Aug. 13, 1940. C. L. KNUTSON 2,211,726

ELECTRICAL SOCKET

Filed March 5, 1938

Fig. 1.

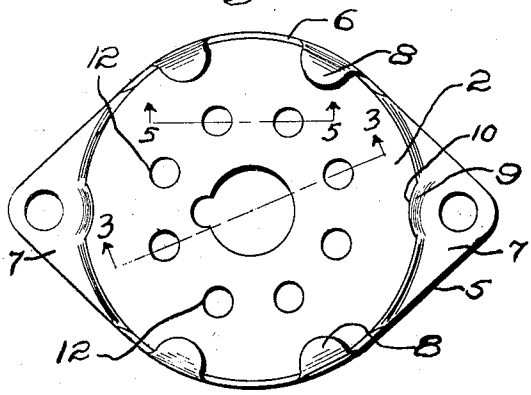


Fig. 2.

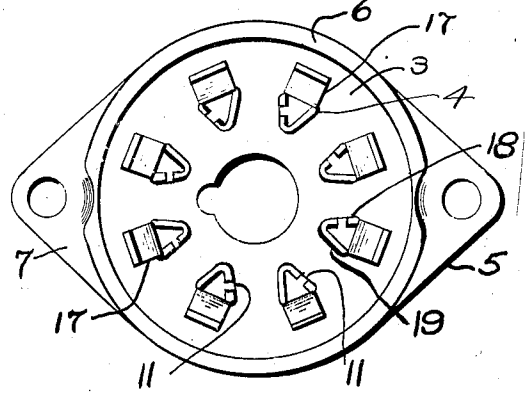


Fig. 3.

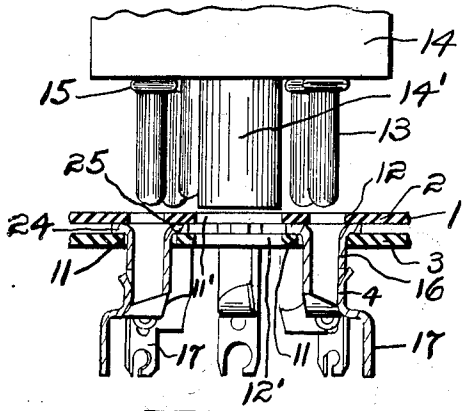


Fig. 4.

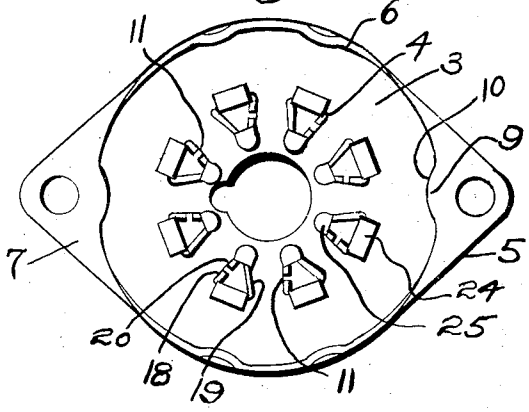


Fig. 5.

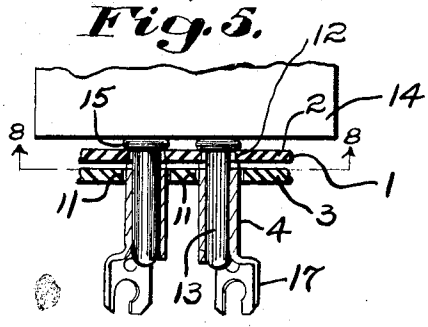


Fig. 8.

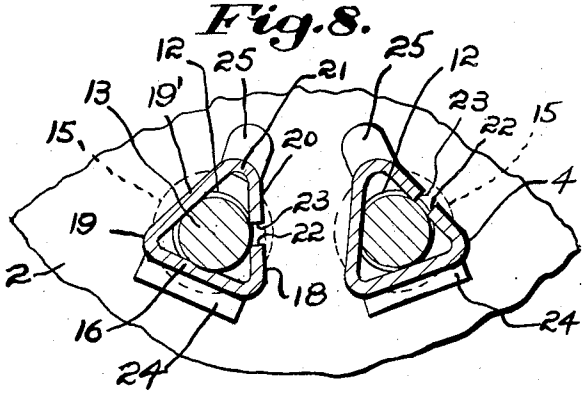


Fig. 6.

