Sept. 24, 1968 W. E. CARPENTER 3,403,370

MECHANICALLY BASED REAR LOADING PANEL LAMP

Filed Oct. 15, 1965 2 Sheets-Sheet 1

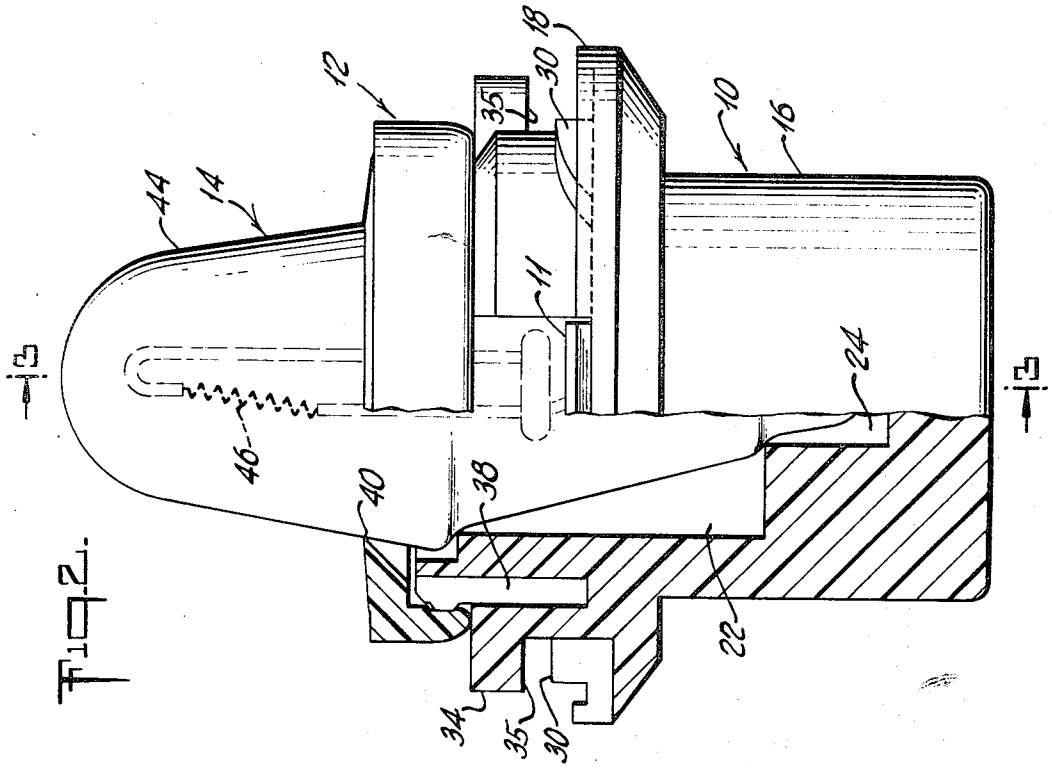


FIG. 2.

