Nov. 27, 1962 C. E. SWANSON 3,066,040

METHOD OF PRODUCING CRYSTAL PATTERN AND THE PRODUCT

Filed Jan. 26, 1959 2 Sheets-Sheet 1

Fig. 1.

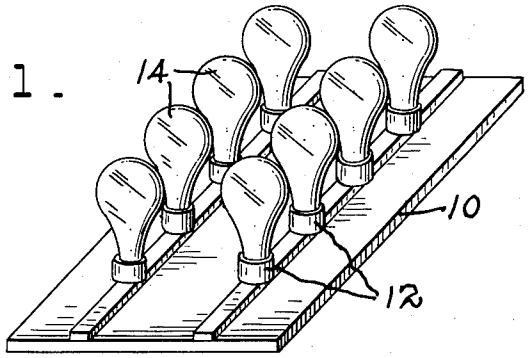
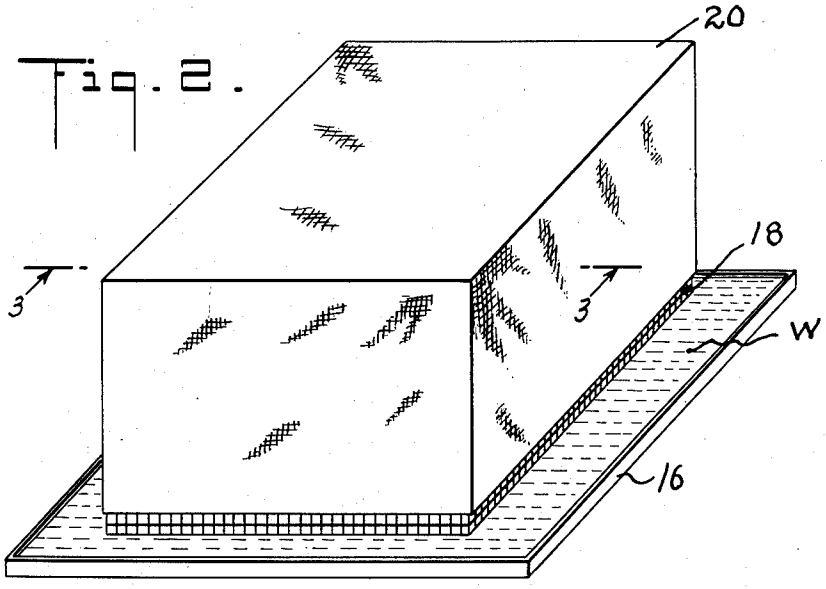


Fig. 2.



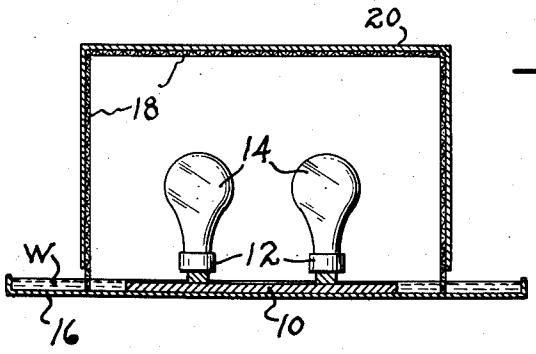


Fig. 3.

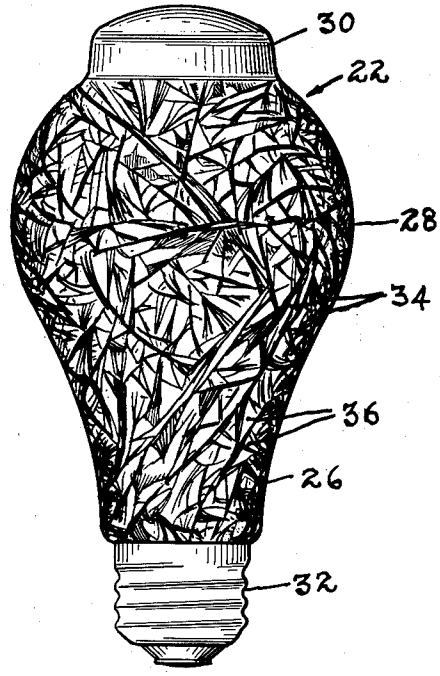
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ATTORNEYS

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Fig. 4.



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METHOD OF PRODUCING CRYSTAL PATTERN AND THE PRODUCT

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5 Claims. (Cl. 117—42)

This invention relates to a method of producing a decorative surface on articles comprising a crystalline lacquer pattern and the resulting product.

A broad object of this invention is to provide a novel method of causing a crystal forming lacquer to dry on the surface of an object to effect controlled crystalline pattern formations.

Another object of this invention is to provide a method of decorating the surface of glass objects, such as for example incandescent lamp bulbs, to give them the appearance of cut glass.

The more detailed and many other objects of this invention obtained by the procedure herein disclosed will become apparent from the following explanation thereof made in connection with the illustrations in the attached drawings.

