

Aug. 19, 1941.

S. M. DEL CAMP

2,252,918

ELECTRICAL SOCKET

Filed Feb. 18, 1939

2 Sheets-Sheet 1

Fig. 1.

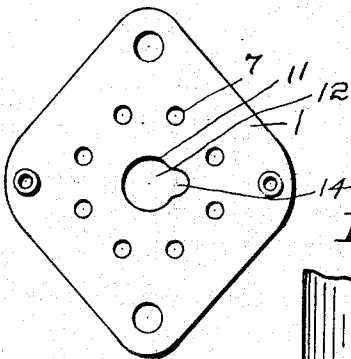


Fig. 2.

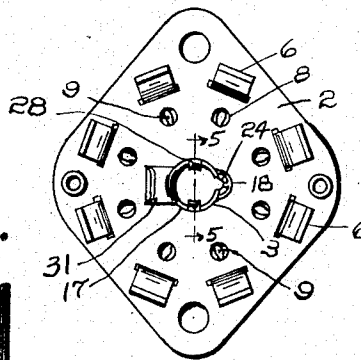


Fig. 4.

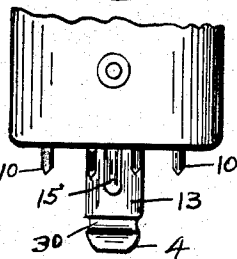


Fig. 3.

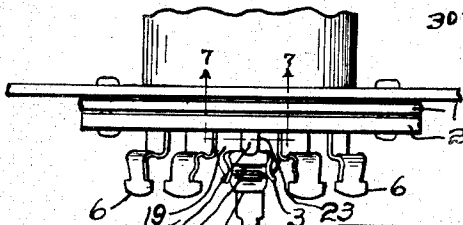


Fig. 6.

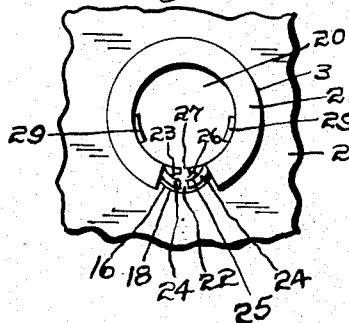


Fig. 5.

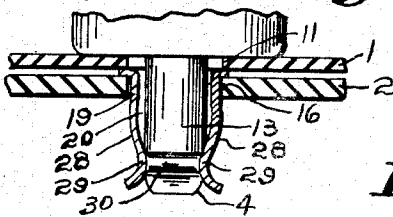


Fig. 7.

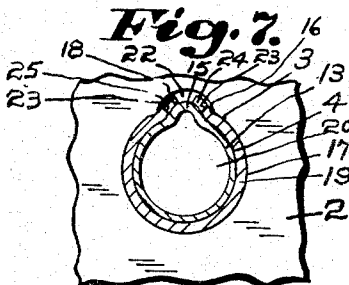


Fig. 8.

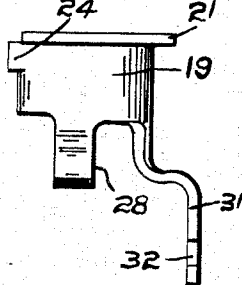
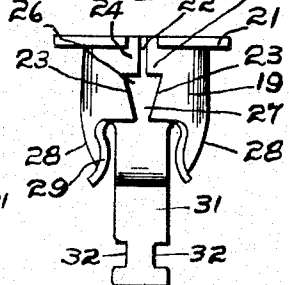


Fig. 9.



Inventor:
Scipione M. Del Camp.
by *Walter J. Jones*
Att'y.

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2 Sheets-Sheet 2

Fig. 10.

