July 9, 1957 G. W. CARSON 2,799,010

TUBE SOCKET

Filed Dec. 26, 1952

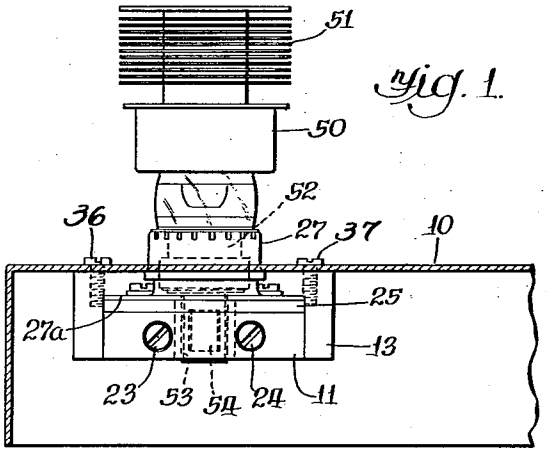


Fig. 1.

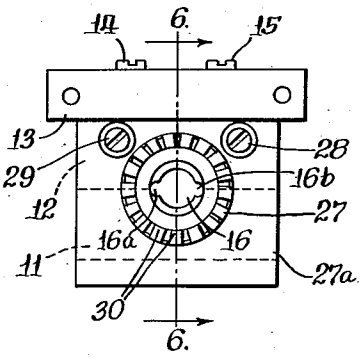


Fig. 3.

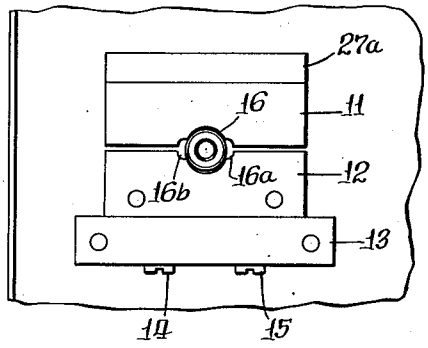


Fig. 2.

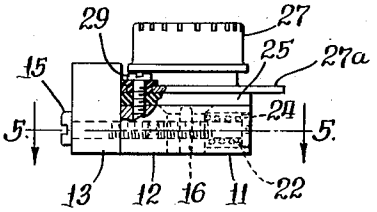


Fig. 4.

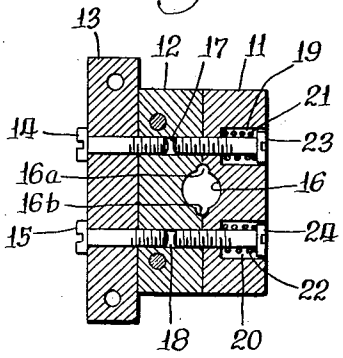


Fig. 5.

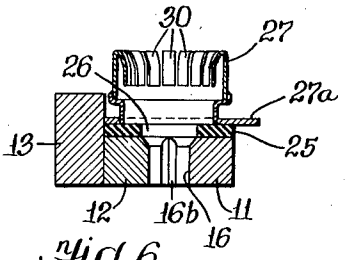


Fig. 6.

INVENTOR.

George W. Carson

BY

Norman L. Mueller

Atty.

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TUBE SOCKET

George W. Carson, Chicago, Ill., assignor to Motorola, Inc., Chicago, Ill., a corporation of Illinois

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3 Claims. (Cl. 339—112)

This invention relates generally to tube sockets, and more particularly to an improved tube socket for an electron discharge device subject to develop excessive heat at one or more of its electrical contacts during operation thereof.

High mu, planar transmitting triode discharge devices have been developed for use as power amplifiers, oscillators, or frequency multipliers, and the small size, rugged construction, unusually high trans-conductance and relatively high plate dissipation of such triodes make possible the manufacture of compact equipment for moderate power output in either fixed or mobile service.

The above type of discharge device, however, develops excessively high heat at its anode and at its combined cathode-heater contacts. For this reason, forced air cooling is recommended which entails additional expense and equipment. Moreover, although forced air cooling is quite satisfactory insofar as the anode of the device is concerned, difficulties have been encountered in providing sufficient cooling by this means for the cathode-heater contacts due to their small surface area.

A general object of the invention is to provide an improved receptacle for electron discharge devices which have at least one electrical contact subject to excessive heating.

Another object of the present invention is to provide an improved receptacle for electron discharge devices of the above described type which is constructed to obviate the need for forced air cooling of the cathode-heater contact of such device.

A further object of the invention is to provide an improved tube socket for electron discharge devices of the above described type which is exceedingly simple in construction and by means of which the device may be operated without undue heating of its cathode-heater contact.

A feature of the invention is the provision of an improved tube socket for electron discharge devices of the above described type which incorporates heat-conductive blocks of appreciable mass that engage the aforementioned cathode-heater contact and rapidly conduct heat therefrom to the chassis of the equipment in which the device is installed.

