Sept. 2, 1958 C. J. PACE 2,850,714

HIGH VOLTAGE TUBE SOCKET

Filed Nov. 16, 1954

Fig. 1.

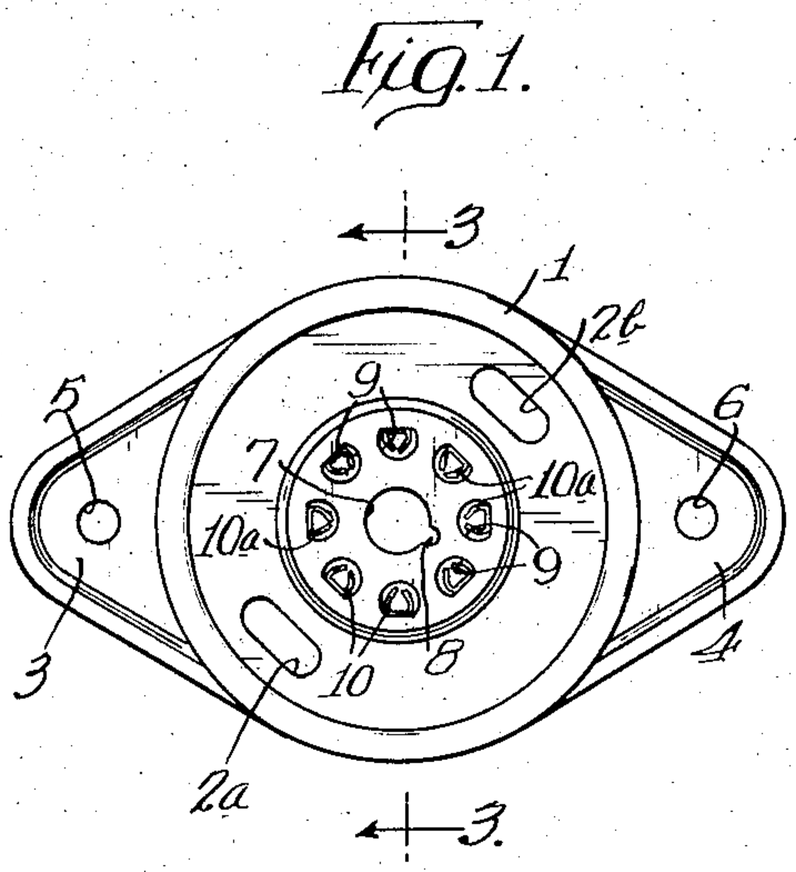


Fig. 2.

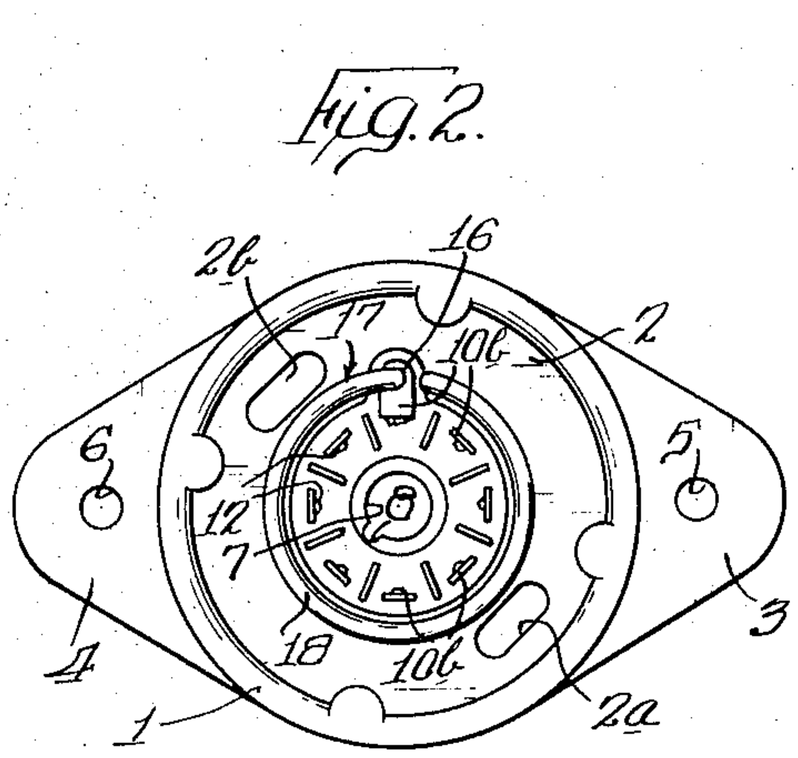


Fig. 3.

