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## IMPREGNATING AGENT FOR METAL WOOL PADS

Henry A. Goldsmith and Alfred Leroy Humbert, Boston, Mass., assignors, by mesne assignments, to Phipps Products Co., Boston, Mass., a partnership

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This invention relates to a surface-active or detergent composition, and more particularly to an impregnating agent for metal wool pads, made of steel or aluminum wool, shavings and the like for use in connection with cleansing operations in kitchens, of household utensils, etc.

It has been found in practice that metal wool pads which contain a soap or detergent composition do not fulfill satisfactorily and adequately the requirements necessitated by the handling of various metallic articles to be cleansed and called for by the use of these pads, especially in hard and sea water.

Many substances have been proposed for admixture with soap and other cleansing compounds to improve their usefulness in hard water, but despite certain improvements obtained, other desirable properties were unobtainable, so that these compounds displayed objectionable results and became detrimental to effective and economical cleansing operations and to the treated metal surface of the articles.

The present invention tends to overcome these disadvantages and to markedly improve cleansing pads, in particular made from metal wool and has as its main objects to provide an impregnating agent which clings to the surfaces of the metal fibres or shavings, inhibits corrosion and staining of the pad or carrier, is substantially stabilized in hard water and provides surface active properties, such as foaming, lathering, etc. in such hard water without being dissolved speedily and in particular at higher temperatures at which cleansing operations are being performed.

It belongs further among the objects of this invention to impart to the composition the ability of inhibiting rusting of the metallic pad during storage, even if the pad or carrier became moist and of being manufactured in an economical manner, preferably by dipping the pad into the melted impregnating compound.

It is further of advantage that the pad containing the impregnating and detergent agent according to this invention remains substantially elastic and pliable when used during washing and scrubbing operations, that it does not have any irritating effects on the human skin and dusting and chipping off of the impregnating agent will be reduced to a minimum.

The above and other features and advantages of this invention may be more readily understood from the following description in which preferred examples have been disclosed by which the invention may be carried into effect.

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It has been found during certain tests to determine the effectiveness of impregnating compounds in connection with metallic wool pads for use in cleansing purposes, that an agent made in accordance with this invention and composed of hydrocarbon sulfonate, resinate and alkali soap of a solid fatty acid with a suitable binder, solubility retarder and corrosion inhibitor in the presence of a water softener, may advantageously be used to replace the soap in presently employed metal pads and to fulfill all the needs and requirements of the practice.

A preferred impregnating agent for this purpose may be composed of the following more specific ingredients within the following ranges:

*Example I*

| | Per cent by weight |
|---|---|
| Alkali alkyl benzene sulfonate | about 15–25 |
| Alkali abietate, such as sodium abietate or potassium abietate | about 5–15 |
| Solid fatty acid, such as hydrogenated fish oil fatty acid, with M. P. 60° to 62° C. | about 5–15 |
| Alkali hydroxide, such as potassium hydroxide | about 1–3 |
| Alkali polyphosphate, such as sodium tri(poly) phosphate | about 0.5–5 |
| Alkali silicate, such as sodium metasilicate | about 0.5–5 |
| Amorphous petroleum or microcrystalline wax, with M. P. 170–5° F. | about 5–15 |
| Sodium nitrite | about 0.1–1 |
| Dye | optional |
| Water | being the balance |

Excellent results were obtained by the use of the following specific mixture:

*Example II*

| | Per cent by weight |
|---|---|
| Alkyl benzene sulfonate | 17.820 |
| Sodium abietate | 8.500 |
| Hydrogenated fish oil fatty acid, with melting point 60° to 62° C. | 11.320 |
| Potassium hydroxide | 1.910 |
| Sodium tri(poly) phosphate | 1.275 |
| Sodium metasilicate | 1.275 |
| Amorphous petroleum wax; melting point 170–5° F. | 12.720 |
| Sodium nitrite | 0.340 |
| Dye | 0.004 |
| Water | 44.836 |
| | 100.000 |

In order to prepare this impregnating composition, the following steps are proposed:

To a solution of the alkyl benzene sulfonate in water, sodium abietate is added and dissolved by heating the mixture to 65°–85° C., while stirring the same. The fatty acid is gradually added while maintaining the mixture at 65°–85° C. during stirring. The potassium hydroxide (preferably dissolved in a small quantity of water) is then added to saponify the fatty acid. (Such a soap may also be prepared separately by saponifying a suitable hydrogenated solid glyeride with potassium hydroxide, the resultant product then being added.) The polyphosphate and the metasilicate are then dissolved in the mixture; the wax is added in small chips or in melted state, and is emulsified by stirring the hot mixture. Dye and sodium nitrite are introduced as the last step. When the mixture is homogeneous, it is ready for application upon a pad or other carrier by dipping, spraying, etc.

Alkyl benzene sulfonate which forms the detergent base for the other ingredients, contributes considerably to the stability of the impregnating agent in hard water and assists in the development of profuse foaming and lathering, whereas sodium abietate constitutes an inexpensive wetting agent and detergent, which in conjunction with alkyl benzene sulfonate is highly efficient to inhibit corrosion and staining of metallic wool pads and of aluminum articles treated.

