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PUSH-BUTTON ELECTRIC SWITCH

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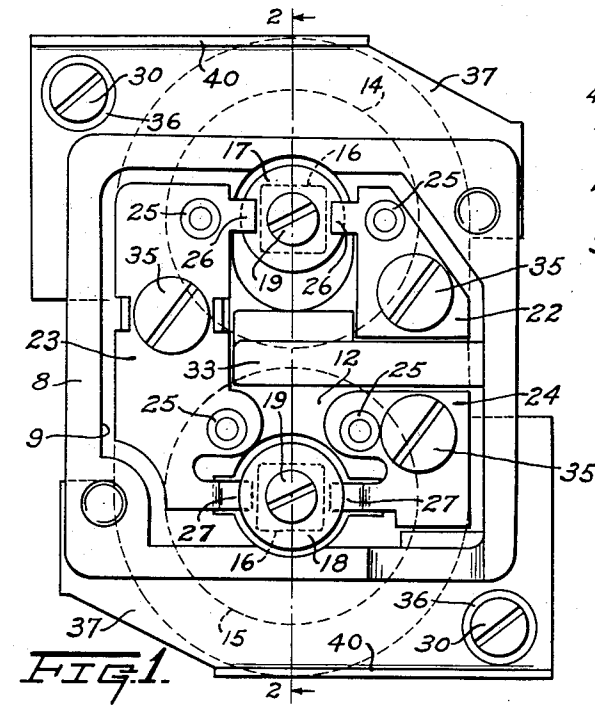


FIG. 1.

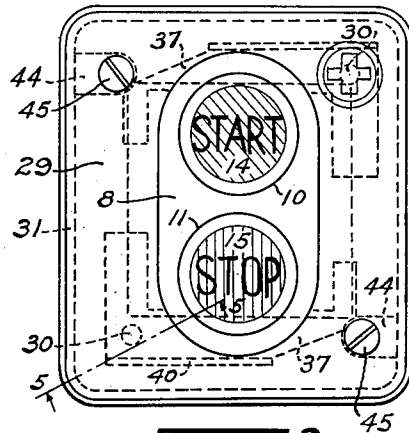


FIG. 3.

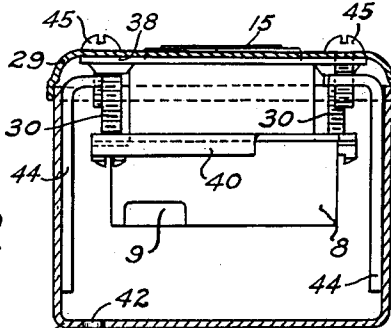


FIG. 4.

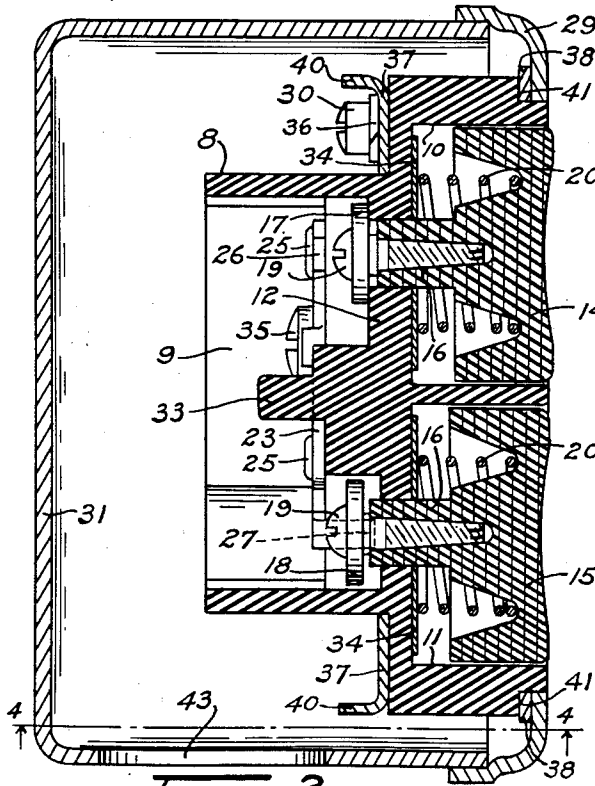


FIG. 2.

