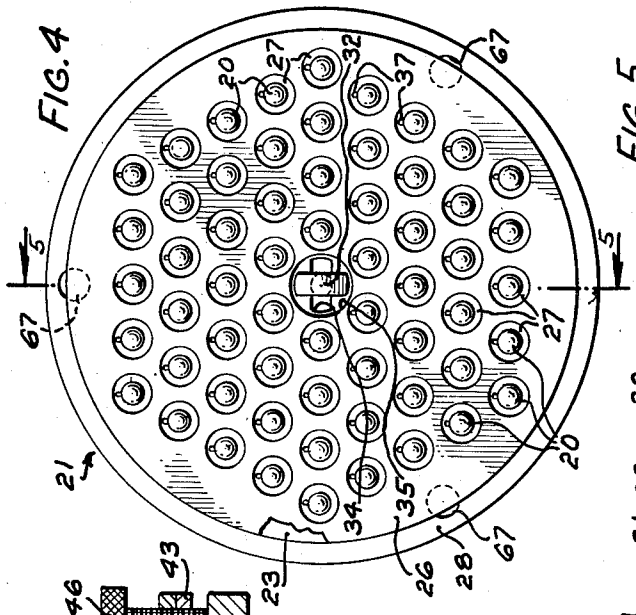
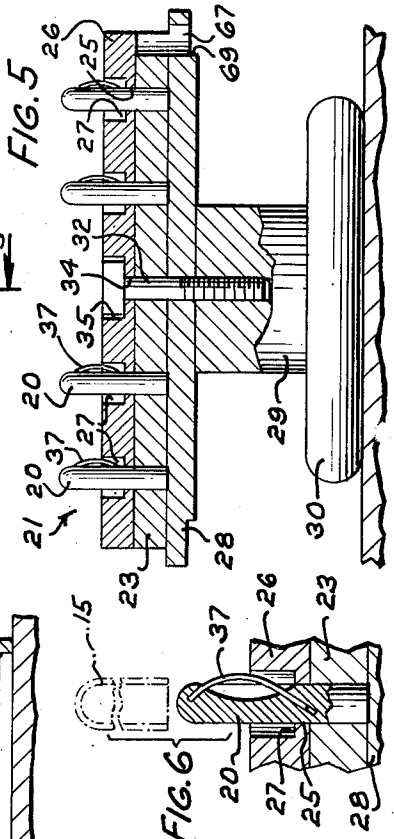
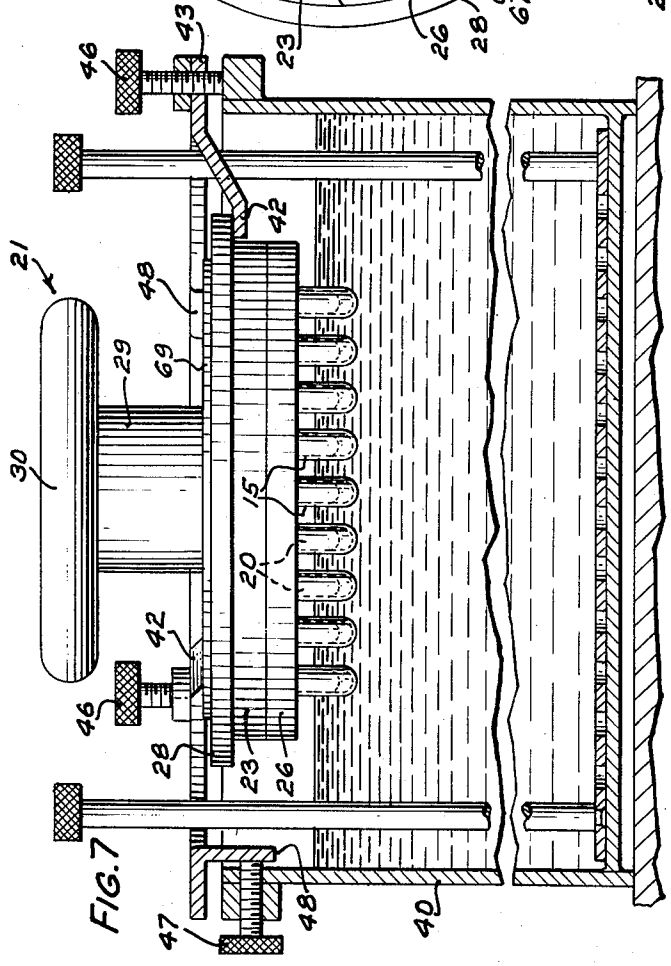
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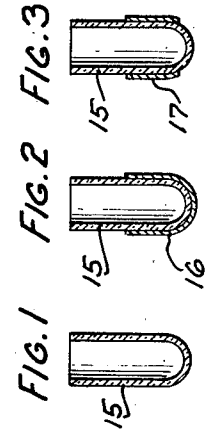
METHOD OF APPLYING ANNULAR COATINGS TO LIGHT BULBS

