

May 27, 1930.

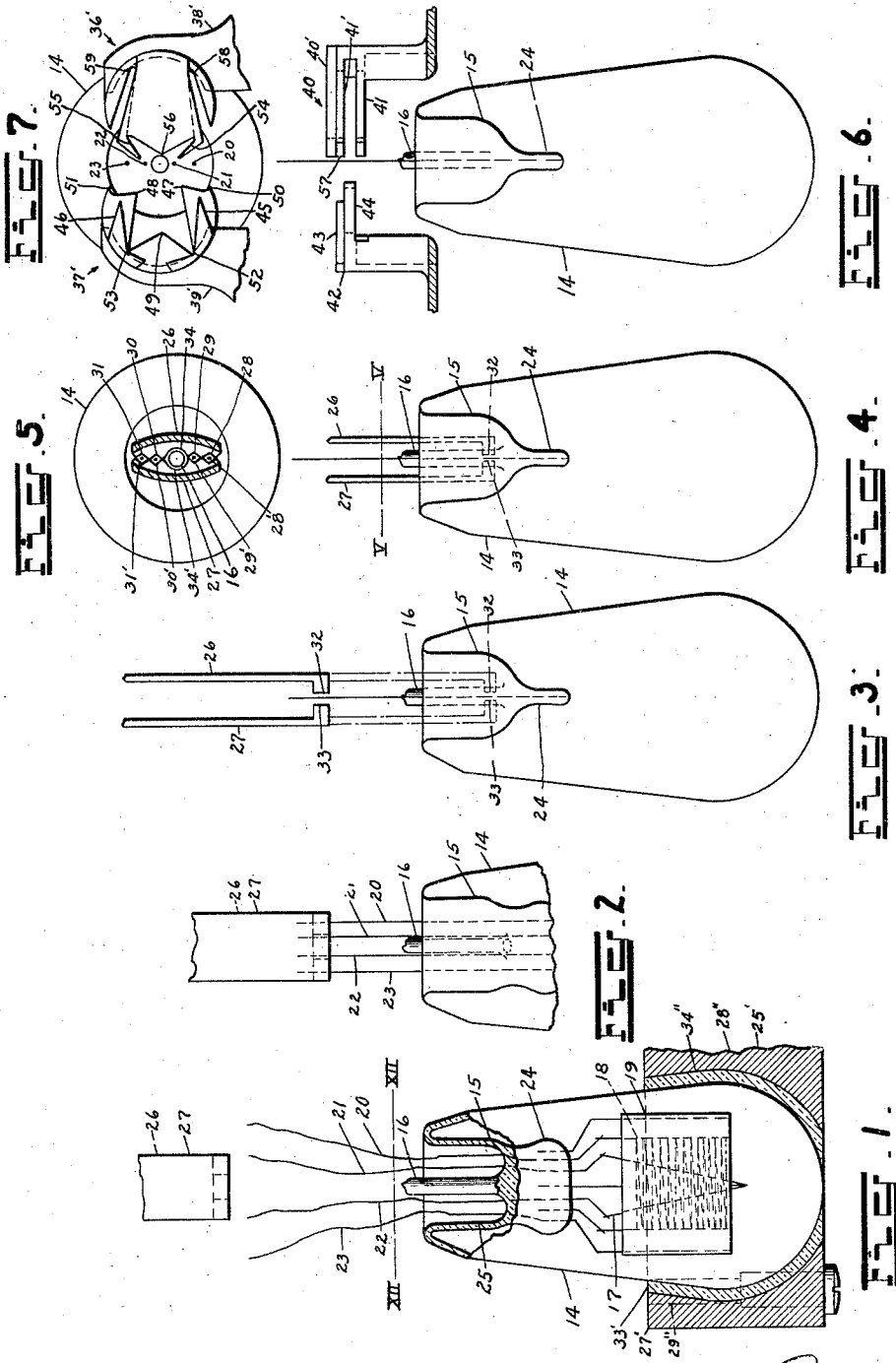
R. BRINDLE, JR

1,760,629

METHOD OF THREADING BASES

Filed Feb. 1, 1929

