Patented Apr. 10, 1934 1,954,751

UNITED STATES PATENT OFFICE

1,954,751

HIGH GLAZE FINISH FOR FABRICS AND THE LIKE

Alva Wayne Bateman and Raymond Einnon Thomas, Newburgh, N. Y., assignors to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

No Drawing. Application October 12, 1932, Serial No. 637,546

8 Claims. (Cl. 91—68)

This invention relates to the art of coating and more particularly to a highly lustrous, waterproof finish on either plain or figured fabrics, paper, or similar flexible materials.

Highly glazed finishes have proved to be a great aid to the sale of many types of products. A high luster is associated with certain specific products such as patent leather, glazed papers, and the like. Coating compositions have previously been developed which, of themselves, impart a reasonable degree of luster to the surface upon which they are deposited, but such finishes have had some inherent defect which has limited their usefulness. For instance, in the case of a highly glazed finish on patent leather, great losses are incurred due to the stickiness which manifests itself, particularly during transportation. Skins which have been coated with patent leather finish and transported by rail or boat are frequently found to have stuck together with serious losses as a result of stickiness of the finish augmented by the heat and pressure which are experienced during shipment. In the case of highly glazed papers, the desired effect is generally produced by polishing by means of a mechanically operated iron a wax-containing composition previously applied to the paper. Such coatings are generally pervious to water and are not entirely suited to packaging of materials which by nature require protection from gain or loss of moisture.

This invention has as an object the production on a flexible base material of a durable, cleanable, highly lustrous, greaseproof, and moistureproof finish. Other objects will appear hereinafter.

These objects are accomplished by applying as a first coat to the material to be protected a composition which has such properties as not to penetrate the surface to be covered, such penetration detracting from the final desired effect. We find that the following cellulose derivative composition containing blown cotton seed oil as a softener is particularly suitable for carrying out our invention.

	Per cent
Cellulose nitrate	15
Blown cotton seed oil	23
Ethyl alcohol	44
Ethyl acetate	18

The viscosity of this composition is adjustable either by concentration of solvents or the viscosity characteristics of the ingredients used. It must be of such a viscosity, determined by trial, which will give a coherent film on the base material and in the case of porous base materials such as paper, it must not penetrate to any appreciable extent lest the color and general appearance of the paper be modified by such penetration. The viscosity characteristic of the cellulose nitrate preferred for best results is expressed as 500–600 seconds for a ¼" steel ball falling through a 10" column of a 21% solution in a 2:1 mixture of ethyl alcohol and ethyl acetate maintained at 25° C.

This first coat is important in preventing the penetration of the subsequently applied varnish which is the luster-imparting ingredient of our coating systems. We find that application of the varnish directly to the porous surface, such as paper, does not ordinarily result in maximum luster, but tends to be absorbed by the paper irregularly, our first coat being of such a nature as not to penetrate paper and giving a satisfactory smooth surface for the varnish to lie upon. Upon drying the first coat by suitable means, a varnish of the polyhydric alcohol-polybasic acid type chemically modified by incorporation of linseed and China wood oil is then applied and dried.

The polyhydric alcohol-polybasic acid resin varnish applied over the cellulose nitrate coating is preferably a solution in hydrocarbon solvent, such as toluol, of a resin prepared from the following ingredients:

	Per cent
Glycerol	12.6
Phthalic anhydride	29.6
Linseed oil	28.9
China wood oil	28.9

The resin is prepared by heating the glycerol, China wood oil, and linseed oil in a suitable receptacle with stirring at a temperature of 200° C. to 225° C. for about 1½ hours. At this time, the phthalic anhydride is added to the receptacle and the heating is continued at 200° C. to 225° C. for approximately 6 hours or until the acid number of the resulting product is equal to 40 or less. (By acid number we mean the number of mgs. of KOH required to neutralize one gram of the reaction product.) For the purpose for which this varnish is to be used, it is found advantageous to add the solvent required for dilution before the reaction mass is cooled below 150° C.

Prior to using the varnish a suitable drier is added thereto. We find that the addition of .05% to 0.8% of metallic cobalt based on the drying oil content of Example B gives suitable drying qualities to this composition. We also find that the

temperature at which this varnish dries most satisfactorily is between 125 and 175° F.

The pyroxylin and resin coatings described above may be applied in any appropriate manner and dried, either at room temperature or at elevated temperature, depending upon the speed of the processing desired.

We have found that blown cotton seed oil is particularly valuable in securing the proper drying of the subsequent varnish coats. Other softeners, however, such as blown castor oil, dibutyl phthalate, tricresyl phthalate, and liquid or soft synthetic resins of the polyhydric alcohol-polybasic acid type such as diethylene glycol sebacate, can be successfully used to the extent of producing a product satisfactory for some purposes.

We have found further that certain softeners are difficult or almost impossible to use in the first coat due to exudation of the softener from the first coat into the second or varnish coat with a resultant stickiness in the finished product. An important advantage of the blown cotton seed oil as softener is that little or no exudation from the first coat into the second takes place, whereas an appreciable quantity of raw castor oil in the first coat is undesirable because of its great tendency to diffuse into the subsequently applied compositions. Also, the amount of softener in the first coat has a bearing on the tendency of the second coat varnish to dry satisfactorily, and powerful softeners such as dibutyl phthalate and tricresyl phosphate cannot satisfactorily be used in as great proportion as such softeners as blown cotton seed oil. We prefer to use the ratio of blown cotton seed oil to pyroxylin of 1.5 to 1.0, although we do not wish to be limited by this particular ratio which might vary widely depending on the results expected. We prefer not to use drying oils in our first coat composition due to a tendency to stiffness and brittleness which develope in such films on aging.