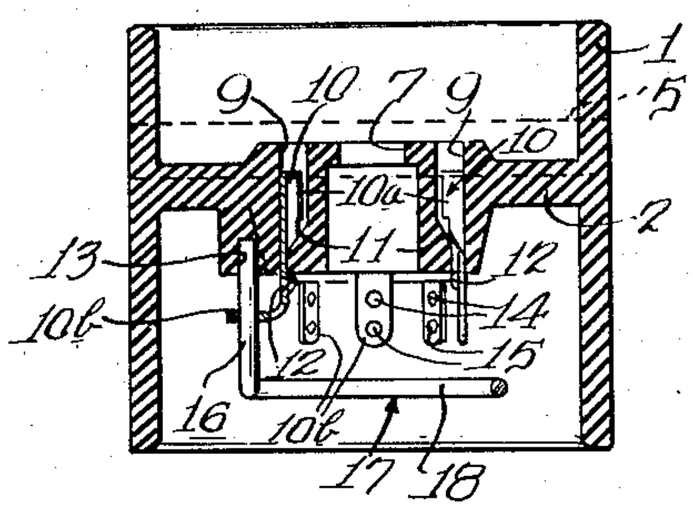
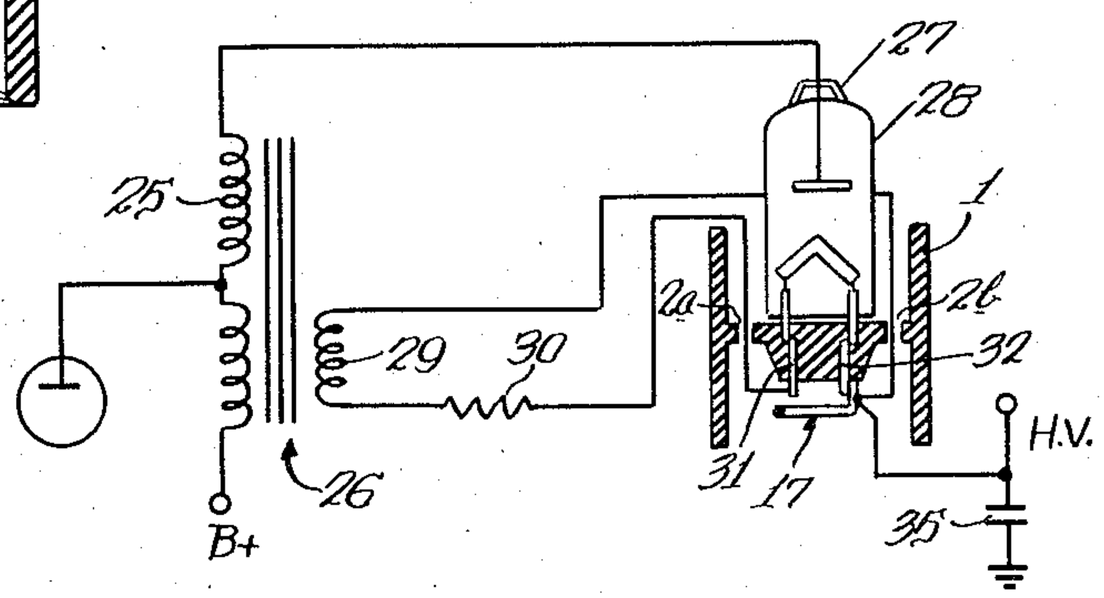


Fig. 4.



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United States Patent Office

2,850,714

Patented Sept. 2, 1958

2,850,714

HIGH VOLTAGE TUBE SOCKET

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Application November 16, 1954, Serial No. 469,156

6 Claims. (Cl. 339—193)

The present invention generally relates to tube sockets and, more particularly, to tube sockets for use in conjunction with high voltages. While the invention is of general utility, it is particularly adapted for and will be described in conjunction with the high voltage generator of a television receiver wherein a high voltage rectifier tube is required to provide the necessary operating potential for the picture tube.

In the present day television receivers, as well as in many other applications, electron discharge devices are operated at voltages of the order of ten to twenty kilovolts. To prevent arcing between such devices and nearby portions of the associated circuit, certain prior art arrangements have provided an insulating shield surrounding both the base of the tube and the tube socket. These arrangements have also included a conductor, called a corona ring, which is mounted in close proximity to the solder lugs of the tube socket to prevent arcing. However, these prior art arrangements have, in general, been quite expensive, and have involved considerable labor, time in assembling the shield to the tube sockets, assembling the corona ring to the tube socket, and assembling the shield on the chassis of the receiver.

