

Sept. 24, 1957

D. J. McCANN

2,807,789

ELECTRON TUBE MOUNTING DEVICE

Filed Feb. 25, 1954

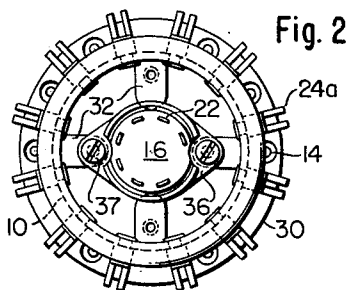


Fig. 2

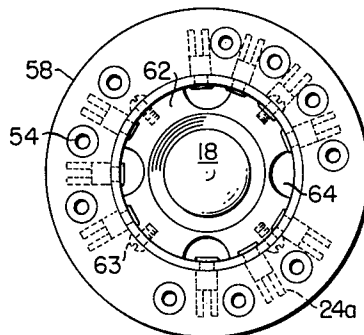


Fig. 4

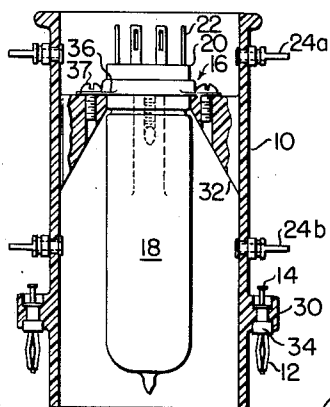


Fig. 1

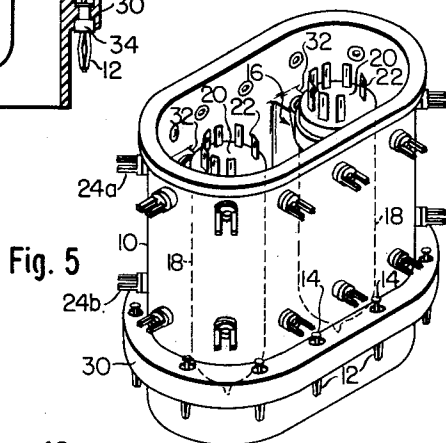


Fig. 5

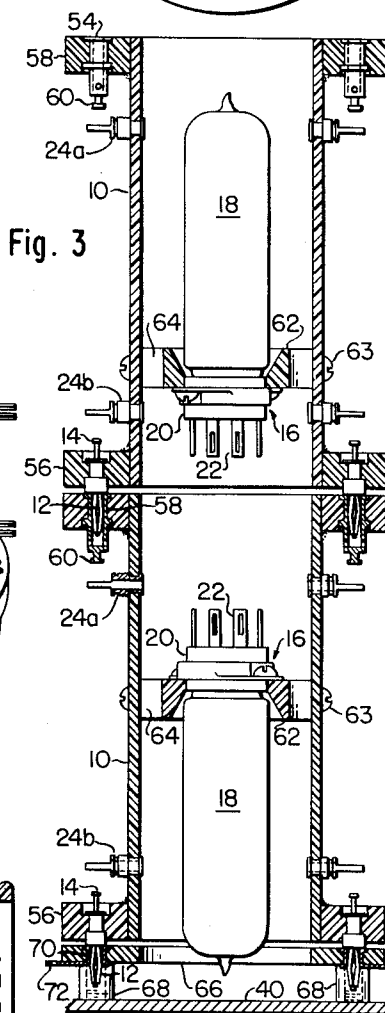


Fig. 3

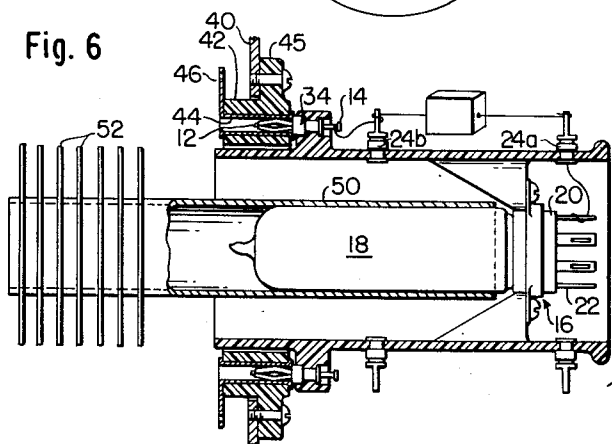


Fig. 6

INVENTOR.
DONALD J. McCANN

BY

Genney, Jenney, Witten & Hill

ATTORNEYS

1

2,807,789

ELECTRON TUBE MOUNTING DEVICE

Donald J. McCann, Newton Highlands, Mass.

Application February 25, 1954, Serial No. 412,480

6 Claims. (Cl. 339-112)

The present invention relates to the mounting of electron tubes and their closely associated circuit elements in electronic equipment, and provides an improved plug-in unit on which may be mounted one or more electron tubes, and those circuit elements in close physical association with them.

Various devices have been proposed for mounting circuit elements in accessible close physical relation with an electron tube, these generally including, (1) tube sockets formed with projections carrying terminals to which the elements may be secured, and (2) plug-in units having several spaced sets of terminals and a tube socket for receiving the tube. Plug-in units have a number of advantages over those devices formed about a permanently secured tube socket, primarily in equipment used where repairs must be made rapidly, but have a disadvantage inherent in the two socket connections between the tube and the chassis (one being the socket connection between the plug-in unit and the chassis, and the other, the one between the tube and the plug-in unit), which in prior devices results in the tube being situated at considerable distance from the chassis. The tube is thus, rather insecurely fastened and also provided with an unnecessarily high moment of inertia about the chassis, rendering it susceptible to loosening by vibration.

The present invention provides a tube mounting device in which the distance between the tube and the chassis is maintained at a minimum, thus greatly decreasing the loosening effect of vibration. In addition, the device of this invention permits the various circuit elements such as condensers, resistors and inductances to be mounted in close proximity to both the tube and the chassis, whereby the length of leads, and stray inductance and capacitance coupled with them, may be minimized.