The drying temperature for the second or varnish coat is important with respect to the tendency of the softener in the first coat to diffuse or exude into the varnish coat. The varnish coat can, in most cases, satisfactorily be dried provided the drying temperature is not above the temperature at which the softener in the first coat exudes from the cellulose nitrate film. This relationship of drying temperature of varnish to exudation temperature of softener from first coat cannot be set forth satisfactorily since there does not seem to be any well defined relationship between these two factors. In the case of raw castor oil we have been unable to dry with complete satisfaction our varnish coat over a first coat cellulose nitrate composition when the raw castor oil is present in any appreciable quantity.

The composition of the resin can be varied with regard to the drying oil used; varnishes derived from soya bean oil, perilla oil, and other such vegetable oils give reasonably good results but the drying conditions must be adjusted in such cases to take care of the slower drying properties of such oils. We have found that China wood oil is a valuable ingredient of the composition because it imparts rapid set-up to the film. Adjustments can also be made in the type of polyhydric alcohol and polybasic acid used, although the preferred ingredients are glycerol and phthalic anhydride. Among the polyhydric alcohols and polybasic acids that may be used satisfactorily, these may be mentioned: diethylene glycol and pentaerythritol instead of glycerol, and succinic, fumaric and adipic acids instead of phthalic anhydride.

The system of finishing described herein is especially useful in imparting a highly glazed finish on artificial leather by which we mean fabric which has been coated with a composition giving a leatherlike finish. This is usually attained by applying a plurality of coats of a composition containing cellulose nitrate, a vegetable oil, suitable pigments all dispersed in suitable solvents. When our system is applied over artificial leather of this type, a finish resembling "genuine patent leather" is obtained which is advantageous over the previously applied glazed finishes for artificial leather in respect to durability, dryness of feel, degree of glaze, exudation temperature of the oil content in the base coats and other advantages. It may be applied to embossed surfaces, or a surface to which the varnish has been applied may be embossed with excellent results. Uses for such coatings are myriad including manufacture of novelties, belts, pocketbooks, table oilcloth, welting, etc.

Our improved finish is also adapted to production of a highly glazed finish on papers of various qualities. It is particularly advantageous as a means of imparting a highly glazed finish on papers which have been printed; for example, the wrappers for cracker cartons, cigarettes, soaps, chewing gum, candy, etc. It is possible to emboss such coated papers and to add further decoration in the form of printing on the surface of such glazed finishes, if desired.

The finish made in accordance with the present invention produces a much more highly glazed surface; that is, it reflects light more perfectly than previous finishes applied to artificial leather; it is a durable finish; it is grease resistant and water resistant; it is readily cleanable; it does not pick up dust upon outdoor exposure, and applied to paper or labels its high luster is superior to finishes now in use, and in the field of wrappings for foodstuffs it is superior to wrappings now in use in regard to waterproofness and moisture-proofness. Other applications for this system of finishing will undoubtedly occur to those skilled in the art.

The resulting finish is a brilliant, highly reflecting surface with many desirable properties and is useful in replacing the so-called genuine type of patent leather which frequently has the objection of being quite tacky. The finish also serves on printed or otherwise decorated papers to furnish an exceptionally brilliant surface which serves as an attractive material for wrapping articles of all sorts, for the production of labels and other paper articles known to the art.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that we do not limit ourselves to the specific embodiments thereof except as defined in the following claims.

We claim:

1. In a flexible glazed paper product, a paper base having a lustrous finish comprising a non-brittle undercoat of thermoplastic cellulose derivative composition, and a top coat of fatty oil modified polyhydric alcohol-polybasic acid resin.

2. The product set forth in claim 1 in which the cellulose derivative is cellulose nitrate.

3. The product set forth in claim 1 in which the cellulose derivative is cellulose nitrate and

the resin is a China wood oil modified glyceryl phthalate resin.

4. A flexible sheet material product comprising a flexible fabric base having a lustrous finish comprising a non-brittle undercoat of cellulose nitrate-blown cotton seed oil composition, and a topcoat of fatty oil modified polyhydric alcohol-polybasic acid resin.

5. The product set forth in claim 4 in which the resin is a China wood oil modified glyceryl phthalate.

6. A process which comprises applying to paper a composition comprising cellulose nitrate, and sufficient softener to yield a non-brittle film, drying said coating, and applying a top-coating of fatty oil modified polyhydric alcohol-polybasic acid resin varnish.

7. A process which comprises applying to a base of flexible sheet material a composition comprising cellulose nitrate and blown cotton seed oil and volatile solvent, drying said coating, and applying a top-coating of fatty oil modified polyhydric alcohol-polybasic acid resin varnish.

8. A process which comprises applying to a flexible fabric base a composition of approximately the formula

	Percent
Cellulose nitrate	15
Blown cotton seed oil	23
Volatile solvent	62

drying said coating, and applying a top-coating of China wood oil modified polyhydric alcohol-polybasic acid resin varnish.

ALVA WAYNE BATEMAN.
RAYMOND EINNON THOMAS.