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G. C. LENNOX

3,002,172

RETRACTABLE LAMPHOLDER

Filed March 4, 1957

2 Sheets-Sheet 1

Fig. 1.

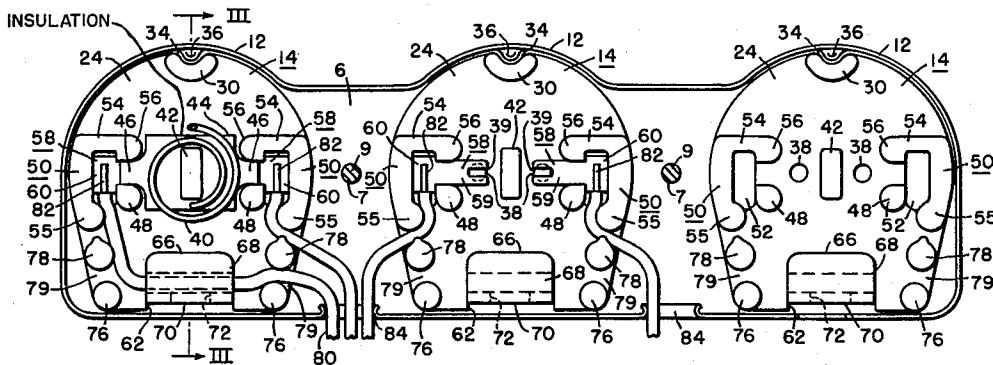
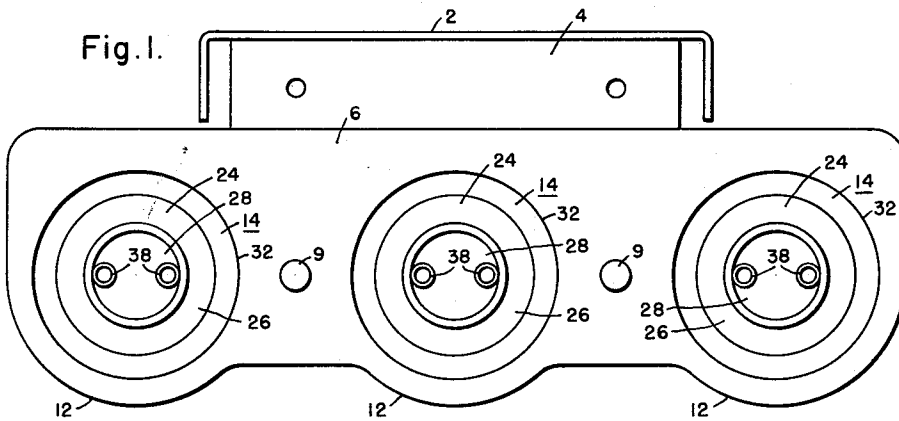


Fig. 2.

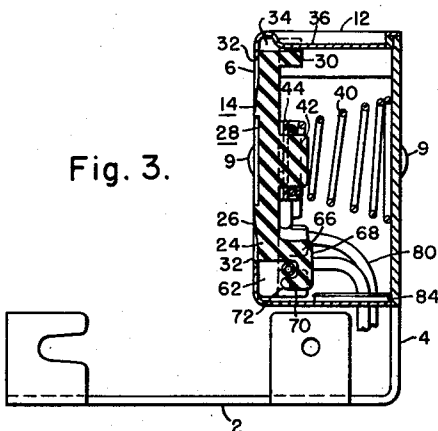


Fig. 3.

WITNESSES

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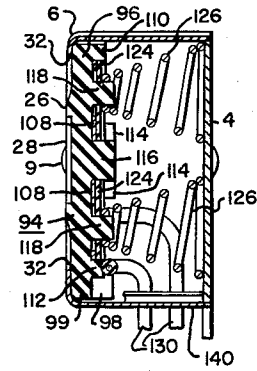
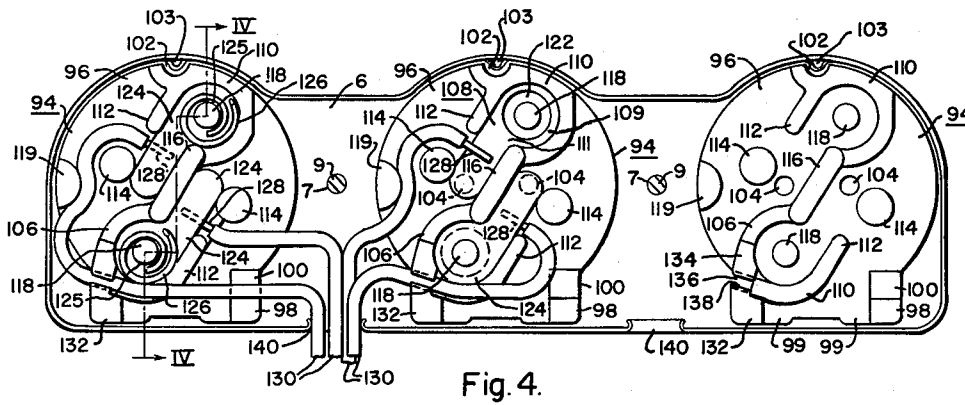
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RETRACTABLE LAMPHOLDER