2 Sheets-Sheet 1



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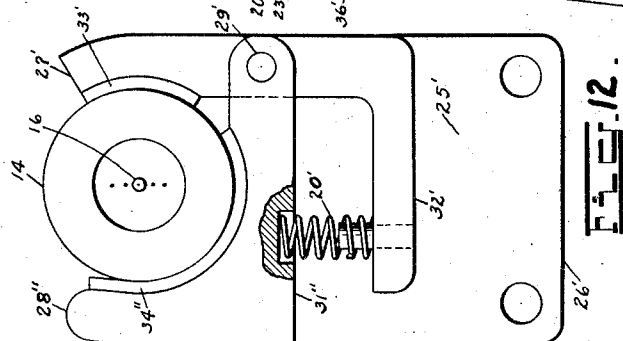
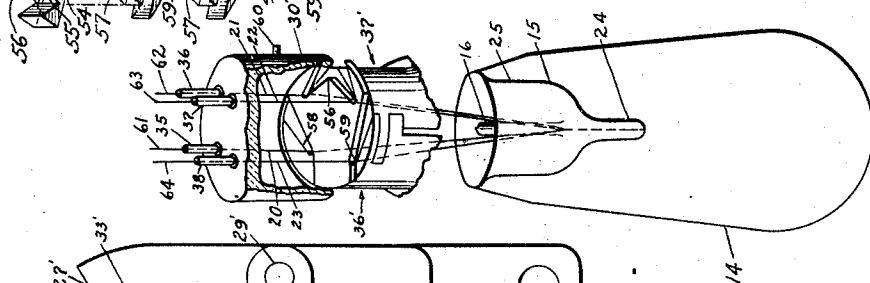
