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ALUMINUM BRONZE CONTAINING COMPOSITIONS

Dean Murphy, Rahway, N. J., assignor, by mesne assignments, to Chadeloid Chemical Company, a corporation of West Virginia

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This invention relates to aluminum bronze containing compositions, and particularly to such compositions enabling decorative effects to be secured.

In the prior art, aluminum bronze compositions have been used, but brilliancy of effect and stability of composition has not been secured.

Among the objects of the present invention is the production of aluminum bronze containing compositions which exhibit high brilliancy.

Other objects of the invention include the production of aluminum bronze containing compositions of decorative character and relatively high stability.

Still further objects and advantages of the present invention will appear from the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

This application is a continuation in part of application Serial No. 553,007, filed July 24, 1931, entitled "Opalescent lacquers."

In accordance with the present invention, aluminum bronze containing compositions are produced by the utilization of various expedients. In the first place, in order to secure the best brilliancy in the composition, the aluminum bronze is desirably employed in paste form in admixture with petroleum spirits or other similar petroleum distillates or vehicles of related hydrocarbon character. By incorporating aluminum bronze with such vehicle using proportions to give a paste material, an aluminum bronze composition is produced having pronounced brilliancy enabling it to be desirably employed either in and of itself for various purposes, or for admixture with various vehicles, such as lacquers, cellulose ester type or resin type, etc., as more particularly illustrated below, and particularly to such compositions when pigmented.

The aluminum bronze may, however, be incorporated into various compositions without necessarily utilizing the bronze in paste form as indicated above, although the use of the paste form of aluminum bronze gives preferred results. Thus the aluminum bronze may be suspended in a desirable coating composition containing film-forming ingredients, such as cellulose derivatives, including nitrocellulose, cellulose acetate, cellulose ether, resins, etc., the color effects desired in the final coating being secured by the incorporation of various colors into the composition, the color preferably being added to the coating composition containing the film-forming ingredient, prior to incorporation of the aluminum bronze therewith. Thus aluminum bronze is incorporated with a colored or dyed lacquer solution. Since the aluminum does not liver, and is relatively stable towards any of the organic acids and even traces of sulphur that are sometimes present in these various lacquer vehicles, no deleterious effects are obtained and no livering occurs such as takes place with the copper bronzes and similar materials.

The coloring agents employed may be of two types—either the soluble or the insoluble colors, the first or soluble colors being generally hereinafter referred to as dyes, and the second class or insoluble colors being hereinafter referred to as pigments.

Of the dyes, the water-soluble aniline colors are preferred, since they are relatively stable to light, and do not result in any substantial amount of bleeding when topcoats or overcoats are applied over the coatings referred to. In view of the stability of the water-soluble aniline colors for the reasons discussed above, they are preferred to the other types of aniline dyes or other dyes including the oil-soluble and spirit-soluble aniline colors, while the less stable dyes such as oil soluble and spirit soluble colors may be used, the stable water soluble colors are far more desirable. As exemplary of the water-soluble aniline colors that are particularly desirable for use in this connection, the following may be mentioned Buffalo black, NBR, conc. and No. 4523 Nigro black conc.; Azo Rubine ex. conc. and amacid brilliant croecine 3BA conc.; orange A conc.; fast wool yellow 3 GL; Resorcine brown; and alkali green 2 GO. Such water-soluble aniline colors may be incorporated with the usual lacquer compositions, the solvent vehicles employed being such as to give solution of the several ingredients. Any of the ordinary nitrocellulose lacquers may be employed for this purpose and the desired dyes may be dissolved directly in the lacquer compositions containing the necessary solvent vehicles, or the aniline dyes may first be dissolved in various solvents, and then added to the nitrocellulose lacquer composition. The nitrocellulose lacquer composition illustrates one type of film-forming coating compositions that may be employed in this connection. Desirably the lacquer compositions may contain glycol ethers as one of the solvent elements in order to

maintain satisfactory solutions of the water-soluble aniline dyes, particularly the blacks, such as the nigrosines. For example, these aniline dyes may be dissolved in a vehicle containing 1 part "Carbitol," 9 parts methyl alcohol, and 6 parts toluol, 2 to 2½ ounces of the particular dye being used to one gallon of the composite solvent, and this may then be incorporated with the desired nitrocellulose lacquer composition. The amount of dye solution added to the lacquer composition will be determined by the depth of color desired therein. The dyed lacquer compositions prepared in this way may then be incorporated with aluminum bronze in any desired manner to give the final dyed lacquer aluminum composition utilizable as a coating composition. Desirably the lacquer compositions will also include resins in accordance with the best lacquer developments now recognized in the art. And when these compositions are to be employed for exterior exposure, it is desirable to include some of the "rezyls," that is the phthalic glyceride types of resins which contain fatty oils or fatty oil acids, and particularly the acids derived from drying oils, combined in these resin molecules. The presence of the "rezyls" in the compositions gives the compositions the desirable property of satisfactory durability on exterior exposure.

