage the contact buttons on the upper surfaces of the fixed contact members 90 and 92 respectively, while the contact buttons on the upper surfaces of the springs 80b and 80c are adapted to engage and disengage contact buttons e.g., 100a, on the lower surface at opposite ends of a common arcuate contact member 100. Member 100 may be stamped from sheet metal and is secured upon a ledge between the movable contacts and at a level above the terminal members 80 and 82.

Thus as the operating member 50 is rotated, the cam surfaces on its underside and the cam surfaces on the underside of the cam member 66 will rotate and cause flexing of the several contact springs which in turn cause engagement or disengagement of the respective, fixed and movable contacts for the purpose of making and breaking various circuit connections. Those connections in themselves do not form any part of the present invention.

Conventional indexing means such as spring pressed balls may be associated with the switch spindle 64 to cause it to remain in its several positions.

The fixed contact members 80, 82 and 100, and the terminals 90 and 92 for the movable contact springs 80b and 80c, and also the terminals for the contact springs 76 and 78 are secured to the body 50 at the various levels previously indicated by similar means which serve not only as the means for securing said parts of the body 50, but also as means for connecting said parts electrically with complementary receptacle contacts in the receptacle R. Said means comprise a cylindrical contact finger 21 such as a brass rod which extends from the bottom surface of the switch body 50 and has a narrow neck 23 extending upwardly through the bottom of the body 50 and through an aperture in the associated contact and terminal member for example 100, and has the inner end of the neck peened on to the contact or terminal member to hold the same in place simultaneously to electrically connect therewith. All the plug contact fingers are substantially alike except for dimensional differences in length of the finger or its neck.

The panel aperture 10 will ordinarily be circular and of such diameter as to permit the insertion of the body 50 which body will substantially fill the aperture 10. Regardless of shape of the body 50 it is desirable to completely cover the aperture 10 so as to prevent any possible access to the live parts within the receptacle or in back of the panel. For that purpose a circular or peripheral flange 50/ is provided on the switch body to overlie the edge of the aperture 10. Thus when the switch unit is plugged in, the aperture is completely covered by the switch unit; also, the switch unit is covered by the insulated operating disc 56.

From the foregoing it will be apparent that by properly locating the several plug fingers so as to register with the several openings 24 in the pockets 22 within which the receptacle members 20 are located, it will be possible to insert the switch as an assembled unit into the receptacle, after or while the receptacle is mounted behind the panel P. Also the switch unit may
be removed by simply pulling it away from the receptacle without disturbing the relationship of the receptacle and panel. When the switch is inserted, all live parts are completely protected against accidental contact; and when the switch is removed the receptacle contacts are nevertheless shielded and protected.

Many modifications within the scope of my invention will occur to those skilled in the art, therefore I do not limit my invention to the specific embodiment illustrated and described.

I claim:
1. An electric switch unit comprising an insulating body having a cavity; switch contacts within said cavity, and an insulated operating member for said contacts covering said cavity; a panel member having an aperture fitting said body; an insulating base structure mounted entirely behind said panel; connector contact members on said base structure, connector contact members on said switch body electrically connected with said switch contacts, said body connector members cooperating with said base connector members upon insertion of said switch body through said aperture, and a flange on said body overlying the peripheral edges of said aperture, whereby the live parts of said switch and base are covered by said insulating parts and panel.

2. A plug-in switch apparatus as claimed in claim 1 characterized by the formation of said switch and panel structures to permit insertion of the switch structure as a complete unit into, and withdrawal from, said base structure while said panel and base structures remain assembled.

3. A plug-in switch apparatus as claimed in claim 2 characterized by the formation of said switch and panel structures to permit insertion of the switch structures as a complete unit into, and withdrawal from, said base structure while said panel and base structures remain assembled.

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The following references are of record in the file of this patent:

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