

July 2, 1940.

L. E. BARTON

2,206,799

RADIO TUBE SOCKET

Filed April 18, 1938

Fig. 1.

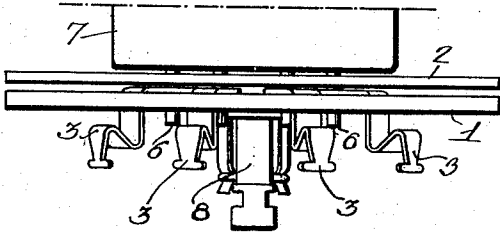


Fig. 4

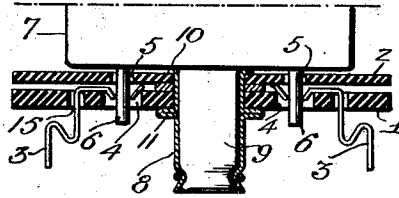


Fig. 2.

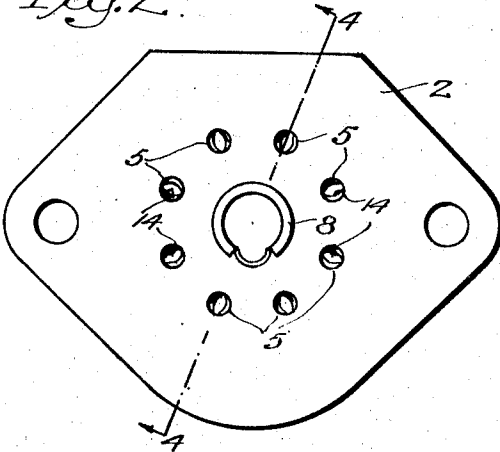


Fig. 5.

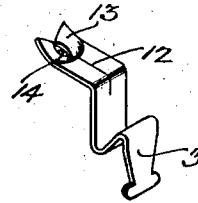


Fig. 3

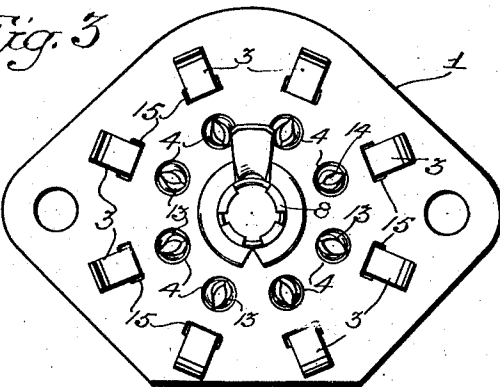
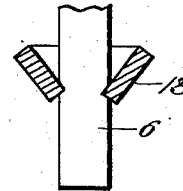


Fig. 6



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UNITED STATES PATENT OFFICE

2,206,799

RADIO TUBE SOCKET

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mesne assignments, to Pennsylvania Patents,
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Nevada

Application April 18, 1938, Serial No. 202,782

6 Claims. (Cl. 173—328)

This invention relates to radio tube sockets and, more particularly, to a socket structure employing contact elements of novel form or construction. The invention relates further to a novel method of making or constructing contact elements for a radio tube socket or the like.

Radio tube sockets employed heretofore have generally relied on the prong-contacting elements to firmly hold or support the radio tube as well as to effect electrical contact with the prongs of the tube. Such socket structures have frequently been the cause of inefficient operation of a radio receiver due to the fact that, after a period of use, the contact elements tend to corrode and accommodate dirt and also tend to become permanently deformed. Moreover, such sockets have generally been incapable of adjusting or accommodating themselves to inevitable variations or tolerances in the location of the tube prongs. All of these characteristics of prior socket structures have contributed toward eventual poor electrical contact with one or more of the tube prongs with consequent loss of efficiency.

The principal object of the present invention is to provide a simple socket structure which may be manufactured at low cost and which eliminates the defects of prior structures by reason of its employing a novel prong-contacting element which engages the prong with high unit pressure over a minimum area and with a scraping, cleaning or biting action and which adjusts itself to misalignment of the tube prong and has high resistance to permanent deformation.

Another object of the invention is to provide a socket structure employing contact elements of this character whose sole function is to make good electrical contact with the tube prongs under all conditions of use, the mechanical support of the tube being realized by other means provided specifically for this purpose.

Still another object of the invention is to provide a contact element suitable for use with a tube having very short prongs by which the capacitive coupling between the elements may be minimized and other advantages obtained.

Other objects and features of the invention will appear later.

In the accompanying drawing:

Fig. 1 is an elevational view of the novel socket structure with the prongs of the tube inserted therein;

Fig. 2 is a plan view of the socket;

Fig. 3 is a bottom view of the socket;

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

Fig. 5 is a perspective view of the novel contact element employed; and

Fig. 6 is an enlarged detail view illustrating the action of the contacting portion of a contact element.

