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PROCESS OF COATING POROUS ARTICLES

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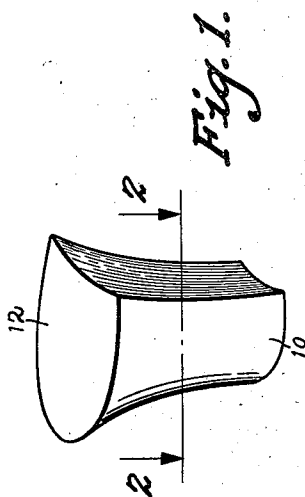


Fig. 1.

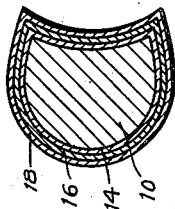


Fig. 2.

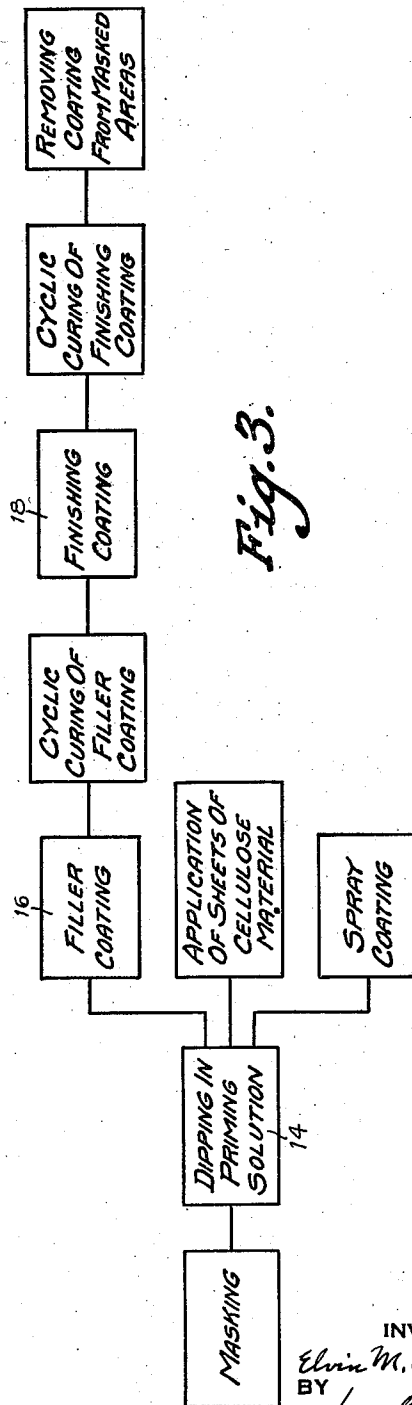


Fig. 3.

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PROCESS OF COATING POROUS ARTICLES

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1 Claim. (Cl. 91—68)

This invention relates to coating of articles and more particularly to the coating of articles having a porous surface, such as articles made from wood or the like, or molded articles made from a porous material such as sawdust and other porous molding materials.

An object of this invention is to provide a mask for a portion of the article to be coated.

Another object of this invention is to provide a priming coat forming a bond between the surface of the article to be coated and the outer coating.

Another object of this invention is to provide a filler to be applied over the priming coat, so as to smooth irregularities in the wood or the article, so as to present a uniform, flat or even surface.

Another object of this invention is to provide a priming coat which will form a bond between the nitrocellulose coating and the article to be coated.

Another object of this invention is to impregnate wood with nitrocellulose material.

Another object of this invention is to provide a coating for an article having a porous, irregular surface, which coating is cheap, efficient and at the same time presents a uniform, glossy surface. 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.

Referring to the drawing,

Figure 1 is a perspective view of a shoe heel made from wood that is to be coated with nitrocellulose material.

Figure 2 is a cross sectional view taken substantially on the line 2—2 of Figure 1, to show the several coatings.

Figure 3 is a schematic diagram showing the process of applying a nitrocellulose coating or other coating to the article to be coated.

