Dec. 30, 1947. N. B. KRIM 2,433,373

APPARATUS FOR APPLYING REINFORCING MEMBERS TO ELECTRON DISCHARGE TUBES

Original Filed Jan. 12, 1944

FIG. 1.

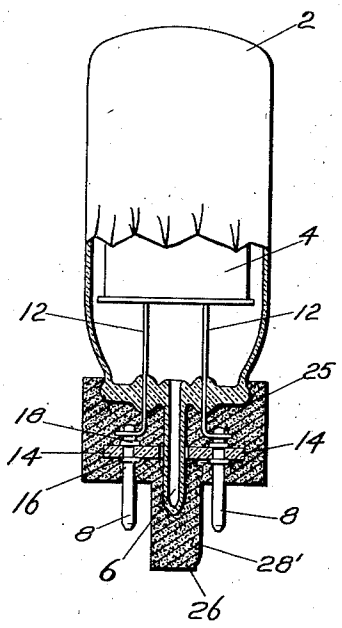


FIG. 3.

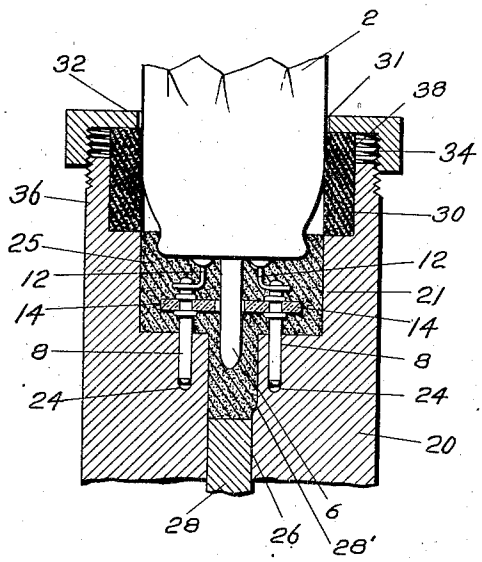


FIG. 5.

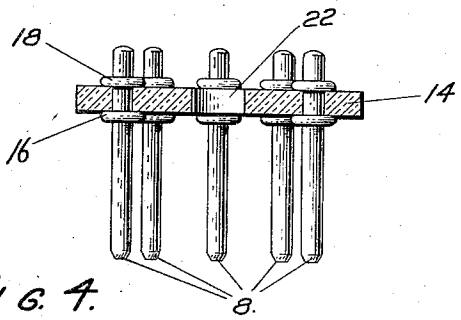


FIG. 2.

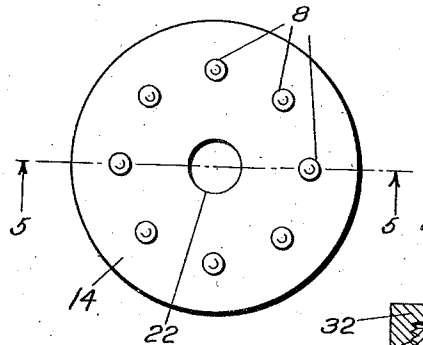
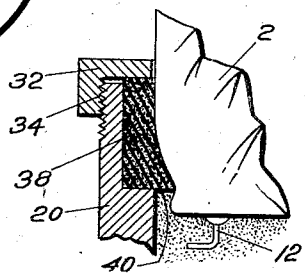


FIG. 4.



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APPARATUS FOR APPLYING REINFORCING MEMBERS TO ELECTRON DISCHARGE TUBES

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4 Claims. (Cl. 18—36)

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This is a division of applicant's copending application Serial No. 518,202, filed January 12, 1944.

One object of the present invention is to produce a reinforced tube provided with a reinforcing member having a uniform and clearly defined upper boundary.

A further object of the invention is to provide apparatus adapted to fashion and apply to a tube a reinforcing member characteristic of the present invention.

