

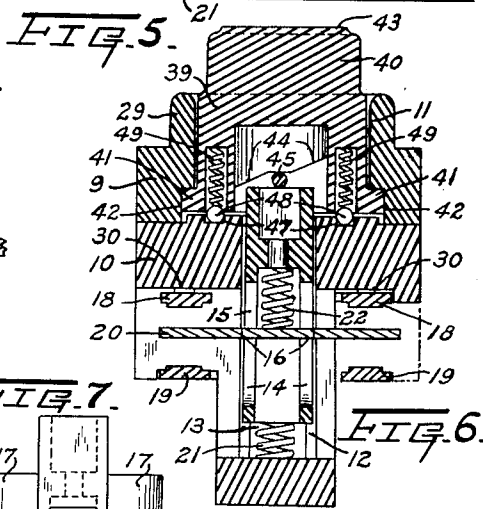
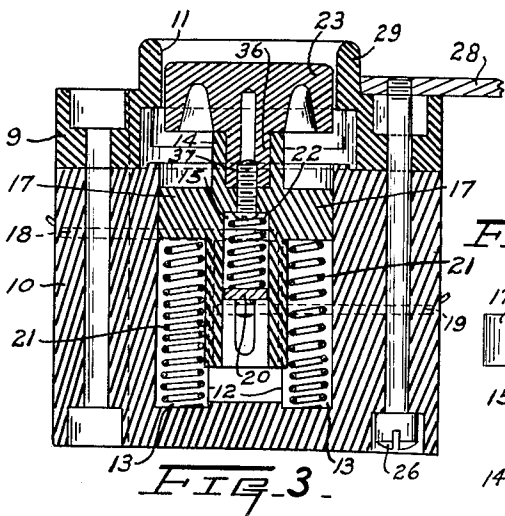
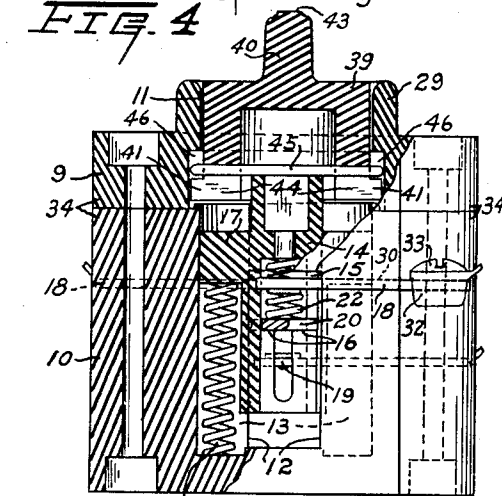
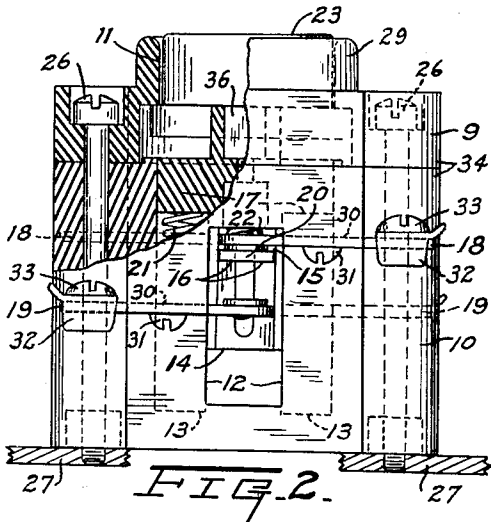
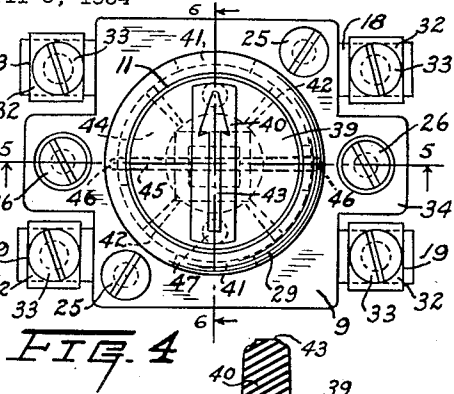
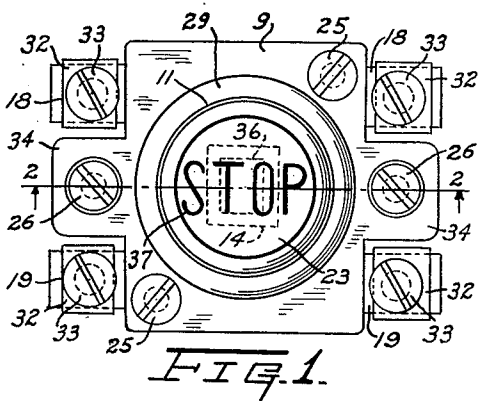
Nov. 26, 1957

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2,814,681

ELECTRIC SWITCH ASSEMBLAGE

Filed April 5, 1954



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ELECTRIC SWITCH ASSEMBLAGE

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Application April 5, 1954, Serial No. 421,017

3 Claims. (Cl. 200—16)

The present invention relates in general to improvements in electrical controllers, and relates more specifically to various improvements in the construction and operation of electric switch assemblies.

