Feb. 15, 1955 M. R. BRUSH 2,702,376

TUBE SOCKET

Filed March 1, 1951

FIG. 3

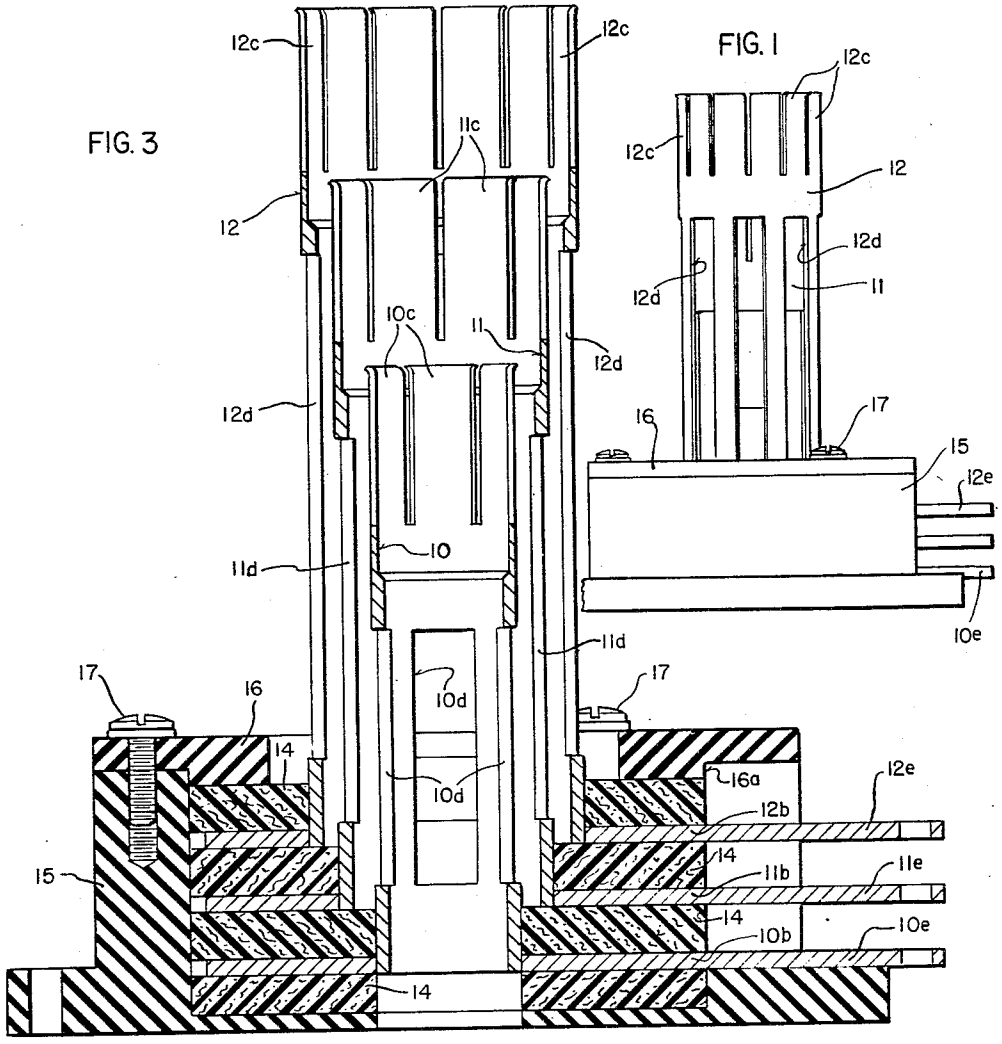


FIG. 1

FIG. 2

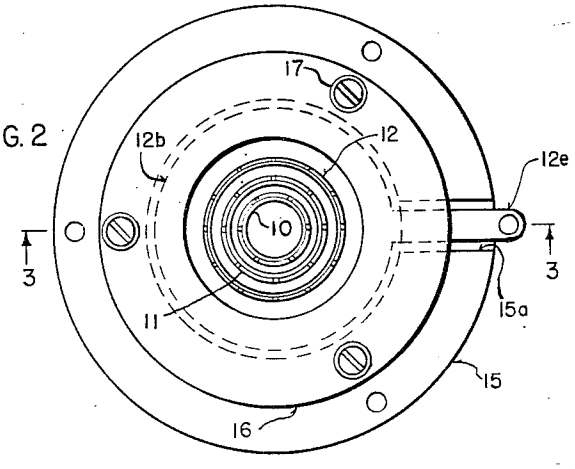
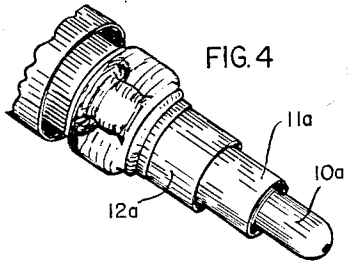


FIG. 4



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United States Patent Office 2,702,376 Patented Feb. 15, 1955

2,702,376

TUBE SOCKET

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Application March 1, 1951, Serial No. 213,411

8 Claims. (Cl. 339—64)

This invention relates to improvements in tube sockets, and more particularly to a specific construction therefor to meet the special requirements of the so-called "Litton" tubes.

In the various forms of tube sockets heretofore used for magnetrons of the plural-cavity type, an example of which is shown and described in Patent No. 2,474,263 issued June 28, 1949, to Charles V. Litton, there has sometimes occurred loss of adequate contact pressure between the flexible, spring-contact fingers of the socket and the spaced and concentrically disposed terminal rings or cylindrical connector elements making up that end or male part of the tube which is plugged into the socket. It has been the practice heretofore in a socket of this type to rely entirely upon the flexibility or spring action of the contact fingers to obtain electrical, spring-contact with misaligned connector elements of the tube. To compensate for extreme eccentricities, however, these fingers must be so flexible that assurance of adequate contact-pressure is lost, especially in regard to fingers on the half circumference "left behind" by any off-center connector element or terminal ring of the tube.

