Dec. 6, 1966 J. M. PISTEY 3,290,638

LAMPHOLDERS FOR ELECTRIC DISCHARGE LAMPS

Filed Oct. 1, 1963 2 Sheets-Sheet 1

Fig. 1

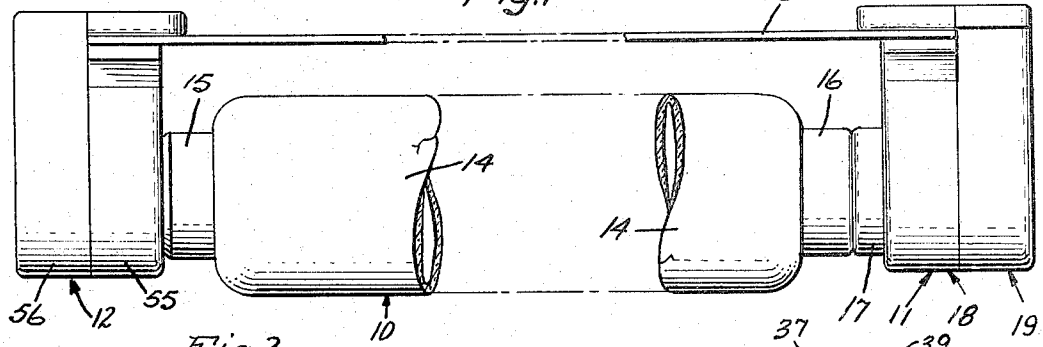

Fig. 2

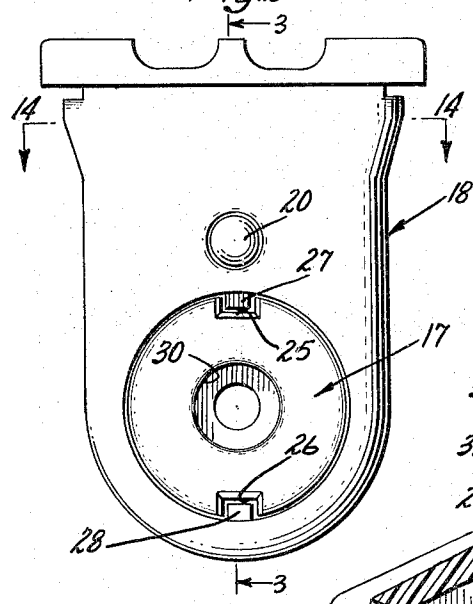

Fig. 3

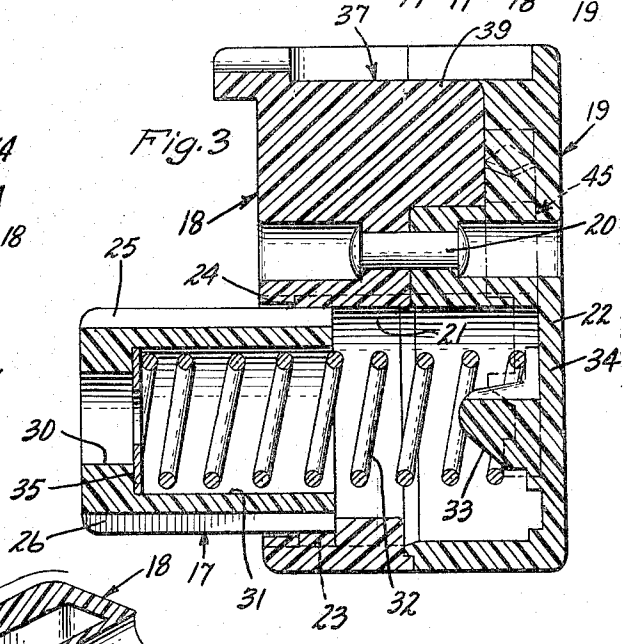

Fig. 4

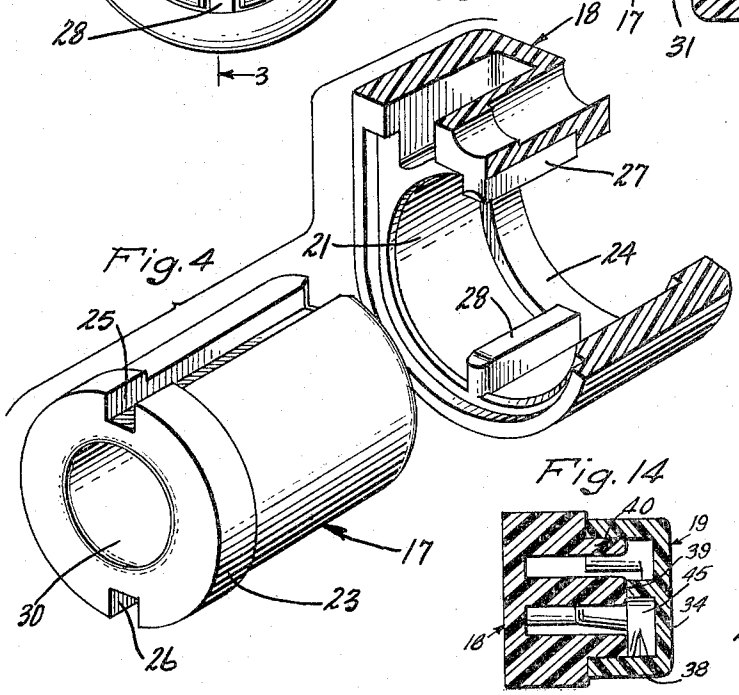

Fig. 5

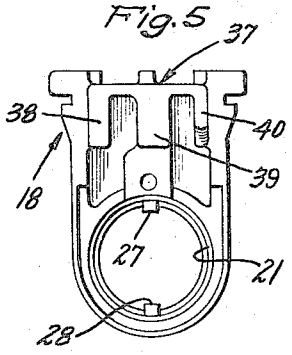

Fig. 14

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LAMPHOLDERS FOR ELECTRIC DISCHARGE LAMPS

Filed Oct. 1, 1963 2 Sheets-Sheet 2

Fig. 6

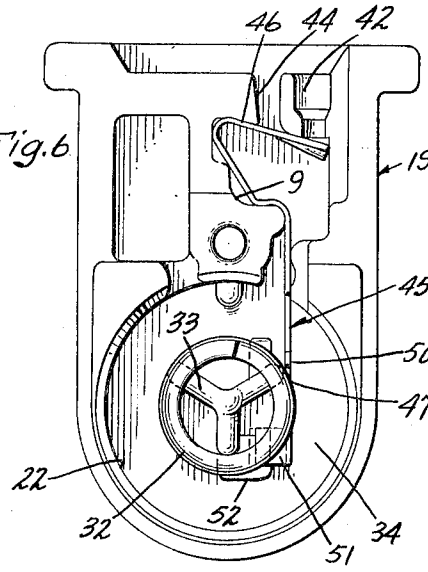


Fig. 7

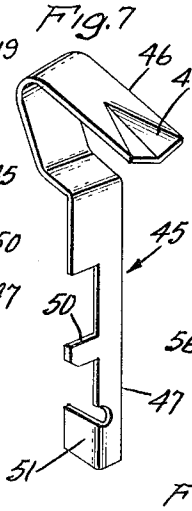


Fig. 10

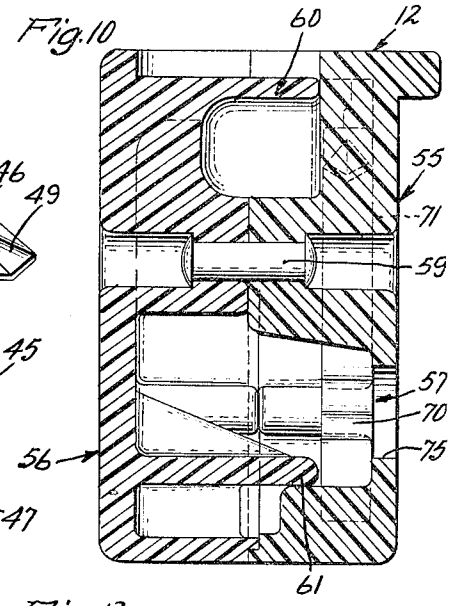


Fig. 11

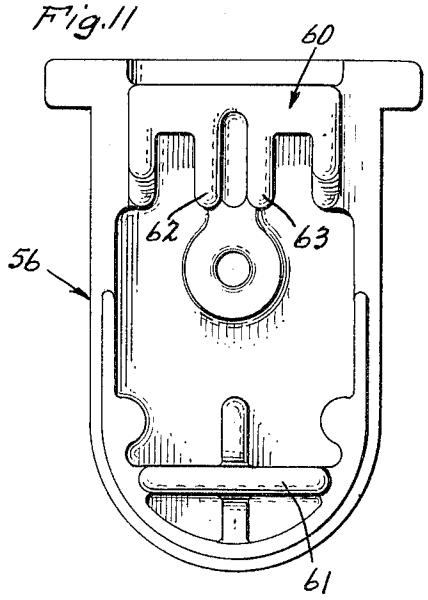


Fig. 12

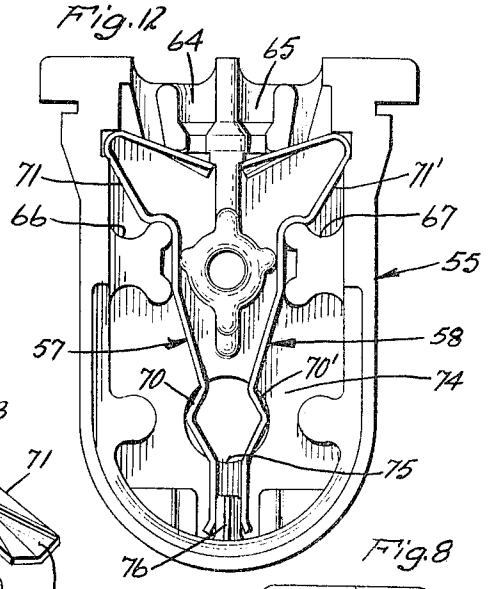


Fig. 13

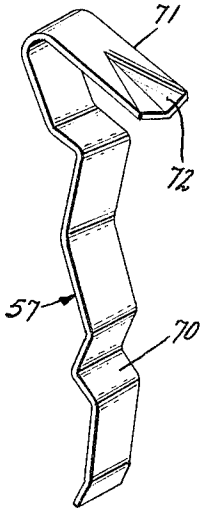


Fig. 9

