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J. M. PISTEY

3,060,399

WIRING DEVICE TERMINAL CONNECTING MEANS

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2 Sheets-Sheet 1

Fig. 1.

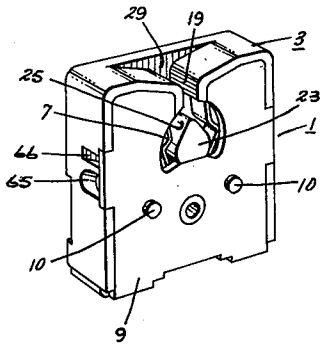


Fig. 2.

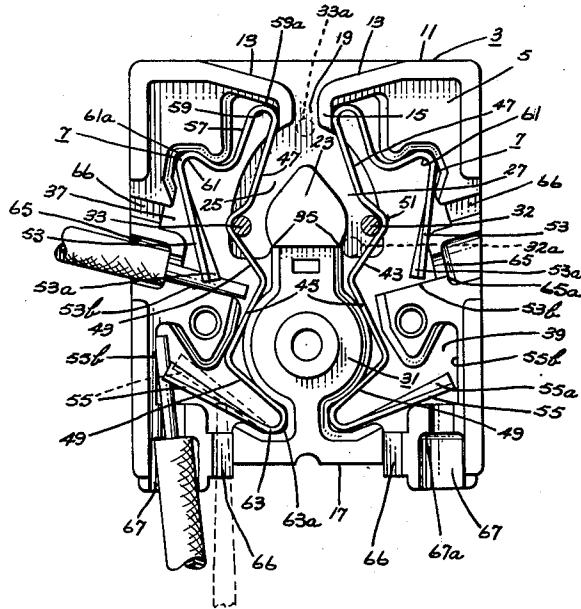
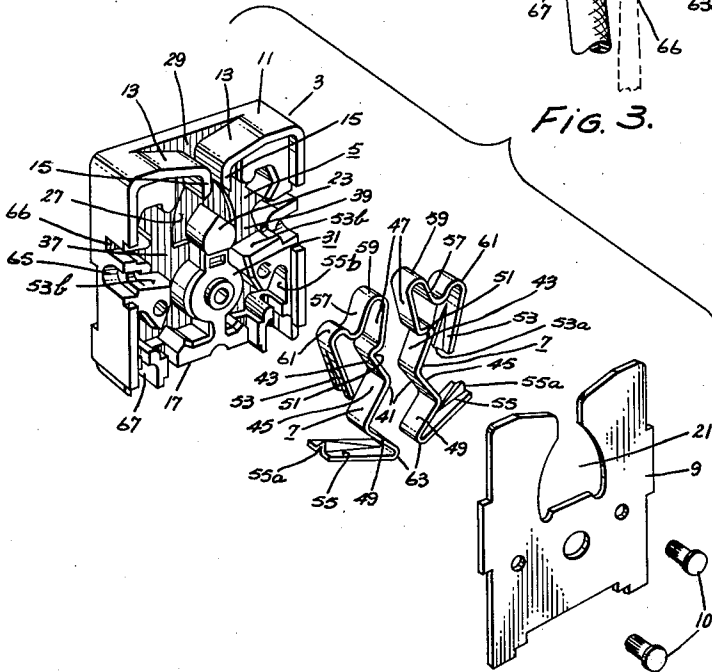


Fig. 3.



Inventor:  
John M. Pistey  
by H.F. Manbeck, Jr.  
His Attorney

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Fig. 4.

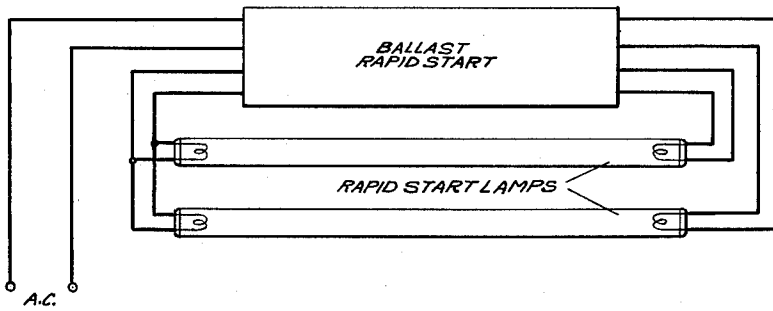


Fig. 5.