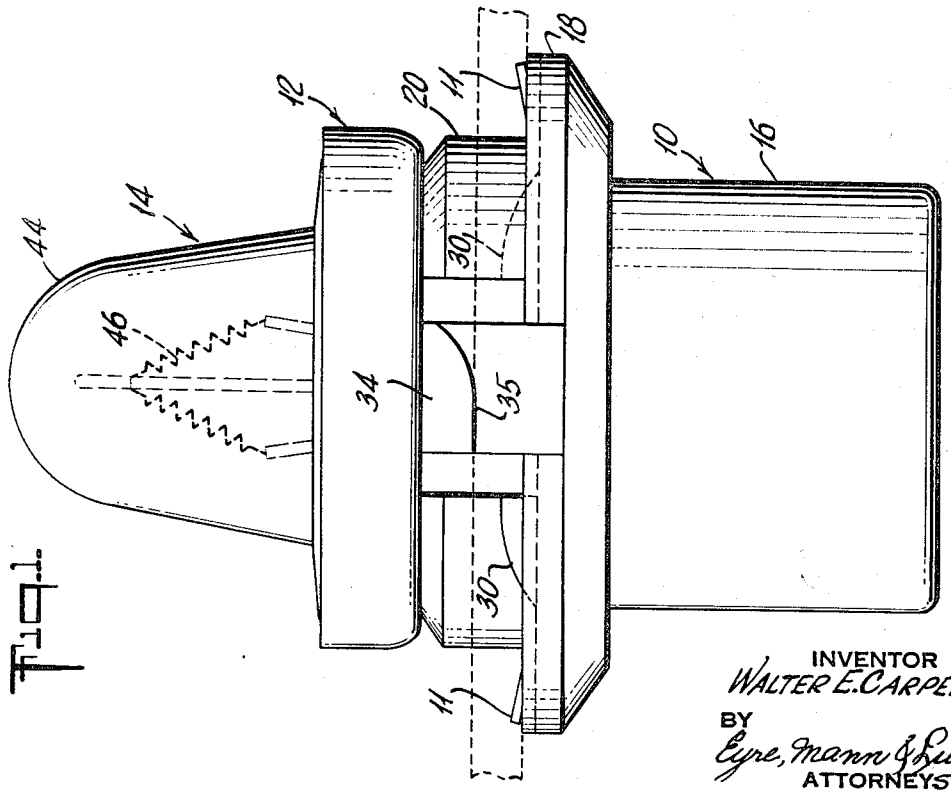


FIG. 1.

INVENTOR
WALTER E. CARPENTER
BY
Eyre, Mann & Lucas
ATTORNEYS

Sept. 24, 1968 W. E. CARPENTER 3,403,370

MECHANICALLY BASED REAR LOADING PANEL LAMP

Filed Oct. 15, 1965 2 Sheets-Sheet 2

Fig. 4.

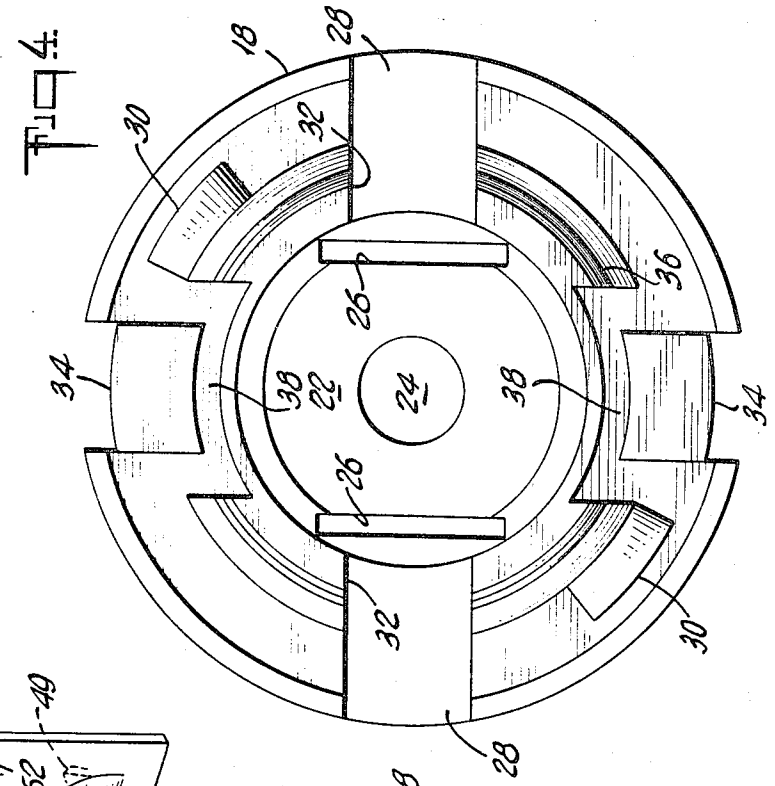


Fig. 5.

