

Oct. 5, 1943.

J. R. NELSON

2,330,838

TUBE BASE

Filed Aug. 7, 1941

FIG. 1.

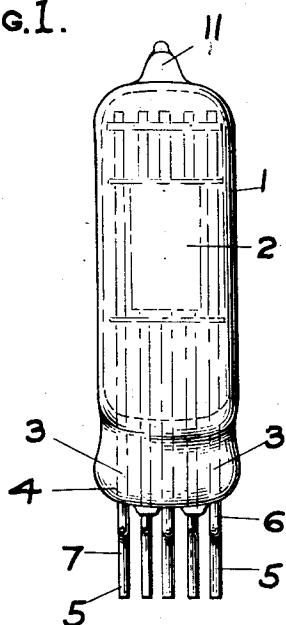


FIG. 2.

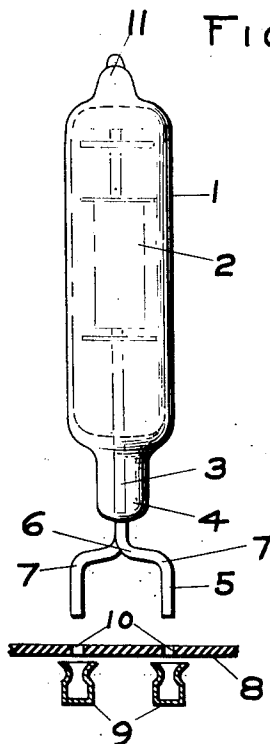
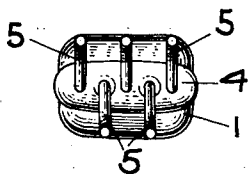


FIG. 3.



INVENTOR.
JAMES R. NELSON,
BY *Elmer J. Gorn*
ATTY.

UNITED STATES PATENT OFFICE

2,330,838

TUBE BASE

James R. Nelson, Belmont, Mass., assignor to
Raytheon Production Corporation, Newton,
Mass., a corporation of Delaware

Application August 7, 1941, Serial No. 405,818

6 Claims. (Cl. 250—27.5)

This invention relates to an electrical space discharge tube base structure, and more particularly to such a base structure which is useful in tubes of extremely small size.

Miniature space discharge tubes, particularly of the high vacuum or radio type, have been developed. In such tubes there has been a severe problem as to the base structure so as to make the tubes readily interchangeable in a set. In some instances the art has been forced to use flexible lead wires which are soldered in place in the set. Where attempts have been made to use a miniature base, these tubes have been so small that a satisfactory base occupied an excessive amount of space. An additional problem has been the fact that if the contact prongs coming from the tube were too close together, it was extremely difficult to construct a socket with its prong-receiving contacts sufficiently close together to receive such closely-spaced contact prongs.

An object of my invention is to devise a tube base which has contact prongs sufficiently spaced so as to enable a satisfactory socket to be constructed, and into which the tube can be detachably plugged.

Another object is to devise such a tube base which does not increase the overall dimensions of the small tube.

A further object is to provide in a simple and effective manner an unsymmetrical arrangement of contact prongs so as to insure proper orientation in the tube socket.

The foregoing and other objects of this invention will be best understood from the following description of an exemplification thereof, reference being had to the accompanying drawing, wherein:

Fig. 1 is a front view of an electrical space discharge tube embodying my invention;

Fig. 2 is a side view thereof shown opposite a cross-section of a tube socket; and

Fig. 3 is a bottom view of the tube shown in Figs. 1 and 2.

The embodiment illustrated consists of an envelope 1 made of some suitable material, such as a flat glass tubular member, within which is supported the usual electrode assembly 2. A plurality of lead wires 3 extend from the electrode assembly 2, and are sealed through an external press 4 formed at the lower end of the envelope 1 by softening the glass at this point and compressing it around the lead-in wires 3. Said lead-in wires extend to the exterior of the envelope where they form a plurality of contact prongs 5.

Preferably there are an uneven number of lead-in wires and corresponding contact prongs. While the portion of the lead-in wire 3 which extends through the glass press 4 should be of a material which readily seals to glass, the external contact portion 5 can be made of any suitable material which, however, is rigid enough to serve as a contact prong. However, in most instances it is satisfactory to make the entire lead-in wire and contact prong of the same material.

