Feb. 24, 1942. H. J. MURPHY 2,274,454

SWITCH

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Fig. 1.

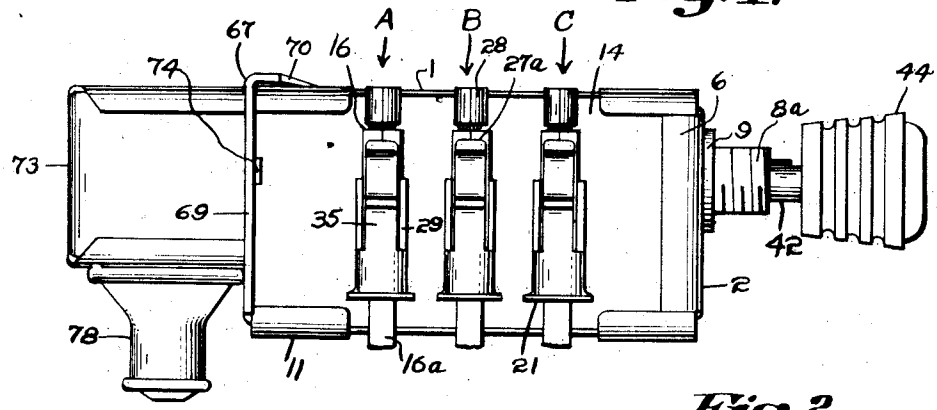


Fig. 2.

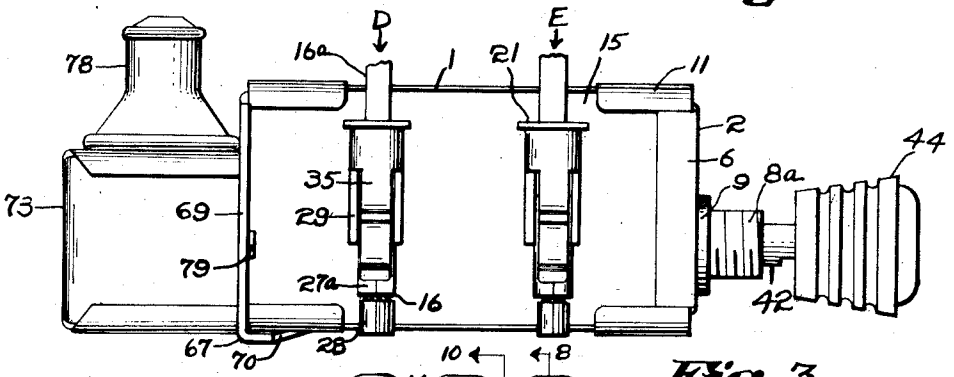


Fig. 3.

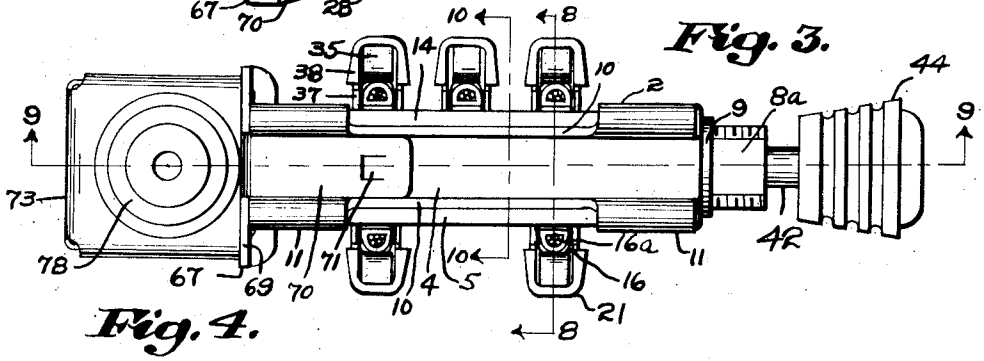
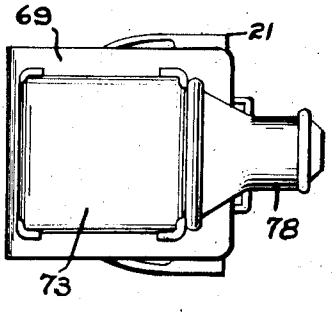


Fig. 4.



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Fig. 5.

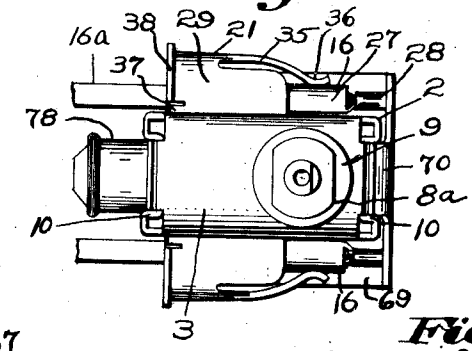


Fig. 6.

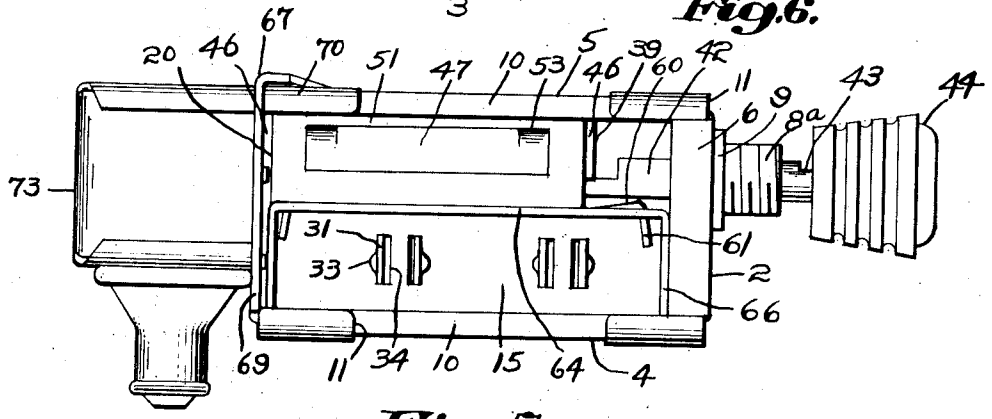


Fig. 7.

