Aug. 25, 1953 F. S. LAMB ET AL 2,650,353

ELECTRIC TERMINAL CONNECTOR

Filed Dec. 26, 1951

Fig. 1

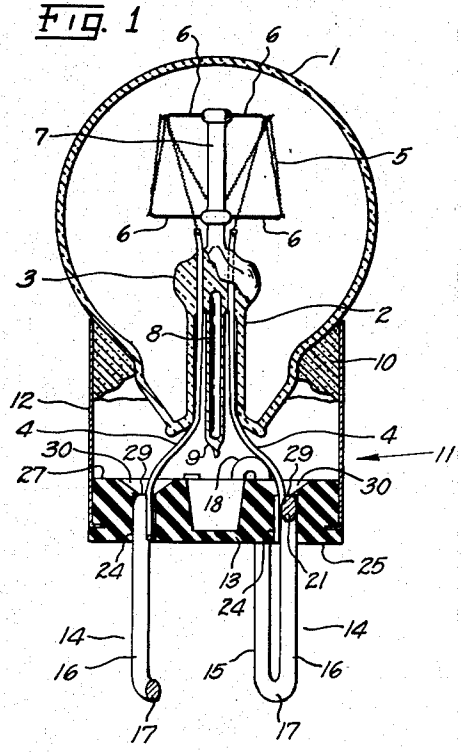


Fig. 2

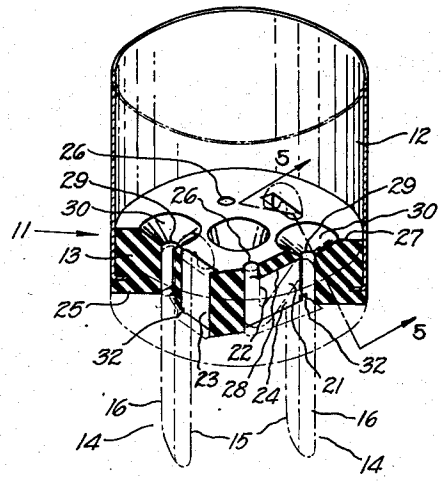


Fig. 3

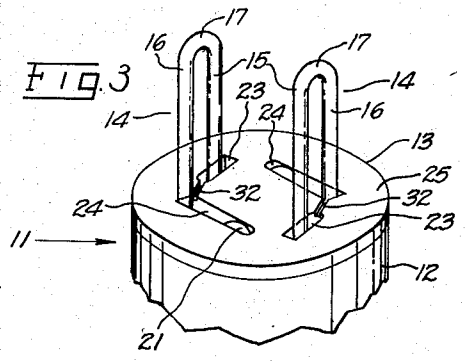


Fig. 5

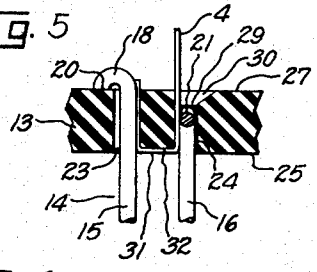


Fig. 4

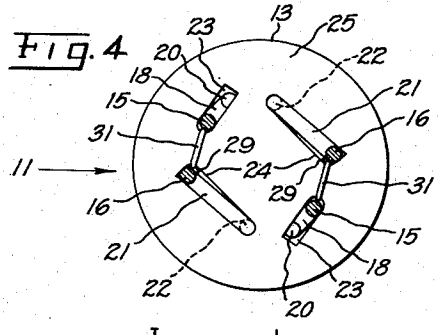
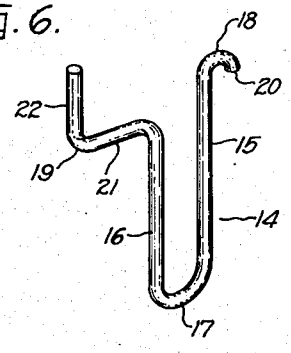


Fig. 6.