With the foregoing in mind, it is one of the objects of this invention to provide an improved socket for a Litton tube or other device wherein there is the problem of misalignment of connector elements or terminal rings, the socket structure to be effective to compensate for such misalignment and simultaneously to provide adequate contact pressure on each of any misaligned connector elements or terminal rings.

Other objects and advantages will hereinafter appear.

For the purpose of illustrating the invention, an embodiment thereof is shown in the drawing, wherein

Figure 1 is an elevational view of a tube socket having structural and operating characteristics in accordance with the present invention;

Figure 2 is a plan view of Figure 1;

Figure 3 is an enlarged, sectional view, the section being taken on the line 3—3 in Figure 2; and

Figure 4 is a fragmentary, perspective view of the end or male part of a Litton tube for which a tube socket embodying the present invention is particularly adapted.

As shown more clearly in Figure 3, a tube socket to have the desired structural and operating characteristics aforesaid, may consist of the three tubular, metal elements **10**, **11** and **12** of varying diameters and length. These elements are supported in spaced, concentric relation with respect to each other to receive, respectively, the connector elements or terminal rings **10***a*, **11***a* and **12***a* of a Litton tube. The latter correspond to and are the equivalent of those designated, in the Litton patent aforesaid, by the reference numerals **52**, **49** and **48**, respectively.

To provide for a compensating bodily or tilting movement of each of the elements **10**, **11** and **12** independently of and with respect to each of the other two, discs **14** of sponge rubber or other equivalent flexible and dielectric material, are employed and disposed as shown in Figure 3, one on each side of the respective base flanges **10***b*, **11***b* and **12***b* of these elements.

