Oct. 21, 1941. S. M. DEL CAMP 2,259,739

VACUUM TUBE SOCKET

Filed Dec. 17, 1938 2 Sheets-Sheet 1

Fig. 1.

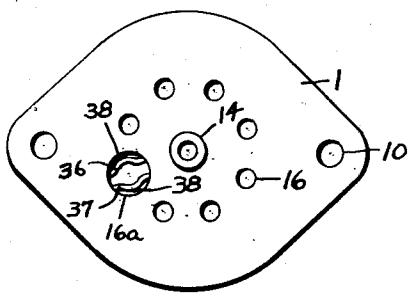


Fig. 2.

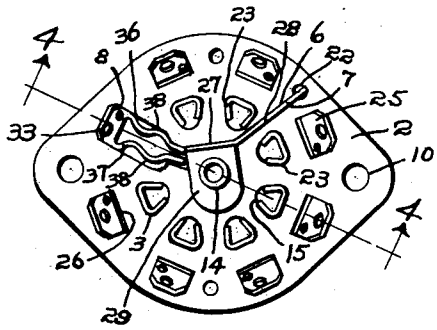


Fig. 3.

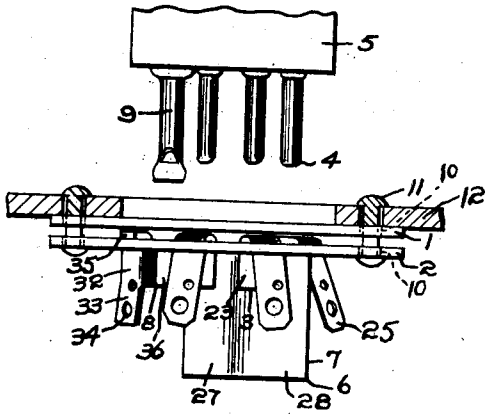


Fig. 4.

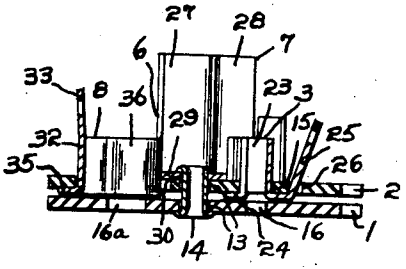


Fig. 5.

Fig. 6.

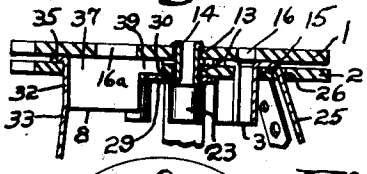
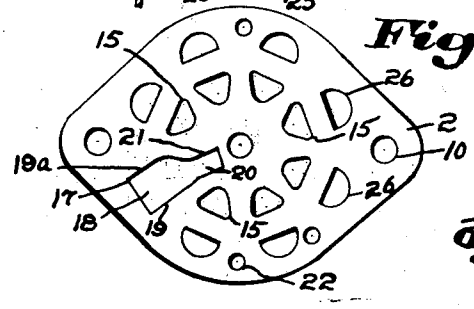
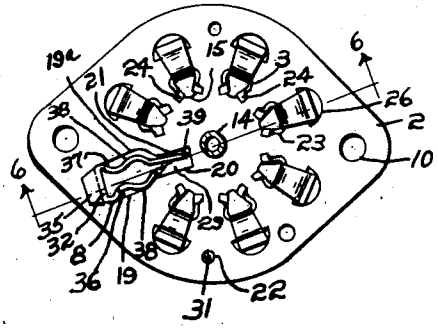


Fig. 7.





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Fig. 8.

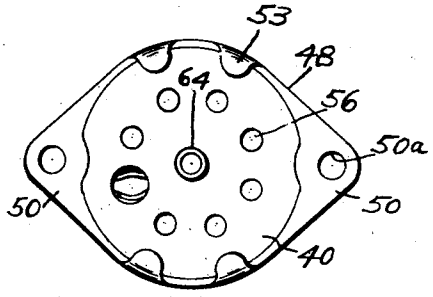


Fig. 9.

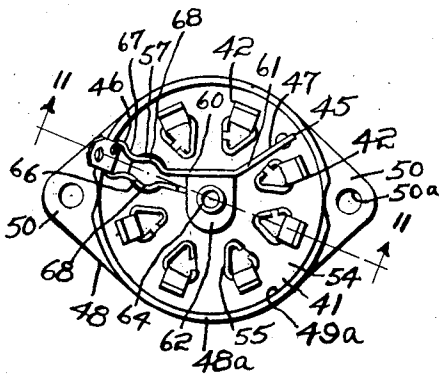


Fig. 10.