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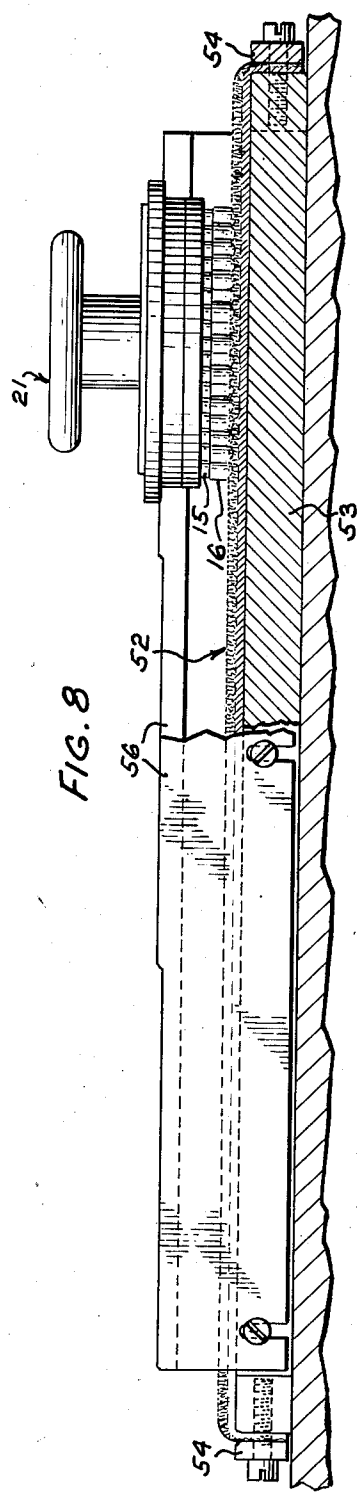