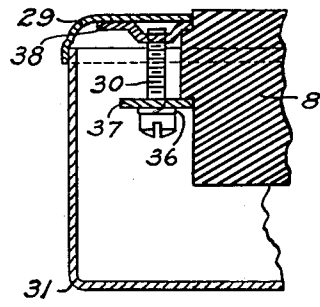


FIG. 5.

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PUSH-BUTTON ELECTRIC SWITCH

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1 Claim. (Cl. 200—16)

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Our invention relates in general to improvements in the art of controlling electric circuits, and relates more specifically to improvements in the construction and operation of push button electric switches or stations especially adapted to control the actuation of magnetic switches or the like.

The principal object of our present invention is to provide an improved push button switch assemblage which is simple, compact and durable in construction, and which is moreover highly efficient in operation.

When operating magnetically actuated electric controls for motors or the like it is desirable to provide a starting and stopping auxiliary switch for the purpose of energizing and de-energizing the magnet or magnets of the main switch. This auxiliary control unit is preferably of the push-button type located at a conveniently accessible location or station, and should embody two contact sets each comprising a fixed and a movable contact, one of which should be operable by a button to start the magnetic control while the other is operable to stop it. Such auxiliary control devices must be safely and reliably operable, and should also be compact in order to permit installation thereof within or closely adjacent to the housing for the main control switch with which it cooperates.

It is therefore an important object of the present invention to provide an improved starting and stopping switch unit which is especially adapted for cooperation with magnetically actuated motor controllers or the like, and which embodies all of the above mentioned desirable features.

Another important object of this invention is to provide a dual push button station for controllers or the like, which may be installed in minimum space and utilized for diverse purposes.

A further object of our invention is to provide an improved push button switch assemblage composed of few simple and sturdy parts, and wherein the electrical conductors are well insulated so as to insure maximum safety.

Still another object of the invention is to provide an improved starting and stopping electric switch of the push button type, which may be manufactured and sold at moderate cost and conveniently installed so that all parts thereof are subsequently readily accessible for manipulation or inspection.

An additional object of the present invention is to provide an improved double button switch unit in which various duplicate parts are inter-

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changeably similar in construction, wherein most of the current conductors may be accurately produced from sheet metal with the aid of punches and dies, and in which the parts may be readily assembled.

These and other specific objects and advantages of our present invention should be apparent from the following description.

A clear idea of the various features constituting our invention, and of the construction and mode of utilizing a typical push button switch or station embodying the improvements, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the several views.

Fig. 1 is a relatively large rear view of our improved push button switch unit removed from its housing and showing the two sets of fixed and movable contacts in elevation;

Fig. 2 is a central vertical section through the switch assembly of Fig. 1 taken along the line 2—2, but also showing the switch housing;

Fig. 3 is a reduced front elevation of the improved push button switch station, showing the assemblage in one actual commercial size;

Fig. 4 is a transverse section through the reduced assemblage, taken along the line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary section through the same assembly, taken along the line 5—5 of Fig. 3.

