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2,866,726

METHOD OF CLEANING ELECTRICAL EQUIPMENT

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FIG. 1.

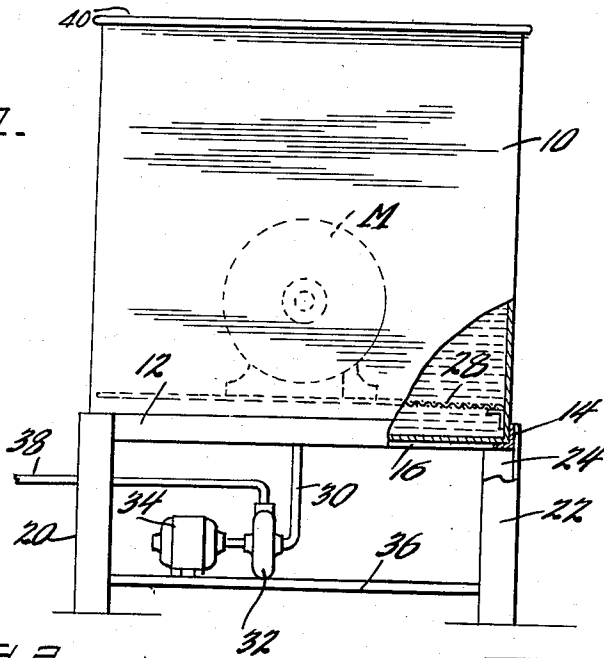


FIG. 2.

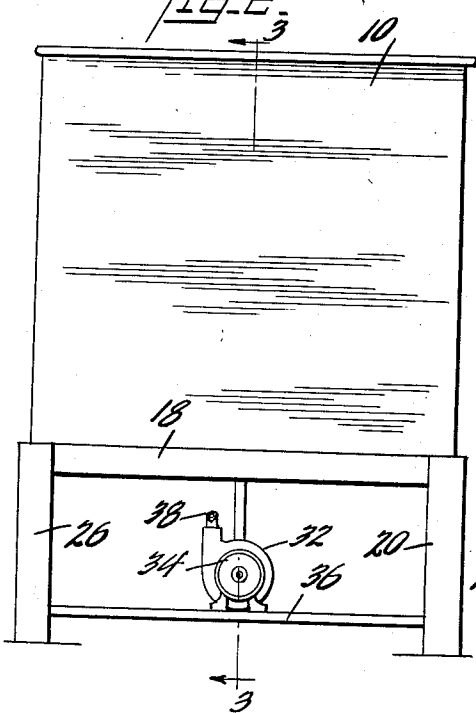
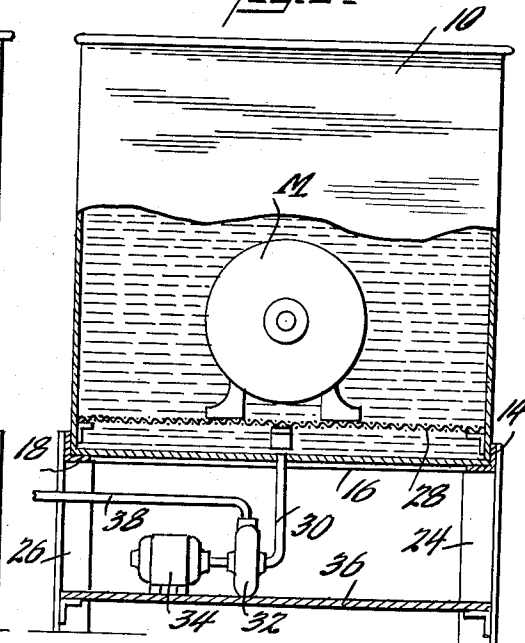


FIG. 3.



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1

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METHOD OF CLEANING ELECTRICAL EQUIPMENT

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3 Claims. (Cl. 134—23)

This invention relates to an improved method of cleaning electric motors, generators and similar electrical machinery having rotating parts.

The prevailing practice in cleaning electric motors, generators and similar equipment entails disassembling parts of the casing of the equipment, as well as the operating parts. The parts are then washed with dirt and grime removing solvents, or steam cleaned, and thereafter dried and reassembled. A considerable amount of skilled labor is involved in carrying out present cleaning methods, and if the parts are carelessly handled when being reassembled, the parts may be damaged or dirtied. The present invention provides a new method and means of cleaning electric motors and like equipment which obviates the need for skilled labor and which results in superior cleaning in substantially less time than is required to obtain the same results under present practices. The invention also provides an improved cleaning composition which is especially adapted for use in carrying out the new process.

It has been found that electric motors, generators and like equipment may be completely submerged in certain liquid cleaning compositions for an appreciable length of time without damaging the equipment in any way or degree, and that when the equipment is operated in the normal manner while so submerged, the rotary motion of certain parts of the equipment causes the cleaning composition in which it is submerged to penetrate all parts of the equipment to an extent which cannot be achieved by force spraying and like processes. A superior cleaning results, and is achieved without the necessity of disassembling the equipment or any component parts thereof. The nature of the new process is such that it will be recognized that especially constituted cleaning compositions only may be employed in practicing the process. It is essential to provide a cleaning composition which is non-conductive, which has a relatively high vapor pressure to facilitate drying by rapid evaporation, and which has a high flash point. It has been found that these required characteristics are obtained in a cleaning solution comprising

- (a) 1 to 25 parts of a liquid aliphatic hydrocarbon having a boiling range of 350° to 450° F., and a flash point above 140° F.;
- (b) 70 to 90 parts of non-inflammable chlorinated organic solvent; and
- (c) 0 to 1 part of an oil soluble non-ionic wetting agent.

