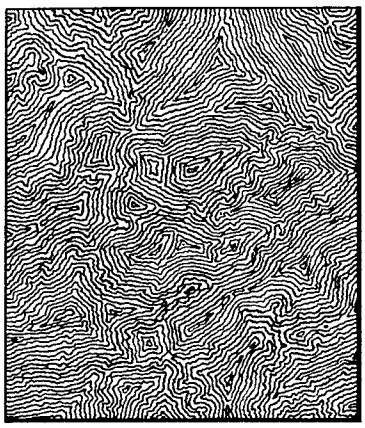
Oct. 18, 1932. F. B. ROOT 1,883,408

WRINKLE FINISH COATING

Filed March 1, 1929

Fig. 1.



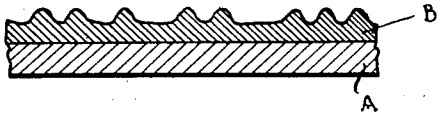



Fig. 2.

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1,883,408

# UNITED STATES PATENT OFFICE

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## WRINKLE FINISH COATING

Application filed March 1, 1929. Serial No. 343,727.

This invention relates to varnishes and enamels and methods of utilizing such compositions and particularly to compositions of this character which result in the production of the so-called wrinkled finishes.

In U. S. Patent No. 1,689,892, to Frank B. Root granted October 30, 1928, there was disclosed for the first time in the art the production of wrinkling finishes and compositions to be used therefor together with processes of producing articles carrying such finishes. This patent represents a very wide departure from the prior art since it taught the art as stated for the first time how the finish of such compositions could be controlled to produce desirable and ornamental wrinkle finishes. Prior to this patent, the attempt in the art in connection with continuous coatings has always been to produce a relatively smooth coating. Where undesirable irregularities of finish appeared in the prior art, attempts were always made to eliminate such undesirable factors. However, under the disclosure of the Root patent refered to, the wrinkling finish was controlled for the first time so that it might be used as a basis for highly ornamental coatings on articles of manufacture.

For such purposes that patent teaches that drying oils are an essential characteristic of the wrinkling finish varnishes. Among the drying oils mentioned in that patent and suggested for these purposes are blown linseed oil, raw linseed oil, perilla oil, China wood oil, blown China wood oil, and partially oxidized or pre-oxidized China wood oil.

As explained in that patent when the surface is coated with a varnish of the desired composition and exposed to drying conditions advantageously at an elevated temperature, a wrinkle finish of pleasing and attractive appearance results. The wrinkling seems to be due to rapid oxidation of the surface of the applied film forming a skin over the less oxidized material on the interior of the film, the surface skin increasing in volume and expanding laterally and the less oxidized material on the interior of the film being of lower viscosity, flowing into the fold produced by expansion of the surface skin. The general effect is that of the level surface carrying ridges projecting therefrom and running more or less irregularly over the surface, the film however being continuous.

The prior patent explains that an important characteristic of the oil used is the speed with which it oxidizes. That patent specifically discloses in detail the utilization of China wood oil, particularly the blown or partially oxidized or pre-oxidized China wood oil.

One of the objects of the present invention is the production of compositions in the nature of varnishes or enamels which result in the production of wrinkle finishes, such compositions containing drying oils which do not oxidize as readily as China wood oil.

Other and further objects and advantages 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 only and not by way of limitation since various changes may be made therein by those skilled in the art without departing from the scope and spirit of the present invention.

In connection with that more detailed description there is shown in the accompanying drawing in

Figure 1 a plan view of a panel carrying the wrinkle finish of the present invention; and in

Figure 2 a cross section of such panel A carrying the wrinkle finish B enlarged to show the wrinkles or rugosities of the surface.

