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WRINKLE COATING

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Fig. 1.

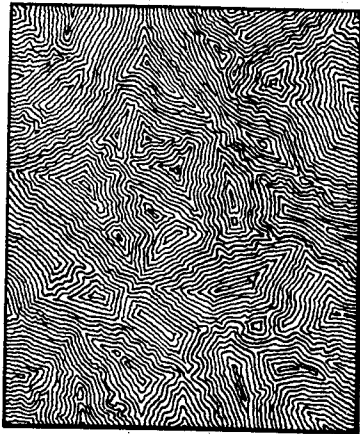


Fig. 2.

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WRINKLE COATING

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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, as well as to articles carrying such finishes.

In U. S. Patent No. 1,639,892 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 such finishes on articles of manufacture. This patent represents a wide departure from the prior art. In that prior art, considering the production of continuous surface finishes, attempts were always made to attain a substantially smooth surface and irregularities of surface finish were avoided, the efforts being directed to the production of smooth finishes. The production of wrinkle finishes, satisfactorily controlled so that the desired effects could be produced, was taught to the art for the first time in that patent.

For the purposes outlined in that patent, it is set forth that drying oils are an essential characteristic of the wrinkling finish varnishes and compositions. Among the drying oils mentioned in that patent and suggested for these purposes are linseed oil, perilla oil, and China-wood oil, particularly preoxidized China-wood oil, the blown product being emphasized as giving a very desirable effect.

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. As explained in that patent an important characteristic of the oil used is the speed with which it oxidizes.

An investigation of the drying oils and their effects in wrinkling finishes discloses the fact that the several oils exhibit their best wrinkling tendencies under different conditions.

One of the objects of the present invention is the production of wrinkle finishes with untreated drying oils, specifically China-wood oil.

A further object of this invention is the production of such wrinkle finishes with unblown drying oils such as China-wood oil as ornamental finishes on articles of manufacture.

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 enlarged in size to show more clearly the wrinkles of rugosities of the surface.

For producing the desired effect, compositions are chosen which under proper conditions for drying or baking the finish coated article, develop the particular effect herein denominated wrinkle finish. As stated, an important 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. The more commonly used drying oils are linseed oil, perilla oil, and China-wood oil. The less common drying oils include chia, citicica,

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
5 "wrinkling oils."

The production of wrinkle finishes with drying oils may be separated into two groups, first the use of oxidized or preoxidized or blown oils, and second the use of unblown or
10 untreated oils. In general it may be said that the use of blown or otherwise oxidized oils give highly satisfactory results. With the untreated or unoxidized or unblown oils, China-wood oil stands out as more or less
15 unique. Unblown perilla oil and linseed oil are relatively weak in their "wrinkling power" while unblown or unoxidized China-wood oil exhibits a stronger wrinkling power than even the blown forms of linseed oil and perilla oil. China-wood oil may be said to be
20 the best of the unblown oils for the production of wrinkling finishes. Experimental comparisons of the relative activity of the wrinkling oils in wrinkling finishes may be expressed in a series as follows: blown China-wood oil 5; raw China-wood oil 6½; blown
25 perilla oil 8; and blown linseed oil 12. This series expresses the fact that the oil bearing the lowest number is the most powerful, and the order of the oils in their wrinkling activity decreases as the series rises.

Further comparison of the several oils in relation to the resin content of the composition when such resin is of the wrinkling finish type to be further defined below, shows
35 that for the production of the best results with such oil-resin compositions, there is a difference in the oil-resin ratios. The more active oils may be used in a smaller ratio as compared with the resin content, than can be
40 less active oils.

As illustrative of the conclusions set forth in the preceding paragraph the following may be noted. With blown China-wood oil
45 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 oil to 100 lbs. of resin. For blown perilla oil
50 the best ratios are from 10 to 30 gallons of oil to 100 lbs. of resin while for linseed oil (blown) the best results are obtained with ratios from 14 to 35 gallons of oil to 100 lbs.
55 of resin. Here again, the difference between the oils is illustrated, and it is a remarkable and noteworthy fact that China-wood oil lies in activity between the most active oil namely blown China-wood oil, and the other blown
60 oils linseed and perilla. This fact also differentiates the unique character of raw China-wood oil in these finishes.

