

April 7, 1964

A. M. KRUPP ETAL

3,128,141

ELECTRIC LAMP SOCKET

Filed June 30, 1961

FIG. 1.

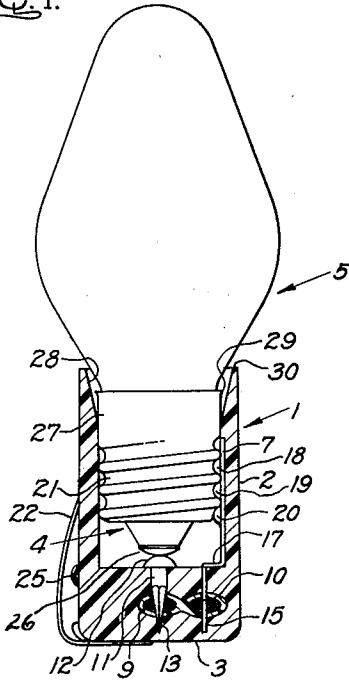


FIG. 2.

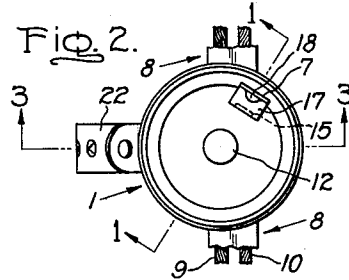


FIG. 3.

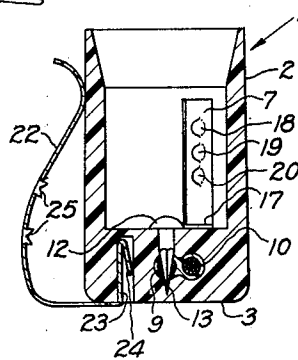


FIG. 4.

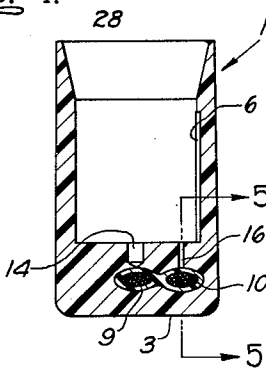


FIG. 5.

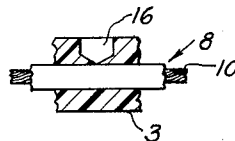
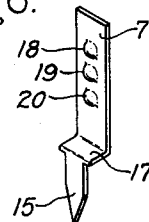


FIG. 6.



Inventors:
Anton M. Krupp
Richard D. Divoky
by *Otto Fichy*
Their Attorney

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ELECTRIC LAMP SOCKET

Anton M. Krupp, Gates Mills, and Richard D. Divoky,
Mayfield Heights, Ohio, assignors to General Electric
Company, a corporation of New York

Filed June 30, 1961, Ser. No. 121,137

4 Claims. (Cl. 339-97)

The present invention relates to sockets for electric lamps and particularly to sockets adapted for use in decorative lighting sets such as strings of lights for Christmas tree decoration.

The principal object of the invention is to provide a unitary socket of this kind which is of simple and compact structure comprising a minimum number of parts and the parts of which are readily manufactured and assembled into a complete socket on a mass production basis to minimize the cost of manufacture. Additional objects of the invention will become apparent from the following description and the drawing accompanying and forming part of this specification.

The bases of the electric incandescent lamps in common use in such lighting sets comprise a cup-shaped metal shell contact having a cylindrical side wall into which screw threads are formed, a center metal eyelet contact and a web of electrically insulating material uniting the shell contact and the eyelet contact at one end of the base. The shell is provided with a cylindrical skirt extending from the threaded portion to an outwardly extending annular flare at the open end of the shell contact. The neck of the glass bulb of the lamp is received within the open end of the shell and the annular flare rests against the glass bulb. The crest of the threads and the skirt of the shell contact have the same diameter.