For producing the desired effect, compositions are chosen which under proper drying or baking conditions give the particular effect denominated as wrinkle finish. An im-

portant component of such compositions is a drying oil. An investigation of the various drying oils that are available shows that the conditions under which these drying oils give the best results varies with the particular drying oil being utilized. For example while excellent results may be obtained with raw China wood oil or with blown China wood oil, the best effects with perilla and linseed oil are obtained when these oils are used either in the form known as blown or oxidized oils. While the present application is therefore particularly concerned with the utilization of blown and boiled perilla and linseed oil in the production of wrinkle finishes, other less common drying oils that may be mentioned and may be similarly utilized include chia, Oiticica, walnut, poppy-seed, sunflower, candle nut, lumbang, hempseed, fish, etc. The oils which may be used in the production of wrinkle finishes may be generically referred to as "wrinkling oils" to distinguish them from the large class of non-wrinkling oils including primarily the semi-drying and non-drying oils. In referring to the wrinkling oils with which the present invention is particularly concerned, such oils will be generically referred to in the description of the invention as oils of the perilla-linseed type.

The production of the best results with wrinkling oils of the perilla-linseed type differentiate themselves from China wood oil in several particulars. For example comparisons of four oils, namely blown China wood oil, untreated China wood oil, blown perilla oil and blown linseed oil, show that the relative activity of these wrinkling oils in wrinkling finishes may be expressed in a series as follows: Blown China wood oil 5; raw China wood oil 6½; blown perilla oil 8; and blown linseed oil 12. This series expresses the fact that the oils bearing the lowest numbers are the more powerful in their wrinkling tendencies and consequently the order of the oils given above represents the wrinkling power of these oils in the specified compositions, blown China wood oil being the most powerful of the oils mentioned.

Further comparison of the several oils in relation to the resin content when such resin is of the wrinkling finish type to be further defined below shows that for the production of the best results with such oil-resin compositions there is a difference in oil-resin ratios depending on the type of oil used. For example with blown China wood oil the best appearance of the finish is obtained when the ratio of oil to resin is approximately from 6 to 18 gallons of oil to 100 lbs. of resin. For untreated China wood oil the ratio is approximately from 8 to 25 gallons of untreated China wood oil to 100 lbs. of resin. For blown perilla oils the best ratios are from 10 to 30 gallons of oil to 100 lbs. of resin while for blown linseed oil the best ratios are from 14 to 35 gallons of blown linseed oil to 100 lbs. of resin. These oil-resin ratios also illustrate a difference between the action of the oil in the wrinkling finish composition.

A further factor which illustrates differences between the several wrinkling oils is in connection with the drying and baking operation. Other factors being the same except for variations in the composition in the character of oil used, show that in the production of the best effects in compositions utilizing wood oil (untreated) the time is approximately ten per cent more than when blown China wood oil is used, while for blown perilla and blown linseed oil the baking temperature should be from 20 to 25 per cent more than that used with blown China wood oil compositions. Unless otherwise indicated below in further defining the present invention, it will be understood that when blown perilla and blown linseed oils and other blown oils of the perilla-linseed type are referred to, these also include oxidized oils and similar products although they may not be specifically mentioned at the particular point under consideration.

While specific drying oils are mentioned above it is understood of course that mixtures of the various drying oils particularly in their blown or oxidized condition may be utilized in the production of satisfactory wrinkle finishes, the range of proportions when mixtures of such oils are used being the arithmatical average of the ranges of the oils when used alone. And while a varnish or other composition to be used to produce a wrinkle finish must contain a substantial proportion of a wrinkling oil, admixtures of the non-wrinkling oils may be used so long as the amount of the latter is not sufficient to eliminate the desired wrinkle effect in the finish obtained.

In general it may be stated that in such admixtures for the best effects, not less than half of the oil mixture should be a wrinkling oil. For example two or more wrinkling oils and two or more non-wrinkling oils may be mixed and a varnish produced therefrom with the addition of the resins, driers and thinners. In such case the sum of the amounts of all the wrinkling oils should desirably be at least one-half of the total oil mixture. Among the non-wrinkling oils there may be mentioned specifically soya bean oil, and other semi- and non-drying oils such as cotton seed, corn, castor, rape-seed, rubber-seed, olein, etc. Such non-wrinkling oils may be either the raw oils or the blown or otherwise treated oils.

