

Oct. 6, 1959

J. LONG ET AL

2,907,852

SWITCH

Filed March 13, 1957

5 Sheets-Sheet 1

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Oct. 6, 1959

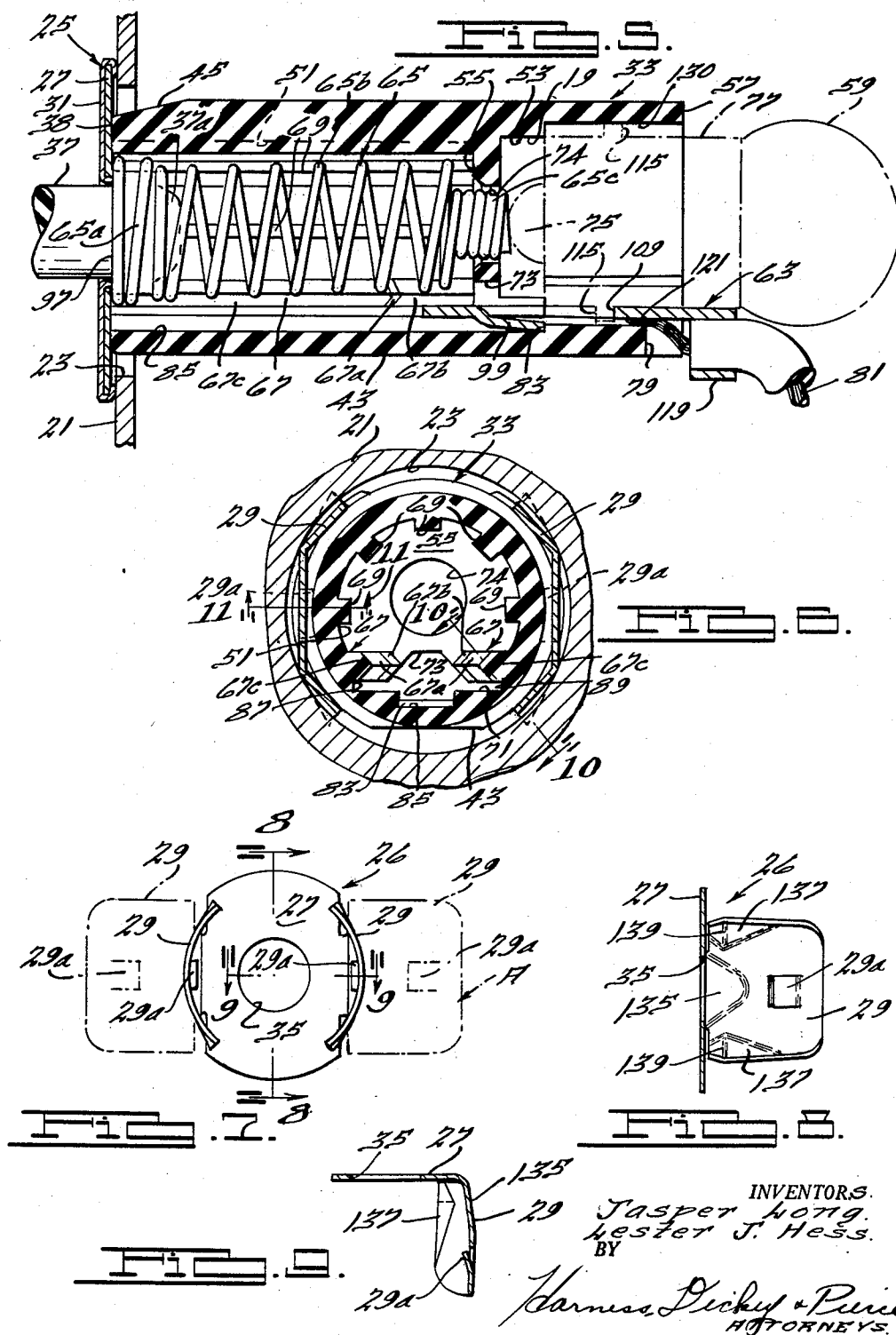
J. LONG ET AL

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SWITCH

Filed March 13, 1957

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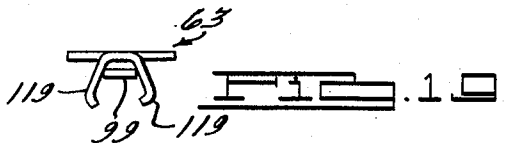
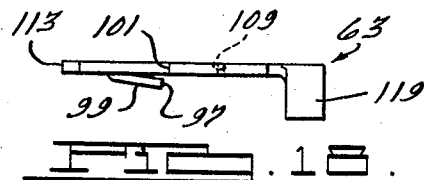
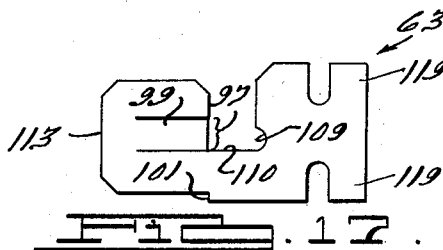
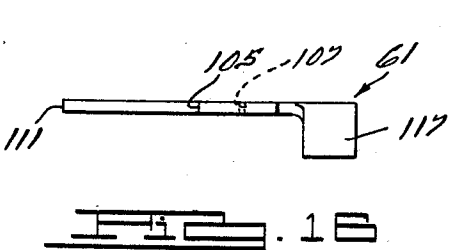
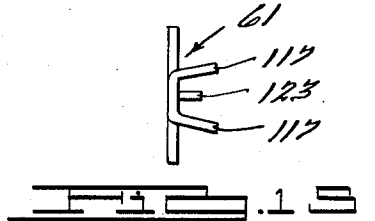
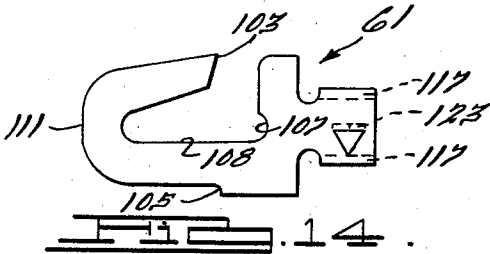
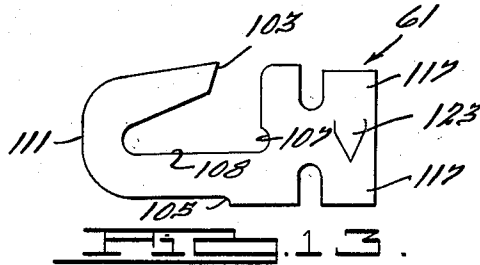
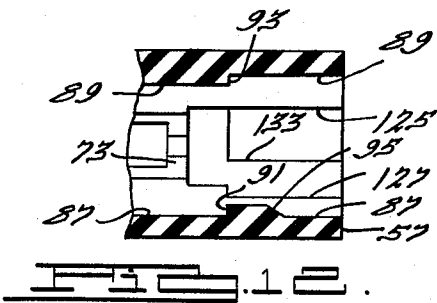
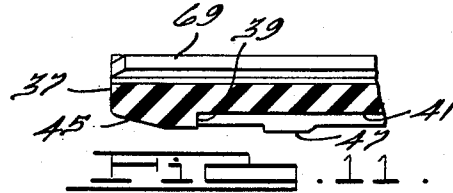
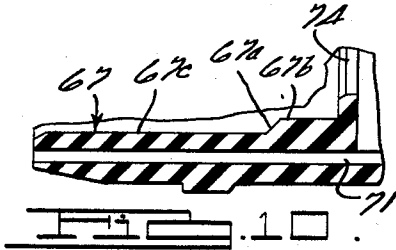
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SWITCH

