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## STAIN FILLER COMPOSITIONS AND PIGMENTED FILLERS THEREFOR

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4 Claims. (Cl. 260—30.2)

1

This invention relates to wood finishing. More particularly, it relates to a method of staining and filling wood. Still more particularly, it relates to a combined wood filler and stain and sealer compositions.

This application is a division of my co-pending application, Serial No. 97,329, filed June 4, 1949.

The conventional stain-fillers have been prepared whereby the steps of staining, applying a wash coat of shellac or the like, and then applying a filler, have been reduced to a single operation.

These stain-fillers have had a limited field of usefulness because of the filler material which it was necessary to incorporate.

The fillers have consisted of two types of suspendable inert materials, the neutral colored fillers such as asbestine, silica, silex wood flour or equivalent product and the colored particles such as activated charcoal, carbon black, burnt umber, iron oxide, burnt sienna and the like.

As far as applicant knows, no completely satisfactory filler composition for light woods, such as maple and bleached mahogany, has ever been produced for commercial use. For colors such as walnut, oak, and light and dark shades of mahogany, the various combinations of fillers have presented difficulties, because the stain-fillers exhibit a muddy appearance which detracts from the finish and obscures the beauty of the grain structure.

Another difficulty experienced with stain-fillers presently in use has been the slow drying of the compositions due to the slowness of the oils to set up and the tenacious manner in which the fillers hold solvents in the pores of the wood. This slowness in releasing solvent has meant a long drying period before the additional finishing steps of applying sanding sealer and cellulose surfacing material could be carried out without danger of blistering or pock marking the finish.

It is an object of this invention to provide coating compositions of the combined filler-stain type which overcome the disadvantages and difficulties associated with the use of prior stain fillers.

It is another object of the present invention to provide an improved combined stain and filler in which there is no oil.

A still further object of this invention is to provide an improved combined stain and filler of markedly reduced drying time.

Still another object of the present invention is to provide an improved combined stain-filler which regardless of color of the wood requires only one filler material.

2

Still another object of this invention is to provide a coating composition which does not have a filler distinguishable from the stain solution.

A still further object of this invention is to provide a stain filler which is of such uniformity of color as to be free from muddy appearance occasioned by different absorption of light by the various heterogeneous fillers.

Another object of the present invention is to provide a stain filler of uniform color and clearness which renders the liquid relatively transparent, thus allowing the true beauty of the grain of the wood to be apparent and developed.

Still other objects and advantages will appear to those skilled in this art as the description proceeds.

In carrying out the objects of this invention, a coating composition is prepared which consists basically of a non-aqueous solution of acid organic dyestuffs. The filler solution is of such a nature that it is itself dyed to the desired color in the dye solution, and the dye solution and suspended product is combined with suitable resins soluble in or compatible with the combination of dye solvent or solvents and thinner.

The preparation of the stain-filler is preferably carried out by diluting a solvent having the ability to dissolve resin and also to be a solvent for or compatible with solvents for acid organic dyestuffs with a thinner composed of a mixture of aromatic hydrocarbons and aliphatic alcohols of a low number of carbons. The dyestuff is dissolved and such components as fast drying resin, and if desired emulsifying agents, wetting agents, bodying agents, dispersing agents incorporated by thorough mixing.

To this solution is added a hydrated precipitated calcium silicate filler. This hydrated precipitated calcium silicate has the unique characteristic of assuming the color of the solution probably by absorption or adsorption of the dyestuff, Thus, it is not necessary to add dark colored pigments to camouflage white or light colored fillers of a color different from that of the stain.

It is at once apparent that this stain filler is simply prepared by mixing the ingredients in some good agitator, such as a pony mixer. Grinding on the cumbersome ball mill of a paste which must afterwards be thinned is entirely eliminated.

Elimination of this step is an important economic factor, inasmuch as the expense of a ball mill and the labor cost incidental to the operation, and the cleaning of such equipment is saved.

Another advantage of this filler is its low

solvent absorption characteristics. The hydrated precipitated calcium silicate absorbs one-twentieth as much solvent, as for example, wood flour, and therefore carries with it that much less solvent which must be released from the wood pores during drying.

The solvent vehicle for the stain filler is preferably a single solvent capable of dissolving both resin and dyestuff. This feature is not absolutely necessary, however, since the vehicle may be two or more compatible solvents having solvent power for one or the other of the basic constituents.

