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F. S. LAMB ET AL

2,730,689

ELECTRIC TERMINAL CONNECTOR

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FIG. 1

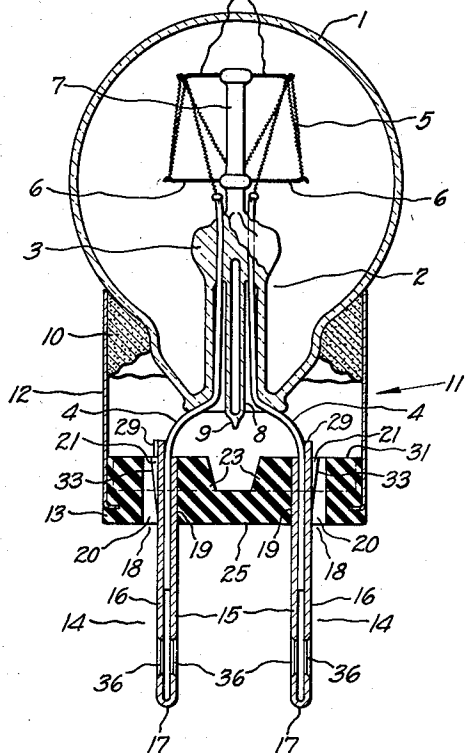


FIG. 2

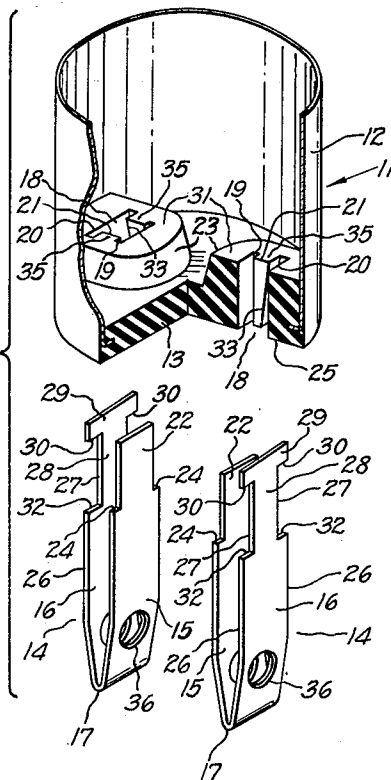
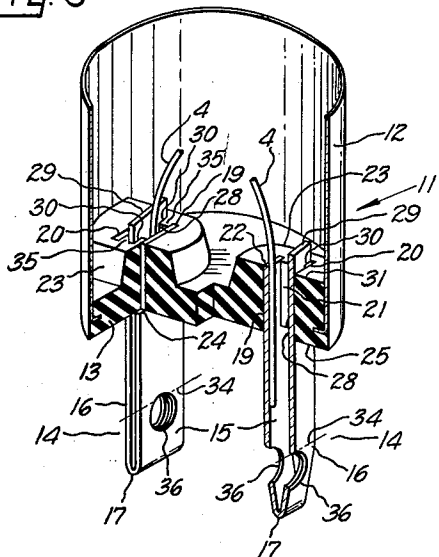


FIG. 3



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2,730,689

ELECTRIC TERMINAL CONNECTOR

Fredrick S. Lamb, Cleveland Heights, and Herman E. Hermanson, East Cleveland, Ohio, 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 U. S. Patent Office, January 4, 1954, Liber U-238, page 394

Application December 26, 1951, Serial No. 263,454

7 Claims. (Cl. 339-145)

Our invention relates to electrical connectors of the plug type having protruding contact prongs which are adapted to be inserted into the contact openings of an electrical socket or receptacle. Such plug-type connectors may be used, for example, as bases for electric lamps or similar devices particularly of the low current type, or as attachment plugs for electric cords. The present application covers an improvement of the electrical connector construction disclosed and claimed in co-pending application Serial No. 141,788, F. S. Lamb, filed February 1, 1950, now Patent No. 2,615,950, and assigned to the assignee of the present application.

It is an object of our invention to provide a prong-type electric terminal connector of simple and relatively inexpensive construction and which may be easily and quickly assembled and connected to the current supply wires of the electric lamp, cord, or other device to which it is attached.

Another object of our invention is to provide an electric terminal connector or plug of the above character having blade-type prongs which may be firmly attached and automatically locked in assembled position on the insulator member of the connector simply by inserting the prongs into respective prong-receiving apertures in the insulator member.