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5 Sheets-Sheet 3



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SWITCH

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5 Sheets-Sheet 4

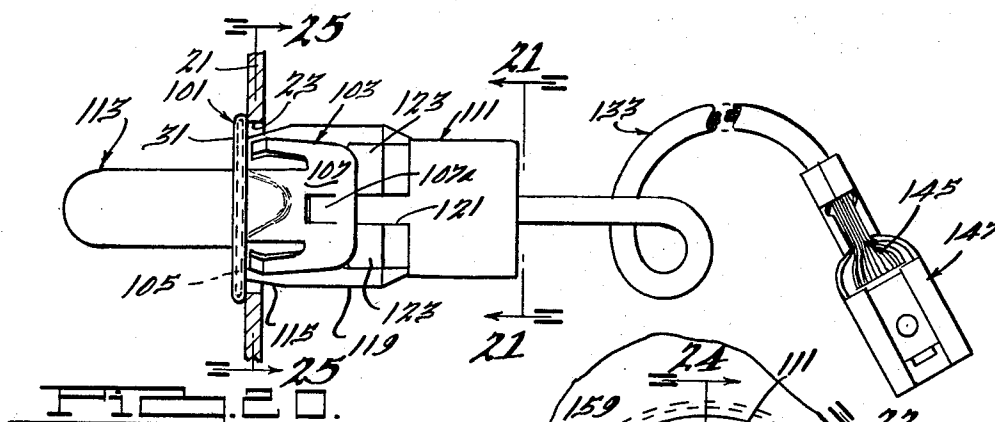


FIG. 20.

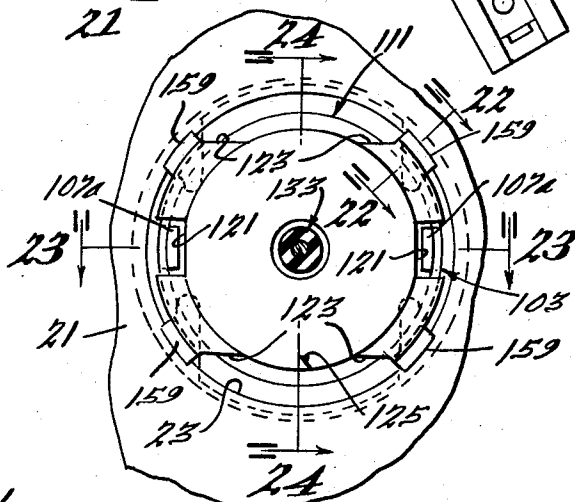


FIG. 21.

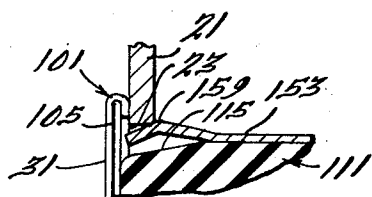


FIG. 22.

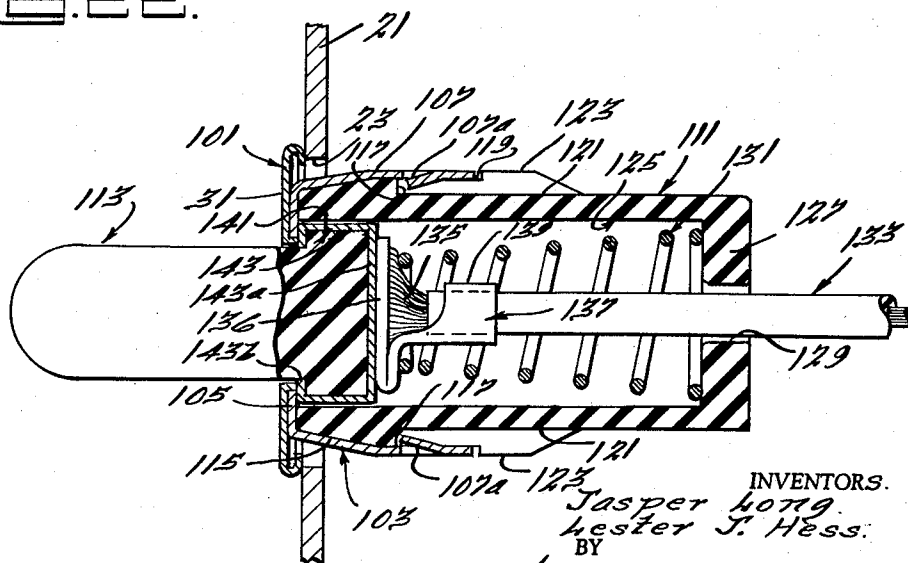


FIG. 23.

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2,907,852

SWITCH

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Application March 13, 1957, Serial No. 645,782

17 Claims. (Cl. 200—159)

This invention relates to relatively small combined switch and light-retainer assemblies of the type which is carried within an aperture in a current-conducting member and which is adapted for use in the glove compartment of motor vehicles.

An important object of the invention is to provide an improved combination switch and light-retainer assembly consisting of relatively few parts which are specially constructed to effect substantial economies in manufacturing costs and which may be easily and quickly assembled on a production basis.

Other important objects of the invention are to provide improved means to operatively and electrically relate the several parts of the switch and light-retainer assembly so that it is especially rugged in construction and reliable in operation; and to provide in an assembly of this character a superior combination comprising among other structure: improved longitudinally movable spring contact means, an improved nonconductive housing construction which is adapted for production by low-cost molding techniques, which incorporates means to guide and support said spring contact means preventing buckling of the same and which is arranged to receive and retain a plurality of structurally different terminal contact means, and improved conductive retainer means in an advantageous snap-on form in relation to said housing which provides greater radial resilience without increase in cost to permit of greater tolerances in the forming of the carrying aperture in the current-conducting member through which the retainer means projects.

It is still another object of the invention to provide in combination with the foregoing structure improved terminal contact means.

