March 7, 1933. J. E. FERGUSON 1,900,099

METHOD OF SECURING CONTACT PINS IN RADIOTUBE BASES

Filed May 25, 1929 2 Sheets-Sheet 1

Fig. 1

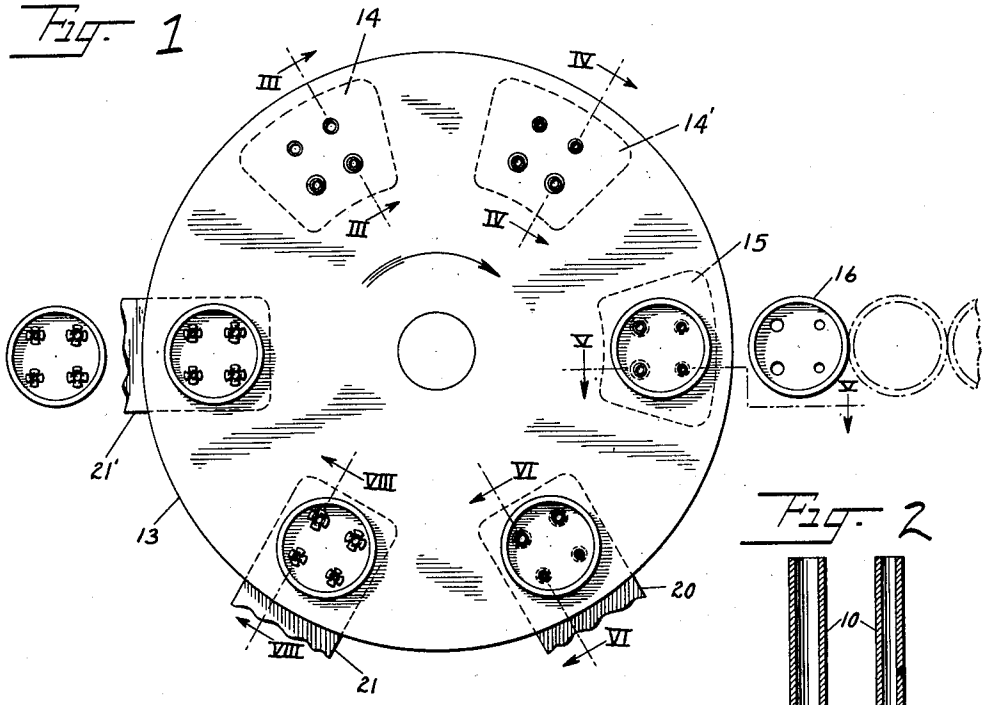


Fig. 2

Fig. 3

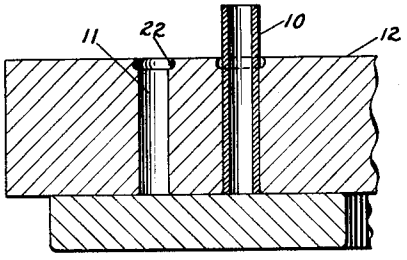


Fig. 4

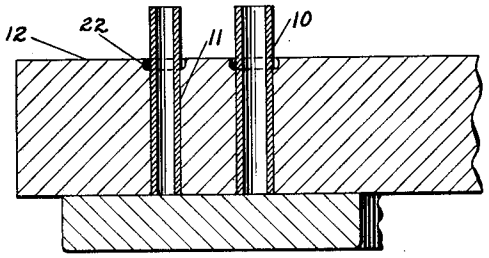
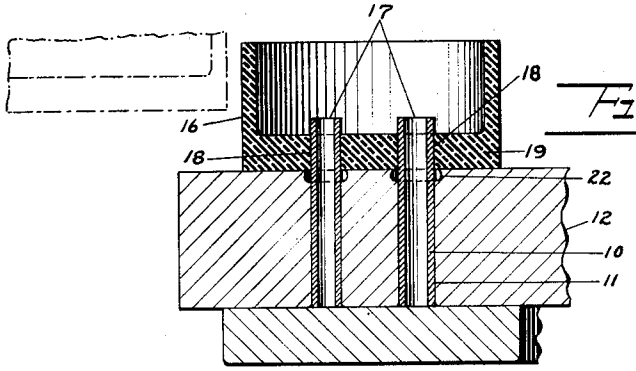