The present invention is directed particularly to sockets for accommodating electric lamps having bases of this kind. In the mass production of such bases, particularly those of small size used in lighting sets, variations of the order of 0.01 inch and larger in the outer diameter of the shell contacts occur from base to base in bases intended to be of the same size. Such variations are tolerated because as long as the variations are within prescribed limits the bases are commercially acceptable. To maintain closer dimensional tolerances of the diameter of the base shell would add appreciably to the cost of such bases produced on a mass production basis.

A feature of the socket embodying the present invention is a hollow cylindrical socket body having a smooth bore for accommodating screw-threaded bases having shell contacts of the largest as well as the smallest outer diameter within the prescribed limits and which socket body makes a sufficiently close fit with the skirt of the shell contact of all such bases as to prevent the entrance of material between the socket and an accommodated base.

Another feature of the socket embodying the invention is a narrow strip contact extending longitudinally within the cylindrical socket body and having a series of spaced protuberances thereon for frictionally engaging the threads of an inserted base to firmly hold the base in the socket and, by frictional drag, to resist rotation of the base in the socket under vibration or ordinary handling.

A further feature of the socket embodying the invention is a stiffly flexible, molded socket body of thermoplastic organic material having a thickened end wall provided with locating recesses for the insertion of electrical contacts and molded around the mutually insulated conductors of a string set cord extending through and beyond the end wall transversely of the longitudinal axis of the socket body with each of the conductors located

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below one of the locating recesses in the end wall. The contacts of the socket body are provided with pointed ends for piercing the conductors extending through the end wall to make electrical contact with the insulated wires of the cord.

In the drawing accompanying and forming part of this specification an embodiment of the socket body is shown in which:

FIG. 1 is a longitudinal sectional view taken along the lines 1-1 of FIG. 2 with the cord of the string set shown imbedded in the end wall and with a based incandescent lamp shown in an elevational view mounted in the socket;

FIG. 2 is a top plan view of the socket shown in FIG. 1 with the electric lamp removed to show the interior of the socket;

FIG. 3 is a longitudinal sectional view taken along the line 3-3 of FIG. 2;

FIG. 4 is a view similar to that of FIG. 1 with the lamp omitted showing the socket molded on the electric cord of a string set and before the contacts are inserted in the end wall of the socket body;

FIG. 5 is a fragmentary sectional view of the end wall of the socket body taken along the line 5-5 of FIG. 4 and illustrating the locating recess for the piercing end of the side contact of the socket;

FIG. 6 is a perspective view of the side contact.

Referring to the drawing, the lamp socket 1 comprises a hollow cylindrical socket body 2 closed at one end by an integral disc-shaped end wall 3 substantially greater in thickness than the cylindrical side wall of the socket body. The opposite end of the socket body is open for the insertion of the screw-threaded base 4 of the electric incandescent lamp 5. Both the inner and outer surfaces of the cylindrical side wall of the socket body are smooth except for the longitudinally extending narrow recess 6 provided in the inner surface of the side wall for accommodating the side strip contact 7 of the socket as described below.

The integral disc-shaped end wall 3 of the socket body is of substantially greater thickness than the cylindrical side wall thereof. The end wall 3 accommodates within its thickness the electrically conducting cord 8 of the string set which cord extends completely through the end wall in a direction transversely of the longitudinal axis of the socket body. The mutually insulated conductors 9 and 10 of the electric cord 8 extend in side-by-side relation through the circular end wall 3 with the conductor 9 extending along a diameter of the end wall and conductor 10 offset slightly from the center of the end wall 3 as best shown in FIG. 2 of the drawing.

In addition to the side contact 7, the socket includes a center contact 11 which is in the form of a straight solid metal pin having a rounded head 12 and a tapered pointed end portion 13. The contact pin 11 is accommodated in and makes a pressure fit with the sides of the locating recess 14 (FIG. 4) at the center of the end wall 3 of the socket body. In the fully inserted position of the pin contact 11, shown in FIGS. 1 and 3, the tapered end 13 thereof extends completely through the conductor 9 and terminates within the end wall 3. This assures a good electrical contact between the contact pin 11 and the wires of the conductor 9 and also serves to lock the cord 8 and the socket body 2 together.

