

Sept. 20, 1949.

W. C. FURNAS ET AL

2,482,540

PEDAL ACTUATED ELECTRIC SWITCH

Filed Nov. 29, 1946

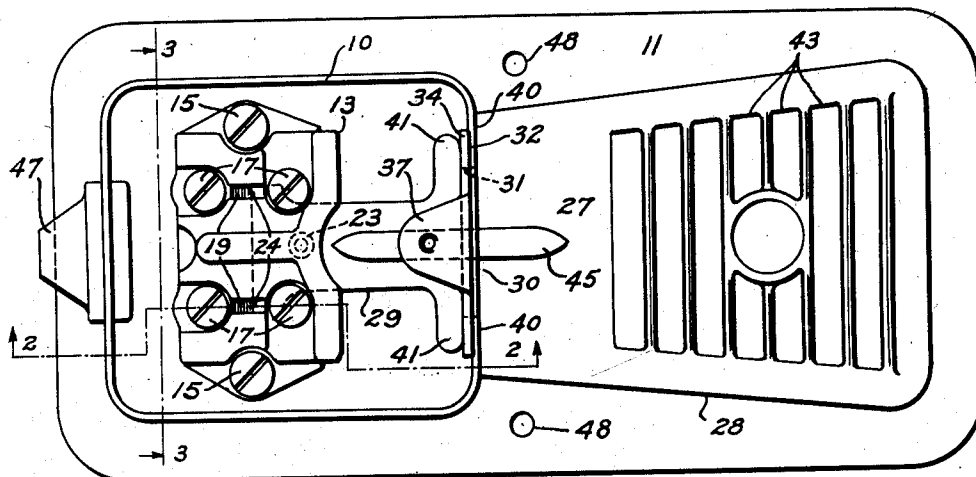


Fig. 1.

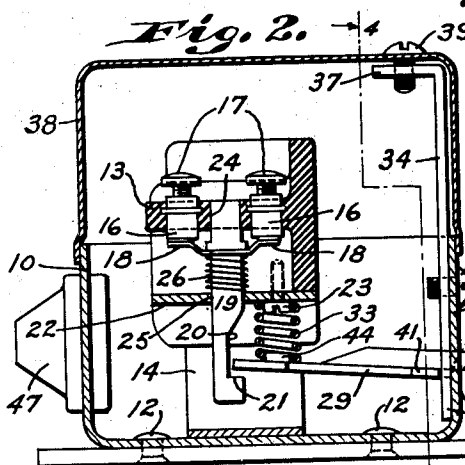


Fig. 2.

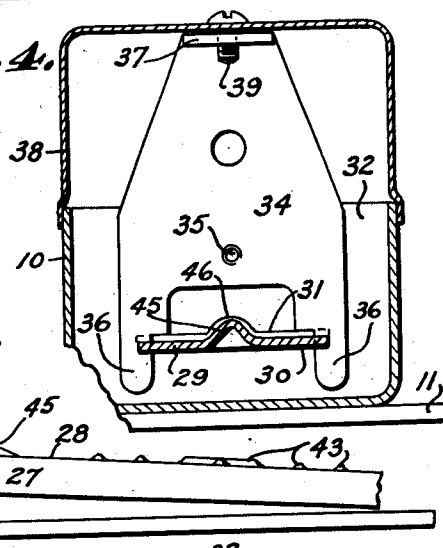


Fig. 4.

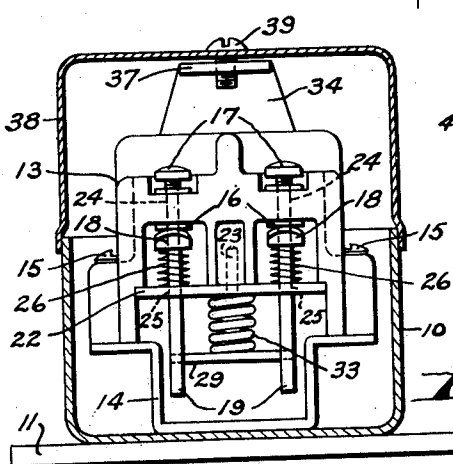


Fig. 3.