There is another feature that serves to distinguish raw China-wood oil from the blown
65 or oxidized oils. Other factors being the

same except for variation in the oil utilized, it has been found that when the drying or baking properties of the compositions containing the several oils are compared, raw or
70 untreated China-wood oil requires approximately ten percent longer drying or heating at a given temperature for the production of a comparable effect as compared with blown China-wood oil while blown perilla oil and
75 blown linseed oil require from twenty to twenty-five percent longer time treatment than does blown China-wood oil.

Without more, therefore, the above considerations are believed to show incontrovertibly that in the production of wrinkle finishes raw or untreated China-wood oil occupies a unique position.

While specific drying oils are mentioned above, it is understood that mixtures of the various drying oils having wrinkling properties may be used in the production of satisfactory wrinkle finishes, the range of proportions when mixtures are used being the
85 arithmetical mean of the ranges of the oils when used without admixture of other wrinkling oils. And while a varnish or
90 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
95 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
100 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 resin, drier and thinner. In such case the
105 sum of the amounts of all of the wrinkling oils present should be desirably at least one-half of the total oil in the composition. Among the non-wrinkling oils there may be
110 mentioned specifically soya bean oil, and other semi-drying or 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, the blown oils, the boiled oils, or otherwise treated oils.

Of the resins usable in the production of wrinkle finishes which resins may be generically referred to as wrinkling finish resins, the following may be noted: Congo, kauri, damar, Cumar, pontianak, manila, Zanzibar, elemi, mastic, phenol-formaldehyde resins particularly those of the oil soluble variety, glycerol-phthalic condensation products and particularly the oil soluble varieties, paracoumarone, Congo ester, rosin ester, and mixtures of these resins and their esters.

Certain substances exhibit a tendency to inhibit the wrinkling effect. Among such substances there may be noted pyroxylin, nitrocellulose, gilsonite, and rosin. These
125

wrinkle inhibiting substances should therefore not be used in any proportion in the composition which would prevent the desired development of wrinkles in the finish; although they may be present in lesser proportions and to obtain particular effects. Such wrinkle inhibiting substances when used in small amounts have a tendency to produce very fine wrinkles while in 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. The application of these wrinkle inhibiting substances to limited areas of the surface on which the wrinkle finishes are to be developed, is an expedient that may be used to modify the wrinkle effect at those particular areas. Rosin for example may be used in this manner.

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 an individual substance or it may be an admixture of two or more 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 naphtha, toluol, benzol, petroleum ether or ligroin (benzine), acetone, carbon tetrachloride, alcohol, chloroform, ethyl acetate, etc., and mixtures of these materials. To some extent, the character of the finish may be varied by the quantity and character of the thinner used. More pronounced wrinkles are produced with compositions containing the lower boiling thinners, but high boiling thinners such as turpentine may also be used. While in the examples given below for illustrative purposes, the use of the low boiling thinners is set forth, this is not to be taken as a limitation for the reasons set forth above.

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 and materials are illustrative.

A number of examples of compositions that

may be used in production of wrinkle finishes in accordance with the present disclosure are set forth below.

Example 1

100	lbs. Congo	70
4	lbs. rosin	
3½	lbs. red lead	
2	lbs. manganese oxide	
10	gals. wood oil	75
10	gals. light naphtha	
32	gals. toluol	

This example illustrates a 10 gal. varnish using unblown China-wood oil, and the wrinkling effect obtained is very good.

Example 2

100	lbs. Congo	85
4	lbs. red lead	
2	lbs. manganese borate	
7½	gals. China-wood oil	
5	gals. blown linseed oil	
5	gals. light naphtha	90
20	gals. toluol	

This composition illustrates the use of a mixture of unblown China-wood oil and blown linseed oil both being wrinkling oils. The wrinkling effect obtained is very satisfactory.

Example 3

100	lbs. Congo	
4	lbs. red lead	100
2	lbs. manganese borate	
7½	gals. China-wood oil	
5	gals. boiled linseed oil	
5	gals. light naphtha	
20	gals. toluol	105

Example 3 illustrates the use of boiled linseed oil in lieu of the blown linseed oil of Example 2 the wood oil being unblown. A good wrinkling effect is obtained although the wrinkles are somewhat coarser than with the composition of Example 2 due to the more pronounced wrinkling character of blown linseed oil as compared with boiled linseed oil.