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3 Claims. (Cl. 339—52)

My invention relates generally to electric wiring devices, and more particularly to new improved lampholders for mechanically supporting and electrically connecting a lamp.

In the past it has been the general practice to construct retractable lampholders having a plurality of springs to bias the contacts of the lampholder and also using the same or additional springs to bias the plungers thereof. These springs have normally been parts of the electrical conducting circuit of the lampholder necessitating the use of large pieces of insulation to insulate them from the housings containing them. The cost of this insulating material becomes a large portion of the final cost of such lampholders. The springs have had to be constructed out of materials such as copper or copper alloys having good electrical conductance as well as the necessary resilient requirements, and have resulted in the use of high cost materials. Accordingly, my invention relates to a construction for eliminating the use of these large pieces of insulating material by insulating the biasing springs from the current-carrying circuit by the use of relatively small pieces of insulating material located between the contacts and biasing springs resulting in substantially lower cost. The springs can be constructed from relatively inexpensive materials, such for example as spring steel or any other material having sufficient resiliency and strength. Another advantage of my invention is that biasing of both the plunger and the contacts is accomplished by the same spring.

Accordingly, one object of my invention is to provide a new and improved lampholder utilizing a minimum of insulating material.

Another more particular object of my invention is to provide a new and improved lampholder having at least one contact supported in a plunger in which the contact and the plunger are biased outwardly by a spring member, with the spring member being insulated from the contacts so that a minimum of insulating material is utilized.

These and other objects of my invention will become more apparent upon consideration of the following detailed descriptions of preferred embodiments thereof, when taken in conjunction with the attached drawings in which:

FIGURE 1 is a front elevation view of a wiring device constructed in accordance with the principles of my invention;

FIG. 2 is a back elevation view of the wiring device shown in FIG. 1 with the back plate and certain other parts thereof removed;

FIG. 3 is a cross sectional view of the wiring device shown in FIG. 2 taken substantially along the lines III—III thereof;

FIG. 4 is a back elevation view similar to FIG. 2 of another form of wiring device constructed in accordance with the principles of my invention; and

FIG. 5 is a cross sectional view of the wiring device shown in FIG. 4 taken substantially along the line IV—IV thereof.

Referring to the particular embodiment of my invention shown in FIGS. 1, 2 and 3, it will be noted that such a wiring device may comprise an upper support 2 having an integral back plate 4 extending transversely downwardly therefrom. The support 2 is of any suitable configura-

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tion so as to be easily secured to the supporting channel of a lighting fixture (not shown) in a manner well known in the art. As shown, an elongated dish-shaped housing 6 is also provided having three longitudinally spaced partially circular extensions 12 for receiving the generally circular edge portion of a plunger 14 therein. The back plate 4 is also provided with similar partial circular extensions in order to close the open side of the housing 6. In order to positively secure the back plate 4 and the housing 6 together, spaced aligned openings 7 are provided in the back plate 4 and housing 6, respectively, through which any suitable securing means such as rivets 9 may extend. As is customary for supporting structures of this type, the housing 6 and back plate 4 are formed from sheet steel; however, any structural material having sufficient strength may be utilized for these members.

Referring particularly to the showing of the plunger 14 in FIGS. 1, 2 and 3, it will be noted that each of the plungers 14 comprises an essentially flat main body portion 24 having an integral circular slightly convex face projection 26 extending outwardly from the central portion of the front face thereof. The center of the convex face projection 26 on the main body portion 24 of each plunger has a slightly recessed circular section 28 with spaced openings 38 therethrough, with the openings 38 located at opposed points tangent to the circumference of the recess 28.