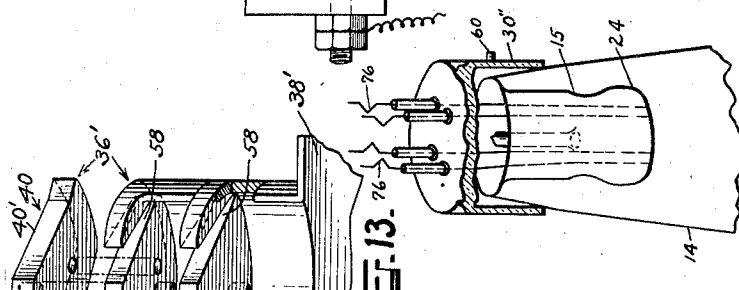
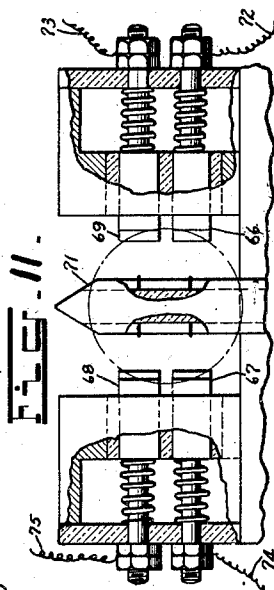
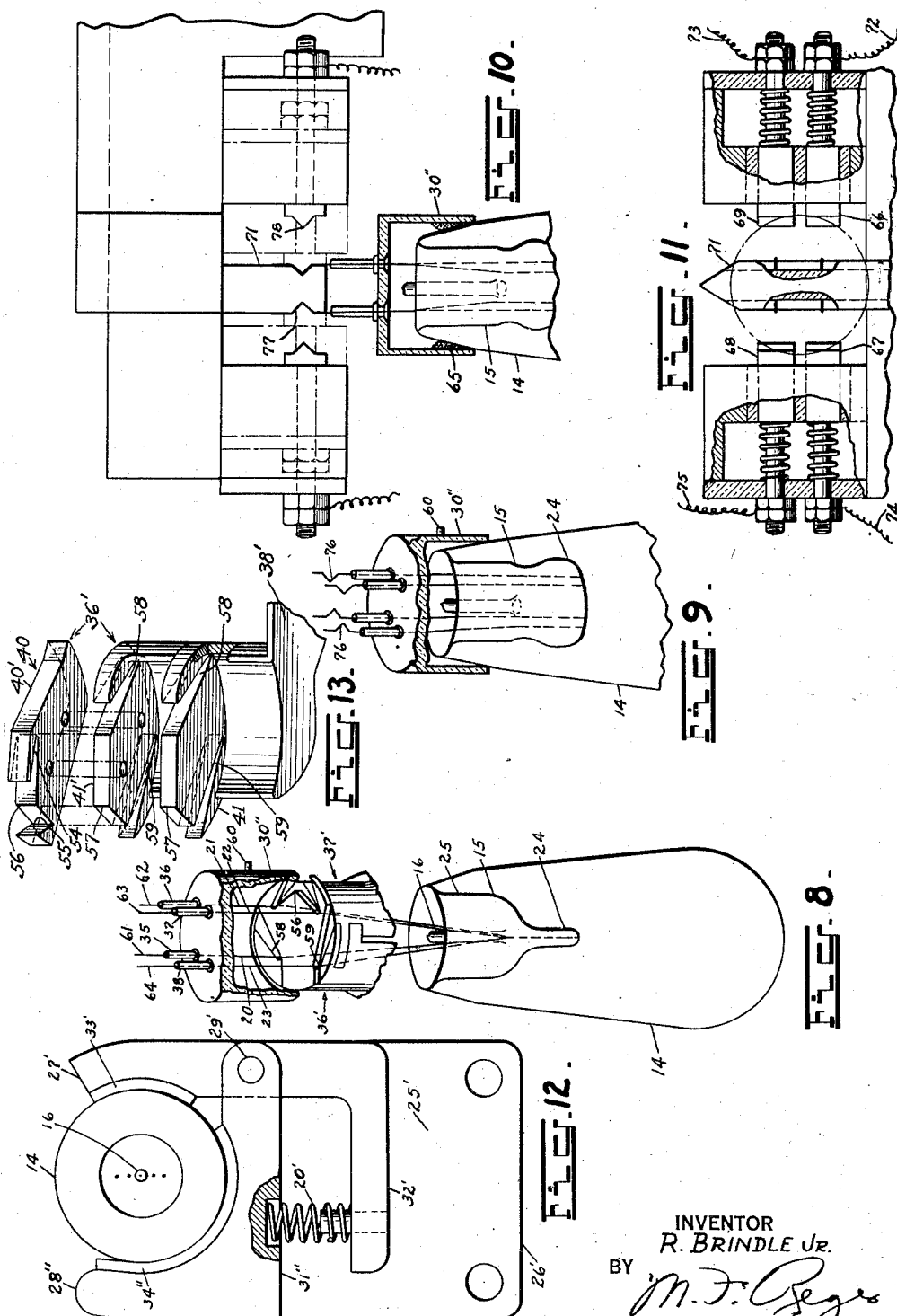
R. BRINDLE, JR