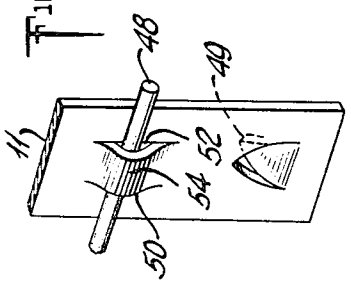
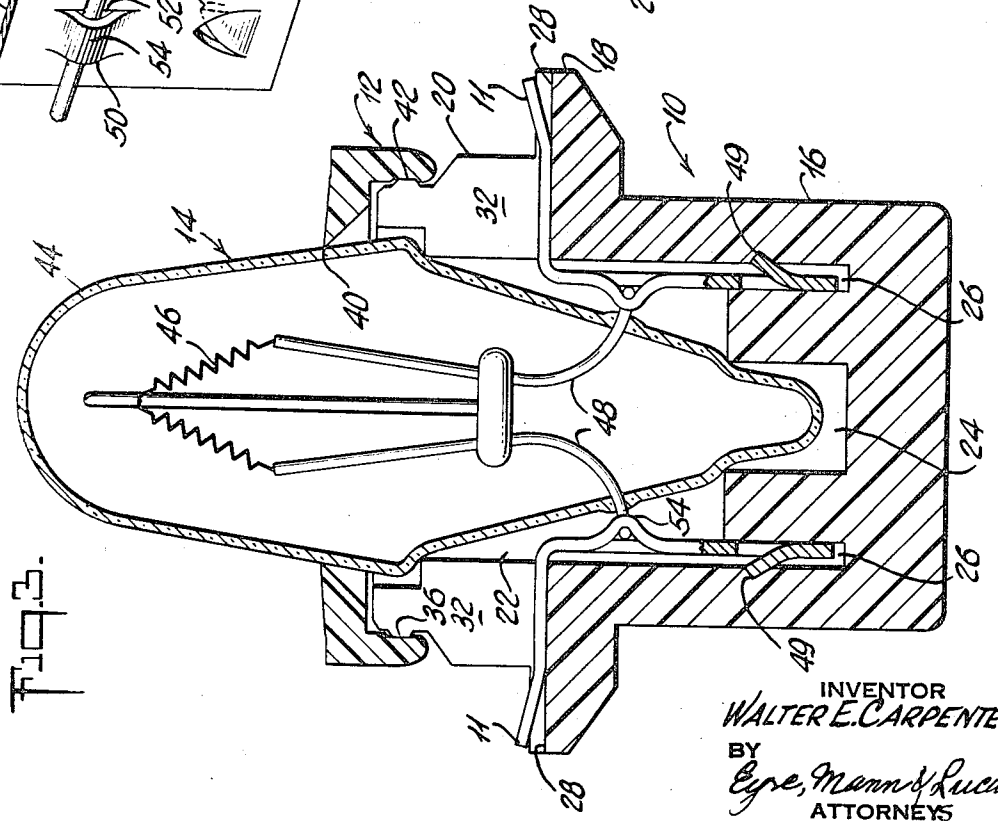


Fig. 3.



INVENTOR
WALTER E. CARPENTER
BY
Eyre, Mann & Lucas
ATTORNEYS

United States Patent Office

3,403,370
Patented Sept. 24, 1968

3,403,370
MECHANICALLY BASED REAR LOADING PANEL LAMP

Walter E. Carpenter, Cedar Grove, N.J., assignor, by mesne assignments, to Wagner Electric Corporation, South Bend, Ind., a corporation of Delaware

Filed Oct. 15, 1965, Ser. No. 496,310
8 Claims. (Cl. 339—17)

This invention relates to an improved rear loading panel lamp for use in printed circuits and more specifically to an inexpensive panel lamp having the bulb portion mechanically fastened to the lamp base and having the bulb wire leads mechanically fastened to the lamp terminals.

