United States Patent

[11] 3,617,984

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[54] SOCKET FOR ELECTRIC LIGHT BULBS
5 Claims, 12 Drawing Figs.

[52] U.S. Cl. ..... 339/61 L, 339/99 L, 339/128, 339/176 L
[51] Int. Cl. H01r 13/48
[50] Field of Search 339/59–61, 97, 91, 99, 128, 176

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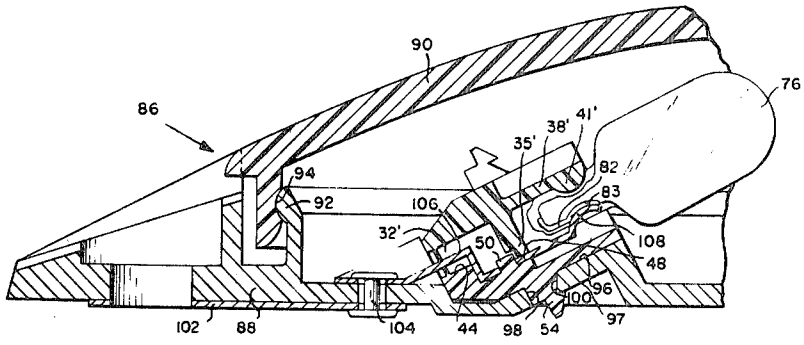
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Primary Examiner—Joseph H. McGlynn
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ABSTRACT: A molded plastic socket for special bulbs of the type having a glass base around which are bent loops of wire comprises a pair of identical molded plastic elements arranged to interlock with each other. A flexible plastic arm forming part of each of the two socket members cooperates with a metal clip mounted in the opposite socket member to hold the bulb in place and to deliver electric current to operate the bulb. Wire may be connected to the metal clips by insulation-piercing elements formed in clips.



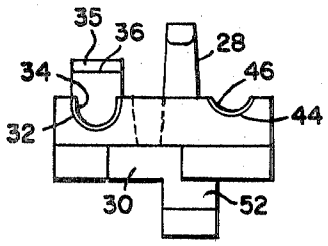


FIG. 2

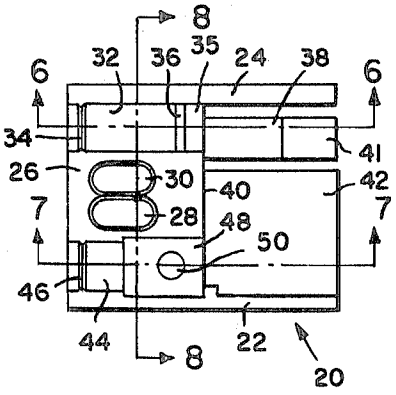


FIG. 1.

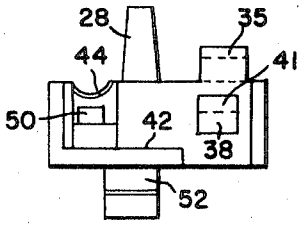


FIG. 3.

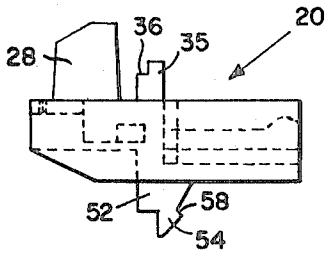


FIG. 4.

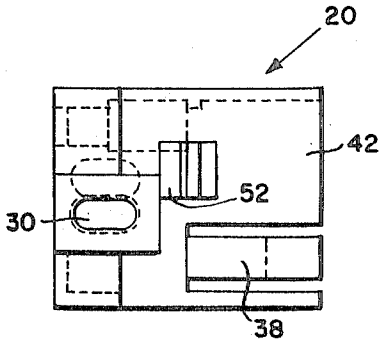


FIG. 5.

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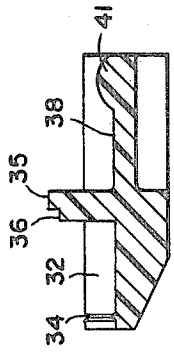


FIG. 6.

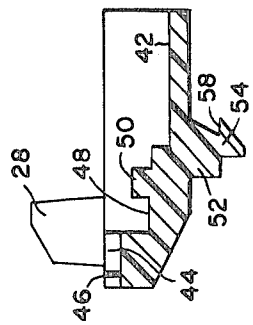


FIG. 7.