The above and related objects will become apparent during the course of the following description taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is an elevational view of the combined switch and light-retainer assembly embodying the invention shown mounted on a current-conducting member;

Fig. 2 is a vertical section with parts removed, substantially along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary section along the line 3—3 of Fig. 2;

Figs. 4 and 5 are, respectively, horizontal and vertical sections along the lines 4—4 and 5—5 of Fig. 2 with certain parts in elevation;

Fig. 6 is a vertical section along the line 6—6 of Fig. 1 with certain parts removed;

Fig. 7 is an elevational view looking at the inside of the retainer ring, also showing in dotted lines a pre-finished form of the same;

Figs. 8 and 9 are, respectively, vertical and horizontal sections taken along the lines 9—9 and 10—10 of Fig. 8;

Figs. 10 and 11 are, respectively, fragmentary sections of the housing only, substantially along the lines 10—10 and 11—11 of Fig. 6;

Fig. 12 is a fragmentary section of the housing only, substantially along the line 12—12 of Fig. 2;

Fig. 13 is a plan view of the blank from which is made one form of terminal contact means employed in combination with the other structure of the combined switch and light-retainer assembly embodying the invention;

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Figs. 14, 15 and 16 are, respectively, plan, rear and side views of the completed terminal contact means of Fig. 13;

Fig. 17 is a view similar to Fig. 13 of another form of terminal contact means;

Figs. 18 and 19 are, respectively, side and rear views of the completed terminal contact means of Fig. 17;

Fig. 20 is an elevational view of a switch assembly embodying the invention shown mounted on a current-conducting member;

Fig. 21 is a vertical section of the structure of Fig. 20 substantially along the line 21—21 thereof;

Fig. 22 is a fragmentary section along the line 22—22 of Fig. 1;

Figs. 23 and 24 are vertical and horizontal sections along the lines 23—23 and 24—24, respectively, of Fig. 21;

Fig. 25 is a vertical section substantially along the line 25—25 of Fig. 1;

Fig. 26 is an elevational view looking at the inside of a modified construction of retainer ring, also showing in dotted lines a prefinished form of the same; and

Figs. 27 and 28 are vertical and horizontal sections taken along the lines 27—27 and 28—28, respectively, of Fig. 26.

Referring now to the drawings, the combined switch and light-retainer assembly embodying the invention is shown in Fig. 1 mounted in cantilever fashion on a current-conducting member 21 which is a part of the structure of the glove compartment of a motor vehicle the construction of which is conventional and not shown. The current-conducting member 21 is provided with an opening 23 through which the retainer means, indicated generally at 25, projects and in so doing resiliently engages the inner surfaces of the opening 23. The details and advantages of the construction of the retainer means 25 will be described and pointed out more fully hereinafter and it will suffice to state at this point that it comprises a retainer ring, generally designated 26, having a body portion 27 from opposite sides of which project relatively wide fingers 29 each of which is specially crimped as will be described and provided with a partially stamped out inwardly projecting detent 29a. The retainer ring 26 is permanently assembled by way of its body portion 27 as a unit with a bezel 31 as shown. The diameter of the bezel 31 and the largest dimension of the body portion 27 are larger than the opening 23 so that they are disposed on one side thereof while the tubular housing, indicated generally at 33, for the other structure of the switch and light-retainer assembly is disposed on the other side of the opening 23. The bezel 31 is provided with a central aperture not shown but which coincides with the central aperture 35 (Fig. 7) formed in the body portion 27 of the retainer ring 26. The switch button 37 which is actuated by the glove compartment door projects through the aperture in the bezel and the aperture 35 into the housing 33.

The forward end, as at 38, of the housing 33 snaps into the retainer ring 26 and in so doing forcefully engages and outwardly expands the fingers 29 which causes them in turn to grip the opening 23 in the current-conducting member 21 with greater force. Movement of the housing 33 relative to the retainer ring 26 in a direction opposite to that in which it is forced for snap-on engagement is prevented by the inwardly projecting detents 29a which engage shoulders 39 formed in the external surfaces of the housing 33 on opposite sides thereof. The shoulders 39 are best shown in the fragmentary sectional view of the housing 33 in Fig. 11 and are formed by longitudinally extending depressions 41 which are recessed as shown from the normal exterior surface. The housing 33 is molded preferably from phenolic resin

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and the depressions 41, as well as the entire internal structure of the housing 33, which will be described in greater detail shortly, is capable of being formed during the molding operation by longitudinally disposed core pins which project inwardly from opposite ends of the housing 33 during its formation and which are removable outwardly therefrom at the completion of the molding process. In this way substantial economies can be realized in the cost of manufacture of the housing in contrast to the housing of prior devices of this character. Before passing to a description of the interior structure of the housing 33 it should be noted that the underbody external surface or bottom of the housing is flat, as at 43, and that a taper is provided inwardly of the forward end 38 by a frusto-conical portion 45 to facilitate entry of the forward end 38 between the fingers 29. Also, the outside surfaces of the housing 33 have formed thereon at each of the opposite sides of the housing transversely disposed bosses 47, 49, raised from the normal exterior surface and spaced respectively above and below the depressions 41. The bosses 47, 49 protectively project outwardly of the normal exterior surface of the housing 33 slightly more than each finger 29 and are contiguous with the outer edge of the latter to prevent possible engagement therewith by any structure of the glove compartment when the assembly is slipped through the opening 23 for mounting.

The interior structure of the housing 33 which will now be described is intricate but nevertheless is capable of being formed with longitudinally extending core pins as previously mentioned. The interior structure of the housing 33 is divided into a switch chamber, indicated generally at 51, and a light-retainer chamber radially offset or eccentric with respect to chamber 51, indicated at 53, by an integrally formed transverse dividing wall 55 which is disposed closer to open end 57 opposite the end 38 so that the switch chamber 51 is considerably longer than the light-retainer chamber 53. The light-retainer chamber 53 is adapted to removably retain a conventional light or bulb, indicated at 59, and to receive a variety of different terminal contact means, such as the two forms shown by way of example in Figs. 13-15, 17-19, and generally designated 61, 63, respectively. The terminal contact means 63 is the one shown secured in the housing 33 in Figs. 1-6 and the manner in which it cooperates with the interior structure thereof will be described in greater detail hereinafter and the same will be described for the terminal contact means 61. The switch chamber 51 receives the inner end of the switch button 37 and guides and supports the spring contact means, indicated generally at 65, by which the make and break of the electrical circuit occurs, as will be described.