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ELECTRIC TERMINAL CONNECTOR

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9 Claims. (Cl. 339—145)

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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 a base for electric lamps or similar devices or as an attachment plug for electric cords. The present invention is an improvement of the connector construction disclosed and claimed in co-pending U. S. application Serial No. 136,549, F. S. Lamb, filed January 3, 1950, now Patent No. 2,627,048 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 easily assembled construction and having wire-type contact prongs rigidly fixed in place and mechanically 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 having wire-type contact prongs which may be firmly mounted in place on the insulator member of the connector body and electrically connected to the current supply conductors of the connector by a simple push-in movement of the prongs into respective prong-receiving recesses in the insulator member.

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 length of relatively stiff or rigid wire doubled back upon itself into U-shape and locked in place in recesses provided in an insulative end wall of the connector body, the inner ends of the prong legs being bent laterally to form transversely extending bent inner end portions between which the insulative wall is locked to thereby longitudinally fix the prongs in place on the wall. According to a further aspect of the invention, the insulative wall is formed with a slot therethrough and a groove in its outer face separated from each other and of a width to snugly receive the respective prong legs and their lateral bent end portions, the slot and groove being disposed at an angle relative to each other of slightly different degree from that of the prong bent end portions whereby the latter are insertable thereinto only upon spring distortion thereof so as to cause the innermost one of the bent end portions to spring back over the inner side of the insulative wall upon insertion completely through the slot, thereby locking the prong in place in the wall against outward withdrawal therefrom.

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Further objects and advantages of our invention will appear from the following detailed description of a species thereof and from the accompany drawing in which:

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 a perspective view, in section, of the base according to the invention, with the prongs thereof diagrammatically shown in dash-dot lines in assembled position thereon; Fig. 3 is a fragmentary perspective view of the outer end of the base with the current supply wires omitted; Fig. 4 is an end view of the outer end of the base with the prong legs shown in section; Fig. 5 is a sectional view on the line 5—5 of Fig. 2; and Fig. 6 is a perspective view of one of the prongs.

While the invention is shown in the drawing as embodied 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 re-entrant stem 2 provided with a press or seal portion 3 through which are sealed a pair of lead-in or current supply 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 secured to an insulative end wall portion 13 which may be made of any suitable insulative 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. In accordance with the invention, the said prongs 14 are formed of relatively stiff or rigid wire such as, for example, round wire of around .060 inch diameter, preferably made of phosphor bronze, spring brass or other good electrically conductive material.

As shown in Fig. 2, each prong 14 is formed of a length of wire which is doubled back upon itself or looped into a U-shape to form two separated and approximately parallel leg portions 15, 16 joined by a curved outer end or bight portion 17. The prongs 14 are securely fastened to the base end wall 13 with their curved ends 17 outward. For this purpose the inner ends of the prong legs 15, 16 are bent sidewardly to form laterally bent inner ends or feet portions 18 and 19, respectively, which extend transversely relative to each other and interlock with the wall 13 to firmly anchor the prongs thereto. The bent end 18 of prong leg 15 is formed by doubling back the inner end portion of the prong leg into the shape of an open hook to thereby provide an outwardly facing shoulder 20 formed by the inner end extremity of the prong leg 15. The bent end 19 of prong leg 16 consists of a lateral portion 21 which is preferably bent back toward the outer end of the prong at an acute angle relative to the prong leg 16 of, for example, around 45° to 55°, and an offset inner end or tail portion 22 extending inwardly from the lateral portion 21 in a direction parallel to the prong leg 16. As shown, the bent inner ends 18, 19 of each prong 14 extend outwardly away from each other to the same side of and angularly to the plane of the two legs 15, 16 of the prong, the bent end 18 preferably extending at a slight angle of, for example, around 30° or so to the plane of the two prong legs 15, 16 and the bent end 19 preferably extending at an appreciable angle of, for example, around 60° or so to the said plane. As a result, the two bent ends 18, 19 of each prong extend transversely relative to each other at an angle of around 90° or thereabouts, as viewed from the end of the prong.