The solvents in which the acid organic dyestuffs are soluble are characterized by the hydroxyl group, which gives the product some water-like characteristic. Useful solvents having solvent power for both dyestuffs and resins are the carbitols, for example, diethylene glycol monoethyl ether, diethylene monobutyl ether, and the like, cellosolves such as ethylene glycol monoethyl ether, tetrahydrofurfuryl alcohol and equivalent higher alcohols.

Other solvents useful in various solvent combinations are the amino alkyl alcohols, such as methyl amino propanol, ethyl amino butanol and equivalent alcohols, also the cyclic alcohols, such as furfuryl alcohol, cyclohexanol, and the like.

Aromatic hydrocarbons useful in conjunction with the above solvents are toluol, xylol, aromatic naphthas, petroleum naphtha, and the like.

In addition, certain lower aliphatic alcohols may be used with these aromatics to form thinner compositions, such as methyl alcohol, propylene alcohol, butyl alcohol, and the like. Under certain circumstances additional compounds, such as acetates, ketones and the like, may be of such a nature as to be compatible in these mixtures.

Color is imparted to these stain-filler compositions by the use of dyestuff. Acid organic of aniline dyestuffs are utilized because they are very fast to light and are readily soluble in vehicles characterized by the hydroxyl group. Thus, for example, the following dyestuffs may be used alone or in combinations to produce almost any desired staining color: Buffalo Black NBR Conc. 126%, Black Stain B34951, Nigrosine 4523J Conc. Powder; the following yellow dyestuffs: Fast Wool Yellow 3GL Conc. 125%, Fast Light Yellow 3G Ex. Conc., Fast Light Yellow D3GA; the following orange-yellow dyestuffs: Metanil Yellow 1955, Calcocid Yellow MXXX Conc.; the following orange dyestuffs: Fast Light Orange 2G, Fast Light Orange GA Conc.; the following red dyestuffs: Azo Rubine Ex. Conc. 133% Calcocid Milling Red 7B Conc., Camoisine BA Extra Conc. CF, Chromolan Bordeaux R. Croceine Scarlet MOO.

Binder resins of the alkyd type are preferred because they exhibit excellent air drying qualities which is essential to a good stain filler. Other resins which may be used are the phenolic resins, the maleic resins, esterified resins or rosins, urea formaldehyde resins. An excellent example of fast drying resin is sold under the trade name of "Beckosol #1313," which is of the alkyd type referred to above, having a phthalic anhydride base.

The quantities of these basic constituents may be varied within reasonable limits depending upon the specific formulation. In general, it may be stated that a formulation including a diethylene glycol monoethyl ether may have the ether and filler vary from 5 to 100 parts by weight depending upon the thickness of stain filler desired.

The dye may constitute from 1 to 15 parts of the composition, while the resin content may constitute an additional 5 to 100 parts by weight, and the filler may vary from 10 to 120 parts by weight.

When a thinner mixture of, for example, methanol and toluol is used, the methanol may constitute 5 to 40 parts, while the toluol may vary from 10 to 30 parts, while the ratio of methanol to toluol seldom is less than 1 to 1, and preferably in the ratio of 2 parts of methanol for each part of toluol.

Additional substances which may be added to the stain filler to improve one or more characteristics are the aforementioned wetting agents, dispersing agents, and bodying agents.

Wetting agents such as morpholine, which is a secondary amine, or sulfonates and sulfates such as the sodium salt of alkyl naphthalene sulfonic acid (Darvan) and sodium heptadecyl sulfate (Tergitol #7) have been found to be most satisfactory.

Dispersing agents for the filler may be selected from such representative groups as the polyvinyl family, metal soaps and esters. Polyvinyl alcohol is preferred because it acts as a thickening agent for the stain composition as well as acting as a disperser. This compound may be used in proportions of 5 to 30 parts by weight of solution.

Other polyvinyl compounds such as polyvinyl acetate may, however, be used in its place.

Other dispersing agents which have been found useful are the metallic soaps, such as aluminum or magnesium stearate, aluminum naphthenates, sodium or ammonium methylacrylates.

Additional compounds that have been found useful are the modified polyhydric alcohol esters such as diglycol laurate, whose proper chemical name is diethylene glycol monolaurate.

These additional substances when added to stain filler form only a minor part of the composition. Thus, dispersing agents in general may vary from 0.1 part to 10 parts, which maximum of 10 seldom constitutes more than one-twentieth of the total weight.

