Feb. 12, 1957 R. S. McCREADIE 2,781,499

TUBE SOCKET ADAPTER

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Fig. 1.

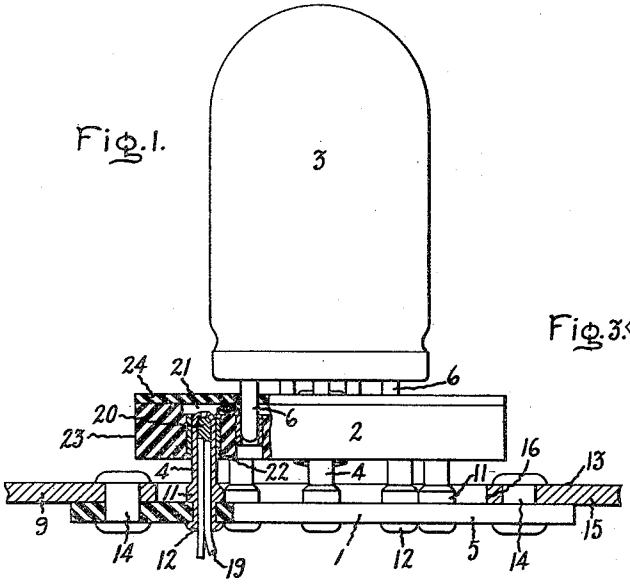


Fig. 3.

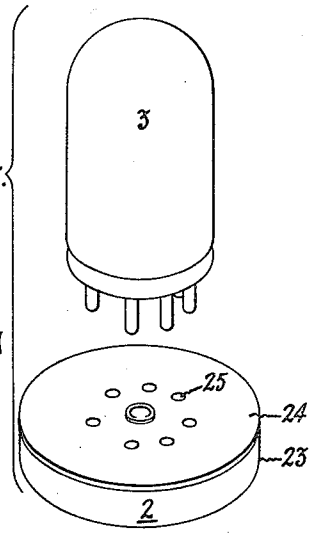
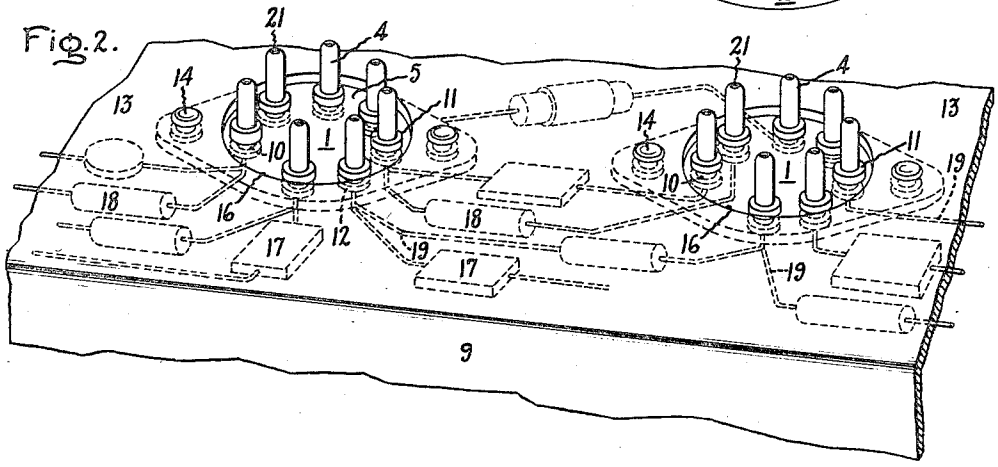


Fig. 2.



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Fig. 4.

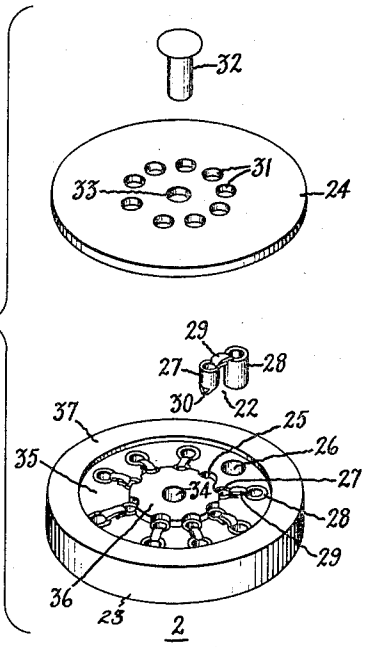


Fig. 5.

