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J. HIRMAN

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TUBE BASE AND SOCKET

Original Filed Aug. 3, 1933

Fig. 1

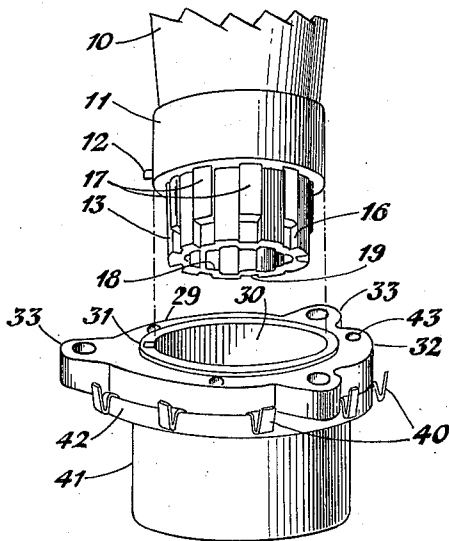


Fig. 2

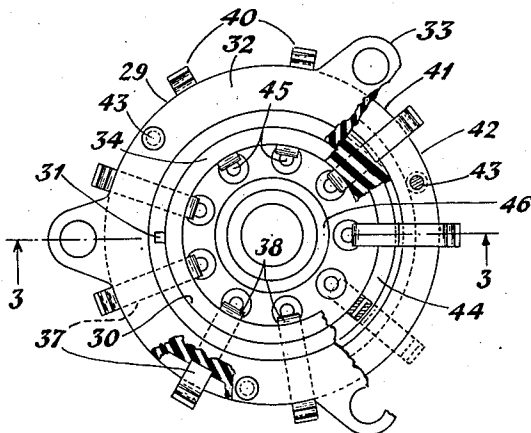


Fig. 3

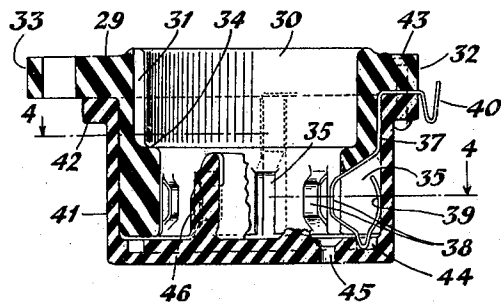


Fig. 4

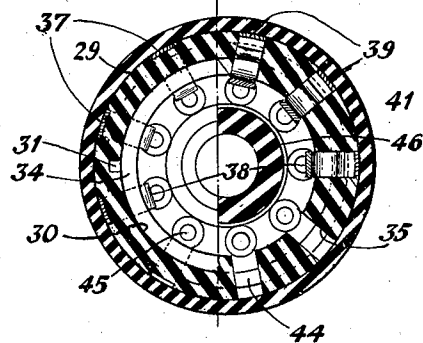
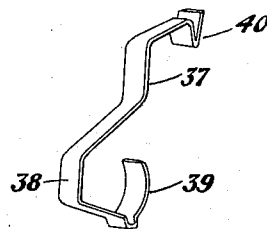


Fig. 5



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2,038,513

TUBE BASE AND SOCKET

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Original application August 3, 1933, Serial No. 683,434. Divided and this application March 27, 1934, Serial No. 717,555

4 Claims. (Cl. 173—328)

My invention relates to vacuum tubes and the like, and more particularly to bases and sockets for such tubes.

This application is a division of my corresponding application, Serial No. 683,434, filed August 3, 1933, and assigned to the same assignee as the present invention.

The conventional vacuum tube has a cup-shaped base with a flat bottom on which tubular contact pins are mounted in a circle near the rim to project perpendicularly from the bottom of the base, thus adding to the overall length of the tube. These tubular contact pins are connected to the electrode elements of the tube by leading-in wires threaded into and soldered to the pins. The conventional socket has spring contacts which engage the contact pins of the base. The socket contacts extend radially outward and are fastened at their ends or intermediately their ends to the bottom of the socket by rivets or the like. The socket is inherently large and bulky, and extends considerably beyond the outline of the base of the tube.

An increase in the number of contact pins on the base decreases the spacing between the pins, increases the tendency for voltage breakdown through the base, and greatly increases the difficulty of basing the tube particularly the threading of the leading-in wires into the contact pins. The number of contacts which can be accommodated by the conventional socket has likewise reached a practical limit because of lack of space and because of the increase in the tendency of voltage breakdown through the socket. Assembly of the socket due to the number of parts required is likewise made more difficult.