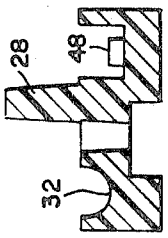


FIG. 8.

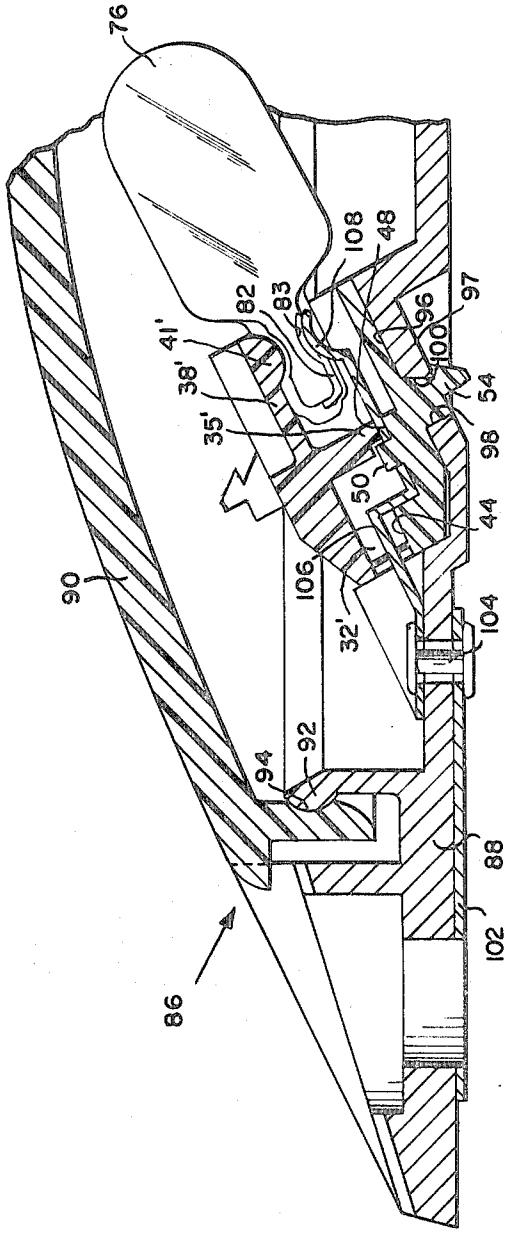


FIG. 9.

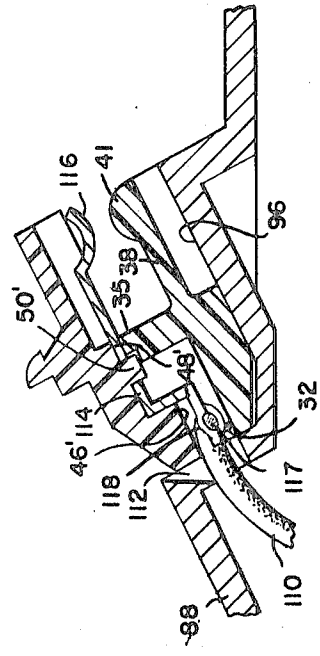


FIG. 10.

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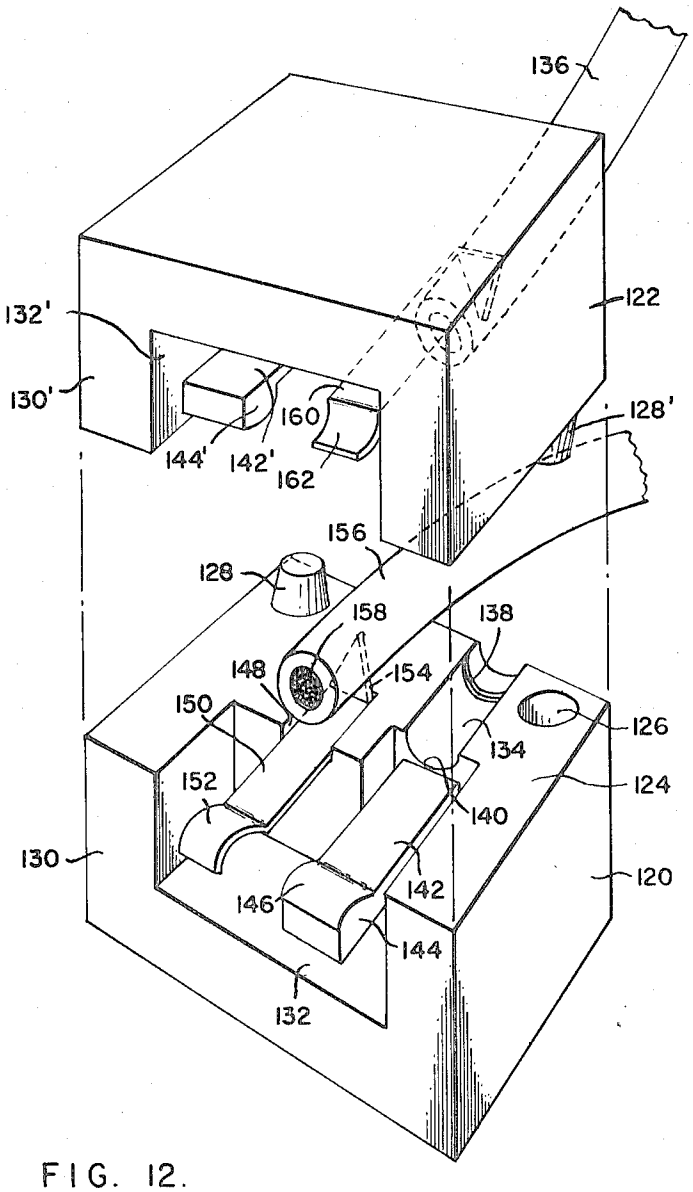