The device employs a novel retaining ring for securing the bulb to the base and a unique method for connecting the bulb wire leads to the lamp terminals.

In existing base loading lamps either a wedge type bulb is required with a special socket having spring loaded clasps which holds the bulb to the base, or the bulb is attached to the base by means of thermoplastic setting compositions or adhesives.

The prime disadvantage in use of the wedge type lamp is that after the bulb has been removed and replaced from the base a number of times, the spring loaded clasps located in the socket will move further apart from each other and the bulb will become dislodged from the base during normal handling of the lamps. Also, since the electrical connection between the bulb and the lamp terminals is made through the spring loaded clasps, the efficiency of the electrical connection will depend to a great extent on the force exerted by the clasps against the bulb leads. When the clasps are worn and move further apart from each other, the electrical connection will be extremely poor or may be broken entirely. In addition the wedge bulb type lamp is more expensive to manufacture and requires more material than the lamp of the invention.

The use of thermoplastic cements or adhesives to hold the bulb to the base has the disadvantage of increasing the cost of the product due to the additional steps of adding the resin material and baking the unit in order to set the resinous material. Further, the resin material has a tendency to flow onto the surface of the lamp terminals, which would be in contact with the printed circuit, because the terminals are exposed and are resting on the base of the lamp. This particular problem causes a high percentage of rejects during production of the lamps.

The lamp of the invention overcomes the disadvantages of the lamps now in use by employing a novel retaining ring and a new method for connecting the bulb leads to the lamp terminals. The retaining ring is made from a pliable material such as rubber, synthetic rubber or the various plastic compositions having resilient properties. The ring is designed to fit over the bulb, which in the preferred form is slightly tapered towards the top, and to hold the bulb firmly in place without breaking it. This is accomplished by making the ring with an inside diameter slightly smaller than the diameter of the bulb at the point where the ring will grip the bulb. Further, the gripping edge of the ring, which holds the bulb is designed to exert a continuing downward force against the bulb assuring that the bulb cannot be accidentally dislodged from the base. The ring is locked onto the base after being placed over the bulb by means of a specially

designed ridge formed on the base and a ledge formed in the ring which mates with the ridge.

The method of attaching the bulb wire leads to the lamp terminals is done mechanically and results in a permanent electrical connection between the leads and terminals without the necessity of welding or relying upon spring loaded mounts. Further the lamp terminals are inserted into the base after the wire leads are attached to the terminals. This eliminates the necessity for expensive machinery or skilled help which would be required if the leads were attached to the terminals after the terminals were inserted into the base. Also, the terminals are designed with a barb so that when they are inserted into the base they cannot be removed. This is an important feature since it assures that the lamp terminals will not fall out of the base during normal handling or shipping of the lamps.

The present invention has the further advantage of being either assembled by workers in the field or if the unit is to be shipped assembled by personnel in a factory since it eliminates the use of thermosetting resins with its accompanying baking period, as well as the necessity for welding the bulb leads onto the terminals.

For a better understanding of the invention and the advantages thereof reference may be had to the accompanying drawings showing the preferred embodiment and of which:

FIG. 1 is a front view of the assembled lamp showing the printed circuit in dotted lines;

FIG. 2 is a side view of the assembled lamp showing a portion of the lamp in section;

FIG. 3 is a section taken along lines 3—3 of FIG. 2;

FIG. 4 is a top view of the lamp base without the bulb or retaining ring; and

FIG. 5 is a perspective view of a lamp terminal with a bulb wire lead attached thereto.

The lamp as seen in FIG. 1 and FIG. 3 consists of a hollow base **10**, lamp terminals **11**, a lamp bulb **14** and a retaining ring **12** which holds the bulb **14** to the base **10**. The base **10**, which can be molded from a plastic compound such as, but not limited to, the urea-aldehyde resins, phenolic resins and the melamine formaldehyde resins, comprises a rectanguler shaped bottom portion **16**, a circular collar portion **18** located on top of the rectangular portion and a neck **20** formed on top of the collar.

