

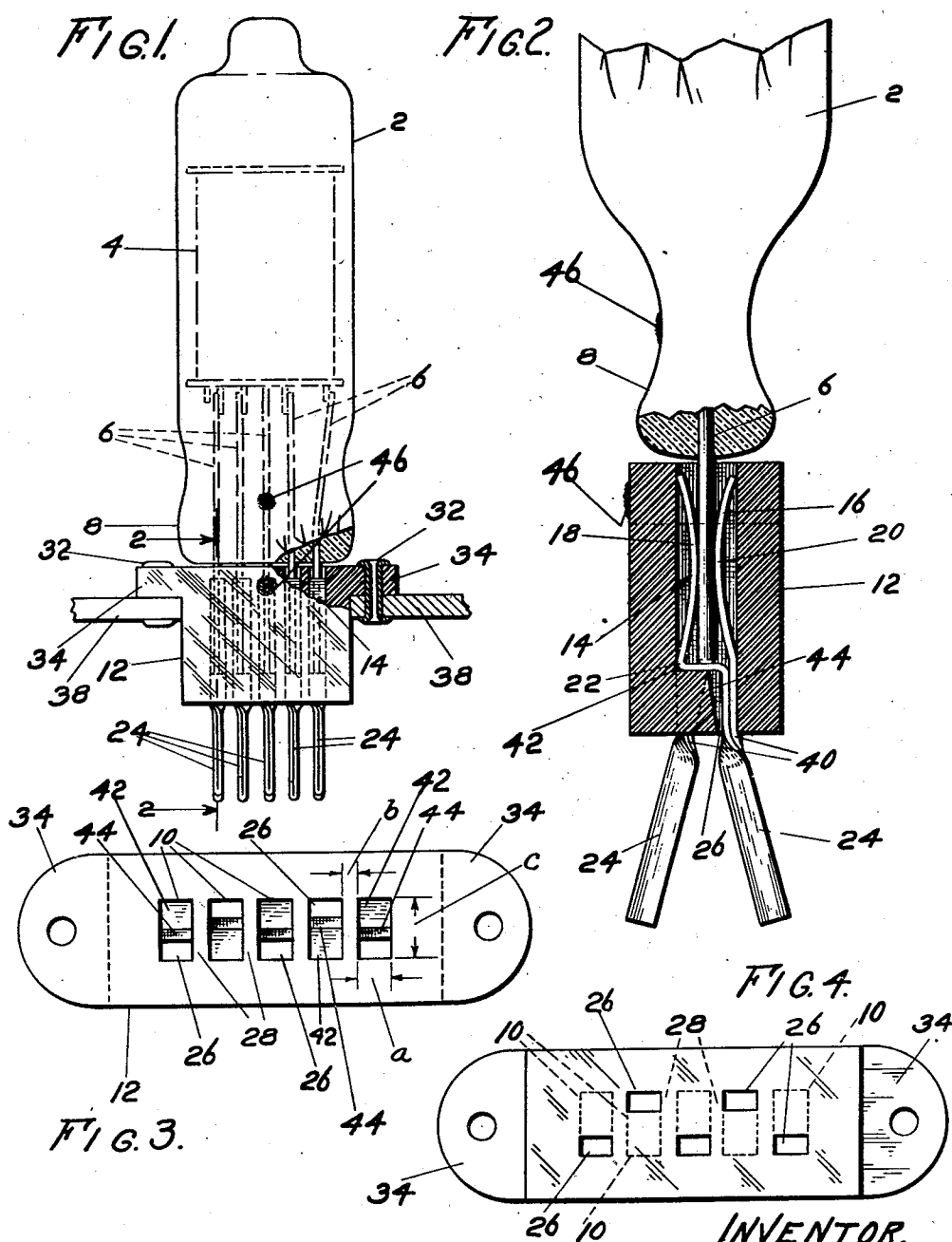
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ELECTRICAL SOCKET

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ELECTRICAL SOCKET

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This invention relates to electron discharge tubes and more particularly to tubes of small dimensions such as are used in small portable devices, pocket radios and hearing aids, for example, which are intended to be carried on the person.

Heretofore, the lead-in conductors of the tube were attached to the device in which it is used by soldering them directly to the corresponding connections in the device. This required considerable care and was a slow process.

One of the objects of the present invention is to provide means whereby this operation is greatly facilitated and expedited.

Another object of the present invention is to increase the leakage path between adjacent leads.

A further object of the present invention is to provide a socket for electron discharge tubes of the general type referred to which shall be able to resist any strains without objectionably increasing the size thereof.

These and such other aims and objects of the present invention as may hereinafter appear will be best understood from the following description, taken in connection with the accompanying drawing, of an embodiment of the invention herein given for illustrative purposes.