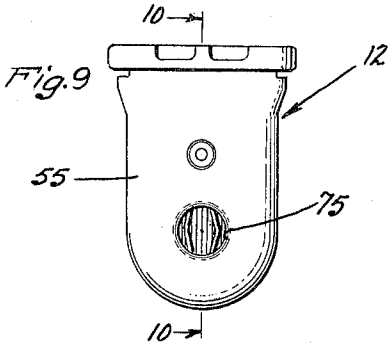
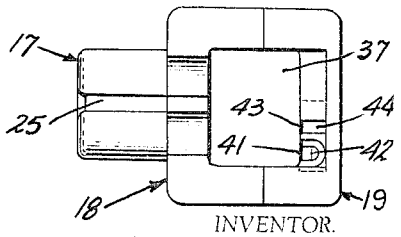


Fig. 8



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United States Patent Office 3,290,638
Patented Dec. 6, 1966

3,290,638

LAMPHOLDERS FOR ELECTRIC DISCHARGE LAMPS

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Filed Oct. 1, 1963, Ser. No. 313,061
6 Claims. (Cl. 339—56)

This invention relates generally to lampholders for electric discharge lamps and more particularly to such improved lampholders for use in conjunction with fluorescentt lamps.

A fluorescent lamp of the single pin type is generally supported at one end by a lampholder having a retractable spring-biased plunger (high-voltage lampholder) and at the other end by a lampholder that provides a fixed support. Thus, the fluorescent lamp is resiliently held between the pair of lampholders. The lampholders also provide the means through which connections are made from the ballast to the lamp. To place the fluorescent lamp in the lampholders, the pin at one end of the lamp is first inserted in the lampholder with the spring-biased plunger, and the spring-biased plunger is compressed until the pin at the other end of the lamp can be engaged in the other lampholder.

In a commonly used lampholder construction the lamp pin is inserted into an aperture formed in the plunger and an axial pressure against the plunger causes the plunger to be retracted into the housing. The housing of such a lampholder is usually constructed of one molded base formed with a relatively deep cavity in which the plunger, spring and other parts are assembled. After the parts are assembled a cover which closes the cavity is attached.

