Patented June 11, 1946 2,401,993

UNITED STATES PATENT OFFICE

2,401,993

CORROSION RESISTANT COMPOSITION

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No Drawing. Application December 31, 1942, Serial No. 470,840

6 Claims. (Cl. 252—34)

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This invention relates to a new additive which imparts corrosion resistant or rust preventing properties to organic materials, especially to mineral lubricating oils which are used in contact with iron or steel surfaces, particularly when substantial amounts of water are present.

The materials to which corrosion resistant or rust preventing properties are given by the additives of the present invention are particularly the light mineral lubricating oils of about 50 to 1500 seconds viscosity Saybolt at 100° F. which are suitable for use especially as turbine oils, as hydraulic fluids or as lubricants for the bearings of machinery which is much in contact with water, such as paper mills, and as insulating oils in refrigerators, and in general in all cases where a lubricating oil is used under conditions in which it may pick up or absorb considerable amounts of water from atmospheric condensation or other sources of contamination. The additives may likewise be used in other lubricating oils and other petroleum fractions, such as fuels, where they are effective in preventing corrosion of tanks, lines, etc. from entrained moisture. In general, they may be used to impart corrosion resistant properties to organic materials of a wide variety where water may become admixed therewith and tend to cause corrosion of metal surfaces; and by preventing such corrosion the additives also greatly reduce wear between rubbing surfaces of metals where they are present in lubricants.

It is generally known that many, if not most, of the additives which are incorporated in mineral oil compositions to prevent rusting have a deleterious effect on the oxidation stability or life of the oil. Oils containing these compositions become peculiarly susceptible to deterioration by the action of oxygen. Also, many well known antioxidants are effective in increasing the normal service life of the oil, but they do not impart corrosion resistant properties. It has now been found, in accordance with the present invention, that remarkable improvement in corrosion resistance may be imparted by the addition to the lubricating oil or other organic material of a small proportion of an amine salt derived from a primary straight chain aliphatic amine containing from 8 to 14 carbon atoms per molecule and an organic acid having a carboxyl group attached to a cyclic nucleus. Such a salt not only imparts corrosion resistant properties to the material to which it is added, but it is of particular value in the fact that it does not nullify the oxidation resisting effect of antioxidants

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present, particularly when such antioxidant is a tertiary butyl ether of a phenol.

It has been found that the amine salt used in accordance with the present invention should preferably have at least 8 carbon atoms in the amine radical, but not more than about 14 carbon atoms. Salts derived from higher molecular weight amines have been found not to be as effective in reducing corrosion. Likewise, the amine radical is preferably a straight chain radical, rather than a branched or cyclic radical, since the latter have been found to be of little or no value in preventing rusting. The acid from which the salt is derived is an acid having a cyclic nucleus with the carboxyl group attached thereto, and such cyclic nucleus may be a saturated nucleus, such as that found in naphthenic acids, or it may be an unsaturated nucleus, such as a benzene nucleus. The nucleus may have attached thereto additional atoms or groups, such as halogen atoms, or alkyl, hydroxyl, nitro, mercapto, alkoxy, or similar groups. The amine or acid component of the salt may be derived from pure compounds or from mixtures of compounds of similar nature. For example, the amines used in the preparation of the salts may be pure amines, such as laurylamine, or they may be technical mixtures, such as "Lorol" amine, which is a mixture of amines containing on the average from 10 to 14 carbon atoms per molecule and is derived from a product obtained in the catalytic hydrogenation of cocoanut oil acids. The latter composition has been found to be particularly effective in the preparation of the corrosion resistant agents of the present invention. The acids found particularly useful are the naphthenic acids, benzoic acid and salicylic acid.

It has been mentioned above that the corrosion resistant additives of the present invention may be satisfactorily used in the presence of antioxidants without preventing the latter from functioning effectively, as is often the case when corrosion preventing materials are added to lubricating oils and the like. The antioxidants which may be effectively used in the presence of the additives of the present invention are the alkyl ethers of phenols, phenols, amines, naphthols, and compounds of like constitution.

In general, the quantity of the amine salt to be used will vary between 0.01 and 0.5% by weight of the organic material to which it is added. The quantity to be used in a particular case will naturally depend upon the nature of the mate-

rial treated and the properties of the particular salt used.

In addition to the compounds to be added to lubricating oils according to the present invention, other agents may also be used beside the amine salts, such as dyes, pour depressors, sulfurized fatty oils, sulfur-chlorine bearing compounds, organo metallic compounds, metallic or other soaps, other basic compounds, such as heterocyclic bases or onium compounds, which may be used to absorb excessive acid, also thickeners, oiliness agents and other ingredients normally employed as oil additives.