Of the resins usable in the production of wrinkle finishes, which resins may be de-

nominated wrinkling finish resins, the following may be noted: Congo, kauri, damar, Cumar, Pontianak, manila, Zanzibar, elemi, mastic, phenol-formaldehyde resins particularly of the oil soluble variety, glycerol-phthalic condensation products particularly of the oil soluble variety, paracoumarone, Congo ester, rosin ester, and mixtures of these resins and resin esters.

Certain substances exhibit a tendency to inhibit the wrinkling effect. Among such substances there may be mentioned pyroxylin, nitrocellulose, gilsonite, and rosin. These wrinkle inhibiting substances should therefore not be used in any proportions in the composition which would prevent the desired development of wrinkles in the finish. Such wrinkle inhibiting substances when used in small amounts have a tendency to produce very fine wrinkles while in the large amounts they may completely eliminate the wrinkling effect. Rosin if used in large amount, also tends to produce irregularities in the size and in the interval between wrinkles in the resulting finish.

Solvents or thinners are not a main factor since any moderately volatile solvent can be used. Preferably the major portion of the solvent or thinner should distil below about 325° F. The thinner used may be a mixture of several thinning components. The low boiling thinner evaporates more quickly from the varnish or enamel film, promotes the rapid formation of a surface skin, and during drying assists in maintaining a greater differential between the degree of oxidation of the surface skin and the oil within the film. When the finish is dried at elevated temperatures, the use of low boiling thinners also assists in eliminating any tendency toward sagging of the finish during the drying operation.

The following are illustrative of the thinners and solvents that may be used: light naptha, toluol, benzol, petroleum ether or ligroin (benzine), acetone, carbon tetrachloride, alcohol, chloroform, ethyl acetate, etc., and mixtures of these. To some extent, the character of the finish may be varied by the quantity and character of the thinner used. Turpentine and other high-boiling thinners may also be used. More pronounced wrinkles are produced with compositions containing the lower boiling thinners.

Driers and drier combinations are also an important element in the composition since the wrinkled effect appears to be somewhat determined by the rate of oxidation of the wrinkling oil. Such driers as cobalt acetate, red lead, manganese borate, lead linoleate, etc., used alone or in admixture with each other or with other driers are illustrative.

A number of examples of compositions that may be utilized in the production of wrinkle finishes in accordance with the present disclosure are set forth below.

*Example 1*

| | |
|---|---|
| Congo | 100 lbs. |
| Red lead | 2½ lbs. |
| Manganese borate | 1¼ lbs. |
| Blown linseed oil | 15 gals. |
| Turpentine | 5 gals. |
| Toluol | 19 gals. |

This example illustrates a fifteen gallon blown linseed varnish. The finish obtained is quite even and shows well defined wrinkles.

*Example 2*

| | |
|---|---|
| Congo | 100 lbs. |
| Lead linoleate | 4½ lbs. |
| Manganese borate | ¾ lb. |
| Cobalt acetate | ½ lb. |
| Blown perilla oil | 10 gals. |
| Light naphtha | 5 gals. |
| Toluol | 15 gals. |

This is a ten gallon blown perilla varnish that gives fairly uniform results when the film is set.

*Example 3*

| | |
|---|---|
| Kauri | 100 lbs. |
| Rosin | 4 lbs. |
| Lead linoleate | 10 lbs. |
| Manganese borate | 1½ lbs. |
| Cobalt acetate | 1¼ lbs. |
| China wood oil | 2½ gals. |
| Blown perilla oil | 22½ gals. |
| Light naphtha | 5 gals. |
| Toluol | 22 gals. |

This example illustrates the use of a varnish containing China wood oil together with a relatively large quantity of blown perilla oil. It yields uniform wrinkles that are quite close together and the wrinkles are quite fine in texture.

*Example 4*

| | |
|---|---|
| Congo | 50 lbs. |
| Kauri | 50 lbs. |
| Rosin | 5 lbs. |
| Red lead | 3 lbs. |
| Manganese borate | 1¼ lbs. |
| Cobalt acetate | 3¼ lbs. |
| China wood oil | 2½ gals. |
| Blown wood oil | 3¼ gals. |
| Blown perilla oil | 3¾ gals. |
| Light naptha | 5 gals. |
| Toluol | 17 gals. |

The mixture of oils given in this example illustrates the use of a number of wrinkling oils and the wrinkling effect obtained is very good.

