Oct. 27, 1942. S. M. DEL CAMP 2,300,350

SOCKET AND SOCKET INSTALLATION

Filed Dec. 12, 1939 2 Sheets-Sheet 1

Fig. 1.

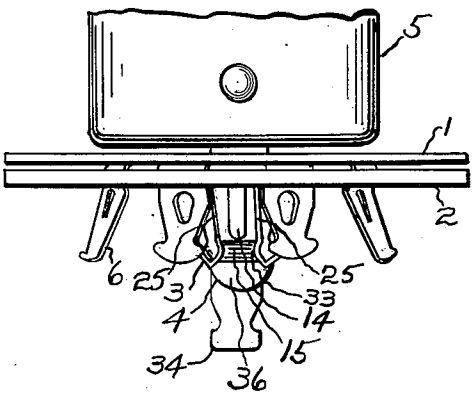


Fig. 2.

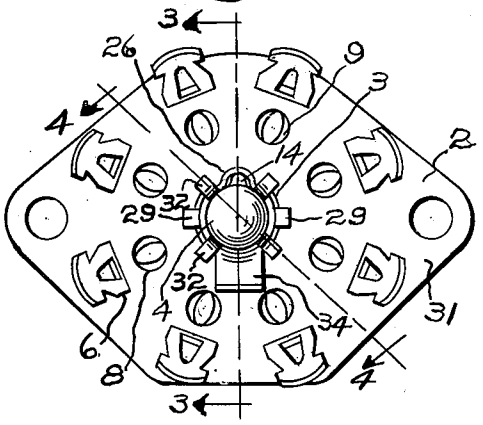


Fig. 3.

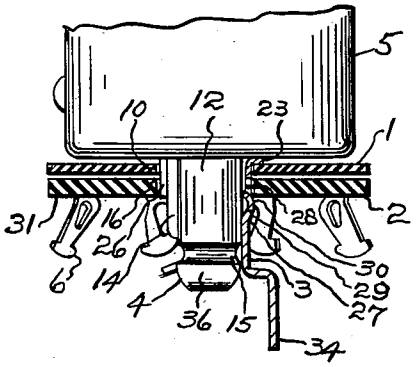


Fig. 4.

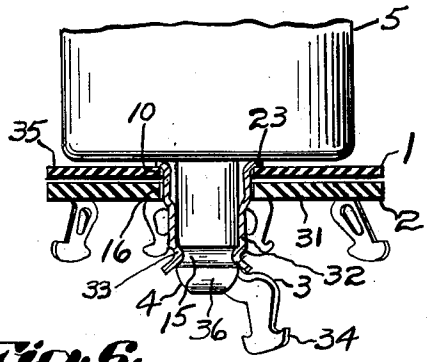
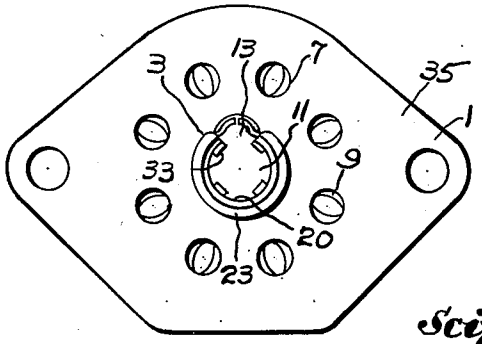
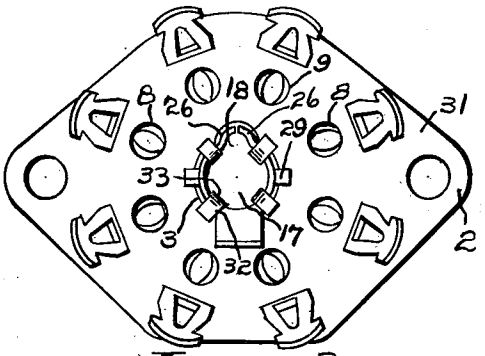


Fig. 6.

Fig. 5.





Inventor:
Scipione M. Del Camp.
By John Todd
Att'y.

Oct. 27, 1942. S. M. DEL CAMP 2,300,350

SOCKET AND SOCKET INSTALLATION

Filed Dec. 12, 1939 2 Sheets-Sheet 2

Fig. 7.