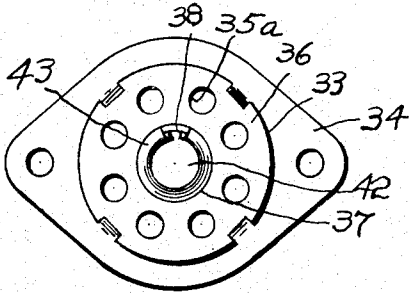


Fig. 11.

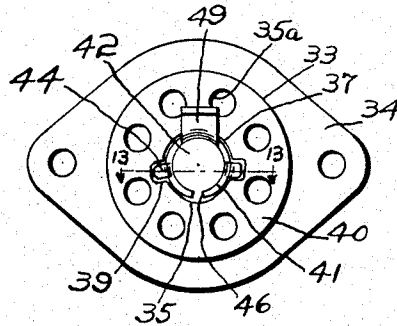


Fig. 12.

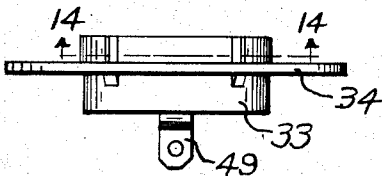


Fig. 13.

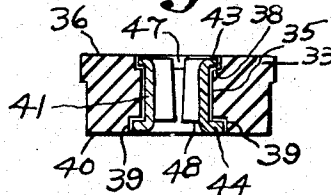


Fig. 14.

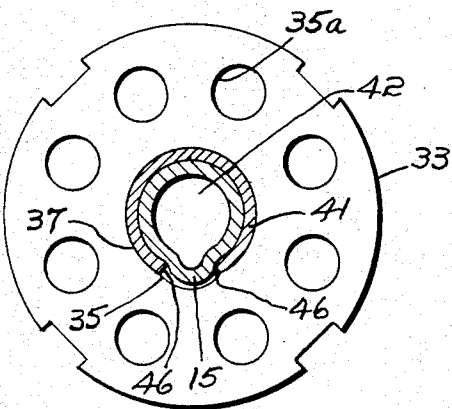


Fig. 15.

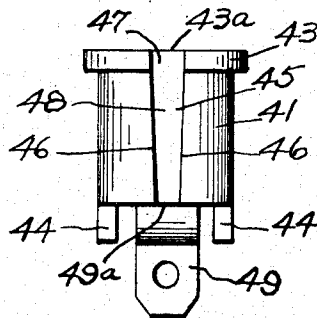
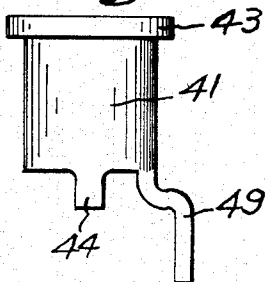


Fig. 16.



Inventor:
Scipione M. Del Camp,
by **Walter S. Jones**
Att'y.

UNITED STATES PATENT OFFICE

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ELECTRICAL SOCKET

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

Application February 18, 1939, Serial No. 257,220

5 Claims. (Cl. 123—328)

This invention relates to improvements in sockets for radio tubes and the like and is directed particularly to those sockets having a bore for receiving a cooperating positioning or grounding prong of a radio tube.

In the drawings, which illustrate preferred embodiments of my invention:

Fig. 1 is a top view of a socket member with which I have chosen to illustrate the use of my first form of positioning member;

Fig. 2 is a bottom view of the socket shown in Fig. 1 with my first form of positioning key assembled therewith;

Fig. 3 is a front view showing a socket member carrying my first form of positioning key secured to a support and a vacuum tube assembled with the socket member;

Fig. 4 is a front view of a part of the tube member shown in Fig. 3;

Fig. 5 is an enlarged sectional view taken on the line 5—5 of Fig. 2 showing a positioning prong of the tube member in electrical engagement with my first form of positioning key;

Fig. 6 is an enlarged top view of a part of the lower insulating plate of the socket member showing the manner in which the positioning key is assembled with the plate;

Fig. 7 is an enlarged sectional view taken along the line 7—7 of Fig. 3;