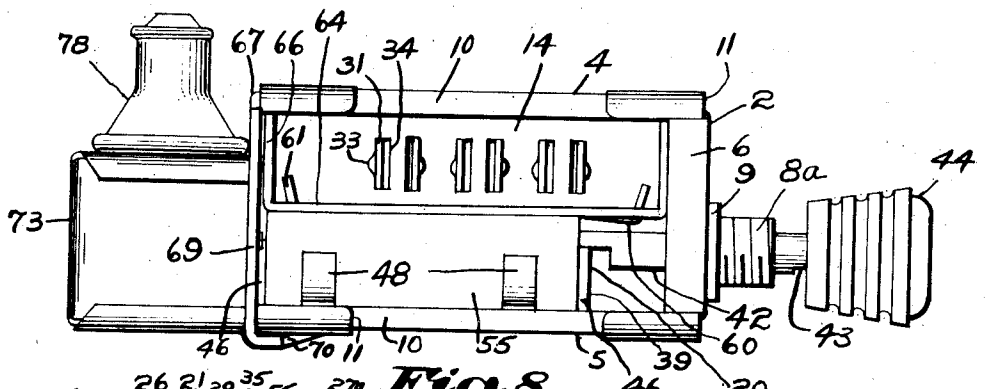
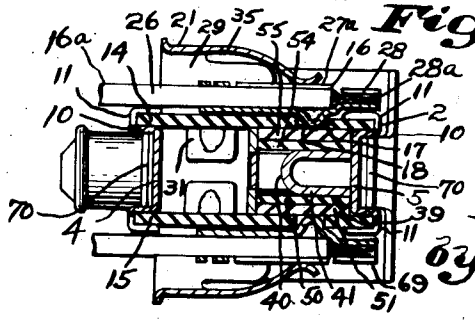


Fig. 8.



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Fig. 9.

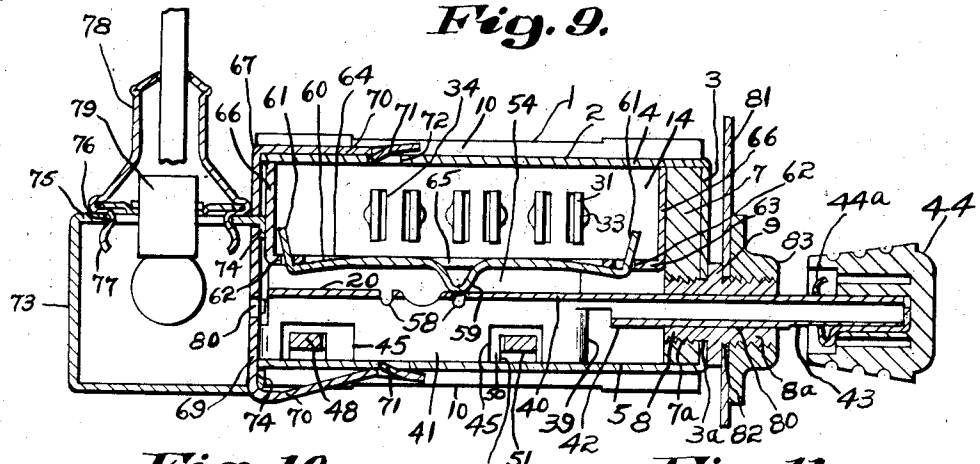


Fig. 10.

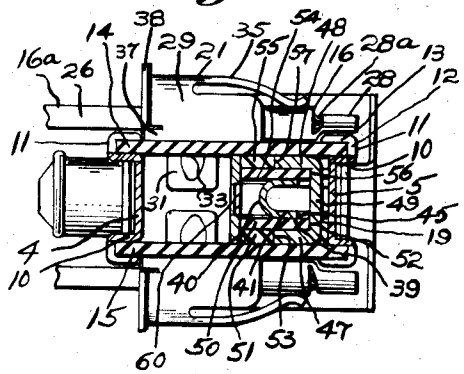


Fig. 11.

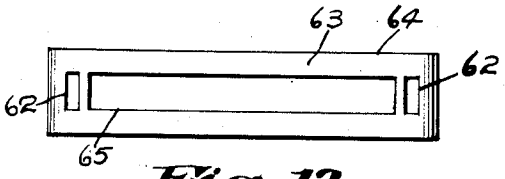


Fig. 12.

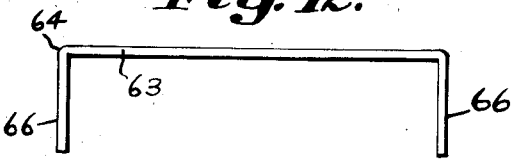


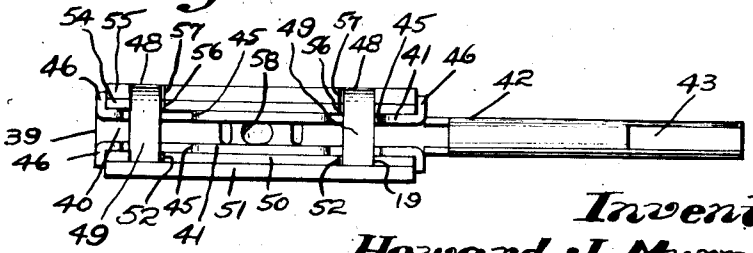
Fig. 13.



