April 5, 1966 J. M. PISTEY 3,245,026

SNAP-IN FLUORESCENT LAMPHOLDERS WITH QUICK-CONNECT TERMINALS

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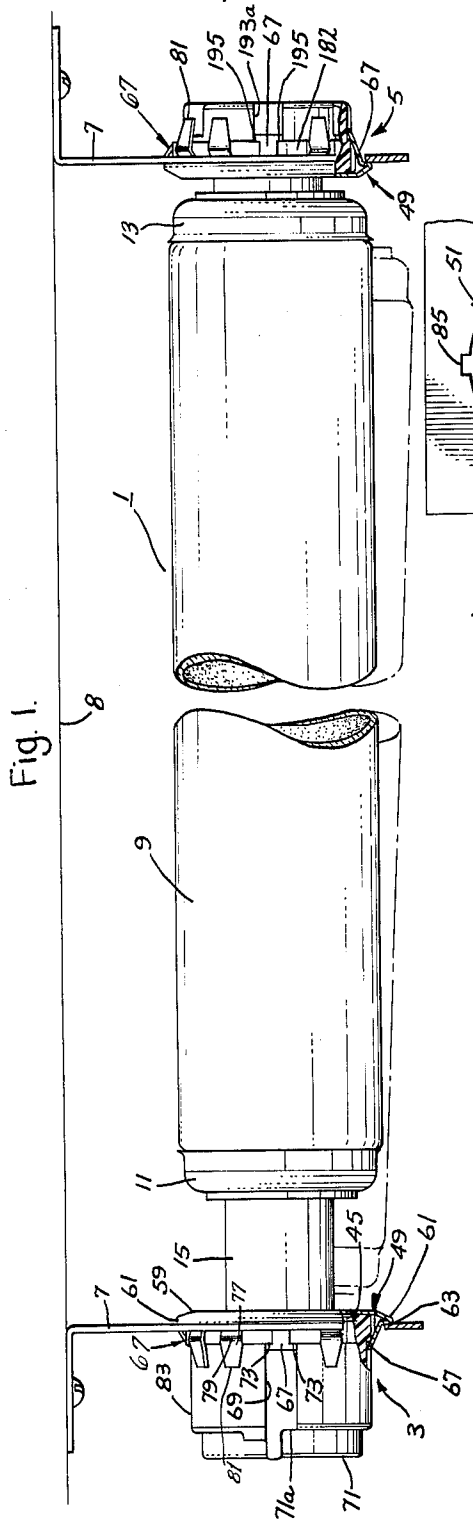


Fig. 1.

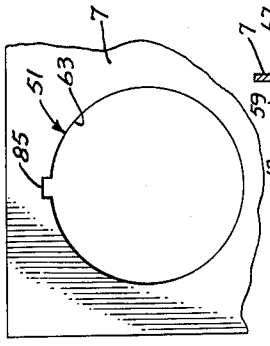


Fig. 1a

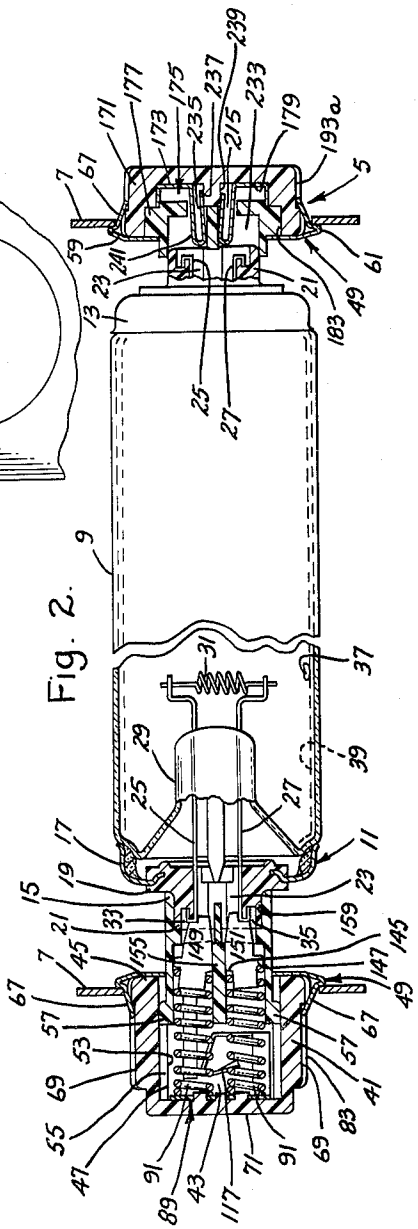


Fig. 2.

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SNAP-IN FLUORESCENT LAMPHOLDERS WITH QUICK-CONNECT TERMINALS

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Fig. 3.

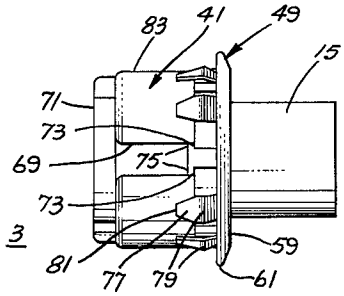


Fig. 4.

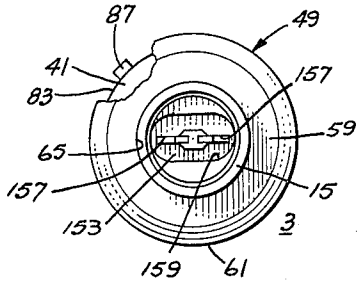


Fig. 5.

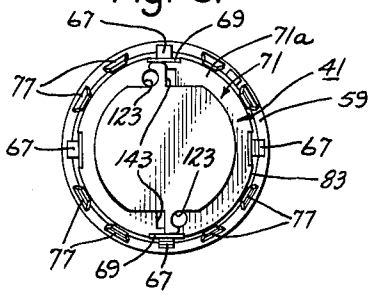


Fig. 6.

Fig. 7.

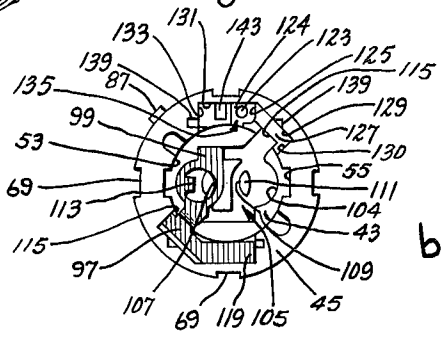


Fig. 8.

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Fig. 9.

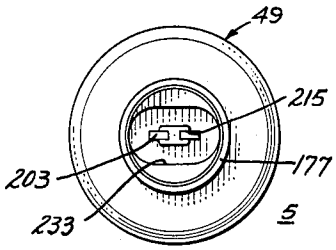


Fig. 10.

