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PAINT VEHICLE FOR FLAKED PIGMENTS

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This invention relates to coating compositions, and more particularly to improved coating compositions having pigments which are flake-like in shape, such as flake aluminum, finely divided metal foil, etc.

Paints intended to give the appearance of metal to the article being coated have been known for some time. Very good imitations of a metallic surface have been made by dispersing certain pigments which are flake-like in shape and which have a metallic lustre, in the proper type of vehicle. Among these pigments, aluminum in flake form has probably been the most extensively used.

The vehicles, for the most part, which have been used in the manufacture of these coating compositions are the gum solutions or so-called "bronzing liquids", oleo resinous varnishes, and bodied drying oils containing no gum.

Certain lacquer vehicles containing nitrocellulose or synthetic resins of the phenol-formaldehyde type, have been used, but for the most part they are expensive and are difficult to apply and do not have the desired durability.

Proper adjustment of the constituents of the vehicles made from these materials will give films satisfactory in appearance. The durability of any of these coating compositions is satisfactory for many purposes where initial decorative value is the main consideration. Good durability can be secured from vehicles already known only in the case of those which dry relatively slowly, such as the long oil varnishes and the bodied oil. Even these films have rather poor resistance to the action of gasoline and oils with which they are likely to be brought into contact.

The physical properties of the vehicle, to a marked degree, influence the behavior of the metallic flakes suspended in it. When these flakes are dispersed in the proper type of vehicle, the surface tension relations of the substances involved are such that the flakes at and near the surface become orientated so that their plane of greatest cross section lies practically parallel to the plane of the surface of the liquid. This phenomenon is known as "leafing". Since the metallic flakes overlap, the surface which is presented to the weather is largely a surface of the metal itself and the resulting film has exceptionally good durability since the binder is protected from the action of the weather by a nearly continuous layer of metal. Leafing, therefore, is essential to maximum durability.

The nature of the binder is also a very important factor in securing satisfactory durability. It must, in itself, be chemically stable and resistant to the action of the weather in order that the flakes may be held firmly in place and continue to furnish protection.

In order that coating compositions containing flaked pigments may be applied efficiently, they must dry rapidly, and the film must be hard enough to resist abrasion and at the same time be somewhat flexible. These qualities must be secured without sacrificing leafing properties.

Oil and varnish compositions, such as mentioned, are deficient, either in the matter of drying or in durability. Leafing, in the case of varnish compositions, is usually good enough to yield films having the desired decorative effect but which are deficient in durability. In the case of untreated drying oils, leafing is not satisfactory. Synthetic resinous coating compositions which has been tried heretofore have also been unsatisfactory from this last standpoint.

Numerous other disadvantages are connected with the use of these oil and varnish compositions. In the case of those which contain relatively large amounts of oil, the films are apt to dry slowly and remain soft on the surface next to the article being coated, for extended periods of time. This is due to the fact that the impermeability of the surface film which is formed by the leafing of the metal particles is so great, that oxygen reaches the lower part of the film only very slowly. This defect cannot be corrected by the selection of high boiling point solvents for the purpose of conferring improved drying properties to the film, because of the fact that the solvent is trapped beneath this impermeable film. In order to secure fast drying the quantity of oil must be diminished, and in the case of many of those compositions containing relatively small amounts of oil, the set-up of the film is so rapid that the leafing process does not have time to take place. Such vehicles have, in addition, a tendency to be brittle and in general possess in themselves poor durability.

This invention has as an object the preparation of coating compositions from flaked pigments which shall leaf properly in order to give the desired decorative effect and which shall yield films having superior durability.

Another object is the preparation of coating compositions from metal flakes, or other flake-like pigments which shall dry with a speed comparable to that of the so-called "bronzing liquids" and which shall have, at the same time, durability when exposed to the action of the weather equal or superior to that of the compositions made

from bodied oils and long oil oleo-resinous varnishes.

Another object is to prepare coating compositions which shall have in addition to the above properties, superior resistance to gasoline and similar materials with which the film is likely to come into contact.

A further object is to prepare coating compositions having superior heat resistant qualities.

These objects are accomplished by using as a vehicle for pigments such as those described, a solution of an oil modified polyhydric alcohol-polybasic acid resin containing appropriate driers. Resins suitable for the purposes of the present invention, compositions of which are expressed in terms of reacting ingredients, are given by the following samples:

Example 1

Phthalic anhydride	39.55
Linseed oil acids	27.50
Glycerol	19.10
China wood oil	13.85
	100.00

This resin is prepared by heating the foregoing ingredients in a varnish kettle at 440 degrees Fahrenheit for about 4½ hours, after which time the product should have an acid number of about 35. This material is then cut while still hot in 90.3 parts of Hi-flash naphtha and the solution so obtained should have a viscosity from about 10 to about 20 poises. The uncut resin will be a very viscous semi-solid mass, light brown in color.

In order to make a satisfactory vehicle for flake aluminum, this solution is still further thinned and driers added as follows: To 63 parts of the above solution are added 3 parts of liquid cobalt drier and 34 parts of toluol. This solution should have a specific gravity of about .90. When flake aluminum is added to this in the amount of 1½ to 2½ pounds per gallon, the paint is then ready for application. The composition dries with a rapidity equal to that of the so-called "bronzing liquids", giving a film of equal or superior hardness and one which is not thermoplastic as the films laid down from the bronzing liquids usually are. The resistance of this film to the action of the weather will be equal or superior to that of coating materials made from the bodied oils or oleo-resinous varnishes, and the gasoline resistance will be definitely superior.

