June 20, 1944. E. M. BRIGHT 2,351,919

METHOD OF COATING WOODEN PATTERNS

Filed July 16, 1942

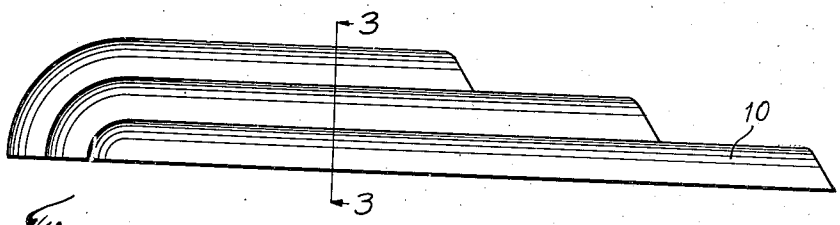


Fig.-1

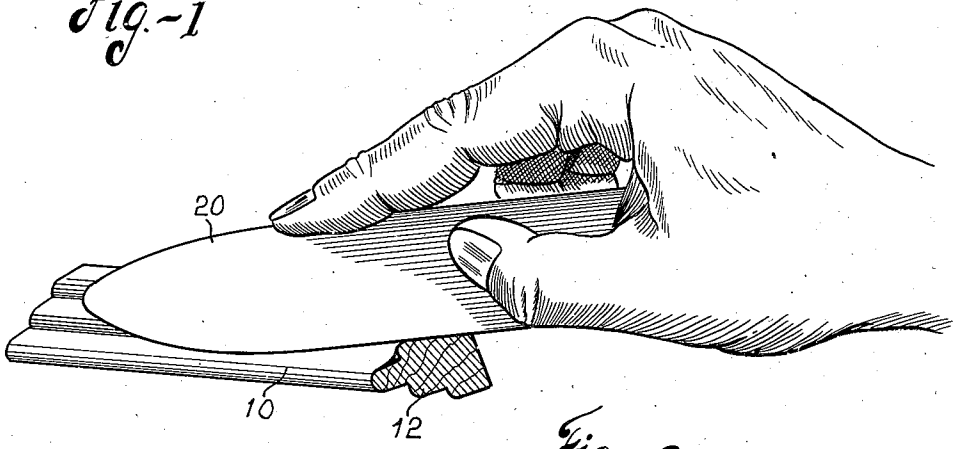


Fig.-2

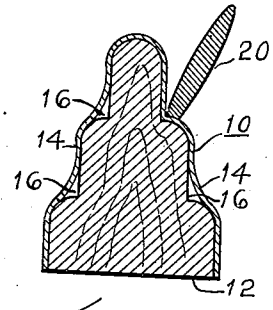


Fig.-3

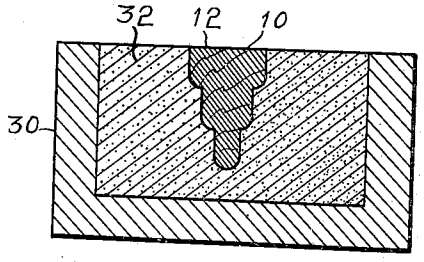


Fig.-4

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METHOD OF COATING WOODEN PATTERNS

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6 Claims. (Cl. 117—103)

This invention relates to patterns and the method of producing same, which patterns are used in forming molds, and more particularly to patterns utilizing a non-metallic core member protected by an impervious coating.

In the past various types of materials have been used in making patterns. The choice of material depends upon the type of castings to be made in the mold, the precision, the number of pieces to be molded or cast and the like. Wood patterns may be used when only a few pieces are to be made and when accuracy in dimensions in the finished pieces is immaterial. When great accuracy is desired, wood is unsatisfactory, for the reason that it changes dimensions in response to the moisture content in the work. Furthermore, wood does not present a highly polished surface. That being the case, when the pattern is removed from the sand mold, grains of sand will be dislodged and roll downwardly, causing irregularities in the surface of the molded article.

