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CLEANING COMPOSITION

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4 Claims. (Cl. 252—126)

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This invention relates in general to a cleaning composition and in particular to an emulsion-type cleaner, and a method for its preparation and use.

In the cleaning of industrial equipment there are frequently encountered problems involving the removal of heavy deposits of grease and oil sometimes combined with deposits of sludge, scale and the like. It is an object of this invention to provide a cleaner that is adapted to remove oily deposits.

It is another object to provide an emulsion-type cleaner for use in removing oily deposits from industrial and similar equipment.

It is another object to provide a solvent-emulsion cleaner for removing oily desposits.

It is another object to provide a solvent-emulsion cleaner concentrate that is adapted to be diluted to form a cleaning composition for oily deposits.

Further objects and advantages of this invention as well as its use and operation will in part be obvious and will in part become apparent from the following description and claims.

The cleaner according to this invention comprises in general a solvent-emulsion concentrate which, when diluted with either water or a light petroleum distillate, can be used to remove grease or oil from surfaces such as, in particular, metallic surfaces. The concentrate comprises a mixture containing fatty acids, an emulsifying agent, an organic solvent, a saponifying agent, an aqueous medium, and optionally a corrosion inhibitor.

The fatty acids in the concentrate are supplied by a source such as, for example, tall oil, rosin, oleic acid, linoleic acid, or other similar unsaturated vegetable fatty acids. Acids of this sort are particularly advantageous in this concentrate inasmuch as they form soaps which have the advantage of being soluble in organic solvents such as, for example, petroleum fractions. In this way there is formed an emulsion-concentrate having a liquid phase containing a soluble soap, the liquid phase itself being at least a partial solvent for the deposit that is to be cleaned thereby.

As hereinbefore disclosed the emulsion concentrate contains an additional agent to improve the emulsifying properties of the concentrate and to aid in the solubility of the soap, such as for example, pine oil or the like. This agent serves to improve the emulsifying properties of the concentrate and in addition has the following actions. The emulsifying agent aids in the solubility of the fatty-acid soap which is formed from the previously described fatty acid; and also it is in itself a partial solvent for certain of the deposits to be removed by this cleaner.

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The saponifying agent or soapmaking material can be one of numerous agents well known to the art. In the preferred embodiment of the invention, the saponifying agent used is potassium carbonate; however it is understood that this can be replaced with other substances having an alkaline reaction in aqueous solution, such as for example, carbonates and hydroxides of alkali metals as well as basic organic compounds such as, for example, amine derivatives and the like. The selection of a saponifying agent is within the ability of those skilled in the art, guided by the general principle that the saponifying agent is a substance having an alkaline reaction in water and adapted to form, with the fatty acid, a soap which is soluble in the organic solvent used in the emulsion.

The solvent-emulsion concentrate also contains a relatively high proportion of an organic solvent such as for example, kerosene or a similar petroleum distillate. The substitution of another substance for the kerosene or the petroleum distillate is within the ability of those skilled in the art, here again with the guiding principle that the organic solvent is one that acts as a solvent for the fatty-acid soap and preferably one which acts as at least a partial solvent for the deposits to be removed. In general the organic solvent will be a relatively inert hydrocarbon, mixture of hydrocarbons, or the like.

Also included in the emulsion is a proportion of water or an aqueous liquid, generally in a lesser quantity than the organic solvent. The aqueous liquid provides a reaction medium for the saponification between the fatty acid and the saponifying agent and in addition serves to provide a second liquid phase for the emulsion formation. To this aqueous liquid there can optionally be added detergents or surface-tension-lowering substances according to conventional practice.

In addition to the hereinbefore described materials the concentrate preferably contains a corrosion inhibitor such as, for example, sodium chromate or the like. The emulsion concentrate herein described has an alkaline reaction in water and accordingly when it is used on metallic surfaces it has a tendency to be corrosive, especially when it is used on some non-ferrous metals such as aluminum. This corrosive tendency is largely overcome by the corrosion inhibitor, thereby permitting much wider use of the cleaner. In addition to the sodium chromate previously mentioned as a satisfactory corrosion inhibitor there can be used a sodium silicate with a silicon dioxide to sodium oxide ratio of 1:1 or greater. Other inhibitors can be substituted therefor.

The following examples are given to illustrate specific forms of the invention and procedures

in connection therewith; however, it is to be understood that these examples are given in illustration only and accordingly the scope to the invention is not to be in any way limited to the specific examples given.

Example 1.—To a mixture containing by weight 9.9 parts of tall oil, 13.8 parts of pine oil and 61 parts of kerosene is added a solution containing 1.8 parts of potassium carbonate, 0.6 part of sodium chromate and 12.4 parts of water. The resulting mixture is thoroughly stirred, and if necessary it is slightly heated until it becomes clear and homogeneous.