FIG. 8

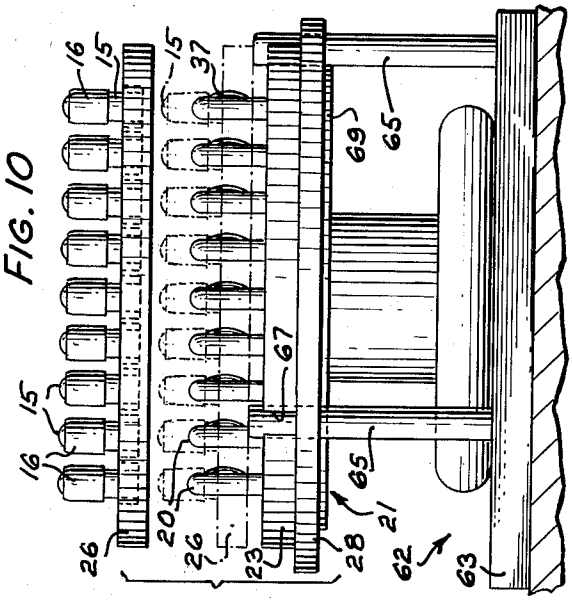


FIG. 10

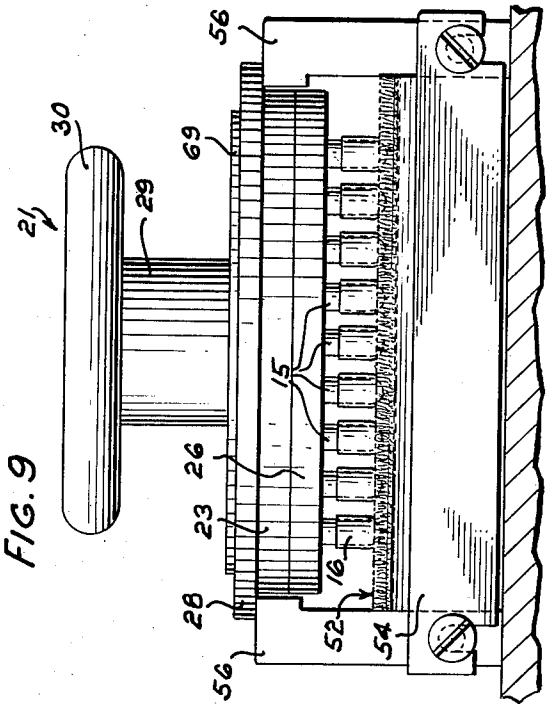


FIG. 9

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METHOD OF APPLYING ANNULAR COATINGS TO LIGHT BULBS

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2 Claims. (Cl. 117—43)

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This invention relates to a method of applying annular coatings to articles and more particularly to a method of applying annular coatings of enamel to switchboard lamp bulbs.

An object of the present invention is to provide an improved method of applying annular coatings to articles.

In one embodiment of the invention, a plurality of tubular lamp bulbs, having closed ends to which annular bands of opaque enamel coatings are to be applied adjacent the closed ends thereof, are mounted on a fixture in parallel and spaced relation to each other and with their closed ends aligned in a plane, after which the fixture is moved into predetermined relation to a container of enamel to dip the lamp bulbs a predetermined distance into the enamel. The fixture, with the bulbs thereon, is removed and the enamel on the bulbs is air-dried to powder form, after which the fixture is supported in a predetermined relation to brushing means and moved relative thereto whereby the dry-powdered enamel on a predetermined portion of the bulbs is engaged by the bristles or nap of the brushing means and removed from the bulbs leaving an annular band or coating of dried-powdered enamel thereon. The bulbs may then be heat-treated to fuse the enamel band onto the bulbs.

Other objects and advantages will be apparent by reference to the following detailed description thereof and the accompanying drawings illustrating one embodiment thereof in which:

Fig. 1 is an axial sectional view of the lamp bulb to which the annular coating of enamel is to be applied;

Fig. 2 is a sectional view of the lamp bulb after it has been dipped in enamel;

Fig. 3 is a sectional view of the bulb showing the annular coating of enamel thereon after the end portion of the coating of enamel has been removed;

Fig. 4 is a plan view of the composite fixture for holding a plurality of lamp bulbs;

Fig. 5 is a sectional elevational view of the fixture shown in Fig. 4, taken on the line 5—5 of Fig. 4;

Fig. 6 is an enlarged detail view through one of the bulb-positioning pins on the fixture showing the spring means for retaining the bulb thereon;

Fig. 7 is a vertical sectional view through a receptacle for containing the enamel to be applied onto the lamp bulbs and showing the fixture supported thereby in predetermined vertical relation to the enamel and the bulbs thereon immersed a predetermined distance into the enamel;

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Fig. 8 is a vertical side elevational sectional view of a brushing device for removing a portion of the dried enamel from the bulbs and showing the bulb-supporting fixture in position thereon;

Fig. 9 is an end elevational view of the brushing device showing the bulb-supporting fixture supported thereon; and

Fig. 10 is a vertical elevational sectional view of the composite bulb-supporting fixture associated with a stripping fixture for stripping the component parts of the bulb-supporting fixture.

In the manufacture of certain types of telephone equipment, using a plurality of closely positioned switchboard lights, it is desirable to provide means for masking portions of the bulbs to reduce lateral transmission of light therefrom. One way of effectively accomplishing this result is to coat the lamp bulbs with an annular layer of opaque enamel, which may be fused to the glass bulb, leaving a clear end through which the light may be transmitted.

