April 27, 1954 E. E. RITTER 2,677,116

ELECTRONIC TUBE SOCKET

Filed March 21, 1950

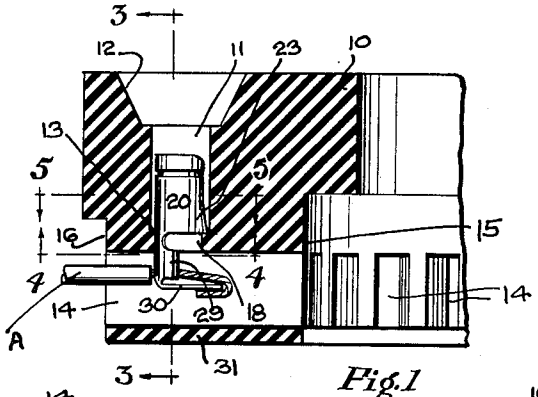


Fig. 1

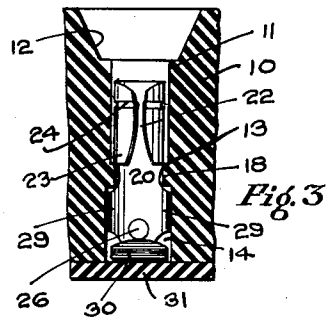


Fig. 3

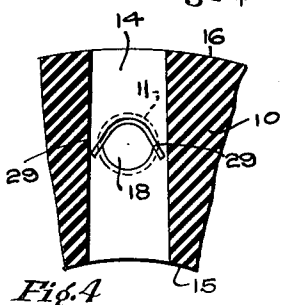


Fig. 4

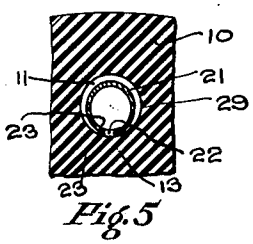


Fig. 5

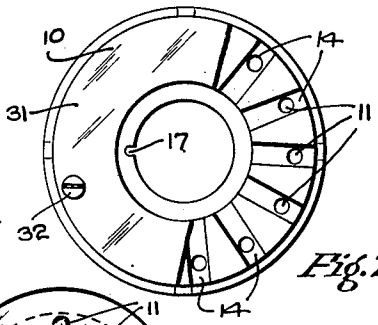


Fig. 2

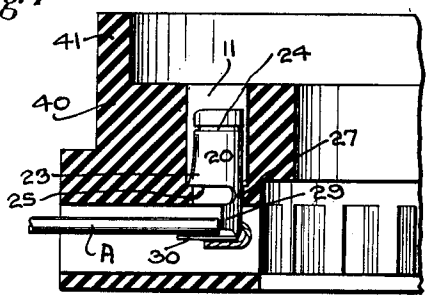


Fig. 9

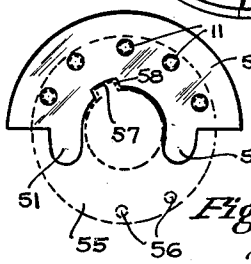


Fig. 10

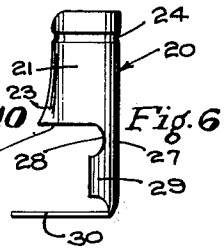


Fig. 6

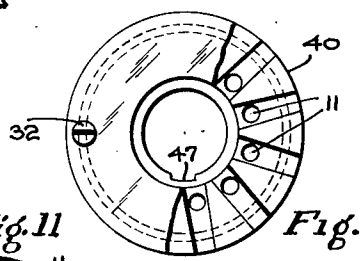


Fig. 7

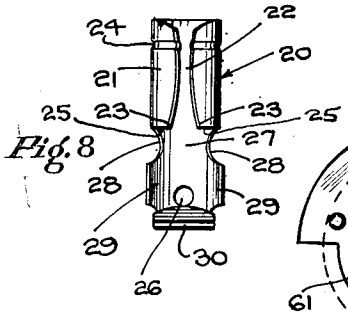


Fig. 8

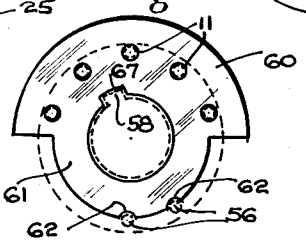


Fig. 11

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ELECTRONIC TUBE SOCKET

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2 Claims. (Cl. 339—64)

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This invention relates to connectors and more particularly to an improvement in tube sockets of the type used in electronic apparatus.

