Nov. 18, 1930. N. C. SCHELLENGER 1,781,957

TUBE SOCKET

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Fig. 1.

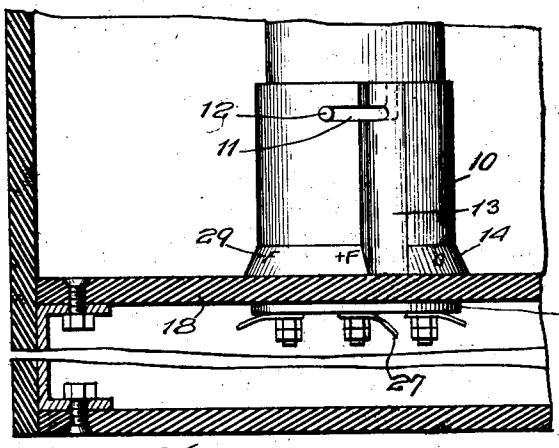



Fig. 2A.

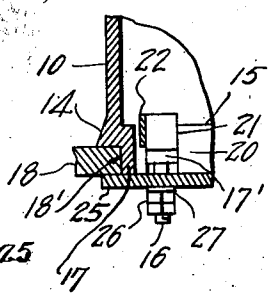



Fig. 2.

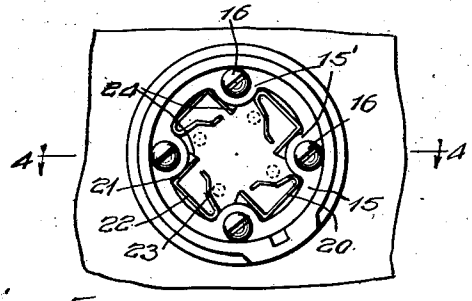



Fig. 3.

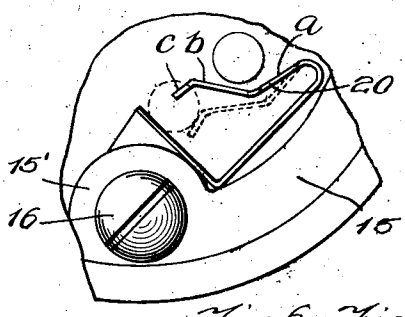



Fig. 5.

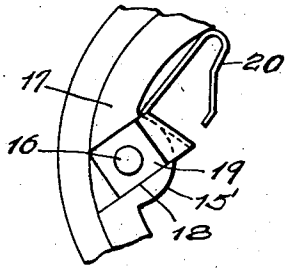



Fig. 4.

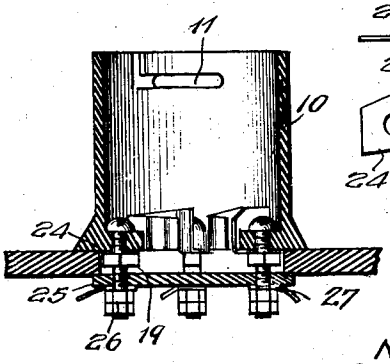
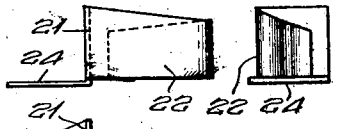



Fig. 6. Fig. 7



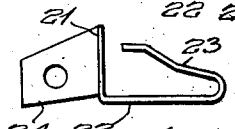




Fig. 8.

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William L. Kilroy
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Attys

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TUBE SOCKET

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Fig. 9.