Although the invention has numerous embodiments, a few of which are described below, it consists generally in a hollow, cylindrical casing of an insulating material near one end of which, are provided a plurality of prongs projecting generally parallel with the axis, by which the casing may be plugged into a socket formed to receive the prongs. About the outside of the casing are mounted a set of terminals each connecting with one of the prongs whereby electrical contact with the prongs may be made, and preferably one or more additional spaced sets of terminals are also provided to facilitate further the mounting of circuit elements to the casing. A tube socket is mounted at one end of or within the casing to support the tube substantially entirely within the casing, with the terminal lugs of the tube socket near the end of the casing to facilitate the making of electrical contact with them.

By thus mounting the tube within the casing, its distance from the chassis is kept to a minimum, as is its distance from the circuit elements mounted at the outer wall of the casing. In addition, the casing serves to shield the tube against damaging physical forces and also serves as a conduit regulating the flow of cooling air currents past the tube.

For a further description of preferred embodiments se-

2

lected as illustrative of this invention, reference is made to the drawings in which:

Fig. 1 is a cross-sectional elevation of one preferred embodiment of this invention with parts broken away to show structural details,

Fig. 2 is a top end view of the embodiment shown in Fig. 1,

Fig. 3 is a cross-sectional elevation showing two other embodiments of this invention, so constructed that two or more of the mounting devices may be connected together in tandem,

Fig. 4 is a top end view of the embodiments shown in Fig. 3,

Fig. 5 is a view in perspective showing an embodiment adapted for mounting a pair of electron tubes, and

Fig. 6 is a cross-sectional elevation showing the embodiments of Figs. 1 and 2 mounted in a panel and provided with a sleeve serving as a cooling element for the tube.