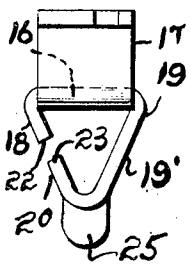
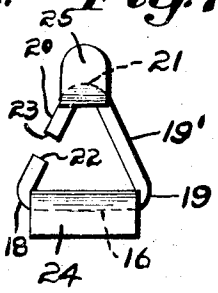


Fig. 7.



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2,211,726

ELECTRICAL SOCKET

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Application March 5, 1938, Serial No. 194,129

3 Claims. (Cl. 173—328)

This invention relates to sockets such as are used in radio apparatus for holding electron tubes having rod-like terminals for electrodes. The invention relates also to improved contact springs for a socket member and to an installation including a socket member having my improved contact springs and a tube member having rod-like electrodes of specific construction received by the contact springs of the socket member.

Heretofore it has been common practice to secure contact springs to a socket base through means of ears extending laterally from one end of the contact spring and disposed between superposed insulating plates of the base. However, it has been found that with the known constructions the ears of adjacent springs are so closely disposed that there is a tendency for leakage between them.

An object of my invention is the provision of a plug and socket installation wherein portions of adjacent rod-like terminals of the plug member are closer together than portions of respective contact springs of the socket member in engagement with the rod-like terminals wherein any leakage at radio frequencies must take place through the rod-like terminals and not through the contact springs.

A further object of my invention is to provide a socket member having my improved contact springs wherein the contact springs are formed to grip resiliently and efficiently a cooperating rod-like terminal of a tube member.

Another object is the provision of an improved contact spring adapted for rapid production in large quantities.

Further objects of my invention will be apparent from inspection of the drawing and specification herein set forth.

Referring to the drawing, in which I have illustrated a preferred embodiment of my invention:

Figure 1 is a plan view of a socket member embodying the present invention;

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

Fig. 3 is a section taken along the line 3—3 of Fig. 1 and showing a portion of a radio tube in spaced relation therewith;

Fig. 4 is a view similar to Fig. 1, but with an insulating plate removed showing the contact springs;

Fig. 5 is a section taken along the line 3—3 of Fig. 1;

Fig. 6 is an enlarged bottom view of one of my improved contact springs per se;

Fig. 7 is an enlarged top view of the contact spring shown in Fig. 6; and

Fig. 8 is an enlarged section taken along the line 8—8 of Fig. 5.

Referring to the drawing, my preferred form of socket member includes a base member 1 comprising an upper plate 2 and a lower plate 3 formed of suitable insulating material. Contact springs 4 are carried by the base 1, and the plates 2 and 3, together with the contact springs, are held together in the assembled socket member by a sheet metal supporting member 5. The supporting member 5 has a dished ring portion 6 having flanges 7—7 at opposed ends which are aperture to receive suitable attaching means for securing the socket member to the under side of a supporting panel (not shown). The ring portion 6 has lug portions 8 in clamped engagement with the top surface of the insulating plate 2 for holding the parts of the socket member in assembly (Fig. 1). In my preferred form the ring member 6 has projections 9 engaging with cooperating notches 10 in the insulating plates 2 and 3 for preventing relative rotation of the parts. The lower insulating plate 3 has apertures 11 therein arranged in substantially circular relation about the center and adapted to receive the contact springs 4, which have supporting ears disposed between the plates 2 and 3. The upper plate 2 has apertures 12 whereby rod-like terminals 13, projecting beyond one end of a tube base 14, pass through the apertures 12 into engagement with the contact springs 4 (Fig. 5). The plates 2 and 3 preferably have aligned central apertures 11' and 12' of non-circular shape for receiving a correspondingly shaped guide pin 14' of the tube member, but this feature forms no part of my present invention as it is well known in the art. The rod-like contacts 13, which I have chosen for the purpose of illustrating my invention, are preferably of the tube type now widely used commercially and have a bead 15 adjacent the tube base 14 for aiding to secure the rod-like contacts to the tube base, as will be understood by those skilled in the art.