The interior structure of the switch chamber 51 is provided with a plurality of circumferentially spaced ribs which extend longitudinally from the open end 38 to the transverse dividing wall 55. The lowermost pair of ribs are indicated generally at 67 and the ribs above these are indicated at 69. Each of the ribs 69 is identical in construction, having a substantially rectangular shape in cross-section as can be seen by reference to Fig. 6. In the instance shown there are five such ribs, two of which are located at opposite sides of the housing 33 and one is located at the top thereof, while the other two are each equally spaced between the top rib and one of the side ribs. The ribs 69 cooperate with lowermost pair of ribs 67 to cradle the spring contact means 65 in its movement within the switch chamber 51. Each of the lowermost pair of ribs 67 has a combination rectangular-triangular shape in cross-section as shown and at approximately three-quarters of its length inward from the end 38, a 45° step, indicated at 67a, is formed thereon which projects toward the vertical axis of the housing 33 and divides each rib 67 into a forward and rearward portion 67c, 67b, respectively. The structure of each of the pair of ribs 67 is best shown in the fragmentary sectional

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view of Fig. 10, by reference to which and to Fig. 6 it will be noted that the forward portions 67c of the pair of ribs 67 form a cradle section with the ribs 69 for the spring contact means 65 of greater diameter than the cradle section formed by the rearward portions 67b and the same ribs 69. The purpose of the two different diameter cradle sections will appear shortly. The pair of ribs 67 are raised from the bottom surface of the housing 33 as can be seen in Fig. 6 and form partial top walls of a slot, indicated generally at 71, which extends longitudinally the entire length of the housing 33 and which is specially formed in a manner to be described with shoulders beyond the dividing wall 55 within the light-retainer chamber 53 for securing various terminal contact means which are inserted therein, as for example, the terminal contact means 61 and 63 previously mentioned. It will be noted by reference to Fig. 6 that the rearward portions 67b of the pair of ribs 67 join the dividing wall 55 at the bottom of opposite sides of an arch 73 formed therein below a central aperture 74.

The spring contact means 65 is cradled and guided as previously mentioned by the upper ribs 69 and the lowermost pair of ribs 67 to prevent buckling of the same in its movement within the switch chamber 51. The spring contact means 65 is formed of three portions of different diameter, designated respectively 65a, 65b and 65c. The portion 65a is formed of the first few coils at one end of the compression spring and has the largest diameter. The portion 65a functions to tiltably and resiliently mount the switch button 37 and for this purpose securely engages an enlargement 37a formed on the inner end of the switch button. Through this arrangement of mounting for the switch button 37 and by virtue of the substantially planar fulcrum provided therefor by the bezel 31 and the body portion 27 of the retainer ring 26, the switch button 37 is actuatable longitudinally even by an eccentrically applied force which could be created from misalignment when mounting the completed assembly. The portion 65c of the spring contact means 65 is formed of a plurality of tightly wound coils at the other end of the compression spring and has the smallest diameter. The portion 65c is carried by the aperture 74 in the dividing wall 55 through which it projects into the light-retainer chamber 53 to make electrical contact with the button 75 on the base 77 of the bulb 59, deflection of the spring accommodating the offset of the two chambers 51 and 53. Mechanically the spring contact means 65 through the portion 65c yieldably urges the bulb 59 toward the open end 57 of the housing 33. The portion 65b constitutes the major portion of the spring contact means 65 and is of intermediate diameter with respect to the diameter of the portions 65a and 65c. When the spring contact means 65 is in the position shown in Figs. 4 and 5, an electrical circuit is completed through the same from the button 75 of the bulb 59 to the current-conducting member 21 by way of the retainer ring 26 and bezel 31. The largest diameter portion 65a of the spring contact means is supported in this position by the engaging surfaces on the upper ribs 69 and on the forward portions 67c of the lowermost pair of ribs 67. Similarly, the intermediate diameter portion 65b of the spring contact means is supported by the engaging surfaces on the same upper ribs 69 and on the rearward portions 67b of the lowermost pair of ribs 67. When the switch button 37 is actuated longitudinally into the switch chamber 51 against the urging of the spring contact means 65, the contact between the retainer ring 26, bezel 31 and the spring contact means 65 is broken, and the electrical circuit opened between the button 75 of the bulb 59 and the current-conducting member 21. During movement of the switch button 37 the portion 65a of the spring contact means 65 is guided and supported in its movement inwardly of the switch chamber 51 over the length of its travel on the forward portions 67c of the lowermost ribs 67 and the upper ribs 69. Likewise the

portion 65b is compressed during inward movement of the switch button 37 and a greater number of its coils travel between the rearward portions 67b of the lowermost pair of ribs 67 and the upper ribs 69 where they are guided and supported in their travel. By virtue of the interior structure of the switch chamber 51, any tendency for the spring contact means 65 to buckle is minimized.

The interior structure of the light-retainer chamber 53 and the manner in which it cooperates with various terminal contact means as for example, terminal contact means 61 and 63, and with the bulb 59 for removably securing them will now be described. Though it is not so shown, it will be appreciated that the chamber 53 end of the housing 33 could be lengthened to completely encase all metallic current carrying parts disposed within it. The longitudinally extending slot 71, previously mentioned, plays an important part in retaining various terminal contact means within the light-retainer chamber 53 and the details of its construction can best be seen by reference to Figs. 2, 4 and 5 and Fig. 12. The bottom surface of the slot 71 is cut away at the end 57 of the housing 33 and terminates at the wall 79 to accommodate a portion of the insulated lead-in wire 81 secured to the terminal contact means 63 as shown in Fig. 5. Inwardly of the wall 79 and still within the light-retainer chamber 53 a shoulder 83 is formed on the bottom surface of the slot 71 by a recessed portion 85 which extends from the shoulder 83 beneath the dividing wall 55 to the end 38 of the housing 33 and is formed centrally of the longitudinal axis thereof. The opposite side walls of the slot 71 are designated 87, 89, respectively and they extend without change in dimension from the end 38 of the housing 33 beneath the dividing wall 55 to a distance within the light-retainer chamber 53 determined by the location of the shoulders formed in each as shown in Fig. 12 which are indicated at 91, 93, respectively. The shoulder 91 is formed by a boss 95 which has the shape as shown and protrudes from the side wall 87 toward the center of the housing 33 while the shoulder 93 is formed by recessing the side wall 89 away from the center of the housing 33 as it extends to the end 57 thereof. The terminal contact means 63 (Figs. 17-19) is secured within the light-retainer chamber 53 by the shoulders 83 and 93 formed in the slot 71. The shoulder 83 engages the edge surface indicated at 97 on the detent 99 which is partially sheared from the blank (Fig. 17) from which the terminal contact means 63 is formed. The engagement of the edge surface 97 with the shoulder 83 after the terminal contact means 63 is inserted into the light-retainer chamber 53 prevents outward movement thereof toward the open end 57. The shoulder 93 engages the edge surface indicated at 101 formed on one side of the terminal contact means 63 and acts as a stop against further movement thereof into the light-retainer chamber 53. The construction of the slot 71 within the light-retainer chamber 53 is also adapted to retain the structurally different terminal contact means 61 shown in Figs. 13-16. For this purpose the shoulders 91, 93 engage the edge surfaces 103, 105, respectively, formed on opposite sides of the terminal contact means 61.

The terminal contact means 61 and 63 are stamped from sheet metal, preferably spring brass, into pre-finished blanks having the shape as shown in Figs. 13 and 17, respectively. Each is provided with concavo-arcuate edge surfaces 107, 109, respectively, which are formed symmetrically with the longitudinal axis and are disposed at the base of side edge surfaces 108, 110, respectively. The arcuate edge surfaces 107, 109 face the inner ends 111, 113, respectively, so as to engage one of the contact bosses as at 115 formed on the base 77 of the bulb 59. The outer ends of the terminal contact means 61, 63 are formed into pairs of tangs 117, 119, respectively, each of which is adapted to be bent over the insulated lead-in wire to firmly grip the same. The

end of the lead-in wire may be flattened and welded to the terminal contact means as shown at 121 in Figs. 4 and 5 for the terminal contact means 63 and may be additionally or solely affixed by puncturing the insulation and strands of the lead-in wire as is intended for the terminal contact means 61 by means of the partially sheared spike 123 provided for this purpose.