From the drawings it will be seen, that each embodiment includes a generally cylindrical casing 10, near one end of which are provided a plurality of prongs 12 projecting generally parallel with the axis of the casing. In an accessible location at the outer wall of the casing are provided a set of terminals 14, each connecting with one of the prongs 12. Mounted to the casing 10 and preferably within it, is a tube socket 16, positioned to support an electron tube 18 substantially entirely within the casing. The tube socket is conveniently of conventional design, consisting of a body member 20 of insulating material having holes on one side adapted to receive the pins of an electron tube. A conductor in each hole connects to a socket terminal lug 22 projecting outwardly from the other side of the body member 20, and provides means for making electrical contact with the pins of the tube 18.

On the outer wall of the casing 10 are provided a plurality of mounting terminals 24 between pairs of which, the various circuit elements may be mounted and to which electrical connections may be made. Preferably, the mounting terminals are arranged in two sets 24a and 24b, those of each set being each aligned in a plane perpendicular to the axis of the casing, and the two sets being spaced from each other a sufficient distance to accommodate between them such circuit elements as resistors, condensers and the like.

In the embodiment shown in Figs. 1 and 2, the cylindrical casing 10 is formed with an outwardly projecting annular flange 30 near the bottom end (bottom and top herein being a designation of convenience) and with opposed internal brackets 32 near the top end. The prongs 12 and prong terminals 14 are provided on plugs 34 mounted in the annular flange 30, with the prongs 12 directed toward the bottom end of the casing, and the prong terminals 14 projecting above the top edge of the flange 30. The plugs 34 are conveniently conventional banana-spring-type plugs.

The internal brackets 32 shown as four in number and arranged in opposed pairs, serve to support the tube socket 16 within the casing 10 and are formed with top surfaces perpendicular to the axis of the casing and with upwardly and inwardly sloping lower surfaces which serve to guide the tube base toward the socket. The socket is of conventional design and includes an encircling rim member 36 secured about the periphery of the body portion 20, and having apertured extensions by which the socket is fastened by screws 37 to the top of an opposed pair of brackets 32 with the socket terminal lugs 22 directed toward the top end of the casing. Thus, the tube 18 mounted in the socket 16 extends toward the bottom of the casing, and is mounted entirely within it. The mounting terminals 24a and 24b are arranged in two

3

annular rows, each in a plane perpendicular to the axis, the top row being approximately opposite the terminal lugs 22, and the bottom row being near the prong terminals 14. The mounting terminals it will be seen, are spaced about the periphery of the casing with one terminal of one set in general longitudinal alignment with a terminal of the other set, the aligned mounting terminals being preferably displaced from alignment with the plug terminals 14 to facilitate the making of electrical connections to the latter.

In this embodiment, the mounting terminals 24a and 24b consist of hollow sleeves having two outwardly projecting fingers extending from their outer ends and are securely fitted into perforations in the wall of the casing. Terminals of this type have been found particularly advantageous, especially in the top row of terminals 24a opposite the socket terminal lugs 22, in that connections between the lugs 22 and the mounting terminals 24a may be readily made by inserting a wire through the mounting terminal, soldering its end to the socket terminal, and then winding the shank of the wire about the fingers of the mounting terminal and soldering it thereto.

In Fig. 6 is shown the manner by which the embodiment of Figs. 1 and 2 may be incorporated in electronic equipment. Such equipment will generally include a panel or chassis 40 on which the equipment is assembled. The panel 40 is conveniently formed with a generally circular opening in which is mounted a casing socket comprising a ring-shaped socket base member 42 through which extend a number of sleeves 44 arranged to receive the prongs 12, and within which is received the lower portion of the casing 10. Electrical connections incorporating the various sub-assemblies mounted on the casing 10 in the desired circuit are made through sleeve terminals 46 projecting outwardly from the rear side of the base member 42. The socket is conveniently secured to the panel 40 by forming the base ring with outward extensions 45 by which the socket may be screwed or otherwise fastened to the panel.