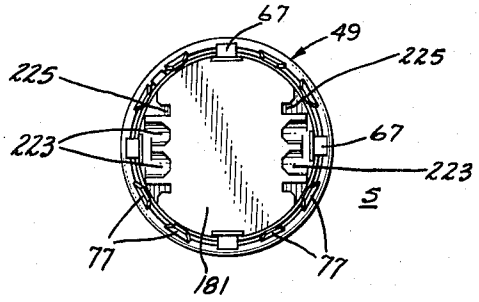


Fig. 11.

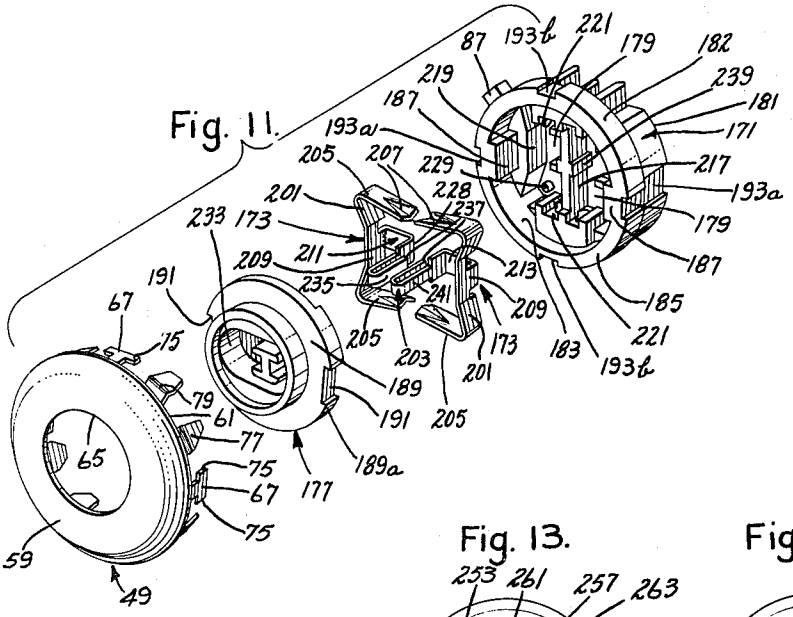


Fig. 12.

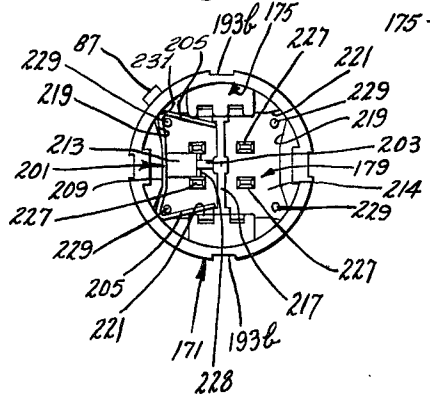


Fig. 13.

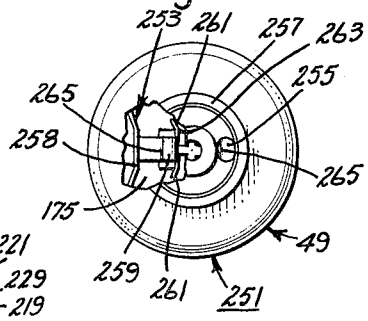
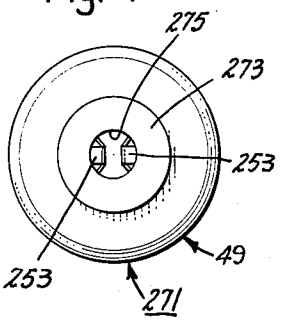


Fig. 14.



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3,245,026

SNAP-IN FLUORESCENT LAMPHOLDERS WITH QUICK-CONNECT TERMINALS

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Filed Mar. 12, 1962, Ser. No. 179,135
3 Claims. (Cl. 339—55)

The present invention relates to lampholders and particularly lampholders for double-ended electric discharge lamps, commonly known as fluorescent lamps.

For assembling certain prior art fluorescent lampholders in lighting fixtures, fastening hardware, such as screws and nuts, commonly has been utilized. One example of prior art lampholders employing the fastening hardware is the type of lampholders wherein one lampholder of each pair includes a compressible contact positioning plunger and the other lampholder of the pair has a stationary contact positioning member. The use of screws and nuts for mounting this type of fluorescent lampholder entails an additional material and labor cost which it would be advantageous for the fixture manufacturers to eliminate. Accordingly it is an object of my invention to provide a new and improved type of fluorescent lampholder with an integral means for simply and expeditiously fastening the lampholder to a panel aperture.

A further object of my invention is to provide a new and improved structure and arrangement of lampholder contacts so that these contacts effectively employ resiliently operable pressure locking terminals, and at the same time result in a simplified over-all lampholder construction which is extremely flexible in application and relatively inexpensive to manufacture.

In carrying out one aspect of my invention, in one form thereof, I have provided a fluorescent lampholder having an insulating body with a recess therein. This insulating body has a generally cylindrical configuration and is of such an external diameter that it may fit into a circular aperture of a thin supporting panel. A contact positioning member is seated in the recess of the insulating body and is in complementary relationship therewith to substantially close one end of the base. Contact means are disposed in the recess and exposed by the contact positioning member for engagement with associated contacts of a fluorescent lamp base. With this lampholder arrangement, an annular clamping member is secured to the insulating body for retaining the lampholder in firmly seated position in the panel. This clamping member has an annular section with a flanged outer periphery of greater diameter than the aperture to seat on the panel around the periphery of the aperture. The annular section is secured to the insulating body and is arranged to engage the contact positioning member and the open end of the insulating body for fastening the contact positioning member to the body. The clamping member thus holds the parts of the lampholder together in assembled relationship.

For removably mounting the lampholder in the panel aperture, a plurality of attaching legs are extended in generally perpendicular fashion from the annular section of the clamping member and are spaced about the periphery of the insulating body. Each of these attaching legs is of resilient construction and has an outwardly extending shoulder spaced apart from the annular section of the clamping member a suitable distance to receive an edge of the circular panel aperture therebetween. With this arrangement, the legs of the clamping member snap into cooperative engagement with the circular aperture of the supporting panel to securely fasten the lampholders thereto. On the outer periphery of the insulating

body, there is formed a radially projecting key. This key cooperates with a notch formed in the panel aperture when the insulating body is positioned therein to prevent any angular rotation of the insulating body. The cooperation of the key of the body with the notch of the panel aperture precludes any angular rotation of the lampholder with respect to the panel. By means of the applicant's clamping member, the lampholder parts are effectively held together and a simple and efficient means is also provided for snapping the lampholder into engagement with a supporting panel in a predetermined angular relationship.

