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LUBRICATING OIL CONTAINING A POLYMER
OF OLEYL METHACRYLATEJohn Mann Butler, Dayton, Ohio, assignor to
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a corporation of DelawareNo Drawing. Application August 21, 1948,
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1 Claim. (Cl. 252—56)

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This invention relates to the improvement of lubricating oils, and more particularly to the reduction of pour points of wax containing mineral oils. More specifically the invention relates to a method of altering the crystallization characteristics of the paraffin wax dissolved in lubricating oils, and avoiding the solidification of the lubricant upon cooling.

Many of the commercially available petroleum stocks contain high molecular weight hydrocarbon waxes, and the lubricating oil fractions separated by various refining procedures, contain a substantial proportion dissolved therein. Upon cooling these lubricants, the dissolved waxes crystallize in such form that the mass is solidified. It is known that some substances affect the crystallization of the wax and permit the lubricants to retain their fluidity after cooling to temperatures below the normal pour points of the oils.

The purpose of this invention is to provide a convenient and readily available agent for depressing the pour points of lubricating oils. A further purpose of this invention is to enable the selection of an effective pour point depressant for a wide variety of wax containing lubricating oils.

The pour points of lubricating oils are measured by a standard A. S. T. M. procedure by which a sample of oil is heated and then gradually cooled while observing the fluid characteristics of the sample at every 5° F. interval; the temperature being multiples of 5° F. The pour point is the lowest recorded temperature at which the sample is fluid. The details of the method of determining pour points are set forth in the American Society for Testing Materials Bulletin on petroleum products and lubricants D-97-39.

It has been found that there is a critical relationship between the structure of a methacrylic acid ester and the pour point of a wax containing petroleum fraction if effective depression of pour point is to be achieved. In accordance with this invention, a polymer of oleyl methacrylate is used as a pour point depressant for wax containing mineral oils having pour points between -10° F. and +5° F., inclusive. Comparable polymers of saturated esters are not effective and the polymer of oleyl methacrylate will not depress the pour point of oils having pour points higher than +5° F. and lower than -10° F.

In the practice of this invention, the polymerized oleyl methacrylate is prepared by the polymerization of oleyl methacrylate, preferably by the well known thermal polymerization at temperatures between 50 and 150° C., in the pres-

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ence of a peroxide catalyst such as benzoyl peroxide, acetyl peroxide, or hydrogen peroxide, if desired. The effectiveness of the polymer as a pour point depressant is not materially affected by the molecular weight of the polymer; the wide range of molecular weight achieved by conventional polymerization operations all appear to have the same or very similar pour point depression. The polymerized oleyl methacrylate may be used in an amount varying from 0.01 to 5 percent by weight, but preferred practice involves the use of 0.05 to 2 percent. The polymer is dissolved in the oil by adding it directly and stirring the mixture until a homogeneous mixture is effected. It is frequently desirable to prepare master batches by dispersing or dissolving large amounts of the polymerized oleyl methacrylate in a lubricating stock and thereafter mixing the concentrate with a suitable larger quantity of untreated oil, the proportions being chosen so as to achieve a small but effective proportion of the polymerized oleyl methacrylate in the final lubricant.

This invention may be practiced by using mixtures of polymeric methacrylates containing predominantly polymeric oleyl methacrylate, or copolymers of mixed methacrylic esters containing predominantly oleyl methacrylate, and substantial proportions of polymers of near homologues, for example, octadecyl methacrylate and linoleyl methacrylate. These copolymers are generally derived by the esterification of methacrylic acid with a mixed alcohol derived from animal or vegetable sources.

The pour depressants may be used in combination with other known depressants and with other modifying agents, such as antioxidants and detergents.

The critical characteristics of the pour point depression of lubricating oils with polymerized oleyl methacrylate are demonstrated by the following examples.

Example I

One percent solutions of oleyl methacrylate were prepared in 0° F. and 20° F. pour oils. The samples were tested by means of the standard A. S. T. M. pour point measurement method and the observed data is set forth in the following table.

Original Pour, °F.	Final Pour, °F.	Depression, °F.
0	-25	25
20	20	0

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These data demonstrate that no pour point depression effect is achieved in 20° F. pour oil and that an unusually desirable depression is achieved in 0° F. pour oil. A depression effect is also noticed for pour points below zero, but these are of little commercial value except in special low temperature oils.

Example II

The critical effect of the olefinic bond in the oleyl radical was demonstrated by preparing one percent solutions of polymerized octadecyl methacrylate and polymerized oleyl methacrylate in 0° F. pour oil, and measuring the pour points. The following table demonstrates the critical effect achieved.

Polymerized Agent	Pour Point, °F.	Depression, °F.
Oleyl methacrylate.....	-25	25
Octadecyl methacrylate.....	+10	-10

These data demonstrate that a very desirable effect is achieved by using oleyl methacrylate, but

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when the saturated homologue, octadecyl methacrylate, is used, an increase in pour point is produced instead of a decided depression.

The invention is defined by the following claim:

A lubricating composition which comprises a wax containing mineral iubricating oil of an A. S. T. M. pour point between -10° F. and +5° F., containing dissolved therein from 0.05 to 2 percent by weight of a polymer of oleyl methacrylate, said lubricating oil containing mineral oil as its major increment.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,091,627	Bruson	Aug. 31, 1937
2,129,665	Barrett	Sept. 13, 1938
2,407,954	Fenske	Sept. 17, 1946