March 7, 1944. S. D. BERGMAN 2,343,522

PIN CONNECTION

Filed Oct. 23, 1943

Fig. 1.

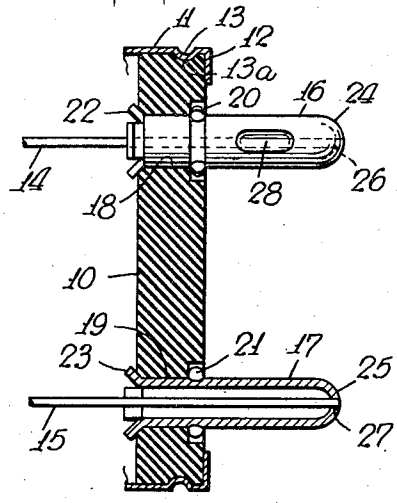


Fig. 2.

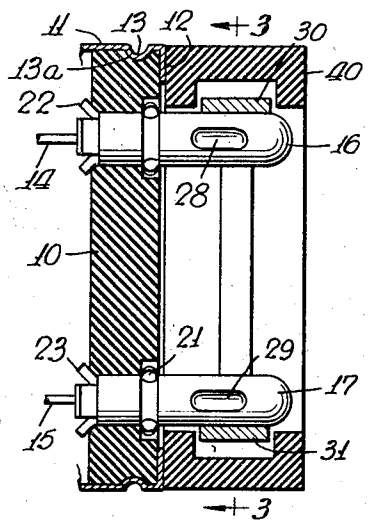


Fig. 3.

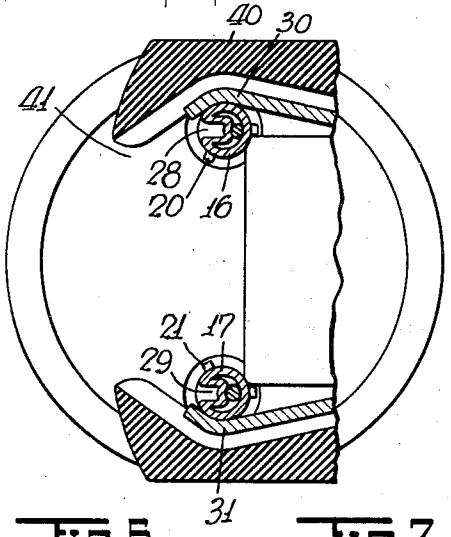


Fig. 4.

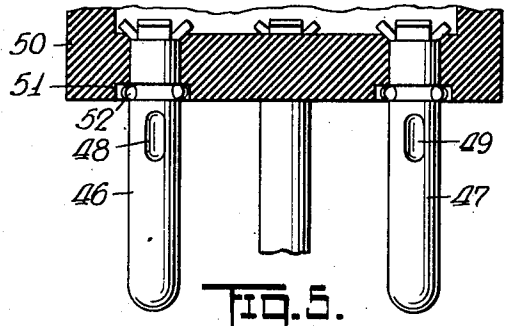


Fig. 5.

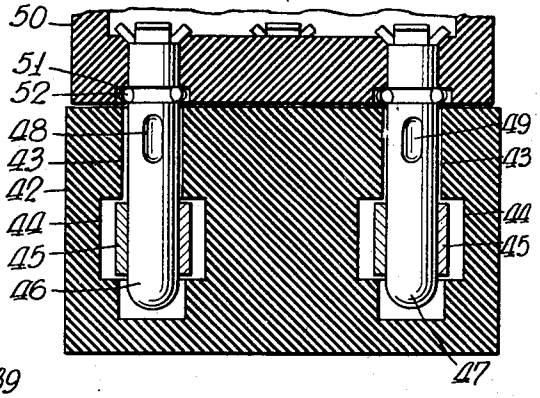


Fig. 6.

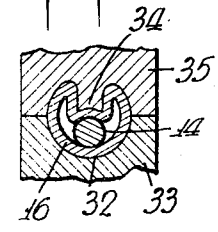
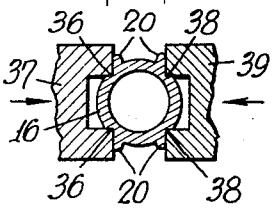


Fig. 7.