It is, therefore, desirable to minimize the number of assembly operations involved in high voltage tube sockets and shield arrangements which are to be competitively marketed. Accordingly, it is a principal object of the present invention to provide a new and improved tube socket arrangement for operation at high voltages.

A further object of the present invention is to provide a new and improved means for mounting a corona ring in close proximity to the solder lugs of a tube socket.

In accordance with one aspect of the present invention, a unitary high voltage shield and tube socket housing is provided which, in addition to reducing the cost of the socket by eliminating certain elements of the prior art and by reducing the number of assembly operations needed to fabricate the socket, effects a more sturdy and consequently safer socket than has been heretofore known. In accordance with another aspect of the present invention, a corona ring mounting arrangement is provided whereby the corona ring may be readily assembled on the tube socket with a minimum number of assembly line operations.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view of a tube socket embodying the features of the present invention;

Fig. 2 is a bottom plan view of the tube socket shown in Fig. 1;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1; and

Fig. 4 is an electrical circuit diagram of a high voltage rectifier circuit wherein the tube socket and corona ring arrangement of the present invention may be employed.

Referring now to the drawing, and particularly to Figs. 1 through 3 thereof, the high voltage tube socket of the present invention is therein illustrated as comprising a hollow cylindrical insulating shield **1** having, intermediate the ends thereof and integral therewith, a partition **2** which extends completely across the cavity in the cylinder **1**, the partition **2** being provided with slots **2***a* and **2***b* which form a passageway for conductors connected between the top and bottom of the partition. When this socket is employed in a television receiver utilizing a filament transformer, the filament leads may conveniently extend from the top to the bottom of the chassis through the slots **2***a* and **2***b*. A pair of ears **3** and **4** are formed integrally with the shield **1** and extend outwardly from the wall of the cylinder **1** at opposite sides of the longitudinal axis thereof and are provided respectively with circular apertures **5** and **6**. These ears and associated apertures provide a convenient means for mounting the socket to a chassis with which it is to be employed. At the center of the partition **2**, which is located at the longitudinal axis of cylinder **1**, there is provided an aperture **7** having a keyway **8** located adjacent thereto. A plurality of recesses **9**, which extend through partition **2**, are symmetrically arranged about the aperture **7** and accommodate a plurality of tube pin receptacles **10** which are disposed within the recesses **9**. The central portion of the partition **2** has a minimum thickness which is determined by the construction of the tube pin receptacles used and which is, therefore, considerably greater than that required to physically support a tube within the insulating cylindrical shield **1**. Therefore, in the interest of reducing the weight of the socket as well as the amount of material used, the annular outer portion of the partition **2** is made thinner than the central receptacle supporting portion thereof.

The contact pin receptacles **10** are conveniently constructed from a substantially T-shaped piece of sheet metal with the cross arm **10***a* thereof folded over so as generally to define a cylinder adapted to receive one of the tube pins. The cylindrical portion of the receptacles **10***a* which make contact with the tube pins are disposed in the upper portions of the recesses **9** and rest on shoulders **11** which are provided within and near the bottom of the recesses **9**. The leg portions **10***b* of the receptacles **10** extend past the shoulders **11** and protrude from the bottom of the partition **2**. Small bulges **12** on the leg portions **10***b* abut against that portion of the lower surface of partition **2** which is adjacent to their housing. The portions **10***b* of the tube pin receptacles **10** constitute solder lugs which enable electrical connections to be made to the pins of a tube inserted within the socket.

In order to provide an arrangement wherein a corona ring may be quickly and easily assembled to the tube sockets with a minimum number of assembly line operations, there is provided in the central portion of the partition **2**, and adjacent one of the solder lugs **10***b*, a bottom opening recess or well **13** which is adapted to receive the supporting leg **16** of a corona ring **17**, the leg **16** extending transversely of the ring portion **18** of the corona ring **17** so that the ring portion **18** is positioned parallel to the partition **2** and is spaced from the tips of the solder lugs **10***b* when the leg **16** is inserted into the recess **13**. Each of the solder lugs **10***b* has provided therein a pair of circular apertures **14** and **15** to facilitate the connection thereto of electrical leads. Preferably, that one of the solder lugs **10***b*, which is adjacent the recess **13**, is bent outwardly in a radial direction, so that the outer aperture in the lug is aligned with the recess **13**. With this arrangement, the corona ring **17** may be readily assembled

to the tube socket by merely inserting the leg portion **16** thereof through the outer aperture of the corresponding solder lug **10***b* and then bending this lug so that the leg portion **16** can be inserted into the recess **13**. The leg portion **16** is then soldered to the solder lug through which it extends so that an electrical connection is established for the corona ring **17** while at the same time providing a good mechanical support for the leg portion **16** so that the ring portion **18** is rigidly secured and not susceptible to vibration.