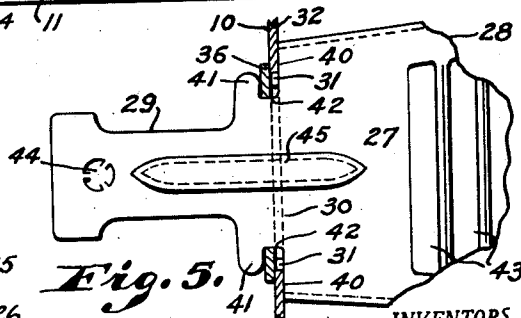


Fig. 5.

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2,482,540

PEDAL ACTUATED ELECTRIC SWITCH

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Application November 29, 1946, Serial No. 712,972

9 Claims. (Cl. 200—153)

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The present invention relates generally to improvements in electric switch assemblies, and relates more particularly to various improvements in the construction and operation of pedal or lever-actuated switches.

A primary object of our invention is to provide an improved new and useful pedal actuated switch assembly which is extremely simple, compact and durable in construction, and which is moreover highly efficient in operation.

Another specific object of our present invention is to provide an improved pedal actuated switch assembly wherein the operating pedal or lever is locked in position in a simple and novel manner.

Another specific object of this invention is to provide an improved manually operable pedal actuated switch which consists of relatively few parts, all of which may be readily constructed, and which may be quickly and easily assembled and dismantled.

Another specific object of the invention is to provide an improved pedal actuated switch unit which is neat and highly attractive in appearance and which is furthermore quickly and conveniently manipulable and positive, dependable and rapid in action.

An additional specific object of our invention is to provide various improvements in the construction and operation of pedal actuated switch assemblies, whereby the cost of construction of such devices is reduced to a minimum, and the efficiency and utility thereof is enhanced to a maximum.

A further specific object of the present invention is to provide a pedal actuated switch or improved construction wherein the actuating pedal or lever is longitudinally insertible through a fulcrum slot or opening in the main switch casing, the lever being locked in position within the slot by simple and novel means cooperating with the casing.

These and other specific objects and advantages of our present improvement will be apparent from the following detailed description.

A clear conception of a typical embodiment of the invention, and of the mode of constructing and of utilizing pedal actuated switch assemblies built in accordance with the improvement, 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 top view of one of the improved pedal actuated electric switches embodying the invention with the casing cover removed;

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Fig. 2 is a longitudinal vertical section through the switch assembly, taken along the irregular line 2—2 of Fig. 1, and showing the cover in normal position and the actuating pedal in active position with the contacts closed;

Fig. 3 is a transverse vertical section through the switch unit, taken along the line 3—3 of Fig. 1, and likewise showing the cover in normal position and the contacts closed;

Fig. 4 is a transverse vertical section through the switch assembly, taken along the irregular line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary top view, showing the manner in which the actuating pedal is fulcrumed and locked in position within the slot of the main casing wall.

While the invention has been shown and described herein as being especially embodied in a pedal actuated electric switch of a particular design, it is not our desire or intention to thereby unnecessarily limit or restrict the scope and utility of the improvement to such specific embodiment.

Referring to the drawing, the improved pedal actuated switch shown therein comprises, in general, a main outer cup-shaped casing 10 mounted on a base or supporting plate 11 in any suitable manner, as by rivets 12; an insulating switch contact support or carrier block 13 formed of insulating material and being removably secured to a substantially U-shaped metal supporting bracket 14 by means of screws 15, the bracket 14 being rigidly secured to an inner wall of the casing 10 by welding or the like; a plurality of spaced apart fixed contacts 16 rigidly mounted in the contact supporting block 13 and having terminal attaching screws 17; a like number of similarly spaced movable contacts 18, each pair of which are carried by an upper portion of a vertically movable pull rod or carrier bar 19 having a side notch 20 forming an abutment 21; a plate 22 or bracket member 22 rigidly supported by the block 13 as by a screw 23, the block 13 and plate 22 each having a series of vertically aligned similar slots 24, 25, respectively, adapted to receive the rods 19 for guiding the same during vertical movement thereof; relatively light compression springs 26 embracing each of the rods 19 and interposed between the contacts 18 thereof and the plate 22, for constantly urging the respective pairs of movable contacts 18 toward the corresponding fixed contacts 16; a switch actuating lever or pedal 27 having a relatively wide actuating portion 28 connected to a reduced switch actuating portion 29 by a fulcrum portion 30 which normally coacts with an elongated slot