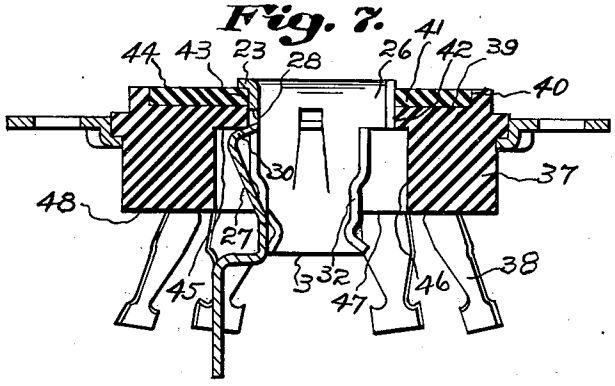


Fig. 8.

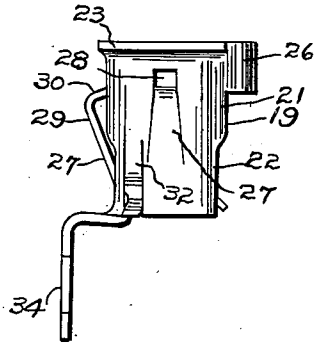


Fig. 10.

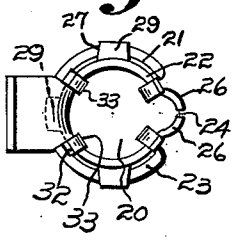


Fig. 9.

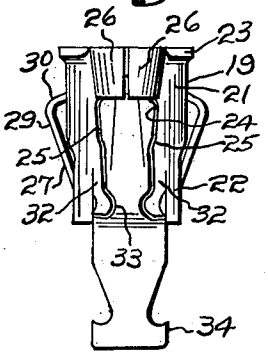


Fig. 11.

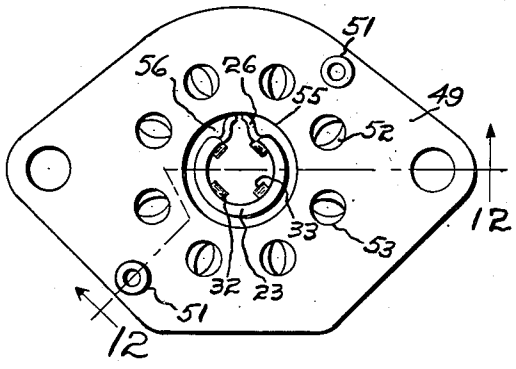
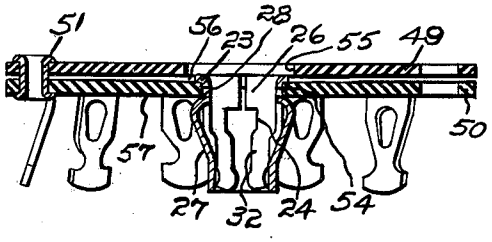


Fig. 12.



Inventor:
Scipione M. DelCamp.
By John Todd
Atty.

Patented Oct. 27, 1942 2,300,350

UNITED STATES PATENT OFFICE

2,300,350

SOCKET AND SOCKET INSTALLATION

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

Application December 12, 1939, Serial No. 308,803

2 Claims. (Cl. 173—328)

This invention relates to improvements in sockets for radio tubes and the like and is directed particularly to that type of socket having a hollow metal member shaped as a key to receive a cooperating positioning prong or grounding prong of a plug member.

One object of my invention is the provision of a metal key adapted to be snapped through aligned openings of insulating parts of a socket member so as to be secured in assembly with the socket member and hold the parts of the socket together.

Another object of my invention relates to a key of the type referred to above wherein it is constructed to engage firmly a prong of a plug member to establish electrical connection therewith and maintain the plug member in assembly with the socket member.

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 front view of a socket installation including my first form of socket member and showing a part of a plug member having a central positioning or contact prong in electrical engagement with a hollow key carried by the socket member;

Fig. 2 is a bottom view of the installation shown in Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2;

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;

Fig. 6 is a bottom view of my first form of socket member;

Fig. 7 is a sectional view through my second form of socket member;

Fig. 8 is a side view of my improved hollow key per se;

Fig. 9 is a view of the hollow key shown in Fig. 8 with the key turned 90° toward the left;

Fig. 10 is a bottom view of the hollow member shown in Figs. 8 and 9;

Fig. 11 is a top view of a third form of socket member; and

Fig. 12 is a sectional view taken along the line 12—12 of Fig. 11.