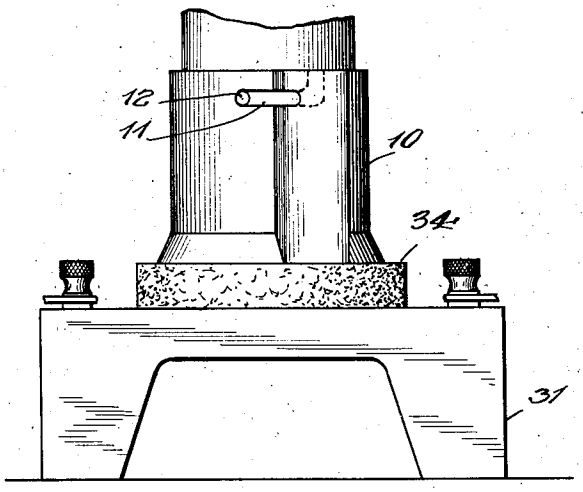
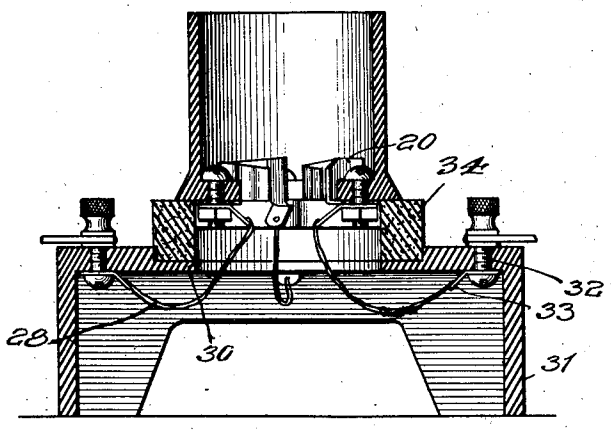



Fig. 10.




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Patented Nov. 18, 1930 1,781,957

# UNITED STATES PATENT OFFICE

NEWTON C. SCHELLENGER, OF ELKHART, INDIANA, ASSIGNOR TO CHICAGO TELEPHONE SUPPLY CO., OF ELKHART, INDIANA, A CORPORATION OF DELAWARE

## TUBE SOCKET

Application filed March 13, 1925. Serial No. 15,224.

The present invention relates to sockets for thermionic tubes and the like.

Sockets for radio tubes which are now on the market, do not always make proper contact with the studs of the tubes. This is due in some cases to the fact that the socket members, especially the springs which contact with the studs, are made of poor material which fails to stand up under continuous usage. In most cases, it is because of the impracticability of the means employed to make such contact. In most of these devices point contact is relied upon and this oftentimes is not firm enough to prevent the contacts from becoming separated by vibrations. The result is unnecessary noise and imperfect functioning of the sound reproducing apparatus.

I obviate the above difficulties by a novel structure and arrangement of the contact springs in the socket which make contact with the studs of the tube. In my device the studs are practically clamped in a V groove. By this arrangement, I am able to get line contact on two of the lateral sides of each stud instead of merely a point contact as is now generally the case. Furthermore, the studs themselves are held tightly against their respective contacts which makes loose contacting impossible. There are certain other features of the present invention such as simplicity and ruggedness of structure which will be apparent to those skilled in the art.

In order to acquaint those skilled in the art with the manner of constructing and operating my invention, I shall now describe the same in connection with the accompanying drawings.

In the drawing:

Figure 1 is a side elevational view of a socket embodying my invention, in position on the mounting base of a radio set;

Figure 2 is a top plan view of the socket showing the structure of the springs;

Figure 2A is a fragmentary sectional view illustrating the shape of the lower part of the socket.

Figure 3 shows the manner in which one stud of the tube makes contact with the cooperating spring in the socket;

Figure 4 is a vertical section of the socket taken on line 4—4 of Figure 2;

Figure 5 is a bottom view of a spring member showing the manner of mounting same in a tube socket;

Figures 6, 7 and 8 are the side, front, and top views respectively of a spring member;

Figure 9 is a side elevational view showing the manner of mounting the socket where a cushion member is used between the socket and the mounting base; and

Figure 10 is a vertical sectional view taken through the central portion of Figure 9.

In the form of socket which I have illustrated as embodying my invention, I provide a tubular cup member 10, which is of molded insulation material, preferably a condensation product. This cup is provided with a bayonet slot 11 which has a shrouded vertical portion and an open lateral portion adapted to receive the pin 12 in the base of the tube adapted for cooperation with the cup 10. Both portions of the slot may be shrouded if desired.

