Feb. 11, 1936. G. M. ROSE, JR 2,030,184

TUBE BASE

Filed June 27, 1933

Fig. 1.

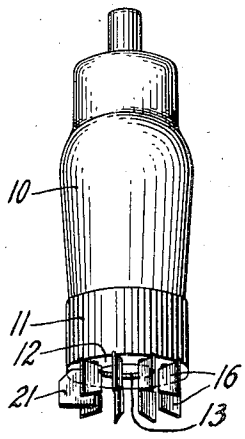


Fig. 3.

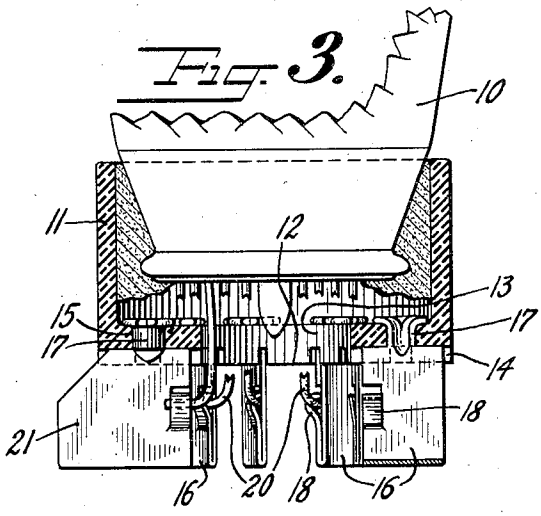


Fig. 2.

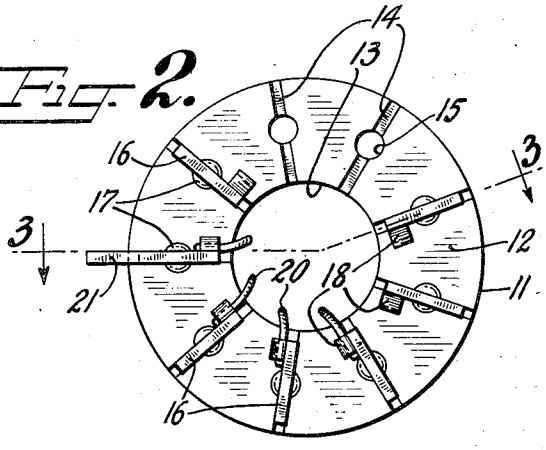


Fig. 4.

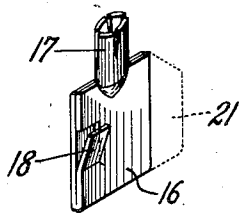


Fig. 5.

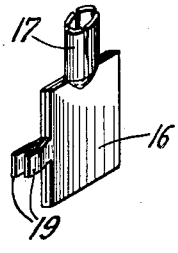
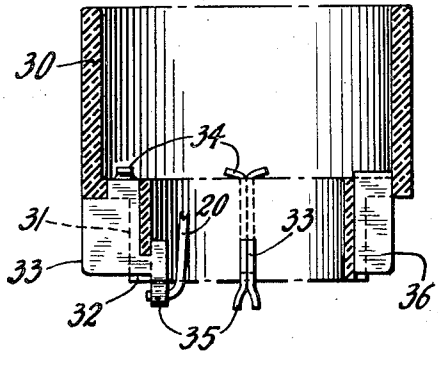


Fig. 6.



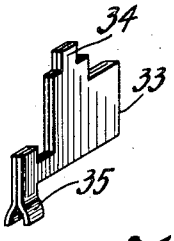


Fig. 7.

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TUBE BASE

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Application June 27, 1933, Serial No. 677,777

7 Claims. (Cl. 250—27.5)

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

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. These tubular contact pins are connected to the electrode elements of the tube by leading-in wires threaded into and soldered to the pins. 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.