Fig. 14.



Fig. 14a.



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Fig. 15.

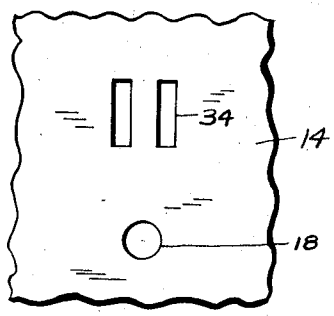


Fig. 16.

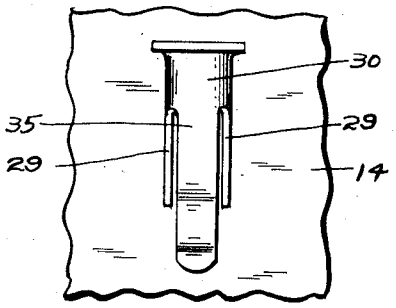


Fig. 17.

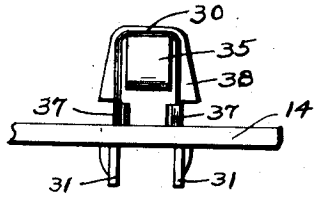


Fig. 18.

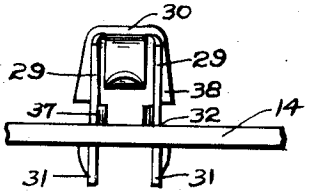


Fig. 19.

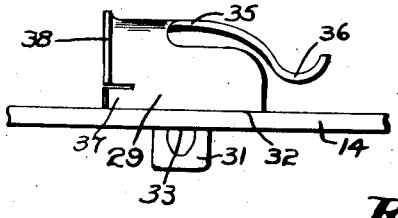


Fig. 20.

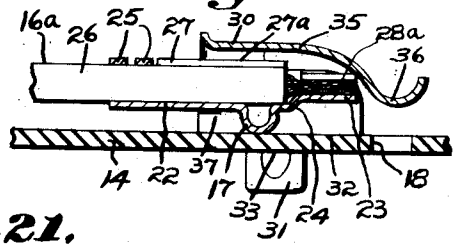
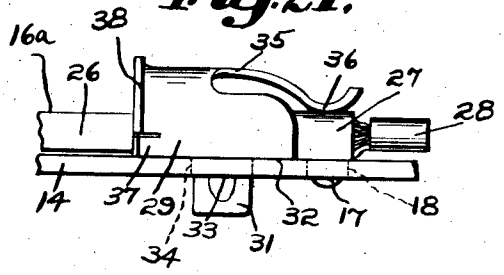


Fig. 21.



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Fig. 22.

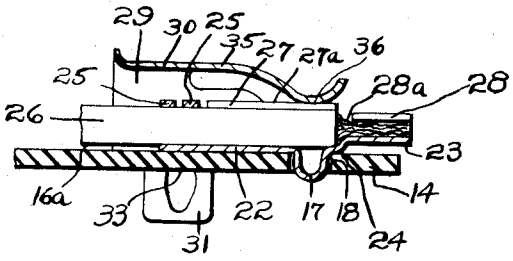


Fig. 23.

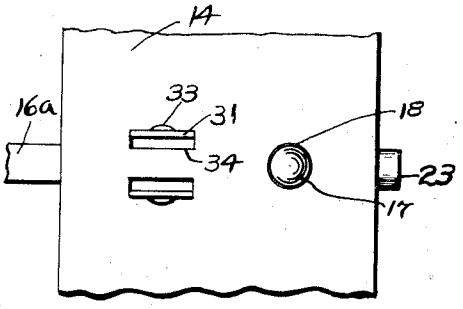


Fig. 24.

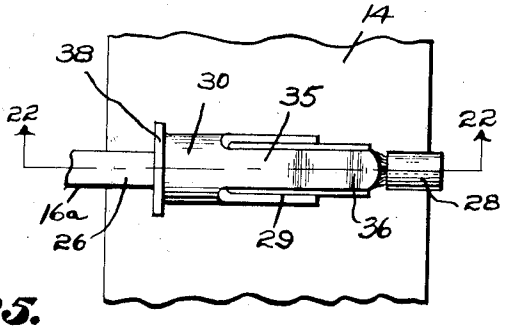


Fig. 25.

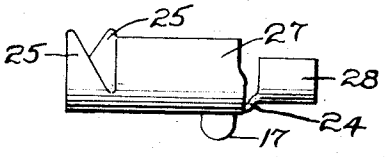


Fig. 26.

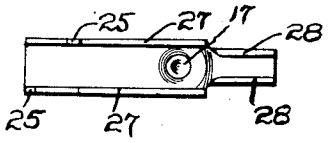


Fig. 27.

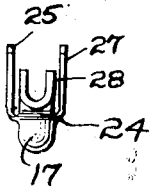
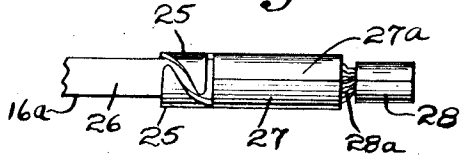


Fig. 28.



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Patented Feb. 24, 1942

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UNITED STATES PATENT OFFICE

2,274,454

SWITCH

Howard J. Murphy, Greenwood, Mass., assignor to United-Carr Fastener Corporation, Cambridge, Mass., a corporation of Massachusetts

Application June 25, 1938, Serial No. 215,795

12 Claims. (Cl. 200—16)

This invention relates to improvements in switches and refers more particularly to push and pull operative switches for automobiles and the like.