In the present method of applying an annular coating of enamel to the lamp bulb 15 (Fig. 1) the bulb is positioned vertically with its closed end extending downwardly and dipped a predetermined distance into a supply of enamel, after which it is withdrawn and the thin coating of enamel 16 thereon allowed to air-dry, leaving a thin coating of enamel in powder form on the bulb, after which the bulb is positioned in predetermined relation to a brushing device which engages the closed end of the bulb and removes a predetermined portion of the powdered enamel coating from the end thereof to provide the annular coating of enamel 17 and a clear uncoated bulb end, after which the bulb is heated to a predetermined temperature to fuse the coating of the enamel onto the glass bulb.

A plurality of glass bulbs 15 are processed simultaneously and in the apparatus disclosed for practicing the process they are applied individually to positioning and holding pins 20 of a composite bulb supporting fixture 21 (Figs. 4 and 5). The pins 20 are secured to a plate 23 of the fixture and pass through apertures 25 in a supporting plate 26, removably attached to the fixture. The apertures 25 are counterbored to provide seats 27 for receiving the open ends of the bulbs 15. Secured to the plate 23, and extending outwardly beyond the periphery thereof to form a peripheral ledge, is a plate 28, to which is secured a spacer 29 and a flat circular

handle member 30. The members 23, 28, 29 and 30 are secured together in any suitable manner to form a unitary structure, and the handle 30, which is of relatively large diameter, is adapted to support the fixture in an upright position, as indicated in Fig. 5. The supporting plate 26 is removably secured to the fixture by a T-bolt 32, the head of which is adapted to pass through a rectangular slot 34 in the plate 26 and be turned at right angles in a counterbored recess 35. The holding pins 20 (Fig. 6) are each provided with a spring wire 37 to resiliently engage the inner walls of the lamp bulbs and yieldably retain them on the pins, whereby the fixture, with the bulbs thereon, may be inverted.

After the bulbs have been assembled on the bulb-supporting fixture 21, the bulbs are ready to be dipped into an enamel bath contained in a receptable or container 40 (Fig. 7). The fixture 21 is inverted from the position shown in Fig. 5 and lowered vertically onto supporting or stop fingers 42 extending radially inwardly from an annular ring 43 adjustably supported on the upper flange 44 of the container 40 by means of thumb screws 46. The ring 43 may be adjustably secured on the container 40 by set screws 47 engaging fingers 48 extending downwardly from the ring 43. In this way, the stops or supporting lugs 42 may be positioned predetermined distances from the level of the enamel and serve to position the fixture 21 in predetermined relation to the top level of the enamel in the container and to gage the immersion of the bulbs therein to a predetermined distance longitudinally of the bulb.

While various enamel or coating materials may be used, it has been found that a low temperature ceramic enamel suspended in isopropyl alcohol is suitable. After the dipping of the bulbs into the enamel, the fixture 21 is removed and the coating of enamel on the bulbs is allowed to air-dry, the enamel drying into a fine powdery form.

After the enamel on the bulbs is thoroughly dried, a predetermined amount of the enamel may be removed from the end of the bulb by a brushing operation to leave the desired ring of enamel on the bulb. A suitable brushing mechanism disclosed in Figs. 8 and 9 comprises a flat brush 52, herein disclosed as carpeting, mohair, plush, or similar material, mounted on an elongated rectangular base 53 and secured thereto by clamping members 54—54. Side walls or rails 56—56 are vertically adjustably secured to the base 53 and are adapted to engage the outwardly extending ledge portions of the plate 28 of the fixture 21 and support the fixture and the light bulbs thereon in a predetermined vertical relation to the brush 52, as seen particularly in Fig. 9. The bulbs extend downwardly into engagement with the bristles of the brush, in this case the upwardly extending nap 58 of the material 52, and upon movement of the fixture 21 longitudinally in one direction relative to the brush 52, the nap 58 thereof will engage a predetermined vertically extending portion of the dried enamel coating on the bulb and brush the dried enamel particles therefrom. If desired, the nap 58 may be slanted from the vertical in the direction of movement of the bulbs to prevent the flaking off of large particles of enamel from the bulbs 15. The fixture and the bulbs thereon are preferably rotated before successive brushing movements to present different portions of the coating on the end of the bulb to the wiping action of the nap of the brush. If desired, the upper surface of the rails 56 may

be provided with supporting surfaces at different elevations so that the bulb-supporting fixture 21 may selectively be moved over one of them to obtain the removal of the enamel from the end of the tube to the proper extent longitudinally of the tube.