When greater precision and longer life of the patterns are required, the patterns are generally made from aluminum or other metals. In spite of the fact that surfaces of the metal pattern may be very highly polished, grains of sand invariably are dislodged when the pattern is removed from the mold. Aluminum is expensive and at times practically unavailable.

An object of this invention is to produce a pattern made from inexpensive materials, which pattern is long-lived, light in weight, easily handled, easily produced, and is not influenced by the presence of moisture contacting the pattern.

Another object of this invention is to produce a pattern utilizing wood as a core, coated with a water impervious, glossy coating material.

Another object of this invention is to use cellulose butyrate as the contacting surface of a pattern.

Another object of this invention is to produce a pattern coated with a coating material having an extremely low surface tension, both as to water and as to oil.

Another object of this invention is to produce a pattern that has a surface such that when the pattern is removed from the mold, the grains of sand remain intact.

Another object of this invention is to provide a pattern having a core coated by spraying the coating material dissolved in a highly volatile solvent, which solvent is removed without forming bubbles and without marring the surface.

Another object of this invention is to spray the coating material having a low viscosity, wherein extremely high air pressure is used as an atomizing pressure and a comparatively high pressure is supplied to the liquid, forcing the liquid into the atomizer.

Another object of this invention is to utilize a coating material such that after it has been partially cured it may be formed so as to comply with the proper contour of the finished pattern.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawing,

Figure 1 is a side elevational view of a pattern having a design suitable for an ornament and the like.

Figure 2 discloses a perspective view of a portion of the pattern, having parts cut away for the purpose of clearness, and a forming tool used in finishing the pattern.

Figure 3 is a cross sectional view taken substantially on the line 3—3 of Figure 1, and a cross sectional view of a forming tool used in finishing the surface of the pattern.

Figure 4 is a cross sectional view of the mold before removal of the pattern.

Patterns are used very extensively in a great variety of industries. The patterns enter into the cost and the quality of the molded piece or article. There are certain requisites to a good pattern. It must be smooth, preferably with a glossy finish. A good pattern should be impervious to liquids, such as water and oil. It should have a low adhesion to oil and water. Ease and cost of production enter into the selection of a suitable pattern.

Such a pattern is disclosed herein, wherein the core is preferably made from seasoned wood coated with cellulose butyrate, as will appear more fully from the detailed description that follows.

Referring to the drawing, the reference character 10 indicates a pattern used for the purpose of illustration. This pattern, as illustrated, may be used in forming a mold for an ornament, as for example, an ornament to be mounted over a radiator or in association with the hood of an automobile. This is shown merely for the purpose of illustration, without thereby limiting the use of the pattern to the particular ornament. The pattern may be used for any type and shape of pattern compatible with the materials used.

The core 12 of the pattern is made from wood, preferably well seasoned wood, so that it will not be subject to extensive shrinkage and warping.

Wood has been used for patterns, in making models and at times in making a few parts, when great accuracy in dimension and when a smooth surface is not essential to the molded piece. Wood patterns, as used in the past, absorb water or moisture from the sand, thereby causing expansion, contraction and warping. Furthermore, wood does not offer resistance to the abrasive qualities of sand. The surface of the wood roughens rapidly. In addition thereto, the surface is not sufficiently smooth to permit the removal of the pattern without displacing more or less of the sand. Attempts have been made to wax, shellac or varnish the surface of the wood pattern; but such patterns have not met the exacting demands of precision in molding.

It has been found that cellulose butyrate obtained by treating suitable cellulose material with butyric acid, a chemical material which has had limited use in the past, provides an excellent surface when used as a coating for a pattern. It seems that cellulose butyrate is rather difficult to handle, in that it has an extremely high melting point and therefore cannot very well be molded. Furthermore, it cannot be sprayed satisfactorily with the conventional spraying equipment. By adding the pressure on the air line in the spray gun and by supplying a pressure to the cellulose butyrate dissolved in highly volatile solvents, small areas may be sprayed at a time, providing this sprayed surface is properly cured.