In the drawing:

Fig. 1 is a front elevation, upon a considerably enlarged scale, of a space discharge tube provided with an illustrative embodiment of the present invention;

Fig. 2 is a section on line 2-2 of Fig. 1, upon a considerably enlarged scale, and showing the lower portion of the tube above in side view;

Fig. 3 is a top plan view, on a considerably enlarged scale, of the socket with the contact elements removed for the sake of clearance; and

Fig. 4 is a view, on a considerably enlarged scale, of the under surface of the socket with the contact elements removed, showing the staggered relation of the openings therein.

In the drawing there is diagrammatically represented, by way of illustration, a space discharge tube of the small type referred to comprising an envelope 2 containing a conventional electrode assembly, diagrammatically indicated at 4. Lead-in wires 6 for the electrode assembly 4, sealed through the flat exterior press 8 of said tube, project from said press 8, the projecting portions of said lead-in wires being inserted in aligned openings 10 provided in a socket 12 made of plastic or other suitable electrically non-conductive material. When thus inserted in said aligned openings 10, said lead-in wires contact

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with conductors 14 provided in said socket. Said conductors 14 are preferably made of a relatively thin, resilient, continuous band of electrically conductive material, such as beryllium copper or Phosphor bronze, for example, said band being bent back upon itself, substantially as shown in Fig. 2, so as to form two contact arms 16 and 18, curved into close proximity to each other at 20 (see Fig. 2), said contact arm 18 being offset or bent substantially at right angles toward the contact arm 16 at 22 and extending downwardly substantially parallel to and adjacent to the downwardly extending prolongation of the contact arm 16, so as to form with the latter a soldering lug 24 for soldering to the proper connection in the device in which the tube is used. When said conductors 14 are mounted in said socket, said soldering lugs 24 project from the bottom wall of said socket through openings 26 (see Fig. 4), the portions of said conductors 14 within said socket being separated from each other by parallel partitions 28, the portions of said conductors within said socket being thus contained in separate chambers.

The socket fits into an opening provided in the chassis of the device in which it is to be used and is secured in place by suitable means, herein illustratively consisting of rivets 32 extending through holes provided in ears 34 projecting laterally from the upper edge of said socket, and through corresponding holes provided in the panel 38 of the device in which the tube is to be used, said ears 34 resting upon said panel 38.

Means will preferably be provided for preventing said conductors 14 from working or slipping up out of said socket. Any suitable means may be used for this purpose. In the present illustrative embodiment of this invention the soldering lugs 24 are twisted about their longitudinal axis through an angle of substantially 90° at the point where they emerge from the bottom wall of said socket. The shoulder 40 thus formed on each conductor, by its engagement with the edge of the opening 26 in the bottom wall of the socket, prevents longitudinal displacement of the conductor. The openings 26 are preferably staggered, so that when said conductors 14 are in place in said socket, their soldering lugs 24 will project in staggered relation from the bottom wall of said socket, the soldering lugs of alternate conductors 14 forming one line and those of the intervening conductors 14 forming the other line. When the lead-in wires 6 are inserted in said aligned openings 10 of said socket, they are firmly clamped between said contact arms 16 and 18.

and their ends will rest upon the substantially horizontal portion 22 of said contact arm 18, thus determining the position of the tube.

The corner of the wall 42, upon which the horizontal portion 22 of the arm rests, will preferably be beveled as shown at 44 to facilitate the insertion of the soldering lug 24 into the opening 26.

Heretofore the use of a socket with the small type of tube with which the present invention is chiefly concerned was deemed impracticable owing to the larger socket that it was thought would be necessary. This was largely due to the fact that stiff and thicker lead-in conductors were used, which required larger openings in the socket for their insertion, and relatively thick partitions between said openings to enable said partitions to withstand the strain put upon them when inserting said stiff lead-in conductors in said openings, or strains caused by sudden shocks or the like administered to the structure in a direction transversely to said partitions.

The present invention overcomes these objections without objectionably increasing the size of the socket, by using flexible, thin lead-in wires, which require smaller openings in their insertion in the socket, and also yield or flex readily responsive to any resistance that may be offered by said partitions to their insertion in said openings, or responsive to any sudden shocks administered to the structure particularly in a direction transversely to said partitions so that thinner partitions can be used without risk of injury to said partitions. I have found that a thin partition can resist any transverse strains to which it may be subject providing the length does not exceed about five times its thickness. It is also preferable that the thickness of the partition be less than the width (a) of the chambers bounded thereby. Using a lead-in wire about 0.016 to 0.025 inch in diameter, the thickness (b) (see Fig. 3) of the partition may be about 0.015 inch to 0.025 inch and the length (c) of the partition may be about 0.040 inch to 0.125 inch.