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METHOD OF THREADING BASES

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2 Sheets-Sheet 2



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METHOD OF THREADING BASES

Application filed February 1, 1929. Serial No. 336,899.

This invention relates to the manufacture of electrical devices such as radio tubes or the like and relates more particularly to a method of applying bases to bulbs of such devices.

Radio tubes or other so-called vacuum devices usually consist of a sealed envelope in the form of a glass bulb having a base secured thereto, the bulb enclosing what is termed a mount comprising electrodes carried on a supporting structure.

For the purpose of supplying electrical energy to the electrodes the mount is provided with a plurality of conductors or lead wires, the lead wires extend from and are sealed in a wall of the bulb and in order to make the device practical it is necessary to secure ends of the lead wires to contact elements of a base after which the base is secured to the bulb neck by cement or in any suitable manner.

When making an electrical device such for example as a radio tube, the mount includes a glass part called a flare tube in which the lead wires are sealed in what is termed a press. The flare tube is then secured to the bulb neck by a fusing operation and the flare closes the bulb neck and constitutes a portion of the wall of the bulb.

The lead wires which are of relatively heavy or large diameter are malleable or pliable and during manufacturing operations the extending portions of the wires take unsymmetrical irregular positions which makes it difficult to insert the wires into the contacts of a base. Bases are usually made with contact elements of tubular form and when a lamp bulb was applied to a base it became necessary to manually insert each wire end into a contact.

This operation was time consuming and required a great number of operators since radio tubes are produced in large volume at a high rate of speed. The operation of applying a base to the lead wires is termed a "threading" operation and when performed in the manner heretofore practised added materially to the cost of the articles.

It is an object of the present invention therefore to provide a simple and effective

method of threading bases for application to a bulb.

Although the invention is applicable to various types of devices it is shown and described herein as applied to a radio tube and a practical embodiment of the invention will be readily understood from the following description together with the accompanying drawing in which,

Fig. 1 shows an electrical device consisting of a radio tube disposed in a holder and having the lead wires in irregular positions to be straightened and arranged in accordance with the present method;

Fig. 2 shows a radio tube after the wires have been straightened to parallel spaced arrangement;

Fig. 3 is a side view of the bulb showing the wires after they have been straightened;

Fig. 4 is a view similar to Fig. 3 but shows members in position for gripping the wires close to the wall of the bulb;

Fig. 5 is a view taken on line V—V in Fig. 4;

Fig. 6 shows a bulb after the wires have been straightened and with separator members in position to readjust the wires;

Fig. 7 is a plan view of a bulb and the positioned separator members shown in Fig. 6;

Fig. 8 is a perspective view showing the separator members closed with the wires readjusted to positions corresponding to contacts of a base, a base being shown with the lead wires inserted into the contacts thereof;

Fig. 9 shows a radio tube with a base having the lead wires threaded through the contacts thereof;

Fig. 10 shows a bulb and base in position to have the lead wires gripped by jaws and provided with offset bent portions;

Fig. 11 is a plan view of the device for bending the lead wires partly in section;

Fig. 12 is a transverse sectional view taken on line XII—XII in Fig. 1 showing the holder for supporting a bulb and;

Fig. 13 is a perspective view of one of the separator elements with one of its component parts separated to more clearly illustrate the construction of the said element.

The device selected for the purpose of

illustrating the present method may comprise a bulb 14 having a mount sealed therein. The mount may comprise a flare tube 15 consolidated with an exhaust tube 16 and having
 5 a supporting structure for holding electrodes such as a cathode 17, a grid 18 and an anode 19. Lead wires or conductors 20, 21, 22 and 23 connect with the electrode and the free ends of the lead wires extend from a com-
 10 pressed portion or so-called "press" 24 of the mount. The lead wires therefore project from the flare tube 15 and inasmuch as the flare tube is integral with the bulb the said flare tube constitutes a portion 25 of the wall
 15 of the bulb.

The lead wires when supported for union with the flare tube are held in fixed spaced relation and although the portions of the lead wires extending from the wall take different
 20 positions, a definite spacing is maintained at the portions of the leads close to the wall 25 of the bulb.

In carrying out the present method advantage is taken of this definite spacing of
 25 portions of the lead wires and a pair of members 26 and 27 may be provided, the member 26 having notches 28, 29, 30 and 31 and the member 27 having notches 28', 29', 30' and 31' so that the lead wires may be gripped
 30 between the members which may be termed combing members. These members may have shank portions and at the free or operative ends are provided with offset edges 32 and 33 in which the said notches are formed. Inter-
 35 mediate the pairs of notches on the member 26 is a central notch 34 and the member 27 is provided with notch 34' to accommodate the exhaust tube 16. When the members are moved to enclose the lead wires, opposite
 40 notches coincide to provide apertures to retain the leads and the opposite central notches are so proportioned and arranged as to permit the exhaust tube to pass therebetween. A bulb 14 may therefore be held in position by
 45 a holder 25' say with the irregular lead-wires projecting upwardly.

