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CLEANING FLUID

Clyde L. Voress, Charleston, W. Va.

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5 Claims. (Cl. 87—5)

This is a continuation-in-part of my application No. 295,345, filed July 25, 1928.

This invention relates to an improved fluid for cleaning and removing grease, dirt, spots, etc. from cloth, leathers, or any materials amenable to such cleaning. In the prepartion of products for this purpose, heretofore it has been found that gasoline usually with a narrower boiling range than motor gasoline is an excellent solvent, but it has the disadvantage that it is highly inflammable and dangerous when in the hands of inexperienced persons. Carbon tetrachloride has also been used for this purpose but although not inflammable, it has a somewhat limited solvent action on the class of grease and dirt stains most frequently found on clothing, and the further disadvantage that its odor is obnoxious to many people, and lingers too long after the liquid has been used.

Now I have found that mixtures of certain aliphatic hydrocarbons, alcohols and alkyl halides prepared and mixed as more specifically described in this specification form superior cleaning fluid. The aliphatic hydrocarbon is preferably a mixture of petroleum hydrocarbons having boiling points suitable for this use as explained further in this specification. I prefer to keep the boiling range of the aliphatic hydrocarbons used between 80° and 140° C.

Ligroin is a name sometimes applied to such petroleum hydrocarbons and has, as commercially marketed, various boiling ranges according to the individual manufacturer, but as above stated it is desirable to maintain this boiling range between 80° and 140° C.

The alcohol is preferably, though not necessarily, one that cannot be oxidized to a fatty acid of the same number of carbon atoms as the original alcohol, or identified in another way, it is an alcohol whose hydroxyl group is attached to a carbon atom to which less than two hydrogen atoms are attached. Technically, this means a secondary or tertiary alcohol. Examples are iso propyl alcohol, iso butyl alcohol, 2 isomeric forms, tertiary butyl alcohol, tertiary amyl alcohol, 2 isomeric forms, etc. These alcohols can all be made from petroleum hydrocarbons. I find it preferable to use an alcohol or alcohol mixture whose boiling point or range is within the limit of 80° to 140° C.

Secondary or tertiary alcohol is preferred because of the fact that a longer carbon chain can be obtained with a minimum boiling point as compared with normal hydrocarbons. As an example normal propyl alcohol boils at 97° C., secondary butyl alcohol boils at 99° C. and tertiary amyl alcohol boils at 101° C.

It is a well known fact that the length of the carbon chain has considerable influence in the solvent power of compounds for various purposes. To get the necessary solvent balance in solvent power in my cleaning solution, I prefer the alcohol have the longer carbon chain. The alkyl halide may be a chlorinated hydrocarbon of suitable boiling range. I prefer to use a chlorinated hydrocarbon or a mixture of chlorinated hydrocarbons having a boiling point or range kept within the limits of 12° to 150° C. Examples are ethylene dichloride, chloroform, carbon tetrachloride, chloro methyl butane, chloro pentane.

The proportion of the representatives of the three classes of solvents in the mixture may be varied at will but I prefer to maintain the following characteristics of the mixture:

1. Non-inflammability. I prefer to keep the final product such that a flash will not occur when an ordinary sulphur match is lighted and brought into contact with either the liquid or the vapors issuing from an open top evaporating dish filled with the liquid at room temperature.

The following is an example of a specific formula which will accomplish this:

	Per cent by volume
Tertiary amyl alcohol	4
Ligroin (B. P. 80°—120° C.)	16
Carbon tetrachloride	80

It will be apparent to anyone skilled in the art that a number of other formulas may be prepared from this description.

2. Non-fractionation. An intimate mixture of aliphatic hydrocarbon, alcohol and alkyl halide, each with properly selected boiling points, will form a series of azeotropic mixtures. These azeotropic mixtures will not sufficiently fractionate insofar as the three classes of solvents entering the mixture are concerned as to permit inflammability if the percentages and boiling points are properly chosen. As an example the formula given above wherein tertiary amyl alcohol with a boiling point of approximately 101° C., ligroin with a boiling point of 80°–120° C. and carbon tetrachloride with a boiling point of 76° C. will accomplish the purpose.

Three phase azeotropic mixtures are formed in this formula between the various hydrocarbons, the ligroin, the alcohol and the carbon tetrachloride so that there is insufficient fractionation to permit the material to become inflammable under the test hereinabove outlined, even

when a given amount of the liquid is placed in an open top evaporating dish and entirely evaporated. No flash will occur at any time during the evaporation.

No specific statement of exact percentages of alcohol, ligroin and chlorinated hydrocarbon can be made to cover all solutions since the proportion may be varied within narrow limits and still have the characteristics disclosed herein. Furthermore, each specific azeotropic mixture may vary from each other within limits imposed by this disclosure. In general, the amount of alcohol used will not be more than 30%, ligroin more than 30%, or chlorinated hydrocarbon less than 60%. Many other combinations of one or more members of each of the three classes I have named can be made by one skilled in the art by following the disclosure I have made to accomplish the result which I have outlined. Among the advantages of the cleaner I have disclosed are:

1. Non-inflammability.
2. Leaves no visible residue.
3. Has wide general solvent properties.
4. Evaporates quickly.
5. Odor is not objectionable.
6. Is non-poisonous in ordinary vapor concentrations.

Shortly after the filing of the original application 295,345, July 25, 1928, of which this is a continuation in part, I filed in the United States Patent Office on August 2, 1928, another patent application, Serial No. 297,127 in which I disclosed a method of preventing certain chemical action between gasoline fractions and carbon tetrachloride when exposed to sunlight.

The ligroin of the present application may be treated according to that disclosure to prevent such chemical action before being placed in this product.

What I claim and desire to secure by Letters Patent is:

1. A product consisting of a solution of tertiary amyl alcohol, of ligroin whose boiling range is substantially 80°–120° C., and of carbon tetrachloride.

2. A product consisting of substantially 4% alcohol whose hydroxyl group is attached to a carbon atom to which less than two hydrogen atoms are attached, of 16% ligroin having a boiling range substantially between 80°–120° C., and of 80% carbon tetrachloride by volume.

3. A product consisting substantially of 4% tertiary amyl alcohol, of 16% ligroin whose boiling range is 80°–120° C., and of 80% carbon tetrachloride by volume.

4. A cleaning fluid consisting of a mixture of an alcohol whose hydroxyl group is attached to a carbon atom to which less than two hydrogen atoms are attached, ligroin having a boiling range between 80° and 120° C. and chlorinated aliphatic hydrocarbon having a boiling range between 12° and 150° C. in quantity by volume of not more than 30% ligroin, not more than 30% alcohol, and not less than 60% chlorinated aliphatic hydrocarbon.

5. A cleaning fluid consisting of a mixture of an alcohol whose hydroxyl group is attached to a carbon atom to which less than two hydrogen atoms are attached, ligroin having a boiling range between 80° and 120° C. and carbon tetrachloride in quantity by volume of not more than 30% ligroin, not more than 30% alcohol, and not less than 60% carbon tetrachloride.

CLYDE L. VORESS.