One of the principal objects of the invention lies in the provision of a moulded tube socket having separate socket-like contacts which are easily assembled by snapping them into place in openings in the body of the socket and which once assembled are permanently locked against removal and against displacement by withdrawal or insertion pressures of a tube.

Another object of the invention resides in the provision of socket-like contacts adapted to seat within openings in a female connector, which when assembled and locked into the openings are floatingly supported in order that they may adjust themselves to variations in position and alignment of contact prongs carried by a tube insertable in the connector.

A still further object of the invention is to provide a female connector with unessential portions eliminated to save material; which shall be inexpensive to make and assemble; and in which the insulating portions thereof may be fabricated by plastic moulding operations, while its metal contacting and connecting portions may be fabricated by simple punching and forming to avoid costly machining operations.

These and still further objects of the invention will become more apparent from the description to follow of certain preferred embodiments which have been selected for illustrative purposes and shown in the appended drawings, in which:

Figure 1 is a sectional view of part of a female connector taken through one of the socket openings and showing in side elevational view a contact element assembled therein;

Figure 2 is a bottom view of the connector shown in Figure 1 with a portion of its bottom cover removed;

Figure 3 is a partial sectional view taken on line 3—3 of Figure 1 showing a complete contact in elevation;

Figure 4 is a partial view as taken on line 4—4 of Figure 1;

Figure 5 is a sectional view of part of the connector as taken on line 5—5 of Figure 1;

Figure 6 is a side elevation of the contact element;

Figure 7 is a bottom view similar to Figure 2 of a modified female connector;

Figure 8 is an elevational view of the contact element taken at 90° to the view shown in Figure 6;

Figure 9 is a sectional view similar to Figure 1 showing the modified connector of Figure 7;

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Figure 10 is a top plan view of a modified female connector showing the outlines of the mating tube base in dotted lines; and

Figure 11 is a top plan view similar to Figure 10 showing still another modified connector.

Referring now to the drawing, an improved socket connector 10, primarily intended for use with the picture tube of a television set, is shown as comprising an annular body of substantial thickness and having a plurality of tubular openings 11 extending therethrough, the axis of the openings being spaced about a circle concentric with the annulus. The entrance end or mouth of each opening 11 communicates with a frusto-conical seat 12 which is adapted to receive and properly position a mating portion of the tube base so as to center the male contact prong in the opening 11. The opposite end of each opening 11 communicates with a radial slot 14 which extends entirely across the full width of the annulus, i. e., edge 15 to the peripheral edge 16 thereof. A key slot 17 is provided in the inner edge 15 for reception of a key carried by the tube to insure only one relative position for insertion of the tube base into the connector. Formed in each opening 11 adjacent its lower end is an annular shoulder 13 from which extends a restricted bore 18 of fixed length.

A plurality of contact elements 20 are respectively adapted to be received in the openings of the socket 10, each of these elements being shaped and formed of sheet metal into the configuration best shown in Figures 6 and 8. It will be noted that each contact includes a rolled or barreled portion 21 of generally cylindrical form having a longitudinally extending slit 22 in its wall to provide resiliency for compression and snap-in assembly and for spreading upon insertion of a contact prong. The lower end of the barrel portion 21 of each contact 20 is flared outwardly, as at 23, and so dimensioned as to permit the contact to be snapped into locked engagement within its accommodating bore 18 formed in the body of the connector 10. In this connection, it will be noted that when the contact is snapped into its accommodating bore 18, the lower edges 25—25 of the flared portions of the slit barrel portion thereof rest on the shoulder 13 with the barrel portion 21 fitting loosely in the opening 11, thereby permitting said barrel portion to freely aline itself with the prong of the tube as it is projected into the contact.