Still another object of our invention is to provide an electric terminal connector or plug of the above character having mechanical or solderless electrical connections of good electrical properties between the connector prongs and the current supply wires of the device to which the connector is attached.

Further objects and advantages of our invention will appear from the following detailed description of a species thereof and from the accompanying drawing.

In the drawing, Fig. 1 is a sectional view, on an enlarged scale, of an electric incandescent lamp provided with a terminal connector or base according to the invention; Fig. 2 is an exploded view of the base shown in Fig. 1 prior to assembly of the parts thereof, with the shell and insulative end wall of the base shown partly broken away; and Fig. 3 is a perspective view, partly broken away, of the base according to the invention, with the respective prongs being shown before and after pinching of the current supply wires between the legs of the prongs.

In accordance with the invention, an electric terminal connector such as a lamp base or electric cord plug is provided with projecting contact prongs or blades each formed of a strip of suitable material, such as brass, which is secured to an insulative wall portion of the plug or base within an opening therein and which extends outwardly from the wall and is bent back upon itself to form two separated side-by-side leg portions between which the current conductor extends and is pinched, one of the prong legs extending into and having a snug sliding fit in a slideway portion of the wall opening so as to be firmly fixed in place in said wall against transverse movement, and the other of said prong legs extending into and being

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locked in place in said opening against longitudinal movement but being transversely movable therein toward the fixedly held prong leg for pinching a current conductor therebetween.

While the invention is shown in the drawings as employed in a base for an electric incandescent lamp, it will be obvious that it may be applied as well to bases for electric glow lamps or other discharge devices, or to a terminal connector or attachment plug cap for electric cords and the like.

Referring to the drawing, the lamp there shown comprises a hermetically sealed glass envelope or bulb 1 having a reentrant stem 2 provided with a press or seal portion 3 through which are sealed a pair of lead-in or current supply conductors or wires 4, 4. Disposed within the bulb 1 is a light source comprising a tungsten filament 5 electrically connected at its ends to the lead-in wires 4 and supported in position within the bulb by a plurality of support wires 6 anchored in a glass arbor 7 extending inwardly of the bulb from the stem press 3. The bulb 1 is exhausted and, if desired, filled with a suitable gas through an exhaust tube 8 communicating with the interior of the bulb, which tube is afterwards sealed or tipped-off, as indicated at 9, to hermetically seal the bulb.

Suitably secured to the neck end of the bulb 1, as by basing cement 10 for instance, is an electric terminal connector or base 11 according to the invention and comprising a cylindrical metal shell portion 12 suitably fastened to an insulative end wall portion 13 which may be made of any suitable insulating material such as glass, porcelain, molded plastic, or the like. Projecting endwise from the end wall 13 and securely fastened thereto is a pair of contact prongs 14, 14 to which the lead-in wires 4 are connected.

In accordance with the invention the said contact prongs or blades 14 are formed of relatively stiff or rigid metal strips of suitable character such as, for example, half hard spring brass or bronze, and having a thickness of the order of .025 inch and a width of around 1/4 inch or so. As shown in Fig. 2, the metal strip forming each prong 14 is bent or doubled back upon itself to form two side-by-side and slightly spaced leg portions 15, 16 joined by a bent outer end or bight portion 17. The prongs 14 are securely fastened in place on the base end wall 13 with their bent or bight ends 17 outward and with one leg portion 15 fixedly secured in the wall against transverse movement and the other leg portion 16 free to be moved transversely. For this purpose, the insulative end wall 13 is provided with a pair of prong-receiving apertures 18 into which the prongs 14 are inserted from the outer side of the said wall. The apertures 18 are of approximately H-shaped cross section each comprising a pair of parallel slot portions 19 and 20 connected by a cross slot portion 21. The two apertures 18 are disposed side-by-side with the parallel slot portions 19, 20 of each aperture arranged parallel to those of the other aperture.

One of the parallel slots of each aperture 18, preferably the innermost slot 19 proximal the other aperture, is formed as a slideway for snugly receiving a narrowed inner end portion 22 of the prong leg 15 so as to firmly fix and hold the latter in place in the wall against transverse movement. For this purpose the slot 19 is formed of a cross section corresponding to that of the narrowed end 22 of the prong leg 15 so that the latter has a snug sliding fit therewithin. The narrowed end 22 of the fixedly held prong leg 15 is of a length approximately corresponding to the depth of the aperture 18, the insulative wall 13 preferably being locally thickened around each aperture 18 by means of interior bosses 23 in order to provide a sufficient length of bearing contact between the prong leg 15 and the wall 13 to assure a rigid mount-

ing of the prong leg in the slot. Inwardly facing lateral shoulders 24 formed on the prong leg 15 at the point where it is reduced in width to form the narrowed inner end 22 serve as stop shoulders engageable with the outer side 25 of the wall 13 to limit inward movement of the prong 14 into the aperture 18.