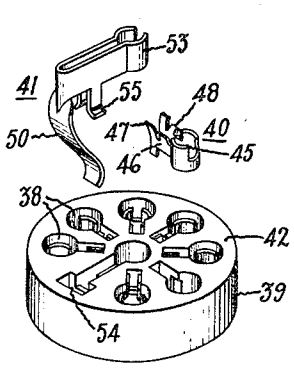
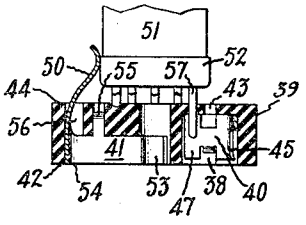


Fig. 6.



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TUBE SOCKET ADAPTER

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Application October 16, 1951, Serial No. 251,553

2 Claims. (Cl. 339—154)

My invention relates to electrical socket adapters and more particularly to an electrical socket adapter designed to make electrical contact engagement between two separate electrical plug connecting units. While my invention is of general utility, it has particular application in the manufacture and assembly of radio receivers. It deals in its preferred application with a new and novel electrical connecting device which may be employed in radio set manufacture readily to connect a plug or pin terminal unit secured to a radio chassis to an external electron discharge device to be plugged therein.

In the manufacture of radio sets heretofore, it has been customary to employ radio tube sockets which were permanently secured by suitable means to the radio chassis. While these sockets have been amply described in the prior art, it may briefly be said that they generally comprised an insulating body member in which there were positioned the desired number of tube socket contact members. Integrally connected with these contact members were flat terminal strips which projected from the opposite side of the socket from the socket contacts into the under side of the radio chassis. It was to these terminals that the various circuit connected components and lead wires were soldered.

While this type socket was generally acceptable, faults often occurred therein which presented a difficult problem in readily removing the socket contact member for replacement. In addition, the aforementioned manner used to connect the various circuit components to the socket terminals proved to be not only inefficient in that it required a number of hand soldering and connecting operations but also it was not always possible to insure uniform soldered joints.

It was therefore found desirable to change the manner of connecting the various components and lead wires to an external electron discharge device. This was done by securing a pin or plug type terminal unit to the chassis whose pins extended upwardly from the chassis and generally corresponded in number to the pins of an electron discharge device to be connected thereto. The pins in this terminal unit were mounted within an insulating base which in turn was secured to the under surface of a radio chassis. The pin terminals were hollow in nature and the necessary interconnecting lead wires were placed in the hollow terminals in the first step of the socket assembly.

When all the leads necessary to complete the circuit were in position within the unit, the radio chassis was inverted and the outwardly extending pin members were immersed in a bath of molten solder. The pin terminals with their inner leads in place were thus effectively soldered together in one automatic operation. This operation was performed by a machine known as an "automatic pot-soldering machine."

It will be seen that when this method of assembly was employed a device was needed electrically to connect the soldered pin terminal elements with the proper elements

in an external circuit which might be an electron discharge device.

It is therefore a primary object of this invention to provide a new and improved electrical socket adapter which may connect two separate electrical pin contact terminal members.

It is a further object to provide a new and improved electrical socket adapter which is designed to be plugged into a plurality of electrical pin terminal contact members secured to a radio chassis and into which a radio tube may be plugged, there being provisions within the adapter electrically to connect desired pin terminals of the chassis unit to desired tube elements.

For additional objects and advantages and for a better understanding of my invention, attention is now directed to the following description and accompanying drawings. The features of my invention which are believed to be novel are particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a perspective view partly in section of my improved tube socket adapter in combination with a terminal pin unit secured to a radio chassis, and an electron discharge device plugged into the adapter.

Fig. 2 shows a portion of a radio chassis designed for use with my aforementioned adapter.

Fig. 3 is an exploded perspective view of the assembly shown in Fig. 1.

Fig. 4 shows an exploded view of the preferred embodiment of my socket adapter.

Figs. 5 and 6 illustrate a modified socket adapter constructed in accordance with the teachings of my invention. Fig. 5 is an exploded bottom view of the modified adapter. Fig. 6 is a center cross-sectional view of the modified adapter shown in Fig. 5.

As heretofore mentioned, my socket adapter **2** is adapted to complete an electrical circuit between two separate and distinct plug units **1** and **3**, the adapter **2** being designed to receive one such unit **1** engageable from one surface and designed to receive another such unit **3** engageable from another surface.