The collar portion **18** of the base has a diametrical transverse channel **28** (see FIGS. 3 and 4) the importance of which will be explained in reference to the lamp terminals **11**. The collar is formed with two stops **30** located on the top surface of the collar to prevent the lamp from being rotated any further than a specified distance when the lamp is inserted into the standard bayonet socket of a printed circuit.

The neck **20** of base **10** has openings **32** cut into the wall of the neck which communicate with the channel **28**. These openings allow the terminals **11** to be inserted into the base after the base has been molded. Extending from the side wall of the neck **20** are two wing members **34** having a cam surface **35**. The purpose of the members **34** is to force the lamp and in turn the lamp terminals **11** up against the surface of the printed circuit when the lamp is mounted in the circuit. This will be explained further in reference to the assembly of the lamp.

The top section of neck **20** is formed with a ridge **36** about its circumference over which the retaining ring **12** will slip and thereby grip the base. In addition arcuate slots **38** are cut into the neck so as to give the neck portion some flexibility. This is important in that it allows the retaining ring to be slipped over the neck portion without to much resistance and at the same time supply a retention pressure against the ring **12** when the ring is on the base.

The interior of the base is made up of a large chamber **22** which starts in the bottom portion **16** of the base and continues through the top of the base. This chamber carries bulb **14** when the lamp is assembled. The diameter of chamber **22** should be made slightly larger at the top of the base if the bulb **14** is tapered in order to give additional support (see FIGS. 2 and 3). The interior of base **10** also has a smaller chamber **24** located at the bottom center of the larger chamber **22** and receives the lowermost portion of the bulb **14** as seen in FIG. 3. In addition there are two openings **26** located on opposite sides of chamber **24** which receive the terminals **11**.

The retaining ring **12**, which is molded from a pliable material, is constructed so that the opening at the top of the ring has a diameter slightly smaller than the diameter of the bulb at a point where the ring will grasp the bulb (see FIGS. 2 and 3). The edge **40** of said opening of the ring is tapered so as to form an acute angle with the main body of the ring causing the edge to rise slightly when the ring is slipped over the bulb **14**. In this manner the edge will cause a downward force to be asserted against the bulb to insure that the bulb will remain in place during normal handling of the lamp.

The lower portion of the ring **12** has a ledge **42** which fits over the ridge **36** of the base. In this manner the retaining ring is locked onto the base and will not come loose during normal use of the lamp.

The bulb **14** used with the lamp of the invention is of standard type having a glass wall **44**, a filament **46** and wire leads **48**. The walls of the bulb can be tapered, as shown in the drawings, or cylindrical.

The lamp terminals **11** are made of a metal having good electrical conductivity and are formed in an L shape as shown in FIG. 3. The vertical portion of each terminal has an inverted V shaped cut in it to form a barb **49** (see FIG. 5) which will engage the wall of the associated opening **26** when the terminal is inserted into the base.

As shown in FIG. 5 in the vertical portion of each terminal **11** there are two vertical cuts **50** and **52** providing a portion **54** there between which can be pushed out from the wall for reception of a wire lead **48**. After the wire lead is inserted between the portion **54** and the terminal wall, the raised portion **54** is pressed against the wire lead to insure a tight and permanent electrical connection between the wire lead and terminal.

In assembling the lamp, the wire leads **48** of the bulb are first attached to the lamp terminals **11** in the manner described above. The bulb is then inserted into the large chamber **22**, being sure that the bottom of the bulb rests in the smaller chamber **24** of the base. The terminals are then placed in the openings **26** being sure that the barbs **49** engage the walls of each opening **26**.

The horizontal portions of the L shaped terminals are placed in channels **28** and are slightly raised by bending them so they will extend above the top most edge of the collar **18** and are not in contact with the bottom surface of the channel. In this manner excellent electrical contact with the printed circuit is obtanied. Further in the event the terminals are to high they will not damage the circuit since the terminals can always move downward into the channels **28**.

