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2,129,591

ELECTRIC SWITCH

Filed Aug. 6, 1936

FIG. 1

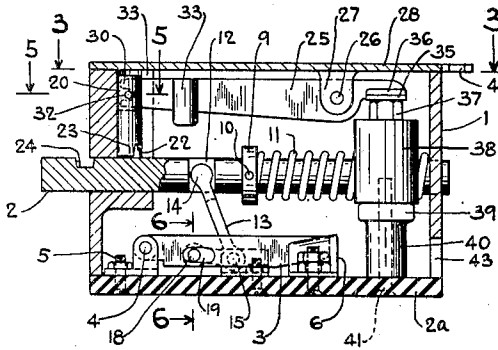


FIG. 2

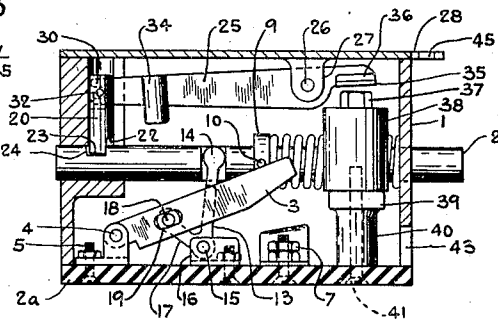


FIG. 3

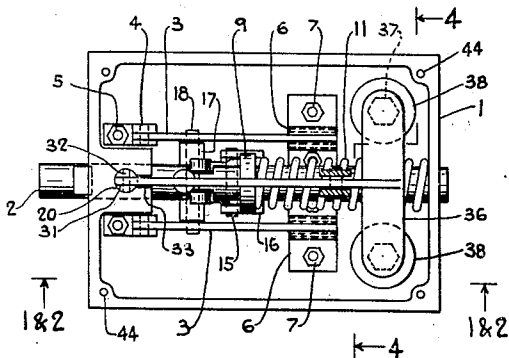


FIG. 4

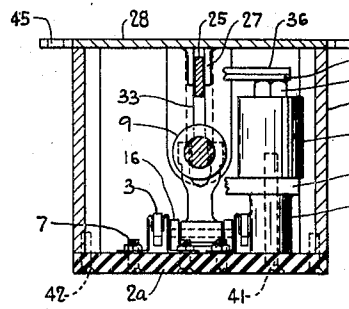


FIG. 5

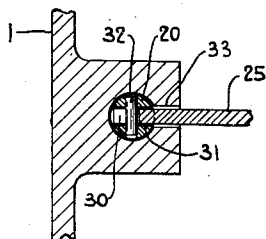
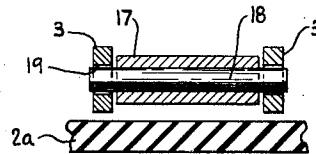


FIG. 6



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2,129,591

ELECTRIC SWITCH

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Application August 6, 1936, Serial No. 94,579

13 Claims. (Cl. 200—106)

My invention relates to electric switches.

It has among its objects to provide an improved electric switch and, more particularly, to provide an improved switch especially adapted to control door opening and closing mechanism, and one which is operative with certainty under all weather conditions. A further object of my invention is to provide such an improved switch having improved switch opening and closing mechanism including improved actuating mechanism therefor and improved controlling mechanism therefor. Other objects of my invention include the provision of improved knife switch swinging mechanism operative to open or close the switch in different positions of an operating member and having improved electrically controlled controlling mechanism automatically operative to hold said operating member in a predetermined position of the same and the switch and operative at will to release said member and return it to its initial position while again operating the switch. Still further objects of my invention include the provision of such a mechanism which may be inexpensively produced and readily and conveniently connected in an improved manner. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawing I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In the drawing—

Figure 1 is a vertical sectional view of this form of my improvements, the switch being shown in closed position;

Fig. 2 is a like view showing the switch in open position;

Fig. 3 is a sectional view on line 3—3 of Figure 1;

Fig. 4 is a sectional view on line 4—4 of Figure 3;

Fig. 5 is an enlarged detail sectional view on line 5—5 of Figure 1, and

Fig. 6 is a like sectional view on line 6—6 of Figure 1.