Referring to Fig. 1, the assembled relationship of the pin terminal unit **1**, the adapter **2** and the tube **3** is clearly shown. It will be seen that the socket adapter member **2** receives the cylindrical pin terminals **4**, which terminals are secured within an insulating base member **5**. The electron discharge device **3** has the usual plurality of contact pins **6** and is shown in its engaged or plugged-in position in the socket adapter.

It will be recalled that my socket adapter is especially adapted for use in radio sets having contact pin terminal units which are secured to the radio chassis. Fig. 2 shows a portion of a chassis **9** which might be found in such a set. The pin terminal unit **1** comprises an essentially circular insulating base member **5** having a plurality of apertures **10** designed to receive the pin terminal members **4**.

The pin terminal members **4** are inserted into the insulating base member **5** and are secured thereto by means of an outwardly flared stop or shoulder portion **11** and an opposed peened or turned-over flange portion **12**. This flange portion **12** is best shown in Fig. 1.

The pin terminal unit **1** comprising the insulating base member **5** and the hollow cylindrical pin terminal members which, it will be seen, extend upwardly from the upper surface **13** of the radio chassis **9**, is secured by means of rivets or eyelets **14** to the chassis **9**. The pin terminal unit **1** is shown secured to the under surface **15** of the chassis **9**, the pin terminals **4** extending through a suitable aperture **16** in the chassis **9** for engagement with the socket adapter **2**. Two pin terminal units **1** are shown, while in outlined form there are illustrated

various circuit components 17 and 18, whose connecting lead wires might conceivably be soldered into the hollow cylindrical pin terminal members 4. These might comprise, for example, a condenser 17, a resistor 18. The lead wires 19 are initially inserted within the pin terminals 4 and then are soldered in a pot-soldering operation.

The radio chassis 9 shown in its assembled form with the leads positioned within the terminal members but not soldered therein is turned upside down and the pin terminal members are immersed in a bath of molten solder. The solder enters the pin terminal members at the ends 21 thereof and solders the terminal members to the lead wires within it. This operation of simultaneously soldering all the pin terminal members is accomplished by a so-called automatic pot-soldering machine.

My improved socket adapter is then employed to connect the pin terminal members 4 to desired contact pins 6 of an electron discharge device 3. Note that in the exploded perspective view in Fig. 3 the upper surface of the adapter 2 has a plurality of apertures 25 corresponding in number to the pins 6 of the tube to be accommodated within the adapter 2.

Referring again to Fig. 1, it will be seen that the socket adapter 2 is placed onto the pins of the pin terminal unit 1. The cross-sectional portion of this figure shows one cylindrical pin terminal member 4 having lead wires 19 soldered therein. The solder 20 is admitted to the pin member 4 during the soldering operation through the hole 21 of that member.

This pin terminal member 4 is engaged by a pin receiving socket contact unit 22 located within the disc-shaped insulating adapter 2. The tube 3 is plugged into the adapter 2 from the opposite surface from the pin terminal. Contact pin 6 of the tube is engaged by a portion of the pin receiving socket contact unit which completes the electrical circuit from the pin terminal 4 to contact pin 6.

This cross-sectional portion further shows that my adapter 2 may be constructed, as far as its insulated portion is concerned, with two superposed insulating members 23 and 24. The member 23 houses the electrical socket connectors while the member 24 forms an insulating cover permitting access to only a desired ring of socket contacts corresponding to the number of pins of the tube. A portion of the insulating cover member 24 effectively shields from human contact the pin terminal members 4 and their enclosing socket contacts within the insulating housing member 23.

It may be mentioned at this point that my socket adapter is also advantageous from the safety point of view since it effectively encases and insulates all the pin terminal members 4 and socket contact units 22 which might otherwise be exposed to bodily contact to persons manipulating the units.

With the assembly illustrated in Figs. 1 and 2, comprising the radio chassis 9, the pin terminal unit 1, the adapter 2 and the tube 3, it will be evident that it would be a simple matter to replace the plugged-in socket adapter 2 in the event of a failure therein. This is an important feature of my invention especially when considered in view of prior art practices where, in the event of a tube socket failure, it was necessary to remove the entire chassis from the cabinet, drill out the rivets securing the socket to the chassis, unsolder the lead wires from the socket terminal members, and replace with a new socket, and then, of course, resolder the lead members and reinsert the chassis within the cabinet.