While very desirable opalescent and colored bronze effects may be obtained by the use of water-soluble aniline dyes as stated above, which yield compositions that do not fade or bleed, improved results are obtained by the use of insoluble pigments as the coloring medium. Of the insoluble pigments, those which are translucent, such as the lake colors are preferred. When opaque or substantially opaque pigments are employed, the amount of the opaque pigment used in the composition should be such that the coating deposited from the composition does not give a solid ground color, since in this way coatings having diaphanous or light-transmitting properties essential in carrying out the present invention, are obtained. Among the lake and other colors that are particularly desirable in carrying out the present invention, there may be mentioned the natural and synthetic lake colors including cochineal, madder, illustrating the natural lake colors, and any of the synthetic lakes which are usually prepared from the aniline colors deposited on aluminum hydrate or any other similar bulky translucent base, while in addition other pigments that may be employed include Prussian blue, Van Dyke brown, umber, etc. Of these, the lake colors, Prussian blue and Van Dyke brown are preferable instances of the insoluble pigments employed in accordance with the present invention. Any of these pigments may be ground in a suitable vehicle, and subsequently incorporated with the film-forming compositions, such as nitrocellulose lacquer.

Of the synthetic lake colors, preferably those are employed which are made by the use of water-soluble aniline dyes, since such water-soluble aniline dyes are light fast, and are therefore preferred to the oil-soluble and spirit-soluble anilines.

The effects obtained by the use of the insoluble pigments as opposed to the dye compositions set forth above are preferred because deeper effects are obtained with the pigment-containing compositions. However, both types of compositions yield satisfactory opalescent lacquers and colored bronze effects, the color, of course, depending on the nature of the dye, pigment or other color employed in the composition, so that bronze, copper, gold effects may be readily obtained with these compositions. In general, these pigmenting materials discussed above may be classified as including the synthetic lakes, and particularly those prepared by the use of water-soluble aniline dyes, the translucent vegetable colors, such as madder, translucent insect or animal pigments, such as cochineal, and inorganic pigments, such as Prussian blue and burnt umber.

In incorporating the aluminum bronze with the film-forming composition, any desirable method may be employed, but it has been found that improved results are obtained if the aluminum bronze is first dispersed in paste form in some vehicle, such as petroleum spirits, or other medium compatible with the other components that are to be employed in the composition. The aluminum bronze in paste form is more brilliant than the dry aluminum bronze of the same fineness. The aluminum bronze in dispersed form, such as a paste produced in this way, may then be directly incorporated by any desired mixing operation with the lacquer or other film-forming composition, and thorough dispersion is thus readily obtained without the necessity of elaborate mixing or grinding that might otherwise be necessary. By using such aluminum paste material, the final coating compositions are also improved in character, since they yield a very even laying on of the powder on the surface, and a remarkably complete coverage being secured with but a few ounces of the aluminum bronze under these circumstances, whereas without such a vehicle, a much larger amount of bronze is generally required. In securing the opalescent finishes, relatively small amounts of aluminum bronze may be employed in the compositions and up to a certain point, increase in the amount of the aluminum bronze increases the opalescent effect. Beyond that point, increase in the amount of aluminum bronze will to some extent decrease the opalescent effect and give a substantially solid ground color, but even in those cases where a higher content of aluminum bronze is employed than is normally necessary for the opalescent finish, the introduction of the aluminum bronze in the dispersed condition in the hydrocarbon or other vehicle still yields a substantially smooth finish, free from rough irregularities such as those exhibited by the copper base bronzes. By variation in the relative amount of coloring matter to aluminum bronze, variation in shade of color is secured, deeper shades being obtained with more coloring matter and less aluminum bronze, whereas more bronze and less color gives lighter shades.