After the terminals and bulb are set in the base the retaining ring is slipped over the bulb and brought down upon the base until the ledge **42** of the ring engages the ridge **36** of the base. The lamp is now assembled and can be inserted into the bayonet shaped socket of the printed circuit.

When the lamp is placed in the circuit board the members **34** are placed through the bayonet socket. The cam surface **35** of member **34** will be in contact with the lower surface of the board and when the lamp is then rotated in the board the lamp will slide along the cam surface **35** of member **34** (see FIG. 1). This will cause the lamp to raise thereby causing firm contact of the terminals with the circuit. As explained before if the terminals were set too high they can recede into channel **28** thereby preventing any damage to the circuit resulting from the terminals gouging into the copper surface of the circuit. The lamp can only be rotated until the stops **30** contact the edges of the bayonet socket.

It will be further understood that it is intended to cover all changes and modifications of the preferred embodiment of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

I claim:

1. A rear loading panel lamp for printed circuits comprising:

(i) a glass bulb having lead wires extending therefrom,

(ii) at least two terminals connected to said lead wires,

(iii) a molded base having a first opening therein to receive said bulb and additional openings to receive said terminals,

(iv) a pliable retaining ring to slide over the bulb and engage the base, said ring and said base formed with interlocking means for mechanically locking the bulb, the ring, and the base together.

2. A rear loading panel lamp for printed circuits as in claim **1** wherein the inside edge of said ring is tapered to form an acute angle with respect to the main body of said ring so that the ring will exert a downward force against said bulb.

3. The rear loading panel lamp for printed circuits as in claim **1** wherein each of said terminals has two vertical cuts in its wall to provide a raised portion therebetween, said bulb wire leads being inserted between said portions and said terminal walls and the raised portions pressed against the wire leads to provide tight and permanent electrical connections between the terminals and said leads.

4. The rear loading panel lamp for printed circuits as in claim **1** wherein the top portion of the base has arcuate slots cut therein to provide a retention pressure against said ring.

5. The rear loading panel lamp for printed circuits as in claim **1** wherein the base is provided with wing members having a cam surface whereby the lamp is forced against the surface of the printed circuit when the lamp is rotated during mounting in said circuit.

6. The rear loading panel lamp for printed circuits as in claim **1** wherein the base is provided with stop means so that the lamp can only be rotated a specified distance when said lamp is inserted into a bayonet socket of said printed circuit.

7. An L-shaped lamp terminal for mechanically connecting bulb wire leads in a rear loading lamp comprising:

(i) at least two vertical slots in the wall of one leg of the terminal to form a raised portion therebetween for reception of a bulb wire lead between the said raised portion and said terminal wall, and

(ii) an inverted V-shaped cut in said terminal wall disposed between said raised portion and the free end of said one leg to form a barb which engages the walls of a lamp base when said terminal is mounted in the lamp.

8. A lamp terminal for mechanically connecting bulb wire leads in a rear loading lamp as in claim **7** wherein the raised portion is pressed against the wire to provide a

tight and permanent electrical connection between the terminal and the wire lead.

References Cited

UNITED STATES PATENTS

2,332,483	10/1943	Doty	339—217
2,497,484	2/1950	Wood	339—217
2,728,059	12/1955	Lagin	339—97
2,953,769	9/1960	Woofter et al.	339—17
3,007,599	11/1961	Greasley	240—8.16
3,017,599	1/1962	Loesch	339—91
3,050,705	8/1962	Benson	339—17
3,125,706	3/1964	Long	339—276
3,312,772	4/1967	Sherlock	174—75.2

FOREIGN PATENTS

990,707	4/1965	Great Britain.

MARVIN A. CHAMPION, *Primary Examiner.*

J. H. McGLYNN, *Assistant Examiner.*