Feb. 8, 1955 A. F. PATE ET AL 2,701,868

MULTIPLE CONTACT SCREW BASE

Filed Feb. 20, 1951

Fig. 1.

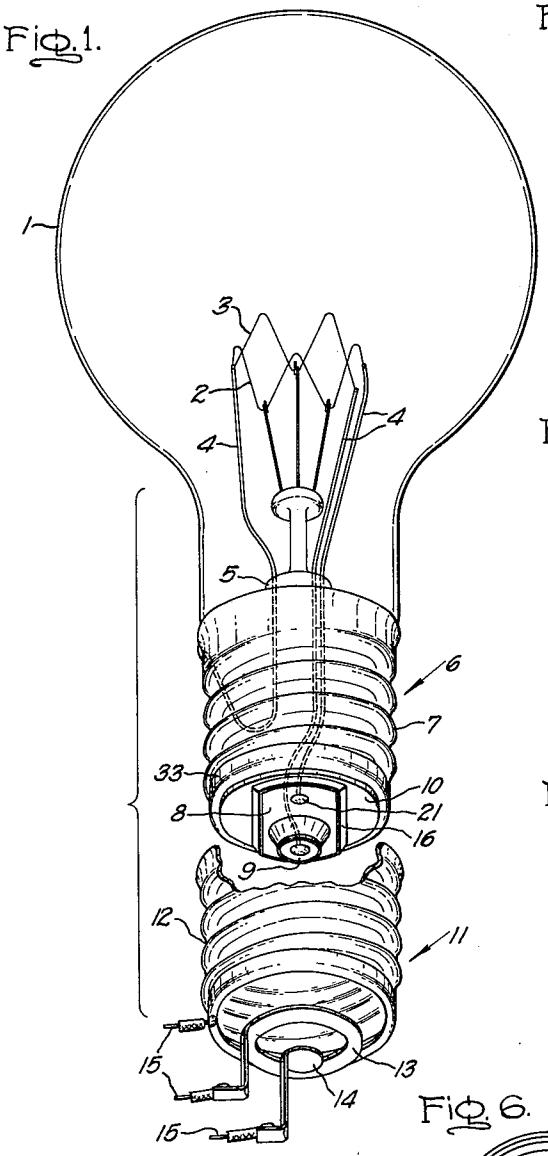


Fig. 5a.

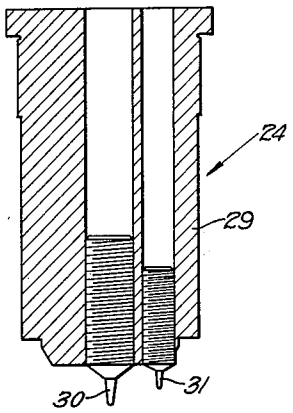


Fig. 5b.

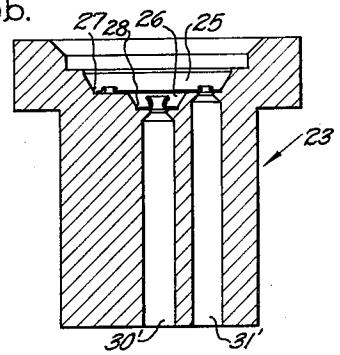


Fig. 3.

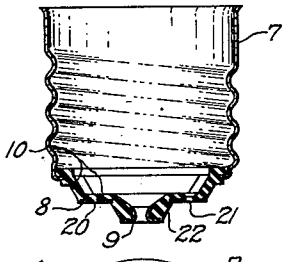


Fig. 4.

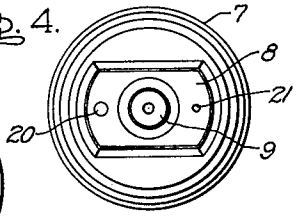


Fig. 6.