Potassium soap of fatty acid, preferably derived from hydrogenated fish oil fatty acid and potassium hydroxide lowers the rate of solubility of the impregnating agent, which possesses a relatively low solubility at higher temperature up to about 55° C. in water.

Amorphous petroleum wax forms a binder, further reduces solubility and powdering off of the impregnating agent in dry state. Sodium tripolyphosphate helps to improve detergency and lather, particularly in hard water, and sodium nitrite acts as a rust preventing ingredient, in particular for steel wool pads, does not irritate the skin, whereas sodium metasilicate furthers the prevention of corrosion on iron, steel and aluminum.

The resultant agent produces an effective detergent action, can be simply and inexpensively manufactured with commercially readily available components and compares favorably with heretofore known detergents for scouring and cleansing pads.

The impregnating agent when used in hard water (500 P. P. M. $CaCo_3$) is completely soluble, dispersible, lathers well, does not form a film on the article to be cleaned and rinses off easily.

It has been found that when commercially available sodium tallow soap and the new impregnating agent are coated on a glass slide and placed in water of 40° C., the tallow soap is washed off in about six minutes, whereas the impregnating agent is about three times more stable and dissolves only after about fifteen to twenty minutes.

Corrosion tests on aluminum have shown that the impregnating agent according to this invention does not leave any stain after twenty minutes of its application to and steaming of the aluminum utensil while ordinary pads now on the market cause staining within a very short time and even without the application of steam.

Rusting of steel wool pads occurs normally very rapidly when sulfonates are employed. If the new compound is placed in contact with the steel wool pad, the same is prevented from rusting for at least 24 hours.



As further examples illustrating the present invention, the following mixtures in the following proportionate relationship are given:

*Example III*

| | Per cent by weight |
|---|---|
| Alkali alkyl sulfonate | about 10–25 |
| (Optional) Alkali fatty alcohol sulfate, such as sodium lauryl sulfate | up to 10 |
| Alkali abietate, such as sodium abietate | about 5–15 |
| Potassium stearate (or another suitable alkali soap of a solid fatty acid) | about 5–15 |
| Microcrystalline wax, with melting point 170–5° F. | about 5–15 |
| (Optional) Glycol, such as ethylene or diethylene glycol | up to 10 |
| Alkali silicate, e. g. sodium metasilicate | about 0.5–5 |
| Alkali polyphosphate, e. g. sodium tripolyphosphate | about 0.5–5 |
| Sodium nitrite | about 0.1–1 |
| Water | being the balance |

*Example IV*

| | Per cent by weight |
|---|---|
| Alkali alkyl sulfonate | 17.30 |
| Sodium lauryl sulfate | 4.90 |
| Sodium abietate | 4.84 |
| Potassium stearate | 12.55 |
| Microcrystalline wax, with melting point 170–5° F | 12.10 |
| Ethylene glycol | 8.05 |
| Sodium metasilicate | 1.21 |
| Sodium tripolyphosphate | 1.21 |
| Sodium nitrite | 0.33 |
| Water | 37.51 |
| | 100.00 |

One proceeds as follows to prepare this impregnating compound:

Potassium stearate is made by neutralizing melted stearic acid with a hot aqueous solution of potassium hydroxide. The resultant compound is then mixed at 65–85° C. with a hot solution of alkali alkyl sulfonate and of alkali fatty alcohol sulfate. Glycol is added, and alkali silicate and polyphosphate are dissolved in the hot mixture while stirring the same continuously. Then wax is added, either in small lumps or in melted form, and is emulsified while stirring the mixture. Sodium nitrite is then added and, as last step, dissolved. (Dye may also be added.) The water content of the mixture may be adjusted to facilitate the dipping or spraying of the hot mixture unto its carrier.

It will be obvious that the properties of the impregnating agent will be somewhat affected by the proportions of the various ingredients present. Since the details that have been given are for the purpose of illustration and not restriction of the invention, it is intended that variations within the spirit of the invention are to be included in the scope of the claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. As a new composition of matter, an im-

pregnating agent for metal wool carriers which consists of about 15 to 25% by weight of alkali alkyl benzene sulfonate, of about 5 to 15% by weight of alkali abietate, of about 5 to 15% by weight of solid fatty acid having a melting point of about 50° to 80° C., of about 1 to 3% by weight of alkali hydroxide, of about 0.5 to 5% by weight of alkali polyphosphate, of about 0.5 to 5% by weight of alkali silicate, of about 5 to 15% by weight of amorphous petroleum wax, and of about 0.1 to 1% by weight of sodium nitrite, dye and water being the balance.

2. As a new composition of matter, an impregnating agent for metal wool pads which consists of 17.820% by weight of alkyl benzene sulfonate, of 8.500% by weight of sodium abietate, of 11.320% by weight of hydrogenated fish oil fatty acid, of 1.910% by weight of potassium hydroxide, of 1.275% by weight of sodium tri(poly)phosphate, of 1.275% by weight of sodium metasilicate, of 12.720% by weight of amorphous petroleum wax of 0.340% by weight of sodium nitrite, of 0.004% by weight of dye, and of 44.836% of weight of water.



HENRY A. GOLDSMITH.
ALFRED LEROY HUMBERT.

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