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AQUEOUS EMULSION PAINT

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This invention relates to an improvement in the art of manufacturing colored emulsion paints, sometimes referred to as resin emulsion paints, and more particularly to a paint which is uniform in color and free from streaking and blotching when applied to ordinary surfaces.

It is the purpose of this invention to produce a colored emulsion paint which is substantially free from blotching and streaking when applied in thin film form, particularly to surfaces which are high in absorption such as plasterboard or a lime putty finish.

It is well known that colored emulsion paints, such as those made using alkyd resins, as well as other film forming materials, will sometimes show differences in color when applied over surfaces exhibiting different degrees of "suction" in various areas, though the paint itself is uniform; and in addition, these paints often show differences of color as streaks along the path of the brush when the paint is applied over such surfaces. When a painted surface exhibits either brush streaks or blotches a very undesirable condition exists which is a consistent cause for complaint in the field. Unfortunately, repainting the non-uniform colored surface does not always result in an improvement of the surface, but in many cases magnifies the difficulty. The exact cause of these conditions is not known but it is believed due to irregular absorption of the surface.

In the description of this invention the term "blotching" is defined to mean the variation in shade in localized areas different from the field color when the same shade of paint is used throughout, and where such difference is not accounted for by a corresponding difference in color of the surface being painted. Also, by the term "streaking" is mean the color variation which follows the path of the brush strokes in parallel lines like the ridges and depressions following the brush though there may not be such ridges and depressions.

This difficulty of streaking and blotching can be overcome by first thoroughly sealing or priming the surface with a varnish type of surfacing material. This treatment is expensive when applied only for this purpose as in general it is not ordinarily needed to accomplish any other purpose. In fact, many of the walls to which an emulsion paint is to be applied are "green" and hence cannot be properly sized until dry. One of the outstanding advantages of an aqueous emulsion paint is that it can be applied to green walls without previous drying, and to dry and size the wall so that it can be painted would be doing away with one of the big advantages in using this type of paint.

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It has been discovered that by the simple addition of certain materials this difficulty of streaking and blotching can be practically completely eliminated. Thus if difficulty of this type is encountered in actual field application, it can be overcome merely by mixing a small quantity of the inhibiting material into the paint.

The materials that accomplish the purpose of this invention were obtained as a result of a great number of trials using various types of materials. No predictions arising out of knowledge commonly known to those skilled in the art could be made. No explanations can be made as to why only certain few materials will work satisfactorily while a great range of other materials will not. Numerous theories were considered, but no data to support them could be evolved.

Only a very limited number of materials can be used for the purpose. One class of materials which has been found satisfactory is certain fatty acid esters of polyethylene glycols. The use of this class of materials to prevent streaking and blotching in colored emulsion paints is the subject of a copending application Serial No. 523,581 of one of the joint inventors of this application.

Another class of materials, which has been found satisfactory is the lower saturated aliphatic alcohols of from 3 to 5 inclusive carbon atoms, except isopropyl, tertiary butyl and tertiary amyl alcohol. Diacetone alcohol is also effective. The above are the only known materials which will give commercial satisfaction in overcoming the disadvantages of streaking and blotching. The use of these alcohols is the subject of this invention.

In carrying out this invention, it is preferred to add the material to the paint during its formulation as a more complete and accurate intermixing can be accomplished; though it is within the scope of this invention, and sometimes necessary, to add the alcohols to the paint in the field. For purpose of illustrating the preferred method of carrying out this invention in the following example, the material will be added during formulation.

The following example clearly describes a paint composition which but for the inhibiting material incorporated therein will show pronounced streaking and blotching when applied to many types of surfaces.

Emulsion

	Pounds
Ester gum-linseed oil binder	166
6% cobalt drier	8
Casein solution, 20% solids	340

Paste paint

	Pounds
Emulsion	514.0
Phthalocyanine blue	31.6
Cadmium yellow	31.6
Bone black	4.75
Titanium dioxide	900
Pine oil	25
Fine Mica	60
Water approximately	350
Fusel oil	35 to 70

The ester gum-linseed oil binder is prepared by heating to a temperature of 580 degrees F. for about one hour, 41.5 lbs. of ester gum with 124.5 lbs. of heat bodied linseed oil. The cobalt drier is then added. The drier can be of the naphthenate type. This mixture, while in liquid form, is emulsified, by any of the well known methods of preparing an emulsion, with the casein solution to form a binder. Most any type of casein solution can be used. A suitable casein solution is one which is described in U. S. Patent No. 2,154,362. This can be used to advantage as it is stable for a considerable length of time to deterioration due to aging. However, the preparation of casein or other protein solutions using alkalies such as borax for use in emulsion paints is well established in the art and a detailed description of a procedure for making them need not be included in the description of this invention.