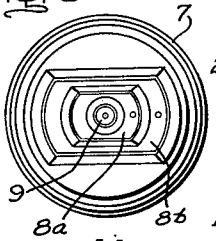
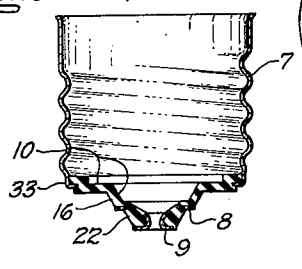


Fig. 2.



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MULTIPLE CONTACT SCREW BASE

Albert F. Pate, Cleveland, Ohio, and Howard A. Wyman, Jr., Ashland, Mass., assignors to General Electric Company, a corporation of New York; patent dedicated to the Public insofar as it relates to lamps and lamp parts to the extent stated in document recorded in the United States Patent Office, January 4, 1954, Liber U–238, page 394

Application February 20, 1951, Serial No. 211,934

5 Claims. (Cl. 339—146)

This invention relates generally to bases for electric lamps and similar devices and more particularly to screw or Edison-type bases suitable for the so-called three-light lamps.

The principal object of our invention is to provide an improved, multiple contact, screw-type lamp base which is adaptable to automatic feeding of the metal parts into a plastic molding machine.

Another object of our invention is to provide an improved arrangement of the metal parts in a base for a three-light lamp to facilitate the molding of an insulating portion made from a plastic material which requires a high molding pressure.

Still another object of our invention is to provide an improved screw-type base for a multiple-filament lamp resulting in increased economy of metal parts and plastic insulating material.

The bases in accordance with our invention are suitable for lamps of the screw-in type requiring more than one bottom contact in their socket connections. An example of such a lamp which is widely used commercially is the so-called three-light or three-way lamp in which two filaments are enclosed within a single bulb. Each filament is of a different wattage and may be lighted individually or in combination with the other to produce three different levels of illumination. Another commercial example of such a lamp is the double filament lamp for use in a three wire system as, for instance, aboard ship. The extra filament provides an emergency source for use until the lamp can be replaced. Since three external connections are required to effect the circuit to the two filaments, the bases for such lamps have an intermediate contact in addition to a shell and center contact. It has been the common practice, up to the present time, to provide this intermediate contact in the form of a metal ring embedded in the glass insulation of the base and surrounding the center contact.

In the production of such contact bases by automatic machinery, one of the most difficult problems encountered is that of hoppering and feeding the metal parts to the machine automatically, particularly when a conventional circular contact ring is used. In the first place, the ring is normally provided with a number of sharp-cornered lugs projecting from it and which are intended to grip the plastic. During the hoppering and feeding operation, these sharp-cornered lugs interfere with the movement of the rings and are likely to produce blocking of the parts in the chutes and slides. Secondly, it is necessary to orient the ring in a particular relationship with respect to the base so that a perforation through it may be located in a preselected position for receiving one of the lead-in wires from the lamp bulb. The orientation of the ring is normally achieved by providing a hole or notch in it for receiving a locating pin in the mold or die.

The difficulties which have been mentioned above with respect to the use of a circular contact ring are aggravated when it is desired to employ a thermosetting high pressure plastic for the insulating material, instead of glass. Among these additional difficulties are the tendency of the lugs to bend over under the molding pressure, resulting in a poor grip on the plastic, and the tendency of the plastic to run under the ring and form flash over the metal surface particularly around the locating hole and the hole for threading the lead-in wire.

At the present time, it is becoming more than ever desirable to utilize thermosetting plastics instead of glass for lamp bases. Molded plastic insulated bases have the following advantages: elimination of rattling due to loose pieces of glass in the base, elimination of scrap loss resulting from broken insulators, better appearance, and the possibility of utilizing light gauge aluminum instead of brass since the molding temperatures are well below the annealing range of aluminum. In general, plastic materials suitable for use in lamp bases include phenol, urea or melamine formaldehydes and alkyd type plastics, these being of the thermosetting type. It is also conceivable that thermoplastic type plastics could be used, providing they have the necessary heat resistance at the normal temperature of the base during operation of the lamp.