The strip contact 7 is similarly mounted in the socket body to make a good electrical contact with the wires of the conductor 10 and to lock the socket body to the cord 8. For this purpose the strip contact 7 is provided with a narrow pointed end portion 15 which is accommodated in and makes a pressure fit with the sides of the locating recess 16 in the end wall 3 of the socket

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body. The pointed end portion 15 of the strip contact 7 pierces the end wall 3 of the socket body, extends completely through the conductor 10 and terminates within the end wall beyond the conductor 10, as shown in FIG. 1 of the drawing.

In the fully inserted position of the strip contact 7 the bent or shoulder portion 17 thereof rests against the end wall 3 and the straight part thereof extending longitudinally of the socket body makes a pressure fit with the sides of the recess 6 and thus is set in the side wall of the socket body. The contact 7 thus is held firmly against longitudinal movement.

Three protuberances 18, 19 and 20 projecting inwardly of the socket body are provided on the strip contact 7 as shown in FIGS. 1, 2 and 3 and are spaced along the strip contact so as to engage the threads in the shell contact 21 of the lamp base 4 as shown in FIG. 1.

As shown in the drawing, particularly in FIG. 2, the insulated conductors 9 and 10 of the rip cord 8 extend in touching side-by-side relation through the end wall 3 while the head 12 of the center contact 11 and the shoulder 17 of the side strip contact 7 are spaced apart from each other the maximum distance possible. This provides a compact unitary outward appearance for the string set including sockets of the invention while retaining the safety features inherent in widely spaced socket contacts.

The socket is provided with a holding clip 22 for attaching the socket to a Christmas tree twig, for example. The clip 22 is firmly secured to the socket body which is provided with an outwardly opening cavity 23 in the end wall 3 accommodating the retroverted end 24 of the clip 22, as shown in FIG. 3. The clip 22 is made of spring metal so that the retroverted end thereof bites into the sides of the cavity 23 to retain the clip firmly on the socket body. The clip is provided with a plurality of burred eyelet opening 25, formed by a nail punch, for example, with the burrs extending towards the socket body so as to bite into the twig of a tree on which the socket is mounted.

In the manufacture of lighting sets incorporating the electrical cord 8 and the sockets of the present invention, the socket body 2 is made of a stiffly flexible thermoplastic organic material, such as polypropylene, which is molded around the insulated cord 8 to form a unitary structure. Any suitable insulating coating material may be used for the wires of the conductors 9 and 10 provided the material is inert with respect to the thermoplastic material constituting the socket body. Suitable insulating covering materials are synthetic rubber and polyvinyl chloride, for example.

In molding the socket body 2, the locating recesses 14 and 16 (FIG. 4) opening into the interior of the socket body are formed in the end wall 3 to facilitate proper insertion of the center pin contact 11 and the side strip contact 7 during assembly of the socket. The contacts 7 and 11 then may be inserted in the socket body by automatic insertion means. The recess 6 and the cavity 23 also are formed in the socket body during molding of the latter.

The parts of the socket 1 are constructed and arranged, as shown in FIG. 1, so that when the base 4 of the electric lamp 5 is fully inserted into the socket with the center contact 26 of the lamp base 4 firmly engaging the head 12 of the center pin contact 11 of the socket, the three protuberances 18, 19 and 20 on the strip contact 7 frictionally engage the threads on the shell contact 21. The shell contact of the base may vary in outer diameter from base to base within prescribed limits, as stated above. Of course, the outer diameter of the shell contact at the crest and the root of the threads will also vary from base to base. According to our invention, the protuberances 18, 19 and 20 on the strip contact 7 have a radius of curvature slightly larger than the radius of curvature of the threads and are of sufficient height to frictionally engage the threads of the base shell contacts of minimum

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diameter within the prescribed limits. Due to the stiffly flexible or resilient properties of the material of socket body 2 the strip contact 7 can be forced or depressed into the side wall of the socket body when larger diameter bases within the prescribed limits are screwed into the socket. Thus, the bases of larger size can be accommodated by the socket and are also held against rotation in the socket by the frictional drag of the protuberances on the strip contact 7 engaging the threads of such bases.