Inwardly pressed into the wall of barrel portion 21 is an annular groove 24 which provides a line of great pressure contact on the surface of a mating contact prong. Below the barrel por-

tion 21 is a neck 27 defined by opposed notches 28 each of a predeterminedly fixed length only slightly greater than the axial length of the restricted bore 18 at the lower end of each opening 11. Below the neck portion 27 are two outwardly flared, relatively rigid wing portions 29—29 the outer free edges of which are spaced apart a distance somewhat greater than the diameter of the restricted bore 18. A hole 26 is punched centrally of the wings for reception of a conductor wire. Below the wing portions 29—29 is a tail or terminal portion 30 which is preferably bent at right angles to the axis of the contact element 20.

The contact elements 20 are each readily and easily assembled into the connector 10 by projecting the barreled portion 21 thereof upwardly through the restricted bore 18 for seating engagement within the opening 11, the lower extremities of the flared portions 23—23 of said barreled portion being initially compressed to permit their passage past the shoulder 13 following which they expand to their normal unflexed state to present their lower edges 25—25 in seating engagement upon the upper edge of said shoulder 13. When inserted to this extent the contact will occupy the position shown in Figures 1 and 3 and will be locked in place with the opposed notches 28—28 thereof in embracing relation with respect to the lower reduced diameter bore 18 of the opening 11. Displacement of the contact by axial insertion or withdrawal pressures of a tube prong is now effectually precluded since the upper edges of the wing portions 29—29 abut the bottom end of the wall of the bore 18 to prevent upward displacement, while the lower edges 25—25 of the flared portion 21 of the barrel contact abut the upper end of the wall of said bore 18 to prevent its downward displacement from the connector body.

When thus axially locked in position the upper end of the contact 20 is free to move slightly in all lateral directions within the mouth of opening 11 since its diameter is slightly smaller. The contact, thus floatingly received in the connector opening, can tilt slightly in all directions as well as spread to receive the tube prong contact centrally therein, and thereby compensates for slight variations in the position and alignment of the prong arising from manufacturing tolerance or bent tube prongs.

The bent tail portion 30 of the contact along with the wing portions 29—29 are positioned in the radial slot 14 for lateral access by the conductor A. Since the width of the terminal portion 30 corresponds rather closely to that of the slot 14 rotation of the contact 20 in the opening 11 is prevented. The angled position of the tail portion 30 also facilitates the connection and soldering of the conductor thereto either before or after the contact 20 is inserted into opening 11. In its application to the base of a television picture tube the connector would be secured to the tube and held in the open away from the chassis of the set. In such case the wiring may be suitably run into the connector through the radial slots 14 and connected to the contact tails at right angles to the contact as shown. The annular cover plate 31, suitably formed of insulating material, is then attached to close the rear of the connector by any desired securing means, screw 32 being shown for this purpose.

The modified connector 40 shown in Figures 7 and 9 is in all respects similar to the connector of Figure 1, differing only in the number of openings 11 provided in the annular body, in the shape of key way 47, and in the elimination of the seat portions for centering the mating tube prongs, an upstanding annular peripheral ring 41 being provided instead for this purpose. The same contact elements 20 previously described are employed in connector 40 and are secured against axial displacement by means identical with that previously described.