In the drawings,

FIGURE 1 is a view of a part of the apparatus which facilitates application of the method of this invention and comprises a mounting for the articles to be lacquered;

FIGURE 2 is a perspective view of the complete cabinet of which the structure of FIG. 1 is a part, in which the lacquered articles are subjected to controlled conditions;

FIGURE 3 is a cross-sectional view taken on the line 3—3 of FIG. 2; and

FIGURE 4 is an elevational view of an article produced by the method of this invention, in this case an incandescent lamp.

There are available so-called crystal forming lacquers which are used for various purposes. The normal procedure in the use of such lacquer is to dip the article to be processed in such lacquer, allow the excess to drain off and then support the article for a drying period in an area relatively free of drafts. Upon drying, lacquer coatings of this kind gradually form a crystal structure, the physical form of which varies greatly because it depends upon a number of variable which have not heretofore been controlled. Heretofore the crystal formation has been understood to depend upon the draft conditions, the temperature during drying, the viscosity of the lacquer, and the humidity of the ambient air.

Because of the uncontrolled effect of such a large number of variables it has been virtually impossible as a practical matter to obtain a definite crystalline pattern, and hence any uniformity of such pattern when processing a large number of articles.

As a part of this invention it has been found that there are at least two important factors which bear upon the crystal formation of such a coating and in part this invention consists in controlling them. One of these is the moisture content of the air surrounding the articles during the drying period. One of the features of this invention is in the control of the humidity of the ambient atmosphere during drying in order to effect relatively uniform and pronounced crystal pattern effects.

Another very important aspect of this invention is in the discovery and the control of the application of disturbing forces to the lacquer coating while it is wet to rapidly initiate and facilitate crystallization of the coating. In accordance with this invention the disturbance of the coating is effected mechanically, and as disclosed herein

can be effected in at least two ways. One way is to apply to the wet lacquer surface small specks of a solid particle of inert character, as by dusting lightly those particles thereon, to seed the lacquer by providing a multitude of disturbing points over the surface of the article. Another and very useful way of effecting mechanical disturbance at a multitude of points is to apply the lacquer with a brush. The application of the brush hair points to the wet surface produces a plurality of definite centers of mechanical disturbance to the coating, causing a rapidly and relatively uniform formation of a crystal pattern as the coating dries.

As a variant of this procedure and one which is better adapted to automated processing, involves the operation of dipping the article in the lacquer coating and draining it. Thereupon the coated article, while the lacquer is still wet, is brushed creating, as explained above, the multitude of points of mechanical disturbance to facilitate crystal pattern formation.

In order to better understand the invention and some of its details, the above ideas will be developed in connection with the attached drawings.

In FIG. 1 is shown a support platform **10** of any suitable material on which are mounted a plurality of fixtures **12**, which for example may be rubber grommets, properly shaped to support the articles to be processed. As illustrated in the drawings, articles very much adapted to the advantages of this process are the incandescent lamps **14**. These lamps, as is common and as illustrated herein, have bulbous glass envelopes, to which when a crystalline pattern of the type herein disclosed is applied imparts a cut glass effect. In this case, therefore, the fixtures **12** are shaped to receive the base ends of the lamps.

As shown in FIG. 2, there is provided a container **16** in the form of a pan for holding a quantity of water W. Enclosing the assembly of FIG. 1 during the application of the process is a casing which comprises a form sustaining open sided wire box **18** of the proper proportions, which can be inverted over the articles. Enclosing the wire box is a water absorbent covering **20**, which may be a fabric such as for example muslin which is slightly permeable to water. It is preferred not to use too dense a fabric so as to prevent the admission of some air therethrough. The fabric covering **20** for the housing is preferably moistened and then inverted over the articles, as clearly shown in FIG. 3 so that the peripheral edge of the open side of the casing rests in the pan **16**. It is important to note that the fabric covering **20** is applied to the perforated housing **18** in a manner to leave a venting space for the enclosure between the edge of the fabric and the surface of the water, as clearly shown in FIGS. 2 and 3.

By using a fabric through which the air can pass evaporation of the water is augmented and in addition gentle currents of air are set up within the enclosure. The result is that the temperature within the space is lowered and the moving air facilitates evaporation of the lacquer carrier.

An object of an equipment of this type is to provide relatively high humidity within the enclosure. By way of example in one application of the process where the ambient room temperature was 64.3° F. and the relative huimidity was 47.5%, the temperature within the moistened enclosure was 59.7° F. and the relative humidity was 82%.

Suitable operating conditions in accordance with this invention are not, of course, limited to these specific values. Tests have indicated that with ambient room temperature of from 60° F. to 85° F. the moistened enclosure will produce effective humidity and temperature conditions within it. Throughout this range the temperature depres-

sion within the enclosure is of the order of 5° F. regardless of the ambient temperature.