The core 12 disclosed in the drawing is covered or coated with a coating of cellulose butyrate. This coating, due to the extremely high surface tension that is created during the curing process, has an extremely smooth surface. Furthermore, this cellulose butyrate coating has an extremely low adhesive force to moist or oily sand. This results in a pattern which may be removed from the sand mold without distorting or removing any of the sand granules. The cellulose butyrate coating has other advantages. It is extremely hard and resistant to wear.

Due to the extremely high melting point, the coating is not subject to influence by variations in the room temperature in the foundry. Furthermore, this cellulose butyrate coating may be applied in extremely thin layers by spraying the pattern. A suitable solution for spraying may consist of

	Parts
Cellulose butyrate	2
Rezyl #14	⅛
Triphenyl phosphate	⅛
Methyl acetone	4
Ethyl alcohol	3
Ethyl acetate	1

(All parts by weight.)

The Rezyl #14 and the triphenyl phosphate function as plasticizers.

The viscosity of this solution is such that it cannot very well be sprayed in the ordinary spray guns operating at normal pressure. That being the case, a pressure is supplied to the solution. For the purpose of illustration, eighty-five pounds (85#) pressure may be applied to the air line, this being the atomizing pressure, which is much higher than normally used in conventional spray guns. In addition thereto, twenty-two pounds (22#) pressure may be applied to the solution, forcing the solution into the atomizer. Two or three coats, each approximately .006 inch thick, are applied to the surface of the core.

The coating applied by the spray gun will not cure satisfactorily in the open air, due to the extremely high volatile solvents. That being the case, it is necessary to cure the coating by extracting the solvents in a partial vacuum chamber or compartment, preferably utilizing a closed circulatory system, at ordinary room temperature, using dehydrated air having fumes of the solvent therein. This circulatory system may include a vacuum pump, a dehydrator and a solvent condenser, as fully described in my copending application Serial No. 379,321, filed August 19, 1940, for Process of curing plastic coatings. If there is moisture in the air, the rapid evaporation of the solvents reduces the temperature on the surface of the pattern below the dew point, resulting in rapid condensation on the surface of the pattern. This moisture formed by the condensation results in the surface of the pattern wrinkling and thereby being marred and rough. It has been found that dehydrated air having fumes therein, which air is preferably maintained at a three-pound vacuum, results in rapid extraction of the solvents from the coating. As the coating cures by the solvents being extracted, the coating shrinks, thereby producing an extremely highly polished and glossy surface.

The high surface tension, in addition to creating a glossy surface, may result in the coating material pulling away from cavities, grooves, notches and low places in the surface of the pattern. This has been illustrated in Figure 3, where the coating 14 has pulled away from the corners 16, leaving voids below the coating stretching over the low areas. Fortunately, this objection may be easily overcome. After the coating has cured sufficiently in the partial vacuum, it may be removed into the open air. Due to a small amount of solvent remaining in the coating, it has not hardened, but is in a semi-plastic state. It may then be forced into the crevice or low spot by a suitable forming tool 20. The shape of the forming tool depends entirely upon the type of a crevice or groove that is to be coated. The tool is preferably contoured so as to leave the desired finished surface. There is sufficient elasticity in the coating material stretching over the crevice to permit the coating to be forced into the crevice without cracking and without stretching beyond the elastic limit. When it has once been forced into position, it will dry in place. As it dries, the surface tension increases, thereby presenting a smooth surface in spite of the operation by the tool.

In the event the surface of the coating is marred or mutilated by the tool, it is merely necessary to spray a small quantity of solvent on the defective parts, so as to cure the irregularities.

Due to the properties of the extremely high volatile solvents used in dissolving the cellulose butyrate, it may be necessary to limit the spraying operation to a small part of the pattern, in that if an attempt were made to spray the entire pattern, condensation would form on parts, causing wrinkles before the spraying operation is completed. That being the case, it is preferable to spray a part of the pattern, then cure this portion before continuing the spraying operation. The finished surface, even though it is sprayed at different times, will be perfectly smooth, even and glossy. After one coat has been applied, a second or a third coat is applied.