A vertical rib 13 serves to reenforce that side of the cup which contains the vertical portion of the slot 11, and permits the cup to be taken more readily out of the die. This rib merges into the conical base 14. The bottom portion 15 is open and it has inwardly extending lugs 15′ apertured to receive the screws 16 which lie parallel to the axis of the cup. Formed integral with the bottom 15 is a downwardly extending annular flange 17 having an outside diameter of substantially the same size as the inside diameter of the cup itself. This flange is adapted to enter into an opening 18′ in the mounting plate 18.

The annular flange 17 is provided with flat bottomed rectangular recesses which serve as seats for the mounting portions of the springs 20 and clamping nuts 19 which are threaded on the screws 16. These recesses are equally spaced in the flange 17 and each recess is at substantially right angles to its adjacent recesses. They are also only slightly wider than the mounting portions of the springs so that there would be no possibility of the springs turning therein when in use. The springs 20 are held securely in position

by the screws 16 which extend through openings in the lugs 15′ and through suitable openings in the springs 20 and cooperate with nuts 19.

Springs 20 are stamped out of sheet metal and are generally U-shape. They comprise a horizontal mounting portion 24, vertical portions 21 and 22 and the vertical contact portion 23. The part 21 is bent at relatively right angles to the horizontal portion and abuts against the side of the member 15, as does the portion 22 which is at relatively right angles to the portion 21. This serves to brace the spring when in use. The contact portion 23 is formed by bending the portion 22 back on itself. It will be noticed that this contact portion consists of three parts, the first which is designated by the letter *a*, in Figure 3, serves merely as a guide for the stud of the tube when the tube is first inserted into the socket. The second part, labeled *b*, serves not only as a guide when the tube is being turned into position, but also exerts a force against the stud which increases as the tube is nearing its final position. The moment the stud passes the bend in the part *b* to the part *c*, it slips into a V which is formed between the parts C and 21 and is clamped and held firmly between them, as is shown by the dotted lines in Figure 3. This permits of firm line contact between the spring 20 and two sides of the tube stud which cooperates with it.

Both legs or portions 22 and 23 of the spring lie substantially parallel to the line of movement of the stud. The member 15 providing an abutment for the parts 21 and 22 of the spring, when the free leg 23 is engaged by the stud while it is moved by a motion of translation with the parts 21 and 22, respectively.

By means of a circular disk 25 which fits over the screws 16, it is possible to hold the socket in position relative the mounting base 18 by tightening the nuts 26. Leads 27 may either be soldered to the screws 16 or fitted thereon by being secured between the upper nut 26 on each screw and the member 25.

The proper positioning of the socket on the mounting base may be easily determined by having the lower conical portion of the socket stamped F, −F, P, and G to designate the filament terminals and the plate and grid terminals respectively as shown at 29.

In Figures 9 and 10, the manner of mounting the socket is shown when a cushion 34 is used between the socket and the mounting base. In this case connections between the leads 28 and the socket springs are made by either securing the leads between the horizontal portion of the springs and the nut which holds them in place, or by using a metal strip which fits over the screw that holds the spring in place and soldering the lead wires thereto.

In this case, the cushion member 34, is shown imbedded in a depending annular portion 30 of the mounting base 31. Provision is made in the mounting base 31 to permit the contact screws 32 carrying the metal strips 33 to be secured therein. Connection being had between the screws 32 and their respective spring contacts 20 through the lead wires 28.

I do not intend to be limited to the details shown or described.

I claim:

1. In combination, a mounting, a contact spring, a movable contact stud cooperating therewith, said spring including a pair of contact legs both of which are adapted to be engaged by said stud, and means on said mounting for holding one leg of the spring and forming an abutment for said leg, the other leg of the spring being free, the legs of the spring extending in the general direction of engaging movement of the contact stud and the free leg lying at an angle to the path of movement of the stud, said stud having means cooperating with said mounting for guiding the motion thereof with respect to said spring.