The various component parts of my socket adapter are best shown in Fig. 4 in which the largest element comprises the disc-shaped insulating housing member 23 having opposed surfaces. As will be seen, this member incorporates a plurality of plug or pin admitting openings or apertures 25 and 26 within which there are positioned plug receiving socket contact units 22. These socket receiving apertures are arranged in two concentric rings of openings, an inner ring of apertures 25, and an outer ring 26. The openings are spaced-apart and there are a corresponding number of openings in each ring.

The apertures 25 and 26 are in radial alignment and may be said to comprise paired-openings and therefore the adapter in one sense incorporates a plurality of paired openings. A pin receiving socket contact unit 22 is inserted within each of the paired-openings.

Each pin receiving socket contact unit 22 may comprise an integral unit made up of two essentially cylindrical pin receiving socket contact members 27 and 28 connected by a web or bridge portion 29. It will be appreciated that this unit might very well be composed of separate pieces in which each socket contact member 27, 28 comprises a cylindrical piece with a tang portion, the tang portions of each member being connected together by suitable means such as by solder.

Each of these pin receiving socket contact units 22 is inserted within one of the paired-openings 25, 26 in the insulating body. As shown in Fig. 4, an inner socket contact member 27 is adapted to fit into an aperture 25 in the inner ring of openings while member 28 fits in the aperture 26. The cylindrical socket member 27 may have a jaw-shaped portion 30 designed to grip a tube contact pin inserted therein. The other socket contact member 28 is positioned within an adjacent aperture 26. A web portion 29 connects the adjacent socket contacts.

Members 27 and 28, when positioned within the disc-shaped insulating housing 23, are engageable from opposite surfaces of said housing. Pin terminal members 4 are plugged into the outer ring 26 of socket contact members 28 from the under surface thereof while the tube contact pins 6 are plugged into the inner ring 25 of socket contact members 27 from the upper surface thereof.

It will be evident that any suitable means may be employed to secure the pin receiving socket contact units 22 within the housing. I have shown in Fig. 4 an insulating cover member 24 which performs this function. This cover member has a single ring of spaced-apart apertures 31 extending therethrough corresponding in position and in number to one of the rings of spaced-apart apertures in the insulating housing member 23. In the exploded view illustrated, the holes 31 are in registry with the inner ring of openings 25 when in superposed position so as to admit correspondingly positioned tube pins into the socket contact members 27 located within the housing 23.

The cover member 24 is secured to the housing member 23 by means of an eyelet or rivet 32 which extends through centrally located apertures 33 and 34 in both the cover member and the housing member. Of course, other conventional means may be employed to perform this function. The cover member 24 not only serves to center the tube pins with respect to proper tube socket contacts located within the housing, but also functions to insulate the contact units 22 held in place at the upper surface of the adapter housing.

A circular under-cut portion 35 is provided on the upper surface of the insulating housing member 23 so that cover member 24 will fit over the socket contact unit 24 and fit flush with central hub portion 36 and outer rim portion 37. The under surface of the cover member when secured to the housing by rivet 32 makes engagement with the upper surface of the insulating housing member at the hub portion 36 and the outer rim portion 37.

I have shown in Figs. 5 and 6 a modified construction of my socket adapter in which the cover member is eliminated and in which the openings 38 in the insulating member are elongated in shape. It will be noted that I provide in this alternative arrangement a different type of socket contact unit 40 from that heretofore disclosed and a novel grounding clip 41.

Referring to Figs. 5 and 6, I have shown a one-piece insulating housing member **39**. In Fig. 5 this body member is shown in inverted position while in Fig. 6 it is shown in its normal position. As shown in Fig. 5 there are a crcular series of elongated openings **38** in the under surface of the member **39**. There are also, as shown in Fig. 6, a corresponding number of circularly placed spaced-apart apertures **43** in the upper surface, which connect with elongated openings **38** in the under surface.

A plug-receiving socket contact unit **40** is provided which functions in a manner similar to the socket contact unit **22** described in connection with Fig. 4. However, in this case each socket contact unit **40** is snapped into engagement within each elongated opening **38**. The contact unit **40** comprises essentially a U-shaped outwardly biased spring clip **46, 47** in which the connecting portion forms an essentially circular pin receiving contact portion and in which the oppositely disposed spaced-apart wing portions **46** include other pin receiving contact members **47**. Outwardly flared tip portions **48** from the wings **47** engage suitable autments within the housing **39**, securing the contact unit **40** within same.