INVENTOR

Sidney David Bergman

BY

Harry Ernest Rubens

ATTORNEY

43-233

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2,343,522

PIN CONNECTION

Sidney David Bergman, Brooklyn, N. Y., assignor to Burndy Engineering Company, Inc., a corporation of New York

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7 Claims. (Cl. 250—27.5)

My invention relates to a pin-type connection and more particularly to a type of pin construction for attachment to a socket member, for establishing a detachable electrical connection therethrough.

Such pins are used in great numbers for radio tubes, fluorescent tubes and other type of pin and socket devices. The pins in actual use today are all of the soldered types and are made of thin sheet metal rolled up into cylindrical form with a rolled up head which acts as a shoulder in the attachment to the tube base. Where the prior art attempted to find a non-soldering solution for the problem, the results were unsatisfactory and never used.

The principal object of my invention, therefore is to provide a pin connection that eliminates the necessity for soldering the conductor to the pin. Further objects are to provide a pin connection that eliminates reshaping the entire contact surface of the pin, which reshaping process might necessarily take place after the pin has been installed on the tube base, with the conductor inserted therein; to eliminate the necessity of adding additional parts to the finished connection; to provide a pin connection that will be adapted to large scale production and will be economically competitive with present types in manufacturing costs, and to provide a construction that will eliminate the large percentage of defective pin connections usually found in present types.

I accomplish these and other objects and obtain my new results as will be apparent from the device described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing in which:

Fig. 1 is a sectional view of a form of fluorescent tube base provided with two pins, one shown in longitudinal section.

Fig. 2 illustrates the same view as Fig. 1 with the tube base installed in a tube socket shown in section,

Fig. 3 is a transverse sectional view of the base and socket taken along the line 3—3 of Fig. 2.

Fig. 4 is a sectional view of a radio tube base.

Fig. 5 illustrates the same view as Fig. 4; with the tube base installed in a tube socket shown in section.

Fig. 6 illustrates the die parts for connecting the conductors to pins that may be used.

Fig. 7 illustrates a method of forming the upset shoulder on the pins.

Referring more particularly to the drawing, reference numeral 10 designates, in Fig. 1, a fluorescent tube base, made of suitable insulating material. A metal sleeve 11, encircles the base and may be spun over, as at 12; and provided with a circumferential bead 13 fitting into a corresponding recess 13a in the base thus insuring unitary attachment thereto. A pair of conductors 14 and 15 are shown, leading from the glass tube, not shown. These conductors are inserted within pins 16 and 17 respectively. The base 10, is bored, as at 18 and 19 into which pins 16 and 17 are inserted. The pins are hollow and provided with shoulders 20 and 21 for abutting the tube base. The open ends of the pins 22 and 23 are flared so as to rivet them securely to the base 10, against the action of the shoulders 20 and 21. The method of forming the shoulders will also be hereinafter described.

The pins are preferably made of relatively thick seamless tubing that is readily malleable. The extending ends 24 and 25 are rounded and provided with openings 26 and 27 for the conductors 14 and 15 to extend therethrough where they are subsequently cut off.

Indentations 28 and 29 are provided on the outside of pins 16 and 17 respectively, on a surface which is not engaged by the socket engaging springs 30 and 31. The indentations are preferably longitudinal and are made with confining compression dies, which do not permit the diameter of the pins to be changed. An example of compression dies that may be used is shown in Fig. 6, where the cylindrical recess 32 is provided in die 33, for supporting the pin while the indenting punch 34 forming a part of die 35 is compressed thereon. The depth of depression in the indentation is calculated to compress the walls of the pin about the conductor without substantially affecting the cross-section of the conductor. This is clearly shown in Fig. 3, and Fig. 6.