By a further aspect of my invention, I provide an improved contact arrangement for a fluorescent lampholder of the general type wherein a relatively stationary contact positioning member is employed. This contact arrangement may, of course, be combined with the aforesaid lampholder mounting structure to provide a particularly desirable fluorescent lampholder. In this arrangement, the insulating body of the lampholder includes at least two opposed conductor receiving apertures extending into the recess through respective opposite sides of the body. At least one resilient contact is disposed within the recess. This contact includes an elongated strip section of U-shaped configuration for providing the lampholder terminations and a looped strip section for resiliently engaging an associated contact pin of a fluorescent lamp. The U-shaped section is connected to the looped section by a supporting strap, and it includes a pair of opposed arms. These arms have their ends positioned angularly across the opposed inner ends of the conductor receiving apertures and are arranged for resilient movement in first and second directions in response to the insertion of bared external conductors to provide a pair of pressure locking terminals for these conductors. The looped strip section is disposed between the ends of the elongated strip section and is arranged for resilient movement in a third direction transverse to the first and second directions to engage the pin of a lamp. With this arrangement, a projection is formed in the recess on each side of the insulating body next to the supporting strap. These projections are in bracketing disposition with the strap at the supported end of the looped section and each projection is arranged to engage the strap on one side thereof. By means of the engagement of these projections with the strap, an effective and simplified means is obtained for substantially segregating the resilient movement of each of the arms of the contact from the other and from the looped strip section.

By a further aspect of my invention, I have provided an improved contact arrangement for a fluorescent lampholder incorporating a movable plunger type of contact positioning member. This contact arrangement may, of course, be combined with the aforesaid lampholder mounting structure to provide a particularly desirable plunger type fluorescent lampholder. In this arrangement, the insulating body of the lampholder is provided with a recessed chamber that opens into one end thereof and at least one conductor receiving aperture extending into the chamber from the other end thereof. The chamber includes a generally cylindrical cavity and at least one recess in the wall of the chamber which opens laterally into the cavity and also communicates with the conductor receiving aperture. A contact supporting plunger is arranged in the cylindrical cavity of the chamber for reciprocating movement relative to the insulating body. Contact means are carried by the plunger for engagement with a fluorescent lamp base. A resilient means is provided for biasing the contact means into engagement

with the plunger and for biasing the plunger outwardly from the cylindrical cavity. With this arrangement, a specially constructed terminal member is arranged in complementary engagement with the chamber. This terminal member includes a contact engaging section disposed in the cylindrical cavity for connection to the contact means and a looped pressure locking section disposed in the recess for resilient attachment to a conductor inserted through the conductor receiving aperture. The looped pressure locking section includes a resilient tongue which is positioned angularly across the inner end of the aperture and located adjacent a wall of the recess. This tongue is arranged to resiliently sandwich the inserted conductor against the wall of the recess for locking the conductor into engagement with the contact means. By using a contact having this configuration and arrangement, an effective and simplified means is provided for connecting an external conductor to the lampholder contact means of the plunger without in any way interfering with the reciprocating action of the plunger in the cylindrical cavity of the chamber.

Further aspects of my invention will become apparent hereinafter and the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which I regard as my invention. The invention, however, as to organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a side elevational view showing a pair of panel mounted lampholders embodying my invention and a fluorescent lamp disposed in engagement with these lampholders;

FIG. 1*a* is a fragmentary plan view of a fixture panel which includes an aperture wherein the lampholders of the present invention may be effectively and removably seated without requiring the use of any supplemental hardware;

FIG. 2 is a plan view showing the lampholders and the ends of the lamp of FIG. 1, partly in section with the base at one end of the lamp partly withdrawn from its lampholder;

FIG. 3 is a side elevational view of the lampholder of FIG. 1 for the high voltage end of the lamp, this lampholder having a movable plunger;

FIG. 4 is a front view of the lampholder of FIG. 3;

FIG. 5 is a rear view of the lampholder of FIG. 3;

FIG. 6 is an exploded view of the lampholder of FIG. 3, with the insulating body partially broken away to show the interior structure thereof;

FIG. 7 is a front view of the lampholder body of FIG. 6, looking into the recessed chamber of the body, and showing one terminal element seated in the body and one terminal element removed;

FIG. 8 is a side elevational view of the lampholder of FIG. 1 for the low voltage end of the lamp, this lampholder having a relatively stationary contact positioning member;

FIG. 9 is a front view of the lampholder of FIG. 8;

FIG. 10 is a rear view of the lampholder of FIG. 8;

FIG. 11 is an exploded perspective view of the lampholder of FIG. 8;

FIG. 12 is a front view of the insulating body of the lampholder of FIG. 8, looking into the recessed chamber of the body, and showing one contact seated and one contact removed;

FIG. 13 is a front view partially broken away of a lampholder embodying my invention in alternate form thereof; and

FIG. 14 is a front view of another lampholder embodying my invention, in alternate form thereof.

Referring first to FIG. 1 of the drawings, there is shown a conventional type of double-ended fluorescent lamp **1** supported at opposite ends between a pair of lampholders **3** and **5** which are constructed in accordance with my

invention. The lampholders **3** and **5** are removably secured to opposed panels **7** of a suitable support **8** which is part of a lighting fixture.

As shown in FIGS. 1 and 2, the lamp **1** has a tubular glass envelope **9** provided with bases **11** and **13** at each of its respective ends. The lampholder **3** is provided with a movable spring biased contact positioning plunger **15** for engagement with base **11** of the lamp, and the lampholder **5** provides a stationary contact positioning means for engagement with base **13** of the lamp. The structure of the lampholders **3** and **5** shall be discussed in detail hereinafter. To mount lamp **1** in the lampholders **3** and **5**, the base **11** is first engaged with plunger **15** of lampholder **3** and the lamp is then moved to the left (viewing FIG. 1) to force the plunger **15** into the lampholder **3** until the lamp base **13** can clear the lampholder **5**, as shown in broken lines in FIG. 1. The lamp **1** is then brought into line with the lampholder **5** and the base **13** of the lamp is engaged therewith. The lamp is held firmly in the lampholders **3** and **5** by the spring biased plunger **15**. Removal of the lamp from the lampholders is accomplished by moving it to the left (viewing FIG. 1) until the lamp base **13** is withdrawn from lampholder **5**, tilting the lamp to clear the lampholder **5**, and then withdrawing base **11** from plunger **15** of lampholder **3**.

The lamp bases **11** and **13** are of identical structure and, therefore, for conciseness in description, the internal parts of only the base **11** have been shown completely in FIG. 2 of the drawings. The lamp base **11**, as shown in FIG. 2, comprises an annular metal shell **17** and a disc **19** of electrically insulating material. The inner rim of the shell **17** is embedded in the periphery of the insulating disc **19** to mechanically join these base members together in the manner illustrated in FIG. 2.

The disc **19** includes an elongated embossment **21** projecting outwardly from its base. A passage **23** is provided in the embossed portion of disc **19**, and this passage **23** extends completely through the center of the disc. Metal wire current inleads **25** and **27** extend inwardly through passage **23** and stem **29** of the glass envelope **9** for connection to electrode **31**. The outer ends of the current inleads **25** and **27** are bent over in opposite directions, as shown in FIG. 2, and they terminate within two outwardly facing cavities **33** and **35** which are connected to the passage **23**.