At the upper ends of elements **10**, **11** and **12**, the gauge or thickness of the metal is made less than that of the more rigid body portion of these elements, as clearly shown in Figure 3, to give the desired flexibility or spring to the respective, cylindrical sets of contact fingers **10***c*, **11***c* and **12***c* which are made by slotting these upper ends. Slots **10***d*, **11***d* and **12***d* are also made in the respective

elements **10**, **11** and **12** to provide for more efficient cooling of the vacuum tube.

The base flanges **10***b*, **11***b* and **12***b* which interleave with the sponge-rubber discs **14**, may be soldered or otherwise made an integral part of the associated elements **10**, **11** and **12**, and are provided, respectively, with the lugs **10***e*, **11***e* and **12***e* to which circuit connections can be made.

The base of the improved tube socket consists of a cup-shape part **15** and a cover part or plate **16**, both parts being of Bakelite or other dielectric material and secured together by studs **17**. A slot **15***a* in base part **15** accommodates the lug **10***e*. This slot may be cut deeper than is shown in order to clear lug **10***e* and thus allow for a slight clockwise movement, as viewed in Figure 3, of element **10** and its flange **10***b*, with respect to the base part **15**.

The vertical dimension at **16***a* is such that when studs **17** are screwed home into base part **15**, the discs **14** of sponge rubber are compressed, but not fully, between parts **15** and **16**. This allows for further compression of discs **14** incident to occurring bodily movement of any of the elements **10**, **11** and **12** either axially, or laterally out of alignment with the vertical axis common to all. As shown in Figure 3, the circular discs **14** have a snug fit within the cup-shape base part **15**, and also have a similar fit about the cylindrical elements **10**, **11** and **12**. In assembly of these parts, therefore, the flexible discs **14** center elements **10**, **11** and **12** on the common vertical axis and yieldingly hold them in alignment. The outside diameter of the circular flanges **10***b*, **11***b* and **12***b* is substantially less than that of discs **14** so that the former are entirely clear of and are therefore free to tilt in any direction with respect to part **15**.

In operation, when a vacuum tube or other device having a male portion or plug as shown in Figure 4 is inserted into the socket, the discs **14** first give slightly under the downward pressure exerted, but then furnish a practically rigid backing, in the vertical or axial direction, for elements **10**, **11** and **12** and their associated flanges. As this action occurs, however, and should there be any misalignment between any of the vacuum-tube contact elements **10***a*, **11***a* and **12***a* and the respective sets of spring contacts **10***c*, **11***c* and **12***c*, the sponge-rubber discs **14** will yield accordingly to permit adequate shifting of the base flanges **10***b*, **11***b* and **12***b* and accompanying bodily movement of elements **10**, **11** and **12** into alignment with the respective axes of the misaligned rings or contacts **10***a*, **11***a* and **12***a*. Since each of the three sets of spring contacts or fingers **10***c*, **11***c* and **12***c* is thus enabled to move bodily to align itself with the respective, complementary vacuum-tube contact element, each finger is able to contribute its share of the current-carrying function. Also, as the individual fingers of any set need flex only enough to allow the respective contact element to slide into position, material of greater than ordinary rigidity may be used for the fingers, and a proportionate increase in contact-pressure obtained.

From the foregoing it will be seen that in the improved construction for a tube socket, there is compensation or allowance for any misalignment of the cylindrical connectors or terminal rings of a vacuum tube such as the "Litton" tube aforesaid. For this purpose, and in accordance with the broader aspect of the present invention, the cylindrical sets of flexible fingers or spring contacts are individually supported by flexible pieces of insulating material whereby they are free to move bodily, out of alignment with the other sets, and sufficiently to compensate for any misalignment of the cylindrical connectors or terminal rings of the tube.

While but one embodiment of this invention has been shown and described, it will be understood that various modifications such as in the size, shape and arrangement of the parts are contemplated, and that such modifications are considered to be within the conception of those skilled in the art and within the spirit of the invention and the scope of the claims.