FIG. 12.

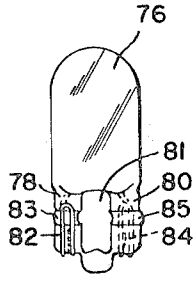


FIG. 11.

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SOCKET FOR ELECTRIC LIGHT BULBS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application discloses subject matter claimed in my copending application Ser. No. 862,689, filed Oct. 1, 1969, and in my copending Design application Ser. No. 19,369, filed Oct. 1, 1969.

BACKGROUND OF THE INVENTION

This invention relates to sockets for electric light bulbs, and particularly to sockets specially adapted to accommodate miniature incandescent bulbs of the type having, instead of a screw or bayonet-type base, a glass base formed in the molding of the bulb envelope. Electrical contacts for such bulbs are provided by loops of wire, which are connected to the filament, and which are bent around the glass base.

Such bulbs are quite inexpensive, but heretofore, sockets for them have been so expensive as to be commercially incompatible with the bulbs.

SUMMARY OF THE INVENTION

In accordance with this invention, a socket consists of two identical mating parts, each of which is a solid piece of molded plastic. Each of the socket parts has an integrally molded flexible finger with a rounded end, the finger being arranged to cooperate with a metal clip mounted in the opposite half of the socket to secure the bulb in place.

The socket may be provided with a tapered projection for mounting it within a lamp.

The metal clips may be provided with means for puncturing the insulated cover of a wire in order to make electrical contact with the wire, and also to hold the wire in place.

The principal object of the invention is to provide a socket which supports a bulb in a secure manner; which is composed of a minimum number of parts; which is inexpensive to manufacture; and which is provided with means for mounting it securely in a lamp.

A further object is to provide simple and secure means for making electrical contact between supply wires and electrical contacts within the socket.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of one of the two identical parts of a socket in accordance with the invention;

FIG. 2 is an elevation of the left-hand side of FIG. 1;

FIG. 3 is an elevation of the right-hand side of FIG. 1;

FIG. 4 is an elevation of the bottom of FIG. 1;

FIG. 5 is a plan view of the opposite side of the socket half shown in FIG. 1;

FIG. 6 is a section taken on the plane 6—6 in FIG. 1;

FIG. 7 is a section taken on the plane 7—7 in FIG. 1;

FIG. 8 is a section taken on the plane 8—8 in FIG. 1;

FIG. 9 is a section of a fragmentary part of a lamp showing the manner in which a socket is mounted in the lamp base, and showing the manner in which a bulb is mounted in the socket;

FIG. 10 is a section of the socket taken on a plane parallel to and behind the plane in which FIG. 9 was taken;

FIG. 11 is an elevation of a bulb of the type for the mounting of which the socket is suitable; and

FIG. 12 is an exploded view in perspective of a different embodiment of the socket, in which the metal contacts are provided with wire-piercing projections.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring particularly to FIG. 1 and to FIGS. 2–8, which represent different views of the structure of FIG. 1, a socket half is generally indicated at 20. Socket half 20 is a solid piece of molded plastic having sidewalls 22 and 24 disposed opposite each other. A surface 26, which is disposed between the walls, and which faces upwardly, has located side by side thereon a tapered pin 28 and a tapered hole 30. The pin 28 and hole 30 are preferably dimensioned so that an identical

pin and hole on an opposite socket half can mate respectively with hole 30 and pin 28. The engagement of pins and holes of the opposite socket halves holds the socket halves together by the frictional fit of the pins in the holes. When the socket halves are together, a surface on the opposite socket half corresponding to surface 26 will preferably come into contact with surface 26, and the edges of walls 22 and 24 will also come into contact with corresponding edges of their counterparts on the opposite socket half.

