March 7, 1933. M. PIPKIN 1,900,463

BULB AND METHOD OF COLORING THE SAME

Filed Nov. 7, 1927

Fig. 1

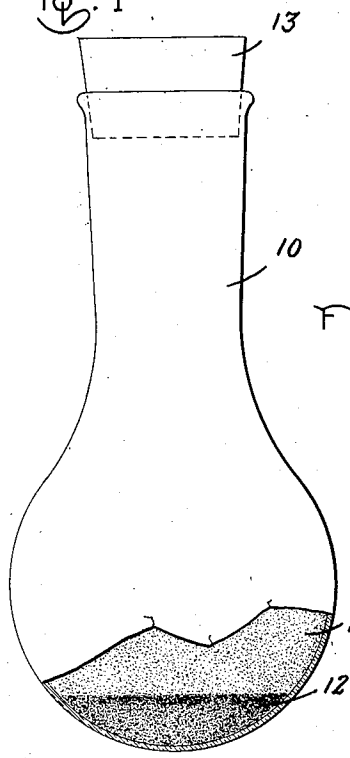


Fig. 2

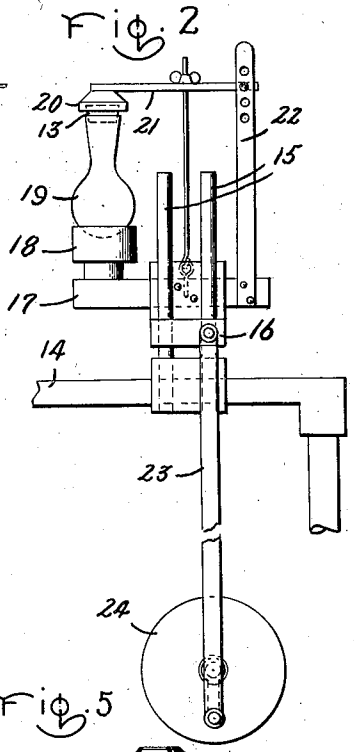


Fig. 3

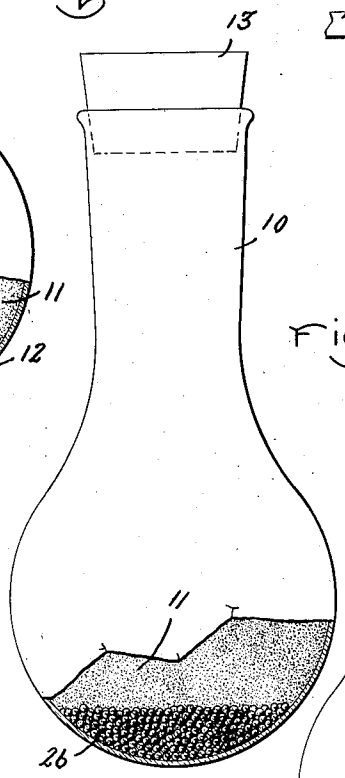


Fig. 4

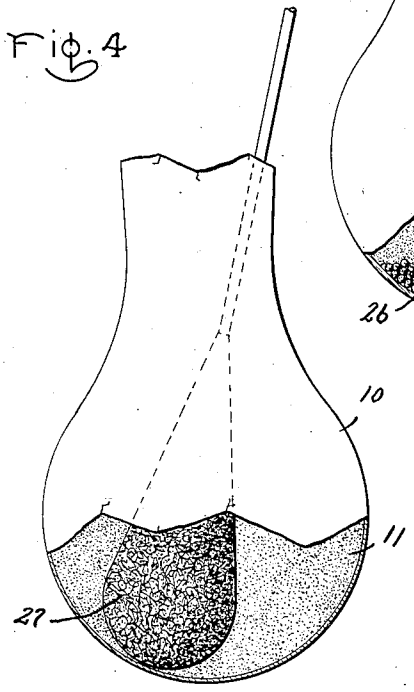
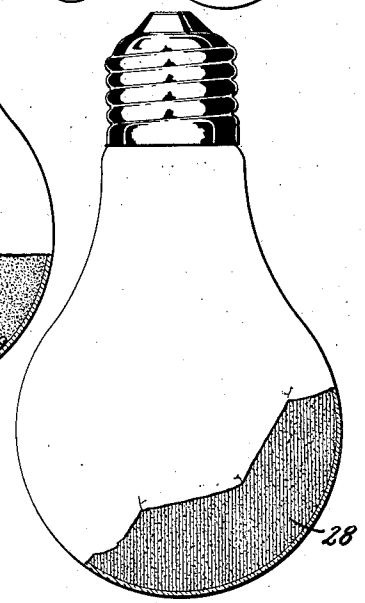


