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COATING

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This invention relates to the coating of metals and, more particularly, to methods of preventing the color degradation of lacquers in which metal objects are dipped.

Lacquers are generally composed of nitrocellulose, cellulose acetate or cellulose ether bases in a suitable solvent or mixture of solvents together with diluents or non-solvents, one or more plasticizers and suitable resins. Pigments, carbon black, metal powders, etc., may be added to give any desired colors. Water white or nearly water white lacquers are required where it is desired to cover highly polished metal surfaces with a thin invisible film to prevent tarnishing of the metal. Frequently, particularly where the surface is large, the lacquer is sprayed upon the object to obtain the desired coverage. Smaller articles, having much smaller surfaces, are often dipped into the lacquer contained in a suitable metal container generally by placing a suitable number in a wired metal basket which is lowered into the lacquer, and then raised above the surface of the solution and excess lacquer is allowed to run back into the lacquer container. In this manner, the same lacquer may be used for dipping a large number of metal articles.

Articles may also be machine dipped. One arrangement involves securing the object on spiked frames which are inserted into a holding rack. The objects are then automatically immersed and withdrawn by a speed controlled machine. The lacquer used for the dipping operations is placed into its container after having been reduced first to its proper consistency. The lacquer is permitted to free itself of air bubbles which rise to the surface.

It has been the experience that the colorless or nearly colorless lacquers used in this manner gradually acquire a greenish tint which becomes intensified with further use. This is particularly true where metallic articles containing high copper content are being dipped, for example, brass, bronze, or copper cigarette cases, compacts, stampings, trays, candle sticks. Once the lacquer becomes colored it is no longer very satisfactory for further use in dipping operations due to the fact that certain stampings or other metallic goods do not completely drain off excess lacquer after the removal from the dipping bath. Upon drying, the goods tinted would show green spots or may even have a green sheen throughout. This is, of course, objectionable where it is desired to retain the appearance of the original polished metal surface.

An object of this invention is to decolorize used lacquers after they have become greenish colored through use in dipping operations and to restore the original color of the lacquer.

A further object of the invention is to add to the original colorless lacquer the decolorizing agent so as to prevent the formation of greenish tint with the use of the lacquer in dipping operations. Small quantities of the agent may be added from time to time to maintain the original color of the lacquer until it is consumed in dipping operations. This and other objects of the invention are accomplished by using a decolorizing agent, a compound having the general formula $R_1R_2R_3PO_3$. Where R_1, R_2 and R_3 may be either hydrogen or an organic radical including alkyl, aryl, alkyl aryl, cycloalkyl radicals which may or may not be substituted.

Suitable compounds for use for the purpose of the invention include phosphorus acid, tricresyl phosphite, triphenyl phosphite, triamyl phosphite, methyl dihydrogen phosphite, diethyl phosphite, hydroxyl ethyl dimethyl phosphite. It is preferable to use compounds which are solid at room temperatures since high boiling liquids act as plasticizers and upset the balance in product composition of the original lacquer. For this purpose phosphorus acid is particularly effective since it is a solid at room temperature and has no disadvantageous property with respect to the adherence of the film of lacquer to the metal to which it is applied.

Moreover, it is not corrosive in such compositions either to the lacquer bath, the article to which it is applied or to the wire baskets used for immersion of the articles in the lacquer bath.

Compounds of this invention may be used alone or in admixture with suitable solvents. Thus, the phosphorus acid may be dissolved in dioxane and concentrated solutions of the phosphorus acids in dioxane may be used.

One composition has been found particularly effective as follows:

	Parts
Phosphorus acid	15
Dioxane	100
Colorless nitrocellulose lacquer	5

The compounds of my invention may be used in concentrations of as low as 0.01% of the effective reagent and up to 1.0% or more.