The terminal contact means, whether it be of the type exemplified by the terminal contact means 61 or 63 or another type, is inserted into the slot 71 and secured therein, as described, before the bulb 59 is inserted into the light-retainer chamber 53. The interior structure of the light-retainer chamber above the slot 71 is specially formed to facilitate insertion of the bulb 59 and will now be described. By reference to Fig. 2 it can be seen that the inner wall of the light-retainer chamber 53 above the slot 71 is substantially cylindrical and has a diameter approximating that of the base 77 for the bulb 59. The bottom portions of this inner wall terminate in inwardly projecting flanges 125, 127 which form partial top walls for the slot 71 at opposite sides thereof. The flanges 125, 127 extend from the dividing wall 55 to the end 57 of the housing 33. The top surface of the flange 127 is recessed over a major portion of its length as shown and has formed therein a side wall of the recess indicated at 129. Another recess as at 130 is formed in the inner wall of the light-retainer chamber 53 at the upper left-hand portion thereof as viewed in Fig. 2 and is provided with opposite side walls 131, 133, respectively. The side wall 131 is disposed diametrically opposite the side wall 129 and the side wall 133 is located to the right of the vertical axis of the housing 33 as shown a distance at least equal to the radius of each of the contact bosses 115 on the base 77 of the bulb 59. To retain the bulb within the light-retainer chamber 53 the base 77 is inserted into the open end 57 with one of the contact bosses 115 thereon disposed within the recess 130 adjacent the side wall 131 and with the other contact boss within the recess formed in the flange 127 adjacent the side wall 129. The bulb 59 through the button 75 thereon is urged against the spring contact means 65 and simultaneously rotated in a clockwise direction as viewed in Fig. 2 until the one contact boss is disposed adjacent the side wall 133 and the other contact boss is disposed adjacent the side edge surface 110 on the terminal contact means 63. Upon release of the bulb 59 it will be prevented from springing out of the light-retainer chamber 53 by engagement of the other contact boss with the arcuate edge surface 109 on the terminal contact means 63.

The details of the construction of the retainer ring 26 of the retaining means 25 can best be described by reference to Figs. 7-9. The retainer ring 26 is stamped from a metal blank into a pre-finished form such as that shown partially in outline and indicated by the reference letter A in Fig. 7 from which it can be seen that the relatively wide flattened fingers 29 are separated from the body portion 27 for a distance inwardly from the top and bottom edges thereof to impart greater resiliency to the fingers 29 for gripping the opening 23 in the current-conducting member 21. From the pre-finished form, as at A, the fingers 29 are returned so as to project from the inner face of the body portion 27 and bent into the substantially arcuate shape as shown in full lines in Fig. 7. At the same time the partially stamped-out detents 29a are forced inwardly toward the center of the body portion 27. Inwardly of the detent 29a thereon each of the fingers 29 is crimped as shown in Fig. 8 at three separate areas, a central area indicated at 135 and top and bottom areas 137. The external surface of each finger 29 is substantially flat and tapers toward the body portion 27 over the area 135 due to the crimping thereof as best shown in Fig. 9. At each of the top and bottom areas 137 because of the crimping thereof, the external surface of each finger 29 is raised substantially along

a transverse line as indicated at 139 in Fig. 8 and tapers in opposite directions from each side of this line. The crimping along the lines 139 provides portions at the top and bottom of each of the fingers 29 which present the greatest diameter for resiliently gripping the opening 23 in the current-conducting member 21, as is best shown in the fragmentary sectional view of Fig. 3.

In assembling the several parts of the combined switch and light-retainer assembly embodying the invention, the spring contact means 65 is first inserted into the open end 38 of the housing 33. The switch button 37 is then placed with the enlargement 37a thereof disposed within the portion 65a of the spring contact means 65. The retaining means 25 consisting of the retainer ring 26 and the bezel 31 is then placed over the switch button 37 so that the stem of the switch button projects through the opening 35 in the body portion 27 and the coincident opening in the bezel 31. The retaining means 25 is arranged with respect to the housing 33 so that the fingers 29 of the retainer ring 26 are disposed on opposite sides of the housing 33 with the detents 29a therein in line with the shoulders 39 formed on the outside surface of the housing 33. The retaining means 25 is then forced into snap-on engagement with the housing 33 to assume the position as shown in Figs. 1 and 4. At the opposite end of the housing, i.e., the open end 57, the terminal contact means, as for example, terminal contact means 63, with the lead-in wire 81 affixed thereto, is inserted into and retained within the slot 71 and thereafter the base 77 of the bulb 59 is inserted into the light-retainer chamber 53 above the slot 71, as previously described. The entire assembly is then inserted through the opening 23 in the current-conducting member 21 with the open end 57 inserted first together with a short length of the lead-in wire 81 which has affixed on the free end thereof a bayonet-type connector-contact not shown. When the fingers 29 of the retainer ring 26 engage the inner surfaces of the opening 23, they resiliently grip the same to support the assembly as previously described. With the elements of the assembly in the position shown in the drawings and with the free end of the lead-in wire 81 connected to a voltage source (not shown), the spring contact means 65 and the body portion 27 of the retainer ring 26 are in electrical connection to complete a circuit from the lead-in wire 81 through the terminal contact means 63, the base 77 and the filament of the bulb 59, the button 75, the spring contact means 65, body portion 27 and bezel 31 to the current-conducting member 21 which in the usual case is grounded as is the opposite side of the source to which the lead-in wire 81 is connected. Upon closure of the glove compartment door, the switch button 37 is actuated longitudinally of the housing 31 against the urging of the spring means 65 to move the portion 65a thereof away from the body portion 27 to break the circuit through the various elements as previously described.

Referring now to the embodiment of switch assembly and associated structure shown in Figs. 20-28, the same is adapted for use in the glove compartments of motor vehicles in a manner similar to the embodiment of combined switch and light-retainer assembly previously described except that the switch assembly of this embodiment is suited for installations where it is desirable that the glove compartment light be mounted as a separate unit and remote from the glove compartment door. In such instances the embodiment of switch assembly to be described is mounted for actuation by the glove compartment door as described for the previous embodiment but nevertheless controls the off-on condition of the glove compartment light through a connecting wiring harness provided for this purpose.