A disadvantage of such a conventional arrangement is that because of the depth of the base the cure time required for the molded part is relatively longer than would be the case if the part molded were of shorter depth. Thus, to enhance the efficiency of the molding operation it is particularly desirable in the manufacture of molded parts that they be of relatively shallow depth and simple configuration. By reducing the depth of the molded part, it will be appreciated that it is possible to thereby reduce the cost of the molding operation since more cavities may be used per mold and shorter curing times may be employed. Another disadvantage in using a single molded housing construction with a relatively deep cavity is that the assembly procedures are complicated for assembling the parts in the deep cavity. It will be apparent that it is generally easier to assemble parts in a relatively shallow cavity.

The electrical contact with the pin of the fluorescent lamp in the high-voltage lampholder is usually provided by a contact means, such as a washer, which engages one end of the plunger spring. The plunger spring serves as a current carrying member of the electrical circuit, and the other end of the spring is in electrical contact with a contact strip to which the leads from the ballast are connected. Once the lamp is in the lampholders sufficient axial force must be exerted by the plunger spring to establish a good electrical contact between the lamp pin and contact strip. Also, the plunger should have sufficient travel to reliably handle lamps within the range of tolerances for the lamp and for mounting the lampholders. The manufacturing tolerances for a typical fluorescent lamp are plus or minus ⅛ of an inch and the mounting tolerances of the lampholders are plus or minus 1/16 of an inch. In view of the lamp and lampholder mounting tolerances it is particularly desirable that the plunger be allowed to retract into the housing as far as possible.

A general object of this invention is to provide an improved lampholder for electric discharge lamps such as fluorescent lamps.

Another object of the invention is to provide an improved lampholder utilizing molded parts of relatively shallow depth.

It is still a further object of the present invention to provide an improved lampholder having an improved spring-biased plunger arrangement providing maximum travel for a given axial width of the lampholder.

A more specific object of the present invention is to provide an improved lampholder construction using parts that can be more efficiently molded.

Another specific object of the present invention is to provide a lampholder having an imporved contact-strip arrangement for use in conjunction with a spring-biased plunger.

In accordance with one form of the invention, I have provided an improved lampholder for a fluorescent lamp with a split insulating housing arrangement. The insulating-housing arrangement includes a first and a second housing section which provide a front and a rear vertical wall and which are joined to form side walls disposed in perpendicular relationship to the vertical walls. One of the housing sections is formed with a projection that extends into the other housing section to provide a guide wall for the conductor receiving aperture formed in the other housing section. The projection also engages a resilient contact strip disposed in edgewise relation along the vertical wall of the other housing section to hold the strip therein. At one end the resilient contact strip is formed with an angulated pressure lock portion that is disposed at the inner side of the conductor receiving aperture for engaging a conductor in locking relation. At the other end the resilient contact strip includes a portion for connection in electrical circuit with the fluorescent lamp.

According to another aspect of the invention, the housing sections are formed with a plunger-receiving opening with a pair of opposed axially extending ribs formed thereon. A plunger having axially extending slots engaging the ribs in the opening is slideably mounted in the opening. A current-carrying spring member normally biases the plunger outwardly of the housing. Preferably, a spring centering means is formed on the vertical wall of one of the housing sections, and the contact strip includes an ear spaced from the centering means and engaging the spring member. Further, the contact strip includes a transversely extending element disposed under the end of the spring member to provide electrical contact therewith.

With the split-housing arrangement it was possible to reduce the cost of the molded parts and to simplify the assembly of the other components in the molded parts because of the relatively shallow depth and configuration of the molded parts. Further, for a given axial width of a high-voltage lampholder, it was possible to provide an increase in the travel of the lampholder plunger.

Further aspects of my invention will become apparent upon consideration of the following more detailed description. The subject matter which I regard as my invention is set forth in the appended claims. The invention, however, together with further objects and advantages thereof may be best understood by referring to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a side elevational view showing a general arrangement of a fluorescent lamp supported between a pair of lampholders embodying one form of the invention;

FIGURE 2 is an enlarged front elevational view of the high-voltage lampholder shown at the right end of the

lamp in FIGURE 1 with the plunger in the extended position(lamp disengaged);

FIGURE 3 is a sectional view taken generally along the line 3—3 of FIGURE 2;

FIGURE 4 is a view in perspective of the plunger and a fragmentary portion of a housing section of the lampholder illustrated in FIGURES 2 and 3 illustrating the cooperative relationship between the housing section ,and the plunger;

FIGURE 5 is a rear elevational view of the front housing section of the high-voltage lampholder shown in FIGURE 1;

