July 27, 1943. K. F. MAYERS 2,325,527

TUBE STRUCTURE

Filed Jan. 15, 1942

Fig. 1.

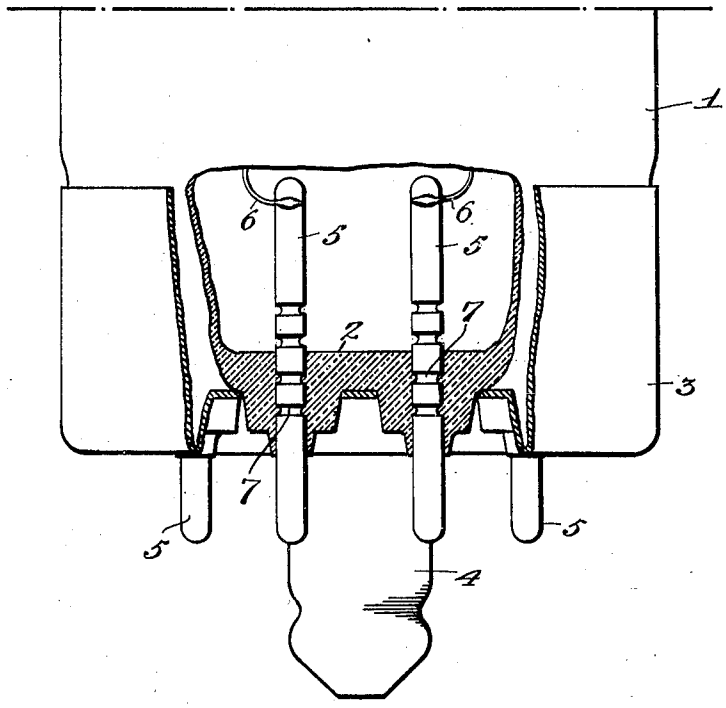
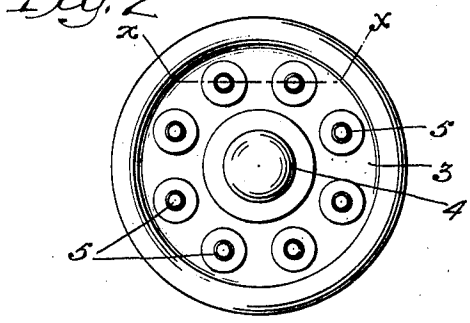


Fig. 2



Inventor.
Karl F. Mayers.
by his Attorneys.
Howson & Howson

Patented July 27, 1943 2,325,527

UNITED STATES PATENT OFFICE

2,325,527

TUBE STRUCTURE

Karl F. Mayers, Somerville, N. J., assignor to National Union Radio Corporation, Elizabeth, N. J., a corporation of Delaware

Application January 15, 1942, Serial No. 426,925

2 Claims. (Cl. 250—27.5)

This invention relates to improvements in the contact pin constructed for radio vacuum tubes and like apparatus, and more particularly to a contact pin constructed to provide a more positive tube base to contact pin seal.

Vacuum tubes are now commonly constructed with glass bases and envelopes and with contact pins of relatively stiff wire which extend through the tube base to the interior of the tube where they serve as electrode supports or connecting wires. The contact pins are sealed into the glass base and are thus supported thereby. While a metal base cap is used to support the tube as a whole, this cap is necessarily insulated and spaced from the contact pins. Accordingly, the contact pins have relatively little support, and upon the placement of a tube into a conventional socket, each pin is subjected to considerable stress which tends to break the seal between the glass base and the contact pin. This tendency may be increased and may be particularly harmful in the case of a slightly misaligned contact pin or socket contact. Further, contact pins are now commonly formed of a reasonably hard and stiff steel or alloy wire formed, for example, by drawing the wire through a proper die. Such wire is likely to bear a die scratch in the form of a slight shallow groove extending longitudinally on the surface of the wire, or it may have longitudinal seams resulting from elongation of gas bubbles or oxides in the original billet of steel or alloy, or surface cracks of any other origin. When contact pins are formed from such wire, one of the several pins used in each tube may have a longitudinal scratch which extends substantially entirely through the glass seal formed between the tube base and the contact pin.