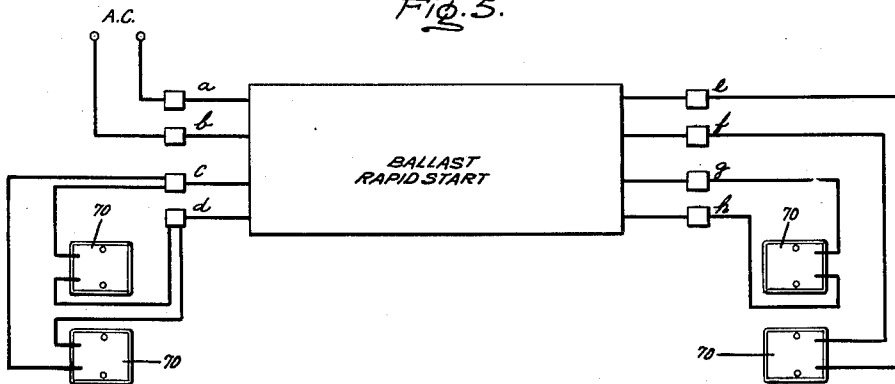
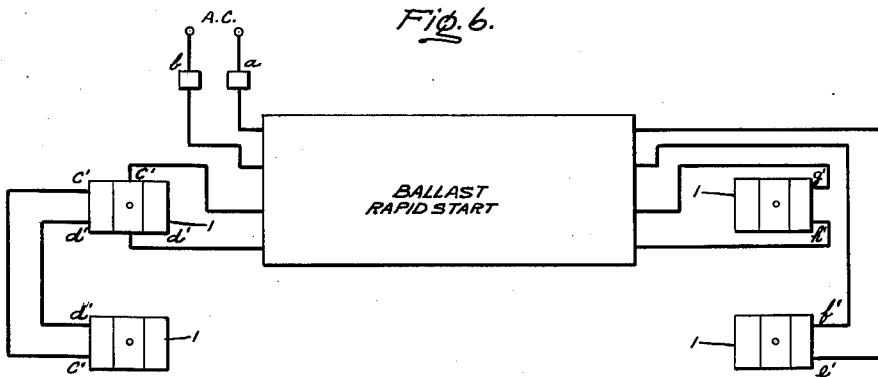


Fig. 6.



Inventor:  
John M. Pistey,  
by H. F. Manbeck, Jr.  
Attorney.

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## WIRING DEVICE TERMINAL CONNECTING MEANS

John M. Pistey, Fairfield, Conn., assignor to General Electric Company, a corporation of New York  
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7 Claims. (Cl. 339-53)

The present invention relates to wiring devices and the contact members used therein, and more particularly to lamp sockets of the type having resilient locking of the input leads.

Prior art wiring devices such as fluorescent lamp sockets have provided connector structure in which the conducting wires are electrically connected to the wiring device and thereby automatically locked in place by simply inserting the bared end of the wire through an opening in the device housing. This technique of wire connection is commonly known as "pressure locking" and use thereof makes it extremely convenient for even the most inexperienced person to install the socket. The pressure locking terminals of these prior art lamp sockets have proven, however, to be somewhat complicated in structure (e.g. requiring additional parts), and as a consequence thereof, they are relatively expensive to manufacture. It is therefore desirable to provide a reliable and durable lamp socket that not only incorporates pressure locking terminals but also is simplified in construction and relatively inexpensive to manufacture.

When prior art wiring devices, such as fluorescent lamp sockets, are installed, the circuitry thereof often requires the use of numerous spliced connections. One illustration of this would be where a rapid start current limiting device is connected in circuit with a pair of rapid start lamps. Each spliced connection is time consuming, and thus adds to the expense of installing the wiring device. It is therefore deemed desirable to furnish a wiring device which substantially reduces the number of spliced connections required for installation, and thus reduces the installation expense.

Accordingly, it is a general object of this invention to provide an improved wiring device, which is simple in construction and relatively inexpensive to manufacture.

A further object of my invention is to provide an improved fluorescent lamp socket which readily lends itself to economical installation.

A still further object of my invention is to provide an improved fluorescent lamp socket which substantially reduces the number of spliced connections required for installing the socket in a circuit.

In carrying out one aspect of my invention, I have provided a fluorescent tube socket having an insulating body with a recess therein. This recess is appropriately configured to receive an oppositely disposed pair of spaced resilient contact members which are arranged to resiliently engage and lock the pins of a bi-pin fluorescent lamp. A plurality of spaced conductor receiving slots are formed in the side walls of the body, with one of these slots adjacent each end of each contact member. Each of the contact member ends is spaced slightly from an associated internal wall of the base and extends angularly away from its adjacent slot so that when the bared end of a conductor is inserted through any of these slots the proper distance, it is automatically locked in electrical engagement with the resilient contact member.