Referring to the drawings, I have shown three forms of sockets for radio tubes and the like, each of which carries a hollow member or key preferably constructed for receiving a positioning prong of a plug device to be attached to the socket, as, for example, a radio tube, so as to locate the proper projecting contacts or pins of the tube member with proper pin-receiving contacts of the sockets. The positioning key of the socket member may also be used to engage electrically a cooperating prong of a plug device so as to connect electrically the parts, or the key may be used as a combination positioning key and contact.

The socket member illustrated in Figs. 1–6 is in the form of an insulating member comprising top and bottom insulating plates 1 and 2. The socket member carries a positioning key 3, which is preferably of metal, for receiving a positioning prong 4 of a tube member 5 and a plurality of socket contact terminals 6, which may be of any well known construction, assembled with the plates 1 and 2 in any desired manner. The top plate 1 has a series of pin-receiving apertures 7 (Fig. 5) arranged in a circle and in alignment with pin-receiving apertures 8 of the lower plate 2. The terminals 6, in my preferred form, have contact-receiving portions 9 disposed between the plates 1 and 2 in alignment with the openings 7 and 8 of the insulating plates adapted to engage in electrical connection an annular series of terminal pins (not shown) depending from the lower end of the tube member 5.

In the center of the top plate 1 I have formed a relatively large opening 10 for receiving the prong 4 of the tube member. The opening 10 comprises a generally circular portion 11 (Fig. 5) for receiving the cylindrical shank 12 (Fig. 3) of the prong 4 and a lateral extension 13 (Fig. 5) for receiving a lateral projecting rib 14 disposed on one side of the prong 4. The prong 4, in my preferred installation, has an annular groove 15 intermediate its ends adapted for cooperating fastener engagement with spring portions provided by the key 3 in a manner to be described. The lower plate 2 has an opening 16 in the center thereof having a generally circular portion 17 (Fig. 6) in alignment with the circular portion 11 of the top plate 1 and a lateral extension 18 (Fig. 6) in alignment with the lateral extension 13 of the opening 10.

My preferred form of positioning key 3 is constructed of sheet metal so as to make proper electrical engagement with the prong 4 of the tube member when the prong acts as a terminal and at the same time the positioning key may serve to shield the leads at the base of the tube from one another, as will be understood by those skilled in the art. The key 3 preferably comprises a hollow cylindrical metal body 19 (Figs. 8 and 9) having a bore 20 (Fig. 5) therethrough. The body 19 has an upper portion 21 and a lower portion 22 of reduced diameter (Figs. 8, 9 and 10). The body member 19 is adapted to extend through the central openings 11 and 17 of the top and bottom plates and provides a flange portion 23 adjacent its upper end overlying the upper surface of the

upper plate 1 adjacent the circular opening 11, in my first form of socket member, so as to limit axial movement of the positioning key through the central openings of the insulating plates when the parts of the socket are finally secured together. The positioning key has a cut 24 (Figs. 9 and 10) extending entirely through the cylindrical body member 19 in a line substantially parallel to the axis of the bore 20 forming spaced edges 25—25 for receiving between them the rib 14 of the positioning prong 4 when the plug and socket members are in connection. A pair of oppositely disposed ears 26—26 integrally joined to the cylindrical member adjacent the top portion 21 extend outwardly from the normal curvature of the top portion 21. The ears 26—26 extend outwardly and then inwardly so as to be disposed laterally beyond the edges 25—25 of the portion of the body 19 beneath the ears forming a flute-like portion adapted to be disposed within the lateral extensions 13 and 18 of the upper and lower insulating plates for receiving the rib 14 of the positioning prong 4, as most clearly shown in Fig. 2. The area of the positioning key 3 through the wings 26—26 is slightly greater than the area of the positioning prong 4 through the rib 14 with the result that the positioning key 3 receives the entire cross-sectional area of the prong 4 through the rib 14 upon initial entrance of the prong into the key.

As a means for securing the positioning key 3 in assembly with the insulating plates 1 and 2, the key provides a plurality of narrow yieldable fingers 27, herein shown as three in number (Fig. 10), formed from the wall of the body member of the positioning key so as to leave openings 28 in the body member. The fingers 27 extend substantially parallel to the axis of the bore 20 and each has a camming portion 29 extending progressively outwardly from the body member 19 and upwardly and an inwardly extending portion 30 at its upper end providing a shoulder facing the flange 23 and spaced a predetermined distance therefrom for engagement behind the lower surface 31 of the insulating plate 2 when the parts are in final assembly to maintain the plates in assembly. As a result of the fact that the fingers are formed from material of the body, they are capable of moving inwardly and outwardly relative to the respective openings 28 of the body member.

