May 20, 1958 C. RINGWALD 2,835,760

DOOR SWITCH

Filed March 9, 1956

Fig. 1

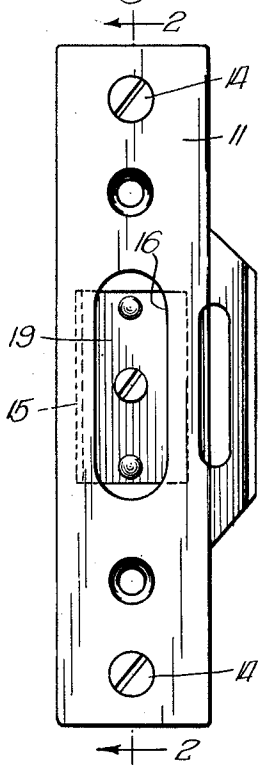


Fig. 2

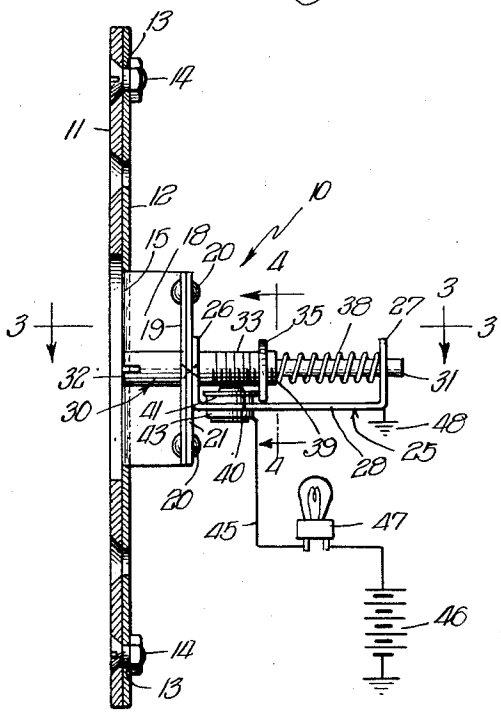


Fig. 3

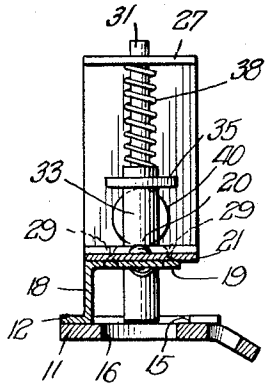
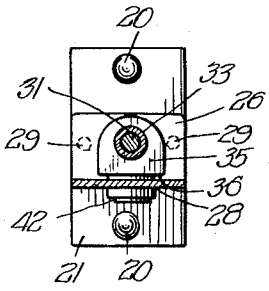


Fig. 4



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DOOR SWITCH

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My present invention relates generally to switches having movable contacts and more particularly to improvements in plunger actuated switches.

It has been accepted practice, for some time, to provide switches operated by the opening and closing movements of doors. The use of plunger type switches in this atmosphere is common for the operation of courtesy lights in automobiles. A particular use of this character, more pertinent to the present invention, concerns the provision of a switch adjacent a safety or escape door in school buses or like vehicles. In this instance of installation, the switch functions when the latch of the emergency door moves to a position where the door is capable of being opened accidently or on purpose. The purpose of the switch in this case is to close contact at the conditioning of the door for opening movement so as to energize a suitable warning means such as a buzzer or a dashboard light, etc.

In order to accommodate the proper initiation of the warning signal, for example, or the operation of the courtesy lights as used in passenger vehicles, it is requisite that the throw of the plunger in the switch be adjustable thereby to regulate the opening and closing of electrical contacts operated thereby. Presently known switches of this variety are by and large adjustable, if at all, only by removing the same from their mounted position, as in the jamb or frame for a door. Such an adjustment operation contemplates complete removal of the switch from its mounting, the adjustment of the plunger throw and contact separation and remounting of the switch. The relationship of the required adjustment to the operating means for the switch is variable and by and large under present practice is determined by trial and error with each trial of adjustment requiring removal of the switch for adjustment purposes. It is obvious that such a mode of adjusting a plunger type switch is not only vexatious, but time consuming and wasteful of manpower.

In order to overcome the above outlined difficulties of presently known plunger switches used especially in conjunction with movable actuator means such as a vehicle door, I have devised a new and improved means for permitting adjustment of the contact throw externally of the switch while the same remains in its mounted position for operation by the actuating means. By providing such a switch, it is obvious that the regulation of its contact throw may be readily adjusted to meet requirements of the means for operating the same so that the switch and the operating means may be easily adjusted to function in perfect harmony and according to desired end results.