Further aspects of my invention will become apparent hereinafter, and the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which I regard as my invention. The invention, however, as to organization and method of operation, together with further objects and advantages thereof,

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may best be understood by reference to the following description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of an improved fluorescent lamp socket embodying my invention in one form thereof;

FIG. 2 is a front elevational view of the socket with the cover removed and two bared conductor ends in electrical engagement with one of the socket contact members;

FIG. 3 is an exploded view of the lamp socket with all of its parts;

FIG. 4 is a diagram representing the wiring of two heated cathode rapid start fluorescent lamps with an appropriate ballast, in an alternating current circuit;

FIG. 5 is a diagram representing the wiring layout required for the circuit shown in FIG. 4, when using conventional fluorescent lamp sockets which have no pressure locking terminals; and

FIG. 6 is a diagram of the wiring layout required for the circuit shown in FIG. 4 when using my improved lamp sockets therein.

Referring first to FIG. 1 of the drawings, there is shown a fluorescent tube socket or lampholder 1 which embodies one form of my invention. This particular socket has been designed for the simplified, and economical mounting of one end of a bi-pin fluorescent tube, and as shall hereinafter become more readily apparent, it is therefore functionally and structurally a most efficient device. To afford maximum simplicity, as shown best by FIG. 3, socket 1 comprises but four basic parts. Supporting body 3 is molded from some suitable insulating material, and it has a recess 5 therein for supporting a pair of similar resilient contact members 7. To close recess 5 of the insulating body 3 and also aid in furnishing a sturdy and compact guiding aperture for the fluorescent lamp pins, I have provided insulating cover 9. This cover 9 is attached to body 3 by any suitable means, such as driven pins 10.

As best shown in FIGS. 2 and 3, molded insulating body 3 is relatively small in size, thus providing the advantage of over-all space economy. To roll or slide the contact pins of a bi-pin fluorescent lamp into the socket 1, upper wall 11 of body 3 has two downwardly and inwardly inclined converging sections 13 which are rounded and turned downwardly to form parallel extensions 15. Extensions 15 are directed perpendicularly toward bottom wall 17 of body 3, to establish an entry slot 19 for movement of the lamp pins into the socket.

To guide the pins of a bi-pin fluorescent lamp within socket 1, I have formed a generally cordate opening 21 in cover 9, and molded a relatively smaller cordate boss 23 in body 3. Boss 23 extends outwardly from the inner side of recess 5 to divide cordate opening 21 into two intersecting arcuate grooves 25 (FIG. 1) when the cover is fitted upon the body. The apex of the cordate opening 21 is intersected by entry slot 19 so that the pins 32 and 33 of the bi-pin lamp may be passed into arcuate grooves 25 to engage the resilient contacts 7 (FIG. 2). When a bi-pin lamp is mounted in this socket, the possibility of the lamp being disengaged and falling is greatly reduced by means of forcing one of the pins into a semi-locked position by a cammed interference of the other pin against an arcuate edge of the cover opening 21 during intentional or accidental removal or rotation of the lamp. This effect is more specifically achieved by the resilient urging of one pin, for example shown in FIG. 2 as dotted pin 32a, against neck 35 of body 3 due to the biasing force of the associated contact member when the other pin, shown for example as dotted pin 33a, rotates to a free or loosened position. To help further guide the

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movement of the lamp pins into electrical engagement with contacts 7 of my socket, I have also provided in body 3 of my improved socket a pair of arcuate recessed surfaces 27 which lie directly underneath arcuate grooves 25, and are substantially coplanar with the flat entry surface 29 underlying slot 19. (See FIG. 1.) Surface 29 is generally perpendicular to converging sections 13 and their parallel extensions 15.

To enhance the sturdiness and durability of my improved lamp socket, I have formed cordate boss 23 as one end of, and an integral part of an arrow-shaped central dividing rib 31. By this manner of construction, the possibility of the shearing of the boss during the mounting or unmounting of the lamp in the socket is substantially lessened. Rib 31 also serves to provide additional sturdiness for body 3 and to generally divide recess 5 into two hollow sections 37 and 39 wherein contact members 7 are resiliently supported.