31 formed in the wall 32 of the main casing 10; a helical compression spring 33 interposed between the reduced portion 29 of the pedal 27 and the plate 22, the extreme end of the portion 29 of the pedal extending beyond the spring 33 and into the notches 20 for coaction with the abutments 21 of the rods 19; a locking plate 34 adapted to be secured to the casing wall 32 by a screw 35 and having at its lower end a pair of prongs 36 cooperating with the fulcrum portion 30 of the pedal 27 and with the slot 31 of the casing wall 32 to normally hold the pedal in normal position within the slot 31, while the upper end of the plate 34 is provided with a flange 27 directed toward the switch assembly; and an inverted cup-shaped cover 38 for the casing 10 adapted to be secured in place thereon by a screw 39 threaded in the flange 37 of the plate 34.

The end of the actuating portion 28 of the pedal 27 adjacent the fulcrum portion 30 forms shoulders 40 and the end of the reduced pedal portion 29 adjacent the fulcrum portion 30 is provided with integral laterally projecting ears or lugs 41, the shoulder 40 and ears 41 cooperating with the fulcrum portion to form notches 42. The pedal 27 may also preferably be formed with slip preventing ribs 43 on the actuating portion 28 thereof and with a bumped out portion on the reduced portion 29 to form a centering projection 44 for the spring 33. To reinforce the sheet metal pedal 27 adjacent the fulcrum portion 30, a rib 45 is formed longitudinally of the pedal as by stamping, and the slot 31 formed in the wall 32 is of sufficient length to permit passage of the ears 41 therethrough but not the shoulders 40 and is formed with a central arched portion 46 to receive the rib 45.

As hereinabove indicated, the contact carrier block 13 is preferably formed of insulating material, and the fixed contacts 16 may be molded directly therein. The several other elements of the assemblage, including the main casing 10, base 11, supporting bracket 14, movable contacts 18, carrier bars 19, plate 22, lever 27, locking plate 34, and cover 38, may all be readily formed of sheet metal or the like with the aid of punches and dies. The conductors may be introduced into the enclosure afforded by the main casing 10 and cover 38 through a rubber grommet 47 or the like provided in a side wall of the casing, and may be connected to the proper contacts by means of the terminal screws 17. The base 11 may be provided with openings 48 for effecting ready attachment of the switch unit to a support by means of screws or the like, and the spring 33 should be considerably stronger than the combined strength of the springs 26.

The operating pedal or lever 27 may be readily positioned and locked in place as follows: With the plate 34 removed, the narrow portion 29 of the lever 27 is inserted longitudinally within the slot 31 of the casing wall 32, the reinforcing rib 45 also serving to guide the portion 29 and the ears 41 thereof through the slot 31 until the shoulders 40 of the pedal portion 28 abut the wall 32. During this insertion of the lever within the slot 31, suitable means may be used to compress the spring 33 so that the extreme end of the portion 29 may pass freely within the notches 20 of the rods 19; and when the lever has been finally positioned as aforesaid, the spring 33 may be released and maintained in proper position between the plate 22 and portion 29 of the lever 27 by means of the projecting head of the screw 23 and the centering projection 44 on the lever,

thereby forcing the extreme end of the portion 29 of the lever against the abutments 21 of the several rods 19. With the lever 27 thus finally positioned with the shoulders 40 thereof against the wall 32, the locking plate 34 is inserted vertically with the prongs 36 thereof passing into the notches 42 of the lever 27 between the ears 41 and the wall 32, thereby locking the lever 27 against longitudinal withdrawal. The locking plate 34 may then be secured in effective position to the wall 32 of the casing 10 by means of the screw 35, and the cover 38 may thereafter be positioned and secured to the flange 37 of the plate 34 by means of the screw 39.