As shown, three longitudinally spaced plungers 14 are located within the housing 6, and accordingly, the front of the housing 6 is provided with three longitudinally spaced circular openings 32 having centers coincident with the centers of the extensions 12 to permit the plunger projections 26 to be engaged from the outside of the housing 6. For convenience in describing the invention, the complete lampholder has not been shown in FIG. 2, except for the lampholder at the left of this figure; however, it will be obvious that it is only necessary to duplicate the complete structure described at each location at which it is desired to engage the lamp. The showing of three lamp-engaging plungers 14 is additionally only for illustrative purposes, as it is obvious that if desired, one or more lamp-engaging plungers 14 may be supported in the same manner.

The plungers 14 are slidably received within the housing 6, and in order to facilitate such sliding movement each of the main body portions 24 is provided with a laterally extending groove 34 at its partial circular edge portion. A laterally inwardly extending flange 30 is provided at the same edge of each of the main body portions 24 and is shaped so as to follow the contour of the groove 34. The groove 34 of the main body portion 24 of each plunger 14 slidably receives a projection 36 formed in the side wall of the housing 6 and extending laterally inwardly, and the opposite edge of each plunger is formed as a flat surface slidably engageable with the inner surface of the opposite flat side wall portion of the housing 6, so that the plungers 14 are non-rotatably received within the housing 6. The openings 38 through each plunger 14 are spaced to receive and support the contact pins of a conventional bi-pin lamp. The back of main body portion 24 of each plunger (FIG. 2), is provided with an integral laterally extending rectangular shaped projection 42 centrally located and extending longitudinally along the vertical line passing through the center of each plunger 14. Spaced generally L-shaped integral projections 50 extend from the rear face of each plunger and are spaced from both sides of the projection 42, in order to receive and at least partially align the electrical contacts 58, to be described later. The L-shaped projections 50 are comprised of portions 55 extending along portions of the outer circumference of the main body portion 24 of each plunger and portions

54 extending laterally inwardly of the circumference and parallel to a horizontal line drawn through the center of the plunger 14, and essentially perpendicular to the portions 55 respectively. The alignment of the electrical contacts 58 is completed by a generally cylindrical laterally inwardly extending integral post 43 spaced inwardly of the outer end of each portion 55 of the projections 50. An essentially rectangular recess 52 is thus defined which extends longitudinally along the inner sides of each of the portions 55 of the L-shaped projections 50, respectively.

Inwardly extending posts 76 are also formed integral with the rear face of each plunger 14 and are located in the opposite corners of the straight portion of the main body portion 24 of the plunger 14. Located adjacent thereto at opposite sides of the main body portion 24 are inwardly extending essentially cylindrical posts 78, respectively, also formed integral with each plunger 14.

A rectangular slot 62 is located in the straight side of the main body portion 24. A laterally inwardly extending integral projection 66 of the same length as the slot 62 is located at the base of the slot 62, and it has an integral portion 68 extending laterally outwardly to lie behind the slot 62 and terminating in an integral portion 70 extending forward laterally towards the front surface of the main body portion 24. A projection 72 extends from the projection portion 70 but is of less width than the projection portion 70. It can, therefore, be seen that the projection 66 comprising the portions 68, 70 and 72 provides an opening through which a conductor 82 may pass.

The electrical contacts 58 are of T-shape and are comprised of a good electrical conducting material such as copper or a copper alloy. The contacts 58 each have a stem portion 59 and a cross portion 60 with the stem portion 59 extending longitudinally along the horizontal line passing through the center of the plunger 14, and the cross portion 60 extends perpendicularly of the portion 59. The end of each contact stem portion 59 has a slot 39 therein. The stem portion 59 of each contact is of such length that its slot 39 is located over the adjacent opening 38 in the main body portion 24 of the plunger 14, and the width of the slot 39 is less than the diameter of the openings 38 to insure positive contact with a lamp pin. Movement of the contacts 58 in a plane parallel to the plane of the main body portion 24 of the plunger 14 is restricted by engagement of the L-shaped projections 50 and the posts 43 with the cross portions 60 of the contacts, respectively. A generally rectangularly shaped cover 44, made of insulating material, such as a phenolic insulating material, has an elongated slot centrally located therein of such size as to receive the central plunger projection 42 and has reduced extensions 46 of a size to fit in the space provided between the posts 43 and the end portions 56 of the L-shaped projections 50, respectively. The cover 44 rests on a major portion of the contacts 58 so that when a centrally located force is placed upon the partition both contacts 58 will be held fixed in position.