Fig. 5



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Patented Mar. 7, 1933 1,900,463

UNITED STATES PATENT OFFICE

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BULB AND METHOD OF COLORING THE SAME

Application filed November 7, 1927. Serial No. 231,541.

My invention relates to the production of hollow glassware for illuminating purposes and particularly to electric lamps comprising a bulb. My invention comprises a method of coloring the said glassware or bulb on the inside surface thereof. This application is a continuation in part of my Patent No. 1,706,182, issued March 19, 1929.

According to my invention the bulb, for instance, is first frosted on the inside. Preferably this is done by the method disclosed in my Patent No. 1,687,510, issued October 16, 1928, but, for the purposes of the present invention, the production of a rough inner surface is a primary requisite, whether this is done by chemical etching, sand blasting or spray coating. The best results, however, are obtained where the inner surface of the bulb or other glassware is covered with the minute rounded depressions or pits characteristic of the glassware treated according to the method of my patent above referred to. The next step is to introduce into the bulb a quantity of a dry powder of any desired color and to agitate to cause a portion thereof to settle in the multitudinous depressions of the inner bulb surface. I have found that by adding to the ordinary coloring materials, such as oxides, sulphides and silicates, a quantity of tungstic oxide that the strength of the bulb is increased. I also prefer to add phosphorus to the mixture which serves as a getter. Ordinarily phosphorus would have a weakening action on the bulb, but the presence of the tungstic oxide prevents this.

In the drawing, Fig. 1 is an elevation of an incandescent electric lamp bulb in process of being coated; Fig. 2 is a partial elevation of an apparatus by means of which my invention may be practiced; Figs. 3 and 4 are elevations illustrating modifications of the process; and Fig. 5 is an elevation of a completed incandescent electric lamp.

Referring now to the drawing and especially Fig. 1, an incandescent lamp bulb 10 is shown having its inside surface 11 frosted, for instance, according to the method set forth in my prior patent hereinbefore referred to. To apply a color or tint, a quantity of dry powdered pigment 12 of the desired color may be introduced into the bulb and allowed to deposit over the frosted surface by turning the bulb in various directions to obtain a uniform distribution. A cork or stopper 13 is inserted in the neck of the bulb to prevent the escape of the powdered pigment. After the bulb has been properly colored or tinted, the excess pigment powder is transferred to another bulb for coloring and, if necessary, any loose pigment remaining in the colored bulb may be blown out by compressed air.

In Fig. 2 is illustrated an apparatus which may be employed. This comprises a holder for the bulb and a means for shaking the holder and bulb so as to cause the distribution of the pigment over the frosted inner surface of the bulb. The apparatus comprises a table 14 having a pair of vertical guide rods 15 extending therefrom. A block 16 is slidable on said rods and carries a cross-head 17. One end of the latter carries the receptacle 18 adapted to receive the end of a bulb 19. A cap 20 is provided for the open end of the bulb, said cap having an extension arm 21 adjustably supported in a vertical standard 22 mounted on cross-head 17. The block 16 and the parts carried thereby are reciprocated up and down by the movements of the link 23, one end of which is pivoted to said block and the other eccentrically on the disk 24 which is rotated rapidly by any suitable power drive (not shown).