The switch assembly is shown in Fig. 20 mounted in cantilever fashion as in the previous embodiment on the same current-conducting member 21 having the opening 23 through which the retainer means for this embodiment,

generally designated 101, projects. The retainer means 101 is interchangeable with the retainer means 25 previously described and in a similar manner resiliently engages the inner surface of the opening 23. The retainer means 101 comprises a retainer ring indicated generally at 103 which is permanently assembled as a unit with the same bezel 31 as before described. The construction of the retainer ring 103 is shown in greater detail in Figs. 26-28 and will be later so described, but briefly at this point it should be noted that its parts corresponding to those of the retainer ring 26 are designated as follows: Its body portion at 105 and the central aperture therein at 106; its fingers at 107 which are substantially W-shaped in this instance to provide greater radial resilience and which are crimped as will appear; and its inwardly projecting detents at 107a.

The tubular housing for the switch assembly is indicated generally at 111 and is disposed on the opposite side of the current-conducting member 21 from that of the bezel 31 and the body portion 105 of the retainer ring 103. The housing 111 is preferably molded of phenolic resin and as in the previous embodiment is capable of being formed during the molding operation by longitudinally disposed core pins which project inwardly from opposite ends of the housing during its formation and which are removable outwardly therefrom at the completion of the molding process to effect savings in the cost of manufacture thereof as previously described. The tapered forward end as at 115 of the housing 111 snaps into the retainer ring 103 in a manner substantially as before described to cause the fingers 107 thereof to expand and grip the opening 23 in the current-conducting member 21 with increased force. The inwardly projecting detents 107a on the retainer ring 103 cooperate with shoulders in this instance indicated at 117 formed in the external surfaces of the housing 111 on opposite sides thereof to prevent movement of the housing 111 relative to the retainer ring 103 as previously described. The external surface of the housing 111 also has an enlarged intermediate portion as at 119 formed thereon inwardly of the tapered end 115 which terminates short of the rearward end of the housing. The shoulders 117 on the opposite sides of the housing 111 are best shown in the sectional view of Fig. 23 and are formed by longitudinally extending depressions 121 which are recessed from the normal exterior surface of the intermediate portion 119. Above and below each depression 121 are spaced bosses 123 which are raised from the normal exterior surface of the intermediate portion 119 for purposes as described in connection with the bosses 47, 49 on the housing 33 of the previous embodiment.

The interior structure of the housing 111 is simply formed into a single switch chamber indicated generally at 125 which extends from the forward end 115 and terminates at an integrally formed rear wall 127 provided with a central opening 129. The switch chamber 125 houses a compression spring, generally designated 131, and receives the inner end of the switch button 113 by which the make and break of the electrical circuit occurs. The coils of the spring 131 decrease in diameter relatively rapidly from its rearward end to its forward end as shown. The spring 131 encircles part of the wiring harness for the switch assembly which includes an insulated conductor indicated generally at 133 which extends through the opening 129 and has one end as at 135 bared and secured as shown to the flattened nose portion 136 of a contact member indicated at 137. The contact member 137 has spaced from its nose portion 136 bent-over tangs 139 which grip the insulation adjacent the end 135 of the conductor 133.

The largest diameter end of the spring 131 operates against the rear wall 127 of the housing 111 and the smallest diameter end against the nose portion 136 to yieldably urge the contact member 137 toward the for-

ward end 115 of the housing 111 against the inner end of the switch button 113. The inner end of the switch button 113 is provided with a radial enlargement 141 completely surrounding which and tightly fitted thereto is a conductive securement 143 having a body portion 143a and an annular portion 143b as shown. The portion 143a of the securement 143 continually bears against and makes electrical connection with the contact member 137 during the operation of the switch assembly. The portion 143b makes and breaks electrical contact with the bezel 31 and the body portion 105 of the retainer ring 103 accordingly as the switch button 113 is actuated by the glove compartment door.

The other end as at 145 of the conductor 133 is secured as shown to a terminal connector-contact, indicated generally at 147, which has the construction as shown in the plan and side views thereof in Figs. 20 and 24, respectively. The connector-contact 147 is adapted to be inserted into the mounting structure (not shown) of a remotely positioned glove compartment light and to make electrical contact with the base of the said light.

When the switch button 113 is in the position as shown in Figs. 23 and 24 an electrical circuit is completed from the base of the glove compartment light through its filament, the conductor 133, the contact member 137 to the current-conducting member 21 by way of the conductive securement 143 and the body portion 105 of the retainer ring 103 and the bezel 31. When the switch button 113 is actuated longitudinally into the switch chamber 125 against the urging of the compression spring 131 by the glove compartment door, the contact between the body portion 105, bezel 31 and the conductive securement 143 is broken and the electrical circuit opened between the base of the glove compartment light and the current-conducting member 21. During movement of the switch button 113 the enlargement 141 thereon is guided and supported through its securement 143 by the wall of the switch chamber 125 and the nose portion 136 of the contact member 137 is continually maintained in contact with the body portion 143a of the conductive securement 143 as mentioned.

Referring now to Figs. 25-28 the details of construction of the retainer ring 103 of the retainer means 101 is shown therein. The retainer ring 103 is stamped from a metal blank into a prefinished form as described for the retainer ring 26 and which is indicated by the reference letter B in Fig. 26. The relatively wide W-shaped fingers 107 join the body portion 105 by way of a center portion 151 for a short distance centrally of the opposite sides of the body portion 105 and are each formed with slots, one above and one below the portion 151, as shown which separate a pair of legs 153 from the portion 151. Because the fingers 107 are formed with the spaced pair of legs 153 they are even more resilient than the fingers 29 on the retainer ring 26 for gripping the opening 23. From the prefinished form at B, the center portion 151 and the legs 153 of each finger 107 are intumed from the inner face of the body portion 105 and are bent substantially into the arcuate shape as shown in full lines in Fig. 26. At this time the detents 107a are forced inwardly toward the center of the body portion 105 as before described.

Each finger 107 inwardly of the detent 107a thereon is crimped as shown in Fig. 27 somewhat as described for the fingers 29 of the retainer ring 26. Each finger 107 is crimped at an area indicated at 157 (Fig. 27) on its center portion 151 and the external surface of each finger over the area 157 is substantially flat and tapers toward the body portion 105 as best shown in Fig. 28. The legs 153 of each finger 107 are also crimped substantially along transverse lines indicated at 159 in Fig. 27 so that legs 153 protrude outwardly at this area from the normal arcuate disposition of the fingers 107 to present the greatest diameter for resili-

ently gripping the opening 23 as best shown in Fig. 26 and the fragmentary sectional view of Fig. 22. If desired to improve spring action, the section 151 may be formed to taper so that its width increases in an outward direction toward its junction with legs 153. In this case the slots between the legs 153 and section 151 would get progressively narrower.

