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## OIL-RESIN COATING COMPOSITION

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The present invention relates to compositions containing drying oils together with resinous ingredients and primarily intended for the production of coatings. This application is a continuation-in-part of a copending application Serial No. 76,394 filed April 25, 1936, which, since the filing of this case, has become Patent No. 2,152,633 granted April 4, 1939. As disclosed in the prior application the invention comprises the conversion or advancement of oil-resin compositions to a condition of substantial chemical inertness and non-solubility, and the products are generally in the form of soft plastic solids or further heat-treated to hard brittle resin-like solids. These products include an agent such as zinc oxide for rendering them dispersible in hydrocarbon thinners.

The present application relates more particularly to a composition in which the resinous component is a direct homo-polymerization product such as the cumarone and indene resins, vinyl compounds, divinyl benzene polymers, polyvinyl esters, etc. Compositions made from such resins and fatty oils, when brought or advanced to the condition of inertness and insolubility in the presence of a control agent whereby they become dispersible are found to yield coatings which harden directly upon evaporation of the solvent content into homogeneous films inert to oxidizing action and lacquer solvents. Films can be so obtained which do not lift or dissolve upon application of lacquers or other finish coatings, and they are markedly superior to the ordinary coumarone drying oil films.

As explained in the prior application the advancement of oil-resin compositions can be determined by measuring the extractability with acetone, i. e. the proportion of non-extractable material remaining is a direct measure of the degree of advancement; by advancement is intended a conversion, preferably caused by heating, of the composition. Heretofore it has been considered impossible to prepare useful oil-resin coating compositions with a non-extractability by acetone greater than 15 to 30 per cent since they become non-dispersible in hydrocarbon thinners used in making coating compositions. By the inclusion of a control agent the compositions can be advanced to a non-acetone-extractability materially in excess of 30 per cent and as high as 90 per cent and more and yet remain dispersible in hydrocarbon thinners. Normally at least 30 per cent and preferably about 60 per cent or more of acetone-extractable material is converted by advancement into acetone non-extractable material; such compositions yield films of requisite resistance to the solvent action of lacquers and other superposed coatings.

Oils suitable for the purposes of this invention include the drying and semi-drying fatty oils such as tung, linseed, oiticica, soyabean, fish, perilla, poppyseed, etc.; all such oils are herein designated as drying oils. Non-drying oils such as rape, cotton seed, corn, etc. may be included or substituted at least in part. Likewise compatible plasticizing agents such as aryl or alkyl phosphates or phthalates may be incorporated. The preferred compositions are in general those which contain tung oil as a major portion of the oil content.

Widely varying proportions of resins and oils can be used, but conditions such as the solvent resistance of the film, drying time, flexibility, etc. indicate as an upper limiting ratio of resin to oil to be about 40 parts of resin to 60 parts of oil. The best results apparently are obtained with a ratio approximating 30 parts of resin to 70 parts of oil.

Zinc oxide is preferred as a control agent in obtaining dispersibility of the compositions in hydrocarbon thinners. In general the minimum quantity of zinc oxide to be included in compositions having as their resinous component a member of the natural resin group is about 10 per cent based on the total weight of oil. In place of zinc oxide there can be substituted the oxides of lead, magnesium, calcium or the hydroxides, naphthenates, tungates, etc. of these metals, other metallic soaps, carbon black, etc. The oxides and hydroxides can be substituted in about equivalent proportions for zinc oxide, but for other agents the proportions may vary widely.

The advanced or converted oil-resin compositions, made dispersible by the inclusion of control agents, are employed as dispersions in hydrocarbon thinners such as toluol, xylol, benzol, hydrogenated petroleum, etc. The dispersions are readily obtained merely by adding the compositions to thinners at room temperature; but the compositions in solid form are preferably coarsely ground or broken up before their addition to thinners. The particle size of the compositions in the dispersed form usually does not exceed two microns. If the concentration of the compositions in the dispersions is not less than 50 per cent the dispersions remain completely stable and show no substantial separation on aging; when the concentration is less than 50 per cent there may be some separation but without impairing the usefulness as coating compositions.

The dispersions possess the characteristics of low viscosity, high percentage of solid flow and leveling which make them useful as coating compositions to be applied by spraying, dipping or brushing. The solvents or thinners readily escape from the films and there is no apparent tendency during drying to retard evaporation with consequent shrinkage. The films dry rapidly (in about 3 to 5 minutes when highly volatile thinners are used) and they are practically inert to the oxidizing action of air with no apparent tendency to lift, blister or crack when finish coats such as cellulose ester lacquers are applied.

Fillers, pigments, dyes, etc. can be incorporated with these advanced oil-resin compositions or with their dispersions to give highly satisfactory paints and enamels; it is also possible to mix them with other oil or oil-resin compositions. Mixing is best done by preliminarily passing the advanced oil-resin dispersion through a colloid mill, as when so processed it is found to mix more readily and with a greater variety of paints, enamels, varnishes and japans than is otherwise the case. Such processing also is desirable when no mixing is intended for it results in a decreased drying time, improves the gloss, and promotes more even hardening throughout the film to thereby further decrease the tendency to dimensional change during the drying of the film.

The converted or advanced oil-resin compositions with or without thinners can be admixed with other oils, resins or varnishes, and when so blended accelerate the drying and hardening of the latter sometimes as much as 30 to 50 per cent or more. This is especially true when added to alkyd resin coating compositions and the like which ordinarily remain tacky for 6 to 8 hours; and their hardening time can be shortened to as little as one-half hour by the addition of 50 per cent of an advanced composition of an oil and resin as herein described.