2. In combination, a pair of cooperating contacts comprising a relatively stationary spring member and a relatively movable cylindrical stud, the stud being moved by motion of translation into contact with the spring, said spring member comprising a generally U-shaped spring with both legs lying substantially parallel to the line of movement of the stud, and means for holding the extremity of the remote leg, said means providing an abutment for the spring, a projection of the remote leg of said spring disposed adjacent the extremity of the free leg, the free leg of said spring being engaged by the stud as it moves toward said projection and the extremity of the free leg.

3. In combination, a tube socket having a base portion containing a plurality of horizontal recesses, and contact springs having horizontal portions adapted for mounting in said recesses, said springs having two vertical portions bearing against the sides of said base portion and a third vertical portion which is swung toward said first two vertical portions when in use.

4. An electrical contact element comprising a mounting lug, a substantially U-shaped contact portion having one of its legs provided with a portion bent toward the other leg and formed integral with said lug, said other leg being resilient and movable to and from said first leg, said last mentioned portion serving as a stop and being adapted to cooperate with said resilient leg to form a substantially V-shaped grip.

5. In combination, a pair of cooperable contacts comprising a contact spring and a stud, said spring comprising a pair of con-

tact surfaces for engaging said stud along parallel lines, one of said surfaces being rigid and the other being resilient and movable by the said stud, the contact surfaces of the said spring when engaged by the said stud being adapted to assume substantially a V-shape with the stud disposed between them.

6. In combination, a pair of cooperable contacts comprising a relatively fixed contact spring and a relatively movable stud, said spring comprising a resilient contact portion and a stationary contact portion, and means for guiding said stud in its movement to cause it to first engage said resilient contact portion and to depress the same toward the fixed portion until the two portions assume a substantially V shape, said stud being stopped in its movement by the said fixed portion at which time it will be positioned between the portions and tightly gripped thereby.

7. In combination, a pair of cooperable contacts comprising a relatively fixed contact spring and a relatively movable stud, said spring comprising a mounting lug and a substantially U-shaped portion having one of its legs formed into a portion bent toward the other leg and formed integral with said lug, said other leg being resilient, movable to and from said first leg, and lying in the path of said movable stud, and means for guiding the stud in its movement to cause it to initially contact and depress said movable leg toward said bent portion, said movable leg when fully depressed by said stud forming with said bent portion substantially a V-shaped grip for the stud with the stud in contact with both the bent portion and the movable leg of the contact spring.

8. In combination, a mounting member having an aperture, a tubular socket including a plurality of contact elements, said socket having a portion extending into said aperture, said portion being provided with a plurality of lateral recesses for receiving off-set lugs of said contact element, a clamping member disposed on the side of the mounting member opposite to that of said socket, and means common to both the socket and the clamping member for fastening said lugs to said socket portion and for drawing the clamping member and socket toward each other to tightly secure them to said mounting member disposed therebetween.

9. An electric socket having a leaf spring contact, one end of which is fixed and the other end free, the free end being bent towards the fixed end, the spring being at right angles to the plane of the bottom of the socket, and being arranged to establish line contact with a stud which is moved laterally into engagement with the free end of the spring and which moves the free end of the spring towards the fixed end until the stud engages both the fixed end and the free end of the spring.

10. In combination, a pair of cooperable contacts comprising a relatively fixed contact spring and a relatively movable stud, said spring comprising a resilient contact portion and a stationary contact portion, and means for guiding said stud in its movement to cause it to first engage said resilient contact portion and to depress the same towards the fixed portion, said stud engaging the resilient spring portion at the edge thereof and moving the same until the stud engages both the resilient contact portion and the fixed contact portion.

11. In combination, a plurality of pairs of contacts comprising a plurality of contact springs mounted on a common support, and a plurality of cooperating lugs fixed with respect to one another, each of said springs comprising a resilient contact portion and a stationary contact portion, means for guiding the studs, said studs being rotatable as a unit to each engage the end of the resilient portion of a spring and to move said ends toward the stationary contact portion of the respective springs, said movement being stopped when the edge of each stud engages the stationary as well as the resilient portion of its spring.

In witness whereof, I hereunto subscribe my name this 11th day of March, 1925.

NEWTON C. SCHELLENGER.