These and such other aims and objects of the invention as may hereinafter appear will be readily understood from the following description, taken in connection with the accompanying drawing, of one embodiment of the invention herein presented for illustrative purposes.

In the drawing:

Fig. 1 is a side elevation, partly in section, of a tube embodying one illustrative embodiment of the invention;

Fig. 2 is a bottom plan view on an enlarged scale of a plate with the conductors forming external contact prongs fixed therein;

Fig. 3 is a fragmentary view, partly in vertical section, of the tube with the parts in position in a mold, ready for the application of the reinforcing member of plastic or other suitable material;

Fig. 4 is a partial fragmentary view showing the formation of the clearly defined upper boundary of the plastic reinforcing member; and

Fig. 5 is a vertical section on line 5—5 of Fig. 2.

The invention is herein illustratively shown in its application to a tube of the Octal base type. These tubes comprise an envelope 2 of glass or other suitable material containing the usual electrode assembly 4 and are provided with the customary exhaust tip 6 and a plurality of relatively stiff conductors 8 forming external contact prongs joined at their inner ends to relatively flexible sealing wires 12, preferably of the Dumet type, leading to the electrode assembly. These conductors 8 are preferably disposed in a circle as shown in Fig. 2.

Heretofore in assembling the tubes, the conductors 8 were inserted in holes provided in the bottom wall of the mold for the base of the tube and the fused glass for forming the base of the tube was then molded around said conductors. This method has proved satisfactory, but the present invention aims to improve upon it by more exactly predetermining the positions that these conductors are to occupy in the tube by prelocating them, that is to say, fixing them in the exact relative positions they are to occupy in the

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tube, before securing them to the base of the latter.

In carrying out my invention the conductors 8 are first secured in the required positions in a suitable member by inserting them in suitably located holes provided in the desired positions in said member, such as a plate or disc 14, for example, of any suitable material, a plastic for example, such as polystyrene. The conductors are then firmly secured in said plate 14 in any suitable manner. Herein they are conveniently provided for that purpose with a collar 16, which, when the conductor is inserted in a hole in said plate abuts against one surface of said plate, herein the under surface, whereupon a second collar 18 is formed by a riveting action upon the part of said conductor projecting from the opposite surface of the plate, and said second collar is then forced down upon the latter, thus firmly clamping said conductor in the desired position in said plate 14 between said two collars 16 and 18. The plate 14 is then attached to the base of the tube by a suitable member, preferably of a nature to reinforce the base of the tube.

In Figs. 3 and 4 there is shown an illustrative apparatus for carrying out that part of the present invention. Referring to these figures, a mold is shown at 20 and when all the conductors 8 are fixed as above stated in the desired relative positions in said plate 14, the latter and the lower portion of the tube 2 are placed in the matrix 21 of said mold 20, as shown in Fig. 3, with the exhaust tip 6 inserted through a suitable aperture 22 in said plate 14 and said conductors inserted in suitable bores 24 provided in the bottom of said mold. The body of the mold is provided with a cylindrical bore 26 in which is slidable a piston 28, and at the top said mold is provided with a circular recess 30 of somewhat greater diameter than said matrix 21, and with a cover 32, provided with a central opening 31 for the passage of the body of the tube. This cover 32 has a screw-threaded connection at 34 with the outer surface of said mold. The space between said cover 32 and the upper surface 36 of the mold contains compressible material, such as compression rubber 38, for example, adapted to surround the lower portion of the tube 2, when the latter is placed in the mold.

