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LUBRICANT

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This invention relates to lubricants and particularly to lubricating oils, gear lubricants and greases employed for lubricating transmission gears, differential gears and other similar gear mechanisms requiring a lubricant having a low pour or channeling point. This application is a continuation in part of my application filed November 8, 1933, Serial No. 697,197.

At the present time, the two most common lubricants employed for lubricating transmission and differential gears are gear lubricants and greases. Gear lubricants are straight mineral oils, which may be light or heavy, and while these have been found highly desirable for use in lubricating gears it has been found impossible to use the heavy gear lubricants because of their high channeling point which makes them unsuitable for low temperature operation. Consequently, it has been possible to use only light gear lubricants up to this time, for low temperature operation, and these oils are not suitable for high temperature operation, unless fillers are added to increase the consistency of the grease. Greases are now largely used for gear lubrication and consist of light straight mineral oils to which are added tallow, soap, animal fats, et cetera, to produce an artificial body or consistency. Inasmuch as the filler in the grease produces merely the desired consistency for proper retention under the given conditions, it is a fallacy to believe that the consistency of the grease is also an indication of its lubricating or load-carrying ability. Therefore, the high quality of a lubricant depends solely upon the quality of the straight mineral oil used, and consequently it can be readily seen it is highly desirable to use straight mineral oils of a high viscosity without the addition of fillers, if the channeling point of such oils can be lowered to permit their use in low temperature operation.

An object of the present invention resides in providing a depressant for lowering the pour or channeling point of straight mineral gear lubricants which is readily miscible with the lubricants and will remain admixed therewith during the entire time of its use.

A further object of the invention resides in providing a pour or channeling point depressant which may be admixed with greases containing straight mineral gear oils, whereby the channeling point of the grease will be lowered to permit a heavy grease to be used under both high and low temperature operating conditions.

A still further object of the invention resides in providing a depressant which when added to bright stocks and heavy gear lubricants permits other depressants such as "Paraflow" and "Santapour" to be effective in further reduction of the pour point.

Other objects and advantages of the invention will be apparent from the disclosure of the invention.

The nature of the depressant and the method of treating lubricants with the same will be fully understood from the following description.

The depressant may be used in treating any mineral oil either of a paraffin, mixed, or asphalt base. The reaction of the depressant on paraffin, mixed base oils, and asphalt-base gear lubricants is practically the same, whereas a larger percent of the depressant is necessary to obtain the same results with an asphalt-base motor oil. The reaction of the depressant with greases containing a mineral oil is determined by the character of the base of the mineral oil in the grease and the filler employed in compounding the grease. A grease containing an animal fat as a filler will have its pour point reduced by adding the depressant to the grease, but where the filler is a soap, lead, or the like, the depressant has been found to break down the grease so that the filler no longer remains in suspension and for this reason it has been found unsatisfactory to use the depressant with greases other than those containing animal fats as a filler. However, it is to be understood that the depressant when added to all kinds of greases will reduce the channeling point of the grease, but owing to the effect it has upon the filler of greases containing fillers other than animal fats it is found to be commercially unsuited for use with such greases. While the depressant may be used with greases to obtain certain desirable qualtities, such as permitting a heavy grease to be used in both low and high temperature operation, it is believed straight mineral gear lubricants will replace the use of grease for gear lubrication, as such lubricants are superior to greases and have not been used only because of the high channeling point of gear lubricants of the proper viscosity.

It will thus be seen that one of the primary advantages of my depressant is that it will permit straight heavy gear lubricants to be used as lubricants in the automotive field, whereas they have been heretofore unsuitable because of their high pour or channeling points, and owing to the superior lubricating qualities of such lubricants it is believed my invention will entirely dispense with the use of greases in the automotive field.

The depressant employed to lower the channeling point of straight mineral gear lubricants and greases is para-cymene, a hydrocarbon product which is readily miscible with mineral oils and has a distillation point of 175° C. The depressant may be mixed with the oil at room temperature by agitation, although the blending of the oil and depressant may be accelerated by first heating the oil to a temperature of about 160° F. to 180° F. and then adding the unheated para-cymene to the heated oil. The exact reaction

of para-cymene on the oil is not known, although tests show when used with oils of a paraffin base or containing paraffin, the paraffin is caused to separate out of the oil as a flocculent precipitate. The action of the para-cymene on asphalt-base oils containing no paraffin is the same as a solvent, as it reduces all fats and greases and is an oil solvent. The viscosity of para-cymene is much less than the oil to which it is added, and naturally will act to thin the oil to a degree, but dilution is not its only reaction, as is shown by a test in which 5% of para-cymene added to a 300 Pale asphalt oil reduced the pour point of the oil only slightly, while the same percentage of para-cymene added to a paraffin-base oil that was over eight times the viscosity of the Pale oil, reduced the pour point of the paraffin-base oil many degrees greater.

