

PATENT SPECIFICATION

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(54) ELECTRIC LAMPS SUITABLE FOR USE IN DECORATIVE STRING SETS

(71) We, GENERAL ELECTRIC COMPANY, a corporation organised and existing under the laws of the State of New York, United States of America, of 1 River Road, Schenectady, State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to electric lamps and sockets for use in decorative lighting such as Christmas tree string sets and to the construction of the lamp stem press.

Decorative lamp and socket combinations presently in use consist of a lamp, a separate base, and a socket. In one form, an incandescent lamp with extended lead wires is secured to a base having two legs with openings through which the lamp's lead wires pass. The respective extended portions of the lead wires are bent around the base legs before insertion into a socket. This construction and method of assembly is more fully described in U.S. Patent No. 3,233,207.

One of the difficulties of a lamp-base-socket combination is the reduced electrical reliability due to the increased number of connections, i.e., lamp-to-base, base-to-socket. Furthermore, the lamp-base-socket combination is inherently more expensive because of the added material costs of a separate base and the additional labor cost of assembling the base to the lamp.

Attempts to alleviate the above difficulties have not been fully satisfactory. A baseless lamp socket combination, as described in U.S. Patent No. 3,286,088, consists of a lamp with a grooved stem press and rigid socket contacts with ribs to fit the grooves thereby making electrical contact

with the bent-around lead wires in each groove. One of the disadvantages of this combination is the fixed position of the rigid contacts which do not always touch the lead wires because of variations in the dimensions of the component parts. Baseless lamps of this type are also susceptible to falling out of the socket when jarred or vibrated. Since typical dimensions of this type of decorative lamp socket combination are .250 inch for the lamp's stem press and .015 inch for the groove, a variation as small as .005 inch can give rise to the above problem.

The present invention may provide a reliable, economical lamp-socket combination by minimizing the number of parts and assembly operations.

The present invention may provide a lamp in combination with a socket which gives a highly reliable electrical connection between the lamp lead wires and the socket contacts.

The present invention may provide a lamp in combination with a socket in which the problem of dimensional variations between component parts is minimized by having spring contacts which constantly hold the lamp in compression regardless of the dimensional variations.

According to the present invention there is provided an electric lamp comprising a sealed vitreous envelope with lead-in conductors hermetically sealed in an extending from a stem press of said envelope, said stem press having two opposite substantially parallel faces and two sides, one of said faces constructed with an indentation extending from one of said sides to substantially the centre of said one face of the stem press, a groove extending from the outer edge of said stem press inwardly along said one face toward said envelope and terminating in an end wall before reaching

said indentation, the other said face of said stem press being similarly constructed such that said indentations extend one from each of the sides of said stem press, and extended end portion of one of said lead-in conductors being bent around the outer edge of said stem press and positioned in the groove of said one face, said one lead-in conductor rising out of the groove over the end wall and overlying the indentation of the said one face, an extended end portion of said other lead-in conductor being bent around the outer edge of the stem press and positioned in the groove and over the end wall and overlying the indentation of the opposite face.

One embodiment of the invention will now be described by way of example, with reference to the accompanying drawings, in which:—

FIGURE 1 is an elevation view of the lamp of the invention;

FIGURE 2 is a fragmentary perspective view of the lamp's stem press;

FIGURE 3 is an exploded elevation view of a socket comprising power leads, contacts and husk suitable for use with the lamp; and

FIGURE 4 is an elevation view and partial section of the assembled lamp and socket taken along section line 4—4 in Figure 3.

Figure 1 of the drawings illustrates an incandescent lamp 11 having an envelope 12 with a stem press 13. Filament 14 is connected to lead wires 15 and 16 which are held in position by glass bead 17. Lamps as illustrated are generally used as Christmas tree lamps which are electrically connected in series in a string set. In order to maintain a closed circuit in the event of filament failure, oxidized cut-out wire 18 is wrapped around the leads just above the glass bead 17. This wire will electrically connect the two lead wires below the filament if the filament fails. Lead wires 15 and 16 are hermetically sealed in stem press 13 and extend beyond the stem press's outer edge 19.

As shown in FIG. 2, stem press 13 has parallel faces 20, 21 and sides 22, 23. Face 20 contains groove 24 which is separated from indentation 25 by end wall 26. Slot 27, which is longitudinally aligned with groove 24 extends from the upper wall of indentation 25 toward envelope 12. Indentation 25 extends from side 23 to approximately the center of the face 20 of the stem press.

Parallel face 21 is constructed similar to face 20. Groove 28, indentation 29 extending from side 22, and slot 30 of face 21, shown by dotted lines, correspond to groove 24, indentation 25 and slot 26 respectively of face 20. The extended portion of lead wire 15 is bent around outer edge 19 and positioned or guided by groove 24 so that

part of the extended-lead wire passes over end wall 26 down into indentation 25. The end of lead wire 15 is positioned in slot 27 which is aligned with groove 24. The positioning of the end of the lead wire in slot 27 gives an improved lead alignment. Although slot 27 is not essential to all embodiments of the invention, it is recommended for optimum results inasmuch as it serves to locate the end of the lead wire in fixed position. Lead wire 16 is bent around outer edge 19 in the opposite direction to wire 15 so as to overlie indentation 29 of parallel face 21. After the bending and positioning of the lead wires, the lamp is ready for insertion into socket 31, the component parts of which are shown in an exploded view in FIG. 3.