Any suitable holder for the bulb may be employed. The holder shown (see Figs. 1 and 12) includes a bracket 26' having jaws
 50 27' and 28''. The jaw 27' being movable upon pivot 29'' and normally urged closed to grip a bulb by spring 20'' disposed between a face 31'' of the jaw and a projecting arm 32'. The jaw faces may be provided with resilient
 55 pads 33' and 34'' so that a bulb may be positioned and held with the lead wires in any given initial position. The combing members 26 and 27 while separated are then inserted into the exhaust tube or neck of the supported bulb until the offset edges are adjacent
 60 to the lower portion or press of the exhaust tube. The members may then be closed to confine the lead wires in the provided apertures formed by the combined opposite notches
 65 which notches are so disposed as to have the

same space relation as the portions of the leads close to the bulb wall 25.

While thus held the combing members may be drawn upwardly combing the lead wires into straight lines and disposing them all in
 70 parallel spaced relation and in a common plane. Usually the lead wires are composed of a metal core of nickel or a nickel steel core with a copper sheath or of nickel alone. The character of the wire is such that the
 75 leads readily take and hold the positions into which they have been guided.

When positioned as above described the leads may readily be put into positions corresponding to the positions of the contacts of
 80 a base 30''. The base shown (see Figs. 8 to 10) has four contact elements 35, 36, 37 and 38 which are of tubular form to receive the lead wires 20, 21, 22 and 23 which are subsequently soldered to the contacts. In carry-
 85 ing out the present method a pair of guides may be employed such as shown in Figs. 6, 7 and 8. These guides comprise spreaders 36' and 37' supported on arms 38' and 39' respectively.

The spreader 36' comprises a compound plate 40 including an upper section 40' and a lower section 41' associated with a lower
 90 plate 41 while the spreader 37' comprises a plate 42 comprised of two sections 43 and 44, the lower section being movable between the compound plate 40 and the lower plate 41 when the spreaders are operated. When
 95 the lead wires 20, 21, 22 and 23 are disposed in parallel relation as shown in Fig. 2 the spreader members 36' and 37' may be moved in opposite directions toward the said wires. Section 43 of the spreader 37' is provided
 100 with two projections 45 and 46 and the lower section 44 is provided with three guide points 47, 48 and 49 and four carrier notches 50, 51, 52 and 53. Section 40' of the spreader 36' is provided with two central receiving slots 54 and 55 to receive wires 21 and 22
 105 and central guide point 56.

The lower section 41' of the compound plate 40 is provided with a central guide point 57 which is of the same formation as
 110 the point 56 and disposed flush therewith so that the points 56 and 57 serve as a unit. The said section 41' is provided with outer receiving slots 58 and 59 to receive wires 20 and 23.

When the spreader members 36' and 37' are moved toward each other to engage the
 115 wires the guide points 47 and 48 move between wires 20 and 21 and between wires 22 and 23 and the carrier notches 50 and 51 guide the wires 20 and 23 into slots 58 and 59. The wires 21 and 22 are guided to central slots 54 and 55. The projections 45 and 46 serve to engage surfaces of the slots 58
 120 and 59 to prevent the wires from being gripped since it is necessary to separate the wires, but to leave them free for a vertical movement of the spreader members. Thus
 125
 133

when the spreader members are closed the four wires take what may be termed four corner positions to correspond with the positions of the tubular contacts 35, 36, 37 and 38.

When considering the positioning of the lead wires their location may be taken with respect to the longitudinal axis of the bulb and consequently the longitudinal axis of a base when in position to be applied to the bulb neck. The positioned wires are therefore spaced symmetrically about the said axis and so held. Therefore if a base is disposed with its longitudinal axis coincident with the longitudinal axis of the bulb the wires will enter the tubular contacts.

It will be understood that given lead wires must always enter given contacts and when practicing the present method the bulb is always held in a definite position and the base is always applied so that the proper contacts will receive the proper lead wires.