The vehicle employed should also be of such character as to avoid any substantial floating effect of the aluminum bronze, particularly when sprayed. In some instances, there may be a slight float when the composition is brushed on to the desired surface. Many of the vehicles on the market employed for similar purposes may be utilized in the present types of compositions. Almost any vehicle that sets practically instantaneously to an amalgam can be employed in accordance with the present invention. That is, if such vehicles remain rather plastic or oily for a short time, floating will result. In general, the composition should be such that there is a rapid expulsion of the solvents in order to get proper set, and under such circumstances no floating effect will result. When resin solutions

are employed as the film forming ingredients without lacquer or nitrocellulose there is a more pronounced tendency to floating. However, resins are available on the market with which float is minimized.

To illustrate the differences between the use of aluminum bronze in accordance with the present invention and prior art bronzes, the following comparison was made. Two glass plates were coated, the first with a blue colored composition containing prior art bronze powder, and the second with a blue composition containing aluminum bronze. The prior art Prussion Blue bronze type of bronze composition required a much greater proportion of bronze powder than was necessary with the aluminum bronze in the products of the present invention. An actual comparison showed 2 ounces of aluminum bronze in the composition prepared in accordance with the present invention, as compared with a full pound of bronze powder in the other type of composition. Although there was this very much smaller quantity of aluminum bronze in the composition prepared in accordance with the present invention, there was actually a much better surface coverage and in addition the product showed an opalescent effect and a smooth finish, neither of which were possible with the bronze powder composition of the prior art.

The following examples illustrate specific types of compositions that may be employed in producing opalescent lacquer finishes in accordance with the present invention. The examples given below include typical formulas employing vegetable coloring matter, lake colors, translucent pigments, etc. In giving these examples, they are illustrated by utilizing clear lacquer bases, and lacquer thinners, as well as grinding vehicles, and these are first generally given below, followed by specific examples employing such materials.

A formula for the clear lacquer base that may be utilized is as follows:

250 pounds 150 second viscosity nitrocellulose
400 pounds resins, including run kauri, run Congo, run dammar, or combinations of the first mentioned with other resins, such as phenol formaldehyde resins, glycerol phthalic anhydride types of resins, etc., or the phenol formaldehyde resins and glycerol phthalic anhydride resins without the natural resins
120 gallons ethyl acetate
80 gallons butyl acetate
40 gallons butyl alcohol
60 gallons Hi-test naphtha
40 gallons denatured alcohol
60 gallons xylol

In producing formulas of this character for use as the lacquer base, the resin content will vary in such lacquer bases, both as to the total amount of the resin used and the particular type of resin, according to the particular use or the specific surface on which the lacquer is to be applied. That is, if the lacquer for example, is to be used to adhere directly to ordinary metal surfaces, the quantity of natural gum will usually predominate; on certain difficult surfaces, especially alloys, the synthetic type of resin will usually predominate; for direct application on wood the glycerol phthalic anhydride types of resins predominate; and when the materials are to be applied on flexible or pliable surfaces, such as leather, the quantity of resin is desirably greatly reduced.

A typical formula for lacquer thinner that may be employed is as follows:

40 parts ethyl acetate
10 parts butyl acetate
30 parts toluol
20 parts butyl acetate

In this formula the parts are by volume.

A typical formula for a grinding vehicle employed when the lake pigment colors and translucent pigment colors are utilized, is as follows:

22½ gallons polymerized China-wood oil
60 gallons linseed oil
20 gallons soya bean oil

These oils are cooked together with 3 pounds of cobalt resinate and reduced with 40 gallons of naphtha.

The following formula illustrates the use of vegetable coloring matter in producing an opalescent lacquer:

10½ pounds of Madder lake is ground in 6 pounds of the grinding vehicle to form a paste, and
6 ounces of this paste is mixed with 4 ounces of paste made by mixing powdered aluminum bronze with a petroleum distillate

This mixture of the two pastes is reduced to a thin consistency by mixing one quart of lacquer thinner, and the resulting mixture is finally admixed with one gallon of clear lacquer.

The following formula illustrates the use of lake colors in the production of opalescent lacquers, this particular instance utilizing a water-soluble anile dye. One part of Yellow Lake is ground with one part of the grinding vehicle. 8 ounces of the resulting paste is admixed with 4 ounces of a paste made by incorporating the aluminum bronze with petroleum distillate. This resulting mixture is reduced with one quart of lacquer thinner and then added to one gallon of clear lacquer.

The following formula illustrates the use of a translucent pigment as the coloring medium in the opalescent lacquer. 35 pounds of Prussian blue is ground to a paste in 65 pounds of the grinding vehicle. 4 ounces of this paste is mixed with 4 ounces of a paste made from aluminum bronze with petroleum distillate. The resulting mixture is reduced with one quart of lacquer thinner and added to one gallon of clear lacquer.