In this illustrative construction I have shown my invention applied to use in connection with a door controlled switch disposed in a casing generally indicated at 1 and having an operating plunger 2 projecting out of this casing and adapted to be moved in opposite directions to operate a switch within the casing through improved switch operating and controlling mechanism hereinafter described.

Referring more particularly to this improved

mechanism, it will be noted that the casing 1 is provided with an insulating bottom plate 2a carrying thereon double throw knife switch blades 3 independently pivoted on coaxial pivots at 4 and provided with suitable terminal connections 5 and adapted to be received in cooperating contacts 6, likewise disposed on the insulating plate 2a and provided with suitable terminal connections 7; this knife switch mechanism herein being disposed on opposite sides of the longitudinal center line of the casing 1 with the pivots 4 adjacent one end wall thereof. As shown, these knife switch blades 3 are also operatively connected to the plunger 2 which is reciprocally mounted in apertures in the end walls of the casing in a plane spaced above the knife switch, the plunger being disposed centrally between the blades 3. Herein this plunger also has a suitable adjustable collar 9 thereon intermediate its ends and within the casing 1, adapted to be positioned by a set screw 10 and to provide an abutment for a coiled spring 11 disposed around the plunger and acting between this abutment and one end of the casing, in such manner as normally to cause the plunger to be projected into the position shown in Figure 1 while the spring 11 is compressed in the retracted position shown in Figure 2. Herein also, the operative connection between the plunger 2 and the blades 3 is such as to cause the knife switch to be automatically opened or closed as the plunger moves in opposite directions. It will be noted that herein the plunger is provided with slots 12 on opposite sides of the same in front of the collar 9 and that a bell crank 13 has a slotted end providing portions 14 projecting into and slidable in these slots 12, while the bell crank is pivoted at 15 to the base or plate 2a on a suitable bracket 16 suitably attached to the base and disposed centrally between the blades 3 and below the plunger 2. Moreover it will be noted that the other arm 17 of this bell crank is shorter than the arm 13 and carries an insulating pin, or pins, 18 projecting in opposite directions laterally from the arm 17 into longitudinally disposed slots 19 in the blades 3. These slots herein are disposed slightly more closely adjacent the blade pivots 4 and are of such dimensions as to permit the desired movement of the pins and cause the blades 3 to be moved into open or closed position as the plunger 2 is moved reversely. Thus it will be evident that, with the plunger 2 in the position shown in Figure 1, the blades 3 will be in their circuit closing position and the spring 11 extended, whereas with the plunger 2 in the position shown in Figure 2, the

blades will be in their open circuit position and the spring will be compressed, while the parts will move into and out of these positions as the plunger is reciprocated reversely.