In some instances, the seal at the contact pin has been found initially to be air tight such that upon evacuation of the tube a satisfactory test could be obtained. However, when the tube was inserted into a socket, the strain thus encountered would very slightly break the glass to pin seal along the longitudinal scratch. Such a tube would then develop a slight air leak which would render the tube useless. In other instances, due to the irregularity of the surface, as a result of the above described surface cracks or seams, an air-tight seal cannot be formed and a very minute air passage will result.

It is the principal object of the present invention to eliminate the defects above mentioned by providing a novel contact pin to which a secure glass seal may be effected.

Another object of the invention is to provide an improved base to contact pin seal for a vacuum tube.

Still another object of the invention is to increase the reliability and strength of the base to contact pin seal in a vacuum tube.

A further object of the invention is to provide a contact pin for a vacuum tube on which longitudinal die scratches, surface cracks, or seams are not detrimental.

Other objects and advantages of the invention will be apparent from the following description.

In the drawing:

Fig. 1 is an enlarged elevation of the lower portion of a vacuum tube having a portion broken away to illustrate the present invention; and

Fig. 2 is a bottom plan view of the tube of Fig. 1, the line x—x of Fig. 2 indicating the portion of the tube broken away in Fig. 1.

The vacuum tube illustrated comprises a glass envelope 1 having an integral base portion 2 which is materially thicker than the side walls of the envelope. To support the tube, a metal base 3 having a central supporting pin 4 is normally fitted onto the envelope base.

A number of contact pins 5, usually eight, are provided. These pins extend through the base portion 2 as shown. It will be understood that the outer ends of the contact pins are adapted for insertion in a suitable socket, while the inner ends of the pins are electrically connected to the tube elements as by connectors 6.

In accordance with the present invention, each contact pin 5 is provided with at least one, and preferably two, circumferential grooves 7. These grooves are preferably of semi-circular section, to eliminate sharp corners, and of a depth substantially greater than that of any longitudinal scratches which may be on the pins. By virtue of these grooves 7, any lengthwise passages are effectively blocked by a secure seal, and, further, the seal thus formed is not susceptible to fracture as is the seal in a shallow, sharp cornered, irregular scratch.

By way of example, two axially spaced circumferential grooves about five or ten thousandths of an inch deep and semi-circular in section cut in a contact pin having a diameter of about fifty thousandths of an inch have proved very satisfactory, and tubes embodying such contact pins are entirely reliable. Preferably, two pairs of grooves are provided in each pin, having the same disposition in relation to the opposite ends of the pin, so that either pair of grooves may be used. This facilitates manufacture of the tube, as it

eliminates the necessity of pre-arranging the pins.

It is to be understood that the invention is not limited to the particular structure shown nor to the dimensions set forth above, but is capable of various modifications within the scope of the appended claims.

I claim:

1. In a vacuum tube, an evacuated envelope having a relatively thick portion formed entirely of a single fusible material, a plurality of contact pins extending from the exterior of said envelope through said portion to the interior of said envelope, and directly engaging said material, the maintenance of the vacuum within said envelope being dependent upon the establishment and maintenance of a direct seal between said pins and said material, such seal being susceptible to breakage thereof along a longitudinal surface scratch on any one of said pins, and means for maintaining said seal and preventing such breakage thereof, said means comprising at least one circumferential groove on each pin located entirely within said portion and filled with said material, said groove being of sufficient depth so that the material therein forms a permanent seal about the pin which is unaffected by the presence of a surface scratch.

2. In a vacuum tube, an evacuated envelope having a relatively thick portion formed entirely of a single fusible material, a plurality of solid smooth-surfaced cylindrical contact pins extending from the exterior of said envelope through said portion to the interior of said envelope, and directly engaging said material, the maintenance of the vacuum within said envelope being dependent upon the establishment and maintenance of a direct seal between said pins and said material, such seal being susceptible to breakage thereof along a longitudinal surface scratch on any one of said pins, and means for maintaining said seal and preventing such breakage thereof, said means comprising at least one circumferential groove on each pin located entirely within said portion and filled with said material, said groove being of sufficient depth so that the material therein forms a permanent seal about the pin which is unaffected by the presence of a surface scratch, each of said pins being of substantially uniform diameter throughout its length except for the reduced diameter at said groove.

KARL F. MAYERS.