The following formula is typical of an opalescent lacquer, made from a rezyl base vehicle, particularly useful for exterior exposure. 1 pound of Green Lake Color is ground in 1 pound of grinding vehicle to form a paste, and 6 ounces of this paste is mixed with 4 ounces of an aluminum bronze powder mixed with petroleum distillate. The resulting admixture of the color paste and aluminum bronze powder paste, is thinned with 32 ounces of toluol and 32 ounces of naphtha, and the resulting admixture is then added to 64 ounces of a vehicle consisting of 40% by weight of Rezyl 1102 and 60% by weight of xylol.

While these formulas given above illustrate various compositions that may be employed in accordance with the present invention, it should be understood that such compositions are illustrative and not limiting since the proportions and constituents of the compositions may vary as explained above. The specific formulas given

above also show that it is not absolutely essential to utilize nitrocellulose lacquers, but that resin solutions, such as the rezyls, may be employed without nitrocellulose or other cellulose ester. Since, however, there is more tendency to exhibit floating with the resins as opposed to the lacquers or of the nitrocellulose type, the cellulose ester containing compositions are preferred to the resin solutions themselves as the film-forming ingredient.

The novel effects obtained in accordance with the present invention may be explained in the following manner, it being understood, however, that this explanation is not to be interpreted as limiting in the character of the invention set forth herein. Since the coating compositions produced in accordance with the present invention are diaphanous, that is either transparent or at least translucent, the light passes through the colored composition and is reflected back from the aluminum with a resultant opalescent effect obtainable in prior art compositions only by the use of pearl essence. Although the colored vehicle in which the bronze is mixed should be transparent or translucent, solid coloring or opaqueness is secured in direct proportion to the quantity of aluminum bronze present.

The coating compositions of the present invention may be employed on any types of base material, including metal, glass, wood, paper, pottery, etc. In cases where porous surfaces are being coated, it may be desirable to use a primer or sealing coat prior to the application of the coating composition of the present invention. Compositions produced in accordance with the present invention may be employed on base metals, such as black iron to produce perfect reproductions of first-class natural bronze and brass finishes.

Various types of overcoats or supercoats may be applied over these compositions, including lacquers, varnishes, etc.

Among the advantages secured by the present invention in addition to the opalescent effects, it may be noted that these compositions may be mixed directly and shipped in final form in which they are to be applied by the user. The defects of the prior art colored bronzes are substantially eliminated in accordance with the present invention, which enables stable compositions yielding smooth coatings to be obtained. Furthermore, as noted above, a much smaller amount of aluminum bronze is required in the composition in order to secure surface coverage, whereas the prior art colored bronzes required very great amounts of the bronze to secure anywhere near equivalent coverage. The smooth finish obtained in accordance with the present invention is particularly noteworthy. Accordingly very satisfactory surface finishes are obtained by relatively inexpensive compositions.

The term "aluminum bronze" has been utilized in this case to cover the leaf type of product which has a greater brilliancy and is preferable to aluminum powders made by blowing processes and related processes that result in a more or less gray amorphous product. The leaf type of material yields a more satisfactory result.

The compositions may, of course, contain inert ingredients, such as barytes, clay, silicate, calcium carbonate, etc.

Durable and attractive compositions may be produced under the present disclosure by the use of a film-forming ingredient, solvents for the film-forming ingredient, pigments to produce a transparent or translucent film and aluminum bronze. The film-forming ingredients may consist of one or more of the following; nitrocellulose, cellulose acetate, ethyl cellulose, resins, both synthetic and natural, gums, oils, plasticizers, alkyd and other synthetic resins or oils, etc., and should be of such nature that a rapid set is obtained, and that the bronze is left in a deflocculated state, dispersed throughout the film at various angles, rather than floating to the top of the film and forming an opaque film that hides the pigment colors. The pigment should be added in proportions to produce a transparent or translucent film, which allows the light to penetrate into the film to strike the bronze flakes and thereby be reflected as colored reflected light.

The proportions of ingredients, particularly of the pigment and bronze and their relation one to the other in such compositions are necessarily restricted to produce the opalescent and iridescent effect. Desirably the pigment should be from 2 to 40% by weight of the total solids content of the coating composition, while the aluminum bronze should be from 0.1 to 10%, and more desirably from 0.1 to 6½% of the total solids by weight. The total of pigment and aluminum bronze should be from 6½ to 45% by weight of the total solids. Thus in the specific examples given above, desirable opalescent effects were produced with pigment percentages running from about 4 to 13%, while the aluminum content was below 10%. For automobile lacquer, the ratio of pigment to aluminum may run as high as 10 to 12 of pigment to 1 of aluminum, depending on the considerations set forth above in connection with the character of pigment and the color effect to be produced.

