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2,888,658

TUBE SOCKET AND ENVELOPE

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Application March 9, 1956, Serial No. 570,458

11 Claims. (Cl. 339-75)

The present invention relates to an improved tube socket and holder for providing mechanical support for an electronic component such as an electron tube in good heat conducting relationship to a metal chassis as well as to provide an electrostatic shield, and further, to provide good electrical contact with the prongs of the component.

Relatively small electron tubes have heretofore been developed for producing and for controlling both audio and radio frequency current and such tubes have found wide applicability in those instances where it is desired to contain the electrical components in a relatively small space such as, for example, in hearing aids, portable radios and the like. Such tubes, however, require a current to heat the filament or cathode of the same to obtain the proper electron emission and such heat produces relatively high temperatures in the relatively small space within which they are confined. One problem thus encountered in the use of these tubes is the problem of heat dissipation. Another problem involves the provision of suitable electrical contacts for the tube prongs which generally consist of wires of tungsten sealed in the tube envelope without a supporting base as is usually present in the larger size tubes. Another problem which arises, due to close proximity of the various electrical circuit components, involves proper shielding of the tube from ambient electrostatic or magnetic waves and interferences, which very often affect the proper functioning of a tube unless it is properly shielded. All of these problems are admirably taken care of by the instant invention, using the structure which is relatively simple and inexpensive.

An object therefore of the present invention is to provide improved means for solution of the problems outlined above.

An object of the present invention is to provide an improved socket which provides good electrical contact with the prongs of an electron tube.

Another object of the present invention is to provide a combination tube holder, shield, heat conductor and electrical connector, which is compact so that it is suitable for use in the same environment in which miniature and sub-miniature tubes are presently used.

Another object of the present invention is to provide an improved tube holder which incorporates means for obtaining good electrical contact with the prongs of the tube, and which also mechanically secures the tube against vibration and other forces.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view showing a device incorporating the features of the present invention mounted

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on a chassis with which it is intended to be used and illustrates a tube mounted therein.

Figure 2 is a view taken generally on the line 2-2 of Figure 1.

Figure 3 is a view similar to that shown in Figure 2 but illustrates the cover pivoted to its open position.

Figure 4 is a sectional view taken substantially on the line 4-4 of Figure 2.

The device illustrated and which incorporates features of the present invention is adapted for mounting on a metallic chassis 10 so as to mechanically support an electron tube 12 and to provide electrical connection to the prongs of such tube. The device incorporates generally a base 14 with apertured portions 14A and 14B therein which adapt said base for mounting on the chassis 10. The base 14 of metal, i.e., good heat conducting material, is secured to the chassis 10 by a pair of countersunk head bolts 16 and 17 extending through the aperture portions 14A, 14B, so as to maintain the base 14 in good heat conducting relationship with respect to the metallic chassis 10. For this purpose the base 14 is provided with an outer plate surface 14C which abuts the flat surface of the chassis 10 with a relatively large contact area between the same. The base may be mounted either on a vertical wall of the chassis or on a horizontal wall, as desired. In either case the chassis 10 is apertured to provide an apertured portion 10A through which contact members in the form of soldering lugs 18, 19, 20, 21, 22 and 23 extend, such contacts being insulatedly mounted on the base 14 in a manner presently described.

The contacts 18, 19, 20, 21, 22 and 23 are formed from metallic sheet stock and are disposed and retained within corresponding grooved and slotted portions 28, 29, 30, 31, 32 and 33 in the block 35 of insulating material. This block 35, as shown in Figure 3, has a portion 35A of reduced cross section which is sandwiched between the base 14 and the chassis 10, and which is apertured to receive the machine screw 17.

These slotted portions in the block 35 are shaped to snugly receive the individual contact members and such contact members may be retained therein by frictional forces or by other means.

These contact members 18-23 each have a pair of spaced projections (as exemplified by the projections 18A and 18B of the contact 18) which are contact spaced portions of the same tube prong (as exemplified by the tube prong 36). These contact members 18-23, however, have apertured extensions which are staggered for purposes of convenience in soldering wires to the same.

The inner surface 14D of the base 14 is slightly concave to conform generally with the surface of the tube 12 so as to provide a relatively large contact area with respect to the same for purposes of conducting heat from the tube to the chassis 10.

A metallic cover 40 is preferably pivotally mounted on the block 35 by means of the pivot pin 42 which extends through the block 35 and the apertured ears 40A and 40B of the cover, although it is understood that other means may be used to hold the cover 40 with respect to the base 14 or chassis 10. For example, the cover 40 is set into a recess in the chassis 10 or base 14 and then locked or clamped thereto instead of being hinged. The cover 40 is of good heat conducting material, i.e., metal, and is generally U-shaped in cross section as shown in Figure 4. The cover 40 is provided with five longitudinally extending heat radiating projections 40C or fins, to improve heat radiation or convection from the same. The inner surface of the cover 40 is concave and shaped to conform with the surface of the envelope of tube 12 so as to provide a relatively large contact area between the same. The opposite legs 40E and 40F of the cover 40 partially embrace the tube 12, and

other ends in the closed position of the cover 40 are adjacent the chassis 10 so as to provide an electrostatic shielding effect.

It is noted with reference to Figures 3 and 4 that the cover 40 carries six insulating projections 50-55 that are arranged to contact corresponding ones of the multiplicity of tube prongs 36 upon closing of the cover 40 at a region intermediate the spaced contact projections so as to resiliently deform the tube prongs as shown in Figure 2.

The cover 40 is maintained in a closed latched position, using conventional means as, for example, the latching means 52 comprising the U-shaped wire 53 which is pivoted on the base 14 and engageable with the spring clip 54 on the cover 40.