As is well known in the art, the lamp envelope **9** contains a starting gas, such as argon, at a few millimeters pressure, and a small quantity **37** of mercury which is at a pressure of about 10 microns during operation of the lamp. A coating **39** of fluorescent material is provided on the inner surface of the envelope and this material is excited to luminescence by the mercury vapor discharge during the energization of the electrodes.

Turning now to an important aspect of the present invention, which concerns a simplified means for removably mounting the new and improved lampholders **3** and **5** in a supporting panel without requiring any supplemental hardware, attention is directed to FIGS. 1 and 2. The lampholder **3**, which is shown at the left of FIGS. 1 and 2, includes a cup-shaped insulating body **41** with a recessed chamber **43** (FIG. 7) opening into one end **45** thereof, and the aforementioned contact positioning plunger **15** which is reciprocably and telescopically arranged within the chamber **43** of body **41** to form an insulative housing **47** (FIG. 2) for the movable contact elements of the lampholder. (See also FIG. 6). In accordance with one aspect of the present invention, the lampholder **3** also includes a clamping member **49**, which effectively holds plunger **15** in complementary engagement with the cup-shaped insulating body **41**, and also readily snaps the lampholder into engagement with a panel aperture **51** (FIG. 1*a*) for securing it to a supporting fixture.

For telescopically receiving plunger **15**, as shown in FIG. 7, the chamber **43** of body **41** includes a generally

cylindrical cavity 53 with a pair of diametrically opposed grooves 55 formed in the side walls thereof. The plunger 15 has a generally cylindrical external configuration of less diameter than the cylindrical cavity 53 and is provided with diametrically opposed shoulders 57 (FIG. 2) which project radially outwardly from the plunger and fit into the grooves 55 of body 41 to guide the reciprocating movement of the plunger 15 in cavity 53.

As shown in FIG. 6, the clamping member 49 includes an annular disc-like section 59. Section 59 has an outer flanged periphery 61 of greater diameter than the round edge 63 of panel aperture 51 (as illustrated on the left side of FIG. 1), and a central aperture 65 (FIG. 6) of slightly greater diameter than the external diameter of plunger 15. For effectively attaching the clamping member 49 to insulating body 41 and at the same time holding plunger 15 in engagement therewith, a series of T-shaped lugs 67 are integrally formed on outer periphery 61 of the clamping member. Lugs 67 extend outwardly in a generally perpendicular direction from the plane of annular section 59. In the illustrated lampholder 3, as shown in FIG. 5, four equiangularly spaced lugs 67 are provided. For cooperation with these lugs 67, the outer periphery of insulating body 41 includes a series of four equiangularly spaced channels 69 which are in generally parallel relationship to the axis of body 41 (FIGS. 3 and 7). Each of the channels 69 extends between open end 45 of body 41 and closed end 71 of body 41 and, as shown in FIG. 1, includes a pair of aligned transverse shoulders 73 adjacent to but spaced from the open end 45. (See also FIG. 3.) The channel 69 is also axially and transversely stepped at shoulders 73, being of shallower depth and smaller width between body end 45 and the shoulders 73 than the depth and width between shoulders 73 and body end 71. (See FIG. 2.)

To attach the clamping member 49 to body 41 and also fasten plunger 15 thereto, as shown in FIG. 2, the plunger 15 is positioned in chamber 53 of body 41 with the opposed shoulders 57 located in grooves 55 of the body. The central aperture 65 (FIG. 6) of the annular section 59 of the clamping member is thereupon placed around plunger 15 and the T-shaped lugs 67 are located in their associated channels 69. Outermost arms 75 of the lugs 67 are then bent over into engagement behind the opposed shoulders 73 of the channels 69 (as shown in FIGS. 1 and 2) to clamp member 49 to body 41. Since the diameter of clamping member aperture 65 through which the plunger 15 extends is smaller than the distance between the outermost surfaces of plunger shoulders 57, the shoulders 57 are limited in their outward movement from within the chamber of the insulating body 41 by engagement with the inner surface of annular section 59 of the clamping member. (See FIG. 2.) It will thus be seen that clamping member 49 has been simply and efficiently utilized to attach the plunger 15 to insulating body 41.

For removably attaching the lampholder 3 to panel aperture 51 in a simplified and effective manner, between each adjacent pair of T-shaped lugs 67, an adjacent pair of angularly spaced attachment legs 77 are formed on the outer periphery 61 of clamping member 49. (See FIG. 6.) Each of the attachment legs 77 includes two sections which are in angular relationship to provide an outwardly extending wall-engaging shoulder 79. The wall engaging shoulders 79 face radially outwardly from the axis of the lampholder and are disposed on the legs 77 a predetermined distance from the outer periphery 61 of clamping member 49 so that the assembled lampholder 3 may be readily snapped into engagement with panel aperture 51 from the front thereof. More particularly, as shown in FIGS. 1, 3, and 5, the legs 77 are arranged in series around the periphery of the clamping member and they are generally perpendicular to annular section 59. When the lampholder 3 is not mounted, the outer ends of shoulders 79 of legs 77 are generally arranged in a circle of diameter greater than aperture 51. During the insertion or withdrawal of lampholder 3 from the panel aperture 51, the shoulders 79 are compressed inwardly toward the axis of the lampholder by engagement of one or the other of the angled leg sections with edge 63 of aperture 51 to allow the attachment legs 77 to pass through the aperture. Upon the insertion or withdrawal of the lampholder 3 from the panel aperture, free ends 81 of the attachment legs 77 bear against the outer cylindrical surface 83 of insulating body 41, to limit the compression of shoulders 79 and thereby provide a relatively stiff spring action for the shoulders 79.

From viewing FIGS. 1 and 2, it will be understood that lampholder 3 is readily snapped into seated engagement with the panel aperture from the right side or front of the panel by means of the engagement of the legs 77 of the clamping member 49 with the panel aperture 51. The mounted lampholder 3 may be readily removed from the fixture panel 7 for servicing and the like. For example, lampholder 3, as shown in its mounted position in FIG. 1, may be easily removed from panel 7 from the right side or front of the panel by prying it out with a suitable tool, or it may be removed from the rear or left side of the panel by pushing closed end 71 of body 41 toward the right.

For many lampholder applications, such as, for example, the arrangement shown in FIGS. 1 and 2, it is important that the lampholder contacts be arranged in a predetermined angular position and in a non-rotational relationship with their supporting panels. To expediently accomplish this, as shown in FIG. 1*a*, aperture 51 of the supporting panel 8 has a rectangular notch 85 formed in the rounded inner edge 63 thereof. The notch 85 receives a radially projecting box-shaped key 87 (FIGS. 4 and 6) formed on the outer wall 83 of the insulating body 41 adjacent the open end 45 thereof, to assure that the lampholder 3 is seated into engagement with panel aperture 51 in a predetermined angular relationship. The key 87 of lampholder insulating body 41 thus cooperates with notch 85 of the panel aperture to always fasten the lampholder 3 to the fixture panel 7 in the same relative position, and it precludes any rotation of the lampholder in the panel after it is fastened thereto.