As may be seen by referring to Figure 4, the pattern 10 is mounted in the mold box 30 and surrounded by the molding sand 32. After the

sand has been packed in position, as is well known to those skilled in the art, the pattern is removed, leaving a cavity identical to the shape of the pattern. Due to the smoothness of the cellulose butyrate coating and the low cohesion of this coating to moist sand, the pattern may be removed from the sand without distorting the cavity. As is well known to those skilled in the art, the cavity may be filled with molding material such as aluminum, iron, brass, or any other suitable molding material.

The core may be provided with corners that are filleted with wax, leather or metal. Furthermore, the core may be provided with metallic reenforcements. In the event the coating material does not adhere to the fillet, the fillet is then preferably coated with a suitable binding material or primer. For this purpose a filler material sold under the trade name Vinyseal T-24-9, may be used.

A suitable pigment may be added to the cellulose butyrate solution, as for example, a yellow pigment. After the pattern has been coated, certain areas may be marked or colored in characteristic colors, for the purpose of identification. For example, the surface corresponding to the surface of the casting that is to be unfinished, may be yellow. The surface that is to be machined, may be red and the surface underlying the portion supporting a core member, may be black. If a yellow die is used in the solution, the red parts and the black parts may be dyed their respective colors by spraying the surface of the cellulose butyrate coating with a solvent having the appropriate dye added thereto, that is, a red pigment or a black pigment, as the case may be. This solvent, having the dye added thereto, upon being sprayed upon the desired surfaces produces red areas and black areas, superimposed upon the yellow coating material. The solvent evaporates very rapidly, leaving a surface film of red or black, as the case may be. This does not in any manner influence the glossy surface of the cellulose butyrate. If anything, it results in a more highly polished surface.

Although the preferred modification of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. The method of producing a pattern having a wooden core member coated with cellulose butyrate dissolved in highly volatile solvents, said method including the steps of forming the wooden core member with depressions therein, applying cellulose butyrate dissolved in highly volatile solvents to the surface of the wooden core, partially removing the highly volatile solvents in dehydrated air in a curing compartment having a sub-atmospheric pressure, removing the pattern with the coating into the open air with some of the solvents remaining in the coating, forming the coating so as to force it into the depressions in the surface of the core, and finally curing the coating by evaporating the remaining solvents therefrom.

2. The method of producing a pattern having a wooden core member coated with cellulose butyrate dissolved in highly volatile solvents, said method including the steps of forming the wooden core member with depressions therein, spraying cellulose butyrate dissolved in highly volatile solvents upon the surface of the wooden core member, partially removing the highly volatile solvents in dehydrated air in a curing compartment having a sub-atmospheric pressure, removing the pattern with the coating from the compartment into the open air with some of the solvents remaining in the sprayed coating, and finally curing the coating by permitting the remaining solvents to evaporate therefrom.

3. The method of producing a pattern having a wooden core member coated with cellulose butyrate dissolved in highly volatile solvents, said method including the steps of forming the wooden core member with depressions therein, spraying cellulose butyrate dissolved in highly volatile solvents upon the surface of the wooden core member, and placing the pattern with the freshly sprayed coating thereon in a curing compartment having dehydrated air therein at a subatmospheric pressure to extract the highly volatile solvents from the coating material.

4. The method of producing a pattern having a wooden core member coated with cellulose butyrate dissolved in highly volatile solvents, said method including the steps of forming the wooden core member with depressions therein, spraying cellulose butyrate dissolved in highly volatile solvents upon the surface of the wooden core member, placing the pattern with the freshly sprayed coating thereon in a curing compartment having dehydrated air therein at a subatmospheric pressure to extract the highly volatile solvents from the coating material, and spraying a second coating of cellulose butyrate dissolved in highly volatile solvents and repeating the steps of extracting the solvents from the coating.

5. A pattern for use in forming a mold, said pattern including a wooden core member coated with cellulose butyrate.

6. A pattern for use in forming a mold, said pattern including a wooden core member, and a cellulose butyrate coating having colored identification areas thereon.

ELVIN M. BRIGHT.