While dispersions of these advanced oil-resin compositions have proven particularly suitable for use as priming coats on metal, wood, and the like, they can also be used to coat paper, cloth, parchment, leather, etc. They have proven valuable as well in the coating of porous surfaces such as plaster, wallboard, adobe, concrete, papier-mâché, etc., since they deposit a stable, rapid drying film resistant to solvent and water and thus provide an effective "sealer" coat on the surface of porous materials. The converted compositions or their dispersions can also be applied to surfaces of asphalt, wax, halogenated naphthalene wax or the like, and when so applied provide a sealing coat which prevents bleeding from an asphalt or wax surface into any lacquer or varnish coat that may be applied subsequently; this has proven effective in the coating of wire which is first given a wax coating, then a coating of an advanced oil-resin dispersion and then a lacquer or varnish.

For a more complete understanding of the invention the following examples are given but it is to be understood that they are merely illustrative and not restrictive.

*Example I.*—A varnish grade coumarone resin melting at about 150 to 160° C. was mixed with China wood oil and zinc oxide in varying proportions and the mixture heated at 250° C. for a period to bring it to the desired degree of advancement. It was found that a period of about 5 hours was required to convert about 60 per cent or more of the acetone-extractable to the non-extractable condition; this extent of conversion is generally desirable for resistant tough undercoatings.

The mixtures were prepared in the following proportions:

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| A | 15 resin | 55 CWO | 30 ZnO |
| B | 25 resin | 50 CWO | 25 ZnO |
| C | 35 resin | 50 CWO | 15 ZnO |
| D | 25 resin | 45 CWO | 30 ZnO |

The acetone extractions were determined by coarsely grinding samples of the composition, placing in a Soxhlet extraction apparatus, and subjecting to acetone extraction for about 16 hours. The retained material was dried for 4 hours at 70° C., and the loss in weight gave the amount of extractable matter. Acetone extractions of the above compositions showed from 65 to 80 per cent non-extractable material.

The xylene dispersions were thinned to about 100 k. v., poured on tin plate and allowed to dry by evaporation of the solvent. They were then spray coated with nitrocellulose lacquer containing white pigment. The cumarone resin films were light in color with a yellowish cast, and the lacquer coatings did not cause roughening, pimpling or pulling at the edges. Apparently mixture C while reasonably good for ordinary uses approached the limiting conditions as to relative percentages for it showed some tendency toward solution by the superposed lacquer coating as indicated by its surface appearance and the edges. This may be attributed possibly to the low percentage of zinc oxide (15 per cent) in conjunction with the relatively high percentage of cumarone resin (35 per cent), since the resin itself is sluggish in reaction in comparison with other types of oil-soluble resins.

*Example II.*—Compositions consisting of polymerized divinyl benzene, China wood oil and a control agent may be advanced by heating to give materials having a high degree of acetone non-extractability and yet maintain the ability to be dispersed in hydrocarbon thinners. These yield, upon the evaporation of solvent, films of good integrity and excellent resistance to lacquer solvents. For example, 15 parts of divinyl benzene polymer, 55 parts of China wood oil and 30 parts of zinc oxide were heated for four hours, a sample taken and the remainder thinned with xylene. The sample proved to be non-extractable with acetone to the extent of 62 per cent of the weight of the resin oil. The xylene dispersion, thinned to brushing viscosity, coated out on sheet metal and allowed 15 minutes to evaporate the thinner, yielded a film substantially unaffected by a nitrocellulose lacquer superimposed by spraying.

What is claimed is:

1. In a process of preparing an oil-resin composition dispersible in a hydrocarbon thinner to yield a film-forming composition the step which comprises advancing by heating a composition of a fatty oil which in part at least is a drying oil and a homo-polymerized resin in the presence of a control agent selected from the group consisting of the oxides, hydroxides and naphthenates of zinc, lead, magnesium and calcium and metallic soaps until at least thirty per cent of original oil-resin is converted into acetone non-extractable material, the upper limiting ratio of resin to oil being about 40 parts of the former to 60 parts of the latter and a control agent present to the extent of at least 10% on the weight of the oil calculated as zinc oxide.

2. Process according to claim 1 in which the drying oil constituent is China wood oil.

3. Process according to claim 1 in which the resin is coumarone resin.

4. Process according to claim 1 in which the agent is zinc oxide.

5. Process according to claim 1 in which the advancement by heating takes place at about 250° C.

6. Composition suitable for use in coating compositions drying substantially by evaporation comprising a fatty oil which in part at least is a drying oil, homo-polymerized resin and a control agent selected from the group consisting of the oxides, hydroxides and naphthenates of zinc, lead, magnesium and calcium and metallic soaps, said composition being in a state of heat-advancement characterized by a conversion of at least thirty per cent of original oil-resin into acetone non-extractable material, the upper limiting ratio of resin to oil being about 40 parts of the former to 60 parts of the latter and a control agent present to the extent of at least 10% on the weight of the oil calculated as zinc oxide.

7. Composition according to claim 6 in which the drying oil constituent is China wood oil.

8. Composition according to claim 6 in which the resin is coumarone resin.

9. Composition according to claim 6 in which the agent is zinc oxide.

10. Composition according to claim 6 in which the agent is zinc oxide constituting at least fifteen per cent and the resin is coumarone resin constituting not more than thirty-five per cent of the composition.

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