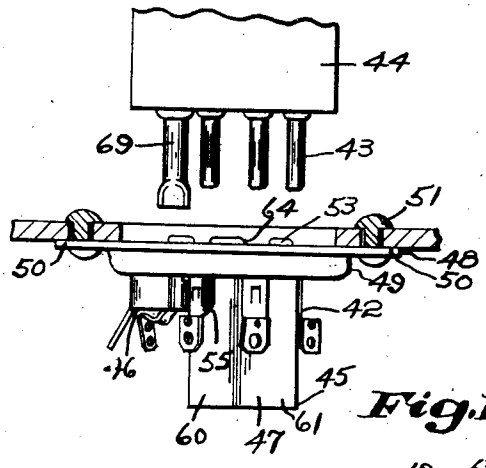


Fig. 11.

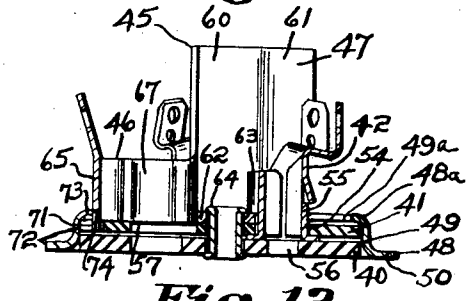


Fig. 12.

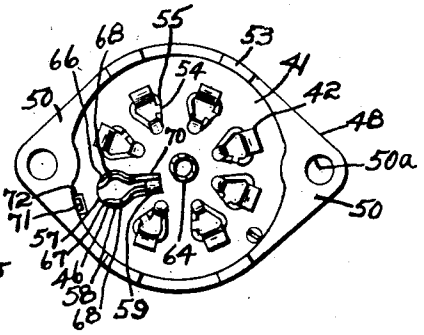


Fig. 14.

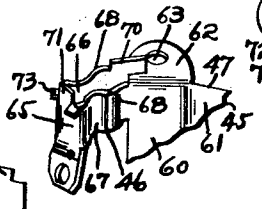
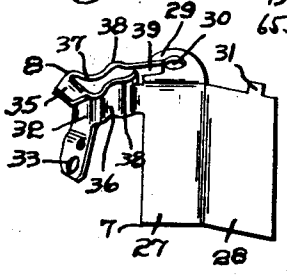


Fig. 13.



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Patented Oct. 21, 1941

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UNITED STATES PATENT OFFICE

2,259,739

VACUUM TUBE SOCKET

Scipione M. Del Camp, Maywood, Ill., assignor to Cinch Manufacturing Corporation, Chicago, Ill., a corporation of Illinois

Application December 17, 1938, Serial No. 246,409

3 Claims. (Cl. 173—328)

This invention relates to improvements in sockets and more especially to sockets for use in combination with radio vacuum tubes.

One of the objects of my invention is the provision of a socket having a shield in the form of a metal wall disposed between contact members thereof which receive high and low potential lead pins provided by a tube base. Thus the shield, which is connected to a ground, serves to maintain low grid-to-plate capacitance notwithstanding the fact that the lead pins are close together.

Another object of my invention is to provide a contact spring formed integrally with the shield for receiving a lead pin of the tube base to ground the same. As a result of the integral construction of the contact spring and shield, a relatively low ground discharge loss is effected.

Other objects and uses of my invention will be apparent from inspection of the drawings and specification hereinbelow set forth.

Referring to the drawings, in which I have illustrated preferred embodiments of my invention:

Fig. 1 is a top plan view of my first form of improved socket member;

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

Fig. 3 is a side view of my first form of socket member and showing lead pins of the base of a vacuum tube in position for cooperating engagement with the contact springs of the socket member;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 2;

Fig. 5 is a top view of my first form of socket member with the upper insulating plate removed to show the relative position of parts of my improved device;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 5;

Fig. 7 is a view of the lower insulating plate before assembly of the contact springs therewith;

Fig. 8 is a top plan view of my second form of improved socket member;

Fig. 9 is a bottom plan view of the socket member shown in Fig. 8;

Fig. 10 is a side view of my second form of socket member showing the lead pins of a tube base in position for engagement with the contact springs of the socket member;

Fig. 11 is an enlarged sectional view taken along the line 11—11 of Fig. 9;

Fig. 12 is a top view of my second form of socket member with the upper insulating plate before assembly of the upper insulating plate therewith;

Fig. 13 is a plan view of the integrally combined contact spring and shield member per se, preferably used with my first form of socket member; and

Fig. 14 is a fragmentary plan view of the integrally combined contact spring and shield member, preferably used with my second form of socket.

