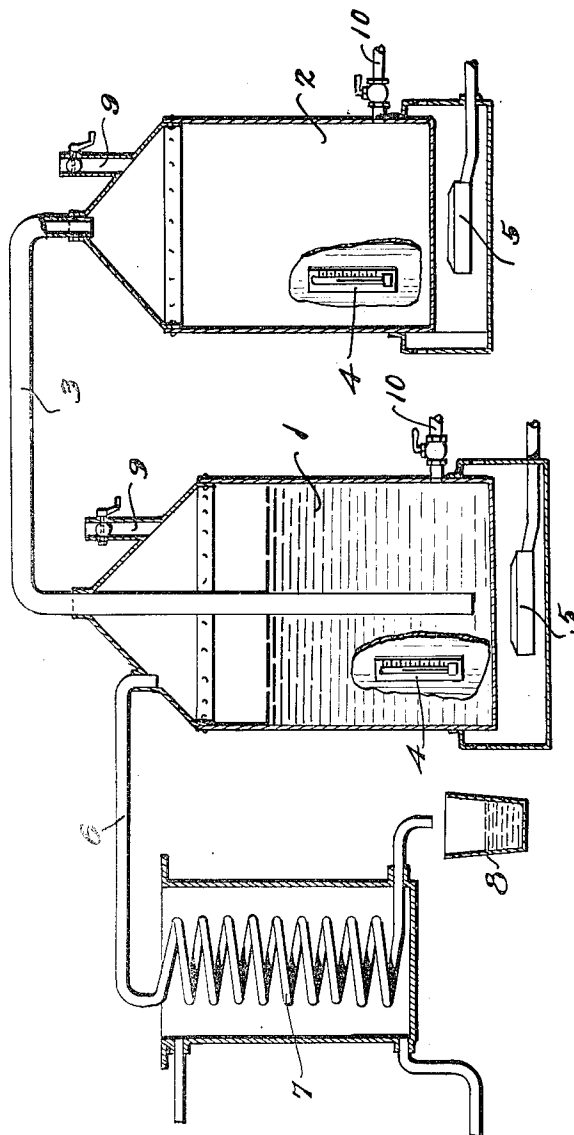


Feb. 14, 1928.

1,659,149

E. A. NILL
LUBRICATING COMPOSITION

Filed May 4, 1923



Witness:

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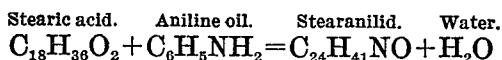
LUBRICATING COMPOSITION.

Application filed May 4, 1923. Serial No. 636,639.

The present invention relates to certain new and useful improvements in the manufacture of lubricants and similar oil and wax compounds which are adapted to be used for lubricating and analogous purposes.

In a copending application for Letters Patent of the United States, Serial No. 585,527, filed August 31, 1922, which has now matured into Patent No. 1,617,077, granted February 8, 1927, I have disclosed a method of producing a solidified oil or grease lubricant without the use of soap, the solidifying agent, however, being of a saponifiable nature. I have now made a further improvement in the lubricating quality of solidified oils by the use of neutral anilids of fatty acids, such as the anilids of palmitic, stearic and arachidic acids. These anilids, although being derivatives of fatty acids, are entirely neutral bodies of hydrocarbon characteristics, and possessing in themselves a lubricating value. Aniline oil is a well known example of an aromatic base, and stearanilid is a product which can be broadly termed an acidyl derivative of an aromatic base.

Anilids are formed by the union of a fatty acid with aniline oil, according to a reaction similar to that given as follows which is for the specific combination of stearic acid and aniline oil.



I have found that it is extremely difficult or practically impossible to effect the union of stearic acid with aniline oil to form stearanilid in quantitative yields by merely mixing the two substances and heating them, as the aniline oil boils or distills at a temperature much below that to which the acid must be heated for a free chemical union of the substances and under the high temperatures necessary to effect this union one molecule of water is given off for every molecule of stearanilid formed. Furthermore, aniline is of a poisonous nature, so that it is necessary to form the union in a closed vessel, and just merely boiling the stearic acid with the quantitative amount of aniline oil at the boiling point of aniline oil will not suffice to bring the two substances into chemical union in sufficient quantities for

practical yields. Besides the formation and condensation of water causes a considerable amount of agitation within the vessel so that the process cannot be controlled without the mass continually boiling over.

