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FOAM CONTROLLING COMPOSITION

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This invention relates to compositions for controlling foaming of various liquids and solutions such as the liquors of sugar refineries, various chemical liquors of chemical plants, anti-freeze mixtures, so-called soluble oils or water emulsions, and the like.

The present invention resides primarily in an anti-foam composition consisting of mineral oil such as a light or intermediate grade of lubricating oil containing a small percentage of an oil-soluble soap together with a small percentage of Montan wax, preferably refined. The invention also extends to the use of lighter mineral oils such as normally volatile distillates like naphtha. For some purposes the invention includes the use of Montan wax derivatives such as the esters rather than the Montan wax itself, or fractions of Montan wax. In a preferred form the invention employs from about 1% to 2% of aluminum stearate and from about 2% to 3% of Montan wax. A specific commercial composition consists of 97% of a mineral lubricating oil having a viscosity of 100 seconds Saybolt Universal at 100° F., 1% of aluminum stearate and 2% of refined Montan wax.

However, the invention is not limited to these particular details. For example, a very satisfactory composition is obtained by using either a heavier or lighter lubricating oil fraction, including the lighter oils known as spray oils which are in fact in the light lubricating oil range. All these are non-volatile at normal temperature. Any well known oil-soluble soap as a substitute for the aluminum stearate such as aluminum and calcium naphthenates, aluminum oleates and the like may be used, and the percentage thereof may be varied from perhaps as low as one-half of one percent to several percent within practical limits, ordinarily about 5%. In fact, with some soaps, such as aluminum stearate, the oil is thickened almost to a grease when only 3% or 4% is used, and with the others very viscous or grease-like consistencies are reached at limits of about 6% to 8%. Therefore, these figures represent the practical upper limits of the soap where fluid compositions are desired. Where more soap is used and the materials are very viscous or are grease-like, only hot liquors can be treated in which the composition will be melted or dispersed by the heat. While it is preferred that the Montan wax be refined, this is not essential. Also its percentage may be varied from perhaps as low as ½% to several percent, such as 4% or 5%.

The compositions above described are, of

course, to be preferably fluid at ordinary temperatures and are to be added to the aqueous or other foaming solutions in small quantities sufficient only to suppress the objectionable foaming characteristics of such solutions. For example, about 0.05% to 0.2% of an oily dispersion as above disclosed may be added to any solution or liquor having foaming tendencies, such as automobile radiator anti-freeze solutions, sugar beet refinery liquors and similar aqueous liquids, to yield in the liquors about 0.005% to 0.02% of Montan wax or combined Montan wax and aluminum stearate. In most instances it has been found that this quantity is sufficient to suppress all objectionable foaming characteristics.

The function of the aluminum stearate primarily is to inhibit crystallization of the Montan wax and thereby cause the composition to approximate a more nearly true solution, as distinguished from suspensions that amount to collections of crystals or groups of crystals. As has been indicated, certain types of soaps may be substituted for the aluminum stearate, such soaps to have said ability to inhibit the wax crystallization. These soaps are those which are readily dispersible in oil and are commonly referred to as "oil-soluble" soaps. The aluminum soaps of the fatty acids containing more than 10 carbon atoms are included and corresponding calcium and magnesium soaps, such as oleates and stearates. Aluminum naphthenate may also be used in some instances. In other words, readily dispersible soaps of the indicated types from the metals and alkaline earth metals are appropriate. In general, however, the best of these soaps are those which have a tendency toward the formation of a true gel when used in sufficient proportions rather than those which tend toward free fluidity in the mineral oil. The above indicated soaps fall in this classification.

Under some conditions it has been found that derivatives of Montan wax, such as the esters, are to be preferred to Montan wax itself. For instance, in controlling the foaming of alkaline liquors containing an alkali such as sodium carbonate, it was found that a commercial combination of the esters of Montan wax, such as one of those known on the market as I. G. waxes, is to be preferred to Montan wax and could be used in combination with a soap such as aluminum stearate and a mineral oil to obtain the desired results. In the case of neutral solutions and those containing the alkaline earth metals, e. g., calcium hydroxide solutions in beet sugar fac-

tories, the Montan wax itself is ordinarily preferred.

Where the term "Montan wax substance" is used in the claims, it is intended to include Montan wax and its fractions and the above-mentioned Montan wax derivatives such as esters. Montan wax occurs in lignite and is extracted therefrom by means of volatile solvents. Refined and crude or unrefined Montan waxes have in general melting points (Ubbelohde) between about 76° C. and 86° C., and their acid and saponification numbers vary somewhat with quality. The Montan wax esters commonly found on the market, and known to the trade as various "I. G." waxes, are products of esterification of montanic alcohols with montanic acids. The montanic acids are high fatty acids of high melting point and are obtained by oxidation of the hydrocarbons in lignite, while the montanic alcohols are made by the reduction of the corresponding acids under high pressure. These esters have varying acid numbers, saponification numbers and melting points and are described in "Chemical Trade Journal" of Dec. 4th, 1931, page 559, and are also described in "La Reveu General de Teinture, Impression, Blanchiment et Appret" for November, 1931, by Dr. Justin-Mueller of the I. G. Farbenindustrie Aktiengesellschaft.