This releasable clamping means 52 serves to resiliently press the legs 40E and 40F of the cover 40 against the chassis 10 so that heat may be conducted from such cover 40 directly to the chassis 10.

It is observed that deformation of the tube prongs, as shown in Figure 2, serves not only to provide good electrical connection between the tube prongs and the corresponding contacts 18-23, but serves also to help to mechanically maintain the tube 12 against vibration and other forces.

It is understood that the tube or device before being mounted in the unit may be first wrapped in a metal foil 60 so that when the cover is closed good electrical and thermal contact is made between the cover 40, base 14 and such metal foil, which is preferably of silver. This also serves to make up for tolerances in the size of different tube envelopes and to permit many different size tube envelopes to be used in a particular size device, the number of wrappings being increased, or the thickness of a single layer of foil being increased, the smaller the tube. Instead of using a wrapping, a metallic sponge or pad somewhat similar to a "Brillo" pad may be used to provide a cushion and a good heat and electrical conductor. The pad in such instance is of woven or intertwined metallic threads.

It is understood that the principles of construction described and shown herein are applicable also to other electrical components in addition to electron tubes. For example, the same may be used with transistors for the same purposes. One of the problems arising out of the use of transistors is their heating. This problem can be also taken care of in the like manner with connections to the transistor made in like manner as described herein, although in general a transistor is smaller than a tube. An arrangement as described and shown herein is particularly useful with transistors since a transistor is usually so delicate and sensitive with respect to high heat, such as soldering iron heat, that it is considered highly undesirable to connect wires to the transistor terminals by soldering. The arrangement may also be used for relays and the like. In referring to a tube socket, I, therefore, intend those words to include all the foregoing.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. A combination tube socket and holder comprising, a base, means adapting said base for mounting on a chassis, said base being of good heat conducting material and shaped to provide a relatively large contact surface for the envelope of a tube, a contact, means insulatedly supporting said contact on said base, said contact having a pair of spaced projecting portions adapted to engage spaced portions of a prong of said tube, a cover of heat

conducting material pivoted on said base and having a relatively large contact surface for the envelope of said tube, a projection on said cover, means insulatedly supporting said projection on said cover, the last mentioned projection being arranged to contact said prong at a portion intermediate said pair of projections so as to bow said prong between said pair of projections when and as said cover is pivoted on said base, and means releasably fastening the free end of said pivoted cover on said base.

2. A tube holder comprising a base, a plurality of spaced contacts, means insulatedly mounting said contacts on said base, said means comprising a block of insulating material grooved to receive the individual contacts with the grooves shaped to provide insulating barriers and to prevent movement of the contacts away from prongs of a tube mounted in said holder, each of said contacts having a pair of spaced projections arranged to contact spaced portions of a corresponding tube prong, a member mounted on said base, said member carrying a plurality of projections corresponding to each contact and arranged to engage a corresponding tube prong at a region intermediate corresponding spaced pairs of projections for bowing corresponding prongs.

3. A tube holder comprising a base of heat conducting material conforming generally with the outer surface of the envelope of a tube, a complementary cover of heat conducting material pivotally mounted on said base and conforming generally with the outer surface of the envelope of the tube, a contact member carried by the base, means pivotally mounting said cover on said base, and means on said cover to press a prong of said tube into engagement with said contact upon pivotal movement of said cover.

4. An electronic component holder comprising a base, a cover conforming in shape to said component and covering the same movably mounted on said base, a raised contact mounted on said base and extending outwardly from said base in a direction transverse to the longitudinal direction of a prong of said component, and means carried by said cover for bending a prong of said component about said raised contact which serves as a fulcrum upon movement of said cover.

5. A holder as set forth in claim 4 in which said base and said cover comprise an electrostatic shield for the tube.

6. A holder as set forth in claim 4 in which said base and said cover cooperate to provide an electrostatic shield for the tube, and means for mounting said base and cover in heat conducting relationship to a chassis upon which said holder is mounted.

7. A holder as set forth in claim 4 having heat radiating fins thereon.

8. An arrangement as set forth in claim 4 in which said component is mounted in said holder with metallic material at least partially encircling said component, said metallic material being squeezed between said base and said cover or member so as to provide good heat conductivity between said base, metallic material and said cover or member and so as to serve also to help in firmly maintaining said component between said base and said cover or member.

9. An arrangement as set forth in claim 8 in which said metallic material is in the form of a cushion and comprises woven or intertwined metallic threads to serve as a cushion.

10. A combination electronic component socket and holder comprising, a base, means adapting said base for mounting on a chassis, said base being of good heat conducting material and shaped to provide a relatively large contact surface for the envelope of said component, a contact, means insulatedly supporting said contact on said base, said contact having a projecting portion extending outwardly of said base in a direction generally transverse to the longitudinal direction of a prong of said

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component, a cover of heat conducting material movably mounted on said base and having a relatively large contact surface for the envelope of said component, a projection on said cover, means insulatedly supporting said projection on said cover, the last mentioned projection being arranged to contact said prong at a portion thereof spaced from the first mentioned projection so as to bow said prong about said first mentioned projection when and as said cover is moved onto said base.

11. A holder for an electronic component having a bendable prong comprising, a base of heat conducting material conforming generally with the outer surface of the envelope of said component, a complementary cover of heat conducting material mounted on said base and conforming generally with the outer surface of the envelope of the component, a contact member carried by the base

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and extending outwardly therefrom in a direction transverse to the longitudinal direction of said prong, means mounting said cover on said base, and means on said cover to bend a prong of said component about said contact which serves as a fulcrum upon movement of said cover.

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