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J. HIRMAN

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TUBE BASE AND SOCKET

Original Filed Aug. 16, 1933

Fig. 1

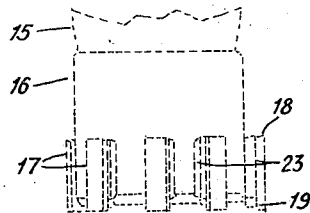


Fig. 3

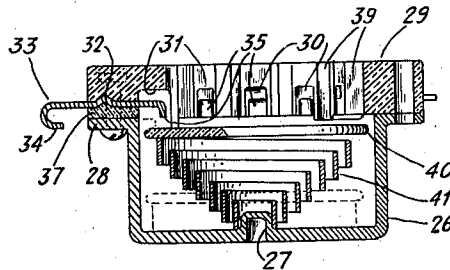


Fig. 2.

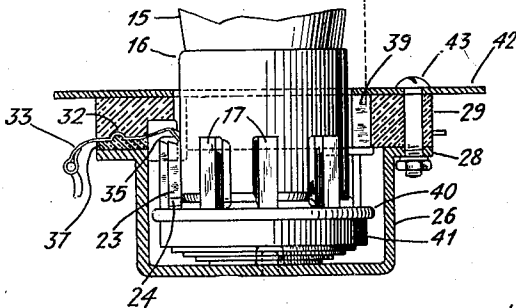


Fig. 4

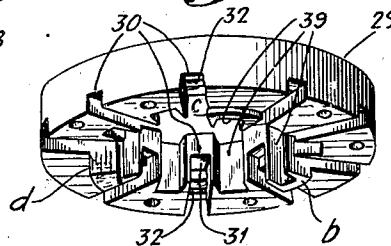


Fig. 5

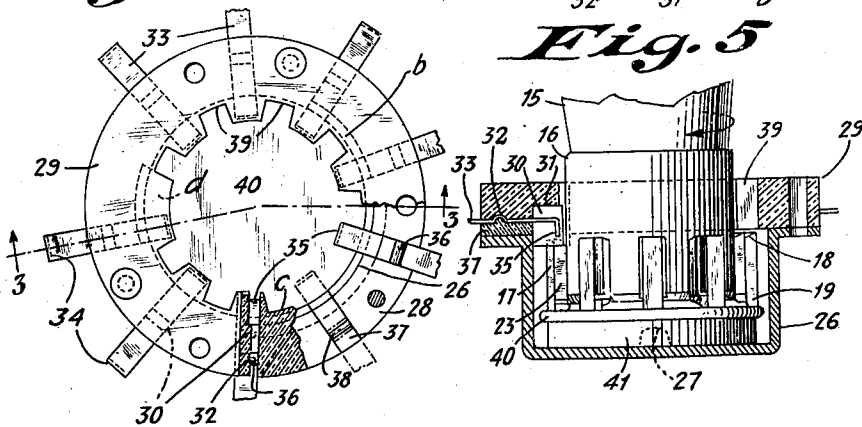
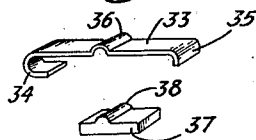


Fig. 6



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2,027,730

TUBE BASE AND SOCKET

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Original application August 16, 1933, Serial No. 685,347. Divided and this application May 18, 1934, Serial No. 726,229

5 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 copending application, Serial No. 685,347, filed August 16, 1933, and Patent 1,976,561 and assigned to the same assignee as the present application.

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 intermediate 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 thru 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 thru 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 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 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 contacts in the socket and still have these contacts properly cooperate with base pins which were not materially less than the 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 pins, the space required for fastening the pins to the base cannot be reduced, nor can smaller socket contacts be used as the conventional socket contact is larger than the base pin.

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 will 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 base and socket contacts which are simple and inexpensive to make.

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 together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawing in which:—

Figure 1 is a longitudinal cross-section of a socket constructed in accordance with my invention with a tube having a base made in accordance with my invention inserted in the socket.

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

Figure 3 is a longitudinal cross-section of the empty socket of Figure 1 taken along the line 3-3 of Figure 2.

Figure 4 is a perspective view of the annular top member of the socket of Figure 3.

