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# IMPREGNATED METAL CLEANER

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## ABSTRACT OF THE DISCLOSURE

A disposable metal cleaning cloth in the form of an absorbent paper, cloth or plastic impregnated with an acid-type metal cleaning formula containing as the active cleaning ingredients 1 to 3 parts by weight tartaric acid for each part by weight of alkali metal chloride.

This invention relates to metal cleaning cloths and, more particularly, to a disposable paper cleaner which is coated or impregnated with an acid type cleaning formula for polishing metals, such as copper.

Metal cleaners when applied to a flexible backing, particularly paper, have presented various problems which have restricted the use of such cleaners. The formulas have been hygroscopic, difficult to dry, have deteriorated upon storage and the texture of the final dried paper has presented problems in regard to handle and feel. Where a strong cleaning formula is used it has usually degrated or burned the paper to a point which its wet strength is destroyed. Moreover, effective metal cleaners usually are liquid and have a bad odor. Therefore, these cleaners are difficult to adhere to a paper backing and the unpleasant odor is very difficult to mask.

It is evident that in order to obtain a superior metal cleaning cloth of the acid type in a disposable form all of the above problems must be solved.

It is an object of this invention to provide a disposable metal cleaning cloth which can merely be moistened, rubbed on the tarnished metal surface, and then thrown away immediately after use.

It is another object of this invention to provide an effective metal cleaner having strong cleaning and polishing action which when placed on a porous, wet-strength backing member will dry completely to provide a cosmetic handle and feel, be stable to moisture, be free of odor, and not degrade or burn the backing member.

It is still another object of this invention to provide a metal cleaner which deposits a thin water-repellent film on the cleaned metal thus eliminating water spotting and affording antitarnish properties to he metal.

It has now been discovered that a disposable, acid-type metal cleaner may be provided by impregnating a flexible, absorbent, wet strength carrier member with tartaric acid and an alkali metal salt of an inorganic acid.

The tartaric acid in combination with the alkali metal salt of an inorganic acid provides an unexpectedly strong cleaning action when moistened and applied to a metal surface while at the same time not degrading or giving an undesirable odor to the paper. It is theorized that the tartaric acid in the presence of water reacts with the inorganic salt to release a small amount of inorganic acid. Thus, while the tartaric acid and the inorganic alkali metal salt have a small effect on cleaning metal when used alone, it is found that when the two are combined, an unexpected cleaning effect is achieved which is above the additive. The tartaric acid used in the formula is highly water soluble and allows freedom in formulating the remaining cleaner ingredients at any percentage desired. This acid also gives the necessary pH to provide effective cleaning power when the metal cleaner is moistened and applied to an alkaline oxide tarnished metal.



Among the alkali metal salts of inorganic acids which can be used in the metal cleaner formula of this invention are the water-soluble sodium, potassium, calcium and magnesium salts of the chlorides, sulfates, nitrates or fluorides. By alkali metal salts is meant not only the typical sodium and potassium salts but also the so-called "alkaline earth metal salts" of calcium, magnesium, barium and strontium. Preferred salts are sodium chloride and potassium chloride.

To the above basic formula may be added various mild abrasives (polishing agents), fillers, film-forming (antitarnish) ingredients, wetting agents, humectants, anti-oxidants and corrosion inhibitors if such are desired.

Any mild abrasive which will develop a high polish without scaring or damaging the metal surface can be used. Thus, the abrasive ingredient should be free of coarse, hard grit particles. Finely divided silica (having a size of under 200 mesh U.S. Standard Sieve) is suitable for this purpose. Typically, the silica will have a screen analysis wherein only 1% or less is retained on a 325 mesh screen. Other abrasives such as jewelers rouge (iron oxide), whiting, talc, magnesium oxide, and other suitable metal oxides could be used. Basically, the cleaning action desired is chemical and the mild abrasive is only present for achieving a high lustre or polish. Abrasive action should be kept at a minimum.