In accordance with our invention, the difficulties enumerated above with regard to the use of a circular contact ring are substantially reduced or eliminated by providing a contact ring having two sides substantially straight and parallel and the other two sides curved to the general circular shape of the base. Since the contact ring has now departed from a perfectly circular shape, there is no need for a locating pin in the mold or die in order to line up the threading hole for the lead-in wire, and it becomes feasible to design the mold cavity with a recess which will automatically line up a contact ring dropped into the cavity from a chute.

The advantages of utilizing a straight side contact ring and the details of construction thereof will be more fully brought out in the description which will now follow, and the novel features of the invention will be more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a perspective view of a commercially well known three-light lamp provided with a three-contact base embodying the invention. Below the base of the lamp, there is shown, in simplified form, a standard socket for use with such a lamp.

Figs. 2 and 3 are vertical cross-sectional views of a three-contact base embodying the invention, the sectional planes being at right angles in the two cases.

Fig. 4 is a bottom end view of the base illustrated in the preceding figures.

Fig. 5 is a sectional view of a mold, and plunger or force, which may be utilized for forming the plastic insulation material and making a base embodying the invention and as illustrated in the preceding figures.

Fig. 6 is a bottom end view of a modified base construction embodying our invention.

Referring to Fig. 1, the electric lamp shown therein, with the exception of its base, is of conventional construction and is typical of commercially available three-light "mogul" base lamps. It comprises a bulb **1** evacuated of air and preferably filled with an inert gas, and containing a pair of filaments **2** and **3** connected to three lead-in wires **4** which pass out of the bulb through a press **5**. Cemented to the constricted lower portion of the bulb is a base **6** comprising a threaded metal shell **7**, a straight sided ring or intermediate contact **8**, and an end contact or eyelet **9**. The shell, the ring contact and the end contact provide the terminals for selectively energizing the two filaments **2** and **3** in order to provide three different light intensities from the lamp. The intermediate and end contacts are held in a web **10** of plastic insulation closing the outer end of the base.

In order to show the manner in which the straight sided ring contact in accordance with the invention may be used interchangeably with the prior art circular ring contacts, the essential elements of a typical mogul screw socket have been illustrated in simplified form at **11** and in vertical alignment below the base **6**. The functional parts of the socket comprise a threaded shell **12** adapted to receive the shell **7** of the lamp base, a ring terminal **13** and a center terminal **14**. The ring and center terminals **13** and **14** are spring loaded so as to bear resiliently against the intermediate and end contacts, respectively, of the lamp base. The circuit connections to the different elements of the socket have been indicated by the wires **15**.

Referring now more generally to Figs. 2, 3, and 4, the shell **7** may be made of brass, aluminum, or any suitable

metal, and likewise the intermediate and end contacts **8** and **9**, although brass is generally used for the contacts to facilitate soldering of the lead wires. The intermediate contact **8** is in the form of a flat annulus or ring having two straight sides and circular ends, as may readily be seen in Fig. 4. It is symmetrical about an axis transverse to the axis of the shell and may be defined as a symmetrical zone of a plane annulus. It is mounted on the major boss **16** which has a like configuration, and is secured to it by the inwardly burred edges about the holes **20** and **21**, which edges are embedded in the plastic. It is also held in place by the minor boss **22** whose shoulders overhang the central hole of the ring.

During the molding operation, it may be desirable to allow the plastic to fill completely one of the holes, for instance, **20** as shown in the drawing. The other hole, **21** in the drawing, is kept free of plastic, in order to permit threading one of the lead-in wires through it. This is achieved by providing a suitable pin in the force or plunger which prevents the entry of plastic material into the hole and also forces out any plastic material which may enter through the clearance between the sides of the hole and the body of the pin. After the lead-in wire has been soldered through the hole **21** and the lamp is complete, the base is then hermetically sealed since both the holes **20** and **21** are filled, the former with plastic and the latter with solder. This is advantageous in preventing the entry of moisture inside the base which might deleteriously affect the cement bonding it to the bulb of the lamp.