Example 4

100	lbs. kauri	
5	lbs. lead linoleate	
1	lb. manganese borate	120
½	lb. cobalt acetate	
6¼	gals. China-wood oil	
3¾	gals. blown perilla oil	
5	gals. light naphtha	
18	gals. toluol	125

This mixture of unblown China-wood oil and blown perilla oil makes a good wrinkling varnish. Boiled perilla oil may be substituted for the blown perilla oil to yield

a satisfactory wrinkling combination, although slightly coarser wrinkles result.

Example 5

5	100	lbs. Congo
	4	lbs. rosin
	13/4	lbs. red lead
	3/4	lb. manganese borate
	2 1/2	gals. China-wood oil
10	6 1/2	gals. blown wood oil
	4	gals. blown soya bean oil
	5	gals. light naphtha
	17	gals. toluol

This varnish contains blown semi-drying oil which is of the non-wrinkling type. The effect obtained upon baking is fairly coarse. The baked film is quite elastic. The soya bean oil of this composition may be substituted by other semi- or non-drying oils. For example raw soya bean oil gives a similar effect and a flexible film.

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 the temperatures may range from 150° F. to 450° F., while for wood and related materials, the temperature range may be from 120° F. to 140° F. These temperatures are merely illustrative. 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 periods 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% longer heat treatment at the same temperature as do similar compositions utilizing blown wood oil, while the compositions utilizing unblown wood oil require but 10% longer treatment than blown wood oil.

Increase in the amount of oil in the compositions results in wrinkling at lower temperatures and hence when lower temperatures are to be used in connection with for example, wood and related articles, the compositions may desirably contain more oil. Further as illustrated by Example 5 above, the higher oil content gives increased elasticity and flex-

ibility so that long oil compositions are particularly desirable for use on metal stamping, or on leather, paper, cloth, rubber, etc.

There have been given above a number of considerations directed to types of composition and baking temperatures which affect the character of the wrinkles produced in the finish. Other factors however may also be utilized to modify the type of wrinkled effect obtained. For example the thickness of the applied film will result in differences in the wrinkle effect. Thinner films give finer wrinkles, while thicker films yield coarser wrinkles. When spraying is used to apply the composition, 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 finish 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 an extent where such movement or flowing would be precluded. The effect of such treatment is to produce waves or areas of accentuated rugosities or wrinkles in the more uniformly developed wrinkled finish. Curtain and sag effects are thus produced, and China-wood oil compositions are particularly adapted to the production of the so-called pine-tree effects in which the accentuated rugosities at a particular point appear to radiate more or less from a limited area and to spread outwardly and downwardly from the point where the accentuated rugosity first appears in the finish during the baking operation. The flowing or movement of the wrinkled coating after it is applied which results in the accentuated effects noted 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. Prior art paint compositions on the other hand invariably require at least several coats in order to secure a comparable hiding effect. The application for example of a single coat of wrinkle finish to a bright metal surface which is silvery in color or appearance, results in a brass or bronze appearing wrinkle finish. The exact brass or bronze effect can be varied by increase or decrease in the temperature at which the baking is effected.

The drawing illustrates the more or less uniformly distributed wrinkle finish that may be obtained with the present invention. The coating B carried by the panel A, presents a rugose or wrinkled surface, in which the distribution of wrinkles is not regular, but the wrinkles are more or less uniformly distributed over the entire surface.

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

Consequently, the wrinkle finishes and compositions used for producing such coatings are particularly desirable as undercoats where a wrinkle effect is desired, and such coats 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 enable the results herein disclosed to be obtained, and the exact interpretation of the reasons for these results is of little moment. It is sufficient that the extremely novel and highly ornamental effects may be obtained by the disclosures of the present application.

Having thus set forth my invention, I claim:

1. A wrinkle finish composition comprising raw China-wood oil, a wrinkle finish

resin, drier and thinner in proportions to yield a wrinkle finish when dried.

2. A wrinkle finish composition as set forth in claim 1 containing an additional wrinkling oil as well as untreated China-wood oil.

3. A wrinkle finish composition as set forth in claim 1 containing a non-wrinkling oil in an amount insufficient to prevent the desired wrinkle finish.

4. A composition as set forth in claim 1 in which the ratio of oil to resin is from 8 to 25 gallons of oil to 100 lbs. of resin.

5. An article of manufacture carrying a coating resulting from the composition of claim 1.

6. An article of manufacture carrying a coating resulting from the composition of claim 1 in which the ratio of oil to resin is from 8 to 25 gallons of oil to 100 pounds of resin and containing oil in an amount sufficient to give the coating substantial flexibility.