Numerous attempts have been made to provide a cheap priming coating for wooden or other porous articles to be coated, which priming coating is to function as a bond between the article to be coated and the outside finishing coating. None have been satisfactory when using a nitrocellulose coating or a nitrocellulose finish, which coating has not been bonded to the article but has formed a tight encasement without a bond between the article to be coated and the outer nitrocellulose coating, whether this outer coating be applied in the form of sheets or by spraying or by dipping. Furthermore, when dipping the article into nitrocellulose solutions as used in

the past, the air or gasses retained by the pores of the wood are liberated and will cause blisters underneath the coating, resulting in a defective coating. The elimination of this air has been an unsolved problem. Before discussing the solution to this problem, a brief explanation will be made of a preliminary masking step in the process. This making step will now be described.

Masking

If the entire article is not to be coated, any portion may be exposed by masking such portion. Any suitable masking material that does not form a bond with the coating material and that has no objectionable features as far as the article is concerned may be used. If a wooden article is to be masked, it may be coated with either potassium or sodium silicate, more commonly known as "waterglass." The nitrocellulose material does not adhere to the waterglass masking material. Furthermore, the waterglass does not in any manner injure the wood later to be exposed. Although waterglass has been disclosed for the purposes of illustration, any other suitable masking material may be used.

Priming and bonding film or coating

By dipping the article to be coated in a very thin solution of nitrocellulose material, wherein the greater portion of the solution consists of the solvent for the nitrocellulose material, this thin solution will penetrate the pores of the wood, expelling the air and the gases therein in the form of minute bubbles. For example, it has been found that by dipping the wooden article into one-fourth pound of nitrocellulose material dissolved in one gallon of Isotone, which is a trade name for a solution consisting of sixty percent acetone, twenty-five percent isopropyl acetate and fifteen percent anhydrous isopropanol, that bubbles will form upon the outer surface of the article to be coated and eventually be liberated therefrom if the solution is not agitated over a period of twenty-five to forty minutes depending upon the condition of the wood, the shape of the body to be coated, the extent of the masked area, the quality of the material, the porosity of the article, etcetera.

By agitating the solution in which the article is dipped, during the time that the article is submerged, the liberation of the gases is greatly accelerated. The time is reduced to five to eight minutes, which is sufficient time to permit all of the air that will cause any deleterious effects to

be expelled from the surface of the article to be coated.

In addition to the expulsion of the air from the outer surface of the article to be coated, the dipping of the article in this thin solution of nitrocellulose material results in some of the nitrocellulose material actually soaking into the pores of the wood, which has in the past been considered absolutely impossible. If the dipping solution contained much more nitrocellulose material, the solution would be much thicker, so as to form an exterior coating which would encase the article without expelling the air and without penetrating the pores of the wood. After the article is coated with this thick coating, some of the solvent would undoubtedly liberate some of the entrapped air, driving this air to the surface beneath the coating, where it forms a bubble that is not released but may show up as a bulge in the finished article. The thin film covering the surface of the article coated with the extremely thin coating is impregnated or soaked into the surface of the wood, so as to form a rigid bond with the article. This priming coat is permitted to dry partially in the open air, without any particularly deleterious effect, as the coating is so thin that there is not sufficient thickness to house or enclose deleterious gas bubbles usually formed in nitrocellulose coating from rapid evaporation of the solvent when cured in the air.

Finishing coat or coating

The finishing coating may include (a) a dipped cellulose coating either with or without the use of a filler coating; (b) a spray coating either with or without a filler coating, or (c) a coating formed by applying sheets from preformed sheets of cellulose material.

In view of the filler coating when used being applied first, the application of the filler coating will now be described.

Filler coating

Heels formed from wood or other porous material usually have some of the grains exposed, leaving rough surfaces. Even though the wood may appear to have a highly polished surface before the application of the priming coating, the surface after being primed usually gets rough, due to the inherent structure of the material of the article. Therefore, it is necessary either to refinish the surface or to use a filler coating to eliminate the irregularities. The former is not satisfactory for the reason that it is impractical to polish a moist surface and the cost is prohibitive. In the next place, if the priming coating were permitted to harden to permit finishing, the purpose of the priming coating would be partially defeated, as it does not form a good bond where the outer film has been removed.