In some instances where a low boiling foam controlling composition is desirable, volatile mineral oil fractions such as naphtha may be employed instead of the heavier spray oil or lubricating oil fractions herein mentioned.

It is to be understood that these disclosures are to be taken only as illustrative of the generic invention which they represent, and not as limiting.

I claim:

1. An anti-foam agent consisting of a mineral oil in the lubricating range, a fatty acid oil-soluble soap of a metal of the class consisting of aluminum and the alkaline earth metals, and Montan wax, the soap and the wax being present in small quantities with respect to the mineral oil in the order of between about one-half per cent and less than 5% each but sufficient to minimize foaming of aqueous solutions.

2. An anti-foam composition comprising a mineral oil in lubricating oil range, a small quantity of aluminum stearate in the order of about 1% and a small quantity of refined Montan wax in the order of about 2%.

3. An anti-foam composition comprising a normally non-volatile mineral oil distillate containing a small quantity of an oil-dispersible soap of the class consisting of aluminum and alkaline earth metal oil-soluble soaps between about one-half per cent and five per cent and a small quantity between about one-half per cent and five per cent of Montan wax.

4. A foam controlling composition comprising a refined non-volatile mineral oil and small quantities between about one-half per cent and five per cent each of Montan wax foam suppressing base material of the class consisting of Montan wax and the esterification products of Montan wax and montanic acids, and oil-soluble soap of metal from the class consisting of aluminum and the alkaline earth metals.

5. A foam controlling composition according to claim 4 wherein the oil-soluble soap is present in the order of one percent and the Montan wax base material is present in the order of two percent.

6. A composition according to claim 4 wherein

the soap content is low enough to maintain liquidity of the composition.

7. A composition according to claim 4 wherein the soap content is low enough to maintain liquidity of the composition and the Montan wax content is not greater than about 2%.

8. An aqueous solution otherwise having foaming characteristics containing a relatively small quantity of a foam reducing composition containing mineral oil, a Montan wax base material of the class consisting of Montan wax and the esterification products of Montan wax and montanic acids between about one-half percent and about five percent of said composition sufficient to materially suppress foaming, and between about one-half percent and about five percent of an oil-soluble soap of metal of the class consisting of aluminum and the alkaline earth metals.

9. An aqueous solution otherwise having foaming characteristics containing a minor proportion of the composition of claim 1.

10. An aqueous solution otherwise having foaming characteristics containing a minor proportion of the composition of claim 2.

11. An aqueous solution otherwise having foaming characteristics containing a minor proportion of the composition of claim 3.

12. An aqueous solution otherwise having foaming characteristics containing a minor proportion of the composition of claim 4.

13. A method for suppressing foaming of solutions comprising adding to a solution having foaming characteristics a minor proportion of a composition comprising mineral oil containing a small proportion between about one-half percent and about five percent of a Montan wax base foam suppressing material of the class consisting of Montan wax and the esterification products of Montan wax and montanic acids, and a small proportion between about one-half percent and about five percent of an oil-soluble soap of metal of the class consisting of aluminum and the alkaline earth metals.

14. A method according to claim 13 wherein the soap is present in the order of one percent of the foam suppressing composition and the wax base material is present in the order of two percent of the composition.

15. A method for reducing foaming comprising adding to an aqueous solution otherwise having foaming characteristics a small quantity of a foam reducing composition containing normally non-volatile mineral oil distillate, between about one-half percent and about five percent each of a Montan wax base material from the class consisting of Montan wax and the esterification products of Montan wax and montanic acids and an oil-soluble soap of metal of the class consisting of aluminum and alkaline earth metals.

16. An anti-foaming composition consisting of mineral oil and between about one-half percent and about five percent each of a Montan wax base material of the class consisting of Montan wax and the esterification products of Montan wax and montanic acids and an oil-soluble soap of metal of the class consisting of aluminum and alkaline earth metals, sufficient to reduce foaming in otherwise foaming solutions.

17. A foam suppressing composition consisting of refined mineral oil and between about one-half percent and about five percent each of aluminum stearate and a Montan wax base material of the class consisting of Montan wax and the esterification products of Montan wax and mon-

tanic acids, sufficient to suppress foaming of otherwise foaming solutions.

18. An aqueous solution otherwise having foaming characteristics containing a small proportion of the foam reducing composition of claim 16.

19. A method of suppressing foaming comprising adding to otherwise foaming solutions a small proportion of the foam reducing composition of claim 16.

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