A broad object of this invention is to lessen the manufacturing cost of switches by constructing a switch of simple and inexpensive parts which may be assembled by hand.

Another object of this invention resides in the construction of the switch housing and the contact carrier wherein a light bulb may be assembled with the housing at one end for illuminating an operating knob at the other end.

Another object of this invention is the provision of a contact carrier in which parts thereof are secured in assembled relation upon insertion of the carrier into the housing.

Another object of this invention is a switch housing of simple construction wherein a pair of opposed sides provide channel means for receiving and holding another pair of sides.

Another object of this invention is to provide a construction wherein a wire terminal is detachably assembled with a dielectric plate on the outer surface thereof with the wire terminal having a contact portion extending through the plate.

A further object of this invention is the provision of a fastener means for holding the wire terminal in assembly with the plate and having means whereby the contact portion of the terminal is held under constant spring tension.

A still further object of this invention resides in the construction of the wire terminal enabling the terminal to be secured to wire conductors having varying diameters.

Other objects and purposes of my invention will be apparent from inspection of the drawings and specification hereinbelow set forth.

Referring to the drawings, in which I have illustrated a preferred embodiment of my invention:

Fig. 1 is a front plan view of a switch embodying my invention;

Fig. 2 is a rear plan view of the switch shown in Fig. 1;

Fig. 3 is a side plan view of the switch shown in Figs. 1 and 2;

Fig. 4 is an end view of my improved switch looking from the left of Fig. 3;

Fig. 5 is an end view of my improved switch looking from the right of Fig. 3 with the operating knob omitted;

Fig. 6 is a view similar to Fig. 1 with a supporting plate member of the switch omitted showing the interior construction of the switch;

Fig. 7 is a view similar to Fig. 2 with an opposite supporting plate member omitted to show the interior;

Fig. 8 is a section taken along the line 8—8 of Fig. 3;

Fig. 9 is a longitudinal sectional view through the switch structure;

Fig. 10 is a section taken along the line 10—10 of Fig. 3;

Fig. 11 is a detail top plan view of a spring supporting member;

Fig. 12 is a side view of the spring supporting member;

Fig. 13 is a detail top view of the spring member;

Fig. 14 is a side view of the spring member shown in Fig. 13;

Fig. 14a is a detail view of the movable contact carrier;

Fig. 15 is a top view of a dielectric plate having apertures for receiving a terminal fastener;

Fig. 16 is a top view showing a dielectric plate with a terminal fastener in assembly therewith;

Fig. 17 is a view of the installation shown in Fig. 16 looking at one end of the terminal fastener;

Fig. 18 is a view of the assembly shown in Fig. 16 looking at an opposite end of the terminal fastener;

Fig. 19 is a front plan view of the installation shown in Figs. 16–18;

Fig. 20 is a sectional view showing the manner in which my improved wire terminal having a wire conductor secured thereto is assembled with a dielectric plate;

Fig. 21 is a front plan view showing a wire terminal having a wire conductor secured thereto in assembly with a dielectric plate and maintained in position by my terminal fastener;

Fig. 22 is a sectional view of the assembly shown in Fig. 21;

Fig. 23 is a bottom plan view of the assembly shown in Fig. 21;

Fig. 24 is a top plan view of the assembly shown in Fig. 21;

Fig. 25 is a front view of my improved wire terminal before attachment thereof to a wire conductor;

Fig. 26 is a top view of the wire terminal shown in Fig. 25;

Fig. 27 is an end view of the wire terminal looking from the right of Fig. 25; and

Fig. 28 is a top view showing my improved wire terminal secured to a wire conductor.

Referring in detail to the construction of my improved switch as set out in the various figures, I have shown the switch housing indicated generally by the reference numeral 1. The main body of the housing is of rectangular shape and has a frame member 2 which is preferably stamped from a single piece of sheet metal. The frame member 2 comprises an end plate 3 and elongated side portions 4 and 5 extending from the end plate in spaced parallel relation. The end plate 3 has spaced side flanges 6 whereby a metal supporting piece 7 (Fig. 9) may be assembled with the frame 2 between the side flanges 6 and inner surfaces of the opposed side portions 4 and 5. In my preferred form, as most clearly shown in Fig. 9, I have provided a bushing having threaded ends 8 and 8a separated by a flange portion 9. The threaded end 8 is adapted to be inserted through an aperture 3a of the end plate 3 and entered into threaded engagement with an aperture 7a of the supporting piece 7 (Fig. 9). In my preferred form each of the side portions 4 and 5 has side walls 10—10 extending upwardly from opposite longitudinal edges thereof. Each of the walls 10, in my preferred form, provides a pair of integrally formed channel-shaped portions 11—11. Each of the channel portions 11, in my preferred construction, comprises a portion 12 extending in angular relation to the wall 10 and a portion 13 extending from the portion 12 in substantially parallel relation to the wall 10 toward the other side portion (Fig. 10). Thus the pair of channel-shaped portions 11 of the upper and lower edges of the side portions 4 and 5 are disposed in substantially opposite relation with the openings of the oppositely-disposed channel portions in facing relation. Opposed dielectric contact-supporting plate members 14 and 15 are received by opposed channel portions 11 at respective upper and lower edges of the side portions 4 and 5, as most clearly shown in Figs. 8 and 10, and serve in combination with the frame member 2 to enclose the entire rectangular main body of the housing except for the end opposed to the end plate 3, which is open prior to complete assembly of the parts of the switch and which is hereinafter referred to as the open end. It will be understood that although preferably I have formed the sides 4 and 5 of the housing with the side walls 10 and the channel portions 11, I do not wish to be limited by that particular construction because the side portions 4 and 5 could have other means than the channel portions 11 for securing the dielectric plates 14 and 15 thereto.