The hazard of casual material entering the interior of a socket through the space between the socket body and the base of an inserted lamp and causing a short circuit in the socket has been recognized in the art. In commercial sockets having socket bodies of rigid thermosetting organic plastic material made so as to accommodate slightly oversized lamp bases sufficient space between the socket body and the base of the inserted lamp for the entrance of such material, which in the case of sockets used in Christmas tree strings could be in the form of electrically conducting tinsel or the like, is present when lamps having slightly undersized bases are inserted in the sockets.

In recognition of this hazard gaskets are provided for such commercial sockets to close the space between an inserted lamp base and the socket body against the entrance of such material. The need for such gaskets is eliminated in sockets embodying the present invention by making the socket body 2 with an inner diameter such that the inner surface of the cylindrical wall of the socket body makes at least a close fit with the skirt 27 of smaller size bases and a running or pressure fit with the skirt 27 of bases of larger size within the prescribed limits. Due to its stiffly flexible properties the socket body 2 readily accommodates bases having a shell contact slightly larger in diameter than the inner diameter of the socket body.

For example, when the socket is intended for accommodating lamp bases provided with a skirt 27 having an outer diameter within the prescribed limits of 0.455 to 0.472 inch the socket body 2 is made with an inner diameter of 0.465 inch at the cylindrical part of the inner surface which overlaps the skirt 27 as shown in FIG. 1 when the lamp is fully inserted in the socket to prevent the entrance of casual material into the interior of the socket body.

The conical portion 28 of the inner surface of the socket body 2 flares outwardly from the skirt 27 of an inserted lamp base so as to provide space within the socket body for accommodating the drop of solder applied to the rim 29 of the base in many commercial lamps to secure one of the lamp in lead wires to the shell contact. The rim 30 of the socket body 2 is larger in diameter than the diameter of the portion of the glass bulb of the lamp 5 around which the rim 30 extends so that the space between the conical portion 28 and the parts of the lamp 5 surrounded thereby is open for the purpose of ventilation.

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

1. A unitary socket for electric lamps having a threaded base comprising a hollow smooth-walled cylindrical socket body of stiffly flexible thermoplastic material, said socket body being open at one end and closed at the opposite end by an integral circular end wall of substantial thickness, a pair of mutually insulated conductors of an electric rip cord molded within the thickness of the end wall, said conductors being in side-by-side relation in a common plane transverse to the longitudinal axis of the socket body with one of the conductors extending along a diameter of the end wall and with the other of said conductors offset from the center of the end wall, the end wall being provided with a cavity at its center opening inwardly of the socket body and an inwardly opening side cavity located adjacent the inner surface of the cylindrical wall of the socket body and directly above the conductor offset from the center of the end wall, and a pair of electrical contacts extending from the interior of

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the socket body through the cavities into engagement with the said conductors and making a pressure fit with the sides of said cavities, one of said contacts being a headed straight pin having a pointed end extending through the center cavity and the conductor beneath said cavity, the other of said contacts being a strip contact provided with a pointed end extending through the side cavity and through the conductor beneath said side cavity, said strip contact also having a straight portion extending longitudinally of the socket body and set in the cylindrical wall of the socket body, said strip contact having between the said straight portion and the pointed end thereof a shoulder engaging the end wall of the socket body, the longitudinally extending straight portion of the strip contact being provided with spaced apart protuberances projecting laterally inward of the socket body for engagement with the threads of an inserted lamp base.