An elongated spiral conical spring 40 comprised of a resilient material, such as spring steel, whose small diameter end is such that it easily fits over the elongated projection 42 is placed over the projection 42 so as to engage the central portion of the cover 44. The large diameter end of the spring 40 is engageable with the back plate 4. The spring 40 is constructed of such length that when the back plate 4 is assembled to the housing 6 initial loading is placed upon the spring to bias the cover and to hold the latter in operative position.

The assembly of the lampholder is very easily accomplished by simply placing the contacts 58 into the spaces provided by the L-shaped projections 50 and the posts 43. The cover 44 is then placed over the central projection 42 and stem portions 59 of the contacts. The plunger is then placed into the housing 6 in the manner

previously described. The small end of the spring 40 is then placed over the projection 42 to hold the parts assembled when the back plate 4 is secured to the housing 6 by means of rivets 9.

It can thus be seen that the spring 40 is not a part of the electrical conducting circuit and that it is insulated from the contacts 58 by the cover 44 of insulating material. It is also apparent that both contacts 58 are engaged by the cover 44 and both are therefore biased into engagement with the back surface of the plunger 14 by the single spring 40. It is also apparent that the spring force, being applied to the center of the plunger 14, also biases the plunger, and that the spring force is directly applied to the contacting portions of the contact 58.

Contact leads 82 are directly and permanently attached to the stem portions 60 of the contacts 58 by appropriate means such as by welding or brazing. The contact leads 82 have a covering 80 of an insulating material such as rubber or plastic. The space 79 between the adjacent posts 76 and 78 is of less width than the covered portions of leads 82. Also the end of the portion 55 of the L-shaped projection 50 is so located as to provide a space between itself and the posts 78 which may be of even less width than the space 79 so that a lead wire must be forced into the former space by compressing the insulation covering 80. The openings between the sides of the portion 70 of the projection 66 and the corresponding inner vertical sides of the slots 62, respectively, are also of less width than the insulated covered portions of the contact leads 82.

Referring specifically to FIG. 2, it should be noted that spaced openings 84 are provided through the straight side wall portion of the housing 6 through which the terminal leads may pass for connection to an external source of power. Specifically, referring to the left-hand plunger in FIG. 2, it is apparent that the left-hand contact lead 82 extends from its contact 58 through the opening provided between the integral projection 66 and the main body portion 24, and then passes through the opening 79 between the spaced posts 76 and 78 on the right-hand side of said plunger. The other lead passes through the opening between the extremity of the portion 55 of the L-shaped projection 50 and post 78, with both leads exiting from the housing 6 through the opening 84. The contact 58 on the left-hand side of the central plunger 14 of FIG. 2 has one lead 82 extending therefrom and passing through the opening provided between the portion 55 of the L-shaped projection 50 and the post 78. By symmetry, it is easily seen that the remaining leads on the other side of the housing 6 are exited in an allochiral manner.

It is thus apparent that, since the spaces through which the leads 82 pass are of less width than the insulated leads 80, strain relief is provided for each of the leads exiting from the housing 6. It is also apparent from the symmetry of the lampholder that the plungers 14 and the contacts 58 are identical in structure, respectively, so as to be interchangeable.

In the embodiment of the invention illustrated in FIGS. 4 and 5, it is to be noted that the plungers described therein are mounted in the same housing as the plungers illustrated in FIGS. 1 through 3. It should also be noted that the portion of the plungers extending through the openings 32 of the housing 6 is the same for this particular embodiment of my invention as that described previously and accordingly the same reference numerals are used to identify these like parts.

The plungers 94 comprise a main body portion 96 which is essentially flat and circular in shape, having outward extensions 99 toward the straight side wall portion of casing 6 to prevent rotation of the plunger when located in the housing 6. A lateral groove 102 is provided at the opposite edge of the main body portion 96 of each plunger in order to slidably receive the projection 103 formed in each curved side wall portion of the hous-

ing 6. An integral ledge 98 extends inwardly of the housing 6 from the back of the main body portion 96 of each plunger and is located in the corner of the outward extension on the right-hand side of the main body portion 96 (FIG. 4) and it has an inclined surface 100 joining one side to the back surface of the main body portion 96. A similar lateral ledge 132 is located in the opposite corner of the outward extension 99. An inclined surface 134 extends from the adjacent end of the serpentine-shaped lateral ridge 106 (to be described later) to the outer plane of the ledge 132 and terminates adjacent to but spaced from the adjacent side of the ledge 132 so that an opening 136 exists between the ledge 132 and the inclined surface 134. The opening 136 passes between the inclined surface 134 and ledge 132 and also extends laterally through the main body portion 96. Lips 138 extend inwardly from the outer surfaces of the ledge 132 and the inclined surface 134, respectively, into the opening 136.