Fig. 8 is an enlarged side view of my first form of positioning key per se;

Fig. 9 is a front view of the positioning key shown in Fig. 8;

Fig. 10 is a top view showing another form of socket member having my second form of positioning key assembled therewith;

Fig. 11 is a bottom view of the socket member shown in Fig. 10;

Fig. 12 is a front view of the socket member shown in Figs. 10 and 11;

Fig. 13 is an enlarged section taken along the line 13—13 of Fig. 11;

Fig. 14 is an enlarged section taken along the line 14—14 of Fig. 12;

Fig. 15 is an enlarged front view of my second form of positioning key per se; and

Fig. 16 is a side view of the positioning key shown in Fig. 15.

Referring to the drawings, I have shown sockets for radio tubes and the like having a hollow member or key for receiving a positioning prong of a part 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. Each of my preferred forms of positioning keys may also serve solely as a terminal contact to engage electrically a proper prong of a radio tube or they may be used as a combination positioning key and contact. The socket shown in Figs. 1 through 7, with which I have chosen to illustrate the use of my first form of positioning key, may be of different style from the socket shown in Figs. 10 through 14, with which my second form of positioning key is preferably assembled.

The socket member illustrated in Figs. 1 through 7 comprises top and bottom dielectric plates 1 and 2, hereinafter referred to in the claims as a base member of insulating material, a positioning key 3 disposed, in my preferred form, in the center of the socket member for receiving a positioning prong 4 of a tube member 5, and a plurality of socket contact terminals 6 of any well known construction assembled with the insulating plates 1 and 2 in any well known manner. The top plate 1 has a series of pin-receiving apertures 7 (Fig. 1) preferably arranged in a circle and in alignment with pin receiving apertures 8 (Fig. 2) in the bottom plate 2. The terminals 6 have openings 9 (Fig. 2) in alignment with the openings 7 and 8 of the respective insulating plates adapted to receive and electrically engage terminal pins 10 (Fig. 4) extending beyond the lower end of the tube member.

In the center of the top plate 1 I have formed a relatively large opening 11 for accommodating the passage of the positioning prong 4 of the tube member. The opening 11 comprises a generally circular portion 12 for receiving the generally cylindrical shank 13 of the positioning prong 4 and a lateral extension 14 for receiving a laterally-projecting rib 15 disposed on one side of the prong 4. The lower plate 2 has an opening 16 in the center thereof having a generally circular portion 17 in alignment with the circular portion 12 of the opening 11 and a lateral extension 18 in alignment with the extension 14 of the opening 11.

My first form of positioning key 3 is preferably formed of sheet metal so as to make proper electrical engagement with the prong 4 of the tube member when the prong is a terminal, as well as to effect secure attachment of the tube member to the socket. In case it is desired that the prong 4 be used solely as a positioning prong and not as a terminal, the positioning key may be formed of any suitable material to engage the prong and grip the same in the manner hereinbelow set forth so as to hold the tube firmly in place. The