As indicated above, the new anticorrosion additive may be used to advantage with many types of organic substances in addition to the lubricating oils described above. They may be used generally in lubricating oils of all types, particularly those suitable for use in internal combustion engines, compressors, steam engines or Diesel engines; also they may be used in industrial oils, e. g., spindle oils and machinery lubricants, also in hydraulic and insulating oils. They may be added to "white products" obtained from petroleum, such as kerosene, white oils, and waxes. They may also be used in gasolines and other petroleum products of the motor fuel type. They may be used in drying oils and in paints and other coating compositions and in fatty oils of animal or vegetable origin. They are effective in extreme pressure lubricants, etc., where they serve to prevent corrosion resulting from the liberation of hydrogen chloride from sulfur- and chlorine-containing compounds present.

In the following example are shown the results of tests of a base oil alone and in combination with an antioxidant alone, and with an antioxidant in addition to various examples of the amine salts used in accordance with the present invention. This example and the various compounds used therein to illustrate the present invention are not to be considered as limiting the scope of the invention in any way.

EXAMPLE

A light turbine oil of 150–160 seconds viscosity Saybolt at 100° F., obtained by the solvent refining of a paraffinic stock, was submitted to the corrosion and oxidation tests described below, with and without additives. The antioxidant employed was the tertiary butyl ether of ortho tertiary butyl para-cresol.

The tendency of the unblended oil and the various blends to corrode a steel surface in the presence of water was determined by the standard A. S. T. M. corrosion test (D665–42T) in which 10% of distilled water was present in the oil.

The rate of deterioration of the oil was determined by the Staeger oxidation test which was conducted as follows:

200 cc. of the oil were poured into a glass beaker. To accelerate aging, a cleaned and polished copper strip 40 x 70 x 1 mm. was put into the beaker as a catalyst. The beaker containing the oil and catalyst was placed on a rotating shelf in an oven, the oven temperature being maintained at 110° C. and the shelf rotated at 5–6 R. P. M. Purified air was blown through the oven at the rate of 1.5 to 2 cu. ft. per hour The life of the oil was determined by observing the time required for the oil to show deterioration as evidenced by a neutralization number of 0.2.

The results of the tests are recorded in the following table:

Table I

Oil composition	Corrosion of steel in oil+10% water	Hours life of oil (Staeger test)
(A) Base oil	Heavy	72
(B) Base oil+0.1% tert. buytl ether of ortho tert. butyl para-cresol.	do	410
(C) Base oil+0.25% tert. butyl ether of ortho tert. butyl para-cresol.	do	790
(D) Oil B+0.02% "lorol" amine naphthenate.	Nil	312
(E) Oil B+0.02% "lorol" amine benzoate	do	
(F) Oil C+0.02% "lorol" amine benzoate	do	490
(G) Oil B+0.02% "lorol" amine salicylate	do	235
(H) Oil B+0.02% "lorol" amine isooctyl salicylate.[1]	do	305
(I) Oil B+0.05% "lorol" amine stearate	Light	365
(J) Oil B+0.05% "lorol" amine oleate	do	365
(K) Oil B+0.05% octadecylamine benzoate.	Medium	315
(L) Oil C+0.02% dicyclohexylamine naphthenate.	Heavy	455

[1] Prepared by reacting "lorol" amine with an alkylated salicylic acid prepared by the Kolbe synthesis, in which 58 parts of the sodium salt of isooctyl phenol and 200 parts of pyridine were heated to 190–240° C. for 3–5 hours in a bomb in the presence of carbon dioxide. The product was acidified and washed with water and further treated with sodium carbonate to separate it from the phenol. The salt formed was separated, acidified and extracted with a solvent.

It can be seen from the above data that the amine salts prepared from straight chain aliphatic acids, or from amines having an excessively long chain, or from cycloalkyl amines, are not as satisfactory as corrosion preventing agents as those prepared in accordance with the present invention. When the preferred amine salts are used, the corrosion is entirely eliminated and the Staeger life test shows the high resistance to oxidation.

This invention is not to be considered as limited by any of the examples mentioned or described herein, but solely by the terms of the appended claims.

We claim:

1. A method of lubricating steel bearings under corrosion inhibited conditions in the presence of substantial amounts of water, which comprises employing in the lubrication of said bearings a mineral lubricating oil containing a tertiary butyl ether of ortho tertiary butyl para-cresol and about 0.01 to about 0.5% of "lorol" amine salicylate in an amount sufficient to exert a corrosion inhibitory effect.

2. The method of lubricating ferrous metal surfaces under corrosion inhibited conditions in the presence of substantial amounts of water normally sufficient to cause corrosion, which comprises employing in the lubrication of said surfaces a mineral lubricating oil containing "lorol" amine salicylate in amount sufficient to inhibit corrosion.

3. The method of lubricating ferrous metal surfaces under corrosion inhibited conditions in the presence of substantial amounts of water normally sufficient to cause corrosion, which comprises employing in the lubrication of said surfaces a mineral lubricating oil containing a salt of "lorol" amine and an organic acid of the class consisting of salicylic acid, napthenic acid and benzoic acid in amount sufficient to inhibit corrosion.

4. The method according to claim 3 in which the acid is salicylic acid.

5. The method according to claim 3 in which the acid is naphthenic acid.

6. The method according to claim 3 in which the acid is benzoic acid.

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