The essentially serpentine-shaped ridge 106 extends inwardly of the back side of the main body portion 96 being formed integral therewith. The ridge 106 is so shaped as to provide a space in which the terminals 108, to be described later, are non-rotatably located. The ridge 106 comprises circularly shaped portions 110 located oppositely of the center of the plunger 94. Tangential end portions 112 extend from opposite ends of the circularly shaped portions 110, respectively, so that the tangential extensions 112 are parallel to each other. Posts 114 are located on opposite sides of and spaced from the intermediate straight portion 116 of the respective ridge 106, being also formed integral with plunger 94 and extending laterally from the rear face thereof. Spaced lamp pin openings 104 extend through the main body portion 96 having their centers on a horizontal line passing through the center of the plunger 94. The distance between the pin openings 104 is equivalent to the spacing of the pin of the conventional bi-pin lamp to be supported by this lampholder. The pin openings 104 are located intermediate the posts 114 and the straight ridge portion 116. A spring supporting post 118 is also formed integral with the rear face of plunger 94 and is located at the center of each of the circularly shaped ridge portions 110. An essentially semi-circular lateral shoulder 119 is formed integral with the rear face of plunger 94 and is located at the edge of the left-hand side of the main body portion 96 as viewed in FIG. 4.

The lampholder is provided with two contacts 108 which comprise circularly shaped end portions 109, and essentially rectangularly shaped portions 111 which extend tangentially from the circularly shaped portions 109 and are of less width than the diameter of the circularly shaped portion 109. It is to be noted that each of the contacts 108 is so shaped as to fit into one of the openings created by the serpentine-shaped lateral ridge 106, respectively, so that movement of the contacts 108 in a plane parallel to the plane of the back side of the plunger 94 is prevented by the ridge 106 and the posts 114. The contacts 108 are provided with openings 122 located in the center of the circular portions 109 thereof, respectively, so that the posts 118 may extend therethrough. Leads 128 are secured to an intermediate portion of the rectangular portion 111 of the contacts 108 by some suitable means, such for example, as brazing or welding, and are so located along the rectangular portion 111 to allow the lead to extend from the contact 108 through the opening between the posts 114 and tangential extensions 112 of the ridge 106. Insulators 124, comprised of an insulating material, such for example as a phenolic insulating material, are shaped exactly like the contacts 108, and are placed on the contacts 108 in order to electrically isolate the contacts from the plunger supporting springs 126. An opening 125 of smaller diameter than the opening 122 of the contacts 108 is centrally located in the circularly shaped portion of each of the insulators 124 to closely

receive the posts 118. Elongated spiral conically shaped compression springs 126, having their smaller diameter ends almost as large as the diameters of the post 118 are locatable over the posts 118 by force fitting. The springs 126 are of such length as to hold the plungers 94 against the front of the housing 6 with an initial loading when the back plate 4 is assembled to the housing.

To assemble the lampholder, the contacts 108 with leads 128 attached are placed in the openings provided by the serpentine-shaped lateral ridge 106. The insulators 124 are then placed over the contacts 108. The springs 126 are force fitted over the posts 118, and the housing 6 is then assembled by means described in the previous embodiment of my invention.

It is therefore apparent that the contacts 108 and the plunger 94 are biased by the same springs and that the springs 126 do not constitute a part of the electric circuit of the lampholder. It can also be seen that a minimum of insulating material is used to insulate the biasing springs from the electric circuit of the lampholder.

