Dec. 3, 1935. M. ALDEN 2,023,190

SOCKET FOR VACUUM TUBES AND THE LIKE

Filed May 23, 1931

Fig. 1.

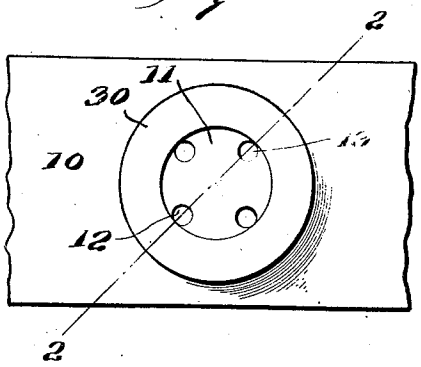


Fig. 3.

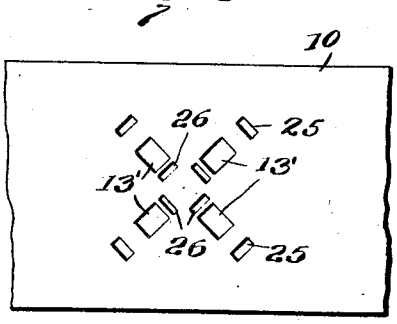


Fig. 2.

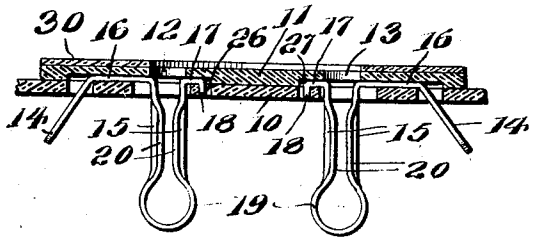


Fig. 4.

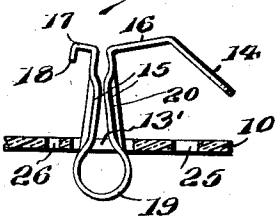


Fig. 5.

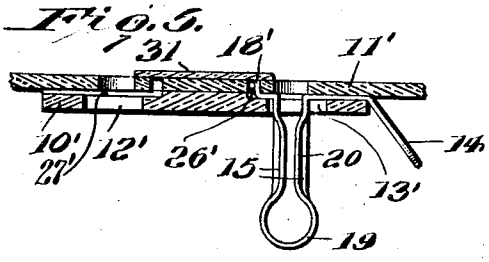


Fig. 6.

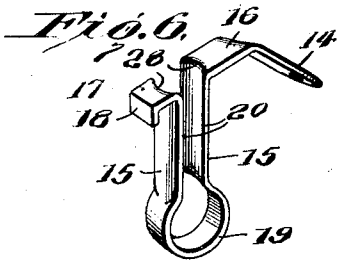


Fig. 7.

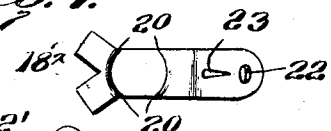
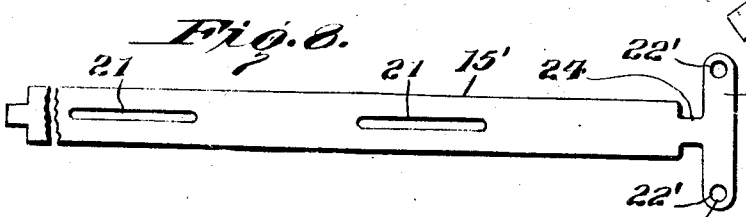


Fig. 8.



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SOCKET FOR VACUUM TUBES AND THE LIKE

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Application May 28, 1931, Serial No. 540,579

7 Claims. (Cl. 173—328)

My invention relates particularly to sockets suitable for vacuum tubes such as are used in radio receivers, but the particular use to which the socket is put is of course immaterial. Such sockets usually are formed of insulating material and provided with conducting members by means of which the electrodes of a tube may be conveniently connected into a circuit. My present invention relates especially to a socket for the type of tube known as the push-pull base in which the socket is provided with apertures into which the prongs of a tube are adapted to be inserted.