Although we have illustrated and described our invention herein as being especially adapted for application to start and stop push button switches cooperating with magnetic controllers, it is not our desire or intent to unnecessarily limit the field of application thereof; and it is also contemplated that specific descriptive terms be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawing, the typical improved push button switch or station shown therein, comprises in general a main unitary switch body 8 having therein a rear recess 9 and two segregated front recesses 10, 11 separated from the recess 9 by a transverse body portion 12; similar start and stop push buttons 14, 15 slidably confined within the recesses 10, 11 respectively and each having an integral polygonal rear projection 16 extending through and snugly slidable within a similarly polygonal hole in the body portion 12; similar movable contacts 17, 18 carried by the rear extremities of the projections 16 of the push buttons 14, 15 respectively and being

secured to their respective carrying projections by special screws 19; a similar coil spring 20 tending to constantly urge each of the push buttons 14, 15 and its movable contact 17, 18 forwardly; fixed contact plates 22, 23, 24 secured within the rear body recess 9 by rivets 25, the plate 22 having a fixed starting contact 26 formed integral therewith and the plate 24 having a fixed stopping contact 27 formed integral therewith while the common plate 23 has both start and stop fixed contacts 26, 27 formed thereon; a cover 29 to which the switch body 8 is secured by screws 30; and a switch casing 31 with which the cover 29 is normally cooperable to enclose the fixed and movable switch contacts.

The main body 8 and the two similar push buttons 14, 15 are preferably formed of durable and relatively hard insulating material, and the interior of the rear body recess 9 between the two sets of starting and stopping contacts is provided with a guard wall 33 formed integral with the body, as shown in Figs. 1 and 2. The front face of the upper push button 14 may be colored green and provided with the word "Start," while the corresponding face of the lower button 15 may be colored red and provided with the word "Stop," as illustrated in Fig. 3. The rear of each of the buttons 14, 15 is provided with an annular groove within which the front portion of the adjacent spring 20 is confined, and the rear ends of these springs 20 coact with insulating and rivet covering washers 34, as indicated in Fig. 2. This construction of the body 8, push button 14, 15, and springs 20 provides a very compact and well insulated button assembly for actuating the movable contacts 17, 18.

Each of the movable contacts 17, 18 consists of a bronze metal washer secured to the square or otherwise polygonal projection 16 of its carrying button 14, 15 by means of a specially constructed screw 19 having threads terminating in notched ends adapted to bite into and firmly grip the insulating material from which the buttons are formed. The fixed contact plates 22, 23, 24 which are firmly and permanently secured to the body portion 12 by the rivets 25, are formed of metal stampings, and each of these plates 22, 23, 24 is provided with a terminal attaching screw 35 as depicted in Fig. 1. The rivets 25 are all alike and pierce the adjacent terminal plates and the body portion 12, the heads of these rivets lying beneath the insulation washers 34 while the shanks thereof are riveted over the adjacent plates 22, 23, 24. The spaced stationary start contacts 26 lie in the common plane of the plates 22, 23, and are engaged by the movable contact 17 whenever the push button 14 is depressed to complete the electric circuit across these plates 22, 23; but the spaced stationary stop contacts 27, are off-set from the common plane of the plates 23, 24 and are normally engaged by the other movable contact 18 to complete the electric circuit across these plates 23, 24.

In order to permit the switch assembly to be readily removed from the normally fixed casing 31 for the purpose of making the electrical connections, or for inspection purposes, the switch body 8 is rigidly attached to the removable cover 29. Such firm attachment is effected by means of the two diagonally opposite screws 30 the heads of which coact with lock washers 36 and with metal clamping plates 37, while their shanks have screw thread coaction with a metal reinforcing plate 38 permanently attached as by welding to the rear of the cover 29, as shown in

Figs. 1, 2, 4, and 5. The two clamping plates 37 are of similar formation and coact with a rear surface of the body 8, and these plates 37 may be stiffened by integral flanges 40 as shown. The front of the body 8 is provided with a shoulder 41 which coacts with the reinforcing plate 38 as in Figs. 2 and 5, so that rigid attachment of the body 8 to the cover 29 is assured.