Cooperating with this switch and plunger mechanism is improved mechanism controlling the movement of the plunger and operative to hold the same in one position, herein the in position of the plunger 2, and release it therefrom at will for outward projection by the spring 11. This mechanism herein includes a holding pin 20 disposed above the plunger 2 and slidably mounted vertically in a suitable aperture in the end of the casing nearer the pivots 4. This pin, in turn, is provided with a cut-away portion 22 providing a downwardly extending projection 23 adapted to rest on the upper surface of the plunger 2, herein a round plunger, in the projected position of the plunger shown in Figure 1, and also to ride on the plunger as it moves to the right from that position and then drop into a notch 24 provided in the plunger adjacent the extremity thereof, in such manner as thereupon automatically to hold the plunger in its retracted position shown in Figure 2. Operatively connected to this pin 20 is also improved mechanism for releasing the same at will. Herein, this mechanism includes a lever 25 which is pivoted at 26 on depending arms 27 on the under side of a removable cover plate 28, the pivot being shown herein as located at a point nearer the opposite end of the casing 1 from the pin 20. Further it will be noted that this lever has a transversely slotted end 30 projecting into a vertical slot 31 in the upper end of the pin 20, and that the slot in the end of the lever provides arms extending above and below a transverse pin 32 supported in the walls of the slot 31, all in such manner as to raise or lower the pin 20 as the lever 25 moves about its pivot 26. Herein, it will further be noted that, the lever 25 being pivoted closely adjacent one end thereof, this lever normally tends to swing down at its left hand end, i. e., toward latch engaging position, and that it is free to do so since this left hand end is movable in a vertical slot 33 in the portion of the casing surrounding the pin 20. Also suitable means may be provided for insuring this downward movement of the lever, as, for example, by providing a suitable weight 34 formed on or attached to the lever. The opposite end of the lever, i. e., the short end, herein also carries an armature 35 on its under face which extends transversely relative to the body of the lever and herein is carried on the under side of a cross bar 36 formed integral with the lever. This armature 35, in turn, is adapted to cooperate with suitable magnetic operating means, herein the cores 37 of a pair of electromagnets 38 suitably carried on a transversely disposed support 39, which is, in turn, supported on the base plate 2a by spacing and supporting spools 40, while the parts are held in assembled relation by screws 41. Thus, it will be evident that, whenever the plunger 2 is held by the pin 23 in the retracted position shown in Figure 2, it is only necessary to energize the electromagnetic means, herein including the magnets 38, in order to attract the armature 35, and thereby cause the lever 25 to move about its pivot 26 and withdraw the pin 20. Thereupon, the spring 11 being under compression, the plunger 2 will be projected back into the position shown in Figure 1, and during this movement will actuate the bell crank arms 13 and 17 in such manner as to move the switch blades

3 from their open position shown in Figure 2 to their closed position shown in Figure 1.

It will be evident from the above that with the parts in the position shown in Figure 1, whenever the plunger 2 is driven in toward the position thereof shown in Figure 2, the switch blades 3 will not only be moved from their closed position shown in Figure 1 to the open position shown in Figure 2, but the pin 20 will be automatically dropped down so that its end 23 engages in the opening 24 in the plunger and thereby holds the plunger in its retracted position. However, whenever the electromagnets 38 are energized, the lever 25 will be swung about its pivot 26 in such manner as to pull up the pin 20 and thereby release the plunger so that the coiled spring 11 would then automatically propel the plunger toward the projected position shown in Figure 1, the switch blades during such movement being likewise moved from their open position shown in Figure 2 to their closed position illustrated in Figure 1.

As a result of my improved construction, it will be noted that the mechanism is such as to be certain in operation and in no way affected by frost or the like. Further, it will be observed that the action of the switch blades is such that when the plunger 2 is pushed in quickly, as would be the case if the same were struck by an opening or closing door, or a part engaged and actuated by such a door movement, the circuit will be broken quickly, whereas the spring 11 will insure a quick opening of the switch blades 3. Moreover, it will be observed that as a result of my improved construction, it is possible for the switch and its wiring and also for the electromagnets 38 to be removed from the casing 1 whenever desired by simply releasing suitable screws 42 connecting the plate 2a to the bottom of the casing 1. Further, it will be evident that, if desired, the entire electrical connections may be made on the plate 2a before the latter is inserted in the casing, and that the plate 2a with the connections thereon may then be inserted in the casing and connected thereto by the screws, the conductors herein being extended through a conductor aperture 43 in one end of the casing. Further, it will be evident that the cover 28 may be separated from the casing 1 whenever desired as by removing suitable screws connected in corner apertures 44, while the whole device may be suitably attached to a support by suitable screws extending through apertures 45 in the edges of the cover plate. Attention is further directed to the exceedingly rugged character of the mechanism, which adapts it to long continued service, and to the further fact that the mechanism is very compact due to my improved disposition of the parts, in such manner as to enable the unit to be disposed in very restricted spaces. These and other advantages of my improved construction will, however, be clearly apparent to those skilled in the art.