As a means for maintaining the plug member in assembly with the socket member and for effecting good electrical connection between the positioning prong and the key 3 when such connection is desired, I have formed an additional set of spring fingers 32 operable independently of the spring fingers 27. The spring fingers 32 are formed from material of the lower portion 22 of the body member preferably by slitting the body member from its lowermost edge toward its upper end. The fingers 32 extend in lines substantially parallel to the axis of the bore 20 of the body member and provide inwardly extending shoulder portions 33 near their free ends which project into the bore 20 of the key 3 so as to enter into cooperative interlocking engagement with the groove 15 of the prong 4 after passage of the groove 15 through the body member. In my preferred construction of the positioning key 3, I have provided four spring fingers 32 with two of the fingers disposed adjacent opposed sides of the slit 24 near the lower end of the body 19. When the key 3 is to be used as a contact, it may have a lead terminal 34 extending downwardly from the lower end thereof enabling a lead wire (not shown) to be soldered to the key.

Assembly of the parts of the socket member is carried out through first disposing the insulating plates 1 and 2 in superposed relation with the opening 10 of the top plate 1 in alignment with the opening 18 of the lower plate 2. Next the key 3 is moved axially through the aligned openings 10 and 16 with the flute-like portion defined by the wings 26—26 disposed within the aligned lateral extensions 13 and 18 of the circular openings 11 and 17. During movement of the key 3 through the openings, the camming portions 29 of the fingers 27 engage the walls of the openings 10 and 16 and are contracted until the flange 23 is in abutting relation with the upper surface 35 of the top plate 1, at which time the fingers expand to engage the inwardly extending portions 30 behind the lower surface 31 of the lower plate 2. As a result of this action the plates 1 and 2 are maintained in fixed permanent assembly between the flange portion 23 and the inwardly extending portions 30 of the key. Thus the insulating plates comprising the insulating body of the socket member are maintained in proper relative position solely by the key 3 and it is not necessary to use rivets or other attaching means extending through the plates, in the manner now commonly practiced, to secure the plates in assembly.

When the plug member is connected to the socket member, the prong 4 is moved into the bore 20 of the key and the plug member is rotated until the rib 14 is in alignment with the flute-like portion provided by the wings 26—26. At this time the pins (not shown) of the tube member are in alignment with proper pin-receiving terminals of the socket member. Next the prong 4 is moved axially of the bore 20 of the key to extend the rib 14 through the flute-like portion into position between the edges 25—25 of the body 19 of the key, as most clearly shown in Fig. 1. As the prong 4 is moved through the bore 20 of the key, the lower end 36 of the prong 4, which is of greater diameter than the imaginary circle defined by the innermost points of the inwardly extending portions 33 of the fingers 32 force the fingers outwardly until the portion 36 has passed by the fingers, at which time the fingers contract to engage the inwardly extending portions 33 within the groove 15 of the prong 4. Thus the fingers 32 resiliently engage the prong 4 to effect a good electrical connection between the prong and key, and, at the same time, interlocking engagement between the prong and key aids to maintain the plug and socket members in fixed connection.

Referring to my second form of socket member illustrated in Fig. 7, I have shown one of so-called molded construction having my improved positioning key in assembly therewith. The key illustrated in connection with my second form of socket member is similar in form to the key of my first form and the same numerals are used to indicate identical portions of the keys of both devices. My second form of socket member includes an insulating member comprising a main body member 37. The main body member 37 has a circular series of openings therethrough (not shown) receiving socket contacts 38 which provide pin-receiving contact portions (not shown) adjacent the upper side 39 of the body portion 37. The body portion 37 preferably pro-

vides a shallow opening 40 adjacent its upper face in which is disposed an insulating disk 41 which overlies the pin-receiving portions of the socket contacts (not shown) to protect the same. The body portion 37 has a central opening 42 which is preferably similar in shape to the openings 10 and 16 of my first form of socket member illustrated in Figs. 1–6. The disk 41 has a central opening 43 which is similar in shape to the opening 42 and in alignment with the same. When the positioning key 3 is assembled with the socket member, the flange portion 23 of the key engages the upper surface 44 of the disk 41 and the shoulders 30 of the yieldable fingers 27 engage the bottom 45 of an opening 46 formed in the body portion 37 and extending from the lower side 47 toward the upper side 39 and of greater diameter than the opening 42. Thus the disk 41 is maintained in assembly with the body portion 37 between the flange portion 23 and the shoulders 30 and at the same time the positioning key 3 is secured in fixed assembly with the socket member to carry out the hereinabove mentioned uses.