For the sake of conveience for those who may not be familiar with this art and with U. S. Patent No. 2,154,362, the following procedure, which is based upon the above patent, can be used in preparing a casein solution. Following this patent the casein solution can be prepared by mixing 55 lbs. of commercial casein with 24 gallons of water with thorough stirring for a sufficient length of time until a smooth mixture of thoroughly soaked casein results. About 3 pounds and 6½ ounces of sodium stannate are dissolved in about 3½ gallons of water, while in a separate container about 10 lbs. of borax are likewise dissolved in about 2½ gallons of hot water. The sodium stannate solution is then added to the casein mixture, with constant agitation, and as soon as all of it has been added, the borax solution is then run into the mixture. An additional amount of, say, 3 gallons of water may then be added and the mixing continued while heating the mixture gradually to about 150 to 160 degrees F. or higher. The mixing is continued at the desired temperature until a smooth solution results. Using the proportion above given, the solution will be found to exhibit an alkaline reaction equivalent to from about pH 8.0 to pH 9.0. The ratio of casein to sodium stannate in the above formula is substantially 100:6.2. The sodium stannate used has the folowing formula: $Na_2SnO_3.3H_2O$. While casein is the preferred type of protein, other proteins may be used including those derived from vegetable sources, such as alpha protein derived from soya beans.

When the emulsion has been prepared, using additional water if necessary, the dry pigments

and other ingredients are added and mixed in a suitable type of mixer. The fusel oil is preferably added last. While fusel oil is used in the above preferred example, it is not intended to limit this invention to this particular material for other alcohols can be used, as will be more clearly described later.

After the fusel oil has been added and the mixing operation has been completed, the paste is then passed through a roller mill to insure complete dispersion of the pigments into the vehicle and to form a paint completely free from lumps.

Various types of pigments, fillers and other finely divided inorganic material can be used in the preparation of paints which can be benefited by this invention. However, it is necessary that some coloring material be present as streaking and blotching have not been observed to any great extent in white paints. Since water is the thinner, it is possible to use a wide variety of low index of refraction materials such as clays, mica, etc., known in the trade as fillers or extenders to replace a certain amount of the more expensive higher index of refraction materials, known as pigments, such as lithopone and titanium dioxide, as required in an oil type of paint. Since both types of material can be used, in order to define these two types of material generically, the word "pigment-fillers" will be used in the forthcoming claims.

Paint prepared in the above manner will not exhibit the streaking and blotching effects commonly associated with emulsion paints. This is done without any sacrifice in the desirable properties of this type of material and with only a slight increase in cost.

If the paint has already been prepared, and streaking and blotching are encountered, then about 4 to 8 ounces of fusel oil can be added per gallon. It may be expedient in many cases not to add the inhibiting material until actual trouble is experienced as the difficulty is only occasionally encountered. Amounts as low as one ounce per gallon have been found effective in some cases.

It is not the intention to limit this invention to the preferred embodiment set forth above for other saturated aliphatic alcohols having 3 to 5 carbon atoms per molecule can be used as well as diacetone alcohol. However, it has been found that isopropyl, tertiary butyl and tertiary amyl alcohols for some unexplainable reason are unsatisfactory for carrying out the principles of this invention, though their presence does not interfere with the effectiveness of the other alcohols to any great extent. Examples of saturated aliphatic alcohols which can be used, including those of 3 to 5 carbon atoms per molecule, are:

Propanol—1	Pentanol—3
Butanol—1	2 methyl butanol—1
Butanol—2	3 methyl butanol—1
2 methyl propanol—1	3 methyl butanol—2
Pentanol—1	2-2 dimethyl propanol—1
Pentanol—2	Diacetone alcohol

Obviously each alcohol will require a different amount to be added in order to give the same results. This can be readily determined by those skilled in the art of which this invention is a part. If, for the sake of economy, it is not required to find the exact minimum to be used, and still obtain good results, then the maximum amounts specified in the description of this invention. i. e., about 8 oz. per gallon, will be found

effective in each case in inhibiting streaking and blotching.

It is not necessary that chemically pure alcohols be used for mixtures of the various ones listed above or with other materials are satisfactory as long as no deleterious effect upon the paint is encountered. The regular commercial grades of alcohols will be satisfactory. Commercial fusel oil, which contains a large proportion of an optically active isomer of amyl alcohol, has been found to be effective.