The other prong leg 16, which is inserted in the outer slot 20 of the aperture 18 and is transversely movable in the cross slot 21 toward the fixed prong leg 15; is provided with a T-shaped inner end, the opposite side edges 26 of the prong leg 16 being correspondingly notched (as indicated at 27) at a region adjacent its innermost end to thereby provide an intermediate constricted portion 28 of reduced width from the rest of the prong leg as well as a headed inner end or lateral tongue 29. The constricted portion 28 is of a length at least equal to the depth of the aperture 18 in the wall 13 and is approximately co-extensive with the narrowed inner end 22 of the fixed prong leg 15. The outwardly facing lateral shoulders 30 formed by the tongue 29 constitute stop surfaces which are adapted to engage with the inner side 31 of the wall 13, when the prong is fully inserted into the aperture 18, to prevent withdrawal of the prong from the said aperture. To assure such condition, the inwardly facing shoulders 32 on the movable prong leg 16 are located slightly outward of the inwardly facing stop shoulders 24 on the fixed prong leg 15, and the outwardly facing stop shoulders formed by the tongue 29 are spaced longitudinally of the prong from the inwardly facing stop shoulders 24 a distance approximately equal to or at most only a few thousandths of an inch greater than the depth of the aperture 18 so as to assure that the insulative wall 13 will fit more or less snugly between the opposed stop shoulders 24, 30, thus effectively locking the prong 14 in place in the aperture 18 against longitudinal movement relative to the wall.

As shown in Fig. 2, the tongue end 29 of the movable prong leg 16 is twisted at a slight angle to the plane of the rest of the prong leg, and the outermost aperture slot 20 into which the said prong leg 16 is inserted, is formed of sufficiently large size at the outer side 25 of the wall 13 to freely receive the twisted prong end 29 therein. One of the flat side walls 33 of the slot 20 is inclined inwardly toward the opposite flat side wall so as to narrow down the slot 20 to a width, at the inner side 31 of the wall 13, which approximately corresponds to the thickness of the prong. The inclined or converging side wall 33 of the slot 20 therefore acts in the manner of an inclined cam surface to flex or straighten out the twisted inner end or tongue 29 of the prong leg 16 during its insertion through the slot 20. Upon clearing the inner side 31 of the wall 13 the flexed tongue 29 springs back to its normal twisted position relative to the rest of the prong leg, thus shifting the stop shoulders 30 over the inner side 31 of the wall into a position to overlie and engage the same to thereby prevent withdrawal of the prong from the aperture 18.

In such inserted position of the prong leg 16, the constricted portion 28 thereof is then located within the wall 13 in a position opposite the cross slot 21 therein, which cross slot is made of sufficient width to receive the constricted prong leg portion 28 so as to permit free transverse movement of the prong leg 16 through the cross slot 21 toward the fixed prong leg 15 for the purpose of pinching therebetween, and thus connecting to the prong, one of the lead-in wires 4 of the lamp. The lead-in wires 4 are inserted from the inner side 31 of the base end wall 13 into the cross slots 21 of the respective apertures 18, and into a position between the two prong legs 15, 16, during the positioning of the base 11 on the bulb 1 in readiness for attachment or cementing thereto. The lead-in wires 4 are of a length such as to extend outwardly beyond the wall 13 and they are preferably securely clamped between the prong legs 15, 16, to form an effec-