One object of my invention is to provide a simple, inexpensive and reliable construction of compact form.

Another object is to provide a construction having reliable contacts but which can be made cheaply.

Another object is to provide a construction of this type having durable and reliable contacts which are securely anchored in place.

A special object is to provide a socket at least one important part of which can be made of sheet insulation such as bakelite or other phenolic composition products.

In carrying out the invention, I make the socket body of two layers of insulation provided with perforations or apertures into which the prongs of a tube are adapted to be inserted. The conducting members may be made in various forms each of which preferably comprises a circuit terminal portion, a spring contact portion and anchorage portions. Structures of this general character are well known in the art but heretofore the parts have been secured together by means of screws, eyelets or rivets which add not only to the expense of the socket, but frequently introduce electrical difficulties. These difficulties are especially noticeable in sockets having a large number of contacts. According to my present invention, the two parts of the body of the socket are secured together without any metallic elements, for instance, by simply cementing one part to the other in a suitable manner as will more fully hereinafter appear.

Fig. 1 is a front view of a socket embodying my invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a front view of the rear part or base of the socket of one form.

Fig. 4 is a fragmentary sectional view showing the method of inserting a typical contact in the base.

Fig. 5 is a fragmentary sectional view of a modified form of my invention.

Fig. 6 is a perspective view of one form of conducting member useful in a socket embodying my invention.

Fig. 7 is a plan view of a modified form of conductor.

Fig. 8 is a detail view of a conducting strip showing another modification.

The insulating portion of the socket consists of a base 10 and a top 11 formed of suitable insulating material which may be either in strip form or molded to shape. The top is provided with perforations such as 12 and 13 of a number, size, shape and arrangement to correspond with the tube for which the socket is intended.

Conducting members such as shown, for instance, in Fig. 6 are provided of course to correspond with each of the perforations in the socket body. Such a member is preferably formed of a comparatively narrow strip of metal of a suitable character and provided with a terminal end 14 which is adapted to be connected to an external circuit wire, a contact portion or portions such as 15, and anchorage portions 16, 17 and 18. In the form shown which is preferable, the contact portions 15—15 are parallel or substantially so and connected by an integral arched portion 19 so that the contact arms are resilient and readily accommodate themselves to the prong of the tube. The contact portions are also preferably provided with edges such as 20 which are more or less sharp and thus tend to cut into any oxide or coating which may be present on the tube prong. Such sharp edges may be formed by cutting or grooving the contacts as shown in Figs. 6 and 7, or by perforating the contact portions as shown at 21—21 in Fig. 8.

The circuit terminal portion 14 is preferably provided with one or more perforations to facilitate the attachment of a circuit wire, such for instance, as the small perforation 22 and the slot 23 in Fig. 7. The wire may be inserted through the hole 22 and drawn into the narrowed portion of the slot 23 and held in place.

According to the form shown in Fig. 8, the outer end 14′ is provided with two perforations 22′ and 22′ for attachment of a circuit wire or wires. In some cases it may be desirable to cut away the metal adjacent the end as shown at 24, so as to provide a narrower neck connecting the terminal portion with the contact portion of the conductor and in this way reduce the amount of heat which can be communicated during the soldering operation from the terminal portion 14′ to

the contact portion 15'. This is desirable in that excessive heat is likely to draw the temper of the metal from the contact portion and thus interfere with its resiliency.

In the form shown the bottom or base member of the socket body is provided with a perforation 13' large enough to permit the insertion of the arched or looped end 19 as shown in Fig. 4 and to accommodate the contact portions of the conductor and the inserted prong of the tube. Alongside of these apertures 13' are perforations 25 and 26 adapted to accommodate respectively the end portions 14 and 18 of the conducting member.

When the conducting members are in place in the base as shown in Fig. 2, the top member 11 is applied and cemented in place, for instance, by the use of fluid composition products, such as bakelite or other suitable quick drying cementing substances. The materials might, however, be cemented together simply by the application of heat and pressure in a well known manner.