Figure 5 is a longitudinal cross-section of the socket shown in Figure 1 with the tube base partly inserted, and

Figure 6 is a perspective view of a contact and locking block made in accordance with my invention.

The vacuum tube shown in Figure 1 of the drawing has an evacuated bulb 15 which encloses the usual cathode and other electrodes, and has cemented to it a cup-shaped base 16, preferably of molded insulation. The base has radial bosses 17 spaced around its periphery near the bottom and extending lengthwise of the base. These bosses have inclined shoulders 18 at the top and tongues 19 at the bottom to position and support the base contacts.

U-shaped contacts 23 consisting of flat strips or ribbons, are wrapped around and carried by the bosses 17. The ends of the contacts are brought together beneath the boss and welded to fasten the contacts in place on the bosses and to form connecting lugs 24 which facilitate and simplify the connecting of the lead wires which extend thru the bottom of the base to the base contacts 23. The lead wires may be welded to the lugs, thus making a good electrical connection more easily than by soldering and eliminating threading of the lead wires into the contact pins.

Since the width of a boss with a contact mounted on it may be less than the diameter of the conventional tubular contact, and since the 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 such contacts can 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. These flat contacts are strong and provide ample contact area.

The contact members 23 may to advantage be made of nickel which can very easily be worked and welded. By mounting the contacts on the bosses projecting radially from the side of the base the overall length of the based tube is made materially less than that of a similar tube having tubular contacts in the bottom of the base.

It is obvious that the base can be registered with the socket in various ways, for example, by a stud or projection on the base shell to enter a corresponding slot in the socket, by one boss of different size than the other bosses, or preferably by spacing two of the bosses further apart than the others.

A socket constructed in accordance with my invention and adapted for use with the tube base above described is shown in Figures 1 to 5 inclusive. It has a metallic cup-shaped member 26 with a central stub 27 in the bottom and a flange like lip 28. The metal cup 26 is an electrical shield for the tube base and thus assists in preventing interstage coupling which is highly desirable in modern apparatus using highly sensitive tubes.

Supported on the flange like lip 28 is an annular or ring-shaped member 29 preferably riveted to the lip. The annular member 29 overhangs the interior of the cup-shaped member 26 and has radial undercut slots or grooves 30, best shown in Figure 4. These slots 30, which are enlarged or cut deeper at 31 adjacent the opening in the annular member 29, also have transverse depressions or grooves 32 by means of which the socket contacts 33 are positioned in the slots.

Each socket contact is positioned in one of the undercut slots 30, and has on its outer end a lug 34 and on its inner end a downwardly extending tongue 35 positioned in the enlarged end 31 of the slot. The socket contact is formed with a hump 36 to fit into a groove 32. An insulating block 37, with a projection 38 for registering with the groove 32, is clamped between the socket contact 33 and the flange like lip 28 to lock the socket contact in place. No rivets, or bolts or the like are needed to directly fasten the contacts to the socket. The contact spring need not be punched for a rivet or bolt, hence the spring contact is stronger and it may be made more compact than has heretofore been feasible. The contact members 33 may to advantage be made of nickel which can be very easily worked or welded. They may be made in various ways, but I prefer to cut them from metal ribbon and form them as shown in Figure 6.

As best shown in Figure 2 longitudinal slots 39 on the inside of the annular member 29 permit a tube base such as shown in Figure 1 to be inserted in the socket. A protector disc 40 normally held against the bottom of the annular member 29 by a biasing spring 41 centered on the stub 27 prevents the entrance of foreign objects into the empty socket, and lessens the possibility of accidentally touching the socket contacts. The socket may be attached to a sub-panel 42 by means of nuts and bolts 43, as shown in Figure 1.

When the base is inserted in the socket, the bosses are registered with the slots 39, and the tube is pushed down into the socket against the disc 40 until the tops of the bosses clear two downwardly projecting lugs "b" and "c" provided on the annular member to insure that the bosses will not accidentally engage and twist the tongues 35 of the contacts while the base is being rotated into place. Another downwardly extending lug "d", which is longer than lug "b" and "c", prevents rotation of the base in a counter clockwise direction, as viewed in Figure 2, but permits rotation of the base in a clockwise direction to bring the contact tongues 35 on the socket and the contacts 23 on the base into alignment. When this position has been reached, pressure is released from the tube and the biasing spring 41 forces the base 16 up against the tongues 35 of the contacts 33 as clearly shown in Figure 1 to provide electrical contact between the base and socket, the tongue 35 giving an inward wiping action as the biasing spring pushes the base into place. This locks the tube base in the socket and prevents poor operation of the tube due to loose contacts brought about by shock and jar, thus making this construction highly satisfactory for mobile and portable use.