The insulative wall 13 is provided with separate prong-receiving recesses for the legs 15, 16 of each prong in the form of a slot 23 and a groove 24 in the outer face 25 of the wall 13. The slot 23 is adapted to receive the hook-shaped bent end 18 of prong leg 15 while the groove 24 is adapted to receive the bent end 19 of the other prong leg 16, the slot and groove being arranged for such purpose at an angle relative to each other more or less corresponding to the angularity of the bent end portions 18, 19 of the prong legs. The slot 23 is of a width to snugly receive the prong leg 15 therein so as to firmly hold the latter in place in the wall 13 against movement transversely of the slot. Likewise, the groove 24 is formed of a width at its far end (i. e., the end furthest from the slot 23) to snugly receive the tail portion 22 so as to firmly hold the prong leg 16 in place in the wall 13 against movement transversely of the groove 24. Additional support to this end is afforded by providing an aperture 26 in the wall 13 in communication with the far end of the groove 24 and which snugly receives the offset tail end 22 of the prong leg 16. Since the slot 23 and groove 24 extend transversely to each other, the snug sliding fit of the prong leg 15 and bent end 19, respectively, in the slot 23, and in the groove 24 and aperture 26, serves to firmly hold the two legs 15, 16 of the prong in a rigid manner against transverse movement in all directions.

To lock the prongs 14 in their respective prong-receiving slots 23 and grooves 24 against withdrawal therefrom, means are provided to cause the innermost bent end 18 of the prong to automatically snap or spring over and engage with the inner side 27 of the wall 13 upon passage of the said bent end 18 completely through the slot 23. For this purpose, the slot 23 and groove 24 are arranged at an angle relative to each other slightly different (preferably around 10° or so greater) than that of the bent ends 18, 19 of the prong so as to require the bent ends 18, 19 to be angularly twisted or spring-distorted out of their normal angular position in order to permit their insertion into the slot 23 and groove 24. Thus, when the bent end 18 clears or passes beyond the inner side 27 of the wall 13 during the insertion of the prong 14 into its respective slot 23 and groove 24, the said bent end 18 then springs back to its normal unflexed position relative to the other bent end 19 thus swinging its outwardly facing shoulder extremity 20 into a position over the inner side 27 of wall 13 (as shown in Fig. 4) where it engages therewith to lock the prong against outward withdrawal from the slots 23 and groove 24. At the same time the lateral extending portion 21 of the bent end 19 of the other prong leg 16 engages with the bottom 28 of the groove 24 to limit the inward movement of the prong into the slot 23 and groove 24, the longitudinal spacing of the opposed outwardly and inwardly facing shoulders 20 and 21 being just sufficient to snugly receive the wall 13 therebetween so as to effectively lock the prong in place on the wall against longitudinal movement.

The lead-in or current supply wires 4, 4 of the lamp are mechanically connected to the respective prongs 14 in the manner shown in Fig. 5. For this purpose, the wall 13 is provided with an aperture 29 communicating with the near end of the groove 24 (i. e., the end nearest the slot 23) and in alignment with the prong leg 16 when in place in the groove 24. The lead-in wire 4 is threaded through the aperture 29 at the time the base 11 is placed over the neck end of the bulb 1 in position for cementing or fastening thereto and before the prongs 14 have been inserted in the prong-receiving recesses in the wall 13. To facilitate such insertion of the wires 4 into the apertures 29, the latter are flared out toward the inner side 27 of the wall 13, as indicated at 30. With the base 11 mounted in place on the bulb 1, the portion of the lead-in wire 4 projecting outwardly beyond the wall 13 is then bent back over the outer side 25 of the wall 13 and back into the slot 23, with the exposed portion 31 of the wire 4 received within a groove 32 which is preferably provided in the outer side 25 of the wall 13 whereby the said exposed wire portion 31 is located flush with the outer side 25 of the wall so as to be protected therewithin. Upon subsequent insertion of the prong legs 15, 16 into the slot 23 and groove 24, the portions of the wire 4 located within the groove 24 and the slot 23 are trapped and tightly wedged or clamped between the walls of the said groove and slot and the respective prong legs 15, 16 therein as shown in Fig. 4, thus mechanically connecting the prong 14 to the lead-in wire 4 and providing a good electrical connection therebetween. At the same time the prong leg 16 is itself, in turn, wedged tight against the wall of the widened end of the groove 24 by the portion of the lead-in 4 therein so as to further aid in supporting the prong leg 16 rigidly in the wall 13. To accommodate both the lead-in wire 4 as well as the prong leg 16 so as to permit insertion of the latter thereinto, the groove 24 is tapered or widened out toward its near end to a width approximating that of the combined diameters of the lead-in wire 4 and prong leg 16.