7. An article of manufacture carrying a baked coating resulting from the composition of claim 1.

8. An article of manufacture carrying a baked coating resulting from the composition of claim 1, the coating exhibiting areas of accentuated rugosities.

9. An article of manufacture carrying a relatively thin coating resulting from the composition of claim 1, said coating exhibiting fine wrinkles.

10. An article of manufacture carrying a relatively heavy coating resulting from the composition of claim 1, said coating exhibiting coarse wrinkles.

11. An article of manufacture carrying a coating resulting from the composition of claim 1 in which the ratio of oil to resin is from 8 to 25 gallons of oil to 100 pounds of resin, the coating being of uneven depth and presenting areas of thin and areas of thick layers such areas exhibiting respectively fine and coarse wrinkles.

12. An article of manufacture carrying a coating comprising an undercoat of a raw China-wood oil wrinkle finish composition and a superposed coat of a nitrocellulose lacquer composition.

13. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto a wrinkling finish composition as set forth in claim 1, and drying the coating at a temperature which produces a wrinkle finish.

14. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto a wrinkling finish composition as set forth in claim 1, in which the ratio of oil to resin is from 8 to 25 gallons of oil to 100 pounds of resin and drying the coating at a temperature of from 120° F. to 450° F.

15. The process of producing wrinkling finishes on articles of manufacture which comprises applying thereto a wrinkling finish composition as set forth in claim 1, and baking the coating under conditions to produce a wrinkle finish carrying accentuated rugosities.
16. The process of producing finishes on articles of manufacture which comprises applying thereto the composition of claim 1, in which the ratio of oil to resin is from 8 to 25 gallons of oil to 100 pounds of resin baking the coating, and applying thereover, a nitrocellulose lacquer composition.
17. An article of manufacture carrying a coating comprising an undercoat of a raw China-wood oil wrinkle finish composition, and a protecting overcoat on the wrinkled undercoat.
18. A wrinkle finish composition comprising raw China-wood oil and a non-wrinkling oil, the proportion of the latter being insufficient to prevent substantial wrinkling of the composition when dried on a surface coated therewith.
19. An article of manufacture carrying a wrinkled coating of a raw China-wood oil wrinkle finish composition.
20. An article of manufacture carrying a wrinkled coating of a raw China-wood oil wrinkle finish composition containing a non-wrinkling oil in an amount insufficient to prevent substantial wrinkling of the coating composition, but sufficient to yield increased flexibility to the coating.
21. An article of manufacture carrying a raw China-wood oil wrinkle finish composition including a non-wrinkling oil, the latter being present in an amount insufficient to prevent substantial wrinkling in the coating, and a protecting overcoat on the wrinkled coating.
22. An improved varnish or enamel composition for producing wrinkled finishes comprising China-wood oil and a resin, a drier and a thinner in proportions to yield a wrinkled finish upon drying.
23. The process of producing coatings on articles of manufacture which comprises applying to the surface of such article a drying oil composition adapted upon baking to yield a wrinkled finish coating, and then baking the coated article to produce a wrinkled finish coating.
24. The process of producing coatings on articles of manufacture which comprises applying to the surface of such articles a blown drying oil composition adapted upon baking to yield a wrinkled finish coating, and then baking the coated article to produce a wrinkled finish coating.
25. The process of producing coatings on articles of manufacture which comprises applying to the surface of such articles a China-wood oil composition adapted upon baking to yield a wrinkled finish coating, and then baking the coated article to produce a wrinkled finish coating.
26. The process of producing coatings on articles of manufacture which comprises applying to the surface of such articles a composition containing oxidized China-wood oil adapted upon baking to yield a wrinkled finish coating, and then baking the coated article to produce a wrinkled finish coating.
27. The process of producing coatings on articles of manufacture which comprises applying to the surface of such articles a thick film of a drying oil composition adapted upon baking to yield a coarsely wrinkled finish coating, and then baking the coated article to produce a coarsely wrinkled finish coating.
28. The process of producing coatings on articles of manufacture which comprises applying to the surface of such articles a thin film of a drying oil composition adapted upon baking to yield a finely wrinkled finish coating, and then baking the coated article to produce a finely wrinkled finish coating.
- FRANK BRIAN ROOT.