A further feature of the invention is the provision of such an improved tube socket which is constructed to incorporate a pair of heat-conductive blocks that resiliently engage the aforementioned heater-cathode contact releasably to support the contact therebetween and to constitute electrical connections to the contact and a heat conductive path therefrom.

The above and other features of the invention which are believed to be new are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof, may best be understood by reference to the following description when taken in conjunction with the accompanying drawing in which:

Fig. 1 is a side view of the improved receptacle of the

invention mounted on a chassis and supporting an electron discharge device of the type described previously herein.

Fig. 2 is a bottom view of the assembly,

Fig. 3 is a top view of the receptacle itself,

Fig. 4 is a side view of the receptacle,

Fig. 5 is a sectional view of the receptacle taken along the lines 5—5 of Fig. 4, and

Fig. 6 is a sectional view of the receptacle taken along the lines 6—6 of Fig. 3.

The improved receptacle of this invention supports and makes electrical contact to a terminal contact of an electron discharge device subject to excessive heating during operation of the discharge device. The receptacle includes a pair of metallic blocks of apreciable mass and relatively high heat conductivity defining an aperture therebetween to receive the aforesaid contact of the electron discharge device, the aperture having a configuration to fit closely with the contact to be received thereby to obtain maximum contact area. A retaining member is provided for maintaining the blocks adjacent one another to bear against the aforesaid contact and constitute heat and electrical conductors for such contact.

Referring now to the drawing, the improved receptacle of the invention is shown in Fig. 1 suspended below the top of a chassis 10 and extending through an aperture therein. The receptacle includes a pair of metallic blocks 11 and 12 of appreciable mass and composed of a relatively high heat conductive material which is also a good electrical conductor, such as aluminum, copper or silver. Block 12 is secured to a metallic member 13, which likewise may be composed of aluminum or other high heat-conductive and high electrical-conductive material, by means of a pair of screws 14 and 15. Blocks 11 and 12 are supported parallel to the top of chassis 10, whereas member 13 extends transversely thereto and is secured to the top by a pair of screws 36 and 37.

Blocks 11 and 12 define an aperture 16 therebetween to receive the electrical terminal contact of an electron discharge device, in a manner to be described, and the aperture has an internal diameter closely approximating the external diameter of such contact to obtain maximum contact area therebetween. In constructed embodiments of the invention the diameter of the aperture was reamed .0005–.001 inch larger than the contact received thereby with a .005 inch shim placed between blocks 11 and 12 during the reaming process. Block 12 has a pair of threaded apertures 17, 18 extending therethrough perpendicular to aperture 16 and on either side thereof. Block 11 has a pair of apertures extending therethrough in respective alignment with apertures 17 and 18 in block 12 and each having an enlarged section 19, 20 extending from the outer side of block 11 through a portion of the block. A pair of coil springs 21 and 22 is respectively disposed within the enlarged sections 19 and 20, and a pair of screws 23 and 24 extends through the coil springs and into the threaded apertures 17 and 18 in block 12, the screws having head portions coacting with the coil springs so that blocks 11 and 12 are resiliently held together. As shown in Fig. 5, screws 14 and 15 supporting block 12 against member 13 also extend into the threaded apertures 17 and 18.

An insulating plate 25 is supported over blocks 11 and 12, and has a central aperture 26 aligned with aperture 16 defined by the blocks. A tube socket 27 is supported over the insulating plate and has an integral bottom plate 27A secured to block 12 by means of a pair of screws 28 and 29 insulated from the bottom plate and threaded into the block through insulating plate 25. Socket 27 has a series of resilient fingers 30 surrounding aperture 26 to make electrical contact with one of the contacts of the discharge device supported in the receptacle, in a manner

to be described. Integral plate 27A of socket 27 extends over the insulating plate 25 and projects slightly beyond the insulating plate to facilitate electrical connection thereto.

The electron discharge device discussed previously herein, which is one of the types that may be conveniently supported by the receptacle of this invention, is shown in Fig. 1. This device includes a cylindrical anode contact 50, anode cooling fins 51, a cylindrical grid contact 52, a cylindrical cathode-heater terminal contact 53 with an external contact surface, and a further cylindrical cathode-heater terminal contact 54 with an internal contact surface co-axial with contact 53. Connection may be made to the cylindrical anode contact 50 in any known fashion, while connection is made to the cylindrical grid contact 52 by means of resilient fingers 30 of socket 27 which coact with the sides of contact 52. Insertion of the discharge device within the receptacle, causes cathode-heater cylindrical contact 53 to be inserted in aperture 16 between blocks 11 and 12 and resiliently held between the blocks. Cylindrical contact 54 is insulated from contact 53 and connection is made thereto on its inner surface by means of any suitable plug extending through aperture 16 from the bottom of the receptacle.