The foregoing difficulties have been overcome by a special process which I have discovered, and while any suitable or appropriate form of apparatus can be employed for carrying on the process, one possible form of apparatus is shown by the diagrammatic figure on the accompanying drawing.

Referring to the drawing, the numeral 1 designates a wrought iron vertical still in which two hundred and eighty-four (284) parts of commercial stearic acid are placed. A second still 2 is also utilized, and one hundred and eighty-six (186) parts of commercial aniline oil are placed in this second still. A vapor pipe 3 leads from the top of dome of the second still 2 to the top of the first still 1, and extends downwardly through the still 1 to a point slightly spaced from the bottom thereof. The discharge end of the vapor pipe 3 thus extends downwardly below the surface of the stearic acid in the still 1. Each of the stills is provided with a thermometer 4, and some means such as a burner 5 is provided for heating each of the stills. The still 2 which contains aniline oil is heated to a temperature of from 182° C. to 189° C., while the still 1 containing the stearic acid is heated to a temperature of about 235° C., the most favorable working range of temperature being from 230° C. to 240° C.

The aniline oil in the still 2 is heated to the boiling point, and the vapors pass over into the heated stearic acid in the still 1. The reaction commences as soon as the aniline vapors begin to pass into the melted acid, providing the latter has been heated to the proper temperature, as indicated above.

A vapor pipe 6 leads from the still 1 to a condenser 7, and a suitable receptacle 8 is provided to receive the liquid discharged from the condenser. The water of formation along with any unattached aniline passes over through the condenser 7 and is collected in the receptacle 8. The unattached or uncombined aniline oil is thus recovered, so that it can be used in a subsequent operation.

The speed of the reaction is entirely dependent on the rapidity of distillation of the aniline oil, and at first practically all of the aniline vapors combine with the stearic acid, although as the operation continues the proportion of aniline oil carried over with the water of formation increases and the quantity of water going over decreases, the distillation being continued until no more water goes over, when the reaction is complete and all of the stearic acid has been converted into stearanilid. The aniline oil distillation is then discontinued, and the stearic acid still is heated until no more aniline oil appears at the discharge end of the condenser 7. This assures the removal of all excess of aniline oil from the product, and the result is a quantitative yield of stearanilid, which has been found to have a melting point of from 85° C. to 93° C., according to the purity of the products employed. The stills 1 and 2 each have an inlet 9 and an outlet 10, which are controlled in the usual manner by valves or cocks, so that they can be opened and closed as desired. The resulting yield of stearanilid can be drawn off from the still 1 through the outlet 10.

In the foregoing example I have used stearic acid, although it will be understood that other fatty acids, such as, palmitic acid and arachidic acid can be employed. The product will be an anilid of the particular fatty acid that is used, and in my experiments I have found that these fatty anilids are nonsaponifiable. These anilids although being derivatives of fatty acids, are entirely neutral bodies of hydrocarbon characteristics. Being neutral, the anilids will not have any corrosive action on metal, and can be used in lubricants or other substances coming into contact with metals without any of the objectionable results which are incident to the fatty acids themselves, the latter acting very readily upon metal surfaces as is well known. The anilids thus have a very decided advantage over fatty substances when used in lubricants, since they do not corrode the metal surfaces.

These anilids have a high melting point which is above 200° F., and only a small percentage of these anilids is required to solidify oils to the consistency of grease, and lubricating oils of any desired viscosity can be reduced to a semi-fluid or solid consistency. For example I find that by melting 10% of stearanilid with 90% of 28° Bé. paraffine oil a light colored transparent lubricant is obtained, and with 7% of stearanilid and 93% of cylinder oil a transparent greenish lubricant results. The former lubricant is suitable for bearings running at high speeds, and under light loads, while the latter grease is more suitable for use in bearings which run at low speeds under heavy loads, or for use in ordinary grease cups or

high pressure lubricating systems. It will be understood that I do not limit the use of the anilid base to the percentages given in the foregoing examples, or to combination with the particular oils which have been mentioned, since the anilid base can be combined with many different kinds of oils and waxes, and in different proportions to produce products of different degrees of consistency and of varying characteristics. By the term cylinder oil is meant any oil having the proper viscosity to be used for lubricating a cylinder. While stearanilid has been particularly mentioned as a base, other anilids can be used to accomplish the same or similar results, and I do not wish to be restricted to the use of stearanilid. The anilid base can be produced in any suitable manner, being the product of chemical reaction between aniline oil and one of the fatty acids.