tive mechanical and electrical connection thereto, by suitably pinching the legs of each prong together so as to be tightly spring-compressed against the lead-in wire. To this end, the lead-in wire 4 should terminate some distance back from the outer bent end 17 of the prong, as shown, and the two prong legs 15, 16 pinched together by the application of pressure thereto at a localized region thereof which is intermediate the outer end of the wire 4 and the outer bent end 17 of the prong (as indicated by the dash-dot line 34 in Fig. 3) but which is sufficiently near the bent end 17 to cause a permanent further bending deformation thereof sufficient to form the prong into a virtually closed hairpin spring or spring clip between the legs 15, 16 of which the lead-in wire 4 is tightly spring-clamped. The pinching together of the prong legs 15, 16 may be effected by the use of suitable pinching jaws which are closed against the outer sides of the two prong legs 15, 16 at the above-indicated intermediate region 34 thereof, which, in the particular case illustrated, is located approximately one-quarter inch or so back from the bent end 17 of the prong. In the said pinching operation, the movable prong leg 16 is transversely moved into the cross slot 21 of the wall aperture 18, as a result of which the locking tongue 29 at the inner end of prong leg 16 is moved onto the shelf portions 35 of the inner side 31 of wall 13 (which shelf portions are located at either side of the cross slot 21 and between the parallel slots 19, 20) thus positively locking the pinched prongs 14 against withdrawal from the apertures 18 at all times.

From the above it will be evident that the base according to the invention is of simple and relatively inexpensive construction and can be assembled and electrical connections made to the contact prongs thereof in a simple, easy and quick manner, without the need of any soldering operations whatsoever. The prongs 14 can be assembled in place on the base simply by pushing them straight into the wall apertures 18 whereupon they become automatically locked firmly in place therein. As shown, the prong legs 15, 16 may be provided with circular apertures or holes 36 adjacent their outer ends for the purpose of accommodating therein the usual protuberances or dimples which are customarily provided on the spring contacts of conventional sockets or receptacles into which the base or terminal connector according to the invention is adapted to be plugged.

Although a preferred embodiment of our invention has been disclosed, it will be understood that the invention is not to be limited to the specific construction and arrangement of parts shown but that they may be widely modified within the spirit and scope of our invention as defined by the appended claims.

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

1. An electrical connector comprising a body member provided with an insulative wall portion having an aperture therethrough; and a contact prong slidably insertable into said aperture from the exterior of said wall to secure the prong in place therein, said contact prong comprising a strip of metal having an inner end portion providing a stop shoulder extending laterally inward from a side edge of the prong and facing outwardly toward the outer end of the prong, said inner end portion being twisted at a slight angle to the plane of the prong to thereby displace the said outwardly facing shoulder to one side of the prong, said prong also having an inwardly facing laterally extending stop shoulder opposed to and spaced from said outwardly facing shoulder a distance approximately corresponding to the thickness of said wall around the said wall to limit insertion movement of the prong into the said aperture in said wall, and said aperture having inwardly converging side wall aperture; said inwardly facing stop shoulder being engageable with the side wall of said aperture to define a slot having a width at its inner end corresponding approximately to the thickness of the prong so as to snugly receive the prong, said converging side walls

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engaging and flexing the said twisted inner end of the prong into parallelism with the rest of the prong during its passage through the said aperture whereby to allow the said flexed inner end to spring back to its normal unflexed position, upon passage thereof completely beyond the inner side of said wall, so as to overlie and engage with the said inner side of the wall to thereby lock the prong in place in said aperture against outward withdrawal therefrom.

2. An electrical connector comprising a body member provided with an insulative wall portion having an aperture therethrough, and a contact prong comprising a strip of metal secured to the said wall and extending outwardly therefrom and bent back upon itself to form two separated and approximately side-by-side leg portions, said prong being insertable into the aperture in said wall from the outer side thereof and being provided with a lateral stop shoulder engageable with the outer side of said wall to limit inward movement of the prong into said aperture, said aperture having a slideway portion snugly receiving one of said prong legs to thereby firmly fix it in place in said wall against transverse movement in said wall, and the other prong leg extending into and being transversely movable in said aperture toward the fixedly held prong leg and being provided with a resilient laterally shouldered locking tongue twisted at an angle to the plane of the prong leg and engageable with and spring-deflected out of its normal twisted position relative to the prong leg by the side wall of said aperture during insertion of the prong thereinto, said locking tongue being free to spring back to its normal position upon passage completely through the said aperture so as to overlie and engage with the inner side of said wall, while the two prong legs are located in their said separated relation for insertion into the said aperture, to thereby prevent withdrawal of the prong from said aperture.