Figure 10 illustrates another modified form of socket connector, which is particularly adapted for use with a television picture tube having a number of prongs omitted and in which the tube base is provided with a plurality of "live" prongs and several "dead" prongs. For such application it is desirable to save material by providing a cut away socket connector as shown at 50 in Figure 10. Connector 50 is semi-annular in shape and provided with openings 11 containing contacts 20 identical with those previously described. A key slot 57 is also formed in the central portion of the connector for receipt of key 58 on the base 55 of the tube. One or more projections 51—51 extend outwardly from the semi-annulus in overlapping position to a circle which contains the inner edges of openings 11. These projections are so dimensioned with respect to the spacing between tube prongs as to engage a prong and prevent assembly when the tube is improperly presented. It will be noted that the tube base 55, outlined in dotted lines, can be assembled to connector 50 in only two relative positions, one being the proper position with the key 58 engaged in the key-way 57. The only other position permitting insertion is that with the tube base rotated 180° from its position as shown in dotted lines, the key 58 being then clear of the annulus 50 and its projections 51, and the "dead" pins 56 being then disposed for entry in two of the openings 11. However, in such condition it would soon become apparent that the tube had been improperly inserted and no harm would result since the circuit connected pins are "dead" and the "live" pins are unconnected.

Figure 11 illustrates another modified connector 60 which is similar to connector 50 and cut away for the same purpose. In place of the projections 51—51 connector 60 is provided with a semi-circular projection 61 which completes the circumference of a central ring. A positioning key slot 67 is formed internally of the ring for reception of tube key 58. In the outer periphery of projection 61 are two semi-circular notches 62—62 which partially receive and position the two "dead" pins 56 of the tube. It will be really understood that connector 60 can be assembled to a tube in only one relative position, which is the correct one, with the live prongs inserted into the openings 11 and the dead prongs positioned in recesses 62—62.

It will be obvious to those skilled in the art that many modifications may be made in the size, shape, form, and materials of the connector of this invention. As an example, the contact terminal portions 30 may be made with a variety of shapes, and may be bent at various angles for right angle or axial connection of the wiring. It is, therefore, desired that the invention not be restricted to the specific embodiments which have been described for illustrative purposes only, but that it be limited only by the scope and spirit of the appended claims.

What is claimed as new and useful is:

1. An electronic tube socket comprising a moulded body of insulating material having a plurality of contact-receiving through openings

formed therein, each of said through openings being provided with axially spaced concentric bore and counterbore portions which communicate with one another and respectively with oppositely presenting outer surfaces of said moulded body, said counterbore portion being greater than the bore portion both in diameter and axial extent so that there is formed within the through opening a circumferentially continuous internal shoulder spaced a relatively short distance from the proximate outer surface of said moulded body, and a contact member in each of said through openings, each of said contact members including a prong-receiving barrel having a single longitudinal slit, said barrel being disposed in said counterbore portion of the through opening in substantial registry with the reduced diameter bore portion thereof, the free corners of said barrel on opposite sides of said slit and at the inner end of said barrel being oppositely flared outwardly of the normal circular form of the main body of said barrel to provide opposed flared barrel portions which merge smoothly with the contiguous portions of said main body of the barrel and which are seated upon said internal shoulder, the outer end of said barrel being thus freely disposed within said counterbore portion of the through opening, the latter being adapted to interchangeably accommodate in a similar manner contact barrels of various lengths, said flared barrel portions being contractible to permit said barrel to be freely inserted axially through said reduced diameter bore portion of the through opening and then into the counterbore portion thereof to seat said flared barrel portions upon said internal shoulder as aforesaid, and means integral with said contact member for engaging said moulded body at the outer end of the reduced diameter bore portion of the through opening, said flared barrel portions and last-mentioned means coacting with said internal shoulder to prevent axial displacement of said contact relative to said through opening.

2. In an electronic tube socket as defined in claim 1 wherein the last-mentioned means comprises a pair of oppositely flared wing portions axially spaced from the contact barrel and secured thereto by an intervening connecting portion of an axial length approximately equal to the axial length of the reduced diameter portion of the opening through the moulded member and wherein said oppositely flared wing portions are spread apart so that the distance between their free ends exceeds the normal diameter of said barrel.

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