As shown to the left, the powdered pigment is poured into the bulb to be treated through a funnel 25 usually from a bulb which has just been treated. After considerable vibration the colored bulb is removed and the powder therein emptied into another bulb.

In Fig. 3 I have shown a modification in which a quantity of shot 26 is added to the powdered pigment in the bulb. This causes the coating to be somewhat coarser giving it more of a pebbled appearance.

In Fig. 4 is shown a brush 27 which may be applied to the coated surface to obtain a particularly smooth effect.

A completed lamp is shown in Fig. 5 having a red coating 28 on its frosted inner

surface. Various colors may be obtained by the use of various pigments.

For a coloring pigment it is desirable to use material which does not give off volatile materials at the temperatures of sealing, exhausting or operating the lamp. The powder used should be fine and dry. The most desirable materials are oxides, sulphides and silicates, of such elements as iron, cadmium, chromium, cobalt, selenium, titanium, tungsten and zirconium. I have found that care must be taken not to use materials which will affect the strength of the bulbs. I have found that the addition of tungstic oxide to the pigment appears to increase the strength of the bulb. In some cases I find it desirable to add red phosphorus which serves as a getter. In such cases the addition of the tungstic oxide seems to prevent the phosphorus from having a weakening action on the bulb.

One mixture which I have used with success is burnt sienna and tungstic oxide in equal proportions by weight. These materials are dried at 110 to 120° centigrade for six hours and then mixed thoroughly, putting them through a forty mesh screen. I find it desirable in some cases to add about five per cent by weight of dry red phosphorus which is also passed through a forty mesh screen. The mixture of the tungstic oxide and burnt sienna gives a suitable color for so-called flame-tint lamps. Tests have shown that the tungstic oxide increases the strength of the bulb. Moreover it seems to cause a better diffusion of light and also makes the mixture easier to pour. When the red phosphorus is added it has a getter action and helps the quality of the lamp in many cases.

For a white pigment I have used a mixture of 200 grams zorconium oxide and 100 grams titanium oxide. The former is preferably coarser than the latter, the zirconium oxide running forty to one hundred mesh and the titanium oxide one hundred to two hundred mesh. For an ivory pigment 400 grams of lead antimonate, 45 grams burnt sienna and 100 grams forty to sixty mesh sand. If desired 40 grams of red phosphorus may be added. The sand acts as a buffing material and also makes the mixture easier to pour. For orange, cadmium sulphide is used; for blue, ultramarine blue; for green, chromium oxide; for yellow, cadmium sulphide; and for red, cadmium and selenium sulphides. These materials are mixed with the tungstic oxide, and red phosphorus may also be included.

Any of the above pigments can be poured into the bulb and shaken around so that they lodge in the various pits of the frosted surface. The addition of some coarse powder gives a mixture that can be poured more cleanly from the bulb without leaving spots. The best condition for coloring seems to be to use dry powder and to have the bulbs surfaces not too dry. Ordinarily the bulbs have enough moisture just from standing in air for the best results.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The method of coloring electric lamp bulbs which consists in frosting said bulb on the inside and then introducing a dry powdered pigment material comprising tungstic oxide and causing some of it to settle in the depressions of the frosted surface.

2. The method of coloring electric lamp bulbs which consists in frosting said bulb on the inside and then introducing a dry powdered pigment material comprising tungstic oxide and phosphorus and causing some of it to settle in the depressions of the frosted surface.

3. An electric lamp comprising a glass bulb having the inside surface thereof etched and coated with a mixture of finely divided pigment and tungstic oxide deposited in the depressions of said etched surface.

4. An electric lamp comprising a glass bulb having the inside surface thereof etched and coated with a mixture of finely divided pigment, tungstic oxide and phosphorus deposited in the depressions of said etched surface.

In witness whereof, I have hereunto set my hand this 4th day of November, 1927.

MARVIN PIPKIN.