Patented Oct. 29, 1935 2,018,871

UNITED STATES PATENT OFFICE

2,018,871

PRODUCTION OF HIGH QUALITY LUBRICATING OILS

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No Drawing. Application March 23, 1934, Serial No. 717,075. In Germany March 30, 1933

4 Claims. (Cl. 196—13)

The present invention relates to a process of producing high quality lubricating oils, especially such as are distinguished by a high viscosity index.

The best cylinder oils obtainable by the usual methods from petroleums have a viscosity index of from 100 to a maximum of about 110. For bearings subjected to great strain or for gears, however, lubricating oils are desirable which have a viscosity index of 120 and more. It has already been proposed to improve the viscosity index of oils by adding to them synthetic hydrocarbons of high molecular weight, as for example condensation products of hard or soft paraffin waxes or of cracking products of such waxes. Thus for example by mixing an oil known as FFF valve oil (American petroleum distillate), which has been refined with nitrobenzene and which has a viscosity index of from 111 to 112, with a small amount of a synthetic condensation product of the said nature, the index of the oil may be improved but the desired index of 120 or more cannot be reached because only a limited amount of the additions of high molecular weight can be employed since otherwise the absolute viscosity of the lubricating oil would become undesirably high.

We have now found that high quality lubricating oils can be obtained by removing from lubricating oils constituents of high molecular weight by treatment with liquefied hydrocarbons which are gaseous at ordinary temperature, and then adding to the remainder of the oil a synthetic product of high molecular weight soluble in oil which has a higher hydrogen content than the constituents of high molecular weight which has been removed, the amount of said added synthetic product being sufficiently great to produce an oil with the desired viscosity index. Generally speaking, this amount is substantially greater than the amount of the synthetic product which is required for pour point reduction in case the synthetic product has pour reducing properties.

As initial materials may be mentioned lubricating oils from any source. They may be obtained from petroleums or tars or their cracking products or from destructive hydrogenation products of carbonaceous substances. Lubricating oils already having a viscosity index of between 100 and 110 are particularly suitable.

The said oils are treated according to this invention with liquefied hydrocarbons which are gaseous at ordinary temperature, such as methane, ethane, propane, butane, pentane, ethylene, propylene, butylene, or mixtures of the same which may also contain other hydrocarbons such as acetylene. The constituents of high molecular weight are thus precipitated while the fraction of comparatively low molecular weight passes into solution. It is preferable to work at temperatures between 40° below zero and 70° C., but also higher temperatures up to 190° C. may be employed. The temperature is dependent upon the nature of the particular solvent used in that it should be at least some degrees lower than the critical temperature of the said solvent, since the operation is to be effected in the liquid phase. The pressure to be employed is so selected that the added solvent remains liquid; it amounts to from 1 to 50 atmospheres or more. The solvent is preferably employed in an amount of from 3 to 15 times by volume of the oil to be treated. If the lubricating oil to be treated contains appreciable amounts of resins, asphalts, hard or soft paraffin waxes, it is advantageous to subject it to a pretreatment with benzine, or more suitably the treatment with liquefied hydrocarbons is carried out in two stages, the said substances, especially the resins, being removed in the first stage. It is advantageous in this case first to employ such liquefied hydrocarbons as butane, propane or mixtures thereof with each other or with small amounts of ethane. By this treatment, especially when also employing ethane, the resins are also precipitated. Then, in order to separate the fraction of high molecular weight, the treatment of the previously purified lubricating oil with, for example, a mixture of propane with larger amounts of ethane is carried out.

In the treatment of lubricating oils with mixtures of propane and ethane, it is preferable to employ those having an ethane content of from about 15 to about 85 per cent. If the ethane content be increased, a larger amount of constituents of high molecular weight is precipitated. Thus by a suitable selection of the ratio of ethane to propane it is readily possible to precipitate the desired amount of constituents of high molecular weight. Thus for example if a mixture containing only 15 per cent of ethane be employed, only small amounts of highly viscous oils of high molecular weight are contained in the undissolved layer; if on the contrary a mixture containing 85 per cent of ethane be employed, the undissolved layer contains larger amounts of oil having a lower viscosity. When the composition of the solvent is kept constant, the amount of constituents of high molecular weight precipitated may be regulated by variation of the temperature in that the same effect

which is obtained by increasing the ethane content may also be obtained by increasing the temperature.

After mixing the lubricating oil with the solvent, the two layers are separated one from the other, as for example by decantation or filtration. The liquefied hydrocarbons are then removed from the solution, as for example by evaporation.

Before separating the added solvent, the solution may be filtered through adsorbents, such as bleaching earths or active carbon, whereby an extensive purification is attained.