In addition to the socket contact unit, I provide a grounding contact member **41** mounted in an additional aperture **54** in the body member **39**. This member **41** includes a spring arm **50**. One use of this spring arm **50** is shown in Fig. 6 in which a tube **51** having a metallic shielding base member **52** is engaged by the spring arm. Of course, an outer metallic cylindrical shielding member, not shown, might be slipped over the tube **51** and would then be engaged by the spring arm.

The grounding contact **41** includes, in addition to portion **50**, a pin receiving contact portion **53** which may be positioned at the axis of the body member. It will be seen that this grounding contact member **41** snaps into the T-shaped elongated opening **54** in the body member and is held in place within the housing by means of the outwardly flared tabs **55**. These tabs **55** are positioned between the portion **53** and the portion **50** to grip the corresponding portion of the side walls of the aperture **54**.

The relationship between the various components described chiefly in connection with Fig. 5 is further illustrated in Fig. 6 where the grounding contact member **41** and its spring finger **50**, which extends through the aperture **56** in the upper surface contacts the lower metal portion **52** of the vacuum discharge device **51**.

This Fig. 6 also shows the unit **41** in place in member **39** with its arms **55** engaging the side walls of the aperture to hold it in place. The position of the socket contact unit **40** within the body cavity is also illustrated showing the pin receiving tubular contact section **45** and the oppositely disposed wing contact portions **47** which are shown in engagement with one of the pins **57** of vacuum tube **51**.

It will thus be apparent that I have provided a novel tube socket adapter which is of particular application in the mass assembling of radio receivers in which a pot-soldered terminal unit is to be connected to an electron discharge device.

While certain specific embodiments of my invention have been described it will, of course, be understood that various other modifications may be made without departing from the principles of the invention. The appended claims are therefore intended to cover any such modifications as fall within the true spirit and scope of this invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination an electronic chassis panel having a perforation therein, said perforation extending entirely through said panel, an insulating base member, means for attaching said base member to said chassis in such manner that the member covers at least a portion of said perforation, a plurality of perforations in said base member, a plurality of hollow dip solder pin terminal members mounted on said base member in alignment with said perforations such that an electrical conductor can be inserted into said dip solder pins and through said perforations in said base member, an adapter comprising an insulating member having an upper and lower surface, an inner ring of separate spaced-apart perforations and an outer concentric ring of separate spaced-apart perforations, a first group of plug-receiving contact members engageable from said upper surface positioned within the perforations of one of said rings, a second group of plug-receiving contact members, engageable from said lower surface positioned within the perforations of the other ring and mounted over said hollow dip solder pin terminal members so as to make electrical contact therewith, and electrical conductors conductively connecting each of said plug-receiving contact members in said outer ring of perforations with a corresponding plug-receiving contact member of said inner ring.

2. In combination an electronic chassis panel having an aperture therein, said aperture extending entirely through said panel, an insulating base member, means for attaching said base member to said chassis in such manner that the member covers at least a portion of said aperture, a plurality of perforations in said base member, a plurality of hollow dip solder pin terminal members mounted on said base member in alignment with said perforations such that an electrical conductor can be inserted into said dip solder pins, an adapter comprising an insulating member having an upper and lower surface, an inner ring of apertures and outer concentric ring of apertures, at least one of said rings of apertures extending entirely through said insulating member, a first group of plug-receiving contact members engageable from said upper surface positioned within the apertures of one of said rings, a second group of plug-receiving contact members engageable from said lower surface positioned within the apertures of the other ring and mounted over said hollow dip solder pin terminal members so as to make electrical contact therewith, and means for conductively connecting each of said plug-receiving contact members in said outer ring of apertures with a corresponding plug-receiving contact member of said inner ring.

References Cited in the file of this patent

UNITED STATES PATENTS

2,002,291	Kulka	May 21, 1935
2,005,682	Pool	June 18, 1935
2,028,717	Hayden	Jan. 21, 1936
2,158,004	Douglas	May 9, 1939
2,458,993	Hanopol	Jan. 11, 1949
2,563,775	Del Camp	Aug. 7, 1951
2,567,829	Suthann	Sept. 11, 1951
2,603,681	Salisbury	July 15, 1952
2,631,184	Sampson	Mar. 10, 1953
2,674,724	Just	Apr. 6, 1954
2,694,799	Del Camp	Nov. 16, 1954