Fig. 5



INVENTOR
J. E. FERGUSON
BY M. F. Reyna
ATTORNEY

March 7, 1933. J. E. FERGUSON 1,900,099

METHOD OF SECURING CONTACT PINS IN RADIOTUBE BASES

Filed May 25, 1929 2 Sheets-Sheet 2

Fig. 6

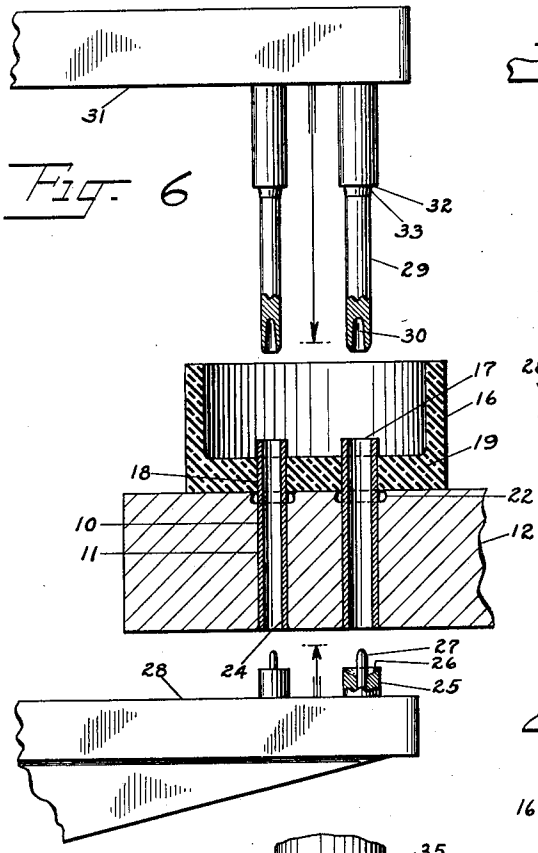


Fig. 7

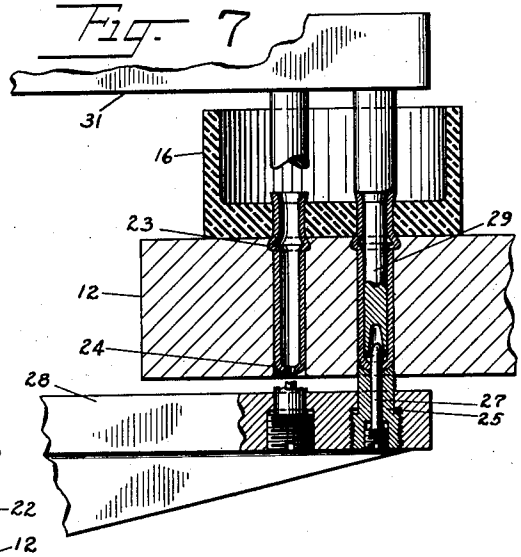


Fig. 8

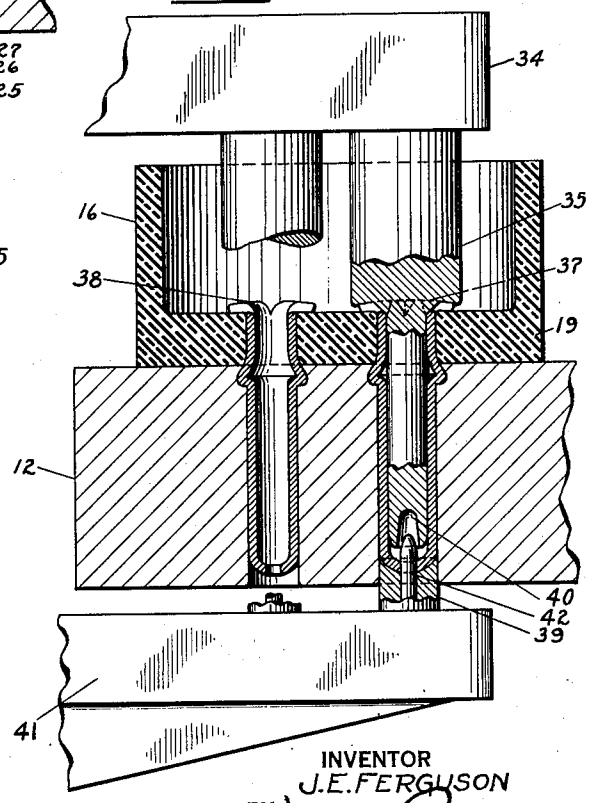


Fig. 9

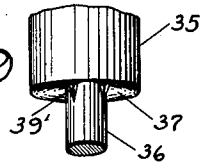
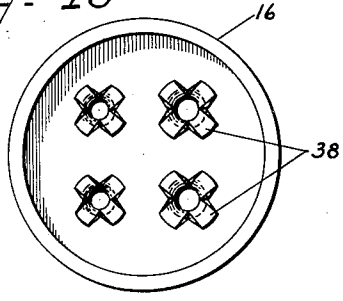


Fig. 10



INVENTOR
J.E. FERGUSON
BY M. F. Reyer
ATTORNEY

Patented Mar. 7, 1933 1,900,099

UNITED STATES PATENT OFFICE

JOHN E. FERGUSON, OF EDGEWOOD, RHODE ISLAND, ASSIGNOR TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA

METHOD OF SECURING CONTACT PINS IN RADIOTUBE BASES

Application filed May 25, 1929. Serial No. 365,845.

The present invention relates to the manufacture of electrical devices and relates more particularly to an apparatus and method for forming contact pins and securing the same in the bases of such devices.

Electrical devices such as radio tubes or the like comprise a sealed glass envelope or bulb containing a plurality of electrodes and are usually provided with what are termed, bases. The base is generally made in the form of a cap or shell and secured by a cement or otherwise to the neck portion of the bulb. It has been found practical to provide radio tube bases in the form of a cap or shell of insulating material such as bakelite or other condensite product.

The manufacture of bases includes the operation of securing a plurality of contact members or pins in the bottom walls thereof. These pins are secured in given spaced relation and project perpendicularly from the wall. The contact pins are usually of tubular form and lead wires or conductors which extend from the bulb neck are soldered or otherwise secured to the contact members.