Mounted on the outer surfaces of the contact supporting plate members 14 and 15 are a plurality of movable wire terminals 16 secured to the end of a conductor 16a. Each of the wire terminals has a contact portion 17 extending through an opening 18 (Fig. 8) in the plate members 14 and 15 for electrical contact with a contact member 19 (Figs. 10 and 14a) carried by the contact carrier 20 reciprocably movable within the housing. Fastener members 21 detachably mounted upon the plate members 14 and 15 serve to maintain the terminals 16 in assembly with the plate members and at the same time provide means holding the wire terminals under constant spring tension whereby the contact portions 17 of the terminals are lifted against the action of the spring during engagement with the contact member 19 of the carrier member 20. Any number of wire terminals 16 may be arranged on the plate members 14 and 15 in any desired relationship, but in my preferred construction, as illustrated in Figs. 1 and 2, I have provided three terminals A, B and C on the plate member 14 and two terminals D and E on the plate member 15 so arranged in relation to the contact member 19 of the contact carrier 20 that when the contact carrier is in its innermost position, as illustrated in the figures, the battery terminal C will be in "off" position. When the contact carrier is moved to intermediary and outermost positions, it will connect electrically the terminals A, B and C and alternately in the two last-mentioned positions of the terminals D and E on the plate member 15.

Referring in detail to the particular construction of my preferred wire terminals 16, as shown most clearly in Figs. 25–28, I have provided one which is made of one piece of metal. The terminal preferably has a base portion comprising a portion 22 and an end portion 23 preferably raised slightly above the normal plane of the portion 22 and joined thereto by a connecting portion 24. A pair of substantially triangular-shaped attaching portions 25—25 extend upwardly from opposite edges of the base portion 22 at an end opposite that to which the connecting portion 24 is joined and disposed with their free ends in offset relation for clamping engagement with the insulating cover 26 of the conductor 16a to secure the terminal to the conductor. Side portions 27—27 extend from opposite edges of the base portion 22 intermediate the attaching portions 25—25 and the connecting portion 24 and have their free ends turned toward each other forming a flat surface 27a at the top of the terminal adapted to be engaged by a spring means of the fastener member 21. A pair of attaching portions 28—28 extend from opposite edges of the end portion 24 of the base and have their free ends turned toward each other, in my preferred form, forming a soldering lug providing an opening between the portions 28—28 and 24 for receiving the bare wires 28a extending beyond an end of the insulating covering 26 so as to connect the wires electrically to the terminal. At the same time the soldering lug acts as a guide means during assembly of the wire terminal with a plate-like supporting member in the manner to be described. The contact portion 17 is preferably in the form of a bump pressed from the portion 22 of the terminal base. The contact 17 has a greater dimension than the thickness of the plate-like supporting members 14 and 15 so as to extend entirely through the plate members for engaging the contact carrier.

In assembling a conductor with my improved wire terminal, the covering 26 is placed between the pair of attaching portions 25—25 and the side portions 27—27 and the bare wires 28a are disposed between the portions 28—28. Then the portions 25—25 are crimped over to grip the covering 26 whereby the terminal is firmly secured to the wire conductor. The side portions 27—27 are bent to dispose the free ends thereof in the plane of the flat surface 27a at the top of the terminal and the portions 28—28 are bent to enclose substantially the bare wires 28a. Electrical connection between the wires 28a and the terminal may now be made positive by dipping the soldering lug of the terminal into solder.

As a result of the particular construction of my improved wire terminal hereinbefore described, it may be secured to conductors having varying diameters at their insulating covers, thus

satisfying a need of manufacturers for a wire terminal which would be universal to any one of various size conductors which they should choose to use in connection with the electrical apparatus of different types.

The fastener member 21, most clearly illustrated in Figs. 15—19, is preferably formed of one piece of spring metal. The fastener, in my preferred form, comprises a pair of spaced yieldable side wings 29—29 joined together near their ends at the top of the member by a connecting portion 30 of less length than the side wings. A leg portion 31 extends beyond a lower edge 32 of each of the side wings 29—29 with each of the legs of less width than the respective side wing so as to form land portions or plate-engaging shoulders at the edges 32. Each of the legs 31 has a shoulder portion 33 pressed therefrom whereby the legs 31 may be snapped through parallel elongated apertures 34 (Fig. 15) in the plate members 14 and 15 to dispose the shoulder portions 33 against an opposite surface of the plate member from that engaged by the edges 32 of the side wings. The side wings 29 are adapted to receive a wire terminal 16 between them after attachment of the fastener to the plate member to hold the wire terminal in assembly with the supporting plate member. As a means for holding the wire terminal in assembly with the plate member I have formed a spring arm 35 integral with the connecting portion 30 of the fastener and extending above the opening between the side wings. The arm 35 has a terminal-engaging portion 36 adjacent its free end (Fig. 5) normally disposed nearer the plate member than the cross-sectional dimension of the wire terminal 16 through the contact portion 17. Assembly of the wire terminal with the plate member is a relatively simple matter and may be quickly and easily carried out by first securing the fastener member to the plate member by snapping the legs 31—31 through the apertures 34 thereof. Next, the wire terminal 16 is moved into an open end of the fastener member between the side wings to engage the soldering lug of the terminal with the under surface of the spring arm 35, as most clearly shown in Fig. 20. As movement of the terminal through the fastener member is continued, the arm 35 will be forced upwardly against the natural spring tension thereof until the contact portion has seated itself in final position within the opening 18 of the plate member, as shown in Figs. 21 and 22, whereby the portion 36 of the arm 35 engages the surface 37a of the wire terminal to assemble it firmly with the plate member.