Any pressure that might be exerted by the spring contact arms 16 and 18 will be exerted upon the thicker outer walls 12 of the socket and not on the thin partitions.

Polarizing means, such as the marks indicated at 46 in Fig. 1, for example, will preferably be provided upon the socket and upon the press in such positions that they will be in vertical alignment when the press and the socket are properly positioned relatively to each other for insertion of the projecting lead-in wires 6 into the proper corresponding openings 10 in the socket.

It will be apparent that the insertion of the flexible lead-in conductor 6 into the aligned openings 10 in the socket can be effected much more expeditiously and easily than the laborious soldering of the lead-in wires to the correct connections in the device in which the tube is to be used, as has heretofore been customary. The time saving thus effected materially reduces the cost of production. Staggering the soldering lugs 24 increases the thickness of the socket material not only between the lugs in the same line but also between the lugs in one line and those in the other line, and this not only adds strength to the socket but also increases the leakage path between each lug and those in both lines adjacent thereto. This leakage path is further increased by the fact that the contact arms 16 and 18 terminate short of the upper surface of the

socket, within the recesses in which they are located (see Fig. 2).

I am aware that the present invention can be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present description to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the aforesaid description to indicate the scope of the invention.

What is claimed is:

1. An electrical socket comprising a body of insulating material, said body having a plurality of aligned passages extending partially there-through, said passages having prong-receiving portions of rectangular transverse section, contact elements, one for each of said passages, each contact element being slidable into said one of said passages from the prong-receiving end thereof, said passages having restricted openings at the ends thereof opposite said prong-receiving ends, said openings each forming a continuation of its corresponding passage and extending within the confines of the projection of the walls of said passage, alternate of said openings being positioned to one side of a common plane through said passages and the intervening openings being positioned on the opposite side of said plane, said contact elements each having a projecting portion extending through one of said openings and a portion abutting an interior end wall of said prong-receiving portion of its corresponding passage, said projecting portions providing connector lugs and being deformed at the outer end of said openings to secure said contacts against movement in the direction of the prong-receiving end of said passages.

2. An electrical socket comprising a body of insulating material, said body having a plurality of aligned passages extending partially there-through, said passages having prong-receiving portions of substantially uniform cross-sectional area, contact elements, one for each of said passages, each contact element being slidable into said one of said passages from the prong-receiving end thereof, said passage each having an opening in the end thereof opposite said prong-receiving end, said opening being of lesser cross-sectional area than the cross-sectional area of said passage and each forming a continuation of its corresponding passage and extending within the confines of the projection of the walls of said passage, alternate of said openings being positioned to one side of a common plane through said passages and the intervening openings being positioned on the opposite side of said plane, said contact elements each having a projecting portion extending through one of said openings and a portion abutting an interior end wall of said prong-receiving portion of its corresponding passage, said projecting portions providing connector lugs and being deformed at the outer end of said openings to secure said contacts against movement in the direction of the prong-receiving end of said passages.

3. An electrical socket comprising a body of insulating material, said body having a plurality of aligned passages extending partially there-through, said passages having prong-receiving portions of rectangular transverse section, contact elements, one for each of said passages, each contact element being slidable into said one of said passages from the prong-receiving end thereof, said passages having restricted rectangular

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openings at the ends thereof opposite said prong-receiving ends, said openings each forming a continuation of its corresponding passage and extending within the confines of the projections of the walls of said passage, alternate of said openings being positioned to one side of a common plane through said passages and the intervening openings being positioned on the opposite side of said plane; said contact elements each having a projecting portion extending through one of said openings and a portion abutting an interior end wall of its corresponding passage, said projecting portions providing connector lugs and being deformed at the outer end of said openings to secure said contacts against movement in the direction of the prong-receiving end of said passages.

4. An electrical socket comprising a body of insulating material, said body having a plurality of aligned passages extending partially there-through, said passages having prong-receiving portions of rectangular transverse section, said passages being separated by flat partitions, contact elements, one for each of said passages, each contact element being slidable into said one of said passages from the prong-receiving end thereof, said contact elements each including two opposed resilient contact arms curved into close proximity to each other and bearing upon the side walls of said passages in directions transverse to said partitions, said passages having restricted rectangular openings at the ends thereof opposite said prong-receiving ends, said openings each forming a continuation of its corre-

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sponding passage and extending within the confines of the projections of the walls of said passage, alternate of said openings being positioned to one side of a common plane through said passages and the intervening openings being positioned on the opposite side of said plane, said contact elements each having a projecting portion extending through one of said openings and a portion abutting an interior end wall of its corresponding passage, said projecting portions providing connector lugs and being deformed at the outer end of said openings to secure said contacts against movement in the direction of the prong-receiving end of said passage.

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