Oct. 21, 1930. K. KNUDSEN 1,779,133

PUSH BUTTON SWITCH CONSTRUCTION

Filed May 10, 1928

Fig. 1.

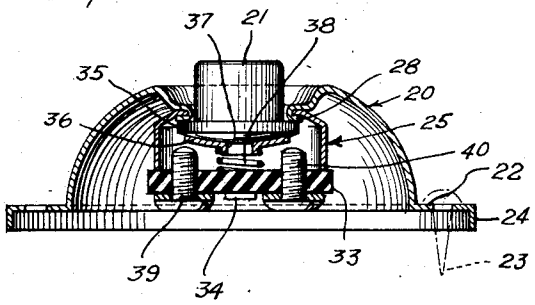


Fig. 4.

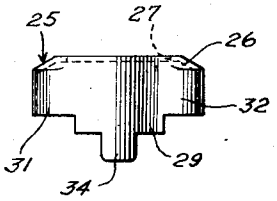


Fig. 5.

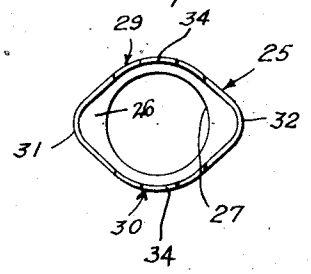


Fig. 2.

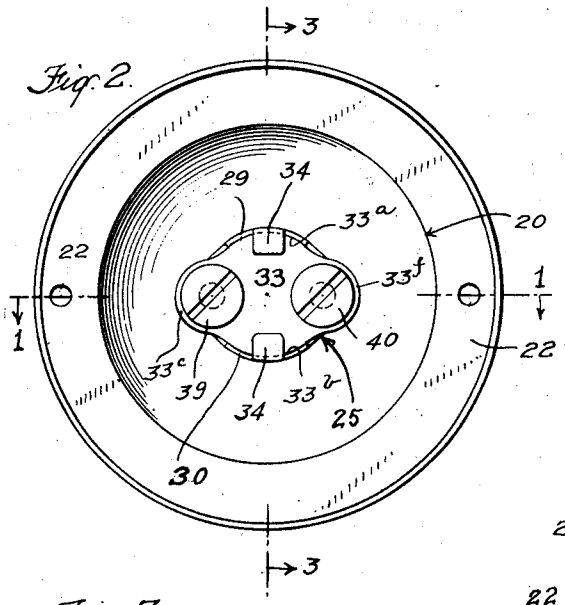


Fig. 6.

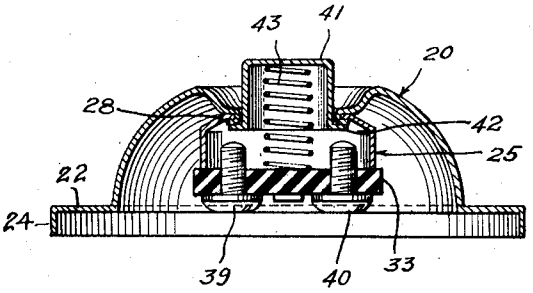
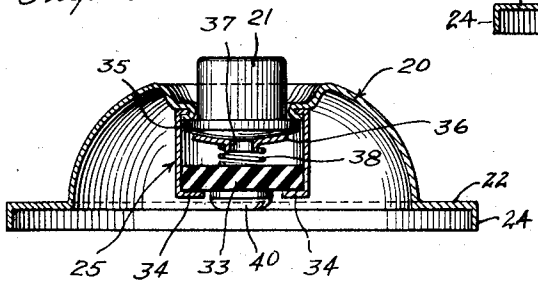


Fig. 3.



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UNITED STATES PATENT OFFICE

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PUSH-BUTTON-SWITCH CONSTRUCTION

Application filed May 10, 1928. Serial No. 276,618.

This invention relates to electrical connecting devices, and more particularly to push button switches.