FIGURE 6 is an enlarged front elevational view of the rear housing section of the high-voltage lampholder shown in FIGURE 1 with the spring positioned on the centering means;

FIGURE 7 is an enlarged perspective view of the contact strip shown in FIGURE 6;

FIGURE 8 is a top view of the high-voltage lampholder shown in FIGURE 1;

FIGURE 9 is a front elevational view of the low-voltage lampholder shown at the left end of the arrangement shown in FIGURE 1;

FIGURE 10 is an enlarged sectional view taken generally along the line **10**—**10** of FIGURE 9;

FIGURE 11 is an enlarged front elevational view of the rear housing section of the low-voltage lampholder shown in FIGURE 9;

FIGURE 12 is an enlarged rear view of the front housing section of the lampholder shown in FIGURE 9 with the front housing section removed;

FIGURE 13 is an enlarged view of the contact strip shown in FIGURE 12; and

FIGURE 14 is a sectional view taken substantially on the plane of line **14**—**14** of FIGURE 2.

Having more specific reference now to FIGURE 1 of the drawings, I have illustrated therein a fluorescent lamp **10** of the single-pin type supported at the right end by a a high-voltage lampholder **11** and at the left end by a low-voltage lampholder **12**. The lampholders **11, 12** in which the invention is embodied, are supported from a plate **13**. The plate **13** may form the part of a lighting fixture or other surface on which it is desired to attach the lampholders **11, 12**. The fluorescent lamp **10** which is supported by lampholders **11** and **12** includes a tubular glass enevelope **14** with a pair of bases **15** and **16**, each of which have a single pin (not shown) extending therefrom.

It will be apparent from the general arrangement shown in FIGURE 1 that for a given lamp length, the lampholders **11** and **12** must be mounted and attached to the supporting plate **13** in a predetermined spaced relation. With the lampholders **11, 12** so mounted, the lamp **10** is inserted into the lampholders by first depressing a spring-biased plunger **17** into the lampholder **11** sufficiently so that the pin at the left end of the lamp **10** can be inserted in the aperture provided in lampholder **12**. To insert the lamp **10**, it is held at an angle to the center line joining the two lampholders **11, 12** and is forced towards the lampholder **11** to push the plunger **17** inwardly. When the pin at the left end of the lamp **10** is engaged in lampholder **12**, the lamp **10** is resiliently supported between the two lampholders **11** and **12**.

Having more particular reference now to the FIGURES 2 to 7, I will now more particularly describe the construction of the high-voltage lampholder **11**, which is shown at the right end of the lamp-mounting arrangement illustrated in FIGURE 1. It will be noted that a split housing arrangement is provided and is comprised of two molded housing sections **18** and **19**. For convenient reference, the section **18** which is adjacent to the lamp **10** will hereinafter be referred to as the front housing section and the section **19** joined therewith shall be referred to as the rear section. The front and rear housing sections **18, 19** are joined to form a unitary housing structure by a

suitable securing means such as an eyelet or rivet **20**. The plunger **17** is slidably mounted within plunger-receiving openings **21, 22** in the front and rear housing sections **18, 19**. The front and rear housing sections **18, 19** and the plunger **17** are preferably formed from any moldable electrically insulating material such as urea.

As is best seen in the exploded view of FIGURE 4 the plunger **17** is cylindrical in shape and includes a flange **23** which engages an annular stop shoulder **24** formed in the front housing section **18** when it is in the extended position. Also the plunger **17** includes a pair of opposed grooves or slots **25, 26** which engage the opposed axially extending ribs **27, 28** formed in the plunger receiving opening **21**. When the plunger **17** is in the outwardly extended position as shown in FIGURE 3, it will be seen that the flange **23** is in contact with the annular stop shoulder **24** formed in the front housing section **18** and any further outward axial movement of the plunger **17** is thereby restrained. The plunger **17** is formed with a pin-receiving aperture **30** and a relatively larger opening **31** for receiving a current-carrying spring **32**.

The spring **32**, as shown in FIGURE 3, is centered at one end by a centering means which is comprised of a ribbed boss **33** formed on the vertical wall **34** of the rear housing section **19**. At the other end the spring **32** engages a contact washer **35** which provides an electrical connection between the lamp pin and the spring **32**. The spring **32** may be formed from any suitable resilient and electrically conductive material, and in the fully extended position is designed to exert a spring force to maintain the plunger **17** in the extended position.