One way of always properly positioning the base is to have the side pin 60 thereof in a given position and since the side pin is always in the same relative position with respect to the contacts it serves as a marker for adjusting the base to receive the lead wires. Any other method of adjusting the base may be employed. For example, when the contacts are applied to the base a mark may be made on the outer surface of the base to indicate the proper positions of the contacts when applied to the bulb. In connection with the above it is also essential to properly position the bulb and this may be accomplished by providing one of the leads as lead 23 for example with a mark either by coloring or by knurling or indenting the surface.

It will be evident that although the type of bulb employed for illustrating a practical embodiment of the method has only four lead wires the method may readily be practiced with a bulb having a lesser or greater number of lead wires. The spreader members may readily be modified to take care of this variation in the number of wires and the combing members may also be modified to straighten a lesser or greater number of wires.

When the wires have been arranged in the four cornered relation, the base 30'' may be moved toward the bulb or the base may be held and the bulb moved toward the base or a combined relative movement may be employed to insert the leads into the tubular contacts.

The lead wires are usually made of sufficient length so that as the base approaches into close relation with the bulb free ends 61, 62, 63 and 64 of the leads extend from the ends of the contacts.

In the manufacture of radio tubes or the like the bases are secured to the bulbs by a

cement which is subjected to a baking operation and this cement is applied to the inner surface of the base in the form of a ring 65. The character of the cement is such that it holds its position and although plastic does not flow or run or in any way interfere with the present method of base threading.

When the base has been threaded it may be pressed down upon the bulb neck and passed into the oven for a baking operation and the extending ends of the lead wires may be severed flush with the ends of the contacts. After baking to harden the cement and secure the base to the bulb the based lamps are subjected to a soldering operation to electrically connect the contacts and leads and are then passed on to other operations for completion.

It has been found desirable however to introduce another operation in the present method prior to the baking or basing of the bulb. This operation consists in securing the extending ends 61, 62, 63 and 64 between jaws 66, 67, 68 and 69 which press the leads against a block 71 to secure the said leads so as to hold the leads while the base is moved in contact with the bulb. This serves to straighten the leads and prevents the possibility of their contacting at points between the base and bulb. While the leads are so held electrical energy is passed through the electrodes in the bulb by means of conductors 72, 73, 74 and 75 so that if the internal structure of the bulb has any electrical defects the same may be indicated on suitable meters and the bulb rejected before the base is secured thereto thus saving the base and preventing the passage of a defective tube to position for further manufacturing operations.

When employing the jaws to electrically test the tubes the block 71 may be of insulating material and electrical current may pass into and out from the device by the electrical connection with the lead wires.

In addition to testing the bulbs the jaws serve another purpose which consists in forming an offset bend 76 in each of the lead wires so that the bases and bulbs may be readily handled without danger of the bases slipping off the lead wires. This is an advantage since it is not always practical to apply the bases and bulb to a basing machine and where the bulb with bases partially attached are to be stored or transported the bends prevent the leads from slipping through the contacts and they may thus be given relatively severe handling without separation.

The bending of the leads to provide projections 76 is readily accomplished by having the block formed with V-shaped notches 77 and the jaws provided with sharp edges 78 so that when the lead wires are engaged by the jaws the edges 78 will press the wires

into the notches to give them the desired shape. This form of contact is particularly effective in obtaining good electrical contact.

From the above it will be evident that the present method of threading bases solves an important problem in connection with the manufacture of electrical devices.

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 threading wires of an electrical device through a member having a plurality of definitely spaced apertures which comprises adjusting the wires in a given spaced relation and in readjusting the wires to positions corresponding to the spaced relation of said apertures.

2. The method of threading lead wires of an electrical device through definitely positioned contacts of a base which comprises adjusting the lead wires in a given spaced relation, readjusting said wires to positions corresponding to the spaced relation of said contacts and in moving the base to insert the lead wires into the contacts thereof.

3. The method of threading the lead wires of an electrical device through a plurality of apertures having a definite spaced relation which comprises adjusting the lead wires in given spaced relation and in readjusting the wires to positions corresponding to the space relation of the said apertures, and applying a base to insert the lead wires through the said apertures.