Although it is generally contemplated that air will be free to circulate through the casing 10, enhanced cooling may be effected by inserting a metal sleeve 50 having cooling fins 52 at one end over the tube with the metal fins in free access to the atmosphere. Alternatively, the sleeve may connect with other cooling means.

In the embodiments shown in Figs. 3 and 4, the mounting units have the general construction outlined above, but include in addition, a set of sleeves 54 provided at the upper end of the casing 10 and arranged to receive the prongs 12 of a second mounting unit. According to this type of construction, the prongs are mounted at an end of the casing conveniently in an outwardly extending annular flange 56 while a similar flange 58 is formed at the upper end of the casing to provide a mounting for the sleeves 54. Each of the sleeves terminates in a terminal 60 extending downwardly below the lower edge of the upper flange 58 to provide for the making of appropriate electrical connections.

Where two units are mounted in tandem, it is frequently convenient to mount the tube in the lower unit with its base toward the top and the tube in the upper unit with its base toward the bottom, in the manner shown in Fig. 3. Conveniently, the tube sockets 16 are mounted in a platform 62 appropriately located within the casing, and secured therein by screws 63 passing through the walls of the casing platform. Each platform and associated tube socket may thus be positioned to face in either direction and in any desired position within the casing. In any case, however, it is contemplated that the tube will be mounted substantially entirely within the casing.

The platforms 62 are preferably cut inwardly at their edges between the regions where they are engaged by the screws 63 to provide channels 64 from one side of the platform to the other, so that a current of air may flow through the casing to provide adequate cooling for

4

the tubes. Where a number of the units are mounted end to end, a convenient method of providing adequate cooling is by forcing a stream of cooling air through the assembled units, as by connecting an air hose to one end of the assembly.

The socket by which the units are mounted to the chassis in the embodiment shown in Fig. 3 consists of a flat ring of insulating material 66 supported above the chassis 40 on hollow posts 68. Sleeves 70 connecting at their lower ends to sleeve terminals 72 are mounted in perforations in the ring 66 to receive the prongs 12 and provide electrical access to them.

In the embodiments shown in Fig. 5, the casing 10 is widened to accommodate a pair of tubes 18 each mounted in a socket 16 secured between a pair of opposed brackets 32 in the manner described with reference to Figs. 1 and 2.

From the foregoing description, it will be seen that this invention provides a versatile plug-in unit of simple construction by which individual stages of an electronic circuit may be made up as replaceable sub-assemblies to be plugged into appropriate sockets in the equipment. By constructing sub-assemblies in this manner, they may be readily assembled and tested before being finally incorporated in the circuit, while the circuitry on the panel to which they are mounted can be greatly simplified, since the majority of the circuit elements will be mounted to the plug-in units and the wiring of the panel will be primarily a matter of connecting together the mounting socket terminals.

The insertion and removal of tubes from the mounting device of this invention may be readily accomplished by means of ordinary commercially available tube pullers. Although this invention has been described with reference to preferred embodiments, it is contemplated that obvious modifications will occur to those skilled in the art, and that such may be made without departing from the scope of the invention.

Having thus disclosed my invention and described in detail preferred embodiments thereof, I claim and desire to secure by Letters Patent:

1. An electron tube mounting device comprising an open ended cylindrical casing of insulating material, parallel metal prongs disposed about the periphery of said casing whereby said casing may be inserted and electrically connected into a suitable receptacle, a plurality of metal terminals mounted at the outside of said casing, a tube socket having means for engaging the pins of an electron tube and having terminal lugs connecting with said means, said socket being mounted within said casing by supporting structure defining an air passage between said socket and said casing to support the tube substantially entirely within said casing, said casing being of large internal cross-section with respect to the tube such that the tube is spaced from the inner wall of said casing to define an air passage between said casing and the tube, whereby a current of air may be passed through the casing to cool the tube.