It will now therefore be seen that by means of one aspect of my invention, the clamping member 49 attaches the plunger 15 to insulating body 41 to form a compact housing for the lampholder 3, and at the same time enables the lampholder 3 to be readily and removably mounted in a panel aperture without requiring the use of any supplemental hardware. It will also be seen that the lampholder 3 includes a complementary engagement means for cooperating with the panel aperture and thereby precluding any rotation of the lampholder in the fixture panel.

Turning now to a further aspect of the present invention whereby there is provided a new and improved pressure locking contact arrangement for a lampholder which incorporates a movable contact positioning plunger, attention is directed to FIG. 6. For resiliently locking the bared ends of external conductors into engagement with the lampholder 3, two terminal elements 89 are provided. Each of the elements 89 is effectively adapted for complementary engagement with chamber 43 of the insulating body 41, and as shall be further understood hereinafter, helps to support and position one of the coiled compression springs 91 in the lampholder cavity 53.

More particularly, the terminal element 89 comprises a generally L-shaped contact engaging section 93 and a looped or U-shaped pressure locking section 95, which are integrally connected together by arm 97. The L-shaped section 93 includes a generally flat platform 99 with an aperture 101 formed therein, and limb 103 which is turned over in perpendicular fashion from platform 99, as shown in FIG. 6. The platform 99 fits into complementary engagement with a similarly configured recess

104 formed upon one side of inner bottom 105 of the cylindrical cavity 53 of body 41 (as shown in FIG. 7). To help place and position platform 99 of each element 89 on one side of bottom 105 of cavity 53, a curved edge 107 of platform aperture 101 engages a curved inner shoulder 109 of a molded positioning stud 111 formed on bottom 105. (See FIG. 7.) Thus, as shown by FIGS. 6 and 7, curved edge 107 of aperture 101 and curved shoulder 109 of stud 111 have substantially the same radius of curvature to enable these surfaces to cooperate with each other. On the other side of platform aperture 101 from the section of edge 107 which engages shoulder 109 of the positioning stud 111, a tab 113 is extended outwardly from the plane of the platform 99. (See FIG. 6.) When platform 99 is seated in engagement with the complementary recess 104 on inner bottom 105 of the lampholder body 41, the curved shoulder 109 of stud 111 and tab 113 each engage within the outer periphery of one end of compression spring 91 (on opposite sides thereof), as suggested by the dotted line of FIG. 6, to accurately position spring 91 in electrical engagement with terminal element 89 and prevent any lateral movement thereof. It will thus be seen that studs 111 of insulating body 41 and tabs 113 of the terminal elements 89 cooperate to precisely position the outer end fo each spring 91 in the lampholder housing.

As shown in FIG. 7, a shallow channel 115 is formed in each side of cylindrical cavity 53. Channel 115 extends axially of body 41 into recess 104 and opens into cavity 53 for receiving and positioning limb 103 of terminal element 89. (See also FIG. 6.)

Turning now to the structure of the U-shaped pressure locking section 95 of terminal element 89, attention is directed to FIG. 6. Section 95 includes at its free end a resilient tongue 117 which is in generally parallel relationship to an opposed portion 119 and connected thereto by bight 121. As shown in FIG. 6, portion 119 is integral and coplanar to the aforementioned connecting arm 97, and disposed at a slight angle with relation thereto.

To enable each of the terminal elements 89 to assume a compact complementary relationship with lampholder insulating body 41, and allow the movable parts of the lampholder to effectively perform their functions in a minimal area, as shown in FIG. 5, the closed end 71 of body 41 has a pair of generally opposed conductor receiving apertures 123 formed therein. The apertures 123 each open inwardly into a stepped inner transverse wall 124 (FIG. 7) from stepped rear end section 71*a* (FIG. 5). More particularly, each of the apertures 123 is located adjacent to the rear end of one of the channels 69 (FIG. 5) of a pair of opposed channels 69, and the axes of the apertures 123 are parallel to each other and also parallel to the axis of the lampholder. Adjacent each of these apertures 123 (as shown in FIG. 7) there is formed in chamber 43 of body 41, a wall 125 which perpendicularly intersects transverse wall 124 and is disposed in a plane parallel to the axis of the aperture 123. Each of the walls 125 is recessed from the cylindrical cavity 53 (as shown in FIG. 7) and conterminous with a stepped surface 127 which is disposed in parallel relationship to wall 124 and in transverse relationship to the axis of the lampholder. Stepped surface 127 is also spaced axially toward end 45 of the insulating body from wall 124. The stepped surface 127 is in turn conterminous at its outer edge with a relatively flat recessed longitudinal wall 129, and conterminous inwardly with shallow channel 115. (See also FIG. 6.) As shown in FIG. 7, the right side of the upper surface 127 perpendicularly intersects longitudinal side wall 130 which is also perpendicularly connected to longitudinal wall 129. The wall 129, as shown in FIG. 6, is also angularly conterminous with an elongated wall 131. The wall 131 is in generally parallel relationship to the axis of conductor receiving aperture 123 and perpendicularly intersects the wall 125 on one of its sides. On its other side, the elongated wall 131 is connected to another wall 133 which is disposed in perpendicular relationship thereto and is also in generally parallel relationship with the shorter opposed wall 125. As shown in FIG. 7, elongated wall 131 is also located adjacent to and outwardly of conductor receiving aperture 123 and it perpendicularly intersects transverse wall 124.

As shown in FIG. 7, the walls 124, 125, 131, 133, and 127, 129, 130 describe an over-all recess 135 in the wall of chamber 43 which communicates with each associated conductor receiving aperture 123 and also opens transversely into the cylindrical cavity 53. By one aspect of the present invention, the pressure locking section 95 of each of the terminal elements 89, together with arm 97 thereof, is positioned in this over-all recess 135 in such a manner that an effective pressure locking action is achieved by the terminals without in any way interfering with the reciprocating operation of the plunger 15. More particularly, viewing FIGS. 6 and 7, the U-shaped pressure locking section 95 is positioned within recess 135 next to transverse wall 124, with tapered groove 117*a* of the pressure locking tongue 117 extending angularly away from the inner end of an adjacent conductor receiving aperture 123. (See also FIG. 2.) Bight 121 of the pressure locking section 95 is then disposed adjacent to the side wall 133 of the recess 135 and connecting arm 97 of the terminal element 89 is positioned upon stepped surface 127. (See also FIG. 6.) To hold the pressure locking section 95 of each terminal element 89 in its desired position within recess 135 of insulating body 41, a flat piece of thin insulating material 137 (as shown in FIG. 6) is positioned with its ends 137*a* disposed in a pair of opposed grooves 139 formed in walls 133 and 129. When clamping member 49 is fastened to insulating body 41, it engages outer longitudinal edge 140 of insulator 137 and presses the inner longitudinal edge 141 against portion 119 and arm 97 of the terminal element to hold the terminal element in its desired position.