With the switch unit assembled and the lever 27 locked in the fulcrum slot 31 as hereinabove described, the relatively heavy compression spring 33 constantly urges the portion 29 of the lever downwardly against the abutments 21 of the rods 19; and since the spring 33 is stronger than the combined strength of the springs 26 which constantly urge the rods 19 upwardly, these rods 19 are normally maintained in lowermost position by the action of the spring 33 and lever 27, the contacts 18 being maintained out of engagement with the fixed contacts. When it is desired to actuate the switch, the actuating portion 28 of the lever 27 is normally moved downwardly against the base 11 as shown in Fig. 2, the lever 27 thereby being tilted about its fulcrum portion 30 with the spring 33 being compressed by the portion 29 of the lever which is moved upwardly away from the abutments 21 of the rods 19 within the notches 20 thereof. As the end of the lever is thus moved away from the abutments 21 of the rods 19, these rods are lifted by the action of the compression springs 26, carrying the movable contacts 18 therewith into engagement with the fixed contacts 16 to close the circuit. As long as the pedal or lever 27 is in the position shown in Fig. 2, with the portion 28 urged downwardly and the portion 29 raised to compress the spring 33, the contacts 18, 16 will remain closed by the action of the springs 26; but upon release of pressure on the pedal portion 28, the force of the spring 33 will overcome the combined opposing force of the springs 26 and will lower the rods 19 by returning the lever to normal position about its fulcrum portion 30, the extreme end of the portion 29 of the lever coacting with the abutments 21 of the rods 19 to impart the spring pressure thereto.

During operation of the switch unit as hereinabove described, the ribs 43 on the pedal or lever 27 form a roughened gripping surface, and the longitudinal rib 45 serves to reinforce the lever at the fulcrum portion 30. The screw 23 and projection 44 on the lever 27 cooperate with the spring 33 to maintain this spring in position between the bracket 22 and reduced portion 29 of the lever, and the rods 19 are guided throughout vertical movement thereof in the slots 24, 25 of the block 13 and plate 22, respectively. The lever 27 is effectively retained within the fulcrum slot 31 of the casing wall 32 by the plate 34, the prongs 36 of which cooperate with the ears 41 of the lever 27 and the wall 32 of the casing 10 to prevent longitudinal withdrawal of the lever from the fulcrum slot; and the plate 34 may be readily removed with the cover 38, if desired, by merely removing the screw 35 and lifting the cover, or the cover may be removed independently of the locking plate 34 by removing the screw 39 and raising the cover while the screw 35 remains in place.

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From the foregoing detailed description, it is apparent that the present invention provides an improved pedal operated switch assemblage which is extremely simple, compact and durable in construction, and which is moreover highly efficient in operation. The improved unit is composed of relatively few parts which may be readily assembled and dismantled, and the switch is extremely flexible in its adaptations. All of the elements of the assemblage are readily accessible for inspection, adjustment and/or repair and all parts may be readily constructed of standard materials. The operating lever 27 is effectively locked in position within the fulcrum slot 31 in a simple and efficient manner and may be quickly and easily withdrawn from the slot upon removal of a single screw 35 and the cover 38, this screw 35 also serving to secure the cover and plate 34 in position. The improved switch is neat and attractive in appearance and positive, dependable and rapid in action. Switch assemblages embodying the invention have proven highly satisfactory in actual use, and may be manufactured and sold at moderate cost since most of the elements may be formed of sheet metal with the aid of punches and dies.

While the invention has been shown and described herein as being embodied in a manually operable pedal actuated switch having four fixed contacts 16 and a like number of movable contacts 18, each pair of which are carried by one of the rods 19, it should be clearly apparent that the invention may be similarly utilized with an assemblage wherein a greater or lesser number of fixed and movable contacts and one or more carrier rods 19 are provided.