2. An electron tube mounting device comprising an open ended cylindrical casing of insulating material, parallel metal prongs disposed about the periphery of said casing at one end thereof whereby said casing may be inserted and electrically connected into a suitable receptacle, a plurality of metal sleeves mounted at the other end of said casing to receive the prongs of a similar device, a first set of terminals mounted at the outside of said casing each connecting with one of said prongs, a second set of terminals mounted at the outside of said casing each connecting to one of said sleeves, a tube socket having means for engaging the pins of an electron tube and having terminal lugs connecting with said means, said socket being mounted within said casing by supporting structure defining an air passage between said socket and said casing to support the tube substantially entirely within said casing, said casing being of large in-

5

ternal cross-section with respect to the tube such that the tube is spaced from the inner wall of said casing to define an air passage between said casing and the tube, whereby a current of air may be passed through the casing to cool the tube.

3. An electron tube mounting device comprising an open ended cylindrical casing of insulating material, an annular flange surrounding said casing, a plurality of metal prongs projecting from one side of said flange parallel with the axis of said casing, a first set of terminals at the other side of said flange each connecting with one of said prongs, a tube socket having means for engaging the pins of an electron tube and having terminal lugs connecting with said means, said socket being mounted within said casing by supporting structure defining an air passage between said socket and said casing to support the tube substantially entirely within said casing, said casing being of large internal cross-section with respect to the tube such that the tube is spaced from the inner wall of said casing to define an air passage between said casing and the tube, whereby a current of air may be passed through the casing to cool the tube.

4. An electron tube mounting device comprising an open ended cylindrical casing of insulating material, an annular flange surrounding said casing at one end, a plurality of metal prongs projecting outwardly from the outer side of said flange parallel with the axis of said casing, a first set of terminals at the other side of said flange each connecting with one of said prongs, a second annular flange surrounding said casing at the other end, a plurality of metal sleeves extending inwardly from the outer side of said second annular flange to receive the prongs of a similar device, a second set of terminals at the other side of said second annular flange each connecting with one of said sleeves, a tube socket having means for engaging the pins of an electron tube and having terminal lugs connecting with said means, said socket being mounted within said casing by supporting structure defining an air passage between said socket and said casing to support the tube substantially entirely within said casing, said casing being of large internal cross-section with respect to the tube such that the tube is spaced from the inner wall of said casing to define an air passage be-

6

tween said casing and the tube, whereby a current of air may be passed through the casing to cool the tube.

5. The electron tube mounting device defined by claim 1 in which the metal terminals are hollow and are mounted in an opening in the casing and project outwardly from the casing, whereby an electrical connection to the terminal lugs may be through the hollow metal terminals.

6. An electron tube mounting device comprising an open-ended cylindrical casing of insulating material, parallel metal prongs disposed about the periphery of said casing at one end thereof whereby said casing may be inserted and electrically connected into a suitable receptacle, a plurality of metal sleeves mounted at the other end of said casing to receive the prongs of a similar device, a first set of terminals mounted at the outside of said casing each connecting with one of said prongs, a second set of terminals mounted at the outside of said casing each connecting with one of said sleeves, a third set of hollow metal terminals mounted in openings through said casing and projecting outwardly therefrom, a tube socket having means for engaging the pins of an electron tube and having terminal lugs connecting with said means, said socket being mounted within said casing by supporting structure defining an air passage between said socket and said casing to support the tube substantially entirely within said casing, said casing being of large internal cross-section with respect to the tube such that the tube is spaced from the inner wall of said casing to define an air passage between said casing and the tube, whereby a current of air may be passed through the casing to cool the tube.

References Cited in the file of this patent

UNITED STATES PATENTS

1,850,583	Gage	Mar. 22, 1932
2,628,270	Himmel	Feb. 10, 1953
2,637,763	Palmer	May 5, 1953
2,720,578	Caffiaux	Oct. 11, 1955

FOREIGN PATENTS

626,131	Great Britain	July 11, 1949
---------	---------------	---------------