Patented Oct. 1, 1940 2,216,711

UNITED STATES PATENT OFFICE

2,216,711

LUBRICATING OIL

Sidney Musher, New York, N. Y., assignor to Musher Foundation Incorporated, New York, N. Y., a corporation of New York

No Drawing. Application November 17, 1939, Serial No. 304,945

12 Claims. (Cl. 252—51)

The present invention relates to the improvement of lubricating oils.

It is among the objects of the present invention to provide improved lubricating oils which will have a decreased tendency toward sludge formation and which will have lessened tendency to cause corrosion of metallic surfaces with which such lubricating oils may come in contact.

Still further objects and advantages will appear from the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only, and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

It has been found that aryl phosphites, triphenyl phosphites and hydroxy and/or amino aromatic compounds do not function most satisfactorily in lubricating oils to inhibit the formation of sludge and to reduce the tendency of the lubricating oil toward producing corrosion on metal surfaces.

It has however been found that combinations of lecithin with certain aromatic hydroxy compounds and amino compounds and particularly polyhydroxy, polyamino and aminohydroxy compounds are most effective and surprisingly active in stabilizing lubricating oils at elevated temperatures.

Although it is preferred to use the polyhydroxy, polyamino, and hydroxyamino nuclear compounds, it also has been found satisfactory to use even poly-nuclear monohydroxy or monoamino compounds.

Among the preferred compounds that may be employed in combination with lecithin at the elevated temperature after addition to the lubricating oil are hydroquinone, pyrogallol, catechol, eugenol, thymol, tannins, tannic acid, polyphenols, alphanaphthol, naphthoquinones, phenylbetanaphthylamine, and para-aminophenol, monobenzyl-p-aminophenol, and other aminophenols, diphenylethylenediamine, benzyl-m-phenylenediamine, and other aromatic diamines, p-aminodimethylaniline and diphenylhydrazine. These various materials are included in the expression "substituted aranes."

Less preferably, aromatic acids may be utilized, particularly aromatic carboxy acids containing one or more amino groups or hydroxy groups either in the nucleus or in aliphatic side chains.

It is, of course, possible to use derivatives of the above identified compounds in which one or more of the hydrogen atoms in the benzene or naphthalene nucleus or in the aliphatic side chain or in the amino or hydroxy groups, is or are replaced by alkyl, aryl, hydroxy, amino, alkoxy or nitro groups although this is usually not preferred.

It has been found that the lecithin which is employed for combination with these various compounds is most satisfactorily a crude lecithin derived from vegetable sources, particularly from soya beans, cottonseed or corn.

This lecithin preferably should be added to or combined with the aromatic compounds in amounts varying from 5 to 30 parts of lecithin for each 20 parts of the aromatic compound.

The lecithin when mixed with the aromatic compounds should preferably contain between 10% and 60% of a glyceride oil, preferably a vegetable glyceride oil.

This combination of lecithin and the aromatic compounds, and preferably the glyceride oil, with or without heating before addition, is mixed with a lubricating oil and thoroughly dispensed therethrough, the lubricating oil during the addition or after the addition being heated with agitation to a temperature in excess of 350° F. and desirably to between 400° F. and 600° F.

It has been found that the interaction of the lubricating oil, lecithin and the aromatic compound is not most satisfactorily obtained unless the high heat treatment is applied to the lubricating oil after or during addition of the combination of lecithin and the aromatic compound, and it has been particularly found desirable that such heat treatment should be conducted with substantial agitation for a period of at least 10 minutes and the treatment may be conveniently continued for as long as several hours or more.

This is quite surprising due to the fact, that normally lubricating oils, as well as lecithin, are decomposed or broken down and rendered more subject to deterioration as a result of being subjected to such elevated temperatures. In accordance with this invention it is necessary for the lubricating oil to be subjected to the elevated temperature in excess of 350° F. together with and after having had thoroughly admixed therein the combination of the lecithin and the aromatic compounds in order to develop the desired effect upon the lubricating oil.

It is not known whether the heat treatment of the lubricating oil containing the lecithin and the aromatic compound results in a chemical action between the lecithin and aromatic compounds or the lubricating oil or whether a special kind of catalytic action takes place, but the heat treat-

ment is necessary in order to obtain the desired effect upon the lubricating oil to retard sludge formation and corrosive tendencies of the oil.

It has been found most satisfactory to add the combination of lecithin and the aromatic compound in amounts varying from 0.075% to as much as 0.75% although generally between 0.2% and 0.4% are sufficient to show a marked effect upon the lubricating oil that is treated at the elevated temperature with the combination of lecithin and the aromatic compound.

Preferably an equal mixture of the lecithin and the aromatic compound by weight is employed rather than other proportions as it has generally been found that where an equal mixture of the lecithin and the aromatic compound is prepared and added to the lubricating oil during or followed by the elevated temperature treatment, the most desirable effect on the lubricating oil is obtained.