If the lead-in wires 3 were permitted to extend straight out from the bottom of the press 4 in an attempt to use the external portions thereof for contact prongs, various important difficulties would arise. In the first place, the spacing between the contact prongs would be so small that it would be commercially impossible to produce a tube socket with its apertures and contact-receiving portions sufficiently close together to receive said aligned contact prongs. Furthermore there would be no way of readily determining the orientation of the tube in the socket inasmuch as the tube could be inserted in either one of two opposite positions, only one of which would be the correct position.

In accordance with my invention the external portions 5 are given two bends 6 and 7 which displace alternate contact prongs in at least two different planes, as shown most clearly in Figs. 2 and 3. The bends preferably are made in such a way that the sides of said contact prongs do not extend beyond the dimensions established by the side walls of the envelope 1, also as shown most clearly in Fig. 3. In this way a maximum spacing between said contact prongs is secured without increasing the overall dimensions occupied by the tube. Furthermore, due to the fact that an uneven number of such contact prongs are used, the unsymmetrical arrangement shown in Fig. 3 results, so that the tube can only be inserted into a corresponding socket in one orientation. Such a socket 8 is shown diagrammatically in Fig. 2. The socket 8 is provided with openings 10 behind which are located contact receiving portions 9. The contact prongs 5 are inserted in the openings 10, and may contact with said contact-receiving portions 9.

The above tube arrangement can be made in a simple and effective manner. First the lead-in wires are prebent with the bends 6 and 7. The electrode assembly 2 is then mounted thereon. Thereupon the contact prongs 5 are held in their final relative position by means of a clamp or by being inserted into properly shaped openings in a holding block; a flat-sided tube is slipped over

the electrode assembly and the lead-in portions 3. Upon heating of one end of said flat-sided tube, it is compressed to form the press 4 with the lead-in wires 3 sealed therein. The tube may then be exhausted in the usual manner through an exhaust tube at the upper end of the envelope 1, which when sealed off leaves the exhaust tip 11.

Of course it is to be understood that this invention is not limited to the particular details as described above as many equivalents will suggest themselves to those skilled in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within this art.

What is claimed is:

1. A tube base comprising an envelope having a plurality of lead-in conductors sealed through one end thereof and projecting through the bottom of the base along substantially a single plane, said lead-in conductors being sufficiently rigid to serve as external contact prongs, the external ends of alternate ones of said lead-in conductors being bent into at least two different parallel planes to provide contact prongs lying in at least two different parallel planes, said contact prongs lying within the space formed by extensions of the planes in which the side walls of said envelope lie.

2. A tube base comprising an envelope having a cross-sectional area which is substantially longer in one direction than in another, a plurality of lead-in conductors sealed through one end thereof and disposed in a plane lying substantially along the longer dimension of said envelope, said lead-in conductors being sufficiently rigid to serve as external contact prongs, the external ends of said lead-in conductors being bent into at least two different parallel planes to provide contact prongs lying in at least two different parallel planes, said contact prongs lying within the space formed by extensions of the planes in which the side walls of said envelope lie.

3. The method of forming a tube base comprising an envelope having a plurality of lead-in conductors sealed through one end thereof and

projecting through the bottom of the base along substantially one plane, said lead-in conductors being sufficiently rigid to serve as external contact prongs, the external ends of said lead-in conductors projecting outside of said envelope being bent into at least two different parallel planes to provide external contact prongs lying in at least two different parallel planes, which method comprises pre-bending said external ends of said lead-in conductors into their final desired shape, supporting said pre-bent ends in their final desired position, and sealing said lead-in wires through the wall of said envelope while so supported.

4. A tube envelope having one end wall thereof constituting the sole base therefor, a plurality of lead-in conductors sealed through said end wall and disposed in a plane, said lead-in conductors being sufficiently rigid to serve as external contact prongs, the ends of alternate ones of said lead-in conductors projecting outside of said envelope being bent into at least two different parallel planes to provide external contact prongs lying in at least two different parallel planes.

5. A tube envelope having one end wall thereof constituting the sole base therefor, a plurality of lead-in conductors sealed through said end wall and disposed in a plane, said lead-in conductors being sufficiently rigid to serve as external contact prongs, the ends of said lead-in conductors projecting outside of said envelope being bent into at least two different parallel planes to provide external contact prongs lying in at least two different parallel planes.

6. A tube envelope having one end wall thereof constituting the sole base therefor, a plurality of lead-in conductors sealed through said end wall and disposed in a plane, said lead-in conductors being sufficiently rigid to serve as external contact prongs, the ends of said lead-in conductors projecting outside of said envelope being bent into at least two different parallel planes to provide an unsymmetrical arrangement of external contact prongs lying in at least two different parallel planes.

JAMES R. NELSON.