Referring to the drawing, the socket structure preferably employs a pair of insulating plates 1 and 2 which serve to support the contact elements 3 and, in this general respect, the structure is similar to prior devices of this type. The plates 1 and 2 may, of course, be formed of any suitable insulating material, for example, resin-impregnated fibrous material is quite satisfactory. Plate 1 serves as a mounting base or plate for the contact elements, while the plate 2 serves as a cover or clamping plate and functions cooperatively with the plate 1 to hold the contact elements in place. Plate 1 is provided with a plurality of apertures 4, and plate 2 is provided with corresponding aligned apertures 5, for the insertion of the prongs 6 extending from the base 7 of a radio tube.

For use with the socket structure of this invention, the prongs 6 of the tube may be relatively small in diameter and short in length compared to the usual tube prongs employed in conjunction with prior socket structures. Moreover, the tube prongs may have substantially less rigidity than the tube prongs employed with prior sockets. A suitable form of tube prong for use with the present socket may comprise simply a short piece of fairly stiff wire extending through the base of the tube. These deviations of the tube prong structure from the usual form are made possible by the fact that the prongs are not relied upon for mechanical support of the tube as they have been in the past.

In order to mechanically support the tube or, in other words, to hold it firmly in engagement with the socket, there is provided a holding member 8 which serves to engage and secure a central pin 9 extending from the center of the tube base. While any suitable means may be employed for this purpose, it is preferred to employ a holding member of the specific character disclosed and claimed in the copending application of Leslie J. Woods, Serial No. 202,781, filed April 18, 1938. Briefly, this device comprises a tubular member formed of resilient sheet metal and having an end flange 10 and a crimp flange 11 engaging the plates of the socket so that this member serves to hold the parts of the socket together in assembled form, in addition to its

function as a holding means for the tube. Interlocking of the member 8 and the pin 9 is effected by the provision of cooperative detent means on these elements, as fully described in the said Woods application. It is unnecessary to describe herein the details of this device since it forms no part of the present invention and is merely illustrative of one suitable means for holding the socket elements together and mechanically supporting the tube.

In accordance with the present invention, the contact elements 3 are constructed as illustrated in Fig. 5. Each of these elements is formed from a piece of resilient sheet metal. Each element is constructed by first stamping or cutting a flat strip, longitudinally slitting an end of the strip as shown at 12, and striking the end of the slit portion with a punch to deform the said end portion and adapt it for the reception of a tube prong. The slitting of the strip forms two rectangular arms and the single punching operation spreads the edges of the slit at the end of the contact strip, and also torsionally deflects or twists the punch-struck portions of the arms through a moderate angle. The result is the formation of a small cupped end portion 13 having a restricted eye-shaped opening 14 with sharp edges for the reception of the tube prong. The final step in the construction of the contact element is to bend it to the shape illustrated in Fig. 5.

Each of the contact elements is supported and held by the plates 1 and 2 in the manner illustrated in Fig. 4. It will be noted that the contact element extends through a slit opening 15 in the plate 1 and between the plates 1 and 2, with the prong-engaging portion of the contact element disposed transversely of the prong-receiving opening 4, the deflected slit edges of the contact element extending partly into the said opening. When a tube prong is inserted into the restricted opening 14 of the contact element, the edges scrape and bite into the prong to effect good electrical contact therewith. The biting action is illustrated in exaggerated fashion in Fig. 6, which represents a greatly enlarged section taken transversely of the contact strip at the biting edges thereof. The slit enables the portions of the contact element on opposite sides thereof to resiliently expand or give without permanently distorting the contact element during use thereof. The slit should preferably be carried beyond the knee of the contact element, as shown in Fig. 5, to prevent excessive strain of the material when the tube prong is inserted. It has been found that if the contact element is constructed substantially as illustrated in Fig. 5, the distortion of the metal caused by the insertion of the tube prong is not great enough for the strain to exceed the elastic limit of the material and, therefore, the pressure exerted by the contact element on the prong will not decrease with use.

It is important that the punching of the contact element to form the prong-receiving portion follow the shearing or slitting of the contact strip, rather than vice versa. If the punching were done prior to the slitting, there would result a ragged edge structure which would not serve the desired purpose. On the other hand, the punching of the strip after slitting thereof does not critically deform the material but provides a smooth sharp knife edge at the punched portion of the slit.

The contact element engages the tube prong

with high unit pressure over a small contact area. The unit pressure over this area will, of course, be determined by the amount that the slit edges are turned. Moreover, the greater the deflection of the slit edges, the larger will be the normal size of the prong-receiving opening 14. By selecting the proper size punch to perform the punching operation, the contact element may be adapted for use with a tube prong of a given diameter.

The contact element may be substantially smaller in size than those employed heretofore since it is not required to engage the tube prong over a large area, nor does it extend through the opening 4 to the lower side of the socket but merely extends partly into the opening as shown clearly in Fig. 4. This structure of the contact element permits the use of shorter tube prongs as above mentioned, thus not only providing improved electrical performance by minimizing the capacitance coupling between elements but also affording greater protection of the prongs against injury.