If desired, the specific weight proportions of each ingredient above can vary within the following range of proportions by weight: between about 9.5 and 10.5 percent tall oil, between about 13.0 and 14.5 percent pine oil, between about 1.5 and 2.0 percent potassium carbonate, between about 0.5 and 1.1 percent sodium chromate, between about 5.0 and 20.0 percent water, and a balance of kerosene to make 100 percent.

Example 2.—One part by weight of the concentrate prepared according to Example 1 is mixed with 4 to 6 parts by weight of a light petroleum distillate such as kerosene with slight stirring, if necessary. The solution is then sprayed onto a soiled surface and allowed to soak thoroughly into the contamination or deposit on the surface. After a thorough soaking, the surface is rinsed with water, for example by a spray of water directed against the surface. Upon contact with the water the cleaner is emulsified and rinsed away, carrying with it substantially all the oil, grease, or other dirt. If desired, this process can be repeated to provide an almost perfectly clean surface.

Example 3.—The concentrate prepared according to Example 1 is thoroughly mixed with 1 or 2 parts of water and is applied to a soiled surface. After being allowed to soak thoroughly into the contamination on the surfaces, the cleaner is rinsed off with water whereby it is carried away, taking with it substantially all the contamination. This process may likewise be repeated if necessary.

Example 4.—To a mixture containing by weight 8.0 parts of oleic acid, 13.8 parts of pine oil, 61.5 parts of kerosene is added a solution containing 2.0 parts of sodium carbonate, and 0.9 part of a sodium silicate having a silicon dioxide to sodium oxide ratio of 1:1, dissolved in 12.4 parts of water. The resulting mixture is stirred and slightly heated until it becomes substantially clear and homogeneous.

The concentrate thus prepared is diluted either with water or kerosene and applied to a soiled surface by means of spraying, brushing, wiping or the like and subsequently is rinsed off, all according to a process similar to that used in Examples 2 and 3.

The concentrate prepared according to these examples has a high flash point and accordingly is safe to handle even in the proximity of an open flame. It is non-toxic on contact with the human body and does not emit toxic vapors. When mixed with water, i. e., as shown in Example 3, the resulting mixture can be boiled without emitting flammable vapors. It is non-injurious to ferrous metals and in addition is not injurious to readily corroded non-ferrous metals such as brass, aluminum, bronze and the like. The concentrate, either as such or after being diluted with either an organic solvent or water, is miscible with water and may be rinsed from the surfaces with water. Likewise where the use of large amounts of aqueous substances is undesirable, the composition can be rinsed off with an organic solvent such as, for example, kerosene.

The cleaning composition herein described effectively removes from both metallic and the non-metallic surfaces, heavy accumulation of grease, oil and other dirt. The use of this cleaner is simple and can be accomplished with a minimum of effort in a relatively short time in substantially complete safety. By a careful selection and blending of ingredients as herein described, the formation of insoluble soaps and the like has been avoided, so that the cleaning composition as well as the dirt can be easily and entirely removed from the surface to be cleaned.

It is to be understood that various modifications and changes may be made in this invention without departing from the spirit and scope thereof as set forth in the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A solvent-emulsion cleaner consisting essentially of a substantially homogeneous mixture of the following proportions by weight: between about 9.5 and 10.5 percent tall oil, between about 13.0 and 14.5 percent pine oil, between about 1.5 and 2.0 percent potassium carbonate, between about 0.5 and 1.1 percent sodium chromate, between 5.0 and 20.0 percent water, and a balance of kerosene to make 100 percent.

2. A solvent-emulsion cleaner consisting essentially of a substantially homogeneous mixture of the following proportions by weight: about 9.9 parts by weight of tall oil, about 13.8 parts by weight of pine oil, about 1.8 part by weight of potassium carbonate, 0.6 part by weight of sodium chromate, about 12.4 parts by weight of water, and 61.0 parts by weight of kerosene.

3. A solvent-emulsion cleaner consisting essentially of the following proportions by weight: about 1 part of the composition set forth in claim 1 together with about 4 to 6 parts of kerosene.

4. A solvent-emulsion cleaner consisting essentially of the following proportions by weight: about 1 part of the composition set forth in claim 1 together with about 1 to 2 parts of water.

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Certificate of Correction

Patent No. 2,485,554 October 25, 1949

RUBIN BERNSTEIN

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 4, line 36, before "5.0", line 43, before "0.6", and line 45, before "61.0", insert the word *about* in each instance;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of March, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.