In the above example a mixture of ester gum and heat bodied linseed oil is used. It is not the intention to limit this invention to any of the ingredients used in the preferred embodiment set forth, for any water resistant film forming substance which will have utility in a colored emulsion paint may be used. It is not necessary that the material be a resin, though most of the emulsion paints in common use contain a resinous or polymerizable material, usually oleoresinous. Examples of some of the materials which can be incorporated are: treated or untreated oils having drying properties, alkyd resins, phenol formaldehyde resins, the various esters of rosin, synthetic and natural resins, such as congo gum, copal gum and manila gum. These can be used alone, in combination, or with solvents; the particular manner in which they are used as well as the addition of other materials such as driers and the like are all within the skill of the art of which this invention is a part and need not be further described.

While it is preferred to use casein or some other protein material, such as Alpha protein derived from soya beans, as the emulsifying agent, it is not the intention to limit this invention thereby, for other emulsifying agents which are compatible can be employed. The volatile alkali soaps are especially suitable for the purpose.

It will be found that paints prepared in accordance with the principle set forth in this invention can be applied over practically any surface without the danger of forming an appreciable amount of streaks or blotches. A uniform film will be obtained. Water paints applied over a lime putty finish and over wallboard are particularly liable to give trouble, yet no difficulty will be encountered if the paint is prepared following the principles set forth in this invention.

By way of summary this invention pertains to the prevention of color blotching and streaking in a colored aqueous emulsion paint by incorporating therein diacetone alcohol or a saturated aliphatic alcohol of from 3 to 5, inclusive, carbon atoms per molecule excepting isopropyl, tertiary butyl and tertiary amyl alcohols. The non-aqueous vehicle may consist of oils, varnishes, natural and synthetic resins or other water insoluble film forming material; these are preferably emulsified by the use of casein or similar materials.

Although there has been disclosed a practical embodiment of this invention and specific examples and uses, which are given to insure a clear understanding of the essence of this invention, it is not the intention to be limited thereby for obviously many variations may be made by those skilled in the art and still be within the scope of this invention which is only limited in extent by the forthcoming claims.

It is claimed:

1. A non-streaking, non-blotching, aqueous emulsion paint comprising a protein selected from the group consisting of casein and alkali dispersible vegetable protein derived from soybeans, a solvent for said proteins, water, a water insoluble film forming material, colored pigment and a streaking and blotching inhibiting material selected from the group consisting of:

Propanol—1	Pentanol—3
Butanol—1	2 methyl butanol—1
Butanol—2	3 methyl butanol—1
2 methyl propanol—1	3 methyl butanol—2
Pentanol—1	2-2 dimethyl propanol—1
Pentanol—2	Diacetone alcohol

2. The composition of claim 1 in which said water insoluble film forming material is an oil having drying properties.

3. The composition of claim 1 in which said water insoluble film forming material is a resinous material selected from the group consisting of synthetic resins and natural resins, and a solvent for said resin.

4. The composition of claim 1 in which said water insoluble film forming material is an ester of resin acids.

5. A non-streaking, non-blotching, colored, aqueous emulsion paint comprising a protein selected from the group consisting of casein and an alkali dispersible vegetable protein derived from soybeans, an alkaline solvent for said protein, water, a water insoluble film forming material, pigment-fillers at least one of which is colored, and an alcohol selected from the group consisting of:

Propanol—1	Pentanol—3
Butanol—1	2 methyl butanol—1
Butanol—2	3 methyl butanol—1
2 methyl propanol—1	3 methyl butanol—2
Pentanol—1	2-2 dimethyl propanol—1
Pentanol—2	Diacetone alcohol

6. The composition of claim 5 in which from about 1 to about 8 ounces of said alcohol is used to each gallon of said aqueous emulsion paint.

7. The composition of claim 5 in which said alcohol is commercial amyl alcohol.

8. The composition of claim 5 in which said alcohol is commercial butyl alcohol.

9. The composition of claim 5 in which said alcohol is diacetone alcohol.

10. An aqueous emulsion paint substantially free from streaking and blotching comprising a water insoluble film forming oleoresinous binder comprising the product resulting from heating an oil having drying properties with a resin selected from the group consisting of synthetic resins and natural resins, an emulsifying agent comprising a protein selected from the group consisting of casein and alkali dispersible vegetable protein derived from soybean, an alkaline solvent for said protein, water, pigment-fillers, at least one of which is colored, and an alcohol selected from the group consisting of:

Propanol—1	Pentanol—3
Butanol—1	2 methyl butanol—1
Butanol—2	3 methyl butanol—1
2 methyl propanol—1	3 methyl butanol—2
Pentanol—1	2-2 dimethyl propanol—1
Pentanol—2	Diacetone alcohol

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