Turning now to contact members 7, and the manner in which they are supported within recess sections 37 and 39, it will become apparent that these contact members and their manner of support constitute an important aspect of my invention. Each contact member 7 is of thin blade construction, and has a long side 41 which is formed into the shape of an asymmetrical flattened W having upper and lower inner portions 43 and 45 which are connected together to form an apex that faces rib 31. Each side 41 further includes upper and lower outer portions 47 and 49 joined respectively to inner portions 43 and 45. To provide a resilient seat for a contact pin in each contact member 7, a curved groove or indentation 51 is formed between upper portions 47 and 43 of each member. Outer portions 47 and 49 are each turned outwardly and inwardly from side 41 to form upper and lower pressure locking contact portions 53 and 55. One pressure locking contact portion is thus located at each end of each contact member 7. The upper locking portion 53 of each contact is spaced from and connected to outer portion 47 by a generally L-shaped portion 57 so that contact portion 53 may be properly positioned within its recess section and have its proper bearing support against the insulating body.

When positioned within body 3, each contact member 7 has curved apexes 59, 61 and 63 in secure resilient engagement respectively with corners 59a, 61a and 63a that are molded into each body recess section. (See FIG. 2.) These apexes serve as resilient bearing supports for the movement of locking portions 53 and 55, and pin receiving groove 51. Lower portions 45 and 49 also each tangentially bear against the annular portion of rib 31 of the body to add additional support for each member 7 within its recess section. The pressure locking contact portions 53 and 55 of each contact member have shallow tapered grooves 53a and 55a, the depth of which gradually increases in the direction of each end. These grooves are provided to increase the effective wedging force against larger size conductors, to reinforce the locking portions against distortion, and to hold the conductor centered with relation to the locking portion. The ends of contact portions 53 and 55 are spaced slightly from respective associated internal walls 53b and 55b of the body 3, as best shown in FIG. 2, and adjacent to these ends upper and lower conductor receiving slots 65 and 67 are molded into the walls of the body. These slots communicate with recess 5 and include shoulders 65a and 67a the purpose of which is to limit the inward movement of each conductor which is pushed into one of the pressure locking terminals, by engagement with the end of the insulation covering of the conductor. The axes of the receiving slots 65 and 67 are parallel to wall sections 53b and 55b respectively, and the tapered grooves 53a and 55a of the contact member 7 extend angularly away from the inner ends of their adjacent slots so that when the bared end of a conductor is pushed through a slot a sufficient distance, it is automatically locked in

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electrical engagement with the resilient contact member.

To effect this pressure locking engagement, pressure locking contact portions 53 and 55 are normally resiliently biased toward their adjacent receiving slots 65 and 67, to provide a wedging biasing force. Thus, when the bared end of a conductor is thrust through receiving slot 65 or 67, locking portion 53 or 55 pivots or flexes about its associated curved apex 61 or 63 in response to the force transmitted to it by the conductor, and the tapered groove of the locking portion resiliently coacts with its adjacent wall 53b or 55b to sandwich or wedge the bared conductor end in electrical engagement with contact member 7. (See FIG. 2.) It will be noted that the secure support of curved apexes 59, 61 and 63, and lower inner portion 45, within each body recess section makes the pressure locking wedging effect achieved by the insertion or withdrawal of the bared conductors independent in that it is accomplished without any significant distortion or biasing effect upon the upper portions 43 and 47 of the contact. This is important because each contact member 7 of my invention, in addition to providing two pressure locking terminals, also furnishes a resilient force for mounting one of the lamp pins within arcuate groove 25, and the lamp pin holding function should not be affected in any way by the pressure locking of the input leads. In addition, of course, when lamp pins 32 and 33 are being seated in curved indentations 51 of contact members 7, there is no significant distortion or biasing effect upon the pressure locking terminations.

To disengage any conductor from its pressure locking terminal, an unlocking slot 66 is molded adjacent each receiving slot. One needs merely to insert a sharply pointed tool therethrough and flex the pressure locking contact portion to unlock any conductor end from electrical engagement with its pressure locking terminal. (See FIG. 2.)

As will now be apparent, one of the important features of my invention is the provision of improved contact means whereby two pressure locking terminals and a central contact engaging seat are obtained by a single contact member. This contact means is particularly advantageous in a fluorescent lamp socket, such as the illustrated socket, intended for use with a bi-pin lamp.