With regard to the wiring of the plungers 94 of the lampholder, it is to be noted that the wiring method illustrated in FIG. 4 shows the wiring of the center plunger as if it were located on the right-hand side of the housing 6. This, however, is done for purposes of illustration, and for normal wiring of the center lampholder of FIG. 4, the wires would be led from opposite sides thereof similar to the center lampholder of FIG. 2. The lead wire 128 attached to the upper contact of the left-hand plunger of FIG. 4 passes through the opening adjacent the latter contact created by the tangential extension 112 and the post 114. The lead wire 128 then passes through the space provided between the semi-circular post 119 and the post 114 and is preferably placed as to have a portion thereof resting against the semi-circular post 119. The covering 130 of the lead wire 128 is then force fitted between the lips 138 across the opening 136 into the latter opening, and then extends across the main body portion 96 to the lead wire exit opening 140 on the left-hand side of the housing 6 (FIG. 4). The lead 128 attached to the lower contact 108 of the left-hand plunger passes directly through the opening provided by the adjacent tangential extension 112 and post 114, then directly to the lead wire exit 140 on the left-hand side of the housing 90. The lead wire 128 attached to the upper contact 108 of the center plunger 94 of FIG. 4 passes through the adjacent opening between the tangential extension 112 and post 114. The lead 128 then may rest against the inner side of the semi-circular post 119 and exits through the adjacent lead wire exit 140. Lead wire 128 attached to the lower contact of the center plunger of FIG. 4 passes through the adjacent opening created by the tangential extension 112 of the post 114 and is then passed across the back of the main body portion 96. The covering 130 is then force fitted between the lips 138 of the opening 136 into the opening 136 and is then passed through the lead wire exit 140 adjacent the opening 136. During normal assembly of the lampholder the lead 128 attached to the upper contacts of the center plunger exits in the same manner shown in FIG. 4 while the lead 128 attached to the lower contact of the center plunger would exit in a manner similar to the lead attached to the lower contact 108 of the left-hand plunger. It is therefore apparent that three leads would normally pass through each of the lead wire exits 140 during normal assembly. By force fitting the covering 130 into the openings 136 it is to be noted that the lead wires which are turned about the springs can not interfere with the biasing springs 126 when the lead wires are pulled.

Although I have shown and described specific embodiments of my invention in accordance with the Patent Statutes, I am aware that various changes and modifications may be made without departing from the broad spirit and scope of my invention. The foregoing description therefore is to be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. A wiring device comprising a housing having oppositely spaced walls, at least one of which has an opening therein, a plunger of insulating material located between said walls having an outer side adjacent said opening, said plunger having a portion engageable with said one wall to limit movement of said plunger through said opening, at least one contact supported on the inner side of said plunger for electrically energizing a contact of an electric lamp, a passage extending through said plunger to the inner side thereof to expose at least a portion of said contact, means for limiting motion of said contact in a plane parallel to said inner side of said plunger, an integral lateral shoulder extending from said inner side of said plunger and located in proximity to said contact, insulating means having an aperture therein receiving said shoulder and having at least a portion thereof in engagement with at least a portion of said contact, a resilient coil spring having one end thereof receiving said shoulder and in engagement with said insulating means and having the other end thereof in engagement with the other of said spaced walls to bias said contact toward said plunger and said plunger toward said one wall.

2. A wiring device comprising a housing having oppositely spaced walls, at least one of which has an opening therein, a plunger of insulating material located between said walls having an outer side adjacent said opening, said plunger having a portion engageable with said one wall to limit movement of said plunger through said opening, a pair of spaced passages extending through said plunger to the inner side thereof, a pair of spaced contacts supported on the inner side of said plunger, each having a portion thereof exposed by one of said spaced passages, respectively, an integral lateral shoulder extending from said inner side of said plunger intermediate said spaced contacts, an insulating member having an aperture therein receiving said shoulder and having portions thereof in engagement with at least a portion of each of the inner sides of said contacts, respectively, a single coiled

spring having one end thereof receiving said shoulder and in engagement with said insulating member and the other end thereof in engagement with the other of said spaced walls to bias said contacts toward said plunger and said plunger toward said one wall.

3. A wiring device comprising a housing having oppositely spaced walls, at least one of which has an opening therein, a plunger of insulating material located between said walls having an outer side adjacent said opening, said plunger having a portion engageable with said one wall to limit movement of said plunger through said opening, at least one contact supported on the inner side of said plunger for electrically energizing a contact of an electric lamp, a passage extending through said plunger to the inner side thereof to expose at least a portion of said contact, means for limiting motion of said contact in a plane parallel to said inner side of said plunger, an integral lateral shoulder extending from said inner side of said plunger and located in proximity to said contact, insulating means having an aperture therein receiving said shoulder and having at least a portion thereof in engagement with at least a portion of said contact, a resilient coil spring having one end thereof in engagement with said insulating means and having the other end thereof in engagement with the other of said spaced walls to bias said contact toward said plunger and said plunger toward said one wall.

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