The switch housing or casing 31 and the cover 29 are formed of sheet metal, and the casing 31 may be attached to a support by screws coacting with openings 42 in its bottom as illustrated in Fig. 4. The casing 31 is also provided with an opening 43 in one wall thereof for the electrical conductors which are attached to the terminal plates 22, 23, 24 by the terminal screws 35; and the interior of the casing 31 has two diagonally opposite angular sheet metal brackets 44 welded or otherwise secured thereto, see Figs. 3 and 4. The cover 29 is readily detachably secured to these stiff brackets 44 by means of screws 45, thus making the switch mechanism quickly and conveniently accessible while normally effectively housing the same within the casing 31. The casing 31, cover 29, brackets 44, plates 37, 38, fixed or stationary terminal plates 22, 23, 24, and movable contacts 17, 18, may all be formed of suitable sheet metal with the aid of punches and dies; and various parts such as the contacts 17, 18, screws 19, springs 20, rivets 25, brackets 44, screws 30, washers 36, screws 45, and terminal screws 35, are interchangeably similar thus facilitating mass production at minimum cost.

When the various parts of the switch unit have been properly constructed and assembled as above described the switch may be utilized for various purposes such as the control of a magnetic switch for motor starters. The stop contacts 18, 27 are normally closed thereby connecting the terminal plates 23, 24; and when the "Start" button 14 is depressed the contacts 17, 26 will also be closed to complete the circuit through these terminal plates and the closed stop contacts. The magnetic switch will then complete the motor starting circuit which will remain thus completed until the "Stop" button 15 is depressed to interrupt the coil circuit of the magnetic switch, whereupon the motor will be stopped until the "Start" button is again depressed. The push buttons 14, 15 will always be returned to their foremost positions as shown in Fig. 2, by the springs 20, whenever the buttons are released, thereby opening or disengaging the starting contacts 17, 26 and engaging the contacts 18, 27; and the dual push button switch unit may be utilized under any conditions where such functioning of the two sets of contacts is desirable or necessary.

From the foregoing detailed description of the construction and operation of our improved push button switch, it will be apparent that we have in fact provided a dual switch assembly which is extremely simple, compact and durable in construction and which is also conveniently manipulable and efficient in operation. All parts of the improved unit are normally well insulated and protected, but they are also readily accessible for installation and inspection, and present a highly aesthetic appearance. By forming most of the metallic parts with the aid of punches and dies, and by making numerous other parts interchangeably similar, the cost of quantity production is greatly reduced and assembly is facilitated. The polygonal projections 16 of the push buttons 14, 15 effectively guide these buttons while preventing rotation thereof, and the location of the

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springs within the rear button grooves enhances the compactness of the button assembly and also increases the available button guiding surface so that these buttons cannot tilt and jam. The formation of the body 8 with opposed front and rear recesses 10, 9 and with a segregating web portion 12 therebetween and a dividing wall 33 between the switch contacts, provides a durable and well insulated support for the push buttons 14, 15 and for the electrical contacts and conductors, and by mounting the body 8 upon the cover 29 the switch may be quickly opened to expose its interior. The improved construction of the body 8 also permits the use of identical rivets 25 throughout, and these units can obviously be installed in very restricted spaces and for diverse uses.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of use of the typical dual push button switch unit herein shown and described, for various modifications within the scope of the appended claim may occur to persons skilled in the art.

We claim:

In a push button switch, a unitary body of insulation having an integral transverse web penetrated by spaced polygonal openings and being provided on one side of the web with segregated cylindrical front recesses disposed coaxially of said openings and on the opposite side of the web with a rear recess having therein a transverse wall formed integral with said web and disposed

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between said openings, a cylindrical push button of insulation slidably confined within each front recess and having a rear polygonal projection slidable through the adjacent web opening and also having a rear annular groove facing said web, a helical compression spring seated in each of said grooves and coacting with said web to constantly urge the corresponding button forwardly within its confining front recess, an annular movable contact secured to the rear extremity of each of said polygonal projections and coacting with said web to limit the forward movement of said buttons to approximately the forward ends of their confining recesses, and fixed contacts secured to said body within said rear recess and being alternately cooperable with opposite faces of said movable contacts, one set of said fixed contacts spanning said wall and being common to both of said movable contacts.

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