Socket 31 is comprised of two contacts 32, 33, power leads 34, 35 and a body or husk 36. Contacts 32 and 33 each have two fingers 37, 37', 38, 38' for engaging the lamp's lead wires and stem press.

Electrical contact between power leads 34, 35 and contacts 32, 33 is made by crimping the respective insulation-bared ends 39, 40 of the power leads into sleeves 41, 42 formed on contacts 32 and 33, respectively. Projections 43, 44 are then clamped around the insulated portion of the power leads to give additional strength to the connection. This type of connection eliminates the need for soldering the power leads to the contacts.

After the husk is slipped over the power leads, and the power leads are attached to the contacts, as described, the contacts are pulled down into a central cavity in the husk so that notched sides 47 of the contacts 32, 33 are inserted into slots 45, 46 of the socket 31. Slots 45, 46 are tapered from top to bottom as shown such that the depth of the slots into the husk wall is greater at the top of husk 36 than at the bottom. The distance at the top is selected such that it is slightly greater than the distance between the tips of notches 47. As the contacts are inserted into the husk, the distance between these extremities changes and the fit between the contacts and the husk becomes an interference fit. The tapering of the slots serves two purposes. First, the clearance fit at the top facilitates assembly of the contact and husk, while the interference fit at the bottom prevents contact removal.

As the contacts are pushed to the bottom of the slots, the power leads are drawn through bores 48 shown in FIG. 4. The lamp of FIG. 1 can then be inserted in the socket.

Contacts 32, 33 are spaced within the husk 36 so that there is an interference fit between stem press 13 and both contacts. This interference fit along with the resiliency of the spring-like material of the contacts

generates a constant compressive force on the lamp's stem press to hold the lamp and maintain a reliable connection.

Indentation 29 and the lead wire diameter are sized such that the top of the lead wire is approximately flush with the surface of the stem press. After lamp 11 has been inserted in socket 31, finger 37' of contact 32 presses bent-around lead wire 16 against the glass surface of the indentation 29, as shown in FIG. 4. Simultaneously, finger 38' of contact 33 exerts a force opposite that of the force exerted by finger 37' adjacent the indentation 25. Adjacent fingers 37 and 38, not shown in FIG. 4, exert a similar force on the other side of stem press 13. Once the lamp 11 is positioned between the contacts, it cannot be removed by jarring or vibrating because lead wires extending over end walls 26 of indentations 29 and 25 act as stops.

By constructing each contact 32 and 33 with two separate fingers, one of which grips a lamp lead wire and the other the face of the lamp stem press, a considerable latitude is developed by relative movement between the fingers to compensate for manufacturing tolerances and small variations in the dimensions of the stem press and lead wires. This insures good electrical contact with the lamp, and firm seating of the lamp in the husk, in spite of the above-mentioned variations and tolerances which sometimes appear in manufacture of the ultra-miniature lamp of this invention. Because the lamp lead wires are positioned in grooves in the stem press they are always in position for gripping by a socket finger and cannot become bent or displaced such as to prevent a good electrical connection between the lamp and the socket.

Reference is made to co-pending patent application No. 25968/73 (Serial No. 1384740) which is a divisional of the present patent application. The performance of the present invention involves the use of the invention claimed in the divisional application.

WHAT WE CLAIM IS:—

1. An electric lamp comprising a sealed vitreous envelope with lead-in conductors hermetically sealed in and extending from a stem press of said envelope, said stem press having two opposite substantially parallel faces and two sides, one of said faces constructed with an indentation extending from one of said sides to substantially the centre of said one face of the stem press, a groove extending from the outer edge of said stem

press inwardly along said one face toward said envelope and terminating in an end wall before reaching said indentation, the other said face of said stem press being similarly constructed such that said indentations extend one from each of the sides of said stem press, an extended end portion of one of said lead-in conductors being bent around the outer edge of said stem press and positioned in the groove of said one face, said one lead-in conductor rising out of the groove over the end wall and overlying the indentation of the said one face, an extended end portion of said other lead-in conductor being bent around the outer edge of the stem press and positioned in the groove and over the end wall and overlying the indentation of the opposite face.

2. An electric lamp as claimed in Claim 1, wherein each face of said stem press has a slot, longitudinally aligned with said groove, which slot extends from an edge of said indentation toward said envelope.

3. An electric lamp substantially as described herein with reference to and as illustrated by Figures 1 and 2 of the accompanying drawings.

4. The use of the electric lamp of Claim 1 in combination with a socket comprising a husk with a cavity for receiving said lamp, two bores extending through the wall of said husk into said cavity, two power leads extending into said bores, said power leads being respectively connected to a pair of contacts located in said cavity, said lamp being inserted in said socket cavity with said stem press being positioned between said pair of contacts, each of said contacts having two bent fingers one of which presses a respective one of said lead-in wires against the surface of the respective indentation, said contacts being positioned in said husk so that an interference fit is formed between said contact fingers and said stem press, each of the other fingers touching a respective face of said stem press adjacent the indentation and opposite the lead-in wires and indentation on the respective other face to hold said lamp and make electrical contact.

5. An electric lamp and socket in combination substantially as described herein with reference to and as illustrated by Figure 4 of the accompanying drawings.

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