High speed production in connection with radio tube manufacture has made it necessary to perform most of the operations automatically and mechanism has been provided for automatically securing contact members to the walls of bases.

In one case it has been proposed to mold the contact pins into the base walls when the bases are formed. This operation, however, involves certain disadvtanges and another method was provided, namely, the provision of co-related mechanical elements which positioned the contact pins, disposed a base thereover and riveted the positioned pins to the base. A machine for performing these operations is shown and described in my copending application Serial No. 362,110 filed May 10, 1929 entitled Base pin staking machine.

The machine described in the above mentioned application handled, what may be termed completed contact pins, i. e., the pins were formed with the desired rounded end and an annular shoulder.

It is an object of the present invention to provide a method and apparatus for combining the operations of forming the shoulder and securing pins in bases.

In carrying out the present invention, straight metallic tubular sections are fed to recesses or die cavities and are held therein while a base is positioned with ends of the supported tubular sections extending through apertures and into the base. When so positioned means are provided for forming shoulders on the pins adjacent to the outer side of the base wall. The ends of the pins extending into the base are then deformed to provide a flange or collar for engagement with the inner side of the base wall and thus secure the pins in position. The pins may also be provided with rounded ends which rounding operation may constitute one of the steps of the method. It is to be understood, however, that the rounded end may be dispensed with and contact pins may have shoulders formed thereon and may be secured to bases without the end rounding operation.