When the parts 10 and 11 of the body are secured together in this way they hold the conducting members securely in position, the portions 16 and 17 being anchored between the two layers of insulating material, and a tip 18 being anchored in the perforation 26. These perforations 13', 25 and 26 are preferably of rectangular form to aid in holding the conducting strip in position. In many cases, however, it is desirable to have a slight amount of play permissible so that the conducting member can move slightly so as to accommodate itself more perfectly to the prong which is being inserted. If desired, a groove such as 27 may be formed in the surface of one of the parts of the socket body as shown in Fig. 2, so as to permit the two parts of the body to be secured tightly together and yet allow a slight freedom of movement of the conducting members. It will be understood, of course, that the proportions of the parts will be such that the conducting member cannot become displaced sufficiently to interfere with the insertion of the tube prong. If desired the corners 28 of the contact portions may be somewhat rounded off so as to facilitate the insertion of the tube prong.

To facilitate the insertion of the tube prongs into the socket, I may provide a raised rim such as 30 as shown in Fig. 2 which may be either integral with the top portion 11 or formed separately and cemented in place.

The inner edge of this rim will be tangential to the outer edges of the various perforations 12, 13 etc.

It should be understood of course that the sockets may be made individually and adapted to be mounted upon a panel or other support in any suitable manner, or a number of sockets can be mounted upon one base strip. It will be understood, however, that in each case the method of securing the two parts of a socket body together is such that it is possible to make a rigid and reliable socket body out of much thinner material than is possible when the layers are to be riveted together, as has heretofore been done. By reason of the fact that cementing unites the entire adjacent faces of the two layers of the socket securely together, a much more rigid structure is formed than would be the case if the two parts of the socket body were merely secured together at one or two points.

In the form shown in Fig. 5, the conducting member has a tip portion 18' which is bent upwardly instead of downwardly to provide anchorage in the recess 26', which in this case is formed in the top member 11'. In this case the bottom member 10' is merely provided with perforations 12' and 13' for the contact arms 15—15 and the terminal portion 14 extends over the outer edge of the disc-like bottom member 10'.

In such a structure it is desirable to cover up the tips 18' for instance, by a disc such as 31 which may be cemented in place as previously described. Such a disc can be colored according to a predetermined code to indicate the type of tube intended to be used in the socket. In a similar manner the ring 30 shown in Fig. 2 might be used for the same purpose. This disc 31 serves also to aid in positioning the tube to be inserted as the outer edge of the disc is tangential to the inner edges of the perforations 12 and 13 in the top member 11'.

While the simplest form of anchorage tip is merely turned at an angle as shown in Figs. 5 and 6, other methods of anchoring the extreme end may be used, as for instance, by turning the ends 18× outwardly as shown in Fig. 7 so as to increase the gripping surface.

The layers 30 and 31 may be formed of what is commonly termed sheet fibre if desired, as the insulating properties are not as important as those of the top and base members.

All the sockets of a set may be formed of two sheets of insulation cemented together and provided with the necessary groups of conductors and apertures. Or a single sheet may constitute the socket panel and support the various sets of conductor strips which can be anchored by individual top pieces for each tube.

In effect, it will be seen that the base plate carries the conductor strips and the top part serves as an insulating face plate.

The two parts are bonded together either by an air drying adhesive or by an adhesive producing its effect by heat and pressure. The latter method, for instance, may be carried out in a continuous process. The laminations or layers will be punched according to a predetermined lay-out for the desired sockets. The surface of the lower layer would then be covered with suitable cement such as bakelite, and dried, or partially dried and moved, for instance, by conveyors, to a place where the clips or conductors are inserted. The upper layer or layers would then be positioned and brought between suitable pressure shoes or dies. Under pressure and heat the two layers of the socket would then become securely attached to each other by a process similar to vulcanization. Such a process can be made as much automatic or hand operated as desired. The process makes a very strong socket and precludes the presence of moisture in or about the contacts, and especially at what would ordinarily be considered the raw edges of the perforations in the insulation. Such a socket is, therefore, superior electrically to those made in the ordinary manner, as moisture tends to cause leakage paths.