Referring to the first form of my invention as illustrated in Figs. 1–5 of the drawings, I have shown a socket which includes an insulating base having an upper plate 1 and a lower plate 2 formed of suitable insulating material. Contact springs 3 are carrier by the base for receiving suitable lead pins 4 of a tube base 5 (Fig. 3). A metal member, generally indicated by the numeral 6, providing an integral contact spring and shield, is assembled with the insulating plates 1 and 2 in a manner to be described. The shield portion 7 of the metal member 6 is disposed between contact springs 3 extending beyond the lower surface of the insulating plate 2 so as to provide a wall between the contact springs, and the contact spring portion 8 of the member 6 is constructed to receive a tube pin 9 (Fig. 3) which may be in electrical connection with the metal envelope (not shown), or other metal shield used in construction of a vacuum tube, for grounding the same. The construction of the contact spring 8 differs from that of the contact springs 3 in a manner to be described.

The insulating plates 1 and 2 have registering apertures 10 at opposed ends for receiving rivets or other suitable attaching means 11 whereby the socket base may be secured to a metal supporting panel 12 (Fig. 3). The insulating plates 1 and 2 have aligned centrally-disposed apertures 13 (Figs. 4 and 6) for receiving an attaching means such as the rivet 14, which secures the member 6 to the socket base and, at the same time, maintains the plates in assembly. The lower plate 2 has a series of apertures 15 for receiving pin-receiving portions of the contact springs 3 and the upper plate 1 has a series of pin-receiving apertures 16 in a registry with the apertures 15. A relatively large opening 17, as most clearly shown in Fig. 7, is formed in the lower insulating plate 2 between a pair of openings 15 thereof for receiving the contact spring 8 of the member 6. The opening 17 comprises a substantially rectangular portion 18 having longitudinal edges 19 and 19a for a purpose to be described and a narrow extension 20 of the inner end of the open-

ing 18 having a side wall 21. A relatively small opening 22 is preferably provided adjacent a peripheral edge of the lower plate 2 for receiving a projection extending from the shield 7 for maintaining the shield in position, as will be hereinafter more fully described.

Each of the contacts 3, in my preferred form, has a substantially tubular pin-receiving portion 23 extending through an aperture 15 of the plate 2 and supporting means in the form of ears 24 (Fig. 5) disposed in superposed relation to the upper surface of the plate 2 adjacent the respective aperture 15. A terminal lug 25 extends from the portion 23 through an opening 26 of the plate 2. It is understood that I do not wish to be limited by the preferred form of contact spring 3 illustrated and described as the particular construction and arrangement of the contact springs 3 is unimportant except as pertaining to the relative position of a pair of contacts enabling the metal shielding wall to be interposed between the same.

Referring in detail to the member 6, I have provided a part made of one piece of sheet metal and comprising the contact spring 8 and the shield means 7 integrally joined together. The shield means 7 is preferably in the form of a rectangular plate and provides a portion 27 and a portion 28 preferably in angular relation to the portion 27 and disposed between a pair of tubular pin-receiving portions 23 of the contacts 3 when the member 6 is finally assembled with the socket base, as most clearly shown in Fig. 2. An attaching portion in the form of a flange 29 extends from an upper edge of the portion 27. The flange 29 has an opening 30 therein for receiving the attaching means 14 whereby it may be secured in adjacent relation to the lower surface of the plate 2 so as to firmly affix the member 6 to the socket base. A lug portion 31 (Fig. 5) extends upwardly from the upper edge of the portion 28 and is received within the aperture 22 of the plate 2 for positioning the shield plate and limiting lateral movement of the same after it has been finally secured to the socket base so as to prevent the portion 28 of the plate from accidentally coming into contact with adjacent contact springs 3.