The invention consists of a series of manipulative steps and apparatus for performing the same and will be more fully understood by reference to the following description together with the accompanying drawings, in which

Fig. 1 is a diagrammatic plan view of a conveyor indicating the positions of mechanisms for feeding tubular sections and bases as well as forming and riveting mechanism.

Fig. 2 is a longitudinal cross sectional view of large and small tubular sections ready to be formed into contact pins.

Fig. 3 shows a portion of a conveyor in cross section taken on lines III—III in Fig. 1 through die cavities, one cavity having a tubular section positioned therein.

Fig. 4 is a view similar to Fig. 3 taken on lines IV—IV in Fig. 1 but showing two tubular sections in position in die cavities.

Fig. 5 is a view similar to Fig. 4 taken on lines V—V in Fig. 1 but showing a base positioned over projecting ends of positioned tubular sections.

Fig. 6 shows a portion of the conveyor taken on lines VI—VI in Fig. 1 with tubular

sections in position ready to have their ends rounded.

Fig. 7 is a view of the conveyor showing two tubular sections in position with the shoulders being formed thereon.

Fig. 8 is an enlarged sectional view of a portion of the conveyor taken on lines VIII—VIII in Fig. 1 and showing mechanism for riveting the contact pins to a base.

Fig. 9 is a fragmentary view showing a portion of one of the riveting members, and

Fig. 10 is a plan view looking toward the inside of a base.

Although the present invention may be practiced by performing the various operations progressively in a rectilinear path it has been found preferable to perform the several steps in connection with mechanism including a rotary conveyor and cooperating feed and discharge mechanisms. A machine embodying the above various mechanisms is clearly shown and described in the above mentioned copending application.

In practicing the present invention, tubular metallic sections 10 may be disposed in die cavities or apertures 11 provided in a bed plate 12. The drawings show a section of a base taken through two tubular members of different sizes and it will be understood that the following described means and operations may be performed on two or more large or small members as desired and that the means employed is substantially the same for each size.

The bed plate 12 may constitute a conveyor 13 diagrammatically represented in Fig. 1. The tubular sections may be fed to the apertures 11 by feeding mechanisms indicated by the reference numerals 14 and 14′. The conveyor may then move to position the tubular sections adjacent to mechanism 15 for feeding bases 16. At this station a base is positioned so that upper ends 17 of the sections 10 extend through apertures 18 provided in the bottom wall 19 of the base. The base with the tubular sections properly positioned may then be moved into operative relation with shoulder forming and end rounding mechanisms 20 indicated in dotted lines, the base and partly formed sections may then be moved into operative relation with riveting mechanism 21 and thence to discharge mechanism 21′.

The mechanism for forming a shoulder, rounding an end of the section and riveting the section to the base is more clearly shown in Figs. 6 to 8. Each of the apertures 11 may be provided with an annular recess 22 to receive material from the tubular section to provide a shoulder 23. Prior to the formation of the shoulder, however, the lower end 24 of the section is rounded.

Means for accomplishing the end rounding operation may comprise end forming tools 25 having concave surfaces 26 and pins 27 centrally located and projecting upwardly therefrom. The function of the pins being to maintain the openings at the ends of the sections, when the metal at the ends 24 thereof is forced inwardly by the surfaces 26 to shape the ends 24. The end forming tools 25 may be carried on a pressure-arm 28 adapted to move the surfaces 26 against the ends 24 of a tubular section.

When the surfaces 26 are in contact with the ends 24 filler cores or plungers 29 carried on a pressure-bar 31 descend. The plungers 29 are provided with annular pressure surfaces or ridges 32 and adjacent tapered portions 33. When the plungers descend the ridges 32 engage the upper ends of the sections 10 and by reason of the tapered portion slightly flare these ends as their edges contact with the ridges 32.