Any suitable means may be employed for preventing incorrect insertion of the wire terminal into the terminal-receiving end of the fastener, but in my preferred form I have chosen to form ears 37—37 integral with the side wings 29—29 at the terminal-receiving end. The ears 37—37 are bent inwardly out of the plane of the side wings 29—29 at the terminal-receiving opening so that the distance between the ears is less than the widest dimension of the terminal, but greater than the widest dimension of the contact portion 17 of the terminal. At the same time the distance from the connecting portion 30 of the fastener member and the nearest edges of the ears 37—37 is less than the cross-sectional dimension of the wire terminal through the contact portion 17 with the result that the terminal can be moved through the open end of the fastener only when the contact portion 17 of the terminal is in proper relative position for entrance into the opening 18. The terminal-receiving end of the fastener may be flared as at 38 to provide a lead for the wire terminal. In my preferred construction the ears 37—37 are bent inwardly toward each other and then outwardly toward their free ends so as to present a relatively smooth surface which will not injure the insulating covering 26 of the conductor when the parts are in final assembly.

The contact carrier 20, as most clearly shown in Figs. 6–10 and 14a has a metal body portion, generally designated by the numeral 39, which comprises a base portion 40 (Figs. 8, 10 and 14a) and spaced upstanding side walls 41. An actuating rod 42, preferably formed integral with the body portion 39, extends from one end thereof. The actuating rod 42 is preferably tubular to present a light passage in alignment with the space between the side walls 41—41 for a purpose to be described. The outermost end may be flattened on one side 43 so as to be detachably secured in non-rotatable relation to a knob 44, as will be described. The side walls 41—41 of the carrier member have oppositely-disposed openings 45 extending from the outermost edges of the side walls toward the base portion 40, as most clearly shown in Fig. 9. Integral side flanges 46 are provided at opposite ends of the side walls 41—41 with the side flanges at adjacent ends extending away from each other for a purpose to be described (Fig. 14a). The contact member 19 supported by the contact carrier has an elongated contact portion 47 (Figs. 6 and 10) disposed on one side of the carrier member for electrical engagement with the terminals A, B and C and a pair of relatively narrow contact portions 48—48 (Figs. 7 and 10) in spaced relation to the contact portion 47 and joined to the contact portion 47 by bridge portions 49—49 (Fig. 14a) which are disposed within the openings 45 of the side walls 41. The contact portions 48—48 are disposed on an opposite side of the member from the portion 47 for electrical engagement with the terminals D and E. The contact portion 47 is insulated from the body portion 40 and maintained in temporary proper relative position to the body member by a pair of insulating plates 50 and 51. The inner insulating plate 50 is disposed between the side flanges 46 of one of the side walls 41 and has a pair of openings 52—52 receiving the bridge portions 49—49 and having smaller dimensions than the openings 45 of the adjacent side wall 41 to prevent engagement between the bridge portions and the body member. The outer insulating plate 51 is disposed between the side flanges 46 and in abutting relation with the outer surface of the plate 50. The plate 51 has an opening 53 receiving the contact portion 47, which is disposed outside the outer surface of the plate 50. The plate 51 has substantially the same thickness as the contact portion 47 whereby the outer surface of the contact portion 47 lies substantially flush with the outer surface of the plate 51.

The contact portions 48—48 are insulated from the body portion 39 and maintained in temporary proper relative position to the body member by a pair of insulating plates 54 and 55. The inner plate 54 is disposed between the side flanges 46 and has one side in abutting engagement with the outer surface of the side wall 41. The plate 54 has openings 56—56 (Figs. 10 and 14a) of less dimensions than the openings 45 of the side wall for receiving the bridge portions

48—48 and preventing any electrical engagement between the bridge portions and the body portion 39. The outer plate 55 has openings 57—57 for receiving the contact portions 48—48. As a result of the fact that the contact portions 48—48 have substantially the same thickness as the plate member 55, the inner surfaces thereof abut the plate member 54 and their outer surfaces lie substantially flush with the outer surface of the plate member 55, as most clearly shown in Fig. 10.

The outer surface of the base portion 40 of the body portion 39 has three indentations 58 (Figs. 9 and 14a), in my preferred form, formed in the path of a male portion 59 of a spring member 60 for indicating the different positions of the carrier member. The spring member 60 is preferably of elongated form having outwardly-bent free end portions 61—61 extending through apertures 62—62 in a plate portion 63 of a spring supporting member 64. The male portion 59 of the spring member is disposed intermediate the end portions 61—61 and the plate portion 63 of the spring supporting member 64 has an elongated opening 65 (Figs. 9 and 11) of slightly greater width than the spring member 60 for receiving portions of the spring member during contraction thereof through engagement of the male portion 59 with the indentations 58 of the carrier member. The plate portion 63 of the supporting member 64 is spaced from the side 4 of the frame by integral angularly-extending legs 66—66 having their outermost free ends in engagement with the side portion 4, as most clearly shown in Fig. 9.

As a means for maintaining the supporting member 64, the spring member 60 and the contact carrier in relative position within the housing for proper operation of the switch, I have provided a clip member 67 having a base portion 69 and spaced angularly-extending yieldable legs 70 integrally joined thereto (Fig. 9). Each of the legs 70 has outwardly-struck shoulder means 71 adapted to enter into cooperative snap fastener engagement with the side portions 4 and 5 of the frame through apertures 72 thereof (Fig. 9) for securing the clip member to the housing. When the clip member is in final attached position the base portion 69 encloses the open end of the housing thus limiting longitudinal movement of the interior parts of the housing through the open end.