In assembling the several parts of the switch assembly shown in Figs. 20-28, the compression spring 131 is first inserted into the open end 115 of the housing 111. The wiring harness comprising the conductor 133 with the contact member 137 affixed at one end and with the other end free is inserted into the housing 111 through the same open end 115 and threaded, free end first, through the opening 129 until the contact member 137 engages the spring 131. The switch button 113 is then inserted into the housing with its enlargement 141 thereof in abutting engagement with the member 137. The retainer means 101 consisting of the retainer ring 103 and the bezel 31 secured as a unit is then placed over the switch button 113 so that the stem of the latter projects through the openings in the unit. The retainer means 101 is arranged with respect to the housing 111 so that the fingers 107 of the retainer ring 103 are disposed on opposite sides of the housing 111 with the detents 107 aligned with the shoulders 117 on opposite sides of the housing 111. The retainer means 101 is then forced into snap-on engagement with the housing 111 to assume the position as shown in Figs. 23 and 24. The complete assembly is then inserted through the opening 23 in the current-conducting member 21 with the rearward end of the housing inserted first together with the free end of the conductor 133. The free end of the conductor 133 is then secured to the connector-contact 147 and the latter is inserted into the mounting structure for the glove compartment light. The fingers 107 of the retainer ring 103 resiliently grip the inner surfaces of the opening 23 to support the assembly as before described.

With the elements of the assembly in the position shown in Figs. 23 and 24 and with the connector-contact 147 in electrical contact with one end of the filament of the glove compartment light through the base thereof and with the other end of the filament connected to a voltage source (not shown) the contact member 137 and the body portion 105 of the retainer ring 103 are in electrical connection through the conductive securement 143 to complete a circuit from the voltage source through the filament of the glove compartment light, the conductor 133, the contact member 137, the conductive securement 143, the body portion 105 and the bezel 31 to the current-conducting member 21 which is usually grounded as is the opposite side of the voltage source to which the filament is connected. Upon closure of the glove compartment door, the switch button 113 is actuated inwardly of the housing 111 against the spring 131 to move the conductive securement 143 away from the body portion 105 and the bezel 31 to break the circuit through the various elements de-energizing the glove compartment light.

What is claimed is:

1. In a combined switch and light-retainer assembly, a non-conductive tubular housing, open at opposite ends thereof having an integrally formed transverse dividing wall raised from the bottom surfaces of the interior structure of said housing defining a switch chamber opening inwardly from one of said opposite ends and a light-retainer chamber opening inwardly from the other of said opposite ends, a horizontal slot extending longitudinally the length of said housing below said dividing wall, a shoulder formed on the bottom surface of said slot, shoulders formed on the opposite side walls of said slot, and a plurality of circumferentially spaced rib members integrally formed with the interior structure of said switch chamber

disposed above said slot and extending longitudinally from said one end inwardly to said dividing wall, said shoulders being disposed within said light-retainer chamber and adapted to engage edge surfaces on terminal contact means insertable into said slot from said other end, and said rib members being adapted to guide and support spring contact means insertable from said one end and arranged to be movable longitudinally of said switch chamber.

2. In a combined switch and light-retainer assembly, a non-conductive tubular housing open at opposite ends thereof having a transverse dividing wall defining a switch chamber opening inwardly from one of said opposite ends, and a plurality of circumferentially spaced rib members integrally formed with the interior structure of said switch chamber extending longitudinally from said one end inwardly to said dividing wall, a lowermost pair of said rib members abruptly changing in cross-section over their lengths providing different diameter portions within said switch chamber, said rib members being adapted to guide and support spring contact means insertable from said one end and arranged to be movable longitudinally of said switch chamber.

3. In a combined switch and light-retainer assembly, a non-conductive tubular housing open at opposite ends thereof having an integrally formed transverse dividing wall raised from the bottom surfaces of the interior structure of said housing defining a light-retainer chamber opening inwardly from one of said opposite ends, a horizontal slot formed on the bottom surfaces of the interior structure of said housing extending longitudinally the length of said housing below said dividing wall, a shoulder formed on the bottom surface of said slot, shoulders formed on the opposite side walls of said slot, and a cylindrical inner wall formed integrally with the interior structure of said light-retainer chamber disposed above said slot for receiving the base of a bulb, said inner wall having recesses formed therein for accommodating and guiding contact bosses on said lamp base, said shoulders being disposed within said light-retainer chamber and adapted to engage edge surfaces on terminal contact means insertable into said slot from said one end.

4. In a switch, the combination comprising a non-conductive tubular housing open at opposite ends thereof, a switch chamber opening inwardly from one of said opposite ends, shoulders formed on the exterior surface of said housing inwardly from said one end, conductive retainer means having resilient fingers provided with detents, the inside surfaces of said fingers embracing in snap-on relation the exterior surfaces of said housing at said one end with said detents engaging said shoulders, the outside surfaces of said fingers being crimped to resiliently grip the inner surfaces of an opening in a current-conducting member for supporting said tubular housing and having portions partially closing off the opening in said one end serving as electrical contact means.

5. In a switch assembly, the combination comprising a non-conductive tubular housing open at opposite ends thereof, a switch chamber opening inwardly from one of said opposite ends, a pair of shoulders formed on the exterior surface of said housing at opposite sides thereof inwardly from said one end, conductive retainer means comprising a body portion and a pair of resilient fingers projecting from the inner face of said body portion, said fingers having detents projecting inwardly toward the center axis of said body portion, the inside surfaces of said fingers embracing in snap-on relation the exterior surfaces of said housing at said one end with said detents engaging said shoulders, means joining said fingers with said body portion over a portion only of the width of said fingers so that said fingers are free of said body portion for a distance inwardly of top and bottom sides thereof, said fingers being crimped so that the outside surfaces thereof resiliently grip the inner surfaces of an opening in a current-conducting member for supporting said tubular housing, said body portion partially closing off the

opening in said one end and serving as electrical contact means.

6. In a combined switch and light-retainer assembly, the combination comprising a non-conductive tubular housing open at opposite ends thereof having a transverse dividing wall defining a switch chamber opening inwardly from one of said opposite ends, shoulders formed on the exterior surface of said housing, a plurality of circumferentially spaced rib members integrally formed with the interior structure of said switch chamber extending longitudinally from said one end inwardly to said dividing wall, spring contact means comprising a compression spring disposed within said switch chamber and movable longitudinally therein, said spring having coils engaging said rib members so as to be guided and supported thereby in its movement within said switch chamber, conductive retainer means having resilient fingers provided with detents adapted to snap on said one end with said detents engaging said shoulders and having portions partially closing off the opening in said one end, said spring means having one end operating against said dividing wall and the other end in electrical connection with said portions of said retainer means.

7. In a combined switch and light-retainer assembly, the combination comprising a non-conductive tubular housing open at opposite ends thereof having a transverse dividing wall defining a switch chamber opening inwardly from one of said opposite ends, a plurality of longitudinally extending rib members formed integrally with the interior structure of said switch chamber, said housing having a pair of shoulders formed on the exterior surface thereof inwardly from said one end, radially resilient conductive retaining means having a pair of detents secured on said one end of said housing through snap-on engagement between said pair of detents and said shoulders, portions of said retaining means closing off the opening at said one end of said housing and provided with an aperture, a non-conductive switch button projecting through said aperture having an enlargement in its inner end within said switch chamber, spring contact means comprising a compression spring movable longitudinally in said switch chamber, having coils at one end disposed about said enlargement and in electrical connection with said portions of said retaining means, and having the other end operatively disposed against said dividing wall, said spring means being guided and supported in its movement within said switch chamber by said rib members.