positioning key is assembled with the insulating plates 1 and 2 and normally extends through the opening 16 of the lower plate 2 in loose relation to the walls thereof permitting relative expansion of portions of the key in a manner to be described. The positioning key 3 preferably comprises a cylindrical body member 19 having a bore 20 extending entirely therethrough adapted to receive the positioning prong 4. The cylindrical body portion 19 extends through the opening 16 of the plate 2 and has flange portions 21 adjacent its upper end disposed between the insulating plates 1 and 2 and overlying the upper surface of the lower plate 2 adjacent the opening 16 (Fig. 6) thereby maintaining the positioning key in assembly with the socket member when the parts of the socket are finally secured together. One of the features of my invention is directed to the fact that the positioning key has a cut 22 extending entirely through the wall of the cylindrical portion 19 in a line substantially parallel to the axis of the bore 20 forming spaced edges 23—23 expansible relative to each other for a purpose to be described. Adjacent the upper end of the cylindrical portion 19 I have provided a pair of ears 24—24 disposed in opposite relation with their free ends terminating adjacent the cut 22. The ears 24—24 extend outwardly from the normal curvature of the cylindrical portion 19 and inwardly laterally beyond the edges 23—23 of the cylindrical portion disposed immediately beneath the ears forming a flute-like portion 25 adapted to be disposed within the lateral extension 18 of the opening 16 of the lower plate 2 for receiving the rib 15 of the positioning prong 4, as most clearly shown in Fig. 6. The area of the cylindrical portion 19 through the flute-like portion 25 is slightly greater than the area of the positioning prong 4 through the rib 15 with the result that the positioning key receives the entire cross-sectional area of the prong 4 through the rib 15 upon initial entrance of the prong into the key. Immediately beneath the ears 24—24 the cut 22 has an enlarged portion 26 (Fig. 9) of greater width than the rib 15 of the prong 4. The cut 22 preferably tapers from the relatively wide portion 26 to the lowermost end of the cylindrical portion 19 forming a portion 27 (Fig. 9) adjacent the lower end of a width less than that of the rib 15 so that the edges 23—23 adjacent the portion 27 preferably engage the rib when it is extended thereinto, as hereinafter described.

Engagement of the positioning prong 4 with the positioning key is a relatively simple matter and is carried out through relative rotation of the tube member until the rib 15 is in alignment with the lateral extension 14 of the opening 11 of the top plate 1. Next the prong 4 is moved axially of the positioning key to extend the rib 15 through the flute-like portion 25 into the relatively wide portion 26 of the cut 22. Thus when the positioning prong is extended through the opening 11 of the top plate 1 into the positioning key, the flute-like portion 25 forms a guide receiving the rib 15 and leading it into the relatively wide portion 26. As downward pressure upon the tube is continued, the rib 15 is forced into engagement with the edges 23—23 of the cylindrical portion 19 adjacent the narrow portion 27 of the cut 22. Pressure of the rib 15 against the converging edges 23—23 adjacent the narrow portion 27 expands the cylindrical portion 19 with the result that the edges 23—23 engage the rib 15 in a line contact, as most clearly shown in Fig. 7, thus effecting an excellent electrical connection between

the parts as well as maintaining the tube member in firm assembly with the socket.

As an additional means for maintaining the tube member in assembly with the socket member and for effecting good electrical connection between the positioning prong and the positioning key when it is so desired, I have preferably provided spring arms 28—28 extending beyond the lower edge of the cylindrical portion 19 in substantially parallel relation to the axis of the bore 20. The arms 28—28 have oppositely arranged inwardly-extending shoulder portion 29 adjacent the outermost free ends normally in alignment with the bore 20 of the positioning key so as to enter into cooperative interlocking engagement with a groove 30 of the positioning prong 4 (Fig. 5) after passage of the groove 30 through the cylindrical portion 19 of the positioning key. Interlocking engagement of the shoulders 29 with the groove 30 takes place, in my preferred form, simultaneously with the maximum engagement of the edges 23—23 of the cylindrical member with the rib 15 of the prong, as hereinbefore described.

When the prong 4 of the tube member is used as a terminal, the positioning key 3 acts as a connector and a soldering lug 31 is provided so as to enable a lead wire to be soldered to the positioning key. In my preferred construction, as most clearly illustrated in Figs. 8 and 9, the soldering lug 31 extends beyond the lower end of the cylindrical portion 19 in substantially parallel relation to the axis of the bore 20, then laterally and again outwardly and parallel to the axis. The lug 31 may have notches 32—32 formed in opposed edges adjacent the outermost free end to facilitate attachment of a lead to the lug prior to soldering.