In my preferred form of switch a box-like light housing 73 is secured to the base portion 69 through means of lugs 74 integral with walls of the light housing extending through the base portion 69 and crimped over on an opposite surface of the base portion from the light housing (Fig. 9). A side wall 75 of the light housing has an opening 76 (Fig. 9) for receiving yieldable attaching portions 77 of a light socket 78, as most clearly shown in Fig. 9. The light socket 78 is of a well known construction and has means for receiving and holding the base 79 of a lamp bulb. The lamp bulb is disposed within the light housing and is adapted to shine through an opening 80 in the base portion 69 (Fig. 9), the light passage between the side walls 41—41 of the body member 39 of the contact carrier, and the hollow actuating rod 42 for illuminating the transparent knob 44. The actuating knob 44 may be detachably secured to the rod 42 by any suitable means, but I have preferred to show the knob secured to the rod by a fastener member 44a similar to that illustrated and described in connection with my copending application, Serial No. 152,581, filed July 8, 1937.

Assembly of the parts of the switch is a relatively simple matter and may be carried out substantially by hand in a minimum amount of time. Although there are several ways in which assembly may be accomplished, I prefer the method hereinbelow set forth. The metal supporting piece 7 is first disposed between the side flanges 6 and inner surfaces of the opposed side portions 4 and 5 in adjacent relation to the end plate 3 of the frame member 2, and the threaded end 8 of the bushing is inserted through the opening 3a of the end plate 3 and turned into threaded engagement with the aperture 7a of the supporting piece 7. Thus one surface of the flange portion 9 of the bushing will be disposed adjacent the outer surface of the end plate 3. Next, the panel-supporting members 14 and 15 having the fastener members 21 mounted thereon are moved into the channel-shaped portions 11 of the respective upper and lower edges of the side portions 4 and 5 from the open end of the housing longitudinally of the housing. In the next step the spring supporting member 64 having the spring member 60 assembled therewith is moved into the housing through the open end thereof so as to engage the free ends of the legs 66 with the side portion 4 of the frame 2 and the outer surface of the innermost leg 66 with the exposed surface of the supporting piece 7. In the next step the contact carrier 20 is moved into the housing through the open end with the actuating rod 42 extending through a central bore 80 (Fig. 9) of the bushing 6 and projecting beyond the outermost end of the bushing. The clip member 67, which may carry the light housing 73, is next assembled with the housing at the open end by moving the yieldable legs 70 over the side portions 4 and 5 of the housing to snap the shoulder means 71 into the apertures 72 of the side portions (Fig. 9). Thus the clip member 67 serves to prevent removal of the supporting member 64 and the contact carrier 20 through the open end. It will be noticed (Fig. 9) that when the parts are finally assembled together, the supporting member 64 is maintained in firm position within the housing through engagement of one of the legs 66 thereof with the supporting base 9 and the other leg in engagement with an inner surface of the base portion 69 of the clip member 67 or, as in my preferred form, with one of the lugs 74 of the light housing (Fig. 9). At the same time it will be noticed that the end of the body portion of the contact carrier opposite the end from which the actuating rod 42 extends substantially abuts the inner surface of the base portion 69 of the clip portion 67 when the contact carrier is in "off" position (Fig. 9). It is important to notice that when the contact carrier has been moved into final position within the housing, the plate supporting members 14 and 15 substantially engage outer broad surfaces of the outer insulating plates 51 and 55 of the contact carrier so as to maintain the plates between side flanges 46 of the respective side walls 41. At the same time longitudinal narrow edges of the insulating pieces 50, 51, 54 and 55 abut the inner surface of the side portion 4 of the frame member and the plate portion 63 of the spring supporting member 64 so as to limit transverse movement of the insulating pieces relative to the contact carrier. The side flanges 46 of the walls 41—41 of the

contact carrier serve to limit longitudinal movement of the insulating pieces relative to the carrier.

The switch housing may be secured to a supporting panel 81 (Fig. 9) by moving the threaded end 8a of the bushing through an opening 82 in the panel to dispose a surface of the flange portion 9 against a surface of the supporting panel 81 and then fixedly securing the housing to the supporting panel by means of a collar 83 in threaded engagement with the end 8a of the bushing. Finally, the wire conductors 16a having the wire terminals 16 secured to an end thereof are moved into the opening between the side wings 29—29 of the respective fastener members 21 to dispose the contact portions 17 within the apertures 18 of the panel-supporting members whereby they are maintained in position under spring tension by the respective spring arms 35. The contact portion 17 of the battery terminal C normally engages the outer surface of the outer insulating plate 51 of the contact carrier when the contact carrier is in innermost position, as shown in Fig. 9, so that the switch is in "off" position. As the actuating rod 42 of the contact carrier is pulled toward the operator to the two "on" positions, the contact portion 47 is electrically connected with the battery terminal.

Thus by my invention I have provided a compact and efficient switch comprising parts of simple construction capable of being easily and quickly assembled into unit form.

Although I have illustrated and described a preferred form of my invention, I do not wish to be limited thereby because the scope of my invention is best defined by the following claims.

I claim:

1. A switch of the class described comprising a housing having a pair of spaced side walls, a pair of contact means carried by said housing, a spring supporting member disposed within said housing having a plate portion and angularly extending portions engaging a side wall of said pair to space said plate portion therefrom, a spring means supported by said plate portion having a projecting means, and a contact carrier reciprocable in said housing between said plate portion and the other side wall of said pair, said carrier comprising a metal body member, and a contact member carried by said body member in insulating relation thereto, said body member having a depression therein receiving the projecting means of said spring means to provide a stop at one position of the reciprocable motion of said carrier.