The shoulders 20 and 21 of the pins 16 and 17 may be formed by upsetting or swaging the metal from the walls of the pins and forcing it beyond the diameter of the pins. A means for doing this is shown in Fig. 7, where the two pairs of cutting edges 36 and 38, forming a part of cutting tools 37 and 39 respectively move linearly towards the centrally positioned pin 16, and upsets the metal from the walls to form extending shoulders 20. The walls of the pins 16 and 17, as has been explained are thicker than the sheet metal pins hitherto used which permits the upsetting operation. The sharp edges of the cut metal may additionally provide means for resisting rotation of the pins after installation in the tube base.

The important aspect of the indenting oper-

ation is that it shall take place on a non-contacting area of the pins when they are inserted into the tube socket. This involves a study of existing sockets so that properly designed pins may be used therein.

The tube base 10 is typical of fluorescent tubes, and the base socket therefore is shown in Figs. 2 and 3. It comprises the U-shaped insulating section 40 having an opening 41 through which the tube pins are laterally inserted. The contact springs 30 and 31 slidably engage the outer surfaces of the pins where contact is made. The supporting structure of section 40 and connections leading to the contact springs are not shown. In this method of establishing contact with the springs 30 and 31 with pins 16 and 17, the proper position for indentation of the pins would be along the three-quarters of the uncontacted circumference that remains. The actual choice should be made with consideration of the method of indentation, and by placing the indentations so they face the same direction and in parallel formation, as illustrated in Figs. 1, 2 and 3, it is possible to use two parallel sets of the die parts shown in Fig. 6, and properly spaced, simultaneously indent both pins.

Where a substantially circumferential type of contact spring is used, as shown in Fig. 5, and found in many types of radio sockets, I have found that an indentation positioned immediately adjacent the upset shoulder will still enable proper connection of pin and inner conductor, without interference with the socket contact spring.

In this view, the socket member 42 is provided with bores 43 for entrance of the pins. Centrally positioned within the member 42, enlarged recesses 44 for positioning the contact springs 45 are shown. The contact springs grip the pins 46 and 47 substantially about the circumference thereof. In such case, as I have explained, the position of the indentations 48 and 49 will be between the contact springs and the tube base 50.

The tube bases may be provided with recessed positions 51 where the shoulders 52 may be inserted, to provide additional space for locating the indentations.

By the foregoing it will be readily apparent that I have provided a method of securing the pins to the inserted conductor wires without employing solder and without damaging or changing the original surface of the pins where they engage the contact springs. This is done by indenting each pin in a non-contacting surface of the pin, thus avoiding the possibility of interfering with the operation of the contact springs as they engage the smooth surface of the pins. The securing operation is accomplished without the use of additional elements as part of the pin.

My method moreover permits large scale production, avoids the use of acid which may corrode the contacts and destroy the usefulness of the tubes. Tests have shown that fewer rejections will result in the assembly lines and a generally increased efficiency in the operation of the tubes occurs.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

1. In combination a pin connection; a tube base having an extending-conductor; and a receiving socket having a contact spring therefor; said pin connection having a central bore, with the conductor inserted therein, and a shoulder positioned thereon, in engagement with the tube base, and an indentation on the outside of the pin connection depressing the metal of the pin connection into the bore and compressing the conductor therein against the wall thereof, said indentation being located on a surface of the pin connection not in contact with the contact spring of the receiving socket.

2. The combination of claim 1, wherein the indentation is positioned on the pin connection at substantially the same point longitudinally as the contact spring and on a position of the circumference of the pin not in engagement with the contact spring of the receiving socket.

3. The combination of claim 1, wherein the indentation is positioned on the pin connection between the tube base and the area of the pin connection in contact with the contact spring of the receiving socket.

4. The combination of claim 1, wherein the shoulder of the pin connection is an upset portion of the original surface of the pin connection.

5. The combination of claim 1, wherein the indentation is a longitudinal depression in the wall of the pin connection.

6. The combination of claim 1, wherein the outside surface of the pin connection from the shoulder to substantially the end thereof has a diameter substantially unchanged.

7. The combination of claim 1, wherein the conductor indented in the bore of the pin connection has substantially the same diameter after indentation.

SIDNEY DAVID BERGMAN.