Among the fillers which can be used, it is preferred to use the alkali metal salt of an inorganic acid since this not only serves to give body to the coating but also enhances the cleaning power of the tartaric acid by releasing a small amount of free acid. Of course, other fillers could be used.

As film-forming ingredients, it is preferable to use a fatty acid such as oleic acid. The oleic acid forms a thin water-repellent film on the metal being cleaned, thus providing good run-off (no water-spotting). Since the oleic acid by itself tends to run-off the paper backing during application of the cleaner to the paper it is preferred to combine the oleic with other fatty acids which help to achieve proper adherence of the oleic acid to the paper. These acids are known in the art and include fatty acids having a titre (congeal point) in the range of 95° to 125° F., e.g., palmitoleic acid, linoleic acid. A suitable mixture of fatty acids which can be used in combination with oleic acid is sold under the trade name Neo-fat 65. Neo-fat 65 contains a mixture of distilled animal fats, i.e., palmitic, stearic and oleic acids with small amounts of myristic, myristoleic, palmitoleic, linoleic and linolenic acids also being present. Various silicone compounds could also be used together with the oleic acid. The end result of these film-forming ingredients is to improve the handle and feel of the impregnated paper.

The wetting agent used in the formula is usually a nonionic detergent (compounds produced by condensation of ethylene oxide groups which are hydrophilic in nature with aliphatic or aklyl aromatic groups which are hydrophobic in nature) which provides good contact between the cleaning formula and the metal when the dried formula is moistened. Any detergent stable to acid could be used. A particularly effective wetting agent has been found in a class of nonionics sold under the tradename of "Pluronic." Pluronics are formed by condensing ethylene oxide with a hydrophobic base formed by the condensasion of propylene oxide with propylene gycol. The hydrophobic portion of the molecule, exhibits water insolubility. Its molecular weight is of the order of 1500 to 1800. The addition of polyoxyethylene radicals to this hydrophobic portion increase the water solubility of the molecule as a whole. Thus, liquid products are obtained up to the point where polyoxyethylene content is about 50% of the total weight of the condensation product. Of

course, other nonionics stable to acid while not preferred can also be used.

The flexible backing member used in this invention may be any type wet strength paper, cloth, or plastic sufficiently porous and absorbent to retain the cleaner solution during drying. Paper such as Kraft paper, bleached or unbleached, is preferable due to its low cost. Plastic laminated paper, the plastic forming the bottom or intermediate layer, may also be used if added strength is desired in the paper carrier. It can be seen that one or two work surfaces can be used depending on the type of plastic lamination.

A metal cleaning formula which can ge applied to unbleached kraft paper is as follows:

| Ingredient | Percent range | Preferred range, percent |
|---|---|---|
| Tartaric acid | 5–50 | 15–45 |
| Alkali metal salt of inorganic acid | 5–20 | 10–20 |
| Mild abrasive (less than 200 mesh) | 10–50 | 20–30 |
| Nonionic detergent | 5–30 | 5–20 |
| Water | 20–50 | 25–35 |

The flexible backing sheet of paper or colth is passed through a solution or bath of the above ingredients. The solution is previously heated to between 75° to 100° F. and agitated to provide good impregnation. The sheet after being impregnated by being passed through a bath of this solution, is then passed between a pair of soft rollers which removes excess cleaner and is dried by passage through a hot air dryer. The tension on the roller determines the amount of cleaner applied to the paper or cloth backing when the viscosity is kept between 3000 and 5000 centipoises. If the viscosity is too high, an incorrect amount of cleaner will be applied. Drying time in air is dependent on temperature, air velocity, amount of cleaner coated, the moisture of the coating and the humidity of the air. This product can be dried to about 3–7% moisture in a high velocity drier at 300° to 350° F. in a very short time (15–60 seconds). At an air temperature of 320° F. about 20–25 seconds residence time is required to dry the impregnated cleaner. After the paper or cloth is treated and dried, it is cut into sheets of convenient size and a number of sheets are enclosed in roll form in a suitable package. A good seal should be provided to prevent excessive drying of the cleaner. This leads to brittlenes or crumbling of the product. Use of a humectant, such as glycerin or polyethylene glycol, in the cleaner formula also helps to prevent over-drying while the cleaner is stored.