To more clearly display one of the numerous advantages achieved by this arrangement, I have illustrated a diagrammatic comparison between a typical circuit embodying my improved lamp sockets and the same circuit wherein conventional sockets having no pressure locking terminals are utilized. FIG. 4 is a diagram representing the wiring required for connecting two rapid start fluorescent lamps with an appropriate ballast, in an alternating current circuit. The ballast is, of course, necessary in such a circuit as this to ignite the lamps and to stabilize the current flow at the correct value when the fluorescent lamps are energized through their associated sockets. Turning now to the manner in which conventional lamp sockets having no pressure locking terminals are connected for the typical circuit of FIG. 4, let us examine FIG. 5. This figure shows conventional sockets 70 connected to an alternating current power source. Because sockets 70 have no pressure locking terminals, it has been found necessary to make spliced connections a, b, c, and d in the vicinity of one side of the ballast, and spliced connections e, f, g, and h on the other side thereof. It is of additional importance at this point to note that spliced connections c and d each link three wires together. Each of spliced connections a-h, of course, necessitates an installation detail which is reflected in the total cost for the circuit. In FIG. 6, I show the same circuit layout as illustrated in FIG. 5, but with my improved lamp sockets 1 being used, instead of conventional sockets 70. It will be seen that in this circuit, only spliced connections a and b are now necessary. All of the other spliced connections have been obviated by the pressure locking terminals of

my four improved lampholders. Thus, although two spliced connections *a* and *b* still remain, two groups of three pressure locking terminals each, *c'* and *d'*, are substituted for the three wire spliced connections *c* and *d*. On the other side of the ballast, as shown in FIG. 6, pressure locking terminals *e'*, *f'*, *g'* and *h'* are substituted for spliced connections *e*, *f*, *g* and *h*, respectively. Use of my improved lampholders has thus cut down the number of splices necessary in a typical two lamp, heated cathode, fluorescent circuit, from eight to two.

It will now therefore be seen that my new and improved wiring device such as herein illustrated in a bi-pin fluorescent lampholder, provides a simple and efficient means for economically providing two pressure locking terminals by the cooperation between a single contact member and an insulating body. This construction conveniently lends itself to simplified installation and thereby substantially reduces installation expense. It should be realized that certain aspects of my invention may efficiently and beneficially be incorporated in numerous other wiring devices, such as switches and outlets of the single or multiple type.

While in accordance with the patent statutes, I have described what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from my invention, and I, therefore, aim in the following claims to cover all such equivalent variations as fall 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 socket for a bi-pin electrical tube comprising an insulating body having a plurality of walls forming a recess therein, four spaced conductor receiving slots extending into said recess through said walls, a pair of resilient contacts spaced apart within said recess, each of said contacts having a curved indentation between its ends for resiliently engaging one of the pins of said tube, each end of each of said contacts being positioned angularly across the inner end of one of said slots to engage a conductor inserted through the associated slot, said contact ends each being located adjacent a wall of said recess and resiliently sandwiching the inserted conductor against said wall for locking said conductor in electrical engagement therewith, whereby said contacts each are capable of performing three resilient functions to provide a lamp pin seat and two pressure locking terminals for external conductors.

2. A socket for a bi-pin electrical tube comprising an insulating body having a plurality of walls forming a recess therein, four spaced conductor receiving slots extending into said recess through said walls, a pair of resilient contacts spaced apart within said recess, an insulating cover for securing said contacts within said recess of said body, each of said contacts having a curved indentation between its ends for resiliently engaging one of the pins of said tube, each end of each of said contacts being positioned angularly across the inner end of one of said slots to engage a conductor inserted through the associated slot, said contact ends each being located adjacent a wall of said recess and resiliently sandwiching the inserted conductor against said wall for locking said conductor in electrical engagement therewith, whereby said contacts each are capable of performing three resilient functions to provide a lamp pin seat and two pressure locking terminals for external conductors.

3. The socket of claim 2 wherein the insulating body includes four unlocking slots one of which is adjacent to each conductor receiving slot, said unlocking slots extending into said recess through said walls and having their axes intersect said contacts inwardly from said pressure locking terminals thereby to provide a means for unlocking each of said pressure locking terminals by the

insertion of an appropriate tool through the associated unlocking slot.