One of the objects of this invention is to provide a push button switch construction which will be of dependable action when in practical use and rugged and durable. Another object is to provide a construction of the above-mentioned nature in which the various parts may be of relatively small dimensions, thus to minimize the amount of material required as well as to simplify the manufacture of such individual parts, and in which the assembly may be achieved with a minimum of separate steps or operations. Another object is to provide a push button construction of the above-mentioned character which will be of compact and self-contained arrangement, and in which the practical application of the device in use may be achieved without interference with the operative parts of the switching mechanism. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, as will be exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which are illustrated several of various possible embodiments of certain features of this invention,

Figure 1 is a sectional view taken on the line 1—1 of Figure 2.

Figure 2 is a bottom plan view of the push button switch shown in Figure 1, and

Figure 3 is a sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a detached side view of an inner casing embodied in the construction shown in Figures 1, 2 and 3, and

Figure 5 is a bottom plan view of the inner casing shown in Figure 4.

Figure 6 is a vertical sectional view of an assembled push button switch in which are illustratively shown certain modifications of certain features of this invention.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring now to the drawing and particularly to Figures 1, 2 and 3, I have shown an outer casing generally indicated at 20; this casing is preferably substantially dome-shaped and is provided at its upper central portion with an appropriate opening, preferably circular, through which may be extended the operative portion of a push button 21. At its lower peripheral portion the casing 20, which is preferably made of sheet metal, and which may thus be rapidly and inexpensively struck up, is provided with a laterally extending flange 22 provided with suitable openings through which may be passed screws 23 for securing the casing in position on a wall, for example. The laterally extending flange 22 may be and preferably is provided with a depending flange 24 about its outer edge.

Within the outer casing 20 there is provided, in depending relation thereto, an inner casing generally indicated at 25. This inner casing 25, more clearly shown in detached side and bottom views in Figures 4 and 5 of the drawing, is provided with an upper portion 26 generally circular in shape and having an opening 27 adapted substantially to register with the opening in the upper part of the outer casing 20. The inner casing 25 may be secured to the outer casing in any suitable manner and very conveniently by means of a lip 28 extending downwardly about the opening in the outer casing 21, this lip 28 being spun over into interlocking relation with the upper portion of the inner casing 25, as will be clear from Figures 1 and 3.

The inner casing 25 is elongated at its lower and major portion, as will be clear from Figures 4 and 5. More particularly, this inner casing 25 will be seen to be provided with oppositely disposed side wall portions 29 and 30 which are shaped or curved to be substantially a downward extension of the upper circular portion 26 of this casing 25, and to be substantially concentric with the opening 27, as will be clear

from Figure 5. The casing 25 furthermore is extended to provide oppositely disposed side wall portions 30 and 32, preferably curved and preferably having a smaller radius of curvature than that of the opposed side wall portions 29—30. The latter, moreover, are extended in a downward direction (see Fig. 4) beyond the lower edges of the opposed end wall portions 31—32 by a distance substantially equivalent to the thickness of a block of insulating material 33 (see Figs. 1 and 3) with which certain connecting mechanism is associated, and which will be more clearly described hereinafter. Each of the opposed side wall portions 29—30 is furthermore provided with an extension shaped to form an ear or lug 34, the purpose of which will also be more clearly set forth hereinafter.

The push button 21 (see Figs. 1 and 3) is provided with a peripherally extending flange 35 at its lower portion, the radius of which is substantially equivalent to the radius of curvature of the opposed side wall portions 29 and 30; this push button 31 may thus be inserted into the opening in the outer casing 21 through the lower open end of the inner casing 25, and the flange 35, aside from limiting the upward movement of the push button 21, may coact with the curved side wall portions 29 and 30 so as to properly guide the push button 21 throughout whatever movement it may be given.

