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PRODUCTION OF METALLIC PIGMENT PASTE

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8 Claims. (Cl. 134—76)

This invention relates to the production of metallic pigments in a form convenient for mixing with the desired vehicle, which effects a more efficient covering power of the metal powder, and eliminates the "dusting" nuisance of metallic pigments in their customary powdered state.

So-called "bronze powders" consist of minute metallic particles in flake form, this shape giving the greatest covering and leafing properties. These powders vary in size of particles from about 200 to 325 per inch. Such fine powders dust easily into the air, are troublesome to handle, and difficult to wet.

I have found that a powder of this character may conveniently be made into the form of a paste by mixing with it a solvent of the vehicle it is desired to employ, in which condition, the dusting property is eliminated and the pigment mixes readily with the vehicle. Furthermore, the leafing powder of the powder in the form of paste is greatly increased over that exhibited by the dry powder.

The leafing or covering powder of the pigment is increased by the present invention because the metallic particles are completely separated from each other by the solvent which is used to form the paste. This makes it easier to obtain a uniform distribution of the metallic particles throughout the viscous vehicle of the paint, lacquer, varnish or other type of protective coating. A more completely effective use of the metallic particles, as pigment, may thus be obtained.

Metallic powders in contact with organic liquids usually accelerate decomposition of such liquids. Metallic pigments are therefore not mixed with their vehicles until immediately before use in order to minimize such decomposition. Whilst this decomposition is more marked with the entire vehicle, decomposition also occurs with the solvent alone, especially with such organic liquids as petroleum hydrocarbons, which are frequently used as diluents of vehicles for metallic pigments. This is so when these solvents contain small amounts of impurities such as sulphur and/or nitrogenous compounds. The decomposition of the solvent (the term solvent being employed in the specification to designate the pure hydrocarbon with the impurities contained therein) has a deleterious effect upon the brilliancy covering power and leafing quality of the metallic powder.

It is, therefore, a further object of the present invention to stabilize pastes or mixtures of metallic powders with hydrocarbon solvents. In accordance with the present invention stabilization is attained by adding to the mixtures of metallic powders with such solvents, small amounts of materials which prevent decomposition of the solvents.

The specific solvent employed for forming the paste of the present invention will depend in any instance upon the vehicle with which the paste is to be used.

For example, in case of varnish it may be "varnolene" a petroleum fraction, or toluene or xylene or high flash solvent naphtha (boiling between 150 and 200 deg. C.) coal tar fractions, or tetrahydronaphthalene, a liquid synthetic product of about the same boiling point. In each instance, however, the solvent employed is a solvent of the vehicle with which the pigment is to be applied, and usually constitutes at least part of the diluent of the vehicle. Simple mixtures of the metallic powder with an organic liquid are likely to separate into layers of greater and lesser concentration, so the paste will lack homogeneity. This is true even of pastes containing as much as 65% metallic powder. To prevent such a separation, thickening agents which form true colloidal sols with the liquid are employed. Such agents effectively maintain the initial homogeneity of the paste.

In accordance with one example of carrying out the present invention the metallic powder is mechanically mixed with the solvent in which there has previously been dissolved an alkaline salt of a weak acid, such as anhydrous sodium stearate, sodium oleate, powdered anhydrous sodium silicate, sodium acetate, sodium butyrate and the like. Such neutral salts or soaps will react with acids which are formed by the decomposition of the solvent present in the paste, thus preventing these acids from effecting further decomposition. The reaction of the neutral salt with the acids formed in the decomposition liberates a very weak acid, such as stearic acid or silicic acid, which has no deleterious effect on the paste. Other substances which combine with impurities, such as camphor, may be used. Camphor forms combinations with certain sulphur compounds, removing the latter from contact with the metal. In addition, camphor, like naphthalene, is a volatile solid, and sublimes completely from films containing it.

As a specific example of carrying out the present invention, 32½ grams of polished aluminum powder are mixed mechanically with 17½ grams of "varnolene" in which was previously dissolved 0.05 of a gram of anhydrous sodium stearate, or sodium oleate. It should be noted that the amount of anhydrous sodium stearate or oleate is far in excess of the equivalent quantity of injurious acids which might potentially be formed by the decomposition of impurities contained in the solvent. The amount of anhydrous sodium stearate or oleate constitutes three-tenths of one percent (.3%).

Owing to the fact that commercial varolene contains only traces of sulphurous and nitrogenous impurities, this amount of anhydrous sodium stearate or oleate will be far in excess of the amount necessary to react completely with the sulphurous or nitrogenous acids formed.

As an alternate example the same quantity of powder may be mixed with 17½ grams "varnolene" together with 0.05 of a gram of powdered anhydrous sodium silicate, sodium acetate or sodium butyrate.