It will be noted that the length of the leg portion **16** is determinative of the spacing between the solder lugs **10***b* and the ring portion **18** of the corona ring **17**. In producing these sockets for different commercial applications, only one type of tube socket need be provided and corona rings having a leg portion at least as long as that required for any desired voltage application may be stocked, the leg portions of the corona rings being trimmed to the desired length before assembly in the sockets. Of course, where a large number of similar devices operating under the same voltage conditions are being assembled, it is expedient to initially provide a corona ring having a leg portion of the desired length.

In Fig. 4 of the drawings, there is illustrated a typical high voltage rectifier circuit wherein the tube shield and corona ring arrangement of the present invention may be employed. Referring to this figure, high voltage pulses are developed across the winding **25** of the high voltage transformer **26** and the upper end of the winding **25** is connected to the anode cap **27** of a high voltage rectifier tube **28**. A filament winding **29** of the transformer **26** is connected through the resistor **30** to the solder lugs **31** and **32** of the tube socket **1**. The solder lug **32** which is connected to the corona ring **17** is connected to the secondary winding **29**. A filter condenser **35** is provided which is connected to one end of the winding **29** and to one side of the filament of the tube **28** so as to smooth out the pulse wave rectified by the tube **25** and provide a suitable energizing potential for the cathode ray tube of the receiver. Since the corona ring **17** is positioned closely adjacent the tips of the solder lugs **10***b*, the potential of all the solder lugs and consequently all the tube pins is maintained at the high voltage produced across the condenser **35** so that arcing to points of lower potential is prevented.

While a particular embodiment of the present invention has been shown, it will be understood that this invention should not be limited thereto since, of course, many modifications may be made. Therefore, by the appended claims it is intended to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed and desired to be secured by Letters Patent of the United States is:

1. A tube socket for use in high voltage applications, comprising a hollow, cylindrically shaped insulating member having a transversely extending insulating partition integral with said member and positioned intermediate the ends of said member, a plurality of tube pin receptacles arranged within said partition for the reception of tube contact pins from one side of said partition, tube indexing means for preventing improper insertion of a tube into said receptacles, a plurality of contact members disposed within said receptacles, and protruding from the other side of said partition, one of said contact members having an aperture in the protruding portion thereof, said partition having a recess therein adjacent said one contact member, said last named contact member inclined toward said recess, and a corona ring having a substantially annular portion and an outstanding portion, said corona ring being disposed with the annular portion defining a plane parallel to the plane of said partition and with the outstanding portion extending through said aperture in said contact member and terminating within said recess.

2. A combined tube socket and corona ring assembly, comprising an insulating body member having a plurality of contact pin receiving recesses arranged therein, solder lugs disposed within said recesses and extending from one side of said body, said body having a recess disposed adjacent one of said lugs, said one of said lugs having an aperture in the protruding portion thereof and being inclined toward said recess, and a corona ring having a transverse leg portion extending through said aperture and into said recess, whereby said corona ring is fixedly mounted on said body.

3. Apparatus as described in claim 2 wherein said leg portion of said corona ring is electrically and mechanically connected to said one lug.

4. A socket for use with a signal repeating device comprising an insulating housing, a plurality of receptacles arranged within said housing, a plurality of contacts disposed within said receptacles and extending without said housing, said housing including a recess adjacent said one of said contacts opening on only one surface of said housing, a device having a leg extending therefrom, said leg being disposed within said recess, said one of said contacts inclined toward said recess and means bonding said leg to said inclined contact whereby said device is secured to said housing.

5. A high voltage tube socket comprising a hollow cylindrical insulating shield; a partition integral therewith and extending across and intermediate the ends of said cylindrical shield, said partion having a central opening and a keyway, said partition also having a plurality of perforations symmetrically arranged around the central opening, said perforations and central opening adapted to receive the pins and central guiding member of vacuum tube, said partition being thicker at its central portion and having a thinner annular supporting section around said thicker central portion; a plurality of metal connectors, within said perforation, having lugs fixed thereto, said lugs extending through the bottom side of said partition; a circular, metal corona ring; a supporting leg mechanically and electrically fixed to the corona ring, said leg extending through one of said lugs and into an opening in the bottom side, and thicker portion of said partition, said leg being soldered to said lug where it passes through the same, said corona ring lying in a plane parallel to said partition and being within and spaced from the lower inner wall of said cylindrical insulating shield.

6. Apparatus as claimed in the preceding claim characterized by the fact that said partition is slotted so as to enable the passage of electrical conductors therethrough.

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