Electrical connection to the grid of the discharge device may be made from plate 27A integral with socket 27. Blocks 11 and 12, not only connect cathode-heater contact 53 to ground but also have appreciable mass and relatively high heat conductivity so that the excessive heat developed at the cathode-heater contact during operation of the device is rapidly conducted away to chassis 10 through blocks 11 and 12 and member 13. It is desirable that aperture 16 have a pair of small slots 16A and 16B coextensive therewith to allow the discharge device to be flexed in all directions while in the receptacle without causing damage to cylindrical contact 53.

In a constructed embodiment of the invention, blocks 11 and 12 were made of aluminum and had the following dimensions: length 1⅝ inches, width 1 inch, and thickness ⅜ inch. With such dimensions, it was found that the improved receptacle of this invention rapidly conducted heat away from the cathode-heater contacts of the discharge device and maintained that contact at the recommended operating temperature without the need for blowers or any other extraneous forced air equipment. It was also found, that in mobile applications, the intermittent use of the discharge device is usually such that the anode does not become excessively heated so that the receptacle of the invention dispenses with the need for any forced air equipment in such applications. Moreover, it was found that even where the anode structure required forced air to maintain its operating temperature, that the improved receptacle of the invention simplified the forced air apparatus and assured proper operating temperature at the inaccessible contact 53 with its relatively small surface area.

The invention provides, therefore, an extremely simple and reliable receptacle for releasably supporting an electron discharge device on a chassis and which is constructed so that proper operating temperatures are maintained at the various contacts of the device.

While a particular embodiment of the invention has been shown and described, modifications may be made, and it is intended in the appended claims to cover all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. A receptacle for an electron discharge device having a first cylindrical contact subject to excessive heating during operation of the discharge device and having a second cylindrical contact coaxial with but spaced from the first contact, said receptacle including in combination, a pair of metallic blocks of appreciable mass and relatively high heat and electrical conductivity, said blocks having substantially flat surfaces positioned adjacent to each other in opposed relation with semi-circular recesses in said opposed surfaces defining an aperture therebetween to receive the aforesaid first contact of the electron discharge device, said aperture having a selected diameter to obtain maximum contact area with the contact to be received thereby, a pair of resilient retaining members for maintaining said blocks adjacent one another so as to constitute heat and electrical conductors for such contact, an insulating plate secured to one of said blocks and extending over said blocks, said insulating plate having a central aperture, and means mounted on said insulating plate including a plurality of resilient fingers surrounding the central aperture of said insulating plate to define a socket for receiving the aforesaid second cylindrical contact of the discharge device.

2. A receptacle for an electron discharge device having a first cylindrical contact subject to excessive heating during operation of the discharge device and having a second cylindrical contact coaxial with but spaced from the first contact, said receptacle including in combination, a pair of metallic blocks of appreciable mass and relatively high heat and electrical conductivity, said blocks having substantially flat surfaces positioned adjacent each other in opposed relation with semi-circular recesses in said opposed surfaces defining an aperture therebetween to receive the aforesaid first contact of the electron discharge device, said aperture having a selected diameter to obtain maximum contact area with the contact to be received thereby, one of said blocks having a pair of threaded apertures extending therethrough perpendicular to the aforesaid aperture on either side thereof, the other of said blocks having a pair of apertures extending therethrough in respective alignment with the aforesaid threaded apertures and each having an enlarged section extending from the outer side of said last-mentioned block through a portion thereof, a pair of coil springs respectively disposed in the enlarged sections of the aforesaid apertures, a pair of screws extending through said coil springs into threaded engagement with the aforesaid threaded apertures and having respective head portions coacting with said coil springs for resiliently maintaining said blocks adjacent one another to constitute heat and electrical conductors for the contact received by the first mentioned aperture, a metallic member secured to one of said blocks for mounting said blocks on a chassis and constituting a heat conductive and electrical path from said blocks to said chassis, an insulating plate secured to one of said blocks and extending over said blocks, said insulating plate having a central aperture, and means mounted on said plate including a plurality of resilient fingers surrounding the central aperture of the insulating plate to define a socket for receiving the aforesaid second cylindrical contact of the discharge device.

3. A receptacle for an electron discharge device having a first cylindrical electrical contact subject to excessive heating during operation of the discharge device, and having a second cylindrical electrical contact coaxial with but spaced from and insulated from the first contact, said receptacle including in combination, a pair of metallic blocks of appreciable mass and relatively high heat and electrical conductivity, said blocks having substantially flat surfaces positioned adjacent each other in opposed relation with semi-circular recesses on said surfaces defining an aperture therebetween to receive the aforesaid contact of the electron discharge device, said aperture having a diameter and configuration to obtain maximum contact area with the first contact of the discharge device when received thereby, resilient retaining means including first and second coil spring portions positioned on opposite sides of said aperture for maintaining said blocks adjacent one another so as to constitute heat and electrical conductors for the first contact, mounting means of heat and electrical conductive material for securing said receptacle to a chassis and constituting a heat and electrical conductive path from said receptacle to the chassis, and

means insulated from said blocks including a plurality of resilient conducting fingers forming a socket for receiving the aforesaid second cylindrical contact of the discharge device.

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