A filler coating may be applied by dipping the article into a liquid including a suitable comminuted inert filler material suspended in nitrocellulose material dissolved in a suitable solvent. Comminuted diatomaceous earth has been found to give excellent results as an inert filler material. Due to the surface tension of the nitrocellulose material when it is cured, the filler coating has a tendency to fill the pores and the grain of the wood, so as to completely conceal the underlying material. This coating may be cured by the process disclosed in my Patent No. 2,130,225 granted Sept. 13, 1938, which process includes the steps of cyclically dipping or submerging the freshly coated article into a solution having an attraction

for the solvent used in dissolving the nitrocellulose material, in which solution the nitrocellulose is substantially insoluble, then subjecting the article to a gaseous medium saturated with fumes from the solvent used in dissolving the nitrocellulose material.

If nitrocellulose material were used without having added thereto a filler material, the shrinkage would force the nitrocellulose material into the dips or detailed low and high areas of the article. By adding the filler material, it functions to offset the deleterious shrinkage of the nitrocellulose material. This filler material prevents the free flow of the nitrocellulose material. It acts as a buffer or impedance to the flow of the nitrocellulose material. Therefore, the outer surface of the cured filler material has substantially the same contour as it had immediately after the article was removed from the dipping solution when the outer surface was smooth due to surface tension of the liquid coating material. However, the cured surface of the filler coating does not have the desired gloss and texture. That being the case, it is necessary to add a finishing coating that acts as a veneer plastic ply coating.

After the filler coating, which may include the desired pigment or dye, has been applied and cured sufficiently, the final finishing coating may be applied.

For the purposes of illustration, it has been found that as a filler coating, two and one-half pounds of nitrocellulose material dissolved in one gallon of Isotone having added thereto three-fourths pound diatomaceous earth and a suitable pigment or the like, produces excellent results. Any other suitable filler material may be used.

Finishing coating

The finishing coating may now be applied by dipping the article into nitrocellulose solution which may, for the purposes of illustration, consist of two and one-half pounds nitrocellulose material dissolved in one gallon of Isotone, either with or without coloring matter added thereto. The above proportions may be varied depending upon numerous factors including the desired thickness of the finished coating.

This dipped nitrocellulose coating is preferably cured by the process disclosed in my aforementioned Patent No. 2,130,225.

Removal of coating overlying mask

When coating such articles as wooden shoe heels, it is necessary to remove the coating from the top of the heel and also from the bottom. It has been found that by masking the top and the bottom of the heel, as described above, by a suitable material such as waterglass, the priming coating and the subsequent coatings will not penetrate the wood covered by this masking material. Thus, after the article has been coated, the nitrocellulose material extending across the top of the heel and across the bottom of the heel may be cut away and removed bodily, so as to leave the wood exposed. This process will now be described as applied to the coating of a ladies' wooden shoe heel.

In the drawing, the reference character 10 indicates a heel of a ladies' shoe, which has been turned from wood or formed from a plastic including sawdust, which heel is rough, due to the grain in the wood, and therefore must be coated, so as to fill the grain of the wood. The top surface 12 of the heel and the bottom, which has not been shown, must have the wood exposed

after the heel has been coated. That being the case, the top surface of the heel and the bottom thereof are first coated with potassium or sodium silicate, more commonly known as waterglass. This has been shown schematically by the first square shown in Figure 3. After the masking coating has been applied over the surfaces to be exposed, the heel is dipped into a thin nitrocellulose coating 14, as described above, and preferably while the solution is agitated. The solution is agitated from below the liquid level and preferably below the lower level of the heel by a controlled movement. This movement should cause the liquid in the vicinity of the submerged article to have an upward movement so as to sweep upwardly the bubbles forming on the surface of the article. This sweeping action of the bubbles causes these bubbles to rise to the surface of the solution. Any suitable agitator causing the solution to have the desired eddy currents may be used.