When the plate 14, with the conductors 8 fixed therein has been placed in the matrix of the mold as above stated and illustrated in Figs. 3 and 4, the cover 32 is first screwed down, thus compressing said compression rubber 38 within said recess 30, to cause it to conform to the con-

tour of the tube, taking up any irregularities and variations therein and forming a definite upper wall **40** shown in Fig. 4. The hot moldable material, polystyrene, or example, of which the reinforcing member **25** is to be formed, having been introduced into the cylindrical bore **26**, the piston **28** is advanced inwardly along said bore, thus forcing the said moldable material to fill the space about the base of the tube, the plate **14**, the exhaust tip **6** and the portion of said conductors **8** within said matrix. The upper surface of the plastic material, polystrene, for example, will thus meet the definite upper wall **40** of the mold, formed as above stated by the rubber **38**, and will have impressed thereon a clearly defined upper boundary adjoining the wall of the tube.

Owing to the lack of uniformity in the shape of tubes of this type, as manufactured today, it has heretofore been difficult to produce a clearly defined substantially uniform upper boundary on the reinforcing member applied to the tube. The present invention has completely overcome this difficulty. The clean-cut boundary produced improves the appearances of the tube and is much less liable to defacement in use.

The piston **28** may be actuated by any suitable conventional mechanism (not shown), or by hand. The mold may be made of such a height as to extend the reinforcing member up along the wall of the tube for any distance desired. The mold may also be so shaped as to form an orienting feather **28'** on the reinforcing member (see Fig. 3), to facilitate and expedite the joining of the tube to its socket provided with a corresponding seating slot.

The thermal coefficient of expansion of plastics, polystyrene, for example, is considerably higher than that of glass, so that when the polystryrene reinforcing member cools from the elevated temperature at which it is introduced into the mold, it embraces the base of the tube with a compressive pressure that greatly strengthens said base, it being well known that glass is materially strengthened by compression. It also protects it from shocks, all shocks being absorbed by said reinforcing member. The conductors **8** being firmly secured in the plate **14**, which in turn is firmly embraced by the reinforcing member **25**, said conductors can withstand the roughest usage without risk of being displaced or otherwise rendered unserviceable by any force that may be exerted upon them. Preliminarily fixing the conductors **8** in correct position in the plate **14**, not only ensures their correct and uniform position in the tube, so that they are sure to fit the socket, but it also represents a material saving in time and labor, as said plates can be made in quantity in advance.

Wherever the word "plurality" is used in the specification and claims, it is to be understood as meaning two or more.

I am aware that the present invention can be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present description to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the aforesaid description to indicate the scope of the invention.

What is claimed is:

1. Apparatus for applying a reinforcing member of moldable material to an electron discharge tube comprising: a mold to receive the moldable material and the part of the tube to which it is to be applied, a compressible substance adapted to surround said tube, means for compressing said substance to form it into a definite upper wall for said mold, and means to compress the moldable material in the mold into a reinforcing member embracing said part and against said definite upper wall of the mold to give a clearly defined upper boundary to the reinforcing member.

2. Apparatus for applying a reinforcing member of moldable material to the base of an electron discharge tube comprising: a mold provided with a matrix to receive the base of the tube and the moldable material, a compressible substance adapted to surround said tube, means for compressing said substance to form it into a definite upper wall for said mold, and means for compressing the moldable material in the mold into a reinforcing member upon said tube base and up against said definite upper wall to mold a clearly defined upper boundary on said reinforcing member.

3. Apparatus for applying a reinforcing member of moldable material to the base of an electron discharge tube comprising: a mold provided with a matrix to receive the base of the tube and the moldable material, compression rubber adapted to surround said tube within said matrix, means for compressing said compression rubber to cause it to form a definite upper wall for said mold, and means for compressing the moldable material in said mold into a reinforcing member embracing said tube base and against said upper wall to mold a clearly defined upper boundary upon said reinforcing member.

4. Apparatus for applying a reinforcing member of moldable material to an electron discharge tube comprising: a mold to receive the moldable material and the part of the tube to which it is to be applied, a compressible substance adapted to engage said tube, means for compressing said substance to form it into a definite wall for said mold, and means to compress the moldable material in the mold into a reinforcing member engaging said part of said tube and against said definite wall of the mold to give a clearly defined boundary to the reinforcing member.

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