2. A switch of the class described comprising a housing, contact means carried by said housing, a supporting member disposed within said housing and spaced from a side of said housing, thereby providing an opening within said housing for receiving an attaching portion of a member by which a lead wire is secured to said housing, a contact carrier reciprocable in said housing between said supporting member and the sides of said housing, said carrier comprising a metal body member, a metal contact member carried by said body member and insulating pieces insulating said contact member from said body member, said supporting member and the sides of said housing combining to hold said contact member and said insulating pieces in assembly with said body member.

3. A switch of the class described comprising a housing having two pairs of spaced parallel sides, contact means carried by said housing, a supporting member disposed within said housing having a plate portion and angularly extending legs engaging a side of one of said pairs to space said plate portion therefrom thereby providing an opening within said housing for receiving an attaching portion of a member by which a lead wire is secured to said housing, a contact carrier reciprocable in said housing between said plate portion and the sides of said housing, said carrier comprising a metal body member, a metal contact member carried by said body member and insulating pieces insulating said contact member from said body member, said plate portion and sides of said housing combining to hold said contact member and said insulating pieces in assembly with said body member.

4. A switch of the class described comprising a housing carrying contact means, a supporting member disposed within said housing having a plate portion and angularly extending spacing means engaging a side of said housing to space said plate portion from said last-mentioned side, a contact carrier reciprocable in said housing between said plate portion and the sides of said housing, said contact carrier comprising a metal body member having an integral actuating rod extending therefrom, a metal contact member carried by said body member having contact portions on opposite sides of said body member for electrical engagement with the contact means carried by said housing, insulating pieces assembled with said body member insulating said contact member from said body member, said plate portion and sides of said housing combining to hold said contact member and said insulating pieces in assembly with said body member.

5. A switch of the class described comprising a switch housing having a dielectric member enclosing one of the sides of said housing, a contact carrier reciprocably mounted within said housing carrying a contact member which is stationary relative to said carrier, a spring actuated wire terminal carried by said dielectric plate, said terminal having a portion extending within said housing for electrical engagement with the contact member carried by said carrier and a fastener member having spaced side portions in engagement with said dielectric plate through apertures thereof, said wire terminal being maintained in assembly with said plate between said side portions, and said fastener having a spring arm portion engaging said terminal to hold said terminal under spring tension.

6. A switch of the class described comprising a box-like housing having dielectric plates enclosing two sides of said housing, a contact carrier reciprocably mounted within said housing carrying a contact member which is stationary relative to said carrier, a one-piece spring actuated wire terminal carried on the outer surface of at least one of said dielectric plates, said terminal having a portion extending within said housing for electrical engagement with the contact member carried by said carrier, and a fastener member having shouldered spaced side portions in snap fastener engagement with said dielectric plate through apertures thereof, said wire terminal being maintained in assembly with said plate between said side portions, and said fastener having a spring arm portion engaging said terminal to hold said terminal under sprnig tension.

7. In an electrical device the combination comprising an apertured supporting member, a wire terminal carried by said supporting member hav-

ing a laterally projecting contact portion extending into an aperture of said supporting member and a fastener member having spaced attaching portions in fastener engagement with said supporting member through apertures thereof, said terminal being disposed between said attaching portions of said fastener, and said fastener having a spring portion engaging said wire terminal to maintain said terminal under spring tension.

8. In an electrical device the combination comprising an apertured supporting member, a wire terminal carried by said supporting member having a contact portion extending into an aperture of said supporting member and a fastener carried by said supporting member having spaced yieldable legs, said legs extending through said supporting member and having laterally-projecting portions engaging behind said support, said terminal being disposed between said sides of said fastener, and said fastener having a spring portion engaging said wire terminal to maintain said terminal under spring tension.

9. In an electrical device the combination comprising an apertured supporting member, a wire terminal carried by said supporting member having a contact portion extending into an aperture of a supporting member and a fastener carried by said supporting member having spaced side portions providing land portions engaging an upper surface of said support, yieldable leg portions extending from said side portions through said supporting member and engaging an opposite surface of said support, and said terminal and said fastener having cooperating engaging means maintaining said terminal in assembly with said support.

10. In an electrical device the combination comprising an apertured supporting member, a wire terminal carried by said supporting member having a contact portion extending into an aperture of said supporting member and a fastener carried by said supporting member having spaced side portions providing land portions engaging an upper surface of said support, yieldable leg portions extending from said side portions through said supporting member and engaging an opposite surface of said support, said terminal being disposed between said side portions of said fastener and said fastener having an integral spring portion engaging said wire terminal to maintain said terminal under constant spring tension.

11. A switch of the class described comprising a housing carrying contact means, a contact carrier reciprocable in said housing, said carrier comprising an elongated metal body member of U-shaped cross-section, a hollow metal shaft integrally joined to said body member at one end thereof, a pair of spaced side flanges extending outwardly from said body on opposite sides thereof, metal contact portions carried by said body member between said pairs of side flanges for electrical engagement with the contact means carried by said housing, insulating pieces assembled with said body member between said pairs of side flanges insulating said respective contact portions from said body member.

12. The combination with a wire conductor having an insulating covering and an exposed wire extending beyond an end of said covering of a wiring terminal having a portion adjacent a portion of the covering, a wiring lug adjacent to the end of the wire and electrically connected thereto, and a tubular contact-making portion integrally joined to one of said portions projecting away from said portion in substantially transverse relation thereto.

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