To effect the pressure locking engagement of bared conductor ends by the pressure locking tongues 117 of terminal elements 89, the tongues 117 are normally resiliently biased toward their associated apertures 123 to provide a wedging biasing force. Thus, when the bared end of a conductor is thrust inwardly through any receiving aperture 123, the associated locking tongue 117 pivots or flexes about its curved end 117*b* in response to the force transmitted to it by the inserted conductor, and the tapered groove 117*a* of tongue 117 resiliently coacts with the adjacent wall 125 of body 41 and the aperture 123 to sandwich or wedge the bared conductor end into electrical engagement with the terminal element 89.

To disengage any conductor from its pressure locking tongue 117, an unlocking slot 143 is molded into the closed end 71 of body 41 adjacent to each conductor receiving aperture 123. Each slot 143 thus extends axially from stepped outer end wall 71*a* through the closed end of body 41 and opens into chamber 43 thereof adjacent an associated aperture 123. (See FIG. 6.) One merely needs to insert a sharply pointed tool through the unlocking slot 143 and flex the pressure locking tongue 117 to unlock any bared conductor end from electrical engagement with its pressure locking tongue.

Turning now to a further exposition of the structure of lampholder 3, as previously mentioned, each of the coiled compression springs 91 has one of its ends positioned conjunctively around curved shoulder 109 of body stud 111 and tab 113 of platform 99 of the terminal element 89, as shown by the dotted line of FIG. 6. As shown in the left side of FIG. 2, each of the springs 91 is thus in electrical engagement with terminal element 89. The other end of each of the springs 91 engages shoulders 145 and 147 on identical flat metal contacts 149 and 151 (as shown in FIG. 2). The shoulders 145 and 147 of each of the contacts 149 and 151 are urged

toward a transverse integral partition **153** of the plunger **15** to bias the plunger outwardly from chamber **43**. Each of the contacts **149** and **151** also has a transverse embossment **154** (FIG. 6) formed on its surface between shoulders **145** and **147** thereof. Embossment **154** engages the back surface of partition **153** when the lampholder is disengaged from a lamp base.

In addition to the transverse partition **153** of plunger **15**, which acts as a stop for the contacts **149** and **151**, the plunger **15** is provided with an integral longitudinal partition **155** (FIG. 2) which insulates each of the springs **91** and the contacts **149** and **151** from each other.

To enable the spring biased contacts **149** and **151** to engage the inleads **25** and **27** of lamp **1**, these contacts extend through aligned slots **157** (FIG. 4) in the partition **153** and into the cavity **159** in the front face of plunger **15**. The back surface of the partition **153** is slanted forwardly and inwardly from its ends toward the center, as is shown by dotted lines in the plan view at the left side of FIG. 2, so that the blades of the contacts **149** and **151** diverge outwardly from each other when the lamp is removed from engagement with the lampholder **3**.

The springs **91** in the lampholder **3** thus serve the dual purpose of biasing the plunger **15** outwardly of the chamber **53** and biasing the outer ends of the contacts **149** and **151** outwardly from each other so that these contacts make a positive connection with the inleads **25** and **27** of the inserted lamp base **11**. The springs **91** are connected to terminal elements **89** by means of their engagement with platform **99** thereof and thus serve to conduct electrical energy to the mounted lamp from the terminal elements **89**.

It will now therefore be seen that the lampholder **3** embodying the present invention is of simplified construction and effectively achieves automatic resilient locking of the bared ends of conductors by means of a novel structural arrangement.

Turning now to a detailed discussion of the noncompressible or fixed end type of lampholder **5** embodying my invention, attention is initially directed to the right side of FIGS. 1 and 2. The lampholder **5** is similar to the aforementioned lampholder **3** in that it includes the clamping member **49** for snapping the lampholder into engagement with the panel aperture **51** of a suitable fixture. However, the lampholder **5** differs from lampholder **3** in that it is of smaller construction and includes fewer parts. More particularly, as shown in FIG. 11, the lampholder **5** comprises a relatively shallow cup-shaped insulating body **171**, a pair of identical contacts **173** positioned in a recess **175** (FIG. 2) of body **171**, a contact positioning insulating disc **177** disposed in complementary engagement with body **171** in recess **175**, and a clamping member **49** for rigidly fastening disc **177** to body **171** and for also removably mounting the lampholder **5** to a panel aperture **51**.

For supporting and positioning the contacts **173** and insulating disc **177** in insulating body **171**, the body **171** has its recess **175** divided into two laterally spaced chambers **179** located at the closed end **181** of body **171** (as shown in FIG. 11) and opening axially into a generally cylindrical outer cavity section **183** at the open end **185** of body **171**.

One of the contacts **173** is positioned in each of the chambers **179** of body **171**, as shown in FIG. 12, as shall be set forth in detail hereinafter. The disc **177** telescopes into complementary engagement with the generally cylindrical outer cavity section **183** of body **171** to form a very compact and wafer-like insulative housing for the contacts **173** of the lampholder. More particularly, as shown in FIG. 11, insulating body **171** has a pair of inwardly facing opposed ears **187** formed on outer cavity section **183**. Disc **177** has an annular flange **189** with a pair of opposed indentations **191** formed thereon. The flange **189** of disc **177** fits into the outer

cavity section **183** of body **171**, as shown on the right side of FIG. 2, and the indentations **191** of the flange **189** receive ears **187** to securely and compactly form an insulative housing for the lampholder contacts **173**.

As shown in FIG. 11, the outer periphery of insulating body **171** includes a series of four channels which are equiangularly spaced apart and in generally parallel relationship to the axis of a body **171**. One pair of these channels is of the type identified by reference **193***a* in FIG. 11. and the other pair of channels is of the type identified by reference **193***b* in FIG. 11. Each of the channels **193***a* and **193***b* extends between open end **185** of body **171** and the other side of annular flange **182**, and it has a pair of opposed shoulders **195** formed on the rearward side of flange **182**. (See FIG. 1.) The shoulders **195** are functionally and structurally similar to shoulders **73** of the body **41** of lampholder **3**.

The clamping member **49** is attached to body **171** and also fastens disc **177** thereto, as shown in the right side of FIG. 2, in the same manner as previously described for lampholder **3**. Thus, T-shaped lugs **67** of clamping member **49** are located in channels **193***a* and **193***b* of body **171**, and the outermost arms **75** of the lugs are then bent over into engagement behind the opposed shoulders **195** of the channels to clamp member **49** to body **171**. The diameter of central aperture **65** of the annular section **59** of the clamping member is smaller than the diameter of the outer periphery **189***a* of flange **189** and member **49** thus holds disc **177** in rigid complementary relationship with body **171**. (See FIG. 8.)

The clamping member **49** for lampholder **5** includes the aforementioned series of attachment legs **77** for removably, simply and effectively snapping the lampholder **5** into engagement with a panel aperture **51** in the same manner previously described for lampholder **3**. To preclude rotation of the lampholder **5** in panel **7** after it is fastened thereto, a radially projecting key **87** of lampholder insulating body **171** cooperates with notch **85** of the panel aperture **51** in the same manner previously described for lampholder **3**.