In Example 4 the blown perilla oil may be substituted by boiled perilla oil. The wrinkling obtained is also quite satisfactory in the latter case, the wrinkles however being a little coarser than in example when blown perilla oil is used. As a matter of fact it appears to be a general rule that when part

of the wrinkling oils in a mixture is replaced by a non-wrinking oil, the wrinkles that are formed in the film upon baking are slightly coarser than is obtained when all the oils are of the wrinkling type.

*Example 5*

| | |
|---|---|
| Congo | 100 lbs. |
| Litharge | 3 lbs. |
| Manganese borate | 1 lb. |
| Blown linseed oil | 7½ gal. |
| Blown parilla oil | 6¼ gal. |
| Turpentine | 2½ gal. |
| Light naphtha | 2½ gal. |
| Toluol | 20 gal. |

This example illustrates a wrinkling varnish containing both blown perilla and blown linseed oils. The wrinkling effect is satisfactory.

*Example 6*

| | |
|---|---|
| Amberol | 100 lbs. |
| Lead linoleate | 5 lbs. |
| Cobalt acetate | 1 lb. |
| Blown linseed oil | 18 gal. |
| Blown soya bean oil | 5 gal. |
| Toluol | 22 gal. |

This varnish illustrates the use of blown linseed oil in admixture with a lesser amount of a non-wrinkling oil such as blown soya bean oil. Well defined wrinkling which is fairly coarse is obtained with this composition. The resin used in this case is of the oil-soluble phenol-formaldehyde type.

*Example 7*

| | |
|---|---|
| Cumar | 100 lbs. |
| Lead linoleate | 4 lbs. |
| Cobalt acetate | 1 lb. |
| Blown perilla oil | 12 gal. |
| Blown wood oil | 4 gal. |
| Blown soya bean oil | 4 gal. |
| Light naphtha | 8 gal. |
| Toluol | 16 gal. |

The wrinkling oils of this example are a mixture of blown perilla and blown wood oils, there being present a non-wrinkling oil, namely, blown soya bean oil. The wrinkling effect is quite pronounced.

*Example 8*

| | |
|---|---|
| Congo | 100 lbs. |
| Red lead | 2 lbs. |
| Manganese borate | ¾ lb. |
| Cobalt linoleate | 1¼ lbs. |
| Wood oil | 1¼ gal. |
| Blown wood oil | 6 gal. |
| Blown linseed oil | 3 gal. |
| Blown parilla oil | 2½ gal. |
| Blown soya bean oil | 2½ gal. |
| Light naphtha | 4 gal. |
| Toluol | 17 gal. |

This varnish contains a mixture of various wrinkling oils and a small amount of the non-wrinkling oil, blown soya bean oil. Upon baking very pronounced wrinkles are produced.

*Example 9*

| | |
|---|---|
| Kauri | 100 lbs. |
| Red lead | 2 lbs. |
| Manganese borate | 1 lb. |
| Cobalt acetate | ½ lb. |
| Blown parilla oil | 10 gal. |
| Blown linseed oil | 10 gal. |
| Blown soya bean oil | 3 gal. |
| Xylol | 22 gal. |

Example 9 illustrates a varnish containing a mixture of equal amounts of blown perilla oil and blown linseed oil, together with a small amount of a non-wrinkling oil. The wrinkling is fairly coarse.

*Example 10*

| | |
|---|---|
| Congo | 100 lbs. |
| Rosin | 4 lbs. |
| Red lead | 2 lbs. |
| Manganese borate | 1 lb. |
| China wood oil | 2 gals. |
| Blown wood oil | 5 gals. |
| Blown linseed oil | 2 gals. |
| Light naphtha | 20 gals. |
| Toluol | 5 gals. |

This varnish illustrates a mixture of wrinkling oils with blown wood oil predominating. The wrinkling effect is very good. The varnish of Example 10 may be modified by substituting boiled linseed oil for the blown linseed oil specified therein. The wrinkling effect obtained with the modified composition is satisfactory but the wrinkles are somewhat coarser than result when the composition of Example 10 is used.