According to this invention, an electric motor or like equipment is placed in a wash tank and connected to a suitable source of power. A cleaning composition of the kind described above is then pumped or admitted to the tank in an amount sufficient to completely submerge the equipment. Power is then supplied to the equipment causing it to run as in the course of its normal operation. The rotating parts of the equipment drive the cleaning composition throughout the equipment and especially into

2

recesses between windings and other parts which are inaccessible when practicing other cleaning processes. After several minutes of operation in this manner, the cleaning composition is removed from the tank, by pumping or otherwise, and the equipment is then air-dried, preferably by means of directed streams of compressed air.

The invention, the mode of practicing it, and its advantages over present practices, may be better understood by reference to the following exemplary specific description and the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view of a wash tank suitable for practicing the present invention;

Figure 2 is a front elevational view of the tank shown in Figure 1; and

Figure 3 is a vertical sectional view on line 3—3 of Figure 2.

In the drawings a suitable wash tank 10 is shown supported on the inwardly extending horizontally disposed flanges of the upper frame members 12, 14, 16, 18 which at their ends are fixed to the upright legs 20, 22, 24, 26. The tank 10 is provided with a horizontally disposed sludge rack 28 which is removably supported within the tank a short distance from the bottom thereof. This sludge rack serves to support the equipment to be cleaned, and may comprise clamps or brackets, not shown, for retaining the equipment in place within the tank. The sludge rack is preferably provided with a plurality of perforations of small diameter so that it passes liquid cleaning composition drawn downwardly through it, but retains on its upper surface, by screening action, particles of dirt or grime which are removed from the equipment in the course of the cleaning process. The bottom of the wash tank 10 is provided with an aperture which communicates with one end of the conduit 30 which at its other end is connected to the reversible pump 32 driven by the motor 34. The pump and motor are supported conveniently on the lower transom member 36 of the tank supporting frame. A second conduit 38 is also connected to the pump 32, and at the start of the process, this conduit is connected to a source of liquid cleaning composition. In practicing the new process, a motor M is placed on the sludge rack within the tank 10, and connected to a suitable source of power. Liquid cleaning composition is then delivered into the tank by means of the pump 32 in an amount which will completely submerge the motor M. The motor is then operated in its normal manner for about two to seven minutes, or more, depending on the size and condition of the motor. The liquid cleaning composition is then withdrawn from the tank by means of the pump 32. The major portion of the cleaning composition is drawn through the screen-like perforations in the sludge rack 28 and particles of dirt and grime dislodged by the cleaning process are thus collected on the upper surface of the sludge rack. The motor is then removed from the tank and may be conveniently placed on the tank top 40 for air-drying. Preferably, the air drying is accomplished by directing blasts of compressed air at the motor so as to dislodge droplets of cleaning composition and to speed up the drying by evaporation.

It will be understood that the apparatus described above may be modified in form and that means other than those specifically described and illustrated may be employed to deliver and withdraw the cleaning composition from the wash tank. The present invention includes all such modifications and changes as may occur to those skilled in the art except as specified otherwise in the appended claims.

With regard to suitable liquid cleaning compositions suitable for use according to this invention, the aliphatic hydrocarbon component, described above, may comprise

3

any one or any combination of the following compounds: petroleum ethers or mineral spirits.

The non-inflammable chlorinated organic solvent may be any one or any combination of the following compounds: carbon tetrachloride, trichloroethylene, perchloroethylene, ortho-dichlorobenzene, and chloroform.

The oil-soluble non-ionic wetting agent may be any one or any combination of the following compounds: sterols; fatty alcohols; fatty acid esters of polyhydric alcohols or ether alcohols, such as glycerol mono-stearate, oleic acid esters of ethylene glycol, di-ethylene glycol, etc., fatty acid esters of sugar alcohols (Span) and of pentaerythritol (Pentamul). Other well known non-ionic oil-soluble surface active agents may also be employed.

An example of a suitable liquid cleaning composition formulated from the foregoing components comprises:

5 parts of mineral spirits,
90 parts of carbon tetrachloride, and
1 part of Pentamul.

Another suitable liquid cleaning composition comprises

25 parts of mineral spirits,
70 parts of perchloroethylene, and
1 part of Span.

Another suitable liquid cleaning composition comprises

10 parts of mineral spirits, and
80 parts of trichloroethylene.

4

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

1. A process for cleaning electrical equipment having a rotating part comprising submerging the equipment in an electrically non-conductive cleaning composition and operating the equipment so as to cause said part to rotate.

2. A process as claimed in claim 1 in which said liquid cleaning composition comprises 1 to 25 parts of an aliphatic hydrocarbon having a boiling point between 350° and 450° F., and a flash point of about 140° F., 70 to 90 parts of a chlorinated organic solvent, and 0 to 1 part of an oil-soluble, non-ionic wetting agent.

3. A process for cleaning electrical equipment having a rotating part comprising the steps of placing the equipment in a wash tank, admitting to the tank an electrically non-conductive cleaning solution in an amount sufficient to completely submerge the equipment, operating the equipment in its normal manner so as to cause said part to rotate, withdrawing the equipment from said solution and air-drying it.

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