The principal object of my present invention is to provide an improved electric switch which is simple, compact and durable in construction, and which is also highly effective in use and versatile in its adaptations.

Many different types of electric switches have heretofore been proposed and marketed for diverse purposes, and it has also been previously proposed to furnish a group of similar and relatively small switch units adapted to be mounted upon a common support at a station from which a single operator can conveniently control variable functioning of one or more electrical machines or devices. Some of these prior control groups have also included both pushbutton and selector switches, as well as signal or pilot lights, but in most cases these prior small switch assemblies were either too complicated and costly to manufacture, or they were not sufficiently durable to withstand heavy loads and normal usage, or they lacked flexibility in their application, or they could not be mounted pendant style with either front or rear attachments, or they were too difficult to install.

It is therefore an important object of the present invention to provide an improved electric switch assembly of relatively small dimensions which is especially adapted for use in control stations such as above referred to, and which effectively eliminates the objectionable features of prior switches intended for like usage.

Another important object of this invention is to provide an improved pendant type electric switch adapted for either rear or front suspension, and for either standard or heavy duty operation with utmost safety and dependability.

A further important object of the invention is to provide a precision built electric switching device wherein the major parts can be utilized to interchangeably provide either a pushbutton type or a rotary selector type of switch unit, and in either of which the conductor terminals may be conveniently installed or removed.

Still another important object of my invention is to provide an attractive electric switch unit which may be readily installed in compact grouped or nested relation to other similar units bearing like or different identification markings, and which may also be safely operated independently of such adjacent switches.

An additional important object of the invention is to provide an improved electric controller comprising only a few sturdy parts, and wherein the contacts are thoroughly insulated and cooperable so as to insure most effective and safe operation.

These and other more specific objects and advantages of the invention will be apparent from the following detailed description from which it will be noted that the gist of the improvement is the provision of an electric switch assembly comprising a body having separable sections of

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insulation one of which is provided with a bore and the other of which is provided with a guideway in line with the bore and also has recesses on opposite sides of its guideway, a plunger of insulation movable along the guideways and having lateral projections extending over the recesses, two cooperating pairs of fixed contacts secured to the body on opposite sides of the recesses, a movable contact plate slidably confined in the plunger and being alternately cooperable with the two pairs of fixed contacts, resilient means confined within the recesses and coacting with the plunger projections to urge the plunger in one direction, and an actuator movable within the body bore and being operable to cause the plunger to move in the opposite direction.

A clear conception of the specific improvements constituting the present invention, and of the construction and operation of several commercial switch units embodying the same, 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 various views.

Fig. 1 is a top view of a commercial pushbutton stopping and starting switch embodying my invention, but drawn to a considerably larger scale than the actual units;

Fig. 2 is a part-sectional side elevation of the switch assembly shown in Fig. 1, showing the pushbutton unit mounted at its rear or bottom portion and with the pushbutton in its foremost position, and the section having been taken along the line 2—2 of Fig. 1;

Fig. 3 is a complete central section through the same switch assembly also taken along the line 2—2 of Fig. 1, but showing the unit mounted at its front or top and with the pushbutton depressed to its normal full extent;

Fig. 4 is a similarly enlarged top view of a commercial rotary selector switch also embodying the invention and showing the actuator in neutral or midposition;

Fig. 5 is a part-sectional side elevation of the selector switch shown in Fig. 4, taken along the line 5—5 and showing the movable contact plate in neutral or inactive position;

Fig. 6 is a central transverse section through the same selector switch, taken along the line 6—6 of Fig. 4 and likewise showing the movable contact plate in inactive central position; and

Fig. 7 is a side elevation of the movable contact actuating plunger used in both the pushbutton and selector switches of Figs. 1 to 6 inclusive.

While the invention has been shown and described as having been embodied in only two types of switch assemblies especially adapted to be either rear or front pendant mounted at a common control station, it is not my desire or intention to unnecessarily restrict the use of the improved features by virtue of this limited showing; and it is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the disclosure.