The lower or under surface of the push button 21 is curved and is preferably of convex shape, and seated against this curved under surface of the push button 21 is a metallic disk-like member 36, preferably dished or concaved so that the sheet metal member 36 and the lower portion of the push button 21 may be seated one within the other. Preferably the disk member 36 is of a lesser diameter than that of the flange 35, and the inter-fitting of the push button 21 with the connecting member 36 insures keeping the disk member 36 out of electrical contact with the side walls of the inner casing 35. The latter may be made of sheet metal and will be seen to be of such construction that it may be readily drawn or struck up.

The connecting member 36, which, being of sheet metal, may be readily and inexpensively stamped, is depressed at its central portion to provide a downwardly projecting portion 37 adapted to be received within one end of a spiral spring 38 and to substantially center the latter with respect to the remaining parts of the mechanism. The lower end of the spring 38 abuts against the insulating block 33 through which are passed two screws 39 and 40, in threaded connection with the block 33, and adapted at their lower or headed ends to secure in position and make electrical connection with a pair of conductors forming part of the circuit in which the device is to be inserted. The screws 39 and 40, moreover, are spaced at such a distance that the spiral spring 39 may be conveniently received therebetween and so as to be within the range or compass of the disk-like connecting member 36. Thus, as will be seen from Figures 1 and 3, a manual actuation of the button 21, such as a depression thereof, carries the connecting member 36 downwardly against the action of the spring 38 and into bridging relation with respect to the two contacting screws 39 and 40, thus to complete the electrical circuit.

During this latter action a displacement of the connecting member 36 is prevented not only by the interfitting relation thereof with respect to the push button 21, but also by the action of the curved side wall portions 29 and 30.

The insulating block 33 (see Figure 2) is shaped to provide two curved side portions 33^a and 33^b having a radius of curvature substantially equal to the radius of curvature of the side wall portions 29 and 30 of the inner casing 25. The member 33 is extended lengthwise at either end to provide end portions 33^e and 33^f, these end portions being dimensioned so as to overlap the exposed lower edges of the end portions 31 and 32 of the inner casing 25 and provide ample space within which the connecting screws 39 and 40 may be respectively accommodated but still within the compass of the disk-like connecting member 36.

The push button 21 having first been inserted and the connecting member 36 and the spring 38 interfitted therewith and one with another, the lower open end of the casing 25 is closed by means of the insulating block 33, the side portions 33^a and 33^b of which are snugly received between the curved side portions 29 and 30 of the inner casing 25, these coacting parts acting to properly position and center the insulating block 33 with respect to its coacting parts. The end extensions 33^e and 33^f of the insulating block 33, as this insertion of the block 33 is performed, abut against the lower end edges of the end portions 31 and 32 of the inner casing 25, whereupon the ears 34 of the inner casing 25 are bent over upon the insulating member 33, as will be clear from Figures 2 and 3. This inter-relation between the insulating block 33 and the inner casing 35 not only insures a dependable fastening of one to the other, but because of the relatively great extent of the lower end or exposed edges of the end portions 31 and 32 against which the insulating block 33 abuts (see also Fig. 1), the insulating block 33 is securely clamped and held against the pos-

sibility of warping and subsequent distortion when in use.

In Figure 6 of the drawing I have illustrated a possible modified form of certain features of my invention, and it will be noted that the push button, indicated at 41 in Figure 6, is preferably hollow and conveniently made of sheet metal to provide a lower laterally and peripherally extending flange 42 adapted not only to limit the upward movement of the push button 41, but also to be received substantially snugly between the concentric side wall portions 29 and 30 of the inner casing 25 to be guided thereby, the flange 42, moreover, being adapted to coact with and electrically bridge the connecting screws 39 and 40 in the insulating block 33. A coiled spring 43 is received within and held in position by the hollow push button 41, and is adapted to urge and hold the push button upwardly. The outer or exposed surface of the push button 41 may be coated with, for example, enamel or the like in order to provide a substantially non-conductive exposed surface for manual actuation, but any possible disadvantage of having the push button proper electrically conductive will be seen to be avoided in the preferred embodiment hereinabove described in connection with Figure 1, for example.