Although it has been found that polyhydroxy, polyamino, and/or aminohydroxy compounds of mono-nuclear or poly-nuclear nature or monoamino or monohydroxy compounds of poly-nuclear nature are most satisfactorily employed, it is also possible to use in combination with or in lieu of such compounds with the lecithin the following compounds:

(*a*) Monohydroxy-aryl compounds such as p-cresol, substituted o- and p- phenols, and betanaphthol and their derivatives;

(*b*) Monoamino-aryl compounds such as aniline, substituted o- and p- alpha and betanaphthylamines, methyl and ethylalphanaphthylamines, diphenylamine, phenylalphanaphthylamine, aldolalphanaphthylamine, m-toluidine, phenylbetanaphthylamine, acetalaniline, aromatic amines, dimethylaniline, amino-diphenyls, benzidine and amino-naphthols and their derivatives;

(*c*) Amine condensation products with aldehydes and ketones, such as benzalaniline, formylalphanaphthylamine, aldehyde-amine and ketone-amine condensation products, butyraldehyde-aniline and aldol-aniline and their derivatives;

(*d*) Nitrogen ring compounds, such as diphenylguanidine, p - dimethylamino -phenyl-p-phenetidyl-guanidine, pyridine, acridine, triazine, piperidine, quinoline and morpholine and their derivatives;

(*e*) Sulfur compounds, such as thiodiphenylamine, sulphides, mercaptans and phenyl disulphide and their derivatives;

(*f*) Cyanide compounds, such as mercuric cyanide and cyanogen and their derivatives;

(*g*) Aliphatic amines, such as dimethylamine, glycine and other amino acids, and their derivatives;

(*h*) Aliphatic oxygen compounds, such as octadecyl alcohol and trioxymethylene and their derivatives.

Although lecithin is preferred for use in accordance with this invention, it is possible to use cephalin and other similar phosphatides of plant or animal origin. There may also be utilized nerve or brain tissue and meat scrap residues, alcohol and hydrocarbon soluble extracts of crude sugars such as crude cane or beet sugar or their residues such as blackstrap molasses.

The stabilizing procedures of the present invention are most applicable to non-volatile high molecular weight aliphatic hydrocarbons, and these procedures may also be utilized with high boiling liquid hydrocarbon mixtures derived from other sources than petroleum and even in some instances they may be used with solid high molecular weight hydrocarbon mixtures.

Less preferably, these stablizing procedures may be employed with non-aliphatic hydrocarbons of high boiling point and still less preferably with high molecular weight glyceride oils, particularly the triglycerides of high molecular weight fatty acids having 12 to 36 carbon atoms, which acids may contain if desired one or more double bonds or hydroxy groups.

The invention is not particularly applicable to hydrocarbon compounds of volatile nature or having a boiling point less than about 200° F. to 250° F.

Having described my invention, what I claim is:

1. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount of a combination of lecithin and an aromatic compound selected from the group consisting of polyhydroxy aranes, polyamino aranes, aminohydroxy aranes, monoamino-poly-nuclear aranes and monohydroxy-poly-nuclear aranes at an elevated temperature in excess of 350° F.

2. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount of a combination of lecithin and a polyhydroxy benzene.

3. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount of a combination of lecithin and an aminohydroxy benzene.

4. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount of a combination of lecithin and hydroquinone.

5. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount, less than 0.75%, of a combination of about equal proportions of lecithin and an aromatic compound selected from the group consisting of polyhydroxy aranes, polyamino aranes, aminohydroxy aranes, monoamino-poly-nuclear aranes and monohydroxy-poly-nuclear aranes at an elevated temperature in excess of 350° F.

6. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount, less than 0.75%, of a combination of about equal proportions of lecithin and an aromatic compound selected from the group consisting of polyhydroxy aranes, polyamino aranes, aminohydroxy aranes, monoamino-poly-nuclear aranes and monohydroxy-poly-nuclear aranes at an elevated temperature of between about 400° F. and 600° F.

7. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the

entire body of the lubricating oil with a small amount of a combination of lecithin and an aromatic compound selected from the group consisting of polyhydroxy aranes, polyamino aranes, aminohydroxy aranes, monoamino-poly-nuclear aranes and monohydroxy-poly-nuclear aranes, said reaction products having been formed in the lubricating oil at a temperature in excess of 350° F.

8. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the entire body of the lubricating oil with a small amount of a combination of lecithin and a polyhydroxy benzene, said reaction products having been formed in the lubricating oil at a temperature in excess of 350° F.

9. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the entire body of the lubricating oil with a small amount of a combination of lecithin and an aminohydroxy benzene, said reaction products having been formed in the lubricating oil at a temperature in excess of 350° F.

10. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the entire body of the lubricating oil with a small amount of a combination of lecithin and hydroquinone, said reaction products having been formed in the lubricating oil at a temperature in excess of 350° F.

11. A process of treating lubricating oils which comprises mixing the entire body of the lubricating oil with 0.075% to 0.75% of a mixture of 5 to 30 parts by weight of lecithin and about 20 parts by weight of hydroquinone, and then heating the entire body of oil to a temperature of 400° F. to 600° F.

12. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises treating the entire body of such oil with a relatively small amount of a combination of lecithin and a catechol.

SIDNEY MUSHER.