It is important to note that the contact elements are loosely seated in the openings 4 and 15 of the base plate 1 so that they may shift to accommodate themselves to variations in location or misalignment of the tube prongs. This insures good electrical contact with the prongs at all times and insures against deformation of the contact elements in use. It further provides economy in tube manufacture by easing the tolerance on prong location.

The prong-contacting elements 3 may each have its end portion to which the wiring connection is made bent in an S shape. This provides a trap which serves to prevent hot solder and flux present when the solder joint is made from running down into the base members and causing leakage between contacts. This does not, however, cause difficulty in assembly since the contact end of the element will go through the slit opening 15 and drop into place.

Although a single preferred embodiment of the invention is illustrated and described for the purpose of disclosure, it is understood that the invention is not thus limited but is capable of modifications such as will occur to persons skilled in the art.

I claim:

1. In a radio tube socket, an insulating mounting base having apertures therein to receive the tube prongs, and contact elements carried by said base, each contact element comprising a strip of sheet metal having a longitudinal open-ended slit therein dividing the strip into two arms, said strip lying in a plane parallel to the plane of the socket base and having a portion extending into the corresponding aperture in the mounting base, the sides of the strip extending into the aperture being twisted and torsionally deformed in opposite directions through a moderate angle to provide two sharp adjacent edges to receive the tube prong and make a resilient electrical contact therewith.

2. In a radio tube socket, an insulating mounting base having apertures therein to receive the tube prongs, and contact elements carried by said base, each contact element comprising a strip of sheet metal having a longitudinal open-ended slit therein dividing the strip into two rectangular arms, said strip lying in a plane parallel to the plane of the socket base and having a portion extending into the corresponding aperture in the mounting base, the said portion

being punch-struck to separate the arms and twist them somewhat in opposite directions to provide a cup-shaped part having two sharp adjacent edges to receive the tube prong and make a resilient electrical contact therewith.

3. A contact for a radio tube socket, comprising a strip of resilient sheet metal having a longitudinal open-ended slit therein dividing the strip into two adjacent flat arms lying in a single plane, said arms being joined by a connecting portion of the strip at the end of said slit, the adjacent slit edges of said arms near the open end of the slit being twisted and torsionally deformed in opposite directions through a moderate angle to provide two sharp adjacent edges to receive a tube prong, whereby the insertion of the prong exerts a spreading force edgewise of said flat arms along the single plane of the arms which present great strength and rigidity to such force, thereby effecting firm engagement of said sharp edges with said prong.

4. A contact for a radio tube socket, comprising a strip of resilient sheet metal having a longitudinal open-ended slit therein dividing the strip into two adjacent flat arms lying in a single plane, said arms being joined by a flat portion of the strip extending from the arms at an angle to the plane of the arms, the adjacent slit edges of said arms near the open end of the slit being twisted and torsionally deformed in opposite directions through a moderate angle to provide two sharp adjacent edges to receive a tube prong, whereby the insertion of the prong exerts a spreading force edgewise of said flat arms along the single plate of the arms which present great strength and rigidity to such force, and the separation of the arms by the prong torsionally deflects the angularly extending portion of the strip about a longitudinal axis of such portion, thus causing said sharp edges to firmly grip said prong.

5. In a radio tube socket, an insulating mounting base having apertures therein to receive the tube prongs, and contact elements car-

ried by said base, each contact element comprising a strip of resilient sheet metal having a longitudinal open-ended slit therein dividing the strip into two adjacent arms lying in a plane parallel to the plane of the mounting base and extending across one of the mounting base apertures, said arms being joined by a connecting portion of the strip at the end of said slit, the adjacent slit edges of said arms at said mounting base aperture being twisted and torsionally deformed in opposite directions through a moderate angle to provide two sharp adjacent edges to receive a tube prong, whereby the insertion of the prong exerts a spreading force edgewise of said flat arms along the plane of the arms which present great strength and rigidity to such force, thereby effecting firm engagement of said sharp edges with said prong.

6. In a radio tube socket, an insulating mounting base having apertures therein to receive the tube prongs, and contact elements carried by said base, each contact element comprising a strip of resilient sheet metal having a longitudinal open-ended slit therein dividing the strip into two adjacent flat arms lying in a plane parallel to the plane of the mounting base and extending across one of the mounting base apertures, said arms being joined by a flat portion of the strip extending from the arms at an angle to the plane of the arms, the adjacent slit edges of said arms at said mounting base aperture being twisted and torsionally deformed in opposite directions through a moderate angle to provide two sharp adjacent edges to receive a tube prong, whereby the insertion of the prong exerts a spreading force edgewise of said flat arms along the plane of the arms which present great strength and rigidity to such force, and the separation of the arms by the prong torsionally deflects the angularly extending portion of the strip about a longitudinal axis of such portion, thus causing said sharp edges to firmly grip said prong.

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