Referring to Fig. 5, the essential elements of the apparatus for assembling a lamp base utilizing plastic molding material in accordance with our invention, are the mold **23** and the force or plunger **24**. The mold, which is preferably made of heat-hardened steel, has a cavity in its upper face shaped to conform to the outline of the bottom end of the base as illustrated in the preceding figures. The cavity includes a shallow straight-sided elongated recess **25** for receiving the ring contact, and the circular conical recess **26** for receiving the end contact or eyelet. Both these recesses have sloping sides which facilitate the location of the inserts, that is, the ring contact and the end eyelet, within them.

The bottom of each recess in the mold is proportioned to be slightly larger than the size of the insert, and the walls at the bottom are practically vertical or have a very much reduced taper. This configuration is provided in order to permit a very thin section of plastic material to flow between the edge of the insert and the edge of the cavity during the molding operation. It will be understood that the plastic cures or sets by reason of the heat imparted to it by the mold. The mold may be maintained at a suitable temperature, for instance 350° F., by heating means, not shown in the drawing. The setting or hardening of the plastic material occurs as a result of the pressure imparted to it by the force and the heat which it receives from the die. The pressure tends to force some of the plastic under the inserts. Plastic material which is thus forced under an insert appears on the finished article as a very thin layer of material which covers the surface of the insert, and is commonly referred to as flash. Such flash, in addition to being unsightly, is objectionable because it acts as an insulator and prevents the establishment of a circuit to the lamp when it is inserted in a socket. Its formation may be eliminated or substantially reduced by allowing a thin section of plastic to occur between the edge of the insert and the side of the mold, as illustrated at **27** and **28** in Fig. 5. In these very thin sections, the heat from the mold is communicated very rapidly to the plastic so that it cures rapidly and freezes the flow, thereby preventing any of it from passing under the eyelet or insert and forming flash. This feature is described and claimed in the copending application No. 209,816, filed February 7, 1951, of Albert F. Pate and Robert L. Imboden, entitled "Plastic Insulated Lamp Base," and assigned to the same assignee as the present invention.

The molding force or plunger **24** comprises a body portion **29** which is suitably drilled and tapped to receive pins **30** and **21**. These pins enter the holes in the eyelet and ring contact and keep them free of plastic. In addition, any plastic which does enter the holes is forced out by the pins and falls through the corresponding undercut holes **30'** and **31'** in the mold **23**.

In order to prevent the exudation of plastic material between the force and the shell, the lower end of the shell has a straight cylindrical portion **33** as may be seen in Figs. 1 and 2. This straight portion need only be long enough to permit the sides of the force to make a seal therewith during the molding operation so as to maintain the plastic under pressure. The straight cylindrical section has a diameter slightly less than the root diameter of the threaded portion of the shell in order to permit the force to enter the shell without interfering with the threads, as described in he copending application No. 209,829 of William B. Landgraf, filed February 7, 1951, entitled "Plastic Insulated Screw Base," and assigned to the same assignee as the present invention.

The design of the lamp base which has been described permits a great simplification in the process of feeding the inserts, that is, the ring and the eyelet, to the molding machine or die. Since the contact ring has straight sides and is symmetrical end for end, it need only be dropped into the straight-sided recess in the mold, and it will automatically align itself so that the threading holes will be in line with the pins in the force and the undercut holes in the mold. The need for a locating pin in the mold is thus eliminated, making it possible to have plunger pins in the force as described. This is a considerable advantage with high pressure molding plastics because, if a locating pin attached to the mold is used, there is a tendency for plastic to flow around the pin and flash over the hole. However, by placing a plunger pin on the force and allowing the pin to move down into the hole, the plastic is forced out so that practically no flash occurs.

With the prior art three-contact bases, the contact ring was usually secured by means of lugs which were embedded in the plastic. These lugs naturally reduce the the strength of the plastic so that a thicker body or web was required. With the present construction, due to the channel-shaped insulator section or web, the same longitudinal strength may be achieved with a reduction of as much as 20 percent in the amount of plastic.