Not only has the practical limit been reached in the number of contact pins which can be mounted in the conventional way in a tube base of conventional size, but tubes only about one-half the conventional size must be provided with bases having as many contact pins as the conventional sized tube. The usual number of conventional sized contact pins cannot be mounted in the conventional way on a smaller base, yet a corresponding reduction in size of the contact pins will result in pins which are too weak for practical use, do not have enough contact area, and offer very great difficulties in the threading of the leading-in wires into the pins. There is a practical limit to the reduction in 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.

The conventional contact pin is in effect riveted into the base by upsetting or spinning the inner end of the pin over on the inside of the bottom of the base. The inner end is thus enlarged and in effect the diameter of the pin is increased, so that more room is required for proper 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, hence a base constructed in the usual way cannot as a practical matter be reduced in size and still be commercially satisfactory.

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

Another object of my invention is to provide a base so constructed that the attachment of the leading-in wires to the contacts is much simpler and easier than soldering to tubular contact pins.

A further object of my invention is to provide a base having rigid and strong contacts which occupy less angular space on the base than the contact pins commonly used yet have as great or even greater contact area than the conventional contact pins.

Still another object of my invention is to provide an improved base contact terminal which is simple and inexpensive, and provides ample contact area.

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 best be 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 constructed in accordance with my invention.

Figure 2 is an enlarged bottom view of Figure 1.

Figure 3 is a longitudinal section of the lower end of the tube shown in Figure 1, taken along the line 3—3 of Figure 2.

Figures 4 and 5 are perspective views of contact terminals made in accordance with my invention.

Figure 6 is a sectional view of a modified form of base embodying my invention.

Figure 7 is a perspective view of a base contact for the modification shown in Figure 6.

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 cup-shaped base comprising a shell 11 with a flat bottom 12 and preferably molded from insulating material. In the particular device shown in Figures 1, 2, and 3, the flat bottom 12 has a circular opening or aperture 13 at the center, so that the bottom 12 is in effect a washer or apertured disc. From the edge of the aperture 13 radial grooves 14 in the outer side of the bottom 12 extend to the outer edge of the base as best shown in Figures 2 and 3. Near the middle of each groove is a hole 15 through the bottom 12 to the interior of the base.

Contact terminals 16, in the form of blades or fins, are set edgewise in the grooves 14 to be perpendicular to the bottom 12. Each contact

has on its upper edge a fastening lug 17 which extends through the hole 15 in the bottom of the groove 14, and is upset or peened over at its inner end to fasten the contact fin 16 firmly to the base.

To facilitate and simplify the connecting of the lead wires to the base contacts, I provide each contact on its inner edge with a connector, such as the connecting lug shown in Figure 4 or the slightly modified connecting lug 19 shown in Figure 5. When the base is put on the tube during assembly these connecting lugs 18 or 19 practically adjoin the lead wires 20 which project through the opening 13 in the base shell. The lead wires may be inserted in the connecting lugs and then welded to the lugs, thus making a good electrical connection more easily than by soldering. The threading of the lead wires into tubular contact pins is eliminated, and the welding assures a good electrical contact.

As the contact fin 16 requires materially less angular space on the base than the conventional tubular contact more of such contact fins 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 practically possible in the usual size base can be used because of the small angular space required by the contact fins. These contacts with flat surfaces provide ample contact surface, at least as much as the conventional contact pin.

The flat contact blades or fins 16 may to advantage be made of nickel, which is easily worked and welded and may be made in various ways. I prefer to punch them as double blanks and fold them. An advantage of the folded punching is that the connecting lugs, as clearly shown in Figures 4, 5, and 7, are formed of two halves which can be separated to permit a lead wire to be placed between them. This construction produces a contact which is amply rigid and strong for its intended use. Furthermore it greatly simplifies the manufacture of base contacts, as it is easier to make and fold the contact blanks than to make the usual tubular type contacts.

While I show a contact fin with lugs for securing it to the base shell, I may mold the contact fins into the base shell and secure them to the shell in any of the various ways commonly used to secure metal inserts in molded material. For example, I may provide a hole through a part of the contact fin which is within the body of the base shell, so that during the molding process the shell material will flow into the hole and lock the contact fin to the shell.