From the above it will be evident that the attachment of the contact prongs 14 to the base end wall 13 and their connection to the lead-in wires 4 is easily performed and automatically effected simply by inserting the prong legs 15, 16 and their bent ends 18, 19 into the slot 23 and groove 24 in the base wall 13 and pushing them thereinto until the innermost bent end 18 passes completely through the slot 23 and springs or snaps over the inner side 27 of the base wall 13 whereupon the prongs become automatically locked in place on the said wall. Thus, the base according to the invention can be assembled, and the electrical connections made to the contact prongs thereof, in a simple, easy and quick manner, without the need of any solder operations whatsoever. The snug fit of the prong legs 15, 16 and their bent ends 18, 19 in the slot 23 and in the groove 24 and aperture 26 serve to rigidly anchor the prongs in place in the wall 13 against lateral movement or wobbling in all directions, while the snug fit of the wall 13 between the opposed shoulders 20, 21 of the prongs serves to lock the prongs in place in the wall against longitudinal movement. The separation between the outer legs 15, 16 of the prongs provides the necessary space for the accommodation therein of the customary protuberances or dimples which are normally provided on the spring contact blades of conventional type sockets or receptacles into which the base or terminal connector according to the invention is adapted to be plugged. In addition, the rounded cross section of the wire of which the prongs 14 are made inherently provides beveled or rounded outer end surfaces on the prongs which therefore serve to facilitate insertion of the prongs between as well as removal from the spring contacts of the socket or receptacle.

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, and a contact prong formed of rigid wire bent into U-shape and securely fastened to said wall with its U-bend outward, the two legs of the prong having laterally bent inner end portions and said wall having a slot therethrough and a groove in its outer face separated from each other and of a width to snugly receive the respective prong legs and their said bent end portions, said slot and groove being disposed at an angle relative to each other of slightly different degree from that of the prong bent end portions whereby the latter are insertable thereinto only upon spring-distortion thereof, and said bent end portions being separated longitudinally of the prong a distance to snugly receive the said wall therebetween to thereby lock the prong longitudinally in place upon insertion of the innermost one of said bent end portions completely through the said slot.

2. An electrical connector comprising a body member provided with an insulative wall, and a contact prong formed of rigid wire bent into U-shape and securely fastened to said wall with its U-bend outward, the two legs of the prong having laterally bent inner end portions extending transversely relative to each other and said wall having a slot therethrough and a groove in its outer face separated from each other and of a width to snugly receive the respective prong legs and their said bent end portions, said slot and groove being disposed at an angle relative to each other of slightly different degree from that of the prong bent end portions whereby the latter are insertable thereinto only upon spring-distortion thereof, and said bent end portions being separated longitudinally of the prong a distance to snugly receive the said wall therebetween to thereby lock the prong longitudinally in place upon insertion of the innermost one of said bent end portions completely through the said slot, at least a portion of the outermost one of said bent end portions extending in the general direction of the length of and in a plane including the associated prong leg.

3. An electrical connector as set forth in claim 2 wherein the outermost one of the prong bent end portions is bent back at an acute angle to the associated prong leg and is provided with an inwardly extending offset end parallel to the associated prong leg, said wall portion having an aperture therethrough communicating with said groove and snugly receiving the said inwardly extending offset end of the outermost bent end portion of said prong.