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, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art to which this invention pertains.

We claim:

1. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot, said lever having one end thereof disposed within said casing and cooperable with said movable contacts and the opposite end disposed exteriorly of said casing, and a locking plate cooperable with said lever adjacent the fulcrum edge for preventing displacement of said lever portion from within said slot, said plate being independently removable transversely of said lever to permit withdrawal of said lever from within said slot.

2. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot, said lever having one end thereof disposed within said casing and cooperable with said movable contacts and the opposite end disposed exteriorly of said casing, a locking plate cooperable with said lever adjacent the fulcrum edge for preventing displacement of said lever portion from within said slot, said locking plate having

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an upper flange, and a cover cooperable with said casing to enclose said switch, said cover being detachably secured to the flange of said locking plate to maintain the same in position on said casing.

3. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot, said lever having a notch formed therein adjacent the fulcrum portion thereof and having one end thereof disposed within said casing and cooperable with said movable contacts and the opposite end disposed exteriorly of said casing, and locking means cooperable with the notch in said lever for preventing displacement of said lever portion from within said slot, said locking means being independently removable transversely of said lever to permit withdrawal of said lever from within said slot.

4. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot, said lever having side notches formed therein adjacent the fulcrum portion thereof and having one end thereof disposed within said casing and cooperable with said movable contacts and the opposite end disposed exteriorly of said casing, and a locking plate having spaced prongs cooperable with the notches in said lever for preventing displacement of said lever portion from within said slot, said plate being independently removable transversely of said lever to permit withdrawal of said lever from within said slot.

5. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot, said lever having laterally projecting ears forming side notches therein adjacent the fulcrum portion thereof and being freely longitudinally insertible through said slot past said ears, and means insertible within said notches between the ears of said lever and the fulcrum edge and cooperable with said wall and the ears of said lever for preventing displacement of said lever portion from within said slot.

6. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot with one end thereof disposed within said casing and cooperable with said movable contacts and the opposite end disposed exteriorly of said casing, said lever having shoulders formed by the outwardly extending portion thereof adjacent the fulcrum portion and having the inwardly extending portion thereof of reduced width and provided with lateral projections adjacent the fulcrum portion, the shoulders and

projections cooperating with the fulcrum portion to form notches, and means independently removable transversely of said lever and cooperable with said notches for preventing displacement of said lever from within said slot.

7. A switch assemblage comprising, a casing having a wall provided with a slot having a bottom edge, said slot being formed with an arcuate portion, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, an actuating lever for said movable contacts having its medial portion fulcrumed directly on said wall along the bottom edge of said slot, said lever being longitudinally removable from said slot and having a rib cooperable with the arcuate portion of said slot for guiding the same during removal and insertion thereof, and a locking plate cooperable with said lever adjacent the fulcrum edge for preventing displacement of said lever portion from within said slot, said plate being independently removable transversely of said lever to permit withdrawal of said lever from within said slot.

8. A switch assemblage comprising, a casing having a wall provided with a slot, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, said movable contacts being carried by a rod provided with an abutment, an actuating lever having its medial portion fulcrumed in said slot and its inner end cooperable with the abutment of said contact carrier rod, a spring cooperable with said rod to constantly urge said rod and the contacts carried thereby toward said fixed contacts, and a stronger spring cooperable with said lever adjacent the inner end thereof to constantly urge said rod and the contacts carried thereby away from said fixed contacts.

9. A switch assemblage comprising, a casing having a wall provided with a slot, a switch mounted upon said casing adjacent to said wall and having fixed and movable contacts, said movable contacts being carried by a rod formed with an abutment and movable toward and away from said fixed contacts, means for guiding said rod during movement thereof, an actuating lever having its medial portion fulcrumed in said slot and its inner end cooperable with the abutment of said contact carrier rod, a spring cooperable with said rod to constantly urge said rod and the contacts carried thereby toward said fixed contacts, and a stronger spring cooperable with the guide means for said rod and with said lever to constantly urge said rod and the contacts carried thereby away from said fixed contacts.

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