In order to produce a finished lubricant of smooth and uniform texture, I preferably bring the anilid and the wax or oil together and heat the mixture to a temperature of about 205° F. All of the anilid is thereby dissolved, after which the mixture is suddenly chilled to a temperature below the solidifying point thereof. This can be accomplished in any suitable manner, although I have found that one convenient way of doing this is to use a cooling cylinder similar to those which are commonly employed in chilling lard compounds.

As another example of the manner in which this invention can be put into practice, I might mention that a lubricant well adaptable for use in roller and ball bearings can be produced by dissolving a small percentage of stearanilid in petrolatum. A mixture of 5% stearanilid with 95% zero oil, that is a mineral oil having a viscosity of 500 seconds Saybolt at 100° F., forms a transparent lubricant of proper consistency for use in ordinary grease cups or a high pressure gun. A mixture of 3% stearanilid and 97% zero oil having a viscosity of 2000 seconds Saybolt, at 100° F., forms a suitable lubricant for gears and bearings carrying extremely heavy pressures. Even gasoline, kerosene and the like can be used with the stearanilid. While they have little lubricating value in themselves, they may be employed as vehicles to carry the stearanilid and oil mixture to parts which are difficult to reach. For example, a mixture of 25 parts stearanilid and 75 parts of kerosene forms a paste suitable for use in the lubrication of phonographs.

The products of the invention are not restricted to lubricants, since I have found that by mixing stearanilid with paraffine wax or a mixture of stearic acid and paraffine wax, a product suitable for molding into candles is produced. The particular ad-

vantage of this candle making product is that the stearanilid gives it a comparatively high melting point, so that the candles will be harder and better adapted to resist the softening influences of a warm atmosphere. Candles manufactured from this compound will maintain their shape under all usual atmospheric and climatic conditions, and will not soften and bend over under the influence of a warm atmosphere. While stearanilid costs slightly more than stearic acid, it serves as a cheaper substitute for the latter in this candle making compound, since a smaller amount is needed to produce paraffine candles of proper hardness or stiffness.

For illustrative purposes in describing the invention, I have shown a number of specific ways in which the invention can be used to produce commercial products, although I wish it to be understood that I do not restrict myself to the details of the process or to the particular products mentioned, since many other useful products can be obtained by various combinations and mixtures of an anilid with different kinds of oils and waxes, the anilid serving to stiffen the consistency of the oil or raise the melting point of the wax.

A method of producing the lubricating composition of the present invention is disclosed and claimed in my copending application, Serial No. 238,267, filed December 7, 1927, which is a continuation in part of this application.

Having thus described my invention what

I claim as new and desire to secure by Letters Patent is,

1. A neutral lubricating composition which is substantially free from water and consists of paraffine oil having a neutral stearanilid mixed therewith to stiffen the consistency thereof.

2. A lubricant which is free from water and comprises cylinder oil and neutral stearanilid mixed with the cylinder oil to stiffen the consistency thereof.

3. A lubricant which is free from water and comprises approximately ninety-three percent (93%) cylinder oil and approximately seven percent (7%) neutral stearanilid, the stearanilid serving to stiffen the consistency of the cylinder oil.

4. A lubricating composition which is substantially free from water and comprises a mineral oil having dissolved therein a neutral anilid of a fatty acid to stiffen the consistency and raise the melting point of the composition.

5. A lubricating composition which is substantially free from water and comprises a mineral oil having stearanilid dissolved therein to stiffen the consistency thereof.

6. A lubricating composition which is substantially free from water and comprises cylinder oil having a neutral anilid of a fatty acid dissolved therein to stiffen the consistency and raise the melting point of the composition.

In testimony whereof I affix my signature.

EDWARD A. NILL.