While I have in this application specifically described one embodiment which my invention may assume in practice, it will be understood that this form of the same may be modified and the invention embodied in other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a switch mechanism, an enclosing casing, a switch actuating plunger therein projectible through an end wall of said casing and having spring means biasing said plunger into pro-

jected position, a pivoted switch member, and operative connections therebetween for reversely operating said switch member upon reverse movements of said plunger including a bell crank movable about a different pivot from said member and having one arm thereof connected to said plunger and its other arm connected to said switch member.

2. In a switch mechanism, a plunger, a pivoted switch member, and pivoted operative connections therebetween for reversely operating said switch member relative to said plunger upon reverse movements of said plunger including a bell crank movable about a different pivot from said member and having one arm connected to said plunger and the other connected to said member between the pivot of the bell crank and the pivot of said switch member.

3. In a switch mechanism, a plunger, a pivoted switch member movable relative thereto, positive operative connections therebetween for reversely operating said switch member relative to said plunger upon reverse movements of said plunger including a bell crank, and automatically operative means for holding the parts in one position thereof including a latch cooperating with said plunger.

4. In a switch mechanism, a plunger, a pivoted switch member, operative connections including a bell crank therebetween for reversely operating said switch member about its pivot upon reverse movements of said plunger, means including a lever having a latch for holding said plunger in one position of said switch, and means for projecting said plunger into another position and actuating said switch upon release of said holding means.

5. In a switch mechanism, a plunger, a pivoted switch member at one side thereof, and latch mechanism controlling said plunger disposed on the opposite side of said plunger from said switch member, said switch member having pivoted operative connections to said plunger for reversely operating said switch member upon reverse movements of said plunger and said switch member comprising a double pole knife switch and having said plunger disposed centrally longitudinally of the blades thereof.

6. In a switch mechanism, a movable switch member comprising parallel pivoted contact members, a switch actuating plunger disposed centrally longitudinally of said contact members, and a bell crank mounted at the junction of its arms between said pivoted contact members and having one arm operatively connected to said plunger and the other arm operatively connected to said contact members.

7. In a switch mechanism, a plunger, a pivoted switch blade, and a bell crank mounted at the

junction of its arms and having one arm operatively connected to said plunger and the other arm operatively connected to said blade between the pivots of said blade and bell crank, said operative connections including lost motion connections.

8. In a switch mechanism, a plunger, pivoted switch members having their free ends movable on opposite sides of said plunger, and a bell crank mounted at the junction of its arms between said switch members and having laterally extending oppositely projecting portions on one arm operatively connected to said switch members and having the other arm operatively connected to said plunger.

9. In a switch mechanism, a plunger, a pivoted switch blade, and a bell crank having one arm operatively connected to said plunger and the other arm operatively connected to said blade, the arm connected to said plunger being longer than that connected to said blade and said arms having a slot and pin connection and a yoke connection with said blade and plunger respectively.

10. In a switch mechanism, a casing having a plunger reciprocally mounted therein and a removable base member, and switch mechanism within said casing carried on said base member and removable therewith including a switch and operative connections between the same and said plunger separable upon removal of said base.

11. In a switch mechanism, a casing having a plunger reciprocally mounted therein and a removable base member, switch mechanism within said casing carried on said base member and removable therewith including a switch and operative connections between the same and said plunger separable upon removal of said base, and latch mechanism controlling said plunger and carried in said casing having electrically controlled controlling means carried on said base and removable therewith.

12. In an electric switch, a casing having a plunger reciprocally mounted therein, a switch controlled by said plunger and disposed in said casing, a removable cover on said casing, and latch mechanism controlling said plunger and carried by said cover and removable with said cover.

13. In an electric switch, a casing having a plunger reciprocally mounted therein, a switch operatively connected to and controlled by said plunger and disposed in said casing, a removable cover on said casing, latch mechanism controlling said plunger and carried by said cover and removable with said cover, and a base removably carried on said casing and carrying said switch, said switch being separable from said plunger upon removal of said base.

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