Referring especially to Figs. 1 to 3 and 7 of the drawing, the improved pushbutton type of electric switch shown therein, comprises in general a body having separable sections 9, 10 of which the section 9 is provided with a central bore 11 while the section 10 is provided with an elongated guideway 12 and with recesses 13 on the opposite sides of the guideway; a plunger 14 slidably along the guideway 12 and having therein an elongated slot 15 provided with abutments 16, and also having a pair of integral lateral projections 17 extending over and slidably along the body recesses 13; two pairs of cooperating fixed contacts 18, 19 secured to the body on opposite sides of the recesses 13 and in spaced relation to each other; a movable contact plate 20 slidably confined within the slot 15 of the plunger 14 and being alternately coop-

erable with the two sets of fixed contacts 18, 19; a helical spring 21 confined in each of the recesses 13 and coating with the adjacent plunger projections 17 to urge the plunger 14 toward the body bore 11; another helical spring 22 interposed between the plunger 14 and the movable contact plate 20 to urge this plate toward the abutments 16; and an actuator or pushbutton 23 slidable within the body bore 11 and being operatively attached to the plunger 14.

The body sections 9, 10 are formed of insulating material and are detachably united by screws 25 as shown in Fig. 1, and the body may be firmly secured by means of other screws 26 either to a rear support 27 as in Fig. 2, or to a front support 28 as in Fig. 3. The outer or front body section 9 is provided with an annular flange 29 within which the bore 11 is formed, and the inner or rear body section 10 has opposite side ledges 30 to which the fixed contacts 18, 19 are fastened by means of screws 31 as illustrated in Fig. 2. Each of the fixed contacts 18, 19 is provided at its inner end with a silver contact plate, and at its outer end with a terminal clamp 32 and a terminal attaching screw 33 disposed outwardly beyond the ledges 30 so as to facilitate attachment of the conductors, and the terminal receiving ends of the fixed contacts 18, 19 are separated by longitudinal lugs 34 formed integral with the body and through which the mounting screws 26 extend, as depicted in Figs. 1 and 2.

The plunger 14 is also constructed of insulating material, and should be freely slidable along the guideway 12 of the body section 10 in order to permit the helical springs 21 which are confined within the recesses 13 to constantly urge the plunger 14 outwardly toward the body section 9 and to thereby cause the abutments 16 to bring the movable contact plate 20 into engagement with fixed contacts 18 whenever no pressure is being applied to the pushbutton 23. The medial portion of the movable contact plate 20 is narrowed so as to prevent longitudinal displacement of this plate out of the slot 15 while still permitting free movement of the plate 20 along this slot, and the helical spring 22 constantly urges this movable contact plate 20 toward the abutments 16 but permits this plate to leave the abutments when it engages the fixed contacts 19 while the pushbutton 23 is being depressed. The spring 22 also permits the elongated movable contact plate 20 to rock so as to insure perfect engagement with the fixed contacts 18, 19 spanned by the plate, and the pushbutton 23 has a square central shank 36 which snugly fits a similarly shaped socket in the outer end of the plunger 14 and is secured to this plunger by a screw 37. The outer face of the pushbutton is also provided with suitable identifying indicia 39 as shown in Fig. 1.

When the improved pushbutton switch unit has been properly constructed and assembled as above described, its normal operation is as follows. With the parts disposed as in Fig. 2, the springs 21 will coact with the lateral projections 17 of the plunger 14 to cause the abutments 16 to force the movable contact plate 20 into snug engagement with the two outer fixed contacts 18, and to also hold the pushbutton 23 in its outermost position within the body bore 11. When the pushbutton 23 is depressed as in Fig. 3, the plunger 14 will move inwardly along the guideways 12 and will compress the springs 21, and the other spring 22 will simultaneously function to quickly move the contact plate 20 out of engagement with the fixed contacts 18 and into snug engagement with the two fixed contacts 19. If the pressure applied to the pushbutton 23 is sufficient to cause the plunger 14 to move inwardly after the plate 20 has initially engaged the contacts 19, the spring 22 will be compressed sufficiently to compensate for the excess plunger movement, and this central spring 22 will also permit the movable contact plate to rock and to thereby insure effective engagement with both of the fixed contacts 18, 19 which are bridged by this plate. Upon release of the pushbutton 23, the

parts will be restored to the position shown in Fig. 2, by the springs 21.

Referring to Figs. 4 to 6 and Fig. 7 of the drawing, the improved rotary selector switch shown therein, is adapted to be assembled with the same elements or parts used in the pushbutton switch unit, except that the pushbutton 23 is replaced by a rotary actuating plug or rotor 39 adapted to revolve within the body bore 11 and having an outer gripping extension 40 and inner segment flanges 41 co-operable with segmental grooves 42 formed in the outer body section 9. This selector rotor 39 has an indicating arrow 43 at the outer end of the extension 40, and is also provided with an oppositely inclined cam surface 44 co-operable with a non-rotary transverse pin 45 which has its opposite ends slidable in parallel recesses 46 formed in the body section 9 while its midportion engages the outer end of the plunger 14 as shown in Figs. 5 and 6. In order to index the position of the rotor, the outer face of the inner body section is provided with diametrically opposite detents 47 with which latch balls 48 are engageable under the influence of springs 49, as illustrated in Fig. 6, and the body sections 9, 10 may be furnished with the grooves 42, recesses 46 and detents 47 when used for either of the two types of switches illustrated, so as to make the major parts usable without alteration when assembling either pushbutton or selector switches.