Tests which I have conducted show the following results:

Treating a Pennsylvania Bright Stock straight mineral oil, 100% paraffin base, having a viscosity of 2400 @ 100 and 160 @ 210 showed the pour point of the oil to be as follows:

Untreated	pour point plus 20° F.
2% of para-cymene	pour point plus 20° F.
5% of para-cymene	pour point plus 10° F.
10% of para-cymene	pour point plus 5° F.

A winter light gear lubricant number 90 having a viscosity of 933 @ 100 and 83 @ 210 showed the pour point of the oil to be as follows:

Untreated	pour point minus 5° F.
2% of para-cymene	pour point minus 10° F.
5% of para-cymene	pour point minus 20° F.
10% of para-cymene	pour point minus 35° F.

An extra heavy gear lubricant having a viscosity of 3885 @ 100 and 191 @ 210 showed the pour point of the oil to be as follows:

Untreated	pour point plus 50° F.
2% of para-cymene	pour point plus 40° F.
5% of para-cymene	pour point plus 20° F.
10% of para-cymene	pour point plus zero

Other known depressants such as "Paraflow" and "Santapour" have not heretofore been effective when used with bright stocks or heavy straight gear lubricants. After treating such lubricants with para-cymene it is found further lowering of the pour point may be accomplished by the use of "Paraflow" or "Santapour" as shown by the following samples:

An extra heavy gear lubricant of the same viscosity as above stated showed the pour point of the oil to be as follows:

Untreated	pour point plus 50° F.
2% of para-cymene and 5% Santapour	pour point plus 12° F.
5% of para-cymene and 5% Santapour	pour point plus 4° F.
10% of para-cymene and 5% Santapour	pour point minus 12° F.

A Bright Stock oil of the same viscosity as above stated, treated in the same manner, showed the following results:

Untreated	pour point plus 20° F.
2% of para-cymene	pour point plus 20° F.
2% of para-cymene and 5% Santapour	pour point plus zero
5% of para-cymene and 5% Santapour	pour point minus 10° F.
10% of para-cymene and 5% Santapour	pour point minus 20° F.

In tests I have conducted it has been found that the percentage of para-cymene will vary according to the type of oil to be treated. The pour point of Pennsylvania and Mid-Continent Bright Stocks will be reduced by 2% or more of para-cymene mixed therewith. Gear lubricants of both the paraffin and asphalt-base types require the addition of 2% or more of para-cymene to reduce their pour points. In the case of asphalt-base motor oils, 5% or more of para-cymene is required to reduce the pour point. In the treating of all oils the greater percent of para-cymene used the greater will be the reduction in the pour point. Also, when "Paraflow" or "Santapour" is used in combination with para-cymene a lesser percent of para-cymene may be used. Tests have shown that 1% or more of para-cymene and "Paraflow" or para-cymene and "Santapour" will reduce the pour point of the oil to a greater degree than a larger percent of the para-cymene used alone, but in treating all types of bright stocks and heavy gear lubricants para-cymene must be added in order to make "Paraflow" or "Santapour" effective. However, it is to be understood the pour point of the lubricant may be depressed by the use of para-cymene alone.

The invention as described is not to be limited by any of the specific examples which may have been given for the purpose of illustration, but only by the following claims.

Having thus described my invention, I claim:

1. A lubricant comprising a mineral lubricating oil and 2% to 10% of para-cymene to lower the pour point of the oil.

2. A lubricant consisting of a mineral lubricating oil and 2% to 10% of para-cymene to lower the pour point of the oil.

3. A lubricant comprising a lubricating oil containing paraffin wax and 2% to 10% of para-cymene to lower the pour point of the oil.

4. A lubricant consisting of a lubricating oil containing paraffin wax and 2% to 10% of para-cymene to lower the pour point of the oil.

5. A lubricant comprising a straight heavy gear lubricating oil, 1% to 10% of para-cymene, and 5% of an aluminum chloride condensation product of naphthalene and chlorinated paraffin wax to lower the pour point of the oil.

6. A lubricant comprising a bright stock lubricating oil, 1% to 10% of para-cymene, and 5% of an aluminum chloride condensation product of naphthalene and chlorinated paraffin wax to lower the pour point of the oil.

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