Mixtures of the dispersing agents and bodying agents which are compatible in such mixtures are, for example, morpholine and polyvinyl alcohol (Darvan), polyvinyl acetate, aluminum stearate, and the like.

In the preparation of thinner compositions designed for spraying, the procedure for preparing a mixture is relatively simple.

The methanol and toluol are poured into a pony mixer. To this mixture is added the dye or combination of dyestuffs. The pony mixture is then agitated for a few minutes to wet the dyestuffs. The desired amount of methyl carbitol is then added and the pony mixer run until the dye solution is clear.

The resin, polyvinyl alcohol and, if desired, morpholine are then added and the mixture agitated for about ten minutes. To this dye and resin solution is then added the hydrated precipitated calcium silicate filler.

After a thorough agitation for a period such as ten minutes the mixture is ready to be applied to a wood surface to be stained.

In the following a few embodiments of the invention are illustrated by way of example without intending thereby to limit the invention thereto.

*Example I*

10 parts of toluol and 20 parts of methanol

were placed in the pony mixer, as explained above. Then in order there was added:

50 parts of diethylene glycol monomethyl ether
6 parts of red mahogany dye
40 parts air drying phthalic anhydride-glycerol resin (Beckosol #1313 EL)
15 parts of polyvinyl alcohol, low viscosity type A
10 parts of morpholine
20 parts of hydrated precipitated calcium silicate

This composition was sprayed on to the surface of wood, allowed to dry for 2 minutes, and the excess material wiped from the surface of the wood.

After 8 minutes of drying the wood surface was in excellent condition for the sanding sealer treatment.

*Example II*

The following composition was prepared as explained above, with the ingredients being added in the order listed:

10 parts toluol
15 parts methanol
4 parts croceine orange
2 parts scarlet red moo
3.5 parts Buffalo black
50 parts methyl carbitol
30 parts phthalic acid base alkyd resin
10 parts polyvinyl alcohol
10 parts aluminum stearate
5 parts morpholine
30 parts hydrated precipitated calcium silicate

This composition, like the composition of Example I, dried within 10 minutes to a clear surface, allowing the grain structure of the wood to show through unclouded by any muddiness.

It will be understood that while there have been given herein certain specific examples of the practice of this invention, it is not intended thereby to have this invention limited to or circumscribed by the specific details of materials, proportions, or conditions herein specified, in view of the fact that this invention may be modified according to individual preference or conditions without necessarily departing from the spirit of this disclosure and the scope of the appended claims.

I claim:

1. In a method of staining and filling wood, the steps of applying to a wood base a solution-suspension consisting of 50 parts of diethylene glycol monomethyl ether, 6 parts of acid organic dyestuff in solution in said ether; 40 parts by weight of an air drying resin selected from the group consisting of phthalic anhydride-glycerol resin, and ureaformaldehyde resin in solution in said ether; 20 parts by weight of hydrated precipitated calcium silicate; 10 parts by weight of morpholine; 15 parts by weight of polyvinyl alcohol; 10 parts by weight of toluol; drying for approximately 2 minutes; and thereafter mechanically removing any excess material after said predetermined period of contact with the wood.

2. A combined wood stain and filler in the form of a solution-suspension consisting of diethylene glycol monomethyl ether, acid organic dyestuff dissolved in said ether, an air drying resin selected from the group consisting of phthalic anhydride-glycerol resin and ureaformaldehyde resin in solution in said solvent base, a hydrated precipitated calcium silicate and polyvinyl alcohol.

3. A combined wood stain and filler consisting essentially of, in parts by weight, 10 parts of toluol, 20 parts of methanol, 50 parts diethylene glycol monomethyl ether, 6 parts of red mahogany dye, 40 parts air drying phthalic anhydride-glycerol resin, 15 parts of low viscosity polyvinyl alcohol, 10 parts of morpholine, and 20 parts of hydrated precipitated calcium silicate.

4. A combined wood stain and filler consisting essentially of, in parts by weight, 10 parts of toluol, 15 parts of methanol, 4 parts of croceine orange, 2 parts of scarlet red moo, 3.5 parts of Buffalo black, 50 parts of diethylene glycol monomethyl ether, 30 parts phthalic acid anhydride glycerol resin, 10 parts of polyvinyl alcohol, 10 parts of aluminum stearate, 5 parts morpholine and 30 parts of hydrated precipitated calcium silicate.

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