There is then added to the part of the lubricating oil freed from constituents of high molecular weight an amount of from 0.1 to 30 per cent or more of an oil-soluble synthetically prepared product rich in hydrogen and of high molecular weight. For this purpose it is advantageous to employ condensation or polymerization products of hydrocarbons consisting wholly or mainly of hard or soft paraffin wax, such as are obtainable according to the British Patent No. 349,071, or the French Patent No. 749,942. Hydrogenation products of polymerized styrene or polymerized indene, and polymerization products of olefines and diolefines, such as isobutylene, and their hydrogenation products are also suitable.

The process according to this invention is of special value for the preparation of lubricating oils which have to withstand high bearing pressures. Lubricating oils having a viscosity index of 120 and more may be thus obtained.

The following example will further illustrate the nature of this invention but the invention is not restricted to this example.

Example

An oil known as FFF valve oil having a viscosity index of 110 is treated at from 70° to 75° C. with eight times its volume of liquefied propane, whereby a fraction of high molecular weight is precipitated in an amount of from about 20 to 25 per cent by weight of the initial oil while the fraction of lower molecular weight remains dissolved in the propane. After running off the fraction of high molecular weight, the oil dissolved in the propane has a viscosity of 3.15° Engler at 99° C. after removing the propane. There is added to this oil 25 per cent, by weight, of a product having a viscosity of 47° Engler at 99° C. obtained by the volatilization of paraffin wax, whereby a gear oil having a viscosity of 7.17° Engler at 38° C. is obtained. This oil has a viscosity index of 125.

By adding about 25 per cent, by weight, of hydro-rubber having a molecular weight between 2000 and 3000 and a viscosity at 99° C. between 50° and 100° Engler to the oil treated with propane, a gear oil having a viscosity index of 125 is obtained.

If the oil treated with propane has added thereto a polymerization product of isobutylene having a molecular weight between 2000 and 5000 in an amount to impart to the oil a viscosity at 38° C. of 7.2° Engler, an oil having a viscosity index of between 123 and 125 is obtained.

What we claim is:—

1. The process of producing a high quality lubricating oil which comprises acting on a lubricating oil substantially free from asphalt and paraffin wax and having a lower viscosity index than desired with a liquefied normally gaseous hydrocarbon, thereby precipitating constituents of high molecular weight, withdrawing the solution of oil in said hydrocarbon, removing said hydrocarbon therefrom, and adding to the resulting oil an oil-soluble synthetic high molecular weight product richer in hydrogen than said precipitated constituents of high molecular weight, said synthetic product being added in viscosity index increasing proportions.

2. The process of producing a high quality lubricating oil which comprises acting on a lubricating oil substantially free from asphalt and paraffin wax and having a lower viscosity index than desired with a liquefied normally gaseous hydrocarbon mixture comprising ethane and propane, thereby precipitating constituents of high molecular weight, withdrawing the solution of oil in said hydrocarbon mixture, removing said hydrocarbon mixture therefrom, and adding to the resulting oil an oil-soluble synthetic high molecular weight product richer in hydrogen than said precipitated constituents of high molecular weight, said synthetic product being added in viscosity index increasing proportions.

3. The process of producing a high quality lubricating oil which comprises acting on a lubricating oil substantially free from asphalt and paraffin wax and having a lower viscosity index than desired with a liquefied normally gaseous hydrocarbon, thereby precipitating constituents of high molecular weight, withdrawing the solution of oil in said hydrocarbon, removing said hydrocarbon therefrom, and adding to the resulting oil an oil-soluble synthetic high molecular weight product richer in hydrogen than said precipitated constituents of high molecular weight obtained by condensation of paraffin wax hydrocarbons, said synthetic product being added in viscosity index increasing proportions.

4. The process of producing a high quality lubricating oil which comprises acting on a lubricating oil substantially free from asphalt and paraffin wax and having a lower viscosity index than desired with a liquefied normally gaseous hydrocarbon, thereby precipitating constituents of high molecular weight, withdrawing the solution of oil in said hydrocarbon, removing said hydrocarbon therefrom, and adding to the resulting oil an oil-soluble synthetic high molecular weight product richer in hydrogen than said precipitated constituents of high molecular weight obtained by condensation of paraffin wax hydrocarbons by means of silent electric discharges, said synthetic product being added in viscosity index increasing proportions.

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CERTIFICATE OF CORRECTION.

Patent No. 2,018,871. October 29, 1935

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 52, for "volatilization" read voltolization;and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of April, A. D. 1936.

Leslie Frazer

(Seal) Acting Commissioner of Patents.