2. A unitary socket for electric lamps having a threaded base comprising a hollow smooth-walled cylindrical socket body of stiffly flexible thermoplastic material, said socket body being open at one end and closed at the opposite end by an integral circular end wall of substantial thickness, a pair of mutually insulated conductors of an electric rip cord molded within the thickness of the end wall, said conductors being in side-by-side relation in a common plane transverse to the longitudinal axis of the socket body with one of the conductors extending along a diameter of the end wall and with the other of said conductors offset from the center of the end wall, the end wall being provided with a cavity at its center opening inwardly of the socket body and an inwardly opening side cavity located adjacent the inner surface of the cylindrical wall of the socket body and directly above the conductor offset from the center of the end wall, and a pair of electrical contacts extending from the interior of the socket body through the cavities into engagement with the said conductors and making a pressure fit with the sides of said cavities, one of said contacts being a headed straight pin having a pointed end extending through the center cavity and the conductor beneath said cavity, the other of said contacts being a strip contact provided with a pointed end extending through the side cavity and through the conductor beneath said side cavity, said strip contact also having a straight portion extending longitudinally of the socket body and set in the cylindrical wall of the socket body, said strip contact having between the said straight portion and the pointed end thereof a shoulder engaging the end wall of the socket body, the longitudinally extending straight portion of the strip contact being provided with spaced-apart protuberances projecting laterally inward of the socket body for engagement with the threads of an inserted lamp base, said protuberances being rounded on a radius of curvature slightly larger than the radius of curvature of the base threads of lamps accommodated by the socket to hold the lamp against rotation in the socket by frictional drag.

3. A unitary socket for electric lamps having a threaded base comprising a hollow smooth-walled cylindrical socket body of stiffly flexible thermoplastic material, said socket body being open at one end and closed at the opposite end by an integral circular end wall of substantial thickness, a pair of mutually insulated conductors of an electric rip cord molded within the thickness of the end wall, said conductors being in side-by-side relation in a common plane transverse to the longitudinal axis of the socket body with one of the conductors extending along a diameter of the end wall and with the other of said conductors offset from the center of the end wall, the end wall being provided with a cavity at its center opening inwardly of the socket body and an inwardly

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opening side cavity located adjacent the inner surface of the cylindrical wall of the socket body and directly above the conductor offset from the center of the end wall, and a pair of electrical contacts extending from the interior of the socket body through the cavities into engagement with the said conductors and making a pressure fit with the sides of said cavities, one of said contacts being a headed straight pin having a pointed end extending through the center cavity and the conductor beneath said cavity, the other of said contacts being a strip contact provided with a pointed end extending through the side cavity and through the conductor beneath said side cavity, said strip contact also having a straight portion extending longitudinally of the socket body and set in the cylindrical wall of the socket body, said strip contact having between the said straight portion and the pointed end thereof a shoulder engaging the end wall of the socket body, the longitudinally extending straight portion of the strip contact being provided with spaced-apart protuberances projecting laterally inward of the socket body for engagement with the threads of an inserted lamp base, the said end wall having a cavity opening outwardly at the bottom of the socket body, said socket comprising also a holding clip having a retroverted end engaging the sides of the outwardly opening cavity.

4. A unitary socket for electric lamps having a threaded base comprising a hollow smooth-walled cylindrical socket body of stiffly flexible thermoplastic material, said socket being open at one end and closed at the opposite end by an integral circular end wall of substantial thickness, a pair of mutually insulated conductors of an electric rip cord molded within the thickness of the end wall, said conductors being in side-by-side relation in a common plane transverse to the longitudinal axis of the socket body with one of the conductors extending along a diameter of the end wall and with the other of said conductors offset from the center of the end wall, the end wall being provided with a cavity at its center opening inwardly of the socket body and an inwardly opening side cavity located adjacent the inner surface of the cylindrical wall of the socket body and directly above the conductor offset from the center of the end wall, and a pair of electrical contacts extending from the interior of the socket body through the cavities into engagement with the said conductors and making a pressure fit with the sides of said cavities, one of said contacts being a headed straight pin having a pointed end extending through the center cavity and the conductor beneath said cavity, the other of said contacts being a strip contact provided with a pointed end extending through the side cavity and through the conductor beneath said side cavity, said strip contact also having a straight portion extending longitudinally of the socket body and set in the cylindrical wall of the socket body, said strip contact having between the said straight portion and the pointed end thereof a shoulder engaging the end wall of the socket body, the longitudinally extending straight portion of the strip contact being provided with spaced apart protuberances projecting laterally inward of the socket body for engagement with the threads of an inserted lamp base, said socket body being adapted to accommodate lamp bases varying slightly in outer diameter from base to base and to fit closely around the skirt of an accommodated base to exclude casual material from the interior of the socket body.

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