My third form of socket member illustrated in Figs. 11 and 12 is of the type comprising a pair of superposed insulating plates, but it differs slightly in construction from my first form of socket member and carries a positioning key secured to the socket member in a slightly different manner than illustrated in my first form. As a result of the fact that the positioning key used in connection with my third form of socket member differs only in proportions from the key of my first form, I have chosen to indicate portions of the key of my third form by the same numerals hereinabove used. My third form of socket member comprises an upper insulating plate 49 and a lower insulating plate 50 secured together by attaching means such as rivets 51 extending through aligned apertures in the insulating plates. The lower plate 50 carries an annular series of socket contacts providing pin-engaging portions 52 (Fig. 11) and the upper insulating plate 49 has a plurality of apertures 53 arranged in a circle to align with the pin-engaging portions 52 of the contacts. The insulating plate 50 has a central aperture 54 which is preferably of identical shape to that of the openings 10 and 16 of the plates of my first form of socket member. The upper plate 49 has a central circular opening 55 of greater diameter than the maximum diameter of the opening 54 and in alignment with the opening 54. As a result of the relatively greater diameter of the opening 55, the prong 4 of the plug member may be extended through the opening 55 into engagement with the key 3 without contacting the upper plate. The key 3, in my third form of socket member, is assembled with the lower plate 50 only and this action is carried out through inserting the key 3 axially of the opening 54 to engage the flange portion 23 of the key adjacent the upper surface 56 of the lower plate and the shoulders 30 adjacent the lower surface 57 of the lower plate. It will be seen that where it is desired to engage the key with one only of the superposed plates, the distance between the flange portion 23 and the shoulders 30 of the yieldable fingers 27 is relatively less than where it is desired to engage two plates between the aforesaid portions of the key, such as illustrated by my first form of socket member. As a result of my improved construction, wherein the opening 55 is relatively large, there is no wear or possible breakage of the upper plate adjacent the central opening during insertion of the tube prong through the opening of the upper plate into engagement with the positioning key. The key 3, in combination with my third form of socket member, is in every way adaptable to effect the uses required of the keys in assembly with the other forms of socket members hereinabove described.

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

I claim:

1. In a socket receptacle for the reception of a plug-in device having contact prongs and a guide prong of non-circular cross-section formed with an annular groove near its outer end, in combination with a centrally apertured insulating member thereof; of a snap-in contact key for snap fastening engagement with the insulating member through the aperture thereof, said key comprising an open ended tubular sheet metal sleeve formed with laterally extending flange means at one end overlying a portion of the insulating member and limiting movement of the key in one direction through the aperture thereof, said sleeve having a longitudinal slot in one side thereof providing widely spaced edges throughout the length thereof, laterally extending arcuate ears extending from said edges on the upper portion of the sleeve and combining with the sleeve opening to conform to the non-circular cross-section of the guide prong, a plurality of spaced outwardly bowed resilient fingers forming an enclosed loop with the side of the sleeve and each having a relatively long cam face extending lengthwise of the sleeve and a relatively short shoulder disposed transversely of the sleeve for engaging a face of said insulating material as the key is snapped into the aperture of the insulating member to hold said key in secure assembly therewith, and a plurality of pairs of diametrically opposed inwardly bowed fingers extending inwardly of said sleeve at the lower end thereof and engaging the groove in the plug guide prong, one finger of each pair being formed from metal between a marginal edge of the slot in the sleeve and a slit spaced therefrom.

2. In a socket receptacle of the class described having at least one apertured insulating base member as a part thereof; of a snap-in contact member for the reception of a prong of a plug device to be electrically connected therewith, said contact member being formed from a single piece of metal for snap fastening engagement with the insulating member through the aperture thereof, and comprising an open ended tubular sleeve having flange means at one end, said sleeve being formed with a plurality of alternately arranged upwardly and downwardly extending fingers cut from the body of the sleeve and each connected to the sleeve in the region of the central portion of the sleeve body, the upwardly extending fingers extending outwardly from the sleeve and cooperating with the flange means to hold the contact member in assembly with the insulating member, and the downwardly extending fingers extending inwardly of the sleeve for snap fastening engagement with said plug prong.

SCIPIONE M. DEL CAMP.