4. An electrical connector as set forth in claim 3 wherein the inner end of one of said prong legs is doubled back upon itself to form the innermost one of said bent inner end portions.

5. An electrical device having a terminal connector comprising a body member provided with an insulative wall, a contact prong formed of rigid wire bent into U-shape and securely fastened to said wall with its U-bend outward, the two legs of the prong having laterally bent inner end portions spaced apart longitudinally of the prong and engaging opposite sides of said wall to lock the prong in place thereon against longitudinal movement, said wall having a slot therethrough and a recess therein snugly receiving portions of respective ones of said prong legs to firmly support the prong in place in said wall against transverse movement in planes at approximately right angles to each other, the bent inner end portion of one of said prong legs being insertable through said slot from one to the other side of said wall, said wall further having an aperture therethrough communicating with the said recess, and a current conductor extending outwardly through said aperture and said recess and wedged in the said recess by the prong leg therein to thereby electrically connect the prong to said conductor.

6. An electrical device having a terminal connector comprising a body member provided with an insulative wall, a contact prong formed of rigid wire bent into U-shape and securely fastened to said wall with its U-bend outward, the two legs of the prong having laterally bent inner end portions spaced apart longitudinally of the prong and extending transversely relative to each other and said wall having a slot therethrough and a groove in its outer face separated from each other and of a width to snugly receive at least a portion of the respective prong legs, said slot and groove being disposed at an angle relative to each other of slightly different degree from that of the prong bent end portions whereby the latter are insertable thereinto only upon spring-distortion thereof, and said wall being locked between said bent end portions to thereby longitudinally fix the prongs in place thereon,

said wall further having an aperture therethrough communicating with said groove and aligned with the prong leg extending thereinto, and a current conductor extending outwardly through said aperture and bent around the outer side of said wall and back into said slot and wedged against the walls of said groove by the prong leg therein to thereby electrically connect the prong to said conductor.

7. An electric lamp comprising a bulb, a light source in said bulb, a pair of lead-in wires electrically connected to said light source and sealed through the wall of said bulb, and a base secured to said bulb and comprising an insulative wall portion having a pair of contact prongs formed of rigid wire bent into U-shape and securely fastened to said wall with their U-bends outward, the legs of each prong being provided with lateral inner end portions extending transversely relative to each other and the said wall having grooves in its outer face for snugly receiving at least a portion of one of the lateral end portions of respective prongs and slots therethrough for passage of the other lateral end portion of respective prongs and adapted to snugly receive the associated prong leg, the groove and slot for each prong extending at an angle relative to each other of slightly different degree from that of said lateral prong end portions whereby the latter are insertable into the said groove and slot only upon spring-distortion thereof, said insulative wall having apertures therethrough communicating with respective ones of said grooves and said wall being snugly locked between the said lateral prong end portions of the prongs to longitudinally fix them in place on said wall, and said current conductors extending through said apertures into respective ones of said grooves and being tightly wedged in the said grooves by the respective prong legs therein to thereby electrically connect the said conductors to respective prongs.

8. A contact prong for a lamp base or similar device, said prong comprising a length of rigid wire bent into U-shape to form two separated side-by-side leg portions having laterally bent free end portions located at different distances from the closed end of the prong to form longitudinally spaced shoulders thereon, said bent end portions extending laterally outward from the respective prong legs in transverse relation to each other.

9. A contact prong for a lamp base or similar device, said prong comprising a length of rigid wire bent into U-shape to form two separated side-by-side leg portions, the free end of one of said prong legs being bent back upon itself to the outward side of the prong leg to form an open hook end having its end extremity facing toward the closed end of the prong, and the free end of the other prong leg being bent back upon itself at a point nearer the closed end of the prong than the end extremity of said hook end and extending in a direction to the outward side of and at an acute angle to the prong leg and transverse to the said hook end to form an angular bent end, said angular bent end having its free end bent back in the direction of the open end of the prong and parallel to the prong leg to form a laterally offset portion thereon.

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