It will thus be seen that I have provided a base and socket in which the maximum number of contacts which is now feasible to use on the conventional base and socket can be materially increased and still have the base and socket fully meet the electrical and mechanical requirements of such tube bases and sockets. In accordance with

cordance with my invention I can materially reduce the size of the usual base and socket and still properly accommodate as many contacts as can now be used on the base and socket of usual size. In addition to providing an improved method of attaching the contacts to the socket, the socket electrically shields the tube base and securely retains the tube base in place against the usual vibration and shock encountered in portable and mobile use. The shielding and wide spacing of the contacts which reduces interlead capacity also makes a base and socket embodying my invention most suitable for short wave use.

While I have indicated the preferred embodiments of my invention of which I am now aware and have also indicated only one specific application for which my invention may be employed, it will be apparent that my invention is by no means limited to the exact forms illustrated or the use indicated, but that many variations may be made in the particular structure used and the purpose for which it is employed without departing from the scope of my invention as set forth in the appended claims.

What is claimed as new is—

1. A socket for a vacuum tube having spaced contact supporting bosses on the periphery of the base, including a cup-shaped member having an outwardly extending flange like lip, an annular member supported on said lip and overhanging the interior of said cup-shaped member, spaced radial contact members supported on the under side of said annular member and insulated from said cup shaped member and overhanging said cup-shaped member to a less extent than said annular member, said annular member being provided with interior longitudinal slots intermediate said contacts to permit the insertion of the base into the socket, and means for biasing the base to force the contacts on the base against the contacts in the socket.

2. A socket for a vacuum tube having spaced contact carrying bosses on the periphery of the base, including a cup-shaped member having a flange like lip, an annular member supported on said lip and overhanging the interior edge of said cup-shaped member, said annular member having radial under-cut grooves, contact members supported within said grooves insulated from said cup shaped member and overhanging the interior edge of said cup-shaped member, said annular member being provided with longitudinal slots intermediate said grooves to permit insertion of the tube base in said socket, stop means on the under side of said annular member cooperating

with the bosses on the tube base for permitting limited rotation of said base in one direction only to align the contacts on the base and in said socket and means for biasing the base to engage the base and socket contacts.

3. A vacuum tube socket including a cup-shaped member having a flange like lip, an insulating annular member supported on said lip and to overhang the interior of said cup-shaped member, said annular member having radially directed under-cut slots provided with a transverse groove intermediate its ends, a spring contact mounted in said slot and having an intermediate portion formed to fit in said transverse groove, and a block of insulating material clamped between said flange like lip and said contact, and provided with a projection thereon registering with the intermediate portion of said spring contact for locking said contact in said annular member.

4. A vacuum tube socket including a metal cup-shaped member provided with a flange like lip, an annular member of insulating material supported on said lip to overhang the interior of said cup-shaped member, said annular member being provided with spaced under-cut radial slots, flat spring contact members in said slots and insulated from said cup-shaped member and overhanging the interior of said cup-shaped member to a less extent than said annular member, said annular member being provided with spaced longitudinal slots intermediate said under-cut slots to permit the insertion into said socket of a base having contact carrying longitudinal bosses on its periphery, and means for biasing the base against the contacts in the socket to engage the base and socket contacts.

5. A socket for a vacuum tube having spaced longitudinal contact carrying bosses on the periphery of the base, including a metal cup-shaped member, an annular member mounted on said cup-shaped member to overhang the interior of said cup-shaped member, said annular member having radial under-cut grooves enlarged at the inner ends, contacts insulated from said metal cup-shaped member and supported within said grooves to overhang the interior of said cup-shaped member and to permit free movement of the inner ends of said contacts, said annular member having longitudinal slots intermediate said grooves to permit the insertion of the tube base, and a disc biased against the under side of said annular member to close the opening into the interior of said cup-shaped member.

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