The dried formula is stable upon storage for several months under all normal moisture conditions encountered commercially, and has its cleaning power released by merely moistening the paper or cloth. A sheet of the cleaner may be simply removed from the wrapper, moistened, and then rubbed several times over the tarnished metal surface. This will renew the original finish on the metal surface.

This invention will now be described by reference to the following specific examples.

Example 1

| | Grams | Percent by weight |
|---|---|---|
| Tartaric acid | 300 | 30 |
| Silica (2-4 microns) | 200 | 20 |
| Pluronic detergent | 150 | 15 |
| Sodium chloride | 150 | 15 |
| Mixture of distilled animal fatty acids (Neo-fat 65) | 100 | 10 |
| Oleic acid | 90 | 9 |
| Polyethylene glycol | 10 | 1 |
| | 1,000 | 100 |

The above formula was prepared by dissolving the tartaric acid and the sodium chloride in 600 cc. of warm water (90° to 100° F.). The oleic acid, mixture of fatty acids and Pluronic detergent were heated at 180° to 210° F. in a sepaarte container until melted. The water solution was then added to the hot melt until a smooth emulsion was obtained. Finally, the silica patricles were blended into the solution until a smooth suspension of all the particles occurred.

The completed formula was placed in a receptacle and heated to 125° F. with agitation. Bleached white kraft paper was then passed through the cleaner solution in strip or web form. The paper absorbed the solution and excess cleaner carried on the surface was removed by passing the paper through a set of rollers. The impregnated paper was then air-dried at a temperature of 75° F. and a relative humidity of under 50% over a period of about 15 hours. Moisture content of the paper was reduced to about 5%. The weight of formula deposited on the kraft paper was about 12.8 grams per square foot and this formula was uniformly distributed through the paper medium due to the process employed. The final dried paper was non-hygroscopic on storage, had no undesirable odor, had a cosmetic or soft feel when handled, and provided strong cleaning power when moistened and rubbed against a tarnished copper surface.

Example 2

The procedure of the above example was repeated with the exception that the drying time was shortened to about 30 seconds. This was accomplished by passing the impregnated paper through a drying tunnel 20 feet long. Temperature of the air in the tunnel was 320° F. and the wet paper travelled at a speed of 60 feet per minute. The paper was removed from the tunnel at 5% moisture and was similar in all respects to the product of Example 1.

While this invention has been described by reference to a specific example, reference should be had to the appended claims for a definition of its scope.

What is claimed is:

1. A metal cleaner of the acid type consisting essentially of a wet-strength paper, cloth or plastic backing impregnated with tartaric acid and an alkali metal salt of an inorganic acid, said acid and said salt being present in the weight ratio of between 1:1 and 3:1 and being at least partially absorbed by said fibers.

2. The impregnated metal cleaner of claim 11 wherein the tartaric acid is present at 15–45% by weight, mild abrasive having a particle size of less than 325 mesh U.S. Standard Sieve and present at a level of 20–30% by weight, alkali metal salt of an inorganic acid present at a level of 10–20% by weight, a nonionic wetting agent stable to acid present at a level of 5–20% by weight (and oleic acid present at a level of 1–10% by weight.

3. The impregnated metal cleaner of claim 2 wherein the nonionic wetting agent is a condensation product of propylene oxide and propylene glycol having a molecular weight of 1500–1800.

4. The impregnated metal cleaner of claim 3 wherein the oleic acid is combined with fatty acids having a titre in the range of 95° to 125° F.

5. The impregnated metal cleaner of claim 4 wherein the alkali metal salt is sodium chloride.

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