In producing the improved wrinkled finish of this invention, it is advantageous to dry or bake the applied finish of varnish or enamel, preferably at an elevated temperature depending on the type of article being treated. For metal and related surfaces a temperature of 150° F. up to approximately 450° F. may be advantageously used. For wood and similar materials somewhat lower temperature such as 120° F. up to 140° F. may be utilized. At elevated temperatures rapid oxidation of the surface of the applied film is promoted and any tendency toward diffusion of oxidation products from the surface into the interior of the film is lessened. In general, drying at elevated temperatures accentuates the wrinkling and assists in providing a harder finish.

As an illustration of the relation between the drying times and temperatures of drying or baking to produce satisfactory wrinkle finishes the following are given. With compositions that give satisfactory effects by five-hour treatment at 180° F. similar treatment for three hours at 200° F., or two hours at

250° F. or one and one-half hours at 300° F. and approximately three-fourths of an hour at 400° F., may be used. As stated above, the wrinkling finish composition containing wrinkling oils of the perilla-linseed type require from 20 to 25 per cent longer heat treatment at the same temperature as do similar compositions utilizing blown wood oil. Drying at elevated temperatures also assists in making this finish resistant to the action of the usual solvents employed in pyroxylin enamels and lacquers.

Increase in the amount of oil in the compositions result in wrinkling at lower temperatures and hence when the lower temperatures are to be used in connection with wood and related articles, the compositions may desirably contain more oil. Further the higher oil content gives added flexibility so that the long oil compositions are desirable for use in metal stamping, or on leather, paper, cloth, rubber, etc.

There have been set forth above a number of considerations directed to the types of compositions and the baking temperatures which effect the character of the wrinkles produced in the finish. Other factors however are also found which affect the character of the wrinkles produced. For example the thickness of the applied film will result in differences in the finish. Thinner films give finer wrinkles and thicker films coarser wrinkles. When spraying is used, spray nozzles giving coarse atomization give greater deposition of composition and consequently coarser wrinkles, while on the other hand spray nozzles of finer atomization give thinner films with finer wrinkles.

For the production of wrinkle finishes having a textured effect by the production of accentuated rugosities at certain points or areas in the finish the article to be treated may desirably be coated with a relatively heavy coating of the desired composition and baked in an inclined position which inclined position may vary from a small angle to the horizontal to a vertical position. The incline of the surface of the article bearing the coating produces a flowing or movement of the wrinkle coating after it is applied and at or about the time when the baking commences and before the baking has caused the setting of the finish to take place to a point where such movement or flowing would be prevented. The effect of such treatment is to produce waves or areas of accentuated rugosities or wrinkles in the more regularly wrinkled finish.

The flowing or movement of the wrinkle coating after it is applied which results in the accentuated rugosites set forth above may be accomplished in other ways than merely by gravity due to the position of the work. For example air currents or other flowing methods may be used.

When gang sprays are used to apply the composition, at certain points the atomization may be made coarser to produce heavier or thicker layers at these points resulting in coarser wrinkles in such thicker layers. Accentuated rugosities distributed in the more uniformly wrinkled finishes may be produced in this manner.

The wrinkle finishes are characterized by an exceedingly important property, namely their remarkable hiding quality. This term "hiding quality" is used in more or less the same meaning that the expression "covering power" is used in the paint art. It is a remarkable thing for example that a single coat of unpigmented wrinkle finish may be applied to a bright metal surface and the resulting finish will completely mask the metal surface. Other pigmented compositions generally require at least several coats in order to secure a comparable hiding effect.

The baked or dried finishes of the present invention are particularly resistant to softening by lacquer compositions and particularly the solvents used in nitrocellulose lacquers, so that although the rugose surface of the wrinkle finish affords a very extensive area for the action of such solvents or lacquers the baking creates a resistance to such softening action.