Surface 26 is separated from wall 24 by a channel 32, which has, throughout most of its length, a cross section which is in the form of a circular arc subtending an angle slightly greater than 180°. A circular ridge is formed at 34 in the channel 32. The function of the circular ridge is to aid in holding an electrical supply wire in place, although sometimes it may not be used.

At the opposite end of channel 32, there is provided a projection 35, which is used to hold a metal clip mounted in the opposite socket half in place. Projection 35 is provided with a step 36 which does not extend as far outwardly from the channel 32 as does the end of projection 35. A flexible, resilient finger 38 extends in a direction parallel to walls 22 and 24 and between the walls, from surface 40, which is a surface on the portion which connects the walls, and which is mutually perpendicular to surface 26 and the faces of the walls. Finger 38 is provided with a transverse projection 41, which is cylindrical in form, as best shown in FIG. 6, so that it provides a detent for a depression formed in the lamp base as will be apparent from subsequent description.

Integrally molded with wall 22, a bottom wall 42 extends transversely from wall 22 to a position approximately halfway between the walls. This leaves an opening underneath resilient finger 38 which facilitates formation of the socket half.

A channel 44, which is similar to channel 32 is provided adjacent wall 22. Channel 44 is cylindrical, and subtends an angle which is supplementary to the angle subtended by channel 32 so that, when two identical socket halves are put together, the cooperating channels form complete circular, cylindrical passages.

A ridge 46 is provided in channel 44 at a position such that it will cooperate with a ridge corresponding to ridge 34 on an opposite socket half to form a complete circular ridge.

At the opening of panel 44 which faces the interior of the socket assembly, there is a depression 48, on the surface of which there is molded a cylindrical projection 50. Projection 50 is provided in order to support an electrical conductor against sliding movement on the surface of depression 48.

In FIG. 4, there is shown a tapered projection 52, which extends downwardly from wall 42. This projection is for the purpose of mounting the socket assembly. A flexible tip projection 54 has a retaining surface 58. The functions of the retaining surface 58 will be apparent from the following description with reference to FIG. 9.

Before describing the assembled socket, reference should be made to the drawing of the bulb 76 in FIG. 11, since the socket is designed to accommodate this particular form of bulb.

Bulb 76 has a molded glass base consisting of flattened parts 78 and 80, which are separated by a larger thickness of glass at 81. Each of members 78 and 80 has extending through it a conductor, which terminates in a wire loop. Wire loop 82 is bent around in one direction so that it lies along and in front of member 78, as it is shown in FIG. 11. Wire loop 84 is bent around and behind element 80. Members 78 and 80 are respectively provided with transversely extending depressions 83 and 85 for cooperation with the mounting members in the socket. Similar transverse depressions are provided on the opposite side of the bulb, as will be apparent from FIG. 9. Reference should now be made to FIGS. 9 and 10, in which the assembled socket is shown supported in a marker lamp housing 86.

Marker lamp housing 86 consists of a base 88, and a lens 90 which is supported by the cooperation of detent 92 on the

base with a groove 94 in the sidewalls of the lens. Base 88 is provided with an oblique surface 96, in which there is provided a tapered opening 98. When the projection 52 is inserted into the tapered opening, projection 54 is forced backwardly, permitting movement of projection 52 into the tapered opening. When the projection 52 is completely inserted, projection 54 clears the tapered opening 98, and snaps forwardly so that surface 58 engages the oblique side 97 of the base opposite oblique surface 96.

Ground electrical contact to one terminal of the bulb 76 is made through conductive strip 102, rivet 104 and contact member 106.