As is best seen in FIGURE 5, the front housing section **18** is formed with a foot or projection **37** which extends outwardly of the front housing section **18**. The projection **37** includes three rib portions **38, 39** and **40** and engages the rear housing section **19** in interlocking relation to provide structural rigidity between the housing sections **18** and **19**. It was found that with the projection **37** extending into the rear housing section **19**, as shown in FIGURES 3 and 8, the split housing arrangement had the requisite mechanical strength and permitted the use of molded housing sections **18, 19** having a relatively shallow depth. This results in the important advantage that more cavities per mold and shorter cure times are possible, as compared to a lampholder arrangement utilizing a non-split housing arrangement. Also, the projection **37** provides for an accurate fit between the two housing sections **18** and **19**.

Referring to FIGURES 5 and 8, the end surface of the rib portion **38** provides a guide wall **41** for the conductor receiving aperture **42** and serves to guide a conductor or lead into proper pressure-lock engagement. The end surface of portion **39** locks the contact strip **45** in the rear housing section **19** and also provides a wall **43** for the tool-receiving aperture **44**. Referring to FIGURE 3, it will be observed that the contact strip **45** is illustrated in phantom lines in its operative position in edgewise relation between the vertical wall **34** of rear housing section **19** and the end surface of projection portion **39**. This relationship is even more clearly illustrated in FIGURE 14, wherein the contact strip **45** may be seen to be in place between wall **34** and projection portion **39**. It will also be seen in FIGURE 14 that the projection portion **38** provides the guide wall **41** for the conductor receiving aperture **42** as well as engaging a portion of the contact strip **45**.

As is seen in FIGURES 6 and 7, the resilient contact strip **45** includes an angulated pressure-lock portion **46** and spring contact portion **47**. The pressure-lock portion **46** is disposed in the cavity **9** formed in the rear housing section **19** with an interference fit so that the contact strip **45** can be held in position within the rear housing section **19** during assembly. Further, it will be seen that the pressure lock portion **46** is disposed so that the end is located at the inner side of the conductor-receiving aperture **42**.

The end of pressure lock portion **46** is formed with an indentation **49** for facilitating the entry of the conductor into pressure-lock engagement.

The spring contact portion **47** of the contact strip **45** includes tapered ear **50** which, as shown in FIGURE 6, serves to position and lock the spring **32** against the boss **33**, and also includes a transversely extending contact portion **51** which extends in a direction parallel to the vertical wall **34** of the rear housing section **19**. The contact strip **45** may be formed from any suitable electrical conducting material, preferably Phosphor bronze, which may be readily formed to the configuration described herein. It will be noted that the contact strip **45** is disposed in edgewise relation with respect to the wall **34** and that the transverse contact portion **51** is situated between a pad **52** formed on the wall **51** and the end of the spring **32** whereby the spring **32** always presses against the transverse contact portion **51** irrespective of the position of the plunger **17**.

When the spring **32** is inserted over the centering means or element **33** on the wall **34**, the spring **32** effects a slight outward displacement of the spring contact portion **47**. The ear **50** is held resiliently against the spring **32**. This provides the advantage that a spring type of engagement is provided between the ear **50** and the spring **32** which permits the spring **32** to be held in position during assembly.

In assembling the high-voltage lampholder **11**, the contact strip **45** is initially placed in the cavity **9** of the rear housing section **19** and the spring **32** is clipped in position between the centering element **33** and the tapered ear **50**, as shown in FIGURE 6. The plunger **17** is assembled in the plunger receiving opening **21** of the front housing section **18**, and the contact washer **35**, which provide the electrical contact with the lamp, is inserted into the spring-receiving opening **31** of the plunger **17**. The front and rear housing sections **18**, **19** are then joined by setting the eyelet **20**.