Not only has the practical limit been reached in the number of contacts which can be mounted in a conventional way in tube bases and sockets of conventional size, but now tube bases and sockets only about one-half the conventional size must be made with as many or even more contacts than the bases and sockets of conventional size. The usual number of conventional contact pins cannot be mounted in the conventional way on the smaller base, yet a corresponding reduction in size of the contact pins will result in pins which are too weak for practical use, which do not have enough contact area and which offer very great difficulty in the threading of the leading-in wires into the pins. Furthermore, there is a practical limit in the reduction of the diameter of the contact pins and of the leading-in wires, as the wires must be sufficiently large to carry the necessary

current and also stiff enough to thread easily into the pins, which must, of course, have a bore somewhat larger than the wire.

A reduction in the size of the conventional socket and its contacts will result in contacts which are too weak for practical use, which do not have sufficient contact area, and which increase the difficulty of assembling the socket. It would not be practical to materially reduce the size of the contacts in the socket and still have these contacts properly cooperate with pins on the tube base which were not materially reduced from conventional size.

The conventional contact pin is in effect riveted into the base by upsetting or spinning the inner end of the pin over the inside of the bottom of the base. The inner end is thus enlarged and in effect increases the diameter of the pin so that more room is required for spacing between the pins. As it is not feasible to reduce the diameter of the pin, the space required for fastening the pins to the base cannot be reduced, nor can smaller contacts be used, as the conventional socket contact is larger than the base pin which it engages.

One object of my invention is to provide a base and socket which can be made smaller than the conventional base and socket and yet have as many or even more contacts of ample area and properly spaced so that the electrical and mechanical properties of the smaller base and socket are ample to meet all requirements.

A further object of my invention is to provide a base and socket having mechanically strong contacts which are so arranged that more angular space is made available for the contacts than in the conventional base and socket and which are made to occupy less angular space on the base and socket than the contact pins and socket contacts commonly used, yet have as great or even greater contact area than the conventional pin and socket contacts.

Still another object of my invention is to provide improved socket contacts which are simple and inexpensive to make.

These and other objects will appear hereinafter.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims, but the invention itself will be best understood by reference to the following specification taken in connection with the accompanying drawing in which,—

Figure 1 shows a vacuum tube having a base made in accordance with my invention and a

socket made in accordance with my invention and cooperating with the tube base.

Figure 2 is a top view of the socket shown in Figure 1 with parts broken away to show details of construction.

Figure 3 is a longitudinal section of the socket shown in Figure 1 taken along the line 3—3 of Figure 2.

Figure 4 is a horizontal section of the socket shown in Figure 1 taken along the line 4—4 of Figure 3.

Figure 5 is a perspective view of a socket contact made in accordance with my invention.

The vacuum tube shown in Figure 1 of the drawing has an evacuated bulb 10 enclosing the usual cathode, anode and grid or grids. The bulb 10 has secured to it by cement a tubular base preferably molded from insulating material and comprising a collar 11 provided with the usual indexing pin 12, and a lower portion 13 of smaller outside diameter than the collar. The portion 13 of reduced diameter has at its lower end slots 16. Flat ribbon contacts 17, which extend thru the base and are wrapped longitudinally around the portion 13 of reduced diameter to provide flat contact faces on the outside of the base, have their ends brought together in the slot 16 and welded together to fasten the contacts in place on the base and also to form connecting lugs 18 and 19 which facilitate and simplify the connecting of the lead wires to base contacts 17.

When the tube is based the connecting lugs 18 and 19 practically adjoin the outer ends of the lead wires, which extend thru the tubular portion 13 of the base shell. The ends of the lead wires are inserted between and then welded to the connecting lugs 18 and 19 whereby threading of the lead wires in the tubular contact pins is eliminated, and a good electrical connection made more easily than by soldering. The contacts are backed and supported by the base shell 13 and although narrow are held sufficiently rigid to constitute a strong rigid contact.

As the width of the ribbon contact may be less than the diameter of the conventional tubular contact, and since the ribbon contacts are spaced around the exterior of the base instead of in a circle on the bottom of the base near the rim, as is done with tubular contacts, more of such contacts may be accommodated on a base of the usual size, or the size of the base can be materially reduced and still the maximum number of contacts now feasible for the usual size base can be used. The flat contacts have ample contact area, at least as much as the conventional contact, and because of their being mounted on the side of the base the tube is shortened and less head room required for it.

The flat contacts 17 may to advantage be made of nickel which is easily worked and welded. They may be made in various ways, but I prefer to cut them from metal ribbon and form them automatically by machine, as it is easier to shape the metal ribbon into a flat contact than it is to make the usual type of tubular contact.

It is obvious that the base can be registered with the socket in various ways; for example, by placing the contacts nonsymmetrically around the shell or providing studs or projections on the base shell to enter corresponding slots in the socket. I prefer to register the base and socket by means of a stud or pin 12 for this purpose.