A flexible, resilient metal member 106 is mounted by rivet 104 outside the socket assembly, and extends into the socket assembly through a cylindrical opening formed by channel 44 and a cooperating channel 32' on an upper socket half, which is identical to the lower socket half. Reference numerals in the upper socket half are the reference numerals of the lower socket half primed. Projection 50 extends through a hole in member 106 to prevent member 106 from moving from side to side. Member 35' of the upper socket half holds member 106 securely against depression 48 in the lower socket half to prevent member 106 from moving up or down. Member 106 terminates in a curved contact 108, which makes electrical contact with wire loop 82 and also forces wire loop 82 into transverse depression 83. Contact 108, by cooperating with the wire loop and the transverse depression, acts as a detent for the bulb 76, preventing it from sliding outwardly or inwardly with respect to the socket. End member 41' of flexible finger 38' cooperates with the opposite transverse depression on the base of the bulb to act as a second detent.

The electrical circuit to bulb 76 is completed through a wire 110, which extends through an opening 112 in the base 88. Opening 112 is in a position such that, when the socket assembly is in place, opening 112 comes face to face with an opening of a cylindrical passage formed by channel 32 and channel 46'. Within this channel, the conductive wire 110 is connected to a conducting member 114 by clamping its strands 117 in a loop 118 formed in member 114 near its end. Projection 50' on the upper socket half extends through a hole in member 114, and prevents it from moving from side to side. Member 35 clamps member 114 against surface 48' to prevent up and down movement of member 114. Member 114 terminates at its end in contact 116, which is similar to contact 108 (FIG. 9). Contact 116 connects to wire loop 84 of the bulb, and acts as a detent in that it forces the wire loop into the adjacent transverse depression on the base of the bulb. End portion 41 of finger 38 cooperates with transverse depression 85 to prevent movement of the bulb inwardly and outwardly with respect to the socket assembly.

It will be apparent that the socket halves can be produced in the same mold, and, therefore, very inexpensively. The metal parts 106 and 114 can also be produced very inexpensively. The socket described above has advantages not only in its simplicity, but also in the fact that the opposed plastic fingers and metal contacts insure that the bulb is held securely, and that good electrical contact is maintained with the bulb even under conditions of vibration. Since the metal contact elements and the plastic fingers are both flexible and resilient, any vibration tending to cause one of the elements to deform will also cause the other elements to deform in the same direction. Therefore, secure electrical contact is maintained. In addition, since the retaining elements on both sides of the bulb are all flexible, the deformation of any given element resulting from insertion and removal of the bulb is only slight, and the danger of forcing a retaining element beyond its elastic limit is consequently minimized.

FIG. 12 shows a socket assembly which is similar to the assembly shown in FIGS. 9 and 10, but in which electrical contact is made between the metal contact elements and the external conducting wires in a different manner.

The socket assembly in FIG. 12 consists of a pair of identical molded plastic socket halves 120 and 122. Socket half 120 will be described in detail, and it will be understood that socket half 122 is identical with it in all respects.

Socket half 120 is generally in the form of a rectangular solid. In its upper face 124, it is provided with a tapered hole 126, and a tapered projection 128. Tapered hole 126 is adapted to receive projection 128' on socket half 122. Projection 128 is adapted to fit into a tapered hole in socket half 122.

It will be apparent that, when the socket halves are fastened together by the frictional engagement of the projections and holes just described, the forward face of the completed socket, which will comprise surfaces 130 and 130', will have a rectangular opening formed by openings 132 and 132', into which there can be inserted the base of bulb 76 (FIG. 11).

Surface 124 is provided with a cylindrical channel 134 adapted to receive an insulated wire 136. A ridge 138 is formed in channel 134 to secure the insulated wire 136 in place, the ridge being arranged to compress the insulation of the wire 136 to a small extent.

Adjacent the end 140 of the channel 134, there is provided a flexible, resilient finger 142, which is integrally molded in the socket half 120. Finger 142 is provided with a thickened end portion 144, having a cylindrical configuration at 46 adapted to fit into one of the transverse depressions on the base of the bulb.

Surface 124 is also provided with a rectangular depression 148 adapted to receive and support a flexible, resilient, metallic contact member 150. Member 150 terminates in a curved end portion 152 having a cylindrical configuration adapted to engage a wire loop on the bulb and force the wire loop into an adjacent transverse depression in the base of the bulb.

At the opposite end of member 150, there is formed a pointed triangular element 154, which is bent at a right angle to the main body of element 150. Element 154 constitutes an insulation-piercing contact, which is capable of penetrating the insulation on an insulated multiple-strand wire such as wire 156 to make contact with its conductive strands 158.