Having reference to FIGURES 9 through 13, I will now more particularly describe the low-voltage lampholder **12** used at the left end of the fluorescent lamp support arrangement shown in FIGURE 1. It will be seen that the low-voltage lampholder **12** also utilizes a split housing arrangement and includes a front housing section **55**, a rear housing section **56**, a pair of contact strips **57**, **58** and an eyelet **59**. The rear housing section **56**, as shown in FIGURE 11 is formed with a first projection **60** and a second projection **61** which extend outwardly for interlocking engagement with the front housing section **55**. The first projection **60** including a pair of rib portions **62**, **63** provides a guide wall for the conductor-receiving aperture **64**, **65**, and the first projection **60** also locks the upper end of the contact strips **57**, **58** in the cavities **66**, **67** formed in the front housing section **55**. The second projection **61** extends into front housing section **55** to lock the lower end of the contact strips **58**, **59** in position. Both projections **60**, **61** provide a stronger and more rigid unitary structure when housing sections **55**, **56** are joined together because of the interlocking effect of the projections **60**, **61**. Also, the projections **60**, **61** facilitate the assembly of the parts.

The contact strips **57**, **58** used in this illustrated embodiment of the invention were essentially symmetrical. Accordingly, I have used the same reference numbers to identify the corresponding portions thereof, the portions of contact strip **58** being identified by primed numerals to distinguish them from the contact strip **57**. As is best seen in FIGURE 13, the contact strip **57** includes a pin contact portion **70** and an angulated pressure lock portion **71**. The pressure lock portion **71** includes an indentation **72** to facilitate entry of the conductor lead into pressure locking engagement. It will be noted that the contact strips **57**, **58** are disposed in edgewise relation along the vertical wall **74** and the pin contact portions **70**, **70'** confront the lamp pin receiving aperture **75**, so that when the lamp pin is inserted through the opening **75** the pin is resiliently engaged between the pin contact portions **70**, **70'**. Further, it will be noted that the rib **76** formed in the front housing section **55** provides the proper spacing for the pin contact portion **70**, **70'**.

It will be appreciated that although in the illustrated embodiments of the invention I have shown a pressure lock type of contact terminal for connection to the conductors, other types of terminal arrangements can be used.

The assembly of the low-voltage lampholder involves combining five parts. The pressure lock portions **70**, **70'** of the contact strips **57**, **58** are snapped into position in the cavities **66**, **67** in the front housing section **55**. The rear housing section **56** is then joined with the front housing section **55** by setting the eyelet **59** to complete the assembly.

From the foregoing description it will be apparent that I have provided improved lampholder construction utilizing a split housing arrangement formed of two molded housing sections of relatively shallow depth. An important advantage of such an arrangement is that the mold times required to form these parts has been reduced as compared with comparable lampholders of the prior art employing a single molded part for the insulating housing. Further, the split housing arrangement has made it possible to use simplified mold designs and thereby increase efficiency of the molding operation. Also, an improved spring-biased plunger arrangement has been provided. Further, the interlocking projections utilized in the improved split housing construction not only provide structural rigidity for the insulating housing when assembled on a fixture but also facilitate proper fitting and assembly of the parts during manufacture.

While I have described herein exemplifications of the invention as applied to fluorescent lamps of the single pin type, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the invention. For example, the lampholders can be readily adapted to bi-pin type of fluorescent lamps and other terminal lead arrangements may be employed in conjunction with the improved arrangement. It is therefore intended in the following claims to cover all such equivalent variations as come within the true spirit and scope of this invention.

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

1. A lampholder for an electric lamp comprising a split housing formed of a front and a rear housing section of molded insulating material, each of said housing sections having a vertical wall, said front housing section having a ribbed projection on the vertical wall thereof extending into said rear housing section, an elongated resilient contact strip disposed in edgewise relation along the vertical wall of said rear housing section, said projection on said front housing having means for locking said resilient contact strip in said rear housing section, means for connecting one end of said resilient contact strip with a lead wire, said front and rear housing sections having a plunger-receiving opening formed therein, said opening in at least one of said housing sections having a pair of opposed axially extending ribs formed thereon, a plunger slidably mounted in said plunger-receiving opening, said plunger having opposed slots formed therein and engaging said ribs formed in said plunger-receiving opening, a current-carrying spring member engaging said plunger for normally biasing said plunger outwardly from said housing, means on said plunger engageable with said front housing section for limiting the outward movement of said plunger, said contact strip including a spring contact portion engaging one end of said current-carrying spring member to provide an electrical contact therewith, and means at the other end of said spring member for providing an electrical connection with the lamp.

2. The lampholder set forth in claim **1** wherein said rear housing section includes a spring centering means

formed on the vertical wall of said rear housing section to center the end of said spring member which is in electrical contact with said spring contact portion of the contact strip, said spring contact portion including an ear spaced from said centering means and engaging said spring member to lock said spring member in position, and said spring contact portion also including a transversely extending element disposed under the end of the spring member to provide an electrical contact therewith.