The rate at which the crystal pattern forms is subject to the mechanical disturbing forces applied to the wet lacquer coating. In one case at an ambient temperature of 75° F. and using a lacquer having a viscosity as indicated by a Ford cup No. 4 of 60 seconds, the lacquer used was brushed onto the article with repeated brush strokes so as to apply a thing coating of the lacquer on the article surface. Under these conditions the crystal pattern began to develop almost immediately, its formation starting by the brush marks which represents the point of mechanical disturbance of the lacquer. In the above case the lacquer was brushed on thinly but in another test when copious amounts of lacquer were brushed on with a very few strokes while still covering the surface, crystal formation was delayed for a considerable period of time. In the first procedure strong pattern formation resulted within a few minutes, but in the latter it took about 45 minutes. In each of these cases, of course, the articles were placed in the humidity compartment as illustrated in FIGS. 2 and 3 over a body of water with the fabric enclosing the compartment wet at the beginning of the drying period.

An important advantage of this procedure is that a reasonably definite pattern style results, which is uniform in appearance when the article is finished.

To further complete this disclosure the following comprises a formula for a crystal forming lacquer suitable for the purpose, and in fact the one used in the above described embodiment of the process.

1100 Gallon Batch of a Typical Crystal Lacquer

Solvents:
- 162 gallons camphor oil (High boiling Ketone)
- 130 gallons toluene
- 162 gallons methyl amyl acetate

Film forming ingredients:
- 162 gallons phthalic anhydride non-drying alkyd resin (65% solution in xylol)
- 16 gallons maleic resin (50% solution in toluene)
- 178 gallons 27% nitrocellulose solution
- 146 gallons 10% nitrocellulose solution
- 97½ pounds para-dichlor-benzene
- 1,297 pounds naphthalene flakes

The two nitrocellulose solutions are typical commercial products in which the nitrocellulose is dissolved in various easily vaporizable solvents. In this particular batch the solvents comprise a mixture of butyl and ethyl acetate, ethyl and butyl alcohol, and toluene and xylol, the proportions of which are not critical.

The most practical viscosity for this lacquer for the purposes of this procedure was found to be between 50 and 60 seconds as measured by a Ford cup No. 4 at 70° F. ambient temperature. Variations in the pattern form can also be effected by adjusting the viscosity of the lacquer. As further examples at a temperature of between 50 and 60° F., a viscosity of 40 to 45 seconds in a Ford cup No. 4 is effective. At a temperature of 80 to 90° F., a viscosity of 70 to 80 seconds in a Ford cup No. 4 is effective.

The appearance of the finished article is illustrated as is best possible for this type of medium in FIG. 4. In this figure there is illustrated an incandescent lamp comprising the bulb, indicated generally by the reference numeral **22**. This bulb is of glass, of course, and as shown comprises a neck **26**, a partial sphere **28** and a dome **30**, all of which are circular in cross-section. Obviously the procedure is not limited to an incandescent lamp of particular shape, nor is it limited to use on incandescent lamps. The process is not only effective on any glass article, but indeed on an article of any material having a reasonably smooth fluid impervious surface. As is usual, the lamp includes a base **32**.

In the finished article the crystalline coating is perforate, that is the solid contents of the lacquer remaining after the carrier is evaporated forms the pattern. This pattern consists of those solids in crystalline form, as indicated at **34**, enclosing clear spaces, as indicated at **36**. In other words the coating breaks down into a perforate layer which in the case of an incandescent lamp exposes the underlying areas of the glass bulb. The solid crystals are of a great variety of forms but they arrange themselves in patterns around the spaces in reasonable definite manner when the procedure herein outlined is followed. In detail, as between various articles the patterns of course are different but in overall appearance they are generally similar. In any event, they are highly decorative and when applied to a glass surface they give the impression that it has been cut in the pattern shown to simulate cut glass.

It is to be understood, as those skilled in the art are aware that the procedure herein disclosed is not limited to the particular lacquer composition herein disclosed. There are other crystal forming lacquers available commercially which are suitable for the purpose. Likewise, other details in this procedure are subject to variation without departure from the scope of novelty herein disclosed. For this reason it is preferred that the scope of protection afforded hereby be determined by the claims rather than by the exemplary subject matter herein described.

What is claimed is:

1. A method of forming a coating on the glass envelope of a lighting device in the form of a perforate crystalline pattern comprising coating said envelope on its outer surface with a lacquer solution comprising a solvent mixture in the proportions of 162 gallons camphor oil; 130 gallons toluene; 162 gallons methyl amyl acetate, and film forming ingredients comprising 162 gallons phthalic anhydride non-drying alkyd resin in a 65% solution of xylol; 16 gallons maleic resin in a 50% solution of toluene; 178 gallons 27% nitrocellulose solution; 146 gallons 10% nitrocellulose solution; 97½ pounds para-dichlorbenzene; and 1,297 pounds naphthalene flakes, and drying said coated envelope in an atmosphere of air and water vapor having a temperature of the air of about 59.7° F. and a relative humidity of the order of 82%.

2. In the method of claim 1, the further step of mechanically disturbing said coating while wet at a plurality of points to facilitate its crystallization during drying.

3. In the method of claim 1, the further step of mechanically disturbing said coating while wet at a plurality of points to facilitate its crystallization during drying by seeding it.

4. In the method of claim 1, the further step of mechanically disturbing said coating while wet at a plurality of points to facilitate its crystallization during drying by brushing it.

5. A lighting device having a glass envelope which has a decorative lacquer coating in the form of a perforate crystalline structure on its surface as formed by the method of claim 1.

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