A socket for the vacuum tube with the base shown in Figure 1 is shown in Figures 1 to 4

inclusive. It comprises separate upper and lower parts which telescope and between which the socket contacts are clamped. The tubular upper part 29 of the socket has a central opening 30 large enough to receive the tube base 11 and has in one side an indexing slot 31 for the stud or pin 12 on the base of the tube. This upper part 29 has a flange 32 with bosses 33 for attaching the socket to a panel, and a shoulder 34 on the interior wall for limiting the extent to which the base may be inserted in the socket.

When the base is home in the socket the base contacts 17 are in registry with slots 35 in the lower end of the part 29 of the socket as most clearly shown in Figures 3 and 4. These slots 35 extend through and to the bottom of the tubular member 29. Spring contacts 27 project thru these slots and have flat portions 38 which are resiliently forced into engagement with the base contacts by spring portions 39. Connections to the contact are made by connecting lugs 40 on the socket contacts.

The contacts 37 are held in place by being clamped between the upper part 29 grooved to receive the contacts and the lower cup-shaped part 41 of the socket, which has a lip 42 to cooperate with the flange 32 of the upper part. The two parts of the socket are riveted together by rivets 43. The bottom of the lower cup-shaped part 41 has on the inside an annular channel 44 in which the lower ends of the contact springs rest, and by which the extent of inward movement of the spring contact is limited. Apertures 45 in the bottom of the socket permit particles of dirt and the like to fall out of the socket thru the bottom. An annular collar 46 at the center of the bottom part 41 prevents foreign objects dropping into the socket far enough to short circuit the contacts 37.

It will be obvious that when the base is inserted in the socket, the base contacts 17 will engage the flat part 38 of the socket contacts 37 and make a good contact of ample area. The wiping action between the contacts as the base is inserted in the socket insures clean contact surfaces, and the spring 39 of the socket contact insures sufficient pressure between the contacts. The socket contacts 37 for a socket constructed in accordance with my invention can be made in much the same way as the base contacts 17.

It will be seen that I have provided a base and socket in which the maximum number of contacts which it is now feasible to use for the conventional base and socket can be materially increased and still have the base and socket fully meet the electrical and mechanical requirements for such devices. In accordance with my invention I can reduce the size of the usual base and socket and still properly accommodate as many contacts as can now be used on a base and socket of the usual size. The threading of lead wires into tubular contact pins has been eliminated thus expediting manufacture. The electrical connections between the contacts and the lead wires have been materially improved and by means of my invention I provide simple contacts which can be manufactured cheaply and easily from metal ribbon for both the base and socket.

The embodiment of the invention illustrated and described herein has been selected for the purpose of setting forth the principles involved, but it will be apparent that various modifications may be made to meet the different conditions encountered in use and I, therefore, intend to cover

all modifications within the scope of the appended claims.

What is claimed as new is—

1. A vacuum tube socket including an annular member with an outwardly extending lip at one end, a tubular member telescoped within said annular member and formed to receive a tube base having contacts on its periphery and having at one end a flange for engaging said lip and having spaced slots in the other end said slots extending through and up into the periphery of said tubular member, and contact elements clamped between said members and extending thru said slots for providing contact surfaces on the interior of said socket, said contact elements having terminal lugs extending to the exterior of said socket between said lip and flange.

2. A vacuum tube socket including a cup-shaped member having an annular lip and an annular depression on the inside bottom surface, a tubular member telescoped within said cup-shaped member formed to receive a tube base having contacts on its periphery and having a flange engaging said lip, and resilient contacts clamped between said members and extending freely at one end thru said tubular member and into said annular depression for providing contact surfaces on the interior of said socket to cooperate with the contacts on the tube base, said contacts having terminal lugs extending between said lip and flange to the exterior of said socket, and means on said contacts for resiliently biasing the freely extending ends toward the center of the socket against the inside wall of said annular depression.

3. A vacuum tube socket including a cup-

shaped member having an annular lip, a tubular member telescoped within said cup-shaped member and formed to receive a tube base having contacts on its periphery and having at one end a flange for engaging said lip and having spaced longitudinal slots in the other end extending through and up into the periphery of said tubular member, resilient flat contacts clamped between said members and extending thru the slots in said tubular member for providing longitudinal contact surfaces on the interior of said socket, said contacts having terminal lugs extending from said socket between said lip and said flange.

4. A vacuum tube socket including a flat bottomed cup-shaped member having an outwardly extending annular lip and an annular depression on the inside bottom surface, a tubular member telescoped within said cup-shaped member and formed to receive a tube base having flat longitudinal contacts on its periphery and having at one end a flange engaging said lip and spaced longitudinal slots in the other end extending through and up into the periphery of said tubular member, resilient ribbon contacts clamped between said members and extending freely at one end thru the slots in said tubular member and into said depression to provide longitudinal contact surfaces on the interior of said socket to cooperate with the contacts on said tube base and having terminal lugs at the other end extending from said socket to the exterior thereof, and means for resiliently biasing said freely extending ends toward the center of said socket against the inside wall of said annular depression.

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