3. An electrical connector comprising a body member provided with an insulative wall portion having an aperture therethrough comprising a pair of parallel slots connected by a cross slot, and a contact prong comprising a strip of metal secured to the said wall within the said aperture and extending outwardly therefrom and doubled back upon itself to form two separated and approximately side-by-side leg portions, said prong being insertable into the aperture from the outer side of the wall and being provided with a lateral stop shoulder facing toward the inner end of the prong and engageable with the outer side of said wall to limit inward movement of the prong into said aperture, one of the prong legs snugly fitting within one of the parallel slots of said aperture to firmly fix it in place in said wall against transverse movement in said wall, and the other of said prong legs having an intermediate portion extending into the aperture and freely movable through the said cross slot toward the fixedly held prong leg, said other prong leg further having a widened inner end twisted at a slight angle to the plane of the prong leg to provide a spring-locking tongue insertable through and engageable with and spring-deflected out of its normal twisted position relative to the prong leg by the side wall of the other one of said parallel slots upon insertion of the said prong leg thereinto, said locking tongue being free to spring back to its normal twisted position upon passage completely through the said aperture so as to overlie and engage with the inner side of said wall, while the two prong legs are located in their said separated relation for insertion into their respective slots, to thereby lock the prong in place in said wall against longitudinal withdrawal from said aperture.

4. An electrical connector comprising a body member provided with an insulative wall portion having an aperture therethrough comprising a pair of parallel slots connected by a cross slot, and a contact prong comprising a strip of metal secured to the said wall within the said aperture and extending outwardly therefrom and doubled back upon itself to form two separated and approximately side-

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by-side leg portions, said prong being insertable into the aperture from the outer side of the wall and being provided with a lateral stop shoulder engageable with the outer side of said wall to limit inward movement of the prong into said aperture, one of the prong legs snugly fitting within one of the parallel slots of said aperture to firmly fix it in place in said wall against transverse movement, and the other of said prong legs having an intermediate portion extending into the aperture and freely movable through the said cross slot toward the fixedly held prong leg, said other prong leg further having a widened inner end twisted at a slight angle to the plane of the prong leg to provide a lateral stop shoulder and insertable through the other one of said parallel slots to engage with the inner side of and thereby lock the prong in place in said wall against longitudinal withdrawal from said aperture, said other parallel slot having a width corresponding at its innermost end to the thickness of said other prong leg and having at least one of its flat sides converging inwardly toward the opposite side of the slot to serve as a cam surface for flexing the said twisted inner end of the prong leg into parallelism with the rest of the prong leg during passage thereof through the said other slot.

5. An electrical connector comprising a body member provided with an insulative wall portion having an aperture therethrough, and a contact prong secured to said wall within the said aperture to extend outwardly therefrom and comprising a strip of metal doubled back upon itself to form two separated and approximately side-by-side leg portions one of which is fixedly secured in said wall against transverse movement and the other one of which is transversely movable in said aperture toward the fixed leg to pinch a current conductor therebetween, said prong being insertable into the aperture from the outside of the wall and being provided with a lateral stop shoulder engageable with the outer side of said wall to limit inward movement of the prong into said aperture, said transversely movable prong leg having its side edges correspondingly notched adjacent the inner end thereof to form a headed inner end twisted at a slight angle to the plane of the prong leg and a constricted section having a length at least equal to the depth of said aperture, said aperture comprising a pair of parallel slots connected by a cross slot, one of said parallel slots snugly receiving the inner end of the fixed prong leg to thereby firmly fix it in place in said wall against transverse movement and the other of said parallel slots providing an inwardly convergent passageway for the movable prong leg having opposed convergent side walls engaging with the said twisted inner end of the prong leg to flex it into substantial parallelism with the rest of the prong leg upon passage through the slot, said inner end springing back to its said twisted position upon passage completely through the slot to thereby overlie and engage with the inner side of said wall to lock the prong in place in said aperture against withdrawal therefrom, and said cross slot providing a passageway for the constricted portion of the movable prong leg to permit transverse movement of the latter toward the fixed prong leg.

6. A contact prong for a lamp base or similar device, said prong comprising a strip of metal doubled back upon itself to form two separated and approximately side-by-side leg portions, the free end of one of said prong legs being provided with a locking tongue twisted at a slight angle to the plane of the prong leg about the longitudinal axis thereof.

7. A contact prong for a lamp base or similar device, said prong comprising a strip of metal doubled back upon itself to form two separated and approximately side-by-side leg portions, one of said prong legs being narrowed down at its free end to provide stop shoulders thereon facing toward the open end of the prong, and the other of said prong legs having its side edges recessed adjacent the free end of the prong leg to provide a notch in each side edge

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extending toward the closed end of the prong to a point at least abreast of the said stop shoulders and to also provide a locking tongue at the free end of the prong leg, said locking tongue being twisted at a slight angle to the plane of the prong leg.

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