4. The method of base threading and testing an electrical device which comprises adjusting the lead wires of said device to given positions, readjusting the wires to positions corresponding to the positions of tubular contacts of a base, moving a base to insert the wires through said contacts, engaging the projecting ends of said wires and in passing electrical energy therethrough to determine defects in said device.

5. The method of applying a base having tubular contact elements to a bulb having lead wires extending through a wall of the bulb which comprises holding the wires in spaced relation at points adjacent to the bulb wall, straightening the wires and maintaining them in given space relation throughout their length, changing the positions of the wires corresponding in arrangement to the arrangement of the tubular contacts of a base and in moving a base to insert the positioned wires in the tubular contacts thereof.

6. Means for adjusting lead wires of a bulb comprising means for supporting a bulb with lead wires projecting irregularly therefrom, members for embracing the wires at points adjacent to the bulb wall said members be-

ing movable so that a movement of said members away from said wall will guide the wires into parallel spaced relation and means for readjusting the wires to predetermined positions.

7. Means for preparing irregularly positioned lead wires of an electrical device for insertion into a plurality of apertures of another member comprising means for guiding the wires into parallel spaced relation and means for readjusting the positioned wires to different predetermined positions.

8. Means for preparing irregularly positioned lead wires of an electrical device for insertion into a plurality of apertures of another member comprising means for guiding the wires into parallel spaced relation and means for readjusting the positioned wires to different predetermined positions and means for passing electrical energy through said device to test the same.

9. Means for arranging irregularly positioned lead wires of an electrical device for insertion into symmetrically spaced contacts of a base comprising means for combing the lead wires into a given spaced relation and means for repositioning the wires to positions corresponding to the positions of the contacts of a base.

10. Means for arranging irregularly positioned lead wires of an electrical device for insertion into symmetrically spaced contacts comprising means for guiding the wires into parallel spaced relation and in a common plane and means for repositioning the wires into a different spaced relation corresponding to the spaced arrangement of the said contacts.

11. Means for threading the lead wires of a lamp into apertures of a base comprising means for supporting a bulb with irregularly positioned lead wires extending from a wall thereof, members for engaging the lead wires at points adjacent to the bulb wall to guide the wires into a given spaced relation upon a movement of said members along the wires, means for engaging the wires to readjust them into predetermined positions for insertion into said contacts when the base is moved toward said bulb.

12. Means for threading the lead wires of a lamp into apertures of a base comprising means for supporting a bulb with irregularly positioned lead wires extending from a wall thereof, members for engaging the lead wires at points adjacent to the bulb wall to guide the wires into a given spaced relation upon a movement of said members along the wires, means for engaging the wires to readjust them into predetermined positions for insertion into said contacts when the base is moved toward said bulb, and means for gripping ends of the wires extending from said contacts to permit the wires to be held taut while the base is pressed against the bulb.

13. Means for threading the lead wires of
a lamp into apertures of a base comprising
means for supporting a bulb with irregularly
positioned lead wires extending from a wall
thereof, members for engaging the lead wires
at points adjacent to the bulb wall to guide the
wires into a given spaced relation upon a
movement of said members along the wires,
means for engaging the wires to readjust
them into predetermined positions for inser-
tion into said contacts when the base is moved
toward said bulb and means for gripping
ends of the wires extending from said con-
tacts to permit the wires to be held taut while
the base is pressed against the bulb and means
for securing the base to said bulb.

14. Means for threading the lead wires of
a lamp into apertures of a base comprising
means for supporting a bulb with irregularly
positioned lead wires extending from a wall
thereof, members for engaging the lead wires
at points adjacent to the bulb wall to guide
the wires into a given spaced relation upon
a movement of said members along the wires,
means for engaging the wires to readjust
them into predetermined positions for inser-
tion into said contacts when the base is moved
toward said bulb and means for gripping
ends of the wires extending from said con-
tacts and means for passing electrical energy
through said wires to detect electrical defects
in said bulb.

In testimony whereof, I have hereunto sub-
scribed my name this 17th day of January,
1929.

ROBERT BRINDLE, JR.

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