They may be added to the original lacquer in concentrations of 0.01% to 1.0% or more and more of the compound added periodically depending upon the extent to which the lacquer is used in dipping operations. They may be also

added to lacquers that have been used and which have acquired a green color. The amount required to decolorize the lacquer depends upon the intensity of the green color, although as little as one hundredth of a per cent of the active ingredient is frequently effective.

One explanation of the effectiveness of these compounds is that they reduce cupric salts which gradually accumulate in the lacquer due to either failure to wash any free acid from the metal pieces satisfactorily before use, or to the presence of acid forming resins in the lacquer. The invention is, however, in no way limited to the mechanism or interpretation of its action.

As an example of the effectiveness of the compositions of my invention, the following is an example: A commercial colorless lacquer was used for dipping operations for a period of three weeks. A light green tinge was acquired by the lacquer and it was unsatisfactory for use in high grade work. Upon adding 0.1% of the following composition:

	Parts
Dioxane	100
Phosphorus acid	15
Clear lacquer	5

the original color of the lacquer was restored and it was used for a period of three weeks before it again acquired the greenish tinge. By repeated applications of 0.1% of the above composition, the entire amount of lacquer was consumed for dipping operations.

It is to be understood that the invention is not limited to the specific embodiments thereof described hereinabove, but includes all such modifications, variations and equivalents as fall in the scope of the appended claims.

I claim:

1. A process for the prevention of discoloration of clear lacquer compositions used for dipping copper and copper containing material which comprises adding thereto a small amount of a phosphite compound having the general formula $R_1R_2R_3PO_3$ where R_1, R_2 and R_3 are from the class consisting of hydrogen and organic radicals, the amount of said phosphite being sufficient to prevent said discoloration.

2. The process of restoring the original color of lacquer used in dipping operation, which lacquer has become discolored through use in the dipping of copper and copper containing materials, which comprises adding thereto a phosphite of the general formula $R_1R_2R_3PO_3$ where R_1, R_2 and R_3 are from the class consisting of hydrogen and organic radicals, the amount of said phosphite being sufficient to restore the said color.

3. A process according to claim 1 in which the compound is phosphorus acid.

4. A process according to claim 1 in which the phosphorus acid is used in concentrations of 0.01% to 1.0%.

5. A process according to claim 1 in which the compound is first dissolved in a compatible organic solvent and then added to the lacquer composition.

6. A process according to claim 1 in which the compound is triphenyl phosphite.

7. A process according to claim 1 in which the compound is tricresyl phosphate.

8. A process according to claim 2 in which the compound used is phosphorus acid and which is added in increments of 0.01% to 1.0% to the lacquer as it becomes degraded in color.

9. A process according to claim 2 in which the compound is triphenyl phosphite.

10. A composition of matter consisting of a clear lacquer and 0.01% to 1.0% of phosphorus acid.

11. A process for the prevention of the discoloration of clear lacquer compositions used for dipping copper and copper containing material by the addition thereto of 0.01% to 1.0% of phosphorus acid dissolved in a suitable solvent.

12. A process for the prevention of discoloration of clear lacquer compositions used for dipping copper and copper containing material by the addition to the clear lacquer of small amounts of a normally solid phosphite compound of the general formula $R_1R_2R_3PO_3$, where R_1, R_2 and R_3 are from the class consisting of hydrogen and organic radicals.

13. The process of restoring the original color of lacquer used in dipping operations by the addition to the used lacquer of small amounts of a normally solid phosphite compound of the general formula $R_1R_2R_3PO_3$ where R_1, R_2 and R_3 are from the class consisting of hydrogen and organic radicals.

14. A clear lacquer containing a small amount of a compound of the type



where R_1, R_2 and R_3 are from the class consisting of hydrogen and organic radicals, and where said amount is sufficient to stabilize the lacquer against discoloration when used for dipping copper and copper containing materials.

15. A composition of matter consisting of a cellulose ester, a solvent therefore, a soluble resin, a plasticizer and phosphorus acid in amount within about the range of 0.01% to 1.0% by weight based on the total weight of the mixture.

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