Briefly, my present switch, comprises a stationary contact means and a movable contact means. The movable contact means is activated in response to the axial motivation of a plunger; the external end of the plunger being engaged by suitable operating means such as latch striker on an automobile door latch or the like. The plunger means is associated with the movable contact means and a means for threadingly adjusting the axial disposition of the plunger means relative to the movable contact is provided at the external end of the plunger.

Therefore, by applying a suitable tool to the external end of the plunger, the same may be threadingly moved in and out relative to the movable contact means to regulate the throw of the latter and thus adjust the operating characteristics of the switch in response to the movements of the operating means into and out of engagement with the external end of the plunger.

The main object of my present invention is to provide a new and improved plunger type switch having means for externally adjusting the opening and closing movements of its contact system.

A further object of this invention is to provide a new and improved plunger type switch mechanism having a movable and a stationary contact means held by a suitable housing and operable in response to a plunger mechanism which is provided with means for adjusting the movement of the contact means externally of the housing.

Still another object of this invention is to provide a new and improved plunger operated switch mechanism having means for adjustably regulating the throw of the plunger thereby to regulate opening and closing movements of contacts associated with such plunger, the means for adjusting the throw of the plunger being engageable externally of a fixed mounting for the switch.

The above and further objects, features and advantages of this invention will appear to those familiar with the art from the following detailed descriptions and specifications for a particular preferred embodiment of my invention illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a front elevational showing of the improved switch assembly of this invention and mounting means employed therewith;

Figure 2 is a cross-sectional view taken substantially along line 2, 2 of Figure 1, looking in the direction of the arrows thereon;

Figure 3 is a cross-sectional view looking downwardly at the switch means of my present invention substantially from the vantage line 3, 3 of Figure 2; and

Figure 4 is a cross-sectional view taken substantially along line 4, 4 of Figure 2.

With reference now to the drawings, it will be understood from Figures 1 and 2, especially, that a switch assembly, indicated generally by numeral **10** therein, may be secured or mounted to the back side of a striker plate **11** attachable to the door frame of an automobile or the like. Switch **10** may be mounted or associated with other types of supporting structures, as desired, but in relation to the particular and preferred installation illustrated herein, my improved switch is associated preferably with the striker plate of a latch mechanism as shown.

In order to facilitate mounting of the switch assembly **10** on the striker plate **11**, a mounting plate **12** of elongated rectangular form is provided with suitable openings **13** adjacent its ends for receiving mounting bolts **14** which pass through plate **12** and corresponding openings formed in the striker plate **11**. This latter relationship may best be understood by examining Figure 2 of the drawings.

The mounting plate **12** is formed with a central opening **15** disposed opposite a striker or latch receptive opening **16** formed in the striker plate **11**. A bracket support **18** is struck inwardly from one side of opening **15** so as to extend rearwardly from the plate **12**. Bracket **18** is formed with a right angular bend therein so that the same comprises a substantially L-shaped member having a wall portion **19** extending in spaced parallelism with the plane of plate **12** behind the striker receptive opening **16** in the striker plate. The switch assembly **10** is supported directly on wall **19** of the bracket **18** by means of rivets **20**, **20** which extend through suitable

opening near the upper and lower ends of wall 19 and pass through a secondary mounting plate 21 disposed in superposed adjacency to the rearward face of wall 19.

A substantially C-shaped switch body 25 includes parallel spaced front and rearward walls 26 and 27, respectively, which are interjoined by a bottom wall 28 related transversely thereto. The switch body 25 is rigidly secured to the secondary mounting as by spot welding front wall 26 thereof as at 29. Both the wall 19 and plate 21 are pierced by a central opening for the reception and axial passage of a plunger 30 which is designed to be engaged by the striker associated with a latch mechanism carried by a bus door or the like. Plunger 30 includes a reduced cylindrical tongue portion 31 extending rearwardly of its outer end, the latter of which is distinguished by a slotted kerf 32 for the reception of an adjustment tool such as the blade of a screw driver or the like. An intermediate portion of the plunger 30 is threaded, as at 33, for receiving a movable contact plate 35 which is flattened along a lower edge 36, as shown in Figure 4, to ride across the upper face of the wall 28 on the switch bracket 25. A spring member 38 is disposed concentrically about the tongue portion 31 of the plunger and disposed between wall 27 of the bracket 25 and shoulder 39, formed at the junction between the tongue portion 31 and the threaded portion 33 on the plunger. The spring means is operative to bias the plunger axially outward or away from the bracket 25. Contact plate 35 is arranged to engage a stationary silver contact plate 40 mounted over an insulating washer 41 and attached to bottom wall 28 of the switch bracket 25. Note in particular, that a rivet member 42 serves to mount the contact plate 40 above the wall 28 on washer 41 so the same may be engaged by the movable contact plate 35 and that an additional insulator washer 43 is held beneath the wall 28 by the rivet member 42. The lower end of the rivet serves as a terminal connection for an electrical lead 45 in circuit with the positive terminal of a battery 46. Circuit from battery 46 to the switch assembly 10 also includes a suitable warning device such as an electric lamp 47. Bracket 25 is connected to ground as at 48 to complete the electrical circuit for the switch 10. It will be understood, that the engagement of plate 35 with contact 40 serves to close circuit from battery to ground thereby energizing the warning device such as lamp 47.