At this time the end forming tools 25 are in position at the lower ends 24 of the sections 10 and as force is applied to the plungers the lower ends of the tubular sections are guided inwardly by the surfaces 26. A continued movement of the pressure-bar 31 results in the application of a longitudinal stress to the sections and since the metal adjacent to the recesses 22 is free to move it is forced therein with the result that the shoulders 23 are formed and the tubular sections 10 are shaped to provide a contact pin.

For the purpose of maintaining an alignment between the plungers 29 and the end forming tool 25 the plungers are provided with end apertures 30 to receive the ends of pins 27 of the end forming tools.

From the above it will be evident that an actuation of the arm 28 and the bar 31 will convert the tubular sections in to contact pins ready to be secured to the base by a riveting operation.

The riveting operation may be performed at a succeeding station of the conveyor and as shown in Fig. 8 the riveting means may comprise a head 34 having spreading tools 35 mounted thereon. The spreading tools may comprise alignment pins 36 projecting from an annular pressure surface 37 arranged to engage the upper ends of the contact pins and spread or flare them to provide a flange or form prongs 38 which in conjunction with the shoulders 23 secure the contact pins in the wall of the base. The forming surface 37 may be provided with divider ridges or cutters 39′ to separate the ends of the contact pin into a plurality of prongs 38 or where the pins are made of relatively soft material as of copper or the like the pressure surface 37 may operate to form a flange or bead over or otherwise deform the ends of the contact pins.

When the head 34 operates to deform the ends of the contact pins means are provided for engaging the lower ends of the pins so that the stress will be removed from the wall 19

of the base. Stop members for the above purpose may comprise elements 39 similar in construction to the end forming members 25. These elements 39 may be carried on an arm 41 and the alignment pins 36 may be provided with recesses 40 to receive the dowels or pins 42 on the stop elements 39.

After the contact pins have been secured to a base the base and pins may be moved to discharge mechanism 21′ for removal from the conveyor.

With the present invention it is possible to make contact pins from straight tubular sections while the base is in position and by reason of the internal aligning means the pins are held in their proper perpendicular positions with respect to the bottom wall 19 of the base during the operation of forming the shoulder 23 and while being secured to the base by the riveting operation.

It will also be appreciated that by reason of the filler-cores 29 operating in conjunction with the pin 27 the shoulders 23 are formed to lie in such position as to accommodate the formation of the surface of the base wall and that the tubular sections are held from buckling since the walls of the tubular sections are confined between the filler-cores and the walls of the cavities 11 thus the metal thereof being wholly confined will be forced to flow into the recess 22. When the riveting operation is performed the alignment member 36 maintains the perpendicular relation between the contact pins and the wall 19 of the base.

The tubular sections may, as above mentioned, be made of soft copper and the shoulder 23 need only consist of a slight ridge sufficient to furnish a bearing surface for contact with the bottom of the base.

The present method and apparatus makes it possible to quickly and effectively produce bases for electrical devices with properly positioned contact pins and by reason of the rapidity and simplicity of the present method bases may be provided with contact pins with a minimum amount of labor and at relatively low cost and with the pins in the desired perpendicular relation to the bottom walls of the bases.

Although a preferred embodiment of the invention is shown and described herein it is to be understood that modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. The method of securing a tubular metallic member in an aperture provided in a wall of a base which comprises positioning a base with an end of a tubular member extending through said aperture and into said base, applying pressure in the direction of the longitudinal axis of said member to partly close the other end of said member and to enlarge a portion of the wall thereof at a point adjacent to the outer side of said base and intermediate the ends of said member and in deforming to enlarge the end of said member extending into said base.

2. The method of shaping and securing a tubular metallic member in an aperture provided in a wall of a base which comprises positioning a base with one end of a tubular member extending through said aperture, applying force in the direction of the longitudinal axis of said member to engage an opposite end thereof with a forming surface to partly close the said end, continuing the application of said force to form a shoulder intermediate the ends of said tubular member and in deforming the said first mentioned end to secure said member to said wall.

In testimony whereof, I have hereunto subscribed my name this 16 day of May, 1929.

JOHN E. FERGUSON.