8. In a combined switch and light-retainer assembly, the combination comprising a non-conductive tubular housing open at opposite ends thereof having a transverse dividing wall defining a switch chamber opening inwardly from one of said opposite ends, a plurality of circumferentially spaced rib members formed integrally with the interior structure of said switch chamber extending longitudinally from said one end inwardly to said dividing wall, a lowermost pair of said rib members abruptly increasing in cross-section over their lengths providing a larger diameter portion in said switch chamber inwardly from said one end and a smaller diameter portion inwardly of said larger diameter portion to said dividing wall, conductive retainer means secured on said one end of said housing having means closing off the opening at said one end of said housing provided with an aperture, a non-conductive switch button projecting through said aperture having an enlargement in its inner end within said switch chamber, spring contact means comprising a compression spring movable longitudinally in said switch chamber, said spring having enlarged diameter coils at one end disposed about said enlargement in electrical connection with said closing-off means, reduced diameter coils at the other end operatively disposed against said dividing wall, and intermediate diameter coils between said ends, said enlarged diameter coils engaging portions of said rib members defining said larger diameter portions within said switch

chamber, and said intermediate diameter coils engaging portions of said rib members defining said smaller diameter portions, whereby said spring is guided and supported in its movement within said switch chamber by said rib members.

9. In a switch assembly, a non-conductive housing, retaining means for the housing comprising the combination of a retainer ring having a body portion, a pair of resilient fingers joining opposite sides of said body portion, said fingers being intumed from the inner face of said body portion and being bent into a substantially arcuate shape, detents partially stamped out of said fingers and projecting inwardly toward a center axis of said body portion, said body portion having arcuate ends disposed between said fingers, and a bezel having a continuous rim engaged over said arcuate ends, said bezel and said body portion having a central aperture formed in each, said apertures being disposed concentrically one with the other.

10. In a switch assembly, a non-conductive housing, retaining means for the housing comprising the combination of a retainer ring having a body portion, a pair of resilient fingers, and integral means joining opposite sides of said body portion and said fingers for a portion only of the width of said fingers so that said fingers are free of said body portion for a distance inwardly of the top and bottom sides thereof, said fingers being intumed from the inner face of said body portion and being bent into a substantially arcuate shape, detents partially stamped out of said fingers and projecting inwardly toward a center axis of said body portion, said fingers being crimped so that the outside surfaces thereof are adapted to resiliently grip the inner surfaces of an opening in a current-conducting member, said body portion having arcuate ends disposed between said fingers, and a bezel having a continuous rim engaged over said arcuate ends, said bezel and said body portion having a central aperture formed in each, said apertures being disposed concentrically one with the other.

11. In a combined switch and light-retainer assembly the combination comprising a non-conductive tubular housing open at opposite ends thereof having a transverse dividing wall defining a switch chamber opening inwardly from one of said opposite ends and a light-retainer chamber opening inwardly from the other of said opposite ends, shoulders formed on the exterior surface of said housing inwardly from said one end, a horizontal slot formed on the bottom surfaces of the interior structure of light-retainer chamber extending longitudinally inwardly from said other end, a shoulder formed on the bottom surface of said slot, shoulders formed on the opposite side walls of said slot and a cylindrical inner wall formed integrally with the interior structure of said light-retainer chamber disposed above said slot for receiving the base of a bulb, a plurality of circumferentially spaced rib members integrally formed with the interior structure of said switch chamber extending longitudinally inwardly from said one end, radially resilient conductive retainer means having detents secured on said one end of said housing through snap-on engagement between said detents and said exterior shoulders, said retainer means having portions closing off the opening at said one end of said housing provided with an aperture, a non-conductive switch button projecting through said aperture with its inner end movable within said switch chamber, spring contact means comprising a compression spring movable longitudinally in said switch chamber having one end tiltably mounting said inner end of said switch button and in electrical contact with said portions of said retaining means and having the other end operatively disposed against said dividing wall and extending therethrough, said spring being guided and supported in its movement within said switch chamber by said rib members, and terminal contact means disposed within said slot having edge surfaces and being prevented from movement longi-

tudinally of said housing by engagement of said edge surfaces with said shoulders formed in said slot.

12. In a combined switch and light retainer assembly, an elongated housing having a longitudinal axis and open at both longitudinal ends, one of said ends comprising a panel attachment end and the other of said ends comprising a bulb receiving end, means on the exterior of said housing at said panel attachment end providing a shoulder facing said bulb receiving end, means inside said housing at said bulb receiving end forming a shoulder facing said panel attachment end, a resilient panel fastener fitted over said panel attachment end and having a tongue snapped behind said first mentioned shoulder to hold said fastener in place on said housing, and a bulb retainer at the bulb receiving end of said housing having a flexible tongue snapped behind said second mentioned shoulder to hold said bulb retainer in said housing.

13. The invention set forth in claim 12 wherein said means providing said shoulders comprises slots formed in said housing extending longitudinally from the respective shoulders to the end faced by said respective shoulders.

14. In a switch assembly, a switch housing, said switch housing having a panel attachment end, said end being conical with the large diameter portion located inwardly from the end, a panel fastener fitted over said end and secured to the body, said fastener having cantilever flexible portions in radial alignment with said conical portion whereby flexing thereof in a radial direction with respect to the body is provided, the free ends of said cantilever portions being located at the small diameter end of said conical portion.

15. In a bulb retainer, a housing open at one axial end to receive a bulb, a radial wall portion in said housing spaced inwardly from said one end, means providing a longitudinal slot in said housing extending through said wall portion and opening out of the other axial end, the inner end of said slot forming a shoulder facing said other axial end, and a resilient retainer disposed in said slot in alignment with said wall and having a portion thereof snapped over said shoulder whereby said retainer is held in said housing.

16. In a combination switch and bulb assembly, an insulative housing, said housing having a first bore opening out of a first end of the housing, said first bore opening being no smaller than any cross section along the length of the bore, said housing having a second bore opening out of the other end, an integral transverse wall formed in said housing separating said two bores, said wall having an aperture through it, a metallic member secured to the first end of the housing and closing the opening of the first bore out of said housing, said member having a central opening substantially smaller than said bore opening, a switch plunger in said first bore having a portion slidably projecting through said central opening, said plunger carrying a metallic element for electrical engagement with said metallic member, coil spring means having one end acting against said plunger to yieldably urge said metallic element into engagement with said member, the other end of said spring means being smaller in diameter than the one end thereof and extending through the aperture in said integral transverse wall, said second bore being adapted to receive a bulb, and means on the housing associated with the second bore to retain a bulb therein in contact with said other end of said spring means.

17. The invention set forth in claim 16 wherein said metallic element comprises enlarged coils on said coil spring means.

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