This priming coating is permitted to dry in the air for a short period of time. However, this coating should not be permitted to set or harden, as it is very desirable that the subsequent coating 16, which may consist of a filler material and nitrocellulose material dissolved in a suitable solvent as for example Isotone, be applied before the priming coating has hardened, that is, while it is moist, as the bond between the priming coating and the filler material would then be more effective. The filler material may be applied by dipping the article into a solution consisting of nitrocellulose material dissolved in Isotone having added thereto diatomaceous earth and preferably a suitable pigment.

The coated article, immediately upon being removed from the filler material, is subjected to a curing process disclosed in my Patent No. 2,130,225, where the article is cured by dipping the article into gasoline, then removing the article into a fume zone saturated with the fumes from the solvent, these steps being repeated cyclically until the article is cured sufficiently to permit the article to be dipped into the final coating solution.

This final coating solution may contain a pigment, or it may be clear. By providing a clear coating the finished article has greater depth to it. Whether or not a pigment is added to this coating depends entirely upon the condition of the filler coating and the requirements of the finished article. This coating 18 preferably consists of nitrocellulose material dissolved in Isotone, having the desired viscosity. The article thus coated is again subjected to the curing, the same as already described and as fully shown in my aforementioned patent.

After the final coating has been cured, the ends of the heel may be subjected to a clicking machine, so as to remove the coating material overlying the masking material, which coating material is easily removed, as it does not adhere to the waterglass. The article is now finished and ready for use.

Although a heel has been used for the purpose of illustration, any type of article adapted to be dipped can be subjected to the process described above.

Spray coating

For some types of usage, a cheaper coating may be satisfactory. Instead of applying the filler coating and a finishing coating, a coating may be sprayed directly upon the priming coating, which spray coating adheres to the priming coat-

ing, which in turn is impregnated into the surface of the article to be coated. This spray coating may contain the desired pigment.

Application of nitrocellulose sheets

For some types of work it may be desirable to apply sheets of nitrocellulose material directly to the article after it has been primed. Isotone or any other suitable solvent is preferably applied to the inside of the sheet to be applied to the article. This solvent softens the side of the sheet coming in contact with the moist priming coating of nitrocellulose material that is saturated into the outer surface of the article to be coated. The moist inner side of the sheet coming in contact with the moist coating forms a homogeneous union, so that the impregnated priming coating and the outer applied sheeting form a unitary structure. Thus, a coating may be formed from applied sheets that has the characteristics of a unitary impregnated coating. The priming coating constitutes a bond between the article and the covering sheet. Where the surface of the coated article is irregular, as for example a shoe heel, the sheet is preferably first preformed into the approximate shape of the finished article, by any method well known to those skilled in the art.

Although a shoe heel has been used as the article to be coated, the processes of applying the coating are applicable to any other suitable article. Instead of nitrocellulose material, any other suitable coating material having characteristics similar to nitrocellulose material may be used, as for example de-nitrated nitrocellulose material and other cellulose materials such as cellulose acetate, ethyl cellulose, etcetera. Any suitable solvent other than Isotone may be used, providing the solvent has the desired characteristics.

Although the preferred methods have been described, it will be understood that within the purview of this invention, equivalents not excluded by the prior art are included which are capable of carrying out the objects as disclosed and defined in the appended claim.

Having thus described my invention, I claim:

The method of bonding a nitrocellulose coating to a wooden article including the steps of masking the portions of the article later to be exposed without a coating, dipping the masked article into a thin solution consisting of nitrocellulose material dissolved in a suitable solvent so as to expel the air from the pores of the wood and so as to impregnate the outer surface of the wood with the nitrocellulose material priming film, partially drying the priming film, applying a filler coating by dipping the impregnated article while the priming film is moist into a solution including nitrocellulose material dissolved in a suitable solvent having added thereto a filler material, curing the coating, dipping the article into a finishing coating including nitrocellulose material dissolved in a suitable solvent and curing the finishing coating by cyclically dipping the article into a solution having an attraction for the solvent used in dissolving the nitrocellulose material in which solution the nitrocellulose material is substantially insoluble, and removing the article into a zone saturated with the fumes from the solvent used in dissolving the nitrocellulose material, so as to cure the coating, and bodily removing the nitrocellulose material overlying the masking material.

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