3. In a lampholder for an electric lamp an improvement comprising a split housing formed of insulating material with front and rear vertical walls in perpendicular relationship to side walls, said split housing including a first housing section and a second housing section joined to form said side walls of said split housing, one of said housing sections having a projection divided into at least two portions and extending into the other housing section, said other housing section having at least one conductor-receiving aperture formed therein and one of said projection portions forming a guide wall for said conductor-receiving aperture, and at least one resilient contact strip disposed in edgewise relation between the vertical wall of said other housing section and the other of said projection portions, said other projection portion thereby locking said resilient contact strip in said other housing section, said resilient contact strip having an angulated pressure lock portion at one end thereof disposed at the inner side of said conductor receiving aperture for engaging a conductor in pressure-locking relation and said resilient contact strip having a spring contact portion at the other end thereof for connection in electrical circuit with the electric lamp.

4. In a lampholder for an electric lamp an improvement comprising a split housing formed of insulating material with front and rear vertical walls in perpendicular relationship to side walls, said split housing including a first housing section and a second housing section joined to form said side walls of said split housing, one of said housing sections having a projection extending into the other housing section, said other housing section having at least one conductor receiving aperture formed therein and said projection forming a guide wall for said conductor receiving aperture, and at least one resilient contact strip disposed in edgewise relation along the vertical wall of said other housing section and having one edge adjacent to the vertical wall of said other housing section and the other edge adjacent to said projection, said projection locking said resilient contact strip in said other housing section, said resilient contact strip having an angulated pressure lock portion at one end thereof disposed at the inner side of said conductor receiving aperture for engaging a conductor in pressure locking relation and said resilient contact strip having a spring contact portion at the other end thereof for connection in electrical circuit with the electric lamp, at least one of said housing sections being formed with a plunger-receiving opening, a plunger slidably mounted in said plunger receiving opening, a current carrying coil spring having one end engaging said plunger to bias said plunger outwardly from the housing and the other end engaged against the rear vertical wall, said other housing section formed with a spring centering means on the vertical wall thereof and positioning said coil spring in perpendicular relationship to said last mentioned vertical wall and said spring contact portion of the contact strip comprised of a transversely extending element disposed between one end of said current-carrying coil spring and the vertical wall of said other housing section, and a tapered ear spaced from said centering means and engaging said coil spring to lock said coil spring in position.

5. A lampholder for an electric lamp comprising a split housing formed of insulating material with front and rear vertical walls in perpendicular relationship to side walls, said split housing including a pair of housng sections joined to form said side walls of said split housing, one of said housing sections having a ribbed projection extending from one of said vertical walls into the other of said housing sections in interlocking relation therewith, at least one resilient contact strip disposed in edgewise relation between the vertical wall of said other housing section and said ribbed projection, said strip being formed with a first and second contact portion, and said projection including means for locking said resilient contact strip in said other housing section, means including said first contact portion for establishing an electrical connection with the electric lamp, and means for connecting the second contact portion of the contact strip in circuit with at least one conductor lead.

6. A lampholder for an electric lamp comprising a housing formed of insulating material with front and rear vertical walls in perpendicular relationship to side walls, said housing including a pair of housing sections joined to form said side walls of said housing, one of said housing sections having a projection extending from one of said vertical walls into the other of said housing sections, a resilient contact strip disposed in edgewise relation between a vertical wall of said other housing section and, said projection, said projection including means in engagement with an edge of said resilient contact strip for locking said resilient contact strip in said other housing section, said resilient contact strip including a spring contact portion, means for connecting one end of said resilient contact strip with a conductor lead, said housing sections having a plunger-receiving opening formed therein, said opening in at least one of said housing sections having a pair of opposed axially extending ribs formed therein, a plunger slidably mounted in said plunger-receiving opening, said plunger having opposed slots engaging said ribs formed in said plunger-receiving opening, a current-carrying coil spring having one end engaging said plunger for normally biasing said plunger outwardly from said housing, the other end of said coil spring engaging said contact portion of said contact strip, means at said one end of said coil spring for providing an electrical connection with the electric lamp, and flange means on said plunger engageable with one of said housing sections for limiting the outward movement of said plunger.

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