The contact spring 8 preferably comprises a back portion 32 and a terminal portion 33 forming an extension of the lower end of the back portion. The terminal portion has openings 34 for receiving wires (not shown) to be soldered to the terminal as a result of which the contact spring 8 and shield 7 may be grounded to the chassis of the radio set. An ear 35 extends from the upper end of the back portion 2 in substantially right-angular relation to the normal plane of the back portion for a purpose to be described. Spaced side portions 36 and 37 extend from the back portion 32 in angular relation thereto in the general direction of the plate 27. The side portions 36 and 37 have oppositely-facing bowed portions 38 intersecting an opening 16a of the insulating plate 1 for receiving between them the lead pin 9 of the tube base. The end of the side portion 36 away from the back portion 32 is integrally joined to the plate 27 and the side portion 37 is free at its end farthest away from the portion 32 permitting the side portion 37 to yield relative to the side portion 36 upon entrance of the lead pin 9 between the side portions. A lug portion 39 of less width than the side portion 37 projects beyond the free end of the portion 37 and rests upon the upper surface of the flange 29 of the shield 7 with the plane of its flat surface in substantially perpendicular relation to the plane of the upper flat surface of the flange. When the member 6 is in final assembly with the socket base, the flange 29 is riveted to the under surface of the plate 2 and the side portions 36 and 37 are disposed within the aperture 17. It will be noticed that the side portion 36 is preferably positioned within the aperture 17 in such a way that the bowed portion 38 thereof abuts the wall 19 of the opening whereby the side portion 36 is restrained by the wall 19 from expansion upon engagement of the side portions with the contact lead pin 9. On the other hand, the bowed portion 38 of the side portion 37 is spaced from the wall 19a of the opening 18 permitting the side portion 37 to expand upon engagement with the lead pin 9. Expansion of the side wall 37 is limited by the lug 39 which is disposed within the reduced opening 20 and is adapted to abut the wall 21 of the reduced opening 20 when the lead pin 9 is electrically engaged with the contact spring. The ear 35 engages the upper surface of the plate 2 adjacent the aperture 17 preventing axial movement of the contact spring relative to the opening 17 when pressure is exerted on the contact spring during engagement of the lead pin 9 therewith.

Thus it will be seen that the plate 7 effects a shielding wall between the contact springs 3 on opposed sides of the same. At the same time the shielding means may be grounded through the contact spring 8 to a ground wire (not shown) electrically engaged with the terminal 33. Furthermore, the contact spring 8 is capable of gripping and holding a lead pin firmly in place. It will be noticed also that as a result of the one-piece construction of the shield 7 and contact spring 8, a very low ground discharge loss is effected.

The second form of my invention, most clearly illustrated in Figs. 8–12 inclusive, is broadly similar to the socket member of my first form, but is modified over the first form to provide the integrally combined contact spring and shield plate in direct electrical engagement with a metal retainer member so that in mounting my second form of socket to a metal panel, an efficient electrical connection is effected without resorting to any soldering.

Referring in detail to my second form of invention, I have shown a socket having an insulating base comprising superposed upper and lower insulating plates 40 and 41 respectively (Fig. 11). Contact springs 42 are carried by the socket base for receiving contact pins 43 of a tube base 44 (Fig. 10). A metal member, indicated generally by the numeral 45, which is broadly similar to the metal member 6 of my first form, is assembled with the socket and provides a contact spring 46, which preferably differs slightly from the contact spring 8 of my first form of metal member, and a shield portion 47 integral with the contact spring 46. The shield portion 47 is preferably similar in construction to the shield portion 7 of my first form of invention. The insulating plates 40 and 41, together with the contacts 42, are maintained in assembly by a metal retainer member 48. The retainer member 48 has a dished body portion 49 having flanges 50—50 at opposed ends. The bottom surface of the body portion 49 has a lip 48a surrounding an opening 49a therein. The flanges 50—50 have apertures 50a for receiving rivets 51 enabling the

retainer member to be secured in direct electrical engagement with a metal supporting panel 52, as shown in Fig. 10. The dished body portion 49 has lugs 53 at its upper edge in clamped engagement with the upper surface of the insulating plate 40 so as to hold the parts of the socket in assembly. The lower insulating plate 41 has a series of apertures 54 for receiving pin-receiving portions 55 of the contact springs 42 and the upper insulating plate 40 has pin-receiving openings 56 in alignment with the openings 54 of the lower plate. The plate 41 also has an opening 57 which is similar in shape to the opening 17 of my first form and includes a relatively large portion 58, which is generally circular in my second form, and a reduced portion 59 (Fig. 12) forming an extension of one end of the portion 58.