The straight-sided contact ring may be produced from strip stock of nominal width by blanking the holes and chopping the piece off to length. This affords a considerable saving in the amount of material utilized since, with circular contact rings, all the material between the circular stamped portions is wasted.

While a certain specific embodiment has been shown and described, it will of course be understood that various modifications may be made without departing from the invention. Thus, whereas the invention has been described with respect to a mogul size three-contact base, it is equally applicable to other sizes of bases. The invention could also be applied to provide more than one intermediate contact on a base. Thus, for instance, more than one intermediate straight sided ring may be provided between the shell and the end contact, the only reservation being that the rings must be of a suitable size so that one will not interfere with the other during the insertion of the lamp into its socket. Such a modification is illustrated in Fig. 6, wherein two intermediate straight-sided ring contacts **8***a* and **8***b* are positioned between the shell **7** and the end contact **9**. The appended claims are therefore intended to cover any such modifications coming within the true spirit and scope of the invention.

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

1. A base for electrical devices comprising a metal shell, a plastic insulation web closing the bottom end thereof, a major boss projecting from the surface of said web and having an axis of symmetry transverse to the axis of said shell, a contact in the form of a thin metal plate mounted on said boss and having a configuration conforming thereto, a central hole in said metal plate, a minor boss projecting centrally from the outer surface of said major boss and having shoulders outwardly overhanging said central hole, and an end contact mounted on said minor boss.

2. A base for electrical devices comprising a threaded metal shell, a plastic insulation web closing the bottom end thereof, a major boss projecting from the surface of said web and having the configuration of a symmetrical zone of a circle, a metal contact in the form of a symmetrical zone of a plane annulus mounted on said boss and conforming thereto, a minor boss projecting centrally from the outer surface of said major boss and having shoulders outwardly overhanging a central hole through said contact, and an end contact mounted on said minor boss.

3. A plural end contact screw-type base for electric lamps comprising a threaded metal shell, a plastic insulation web closing the bottom end thereof, a major transverse boss having two straight parallel sides projecting from the outer surface of said web and symmetrically located about the axis of said shell, a contact consisting of a thin metal plate mounted on said boss and conforming to its outer surface, said plate having an aperture through its center and an inwardly burred threading hole on the side thereof, a minor boss projecting centrally from the outer surface of said major boss through said aperture, said minor boss having shoulders outwardly overhanging the sides of said aperture through said contact plate in order to secure it to said major boss, and a center contact, consisting of an eyelet having an inwardly burred threading hole, mounted centrally on the outer surface of said minor boss and secured thereto by the embedment of the burred edges of said hole in the plastic of said minor boss.

4. A plural end contact screw-type base for electric lamps comprising a threaded metal shell, a plastic insulation web closing the bottom end thereof, a plurality of stepped bosses projecting from the outer surface of said web, the ones of said bosses located intermediate the shell and a central end boss having symmetrical circular configurations, thin contact plates mounted on said intermediate bosses and having central apertures therethrough, said intermediate contacts being secured to their respective bosses by overhanging shoulders of the plastic material of the boss next above, and an end contact mounted on said central end boss.

5. A three-contact screw-type base for electric lamps comprising a threaded metal shell, a web of plastic insulation material closing the bottom end thereof, a boss of said material projecting from the outer surface of said web and having the configuration of a symmetrical zone of a circle with two parallel straight sides, a ring contact mounted on said boss and having a central aperture, a threading hole on one side, and a pair of straight sided segments cut away in order to constitute a disc having a pair of parallel straight sides conforming to the configuration of said boss, a minor boss of said material projecting through said central aperture and having shoulders outwardly overhanging said aperture in order to anchor said ring contact, and an eyelet contact mounted on said minor boss and having an inwardly burred central hole therethrough, said eyelet contact being held on said minor boss by the embedment of the burred edges of said hole in the plastic material thereof.

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