Element 150 is not held in place against forward movement otherwise than by virtue of the fact that its triangular end member 154 pierces a wire held in place by a ridge in a channel in socket half 122. It should be noted, however, that a projection similar to projection 50 (FIGS. 1 and 9) might be provided.

The upper socket half 122 has integrally molded therein a flexible, plastic finger 142', having an end portion 144', and is provided with a metal contact member 160 having an end portion 162.

The bulb is held in the socket assembly of FIG. 12 in the same manner as a bulb is held in the socket assembly shown in FIGS. 9 and 10.

It will be apparent that the socket assembly of FIG. 12 might be used for many purposes, and that, depending on its desired use, it could be provided with one or more tapered projections similar to projection 52 (FIG. 4) for mounting in a lamp housing.

In both of the two embodiments of the socket described herein, the bulb can be inserted in either of two possible ways. However, because of the arrangement of contacts 108 and 116 and wire loops 82 and 84, proper electrical contact will be obtained whichever way the bulb is inserted.

I claim:

1. A lamp socket comprising a first flexible resilient metal contact member having a detent, a first flexible, resilient plastic finger having a detent and disposed in such relation to said metal contact member that said detents are opposed to and face each other and so that the resiliency of said contact member and said finger tend to resist the spreading of said detents away from each other, a second flexible, resilient metal contact member having a detent, a second flexible, resilient plastic finger having a detent and disposed in such relation to said second contact member that the detents of said second member and said second finger are opposed to and face each other and so that the resiliency of said second contact member and said second finger tend to resist the spreading of said de-

tents away from each other and a housing comprising first and second identical, interchangeable molded plastic elements, means for fastening said elements together, said first element having said first finger integrally molded with it and said second element having said second finger integrally molded with it, said elements including supporting means for supporting said contact members so that the first contact member is located next to the second finger and so that their detents face in the same direction, said means for supporting contact members also supporting the second contact member so that it is located next to the first finger and so that their detents face in the same direction.

2. A lamp socket comprising a first flexible, resilient metal contact finger, a first flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, a second flexible, resilient metal contact finger, a second flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, and a housing comprising first and second identical, interchangeable molded plastic elements, said first and second plastic fingers being respectively integrally molded with said first and second elements, means for fastening said elements together, and means for supporting said contact fingers in the housing so that the first contact finger is located next to the second plastic finger and so that the second contact finger is located next to the first plastic finger.

3. A lamp socket comprising a first flexible, resilient metal contact finger, a first flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, a second flexible, resilient metal contact finger, a second flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, and a housing comprising first and second identical, interchangeable, molded plastic elements, said first and second plastic fingers being respectively integrally molded with said first and second elements, means for fastening said elements together, means defining surfaces against which said metal contact fingers rest, each said metal contact finger having a sharp insulation-piercing element pointing away from the surface on which it rests, and passage means through which conducting wire can pass from the exterior of said housing to the location of the insulation-piercing elements.

4. A lamp socket comprising a first flexible, resilient metal contact finger, a first flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, a second flexible, resilient metal contact finger, a second flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, and a housing comprising first and second identical, interchangeable molded plastic elements, said first and second plastic fingers being respectively integrally molded with said first and second elements, means for fastening said elements together, means defining surfaces against which said metal contact fingers rest, each said metal contact finger having a sharp insulation-piercing element pointing away from the surface on which it rests, grooves in the mating surface of said identical elements cooperating with each other to define at least one passage through which conductive cable can pass from the exterior of said housing to at least one of said insulation-piercing elements, and means defining a ridge in said passage for clamping the conductive cable to prevent longitudinal movement thereof in said passage.

5. A lamp socket comprising a first flexible, resilient metal contact finger, a first flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, a second flexible, resilient metal contact finger, a second flexible, resilient plastic finger, at least one of said fingers having a detent and said fingers being so disposed with respect to each other that the detent faces the opposite finger and the resiliency of said fingers tends to resist spreading of said fingers away from each other, and a housing comprising first and second molded plastic elements, means for fastening said elements together, means for supporting said plastic fingers in said housing and for supporting said contact fingers in said housing so that the first contact finger is located next to the second plastic finger and so that the second contact finger is located next to the first plastic finger and a projection extending outwardly from at least one of said molded plastic elements, said projection having a first portion tapered so that the transverse cross-sectional area decreases with increasing distance from the said element, and a detent at the outermost end of said first portion, said detent being resiliently mounted and having a detent surface facing the said element for engaging an edge of an opening in a supporting element through which said first position extends.

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