In another example of carrying out the present invention the stabilizing agents employed may be alkaline organic amino compounds or derivatives, such as aniline, di-methyl aniline, dimethyl amine and the like. Specifically, 32½ grams of polished aluminum powder are mixed with 17½ grams "varolene" containing 0.05 of a gram of di-methyl aniline in solution. The alkaline organic amino compounds used in accordance with the present example serve to neutralize the acids formed and thereby prevent their deleterious effect on the paste.

A further object of the present invention is to maintain uniformity of the paste and to avoid separation of the same into a more fluid phase and a less fluid phase. For this purpose I employ dispersing agents such as small quantities of substances which dissolve in the liquid to form colloidal sols, such as metallic stearates. I prefer such dispersing agents to be neutral materials, such as, aluminum stearate, calcium stearate, and similar materials.

As an example of the use of a dispersing agent, 40 grams polished aluminum powder are mixed with 22 grams of a warm solution made as follows: 200 grams varnolene, 4 grams sodium stearate.

I have found that some substances added to the liquid used in the production of a paste will enhance the leafing power of such a paste. Agents which effect such an increase in leafing power are characterized by being either aromatic hydrocarbons, such as xylene, high flash solvent naphtha, tetrahydro naphthalene or take the form of complicated aromatic ketones, such as camphor. The addition of 10% camphor to "varnolene" (a petroleum fraction boiling at about 160 to 180 deg. C.) increases the leafing power of the paste made therewith from 10 to 20% above that made with varnolene alone.

For example, I prepared a liquid as follows: 90 gms. of varnolene and 10 gms. gum camphor were heated together until the camphor was dissolved. 1 gm. of aluminum stearate and 3 gms. of stearic acid were then added and the mixture heated until a complete solution of the stearate was obtained. After cooling to room temperature, pastes made by mixing 35 gms. of this liquid with 65 gms. of aluminum powder showed 20% greater leafing power than that obtained in the same manner but without the camphor.

I have described what I believe to be the best embodiments of my invention. I do not wish, however, to be confined to the embodiments described, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. Metallic pigment paste consisting of a paste formed of metallic powder mixed with a hydrocarbon solvent for vehicles used in protective coatings the solvent being of a type which will develop acidity upon admixture with such powder and a stabilizing agent for reacting with acids formed by the decomposition of the solvent by the powder to liberate a very weak acid having no deleterious effect on the paste, said stabilizing agent consisting of an anhydrous alkali metal salt of fatty acid of low molecular weight.

2. Metallic pigment paste consisting of a paste formed of metallic powder mixed with a hydrocarbon solvent for vehicles used in protective coatings, said solvent containing impurities which form weak acids containing sulphur or nitrogen upon admixture of such solvent with such powder, said acids having an injurious effect on the leafing power of the pigment, and an agent for reacting with said weak acids to form either neutral or basic salts, and thereby preventing such acids from having a deleterious effect on the paste, the quantity of such agent being an equivalent of said injurious acids, which might potentially be formed by said decomposition of the impurities contained in the solvent, said agent comprising di-methyl aniline.

3. Metallic pigment paste consisting of a paste formed of metallic powder mixed with a hydrocarbon solvent for vehicles used in protective coatings, said solvent containing impurities which form weak acids containing sulphur or nitrogen upon admixture of such solvent with such powder, said acids having an injurious effect on the leafing power of the pigment, and an agent for reacting with said weak acids to form either neutral or basic salts, and thereby preventing such acids from having a deleterious effect on the paste, the quantity of such agent being an equivalent of said injurious acids, which might potentially be formed by said decomposition of the impurities contained in the solvent, said agent comprising di-methyl amine.

4. A method for the production of metal pigment paste having improved persistence of leafing power, which comprises incorporating in said paste an alkaline organic amino compound.

5. A stabilized metal pigment paste having improved persistence of leafing power, comprising metal flakes, a higher fatty acid, and an alkaline organic amino compound as stabilizing agent.

6. A stabilized metal pigment composition having improved leafing power comprising polished, leafable metal flakes dispersed in a hydrocarbon oil paint thinner which contains a secondary alkyl amine having the property of stabilizing and prolonging the leafing power of the pigment composition.

7. A stabilized metal pigment composition having improved leafing power comprising polished, leafable metal flakes dispersed in a hydrocarbon thinner which contains an alkaline organic amino compound having the property of stabilizing and prolonging the leafing power of the pigment composition.

8. A stabilized metal pigment paste having improved persistence of leafing power, comprising metal flakes, a higher fatty acid, a hydrocarbon thinner and an alkaline organic compound having the property of stabilizing and prolonging the leafing power of the paste, such agent being chosen from the group consisting of an alkaline organic amino compound and an anhydrous alkali salt of a fatty acid of low molecular weight.

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CERTIFICATE OF CORRECTION.

Patent No. 2,234,164. March 11, 1941.

CLARENCE P. HARRIS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 21 first occurrence, and line 24, for the word "powder" read --power--; page 2, first column, line 1, for "varolene" read --varnolene--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of May, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)