It will thus be seen that there has been provided in this invention a push button construction in which the several objects hereinbefore noted, as well as many practical advantages are successfully achieved. It will be seen that the individual parts are all of simple construction, and thus lend themselves to inexpensive manufacture, and moreover, that these parts are of such relatively small dimensions that a further reduction in the cost of manufacture is achieved by reason of the small amount of material required. It will furthermore be seen that the assembly of the device is characterized by great simplicity, and moreover may be achieved with a minimum of mechanical operation. Moreover, it will be seen that the construction provided by this invention is well adapted to meet the conditions of hard practical use. For example, the fact that the insulating member may be made relatively small makes it possible not only to greatly diminish the tendency thereof to warp, but also makes more simple the counter-action of such a tendency.

As many possible embodiments may be made of the above invention, and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing within said outer casing provided with an opening in its upper part in substantial registry with the opening in said outer casing and having depending walls shaped to expose their lower edges at oppositely disposed end portions of said casing and to provide at oppositely disposed side portions thereof curved side flanges, a push button passing through said registering openings of said two casings, an insulating block carrying circuit-controlling means adapted for coaction with said push button and shaped at its ends to overlap said exposed lower edges of said inner casing and shaped at its sides to fit between said curved side flanges, and means for holding said insulating block in position.

2. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing having an upper opening registering substantially with the opening in said outer casing and having depending walls curved to provide a pair of opposed end portions and a pair of opposed side portions, the latter having a greater radius of curvature than the radius of curvature of the former, a push button passing through the opening in said casing, and an insulating block closing the lower end of said inner casing and shaped to provide a pair of opposed portions adapted to rest against the end edges of one pair of opposed portions of said inner casing and a pair of opposed portions adapted to be received between the other pair of opposed portions of said inner casing, said last-mentioned pair of opposed portions of said inner casing having an extension adapted to be bent over against said insulating block, thereby to hold the latter in position.

3. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing having an upper opening registering substantially with the opening in said outer casing and having depending walls curved to provide a pair of opposed end portions and a pair of opposed side portions, the latter having a greater radius of curvature than the radius of curvature of the former, a push button passing through the opening in said casing, and an insulating block closing the lower end of said inner casing and shaped to provide a pair of opposed portions adapted to rest against the end edges of one pair of op-

posed portions of said inner casing and a pair of opposed portions adapted to be received between the other pair of opposed portions of said inner casing, one of said pairs of opposed portions of said inner casing being each provided with bendable locking ears for holding said insulating block in position.

4. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing having an upper opening registering substantially with the opening in said outer casing and having depending walls curved to provide a pair of opposed end portions and a pair of opposed side portions, the latter having a greater radius of curvature than the radius of curvature of the former, a push button passing through said registering openings in said two casings, a conducting member within said inner casing and adapted to be actuated by said push button, an insulating block having passed therethrough a pair of connecting screws adapted to have secured at their outer ends an electrical conductor, said block being shaped to abut against said lower edges of said inner casing, thereby to substantially close the latter, and with the inner ends of said screws projecting into said casing to be bridged by said conducting member upon actuation of said push button, and a spring interposed between said block and said conducting member.

5. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing secured to said outer casing and having depending walls shaped to provide a pair of opposed side portions and a pair of opposed end portions, one pair of said opposed portions being of greater extent than the other, an insulating block carrying connecting terminals and shaped to be received between the opposed portions of said inner casing which are of greater extent and to abut against the edges of the other opposed portions of said inner casing, a push button passing through the opening in said outer casing, and means operated by said push button for electrically bridging the inner ends of said connecting terminals.

6. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing secured to said outer casing and having depending walls shaped to provide a pair of opposed side portions and a pair of opposed end portions, one pair of said opposed portions being of greater extent than the other, an insulating block carrying connecting terminals and shaped to be received between the opposed portions of said inner casing which are of greater extent and to abut against the edges of the other opposed portions of said inner casing, a push button passing through the opening in said outer casing, and a yieldably supported switching member adapted to be actuated by said push button and adapted to coact with said connecting terminals for closing an electrical circuit.

7. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner member secured to said casing, an insulating block carrying a pair of terminal members and supported by said inner member, a push button extending outwardly through said casing, a spring acting between said push button and said insulating block for normally holding said button outwardly, and a conductive device adapted upon actuation of said push button to bridge across said terminal members, said inner member being shaped to retain said device against displacement in the direction of its own plane.

8. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, a spring-retracted push button made of non-conductive material and extending through said opening, a pair of insulated terminal members adapted to have electrical conductors secured thereto, and a conducting member interposed between said push button and said terminal member for making an electrical connection between the latter, said push button and said conducting member being shaped to interfit one with the other.

9. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, a spring-retracted push button made of non-conductive material and extending through said opening, a pair of insulated terminal members adapted to have electrical conductors secured thereto, and a conducting member interposed between said push button and said terminal member for making an electrical connection between the latter, said push button having a lower end por-

tion of convex form and said conducting member being of substantially concave form and adapted thereby to be inter-engaged with said push button.

10. In construction for push button switches and the like, in combination, a casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having a push button movably supported at its upper end, an insulating block having mounted thereon a pair of contact members, a conducting member adapted to be bridged across said contact members upon actuation of said push button, and a spring for retracting said conducting member, said push button and said conducting member being shaped so that one is seated within the other and said spring and said conducting member being shaped so that one fits into the other.

11. In construction for push button switches and the like, in combination, a casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having a push button movably supported at its upper end, an insulating block having mounted thereon a pair of contact members, a conducting member adapted to be bridged across said contact members upon actuation of said push button, an inner casing supported by said outer casing, means for attaching said insulating block to said inner casing, and a spring for retracting said push button and interposed therebetween and said insulating block, said inner casing being shaped to enclose said conducting member and said spring.

12. In construction for push button switches and the like, in combination, an outer casing having means adapted to permit it to be secured to a wall and having an opening in the upper part thereof, an inner casing secured within said outer casing, a push button adapted to be inserted through said inner casing and into said opening in said outer casing and provided with electrically conductive means, a spring adapted to be inserted in said inner casing and to urge said push button outwardly through said opening, and means for substantially closing said inner casing and for holding the parts inserted therein in position comprising an insulating member having two connecting screws threaded therethrough, the inner threaded ends being adapted for coaction with said electrically conductive means associated with said push button and the outer headed ends being adapted to have secured in position electrical conductors.

13. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing secured to said outer casing and having depending walls shaped to provide depending extensions spaced along the peripheral edge of said walls, an insulating block carrying connecting terminals and shaped to fit against the peripheral edges of said depending walls intermediate of said spaced extensions and to be received between substantially oppositely positioned depending extensions, said insulating block substantially closing said inner casing, and a spring-retracted push button passing through the opening in said outer casing and extending into said inner casing for coaction with said connecting terminals.

14. In construction for push button switches and the like, in combination, an outer casing adapted to rest against the surface of a wall and provided with means adapted to permit it to be secured thereto, said casing having an opening in its upper part, an inner casing secured to said outer casing and having depending walls shaped to provide depending extensions spaced along the peripheral edge of said walls, an insulating block carrying connecting terminals and shaped to fit against the peripheral edges of said depending walls intermediate of said spaced extensions and to be received between substantially oppositely positioned depending extensions, the depending walls of said inner casing having also depending ears adapted to be bent over said insulating block to hold it against the peripheral edges of said inner casing, and a spring-retracted push button passing through the opening in said outer casing and into said inner casing for coaction with said connecting terminals.

In testimony whereof, I have signed my name to this specification this 24th day of April, 1928.

KNUD KNUDSEN.