Consequently the wrinkle finishes and composition used for producing such coatings are particularly desirable as under coats where a wrinkle finish is desired and such finishes may then be given one or more coats of pyroxylin enamels, oil enamels, or baking japans. When pigments are used in the wrinkle finish which have a tendency to change or to darken under the action of elevated temperatures, these finishes may be coated with pyroxylin lacquer compositions.

While certain theoretical considerations have been set forth above in an attempt to explain some of the effects obtained, it should be understood that this invention is not limited by such theoretical considerations because the compositions and methods discussed above do result in the particular effects set forth and it is immaterial what may be the actual cause of such effects. Pronounced effects of the character herein set forth are readily obtained with the compositions and methods outlined above.

Having set forth my invention, I claim:

1. A coating composition comprising a wrinkling oil selected from the group consisting of perilla and linseed oils, a wrinkle finish resin, a drier and thinner in proportions to yield a wrinkle finish when dried.

2. A composition as set forth in claim 1 in which the wrinkling oil is blown perilla oil.

3. A composition as set forth in claim 1 in which the wrinkling oil is blown linseed oil.

4. A coating composition comprising a

wrinkling oil containing a mixture of blown perilla and blown linseed oil, a wrinkle finish resin, a drier and thinner in proportions to yield a wrinkle finish when dried.

5. A coating composition comprising a wrinkling oil selected from the group consisting of perilla and linseed oils, a non-wrinkling oil, a wrinkle finish resin, a drier and thinner in proportions to yield a wrinkle finish when baked.

6. A coating composition comprising blown linseed oil, a wrinkle finish resin, a drier and thinner the ratio of oil to resin being from 14 to 35 gals. of oil to 100 pounds of resin.

7. A coating composition comprising blown perilla oil, a wrinkle finish resin, a drier and thinner, the ratio of oil to resin being from 10 to 30 gals. of oil to 100 pounds of resin.

8. A coating composition comprising a wrinkling oil selected from the group consisting of perilla and linseed oils, a non-wrinkling oil, a wrinkle finish resin, a drier and thinner, the wrinkling oil being at least 50 per cent of the oil content of the composition.

9. A composition as set forth in claim 1 in which the thinner is a low-boiling thinner.

10. A composition as set forth in claim 1 in which the thinner is a high-boiling thinner.

11. A composition as set forth in claim 1 in which the thinner contains both low-boiling and high-boiling components.

12. An article of manufacture carrying a wrinkle finish coating produced from a composition containing a wrinkling oil selected from the group consisting of perilla and linseed oils.

13. An article of manufacture carrying a baked wrinkle finish produced from a wrinkling oil composition containing blown perilla oil.

14. An article of manufacture carrying a baked wrinkle finish produced from a wrinkling oil composition containing blown linseed oil.

15. An article of manufacture carrying a baked wrinkle finish coating produced from a composition containing a wrinkling oil selected from the group consisting of perilla and linseed oils, the finish exhibiting areas of accentuated rugosities.

16. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto, a wrinkling finish composition containing a wrinkling oil selected from the group consisting of perilla and linseed oils, a wrinkle finish resin, a drier and thinner, and drying the coating at a temperature which produces a wrinkle finish.

17. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto a wrinkling finish composition containing blown perilla oil, a wrinkle finish resin, a drier and thinner, and baking the coated article at a temperature of 120° F. upwards.

18. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto a wrinkling finish composition containing blown linseed oil, a wrinkle finish resin, a drier and thinner, and baking the coated article at a temperature of 120° F. upwards.

19. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto a wrinkling finish composition containing blown perilla oil and blown linseed oil, a wrinkle finish resin, a drier and thinner, and baking the coated article at a temperature of 150° F. upwards.

20. An article of manufacture carrying a surface coating comprising a hard, unbroken wrinkle film containing a drying oil selected from the group consisting of perilla and linseed oils and a resin.

21. A wrinkle finish composition comprising a drying oil and a non-wrinkling oil in proportions to yield a flexible wrinkle finish when dried on a surface coated therewith.

22. An article of manufacture carrying a wrinkle finish composition of a drying oil and a non-wrinkling oil in proportions yielding a flexible wrinkle finish coating.

FRANK B. ROOT.