When the selector switch unit has been thus properly constructed and assembled, and with the actuating rotor 39 in neutral or mid-position as shown, the portion of the rotor between the oppositely inclined cam surfaces 44 will coact with the transverse pin 45 to hold the plunger 14 in mid-position against the action of the spring 21, thereby causing the movable contact plate 20 to be held against the plunger abutments 16 midway between the outer and inner fixed contacts 18, 19. Upon rotation of the rotor 39 in one direction from neutral position, the outwardly inclined diametrically opposite cam surfaces 44 will ride over the transverse pin 45 and will permit the latter to move outwardly along the recesses 46, thereby causing the springs 21 to quickly slide the plunger 14 outwardly until the abutments 16 have seated the opposite ends of the movable contact bar against the two outer fixed contacts 18. Upon rotation of the rotor 39 in the opposite direction from neutral position, the inwardly inclined diametrically opposite cam surfaces 44 will ride along the transverse pin 45 and will force this pin and the plunger 14 inwardly against the action of the springs 21 until the opposite ends of the movable contact bar have been forced into snug engagement with the two innermost fixed contacts 19, so that a quick action double throw switch is provided and the rotor 39 may be just as quickly returned to neutral position.

From the foregoing detailed description it will be apparent that the present invention in fact provides a very compact and durable switch unit adapted to be employed for either standard or heavy duty by providing proper silver contact portions, and which may be pendant mounted at either end of the body without any alterations. The units are conveniently accessible for wiring purposes and the contacts are well insulated against possible short circuiting, and identically the same body, plunger 14, contacts 18, 19, contact plate 20, and springs 21, 22 may be utilized in the manufacture of either the push-button switches or the selector switches, thus greatly reducing the cost of producing the switch units in quantity. The switch actuators 23, 39 are both adapted to be journaled for rotation in the bore 11 of the body section 9, and the springs 21, 22 are well concealed and protected and function to rapidly move the plunger 14 and movable contact plate 20 when the actuators are manipulated, while the spring 22 also serves to insure most effective closing of the contacts without subjecting the parts to undue stress. The separable body sections 9, 10 also permit the improved units to be conveniently assembled or dismantled for inspection, and by providing cams of different forma-

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tion the selector switch may be caused to provide either two or three positions of setting. Any of the improved switch units may be produced to control either starting or stopping, forward or reverse operation, or pilot or signal light supporting use, in connection with diverse types of electrical equipment, and they have proven highly satisfactory and successful in actual usage.

It should be understood that it is not desired to limit this invention to the exact details of construction and operation of the two types of switches, specifically shown and described herein, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. An electric switch comprising, a body having two detachably interconnected sections one of which has a bore while the other is provided with plane parallel guiding surfaces on the opposite sides of the bore axis defining a transverse opening extending entirely through said other section across said axis and is also provided with parallel recesses extending along but away from said opening, a unitary plunger provided with opposite side projections slidable within and along said recesses and also having one end extension projecting toward said bore and an opposite end extension slidably cooperable with said surfaces, said opposite end extension having a transverse through slot spanning said bore axis and communicating with said opening, a pair of spaced fixed contacts mounted upon the exterior of each of the opposite sides of said other body section and extending across the adjacent end of said opening, a movable contact carrying plate slidably confined within said slot and extending through and beyond the ends of said opening and having movable contacts at its protruding ends alternately cooperable with corresponding fixed contacts of said pairs, a coil spring confined within each of said recesses between

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the recess bottom and the adjacent plunger side projection and extending throughout the length of said opening for urging the plunger toward said bore, a helical spring interposed between said plunger and said plate for urging said movable contacts in the opposite direction, and an actuator movable within said bore and coaxing with said plunger end extension which projects toward the bore to also displace said movable contacts in said opposite direction.

2. An electric switch as per claim 1, wherein the actuator is slidable in one direction within the body bore to displace the movable contacts in one direction and is automatically slidable in the opposite direction within said bore by said coil springs to displace said movable contacts in the opposite direction.

3. An electric switch as per claim 1, wherein the actuator is rotatable within said body bore in one direction to move the movable contacts in one direction and said contacts are automatically movable in the opposite direction by said coil springs when said actuator is rotated in the opposite direction.

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