Turning now to a further aspect of the present invention, whereby there is provided a new and improved pressure locking contact arrangement for a lampholder which incorporates a stationary contact positioning member, attention is directed to FIG. 11. For resiliently locking the bared ends of external conductors into engagement with lampholder **5**, the two aforementioned contacts **173** are provided. Each of the contacts **173** comprises an elongated strip section **201** of generally U-shaped configuration and a looped strip section **203** which is connected integrally thereto. More particularly, the U-shaped strip section **201** of each contact **173** includes a pair of generally opposed resiliently movable arms **205** which have tapered grooves **207** formed on their ends to serve as pressure locking tongues for engagement with the bared ends of external conductors. As shown in FIG. 12, although the arms **205** are generally opposed, they are also convergent with respect to each other. The resiliently movable arms **205** of contacts **173** are connected together by an inwardly bow-shaped bight **209**.

For connecting the integral looped strip section **203** to the pressure locking terminations **205** of contact **173**, as shown in FIG. 11, an L-shaped strap section **211** is bent over from one of the edges of bight **209** near the center thereof. Strap **211** includes a supporting section **213** which is generally coplanar to the body engaging edges of tongues **205** and bight **209**, as shown in FIG. 11, and together with these edges engages the inner transverse surface **214** (FIG. 12) of one of the chambers **179** to support the associated contact therein. The other part of the L-shaped strap **211** forms a supporting shank for the looped strip section **203**. As best shown in FIG. 11, the strip section **203** is of a considerably narrower width than the elongated strip section **201**, to enable the

extension of this looped section **203** through slots **215** of the insulating disc **177**. (See FIG. 9.)

To prevent the resilient movement of each of the locking tongues **205** from undesirably effecting movement of the other tongue **205**, as shown in FIGS. 11 and 12, each of the chambers **179** of lampholder insulating body **171** is specially constructed to cooperate with the U-shaped strip section **201**. More particularly, as shown in FIG. 12, each of the chambers **179** is separated from the other chamber by a transverse rib **217** and it has a generally oblong configuration. Thus, as shown on the right side of FIG. 12, each of the chambers **179** is bounded by rib **217** on one side thereof, inwardly bowed longitudinal wall **219** which is disposed in opposition to rib **217**, and opposed end walls **221** which are in general conterminous with rib **217** and longitudinal wall **219**. As shown best in FIG. 8, each of the opposed end walls **221** has a circular-shaped conductor receiving aperture **223** formed therein, and rectangularly configured unlocking aperture **225** adjacent thereto. Each pair of adjacent apertures **223** and **225** opens into one of the chambers **179** from one end wall **221** thereof and faces another adjacent pair of apertures **223** and **225** at the other end wall **221** of the same chamber **179**. (See also FIG. 10.)

To simply and effectively segregate the resilient functioning of each of the locking tongues **205** from that of the other and at the same time prevent the resilient functioning of each of these tongues **205** from imparting any deleterious effect to the resilient function of the looped strip section **203**, each of the contacts **173** is positioned in chamber **179** of the insulating body **171**, as shown in FIG. 12. Each contact **173** is thus positioned in insulating body **171**, so that the U-shaped strip section **201** fits snugly into a chamber **179**, with the inwardly bow-shaped bight **209** engaging inwardly bowed longitudinal wall **219**, and the locking tongues **205** disposed in convergent relationship and next to an associated end wall **221**. With this arrangement, as shown in FIG. 12, a pair of opposed upright bosses **227** are formed in chamber **179** alongside of the juncture **228** or bent part of L-shaped strap **211**. The bosses **227** project toward the open end **185** of the lampholder insulating body from closed end wall **181**, and are disposed within each chamber **179** so that they bracket the inner end of juncture **228** of the strap **211**. Each pair of bosses **227** is disposed on opposite respective sides of a strap **211** so that the bosses engage the opposite outer edges of strap **211** adjacent juncture **228** upon the resilient flexure of each of the locking tongues **205**. Thus, for example, when a bared conductor is inserted through a conductor receiving aperture **223** on one side of a chamber **179** and engages a tongue **205**, due to the engagement of juncture **228** of strap **211** of the contact with the boss **227** which is farthest away from it, the resilient flexure of the tongue **205** imparts little or no effect upon the opposing tongue **205** at the other side of the contact.

As shown in FIG. 12 to provide a limited bearing area for the pivoted flexure of each of the resilient tongues **205**, a molded stud **229** is positioned in chamber **179** in spaced adjacency to the curved intersection **231** of longitudinal wall **219** and each end wall **221**. Stud **229** is thus spaced radially inwardly from the curved intersection **231** of bight **209** and tongue **205** of the contact, and it engages the contact at or near this curved intersection to provide a limited bearing area for each tongue **205**.

To effect the pressure locking engagement of bared conductor ends by the pressure locking tongues **205** of contacts **173**, the tongues **205** are normally resiliently biased away from each other and toward their associated apertures **223** to provide a wedging biasing force. Thus, when the bared end of a conductor is thrust inwardly through the opposed apertures **223** of each chamber, the associated locking tongue **205** pivots and flexes about its curved end in response to the force transmitted to it by the inserted conductor, and the tapered groove **207** of tongue **205** resiliently coacts with the adjacent end of transverse rib **217** and aperture **223** to sandwich or wedge the bared conductor end into electrical engagement with contact **173**. (See FIG. 12.) As shown in FIG. 12, each of the contacts **173** effectively provides two pressure locking terminations, one at each end of the U-shaped strip section **201**. This construction conveniently lends itself to simplified installation by reducing the number of splices required, and thereby substantially reduces installation expense of the fixture with which the lampholder **5** is incorporated.

To disengage any conductor from its pressure locking tongue **205**, one needs merely to insert a sharply pointed tool through unlocking aperture **225** in the same manner previously described for lampholder **3**. Flexure of each of the pressure locking tongues **205** inwardly thus unlocks any bared conductor end from electrical engagement with its tongue.

Turning now to a discussion of the looped strip section **203** of contacts **173**, attention is directed to FIGS. 2 and 11. As shown in FIG. 12, the U-shaped strip section **201** of each of the contacts **173** is positioned in its chamber **179** of insulating body **171** so that it supports the looped strip section **203**. (See also FIG. 2.) When the disc **177** is positioned in complementary engagement with insulating body **171** by means of clamping member **49**, the major portion of the looped strip section **203** extends outwardly through slot **215** of the disc (as shown in FIG. 2) and protrudes into cavity **233** in the front face of the disc. The side **235** of section **203** next to end **237** is then disposed next to the innermost end of each slot **215** and the end **237** engages central embossment **239** of rib **217** (FIG. 11). As shown on the right side of FIG. 2, the elongated embossment **21** of lamp base **13** telescopes into cavity **233** of lampholder **5** and the outermost ends of inleads **25** and **27** engage the outer side **241** of looped strip section **203** to conduct electrical energy to the mounted lamp from contacts **173**. When the inleads of the lamp base **13** engage sides **241** of contact sections **203**, the outer ends of the looped sections **203** are thereby brushed toward each other to achieve the desired contact wiping effect. The resilient movement of looped section **203** upon contact with the inleads is in a direction generally perpendicular to the direction of movement of pressure locking tongues **205** and the functioning of loops **203** has no effect upon the functioning of tongues **205**.