Referring in detail to my improved spring contact members 4, I have shown contacts having a back portion 16 which is preferably straight and a wire-receiving portion 17 at one end which may be bent into any suitable form, such, for example, as illustrated in Figs. 5 and 6. A short side portion 18 and a long side portion 19 extend from opposed edges of the back portion 16 and are bent

to form an enclosed region for receiving a cooperating rod-like terminal of a tube member and resiliently engaging the same. The long side portion 19 has a portion 19' extending away from the base portion 16 and forming an acute angle therewith. The long side has a free end portion 20 extending substantially toward the back portion and a portion 21 between the portions 19' and 20 in direct opposite relation to the back portion 16, as most clearly shown in Fig. 8. The short arm 18 extends toward the free end portion 20 of the arm 19 and the arms 18 and 19 have separated free edges 22 and 23 respectively intermediate that edge of the back portion 16 from which the arm 19 extends and the free end portion 20 of the long arm 19 (Figs. 6, 7 and 8). As a result of the particular construction of the rod-receiving portion of the contact spring, wherein one arm is formed to have a substantially greater length than the other arm, greater spring action is provided by the longer arm effecting a good resilient engagement of the arm with a rod-like terminal. Furthermore, the rod-like terminal is engaged by four portions of the contact spring; namely, the back portion 16, the free edges 22 and 23 of the arms 18 and 19 respectively, and the outwardly-extending portion 19' of the long arm, as most clearly shown in Fig. 8, so as to insure an excellent electrical contact between the parts. As a means for assembling the contact spring with the base 1 I have provided a supporting ear 24 extending laterally from the back portion 16 and a supporting ear 25 extending laterally from the portion 21 in direct opposite relation to the ear 24. The ears 24 and 25 are adapted for supporting engagement with the upper surface of the insulating plate 3, as most clearly shown in Figs. 4 and 5, for limiting movement of the spring contacts through the apertures 11. It will be noticed that the particular construction of the contact spring, wherein the slot between the edges 22 and 23 is positioned at one side of the contact spring, enables the ears 24 and 25 to be disposed at opposite ends of the contact spring with the result that respective ears 24 and 25 of adjacent contact springs are disposed no nearer each other than the respective side portions 18 and 19 of the adjacent contact springs. Furthermore, it will be seen from inspection of Fig. 8 that when the rod-like terminals 13 are engaged with the contact springs 4, the beads 15 of adjacent rod-like terminals extend laterally beyond the side portions 18 and 19 with the result that the beads of adjacent rod-like terminals are closer together than portions of adjacent contact springs. As a result of this construction, any leakage at radio frequencies must take place between the rod-like terminals and not between the contact springs.

Assembly of the parts of my socket member is easily carried out through first inserting the contact springs through the apertures 11 of the insulating plate 3 with the wire-receiving portions 17 being first entered through the apertures so that the supporting ears 24 and 25 engage the upper surface of the plate 3. Next, the insulating plate 2 is superposed above the plate 3 with the apertures 12 of the plate 2 in substantial alignment with the terminal-receiving regions of the contact springs 4. Finally, the parts are assembled with the metal holder 5 by the means hereinabove described. In the preferred form of my invention the contact springs 4 are fitted so closely within respective apertures 11 of the insulating plate 3 that there is no chance for portions of adpacent contact springs to move into closer relation to one another than the beads 15 of adjacent rod-like terminals 13 when the terminals are in engagement with the contact springs 4 whereby no leakage can take place between the contact springs for the reasons hereinabove set forth.

Although I have illustrated and described a preferred embodiment 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. A contact spring having a non-circular contact pin-receiving portion provided with a back portion and a pair of side portions extending from opposed edges of said back portion, one of said side portions being longer circumferentially of the pin-receiving portion than the other, said longer side portion having a portion extending outwardly away from said back portion, a free end portion extending inwardly toward said back portion, said side portions having separated free edges, a portion of said longer side portion between said outwardly-extending portion and said free end portion being positioned in opposite relation to said back portion, and a supporting ear extending from said back portion and a supporting ear extending from the oppositely-spaced portion of said longer side at one end of the pin-receiving portion substantially as described.

2. A contact spring having an elongated prong-receiving tubular portion of substantially triangular cross-sectional shape, one of the sides of said tubular portion having free edges at opposed longitudinal ends thereof disposed in the normal plane of said side, said side having a slit extending entirely through the length thereof so that the edges of the tubular portion adjacent the slit make line contacts with a contact prong of circular cross-section and a support-engaging portion at one end of said tubular portion extending substantially transversely to the axis of said tubular portion.

3. A contact spring having an elongated tubular portion of substantially triangular cross-sectional shape, one of the sides of said tubular portion having a slit extending the length thereof so that the edges of the tubular portion adjacent the slit make line contacts with a contact prong of circular cross-section, a soldering lug integral with and forming a continuation of the end of another of said sides and a support-engaging portion at the end of said tubular portion opposite from said soldering lug extending substantially transversely to the axis of said tubular portion.

CARL L. KNUTSON.