The invention claimed is:

1. In a socket of the character described, connector elements disposed one within the other and in spaced relation and substantially in alignment with respect to

each other, each of said elements being respectively provided at one end thereof with a flange, means constituting a base for said socket, and discs of flexible and dielectric material fastened to said base and interleaved with said flanges and holding said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relation.

2. In a socket of the character described, connector elements disposed one within the other and in spaced relation and substantially in alignment with respect to each other, each of said elements being respectively provided at one end thereof with a flange, parts secured together and constituting a base for said socket, and discs of flexible and dielectric material fastened to said base and compressed between said parts and interleaved with said flanges to hold said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relation.

3. In a tube socket of the character described, a plurality of cylindrical connector elements disposed one within the other and in spaced relation and substantially in alignment with respect to each other, means constituting a base for said socket and comprising two parts secured together, each of said elements being provided at one end thereof with a flange disposed in said base, and discs of yieldable and dielectric material interleaved with said flanges and each disposed in one of said base parts with a relatively snug fit with respect thereto and about one of said elements with a relatively snug fit with respect to the same whereby said discs hold said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relation, said base parts holding said discs compressed to an initial degree and for further compression under pressure exerted axially on or laterally of said elements.

4. In a tube socket of the character described, a plurality of cylindrical connector elements disposed one within the other and in spaced relation and substantially in alignment with respect to each other, a cup-shaped base part for said socket, each of said elements being provided at one end thereof with a flange disposed in said base part and spaced therefrom, discs of yieldable and dielectric material interleaved with said flanges and each disposed in said base part with a relatively snug fit with respect thereto and about one of said elements with a relatively snug fit with respect to the same whereby said discs hold said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relation, and a plate secured to said base part and holding said discs compressed to an initial degree and for further compression under pressure exerted axially on or laterally of said elements.

5. A tube socket comprising first, second and third cylindraceous connector elements disposed one within the other and in spaced axial relationship and substantially in alignment with respect to each other, each of said elements being respectively provided at one end thereof with a flange, said first element having a given axial extent in a direction opposite to said flange end, said second element having an axial extent greater than the axial extent of said first element in a direction opposite to the flange end, said third element having an axial extent greater than the axial extent of said second element in a direction opposite to said flange end, means constituting a base for said socket, and discs of flexible and dielectric material fastened to said base and interleaved with said flanges and holding said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relationship.

6. A tube socket comprising first, second and third cylindraceous connector elements disposed one within the other and in spaced axial relationship and substantially in alignment with respect to each other, each of said elements being respectively provided at one end thereof with a flange, said first element having a given diameter and a given axial extent from said flange end, said second element having a diameter which is greater than said given diameter and the end opposite to the flange end having an extent greater than the axial extent of the end opposite to the flange end of said first element, said third element having a diameter which is greater than the diameter of said second element and the end opposite to said flange end of said third element having an extent in the axial direction for a distance greater than the extent of said second element, parts secured together and constituting a base for said socket, and a plurality of discs of flexible dielectric material fastened to said base and compressed between said parts and interleaved with said flanges to hold said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relationship.

7. A tube socket comprising first, second and third cylindraceous connector elements disposed one within the other and in spaced axial relationship and substantially in alignment with respect to each other, each of said elements being respectively provided at one end thereof with a flange, said first element having a given diameter and a given axial extent, said second element having a diameter which is greater than said given diameter and having an extent in the axial direction which is greater than the extent of said first element, said third element having a diameter which is greater than the diameter of said second element and an extent in the axial direction which is greater than the extent of said second element, a plurality of discs of yieldable and dielectric material interleaved between each of said flanges and disposed in a base part with a relatively snug fit with respect thereto and about one of said elements with a relatively snug fit with respect to the same whereby each of said discs hold said elements substantially aligned with respect to each other but yieldable under pressure to tilt out of said aligned relation, and a plate secured to said base part and holding said discs compressed to an initial degree and for further compression under pressure exerted axially on or laterally of said elements.

8. A tube socket according to claim 7, wherein the ends of said elements opposite to the flange ends are flexible spring contacts.

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