Referring to the socket illustrated in Figs. 10 through 14, with which I have chosen to illustrate my second form of positioning key, the socket is of the so-called molded type comprising a base member 33 of insulating material having a metal collar 34 assembled therewith in any well known manner for securing the base member to a supporting structure. The base member 33 has an opening 35 in the center thereof extending from the upper face 36 entirely through the body member and providing a seat for my second form of positioning key 37. The opening 35 has an internal annular shoulder 38 (Fig. 13) spaced slightly from the end adjacent the face 36 and a pair of notches 39—39 are formed in the lower face 40 adjacent the opening 35 (Figs. 11 and 13) for a purpose to be described. A plurality of openings 35a of any desired shape are formed in a circular series around the opening 35 for receiving any suitable form of socket contact terminal (not shown). My second form of positioning key 37, which is preferably formed of sheet metal material, is loosely assembled with the base member 33 within the opening 35 and is adapted to receive and tightly grip the positioning prong 4 of the tube member so as to hold the vacuum tube firmly in place and make satisfactory electrical engagement with the tube prong, if the prong is a terminal, in the manner of my first form of positioning key hereinabove described.

My second form of positioning key comprises a cylindrical body portion 41 having a bore 42 extending entirely therethrough. Flange portions 43 are provided adjacent the upper end 43a of the cylindrical portion 41 adapted to be disposed within the opening 35 and supported by the in-

ternal annular shoulder 38 of the opening 35 whereby axial movement of the positioning key is limited in one direction through the opening 35. A pair of lug portions 44 integral with the lower end 44^a of the cylindrical portion 41 extend outwardly in substantially perpendicular relation to the normal axis of the bore 42 of the cylindrical member when the cylindrical member is assembled with the base member. The lug portions 44 are adapted to be disposed within the notches 38—39 of the base member so as to limit movement of the positioning key in an upward direction relative to the axis of the opening 35 and to prevent relative rotation of the parts. A cut 45 is provided in the wall of the cylindrical portion 41 extending, in my preferred form, entirely through the cylindrical portion in a line parallel to the axis of the bore thereof providing spaced-apart edges 46—46. The cut 45 has a relatively wide portion 47 (Fig. 15) adjacent the upper end 43^a of the cylindrical portion 41, which is of greater width than the rib 15 of the positioning prong 4 and serves to receive the rib 15 upon initial entrance of the prong 4 into the positioning key. The cut 45 tapers from the wide portion 47 toward the lower end 44^a of the cylindrical portion 41 providing a portion 48 (Fig. 15) which is relatively narrower than the width of the rib 15.

In assembling the tube member with the socket, the prong 4 is rotated until the rib 15 thereof falls within the relatively wide opening 47 of the cut 45, at which time the pins 10 of the tube member are in alignment with proper pin-receiving terminals (not shown) of the socket member. As pressure is exerted upon the tube member to force the prong 4 axially downwardly relative to the positioning key 37, the rib 15 enters into engagement with the edges 46—46 of the cylindrical portion 41 adjacent the narrow portion 48 of the cut acting as a wedge to expand the cylindrical portion. As a result, when the tube member has been moved into final position, the edges 46—46 of the cylindrical portion adjacent the narrow portion 48 of the cut engage the rib 15 in line contacts, as shown in Fig. 14, so as to effect secure engagement between the parts. Where it is desired to use my second form of positioning key as a connector, a wiring terminal 49 may be provided integral with the cylindrical portion 41 and extending beyond the end 44^a of the same for receiving a lead wire (not shown).

Thus by my invention my improved positioning keys, in assembly with suitable socket base members, firmly engage a positioning prong of a tube member so as to hold the vacuum tube firmly in place even though the tube member is mounted in a horizontal position and even though the parts are subjected to great vibration. At the same time, my improved positioning keys make good electrical contact with the positioning prong of a tube member through reason of the line contacts effected by the tight engagement of the separated edges of the cylindrical walls of the respective positioning keys with the rib of the positioning prong.