This invention is especially valuable for such sockets as have a large number of holes which would tend to greatly weaken the ordinary type of socket. Not only do we provide a stronger socket by the cementation or vulcanizing process, but we eliminate the weakness due to the excessive number of perforations required for the insertion of rivets and the like, and we eliminate the stresses to which the insulation is subjected by the extra perforations and by

the pressure required to head or upset the rivets or eyelets.

The preferred form of conductors as herein illustrated, not only affords an effective and reliable contact but actually supports the tube in such a manner as to a large extent avoid the effect of vibrations transmitted to or from the tube. While each conductor by itself preferably has a slight freedom of movement to adjust or accommodate itself to the inserted prong, it will, of course, be understood that as all of the prongs of the tube are rigidly connected to the base of the tube, no one contact can move independently of the other contact when all the prongs are inserted. A resilient support for the tube is thus provided through the medium of the various independently movable and resilient conductors. This effect is enhanced by the use of comparatively thin insulating material, made possible by the construction as herein set forth, the insulating material itself having considerable resiliency when made in thin layers. Such an advantage is especially noticeable where at least one layer of the socket constitutes the main supporting panel for all the sockets of a radio set.

The lower layer of the socket might be made out of so-called vulcanized fibre and it might be embossed to provide the slight grooves 27' to allow for the contacts. The grooves necessary to allow for the thickness of the conductors might be formed by compressing relatively soft material such as fibre. The invention is susceptible to other modifications and variations within the scope of the claims.

I claim:

1. A socket for vacuum tubes comprising two insulating body layers having apertures and contacts loosely secured between the layers with contact elements adjacent the apertures, one of said layers having grooves to allow for the thickness of the interposed conductor parts and means for cementing the two layers together independently of the conductors.

2. A socket for vacuum tubes comprising two insulating body layers having apertures and contacts secured between the layers with contact elements adjacent the apertures, means for allowing for the thickness of the interposed contact parts so as to leave the contacts free to adjust themselves, means for cementing the two layers together and a prong positioning layer cemented to the outer layer.

3. A socket construction for a radio receiver comprising a resilient insulating panel having groups of passages for contact strips, conductor strips loosely mounted in said passages, each contact strip having a resilient contact portion, an insulating top member for each group of passages, said top member having apertures for tube prongs leading to said contact portions, said top members being cemented to the panel and holding the contact strips and their contact portions in place.

4. A socket comprising two layers of material having contacting areas cemented together and with grooves between the contacting areas and perforations intersecting such grooves, contact strips having anchorage portions, loosely mounted in said grooves and having expansible loop portions registering with said perforations.

5. A vacuum tube socket comprising a resilient foundation sheet of insulating material having spring contacts supported at their outer ends and projecting downwardly from the sheet, and an outer layer of insulating material having prong passages corresponding with the contacts and cemented around the prong passages to the foundation sheet, the foundation and outer layers being free of metal parts other than the contacts said foundation layer having grooves in which said spring contacts are loosely mounted.

6. A laminated socket comprising two layers of insulating material, the outer layer having holes to receive the respective prongs of a tube and the inner layer having holes which register therewith and contact members loosely held in the holes in the inner layer and each having anchorage lugs between the layers and non-metallic cementing material binding the two layers together and holding the contact members in place, said contact members having contact surfaces adapted to be engaged by prongs inserted through said holes and the cementing material completely surrounding the contact members and isolating them from each other.

7. A socket formed of two layers of insulating material having perforations for the prongs of a tube, contact strips having portions loosely held between the layers and having contact portions in line with the edges of the perforations and cementing material surrounding the portions of the contact strips which are held between the layers so as to prevent moisture from entering between the layers adjacent the contact strips and binding the two layers together said contact strips having lateral play between said layers.

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