It is obvious that the base can be indexed or put in the correct angular position in the socket in various ways, for example, by placing the contact fins nonsymmetrically around the shell, by using one or more fins which differ from the others in thickness, or providing studs or projectors on the base shell to enter corresponding slots in the socket. I prefer to index the base by providing a contact fin which has an extension 21, as shown in Figures 2 and 3, but which is otherwise the same as the other contact fins.

In Figure 6 I show another form of embodiment of my invention. The base shell 30 is provided with a stepped portion 31 and radial slots 32 which extend through the bottom of the base. A contact fin 33 of the type shown in Figure 7 is inserted in each slot and secured in the base by peening over the fastening lugs 34. Connecting lugs 35 engage the leading-in wires 20 and are preferably welded to said leading-in wires. For this type of base a convenient registering or indexing means is a pin 36 secured to the base and fitting into a corresponding slot in the socket when the base is in proper position. This pin 36 may be molded in the base instead of being a separate element.

It will be seen that I have provided a base in which the maximum number of pins which it is new feasible to use on the conventional base can be materially increased and still have the base fully meet the electrical and mechanical requirements of a tube base. In accordance with my invention I can materially reduce the size of the usual base and still properly accommodate as many contacts as can now be used on the base of the usual size. The threading of lead wires into tubular contact pins has been eliminated, thus expediting manufacture, and the electrical connection between the contact and the leading-in wires has been materially improved. My invention also provides a novel contact fin which can be manufactured cheaply and easily from a single punching.

The embodiments of the invention illustrated and described herein have been selected for the purpose of setting forth the principles involved, but it will be apparent that various modification may be made to meet different conditions encountered in use, and I, therefore, intend to cover all modifications within the scope of the appended claims.

What I claim as new is,—

1. A vacuum tube base comprising a disc of insulating material having a central opening, flat contact fins mounted on said disc to extend radially from said opening along one surface of and perpendicularly to said disc and spaced around the periphery thereof, each of said contact fins having one edge in engagement with and mechanically secured to said disc, and a connecting lug on its edge adjacent said opening.

2. A base for a vacuum tube comprising a disc of insulating material having a central opening and channels extending radially from said opening along one surface of said disc, flat contact fins mounted on edge in said channels and perpendicularly to the surface of said disc, each of said contact fins having on its edge in contact with said disc a fastening lug secured to said disc and having on its edge adjacent said opening a connecting lug for making an electrical connection.

3. In a vacuum tube, the combination with a bulb having lead wires projecting from one end, of a cup-shaped insulating base with a flat bottom secured to said end of said bulb, the bottom of said base having a central opening through which said lead wires extend, and having channels extending radially from said opening, flat contact fins mounted on edge in said channels perpendicularly to said bottom and mechanically secured thereto, and connecting lugs on the inner edges of said fins adjacent said opening and connected to said lead wires.

4. A vacuum tube base comprising an insulating cup with an annular bottom having channels spaced around its periphery, flat contact fins mounted on edge in said channels perpendicularly to said bottom, a fastening lug on one edge of each of said fins for mechanically securing said fin to said bottom and a connecting lug on another edge of each of said fins.

5. A vacuum tube base including a cup-shaped shell of insulation with a flat bottom having

radial channels spaced around the periphery of said bottom, flat contact fins mounted in said channels perpendicularly to said bottom, said fins having on their edges fastening lugs for securing the same to said base and connecting lugs for securing lead wires to said fins.

6. A vacuum tube base including a cup-shaped base shell of insulating material having a flat bottom, flat contact fins set on edge and radially of said bottom to project perpendicularly thereto and spaced around the periphery thereof, said fins having fastening lugs extending through said bottom into the interior of the shell for securing said contact fins thereto.

7. A vacuum tube base including a base shell having a plurality of contacts each of said contacts comprising an oblong punched blank with extensions on its shorter edges, said blank being folded in half with the shorter edges in contact to make a flat contact fin, the extensions on said edges being in registry to form a lug for fastening said fin edgewise to said base, said blank being formed to provide a second lug on another edge of said fin for securing a lead wire to said fin.

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