From the foregoing description of the several elements which are embodied in the improved plunger type switch of this invention, it will be seen that the threaded connection between the plunger 30 and the movable contact plate 35 provides a convenient means for varying the position of contact plate 35 on the plunger. Specifically, by providing external means, such as the slotted kerf 32 at the outer end of the plunger, the latter member may be threadingly moved relative to the contact plate 35 so as to advance or retard the movement of the contact plate relative to the stationary contact plate 40. This threading movement of the plunger likewise serves to vary the effective force of the compression spring 38 and to vary the projection of the plunger past the plate means 21 and into the small pocket or recess formed by the L-formation of the struck out wall members 18 and 19 of the mounting plate 12.

Thus when an external initiating means, such as a striker associated with a catch mechanism on the emergency door of the school bus or the like engages the protruding end of the plunger 30, the amount of throw necessary to separate contact plates 35 and 40, or that is, the required depression of the plunger against the force of spring 38 is fixed. In the normal operation of this type of switch in the particular safety door situation described, it is required that the contact plates 35 and 40 be engaged upon the disengagement of the actuating means or striker from the plunger. It will be understood that, conversely, the amount of throw requisite for the plunger 30 to bring the contact plates 35 and 40 together again is accordingly regulated. Note that the means for adjusting the throw of the plunger and thus the relative movement beween switch contacts is adjustable externally of the housing or the means carrying working elements of the switch. Thus, I have achieved the main object of the invention, namely, to provide a plunger type switch capable of adjustment exteriorly of its mounting or housing.

From the foregoing description of my invention as related to a preferred embodiment thereof, its various features and novel aspects will be readily recognized. It is to be understood, of course, that while I have herein shown and described my invention in association with a preferred form as set forth in the accompanying drawings and as described, numerous changes, modifications and substitutions of equivalents may be made therein without necessarily departing from its spirit and scope. As a consequence, it is not my intention to be limited to the particular form of device herein shown and described except as may appear in the following appended claims.

I claim:

1. A switch of the class described, comprising, a body member, means on said body member for attaching the same to a support, a stationary contact means carried by said body member, plunger means reciprocal within said body member over said stationary contact means, one end of said plunger protruding outwardly of said body member for engagement by actuating means, movable contact means mounted on said plunger means, spring means normally biasing said plunger in a direction appropriate to bring said two-named contact means into engagement, and means at said protruding one end of said plunger for adjusting the position of said movable contact means on said plunger thereby to regulate the opening and closing of said contact means.

2. A switch of the class described, comprising, a body support, stationary contact means mounted on said support, plunger means reciprocal relative to said support and having one end thereof protruding outwardly of said support, movable contact means threadingly mounted on said plunger means, spring means engaged with said plunger means and said support for normally biasing said plunger means appropriately to bring said two-named contact means into engagement, and means at the said one end of said plunger means whereby the latter may be engaged and threadingly adjusted to advance and retard the position of said movable contact means thereby to adjust the throw of said plunger means and the relative throw between said stationary and movable contact means.

3. A switch of the class described, comprising, a body support, stationary contact means mounted on said body support, plunger means reciprocal lengthwise of said body support and passing over said stationary contact means, movable contact means carried on said plunger means and having threading connection with the latter, spring means biasing said plunger means in a direction appropriate to bring said two-named contact means into engagement, and means formed at one end of said plunger means externally of said body support whereby said plunger means may be rotated about its lengthwise axis to adjust the position of said movable contact means on said plunger means, the adjustment of said movable contact means serving to regulate the throw of said movable contact means relative to said stationary contact means in response to the axial movement of said plunger means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,675,439 Merchant ---------- Apr. 13, 1954

FOREIGN PATENTS

328,975 Germany ---------- Aug. 9, 1919