It will now, therefore, be seen that the lampholder **5** embodying my invention is of simplified construction and effectively achieves automatic resilient locking of the bared ends of two conductors to each lampholder contact by means of a novel structural arrangement.

FIG. 13 illustrates, as a modified form of the present invention, a lampholder similar to the lampholder **5** of previous description. For the lampholder **251**, the same reference numerals have been employed to indicate lampholder parts which have heretofore been described for lampholder **5**. The lampholder **251** differs from lampholder **5** in that the contacts **253** do not extend outwardly of recess **175** for engagement with associated lamp base contacts but are instead engaged by extending lamp pins (not shown) of a lamp base through apertures **255** of stationary disc **257**. Each of the contacts **253** of lampholder **251** employs a U-shaped strip section **258** which provides two pressure locking tongues and is identical structurally and functionally to the U-shaped strip section of contacts **173** of lampholder **5**. The lampholder **251** also employs the same insulating body as does lampholder **5**. The structure of the contacts **253** differs from that of the contacts **173** of lampholder **5** in that the width of the strip material comprising looped section **259** of contact **253** is greater than the width of the material comprising looped strip section **203** of contact **173**. In addition, each of the contacts **253** has a pair of wings **261** which extend outwardly and angularly from the side edges of the inner side **263**

of the looped section. These wings **261** cooperate with a recess formed in the underside (not shown) of disc **257** to position the looped section **259** of the contacts therein.

Upon engagement of a suitable lamp base (not shown) with lampholder **251**, the lamp pins thereof enter apertures **255** of disc **257** to resiliently engage the outward side **265** of the looped section.

FIG. 14 illustrates a further modified form of lampholder **5**. Lampholder **271** which is shown in this figure differs from lampholder **251** in that it employs a stationary disc **273** with a single relatively wide central aperture **275** formed therein. The disc **273** is in complementary engagement with an insulating body **171** and is exposes two recessed contacts **253** of the same construction and function as the contacts for lampholder **251**.

It will now therefore be seen that the present invention provides novel lampholders which may be very conveniently mounted in panel apertures without requiring the use of any supplemental hardware. It will be further understood that the lampholders of the present invention are simple in construction, efficient in operation, and relatively inexpensive to manufacture.

While in accordance with the patent statutes, I have described what at present are considered to be the preferred embodiments of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and I, therefore, aim in the following claims to cover all such equivalent variations as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A fluorescent lampholder arranged for mounting in a thin supporting panel having a circular aperture with a notch in its periphery, said lampholder comprising an insulating body having a cylindrical configuration of lesser diameter than the aperture for arrangement therein, said body having a cavity formed therein which opens outwardly at one end, a radially projecting key disposed on the outer periphery of said body for cooperation with said notch of the panel aperture, a contact-positioning member disposed in said cavity, contact means disposed in said cavity and exposed for engagement with a fluorescent lamp base by said contact-positioning member, an annular clamping member secured to said insulating body for removably retaining said lampholder in firmly seated position in said panel, said clamping member having an annular section with a flanged outer periphery of greater diameter than the aperture to seat on said panel around the periphery of said aperture, said annular section being arranged to engage said contact-positioning member and the open end of said insulating body to attach said member to said body, a plurality of attaching legs extending from the outer periphery of said annular section and spaced about the periphery of said insulating body, each of said legs having an outwardly extending shoulder spaced apart from said annular section a suitable distance to receive an edge of the circular panel aperture therebetween, whereby the legs of said clamping member snap into cooperative engagement with the circular aperture of the supporting panel to removably fasten said lampholder thereto and the cooperation of the key of said insulating body with the notch of the panel aperture precludes any rotation of said lampholder in the panel, and a series of T-shaped lugs extending in generally perpendicular fashion from said flanged outer periphery of said annular section, said lugs being arranged in equi-angular spaced apart relationship on said section, said insulating body including a flanged portion extending around at least a part of the outer peripheral circumference of said insulating body adjacent said one end and a number of spaced shoulders on the other side of said flanged portion from said one end, each of said lugs including a pair of arms engaging at least one associated shoulder on said insulating body thereby to attach the clamping member and said contact-positioning member to said insulating body.

2. A snap-in fluorescent lampholder mountable in a panel aperture with a recess in its periphery, said lampholder comprising: an insulating body formed with a key to engage the recess, said insulating body having a cavity formed therein which opens outwardly at one end; a contact-positioning member slidably disposed for movement into said cavity; means positioned in said cavity to bias said contact-positioning member toward said outwardly open end of said insulating body; contacts positioned on said contact-positioning member and exposed toward said outwardly open end of said insulating body for engagement with a fluorescent lamp base; a clamping member positioned at said outwardly open end of said insulating body and secured to said body for removably mounting said lampholder in said panel aperture, said clamping member having a generally radially extending flanged outer periphery portion adapted to engage said panel around the periphery of said panel aperture and also defining an inner opening in which said contact-positioning member is positioned and shaped to limit the movement of said contact-positioning member toward said outwardly open end of the insulating body; and a plurality of attaching legs fastened to and extending from said flanged outer periphery portion of said clamping member adjacent said insulating body, each of said legs having a free end and also having an outwardly extending shoulder adapted to snap into cooperative engagement with said panel aperture, and said key formed on said insulating body precluding rotation of said lampholder when mounted on said panel.

3. A fluorescent lampholder arranged to be mounted on a thin supporting panel having a circular aperture with a panel slot in its periphery, said lampholder comprising: a cup-shaped insulating body having an essentially circular external configuration with a diameter less than the diameter of said panel aperture, said insulating body having a cavity formed therein which opens outwardly at one end; a projecting key extending from the outer periphery of said insulating body for engaging the panel slot thereby to prevent relative rotation of said insulating body and said panel; a cylindrically shaped contact-positioning member slidably disposed for movement in said cavity, said contact-positioning member having at least one radially projecting stop; electrically conductive spring means positioned at least partially within said contact-positioning member and in said cavity in engagement with said insulating body for biasing said contact-positioning member outwardly from said one end of said insulating body; contact means mounted on said contact-positioning member in respective engagement with said spring means and exposed for engagement with a fluorescent lamp base; a pair of terminals in respective engagement with said spring means; and a clamping member positioned at said one end of said insulating body and fastened thereto, said clamping member having an annular generally radially extending flange section larger than the panel aperture thereby to seat around said panel aperture and having an internal opening through which said contact-positioning member is movable, said projecting stop engaging said annular section to limit the movement outwardly in said cavity, said clamping member having a plurality of attaching legs extending therefrom and extending adjacent said insulating body, each of said legs having a free end and also having an outwardly extending shoulder shaped for cooperative engagement in said panel aperture.

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