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. An electrical connection comprising plug and socket members, said socket member pro-

viding a base of insulating material having an aperture, a plurality of socket contacts assembled with said insulating base, and a hollow member disposed within the aperture of said base, said hollow member having a cut extending axially thereof forming a pair of separated edges, and said plug member providing a metal depending prong having an integral laterally projecting key, and a series of depending contact prongs, said contact prongs being received in electrical engagement by said socket contacts, said prong having said key extending into said hollow member and said projecting key being received between and engaged in edge contact by said separated edges thereof.

2. An electrical connection comprising plug and socket members, said socket member providing a base of insulating material having a central opening, a plurality of socket contacts assembled with said insulating base in a series around said central opening, and a hollow central member disposed within the central opening of said insulating base, said central member having a cut extending axially thereof forming a pair of separated edges, and said plug member providing a metal depending central prong having an integral laterally projecting key, and a series of depending contact prongs around said central prong, said contact prongs being received in electrical engagement by said socket contacts, said central prong extending into said central member and said projecting key being received between and engaged in edge contact by said separated edges thereof, and said edges being relatively farther apart at one point on the length of said cut forming a lead for initial entrance of said projecting key between said edges.

3. An electrical connection comprising plug and socket members, said socket member providing a base of insulating material having a central opening, a plurality of socket contacts assembled with said insulating base in a series around said central opening, and a hollow central member disposed within the central opening of said base member, said central member having a portion of substantially cylindrical cross-sectional shape and a non-circular portion at one end providing a hollow offset portion extending laterally beyond said cylindrical portion, said cylindrical portion having an axial cut in alignment with said offset portion and forming a pair of separated edges, and said plug member providing a depending central prong having a laterally projecting key, and a series of depending contact prongs around said central prong, said contact prongs being received in electrical engagement by said socket contacts, said central prong extending into said central member and said projecting key extending through said offset portion and received between them and embraced by said separated edges of said cylindrical portion.

4. A socket of the class described comprising, in combination, superposed upper and lower insulating plates having aligned central apertures, at least said upper plate having a lateral recess on one side of the central aperture thereof for receiving an integral lateral guide projection of a metal positioning prong of a tube member, a plurality of contact members assembled with said insulating plates in a series around said central apertures for making electrical connections with contacts of a tube member, a cylindrical metal member assembled with said insulating plates and extending through the central opening of said lower plate, said cylindrical member having an

axial opening therethrough adapted to receive said positioning prong of said tube member, said cylindrical member having a cut in a wall thereof in parallel relation to the axis and forming a pair of separated edges in alignment with the lateral recess of said upper plate, said edges being disposed a predetermined distance apart at a point on the length of said cut to receive between them and engage in edge contact said lateral guide projection of said positioning prong passing through said lateral recess of said upper plate when said positioning prong is properly extended into said central aperture of said upper plate.

5. A socket of the class described comprising, in combination, superposed upper and lower insulating plates having aligned central apertures, at least said upper plate having a lateral recess on one side of the central aperture thereof for receiving an integral lateral guide projection of a metal positioning prong of a tube member, a plurality of contact members assembled with said insulating plates in a series around said central apertures for making electrical connections with

contacts of a tube member, a cylindrical metal member assembled with said insulating plates and extending through the central opening of said lower plate, said cylindrical member having an axial opening therethrough adapted to receive said positioning prong of said tube member, said cylindrical member having a cut in a wall thereof in parallel relation to the axis and forming a pair of separated edges in alignment with the lateral recess of said upper plate, said edges being disposed a predetermined distance apart at a point on the length of said cut to receive between them and engage in edge contact said lateral guide projection of said positioning prong passing through said lateral recess of said upper plate when said positioning prong is properly extended into said central aperture of said upper plate, and said edges being relatively farther apart adjacent another point on the length of said cut forming a lead for initial entrance of said lateral guide projection between said edges.

SCIPIONE M. DEL CAMP.