Example 2

Phthalic anhydride	37.4
Linseed oil acids	31.1
China-wood oil	12.9
Glycerol	18.6
	100.0

This resin is made in a similar way to that of Example 1. It is held at 440 degrees F. for six hours, after which time it has an acid number of about 37, and a sample when cooled will be a very viscous semi-solid mass. This material is cut while it is still hot with 53.5 parts of Hi-flash naphtha and 53.7 parts of mineral spirits. The resulting solution will have a viscosity from about 10 to about 20 poises. When thinned and appropriate drier added, as was done with the resin in Example 1, it may be used in the same way as the resin of Example 1 as a vehicle for aluminum or other flake-like pigments. The coating compositions made from this resin are somewhat more flexible than those made as described in Example 1.

Although the above examples are limited to the use of linseed oil acids and China-wood oil, the acids of other drying oils such as those obtained from soya bean or sardine oil, may be used, and the resin may also be prepared from the oils themselves without the use of oil acids as set forth in the copending application of Paul Robinson, Serial No. 370,727, filed June 13, 1929. As indicated in the examples, the preferred polyhydric alcohol is glycerol and the preferred polybasic acid is phthalic anhydride. Other polyhydric alcohols, and other polybasic acids known to those skilled in the art to be useful for making the type of resin disclosed herein, may, however, be used. It is to be understood also that small amounts of other polyhydric alcohols, such as ethylene glycol, may be substituted for part of the glycerol and monohydric alcohols may be added if desired.

It is to be further understood that rosin or other natural gum may be added in small amounts if desired, either in the process of making the resin or during the thinning operations. Reduction in viscosity of the solution at a given solids content may be secured by this means.

In order to confer special properties, such as increased hardness, quicker drying, etc. upon these compositions, the proportions of the various ingredients may be varied at will to obtain the desired characteristics in the film.

Any of the driers commonly used in such resinous coating materials may be employed. Any of the common thinners in which such resins are soluble may be substituted for the naphtha or mineral spirits.

Our improved vehicle, because of its hard and rapid drying, its excellent leafing properties, flexibility and durability, is especially advantageous when used in connection with flake pigments as compared to vehicles such as the oil type, varnish type, nitrocellulose and synthetic resins of the phenol-formaldehyde type.

Of the flaked metal pigments heretofore mentioned, it is preferred to use flaked aluminum. Among the suitable non-metallic flaked pigments are certain sulfide pigments, graphite and finely divided mica. The flake-like pigments may, if desired, be coated with certain substances such as stearic acid, which are known to those skilled in the art of their manufacture to enhance leafing properties.

The advantages of these coating compositions over those already known are as follows: In addition to possessing satisfactory leafing properties they dry with a speed equal to that of those made from non-durable bronzing liquids and they have a durability equal or superior to that of those made from slow drying but durable bodied oil and oleo-resinous varnishes. Our improved coating compositions also have a gasoline resistance superior to that of the more durable compositions known in prior art. They are also superior in heat resistance to compositions now in common use.

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 appended claims.

We claim:

1. A coating composition comprising flaked

aluminum pigment, a drier and a solution in a volatile solvent of an oil modified polyhydric alcoholic-polybasic acid resin.

2. A coating composition comprising a flaked pigment, a drier and a solution in a volatile solvent of an oil modified polyhydric alcohol-polybasic acid resin, said solution having a specific gravity of about .90, said resin being one which when dissolved in from about 90.3 to 107.2 parts by weight of Hi-flash naphtha gives a solution having a viscosity from about 10 to about 20 poises.

3. A coating composition comprising flaked aluminum pigment, a drier and a solution in a volatile solvent of an oil modified polyhydric alcohol-polybasic acid resin, said solution having a specific gravity of about .90, said resin being one which when dissolved in from about 90.3 to 107.2 parts by weight of Hi-flash naphtha gives a solution having a viscosity from about 10 to about 20 poises.

4. The coating composition of claim 1 in which the polyhydric alcohol is glycerol and the polybasic acid is phthalic anhydride.

5. The coating composition of claim 2 in which the polyhydric alcohol is glycerol and the polybasic acid is phthalic anhydride.

6. The coating composition of claim 3 in which the polyhydric alcohol is glycerol and the polybasic acid is phthalic anhydride.

7. A process of manufacturing a coating composition which comprises dissolving in a thinner an oil modified polyhydric alcohol-polybasic acid resin in the ratio of about 90.3 to 107.2 parts by weight of thinner to 100 parts by weight of resin and thereby obtaining a solution having a viscosity from about 10 poises to 20 poises, incorporating drier into the solution, diluting the solution to a specific gravity of about 0.90, and incorporating flaked pigment into the solution.

8. A process of manufacturing a coating composition which comprises dissolving in a thinner an oil modified glyceryl phthalate resin in the ratio of about 90.3 to 107.2 parts by weight of thinner to 100 parts by weight of resin and thereby obtaining a solution having a viscosity from about 10 poises to 20 poises, incorporating drier into the solution, diluting the solution to a specific gravity of about 0.90, and incorporating flaked aluminum into said solution in the ratio of about 1½ to 2½ pounds of aluminum flake to one gallon of solution.

9. A coating composition comprising a flaked pigment, a drier and a solution in volatile solvent of the resinous reaction product of a polyhydric alcohol, polybasic acid, and at least one modifying agent of the group consisting of drying oils and drying oil acids, said flaked pigment being selected from the class consisting of flaked metal pigments, flaked sulfide pigments, flaked graphite pigments, and flaked mica pigments.

10. The coating composition set forth in claim 9 in which the polyhydric alcohol is glycerol and the polybasic acid is phthalic anhydride.

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