After the fixture, with the bulbs thereon, has been applied to the brushing device and moved relative thereto to cause the removal of the end portion of the enamel coating, thereby leaving an annular coating of enamel of the proper length on the bulbs, the fixture is inverted and applied to a stripping device 62 to expedite the separation of a supporting plate 26 from the fixture 21. The stripping device comprises a base plate 63 with three equally spaced pins 65 extending upwardly therefrom and adapted to enter three (3) aligning apertures 67 extending through the plates 23 and 28 of the fixture 21. A central circular raised portion 69 on the plate 28 serves as a guide to cooperate with the pins 65 to aid in locating the fixture 21 centrally on the stripping fixture 62, after which the fixture 21 may be rotated to align the apertures 67 with the pins 65. When the fixture 21 is aligned on the stripping device 62 with the pins 65 engaging in the recesses 67 of the fixture, the ends of the pins 65 will engage and support the supporting plate 26 and thereby hold the composite supporting fixture in elevated position. Upon turning the T-bolt 32 into alignment with the slot 34 in the supporting plate 26, the fixture 21 will drop or may be urged downwardly to separate it from the supporting plate 26 and partially withdraw the holding pins 20 from the bulbs 15. With the bulbs 15 firmly seated in the seats 27 in the holding plate 26, the plate 26 may be raised vertically to disassociate it from the rest of the fixture 21.

The supporting plate 26, with the bulbs 15 thereon and with the annular coating 16 of powdered enamel on the bulbs, may then be moved to an apparatus where the temperature may be raised to first drive off any remaining binder therein and, subsequently raised to a higher temperature to cause the fusing of the powdered enamel onto the glass bulb. For example, the bulbs 15, with the annular coating of enamel thereon, may be heated to a temperature of approximately 250° F. for one hour to thoroughly dry the enamel and then heated to a temperature of approximately 1200° F. for about eight (8) minutes to cause the fusing of the enamel coating onto the bulb. The bulbs with the annular coating of enamel fused thereon are then allowed to cool and may then be removed from the fixture.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A method of masking predetermined annular portions of light bulbs which comprises the steps of mounting a plurality of said bulbs in parallel relation to each other for movement together with the closed ends of said bulb extending in the same direction and the lowermost portions of said ends being disposed in a predetermined plane, dipping the bulbs, closed ends first, to a predetermined depth into an aqueous suspension of powdered vitreous enamel and removing the bulbs to form a coating of enamel on

the ends and predetermined portions of the sides of said bulbs, air drying the coating of enamel on said bulbs, engaging end portions of the bulbs to a predetermined extent axially thereof with the bristles of a brushing member and causing relative movement between the bulbs and brushing member in a direction transversely to the axis of said bulbs to remove the enamel coating from the ends of said bulbs and also predetermined axial portions thereof, and heating the bulbs to fuse the enamel thereon.

2. A method of applying annular coatings of vitreous enamel onto predetermined portions of light bulbs which comprises the steps of mounting a plurality of said bulbs in parallel relation to each other for movement together with the closed ends of the bulbs extending in the same direction and the lowermost portions of said ends being disposed in a predetermined plane, dipping the light bulbs into an aqueous suspension of powdered vitreous enamel to a predetermined depth and removing it to form a coating of enamel on the closed ends and a predetermined portion of the side walls of said bulbs, air drying the coating of enamel on said bulbs, engaging the closed end portions of said bulbs to a predetermined extent axially thereof with the bristles of a brushing member and moving the bulbs in a direction transversely of said bristles to remove portions of the enamel coating on the

closed ends and predetermined axial portions on the side walls of said bulbs to form annular portions of said coating on predetermined portions of the side walls of said bulbs, heating the bulbs to a temperature of approximately 250° F. for approximately one hour to thoroughly dry the enamel coating, and heating the bulbs to a temperature of approximately 1200° F. for approximately eight minutes to fuse the vitreous enamel onto said bulbs.

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