The amount of aluminum bronze may be kept within the limits specified, whereas some variation in pigment content is necessary depending on whatever the pigment is opaque or whether it is translucent, etc. Translucent pigments may, for example, be used in greater amounts than the opaque pigments.

Having thus set forth my invention, I claim:

1. A bronze composition adapted to yield an opalescent effect on articles having a substantially continuous surface containing a nitrocellulose lacquer, from 2 to 40% of non-metallic pigment based on the solids content of the composition, from 0.1 to 10% of aluminum bronze based on the solids content of the composition, the pigment and aluminum bronze together constituting from 6½ to 45% of the composition.

2. An article of manufacture carrying a relatively smooth bronze opalescent coating containing nitrocellulose, from 2 to 40% of non-metallic pigment based on the solids content of the coating, and from 0.1 to 10% of aluminum bronze based on the solids content of the coating, the pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids of the coating.

3. A coating composition adapted to yield an opalescent effect on articles having a substantially continuous surface, said composition containing a substantially durable film-forming ingredient selected from the group consisting of cellulose esters and resins, a non-metallic pigment, and a rapidly volatilizing quick setting, non-floating solvent vehicle for the film-forming ingredient in the proportions of 2 to 40% of pigment based on the solids content of the film-forming solution to yield a light permeable film, and aluminum bronze in proportions of from 0.1

to 10% based on the solids content of the coating composition to give said composition substantial opalescence without solid ground color effect, the non-metallic pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids in the composition, whereby a substantially durable pigmented coating having an opalescent appearance is secured.

4. A coating composition adapted to yield an opalescent effect on articles having a substantially continuous surface, said composition containing a substantially durable film-forming synthetic resin ingredient, a non-metallic pigment, and a rapidly volatilizing quick setting, non-floating solvent vehicle for the film-forming ingredient in the proportions of 2 to 40% of pigment based on the solids content of the film-forming solution to yield a light permeable film, and aluminum bronze in proportions of from 0.1 to 10% based on the solids content of the coating composition to give said composition substantial opalescence without solid ground color effect, the non-metallic pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids in the composition, whereby a substantially durable pigmented coating having an opalescent appearance is secured.

5. An article of manufacture carrying a relatively smooth bronze opalescent coating containing a substantially durable film-forming synthetic resin ingredient, from 2 to 40% of non-metallic pigment based on the solids content of the coating, and from 0.1 to 10% of aluminum bronze based on the solids content of the coating, the pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids of the coating.

6. An article of manufacture carrying a relatively smooth bronze opalescent coating containing a substantially durable film-forming ingredient selected from the group consisting of cellulose esters and resins, from 2 to 40% of non-metallic pigment based on the solids content of the coating, and from 0.1 to 10% of aluminum bronze based on the solids content of the coating, the pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids of the coating.

7. A coating composition adapted to yield an opalescent effect on articles having a substantially continuous surface, said composition containing nitrocellulose, a non-metallic pigment, and a rapidly volatilizing quick-setting, non-floating solvent vehicle for the nitrocellulose in the proportions of 2 to 40% of pigment based on the solids content of the solution to yield a light permeable film, and aluminum bronze in proportions of from 0.1 to 10% based on the solids content of the coating composition to give said composition substantial opalescence without solid ground color effect, the non-metallic pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids in the composition, whereby a substantially durable pigmented coating having an opalescent appearance is secured.

8. A coating composition adapted to yield an opalescent effect on articles having a substantially continuous surface, said composition containing a substantially durable film-forming phthalic glyceride resin containing a component selected from the group consisting of fatty oils and fatty oil acids bound in the resin molecule, a non-metallic pigment, and a rapidly volatilizing quick-setting, non-floating solvent vehicle for the film-forming ingredient in the proportions of 2 to 40% of pigment based on the solids content of the film-forming solution to yield a light permeable film, and aluminum bronze in proportions of from 0.1 to 10% based on the solids content of the coating composition to give said composition substantial opalescence without solid ground color effect, the non-metallic pigment and aluminum bronze together constituting from 6½ to 45% by weight of the total solids in the composition, whereby a substantially durable pigmented coating having an opalescent appearance is secured.

DEAN MURPHY.