4. A lampholder for a bi-pin electric tube comprising an insulating body having a plurality of walls forming a recess means therein, a plurality of conductor receiving slots extending into said recess through said walls, a pair of resilient contacts spaced apart within said recess, each of said contacts having a curved indentation between its ends for resiliently engaging one of the pins of said tube, at least one end of one of said contacts positioned angularly across the inner end of one of said slots and adjacent to one of said walls to provide a first pressure locking terminal for an external lead, and both ends of the other of said contacts positioned angularly across the inner ends of two other of said slots respectively and adjacent two other of said walls to provide second and third pressure locking terminals for external leads, said contact ends wedging said external leads against the adjacent walls of said body to resiliently lock said leads in electrical engagement with said contacts, whereby said last-mentioned contact provides a lamp pin seat and two pressure locking terminals for external conductors, being thereby arranged to perform three separate and distinct resilient functions.

5. A socket for an electrical tube comprising an insulating body having a plurality of walls forming a recess therein, a plurality of conductor receiving slots extending into said recess through said walls, at least one resilient contact positioned within said recess, said contact having a curved indentation between its ends thereby to resiliently and electrically engage a cooperating contact of said tube, said socket contact having each of its ends positioned adjacent to an inner surface of one of the walls of said recess and extending angularly across the inner end of an associated one of said slots to resiliently coact with said wall and produce a wedging force for urging a conductor thereagainst, said contact being thereby arranged to perform at least three separate and distinct resilient functions by providing two pressure locking terminations for said contact to resiliently lock said contact in engagement with two electrical conductors, and also providing a lamp contact seat, whereby the plurality of pressure locking terminations on said contact reduces the number of spliced connections required to install said socket.

6. A socket for a bi-pin electrical tube comprising a relatively flat rectangularly configured insulating body having a plurality of walls forming a recess therein, an arrow-shaped rib projecting upwardly from an inner base surface of said recess and generally dividing said recess into two hollow sections, said rib having a cordate shaped boss at one of its ends, a pin receiving slot extending through one end of said body and spaced from the apex of said boss, two spaced conductor receiving slots extending into each of said hollow sections through said walls, a pair of identical resilient contacts one of which is arranged within each section of said recess, each of said contacts having a curved indentation between its ends for resiliently engaging a lamp pin, each end portion of each of said contacts having a longitudinally extending tapered groove the deepest section of which is disposed at its end, said tapered groove extending angularly across an inner end of each of said conductor receiving slots, a wall section of said body adjacent to each of said tapered contact grooves, said tapered grooves resiliently coacting with their respective adjacent wall sections thereby to provide four pressure locking terminals, two for each contact, whereby each of said resilient contacts is arranged to perform three separate and distinct resilient functions and upon the insertion of electrical conductors into said receiving slots, the inserted conductors are resiliently wedged between said contact ends and their respective wall sections thereby to resiliently lock said conductors in electrical engagement with said contacts.

7. A socket for a bi-pin electrical tube comprising a relatively flat rectangularly configured insulating body having a plurality of walls forming a recess therein, an arrow-shaped rib projecting upwardly from an inner base surface of said recess and generally dividing said recess into two hollow sections, said rib having a cordate boss facing outwardly at one end and an annular portion between its ends, a pin receiving slot extending through one wall of said body and spaced from the apex of said boss, two spaced conductor receiving slots extending into each of said hollow sections, a pair of identical resilient contacts one of which is arranged within each section of said recess, each of said contacts being of thin blade construction and having a long side formed in the shape of an asymmetrical flattened W, said long side having a pair of converging inner portions connected together to form an apex facing said rib and a pair of outer portions connected respectively to said inner portions, one of said outer portions tangentially engaging said annular portion of said rib and one of said inner portions connected to this tangentially engaging outer portion and also tangentially engaging said annular portion of said rib, pressure locking contact portions connected to each end of said long side of each said contact, each end of said long side being turned outwardly and inwardly to form upper and lower curved apexes, a curved indentation located on said contact between the tangentially engaging inner portion of said contact and said upper curved apex for resiliently engaging a lamp pin, an outer curved apex formed between said upper curved apex and its adjacent pressure locking contact portion, said curved apexes seated within associated supporting corners of said insulat-

ing body, each end portion of each of said contacts having a longitudinally extending tapered groove the deepest section of which is disposed at its end, said tapered groove extending angularly across an inner side of each of said conductor receiving slots, and a wall section of said body adjacent to each of said tapered contact grooves, said tapered grooves coacting with their respective adjacent wall sections thereby to provide four pressure locking terminals, two for each contact, whereby upon the insertion of electrical conductors into said receiving slots, the inserted conductors are resiliently wedged between said contact ends and their respective wall sections thereby to lock said conductors in electrical engagement with said contacts.

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