Referring in detail to the metal member 45, I have shown one having a substantially rectangular shield means 47 comprising a portion 60 and an angularly-bent portion 61, which, when the metal member 45 is finally assembled with the socket member, is disposed between a pair of spring contacts 42 so as to effect a shielding wall between the same in the manner of the shield 7 of my first form. A flange portion 62 extends from an upper edge of the portion 60 and is apertured as at 63 for receiving an attaching means such as the rivet 64 so as to secure the flange 62 in adjacent relation to the lower surface of the insulating plate 41 whereby the metal member 45 is fixed in assembly with the socket base. The contact spring 46 preferably comprises a back portion 65, and spaced side portions 66 and 67 extend in angular relation to the back portion 65. The side portions have oppositely-facing bowed portions 68 for receiving between them a lead pin 69 (Fig. 10) of the tube base. The side portion 67 is integrally joined to the portion 60 of the shield 47 and the side portion 66 is free at its end away from the back portion 65. The side portion 67 provides a relatively narrow extension in the form of a lug 70 at its free end which rests upon the upper surface of the flange 62 in a similar manner to the lug portion 39 of the metal member 6 of the first form of my invention. The lug 70 may extend above the normal edge of the upper edges of the side portions 66 and 67 so as to engage the wall of the reduced portion 59 of the opening 57 to limit lateral movement of the side portion 66 when a pin is received between the side portions. A projection 71, which is narrower than the back portion 65, extends above the back portion substantially in the plane thereof and is adapted to be received within a slot 72 of the insulating plate 41 (Figs. 11 and 12) so as to restrain lateral movement of the spring portion 46. As a means for electrically engaging the contact spring 46 with the metal retainer 48, I have provided ears 73 integrally joined to the back portion 65 at the upper end thereof. The ears 73 are preferably disposed on opposite sides of the projection 71 and extend in substantially right-angular relation to the plane of the back portion 65, as most clearly shown in Fig. 14.

When the metal member 46 is finally assembled with the socket base, with the flange portion 62 riveted to the lower insulating plate 41, the bowed portions 68—68 of the side portions 66 and 67 of the contact spring intersect the large opening 57 of the insulating plate 41, as shown in Fig. 12, so as to receive the contact pin 69 of the tube base. At the same time the lug portion 70 of the side portion 66 is disposed within the reduced opening 59 for limiting expansion of the side portion 66 in the manner illustrated and described in connection with the contact spring of the metal member 6 of my first form of invention. It will be noticed that when the parts of the socket are in final assembly, the ears 73 extending from the back portion 65 of the metal member 45 are clamped in engagement with the retainer member 48 between the lip 48a and the insulating plate 41. At the same time the back portion 65 of the contact spring 46 may engage the innermost edges 74 of the lip 48a of the retainer member, as most clearly shown in Fig. 11. Thus, as a result of engagement of the ears 73 and the back portion 65 with the metal retainer, the metal member 45 is in permanent electrical connection with the retainer member 48 and is grounded through the retainer member to the metal supporting panel 52 when the retainer member is affixed to the same.

It is understood that I do not wish to limit my invention to the particular form of contact springs 42 illustrated and described in connection with my second form of invention as any one of a number of types of contacts now known may be used. Furthermore, I do not wish to be limited by the exact construction and arrangement of the parts of the socket devices hereinabove illustrated and described as these are merely preferred forms and I am aware that substantial modification of the construction arrangements of the socket devices of my present invention could be made without departing from the scope and spirit of my invention.

Although I have illustrated and described preferred forms of my invention, I do not wish to be limited thereby because the scope of my invention is best defined in the following claims.

I claim:

1. A shielded socket comprising an insulating base carrying a series of contacts, and a one-piece metal shielding member assembled with said insulating base, said shielding member having a shield portion interposed between two of said contacts and a flange portion extending from said shield portion having an opening to receive an attaching means whereby it is secured to a side of said insulating base, and said shielding member having a contact spring forming one contact of said series and providing spaced spring arm portions, one of said arm portions being integrally joined to said shield portion.

2. A shielded socket comprising an insulating base carrying a series of contacts, and a one-piece metal shielding member assembled with said insulating base, said shielding member having a shield portion interposed between two of said contacts and a flange portion extending in angular relation to said shield portion, means securing said flange portion to a side of said insulating base, and said shielding member having a contact spring forming one contact of said series and providing spaced spring arm portions adapted to resiliently grip a pin terminal disposed therebetween, a portion of one of said arms overlying said flange portion so as to be supported thereby, and the other of said arms being integrally joined to said shield portion.

3. A shielded socket comprising, in combination, upper and lower superposed insulating plates having a registering series of contact apertures, said lower plate having a contact aperture of elongated shape, a series of contacts carried by said plates each having a pin-receiving portion extending into an aperture of said lower plate,

and a one-piece metal shielding member assembled with said plates, said shielding member having a shield portion interposed between two of said contacts and a flange portion extending in angular relation to said shield portion, a portion of said flange portion underlying said elongated aperture and means securing said flange to a side of said lower plate, and said shielding member having a contact spring forming one contact of said series and providing spaced spring arm portions adapted to grip a pin terminal therebetween, said arms being disposed within said elongated opening and the walls of said opening limiting relative movement of one of said arms away from the other of said arms, one of said arms having its free end overlying said flange portion, and the other of said arms being integrally joined to said shield portion.

SCIPIONE M. DEL CAMP.