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STABILIZER FOR METAL DISPERSIONS IN LUBRICANTS

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3 Claims. (Cl. 252—26)

This invention relates to improvements in lubricant oils and greases containing metals in suspension, and more particularly it relates to a method of stabilizing such metallic suspensions whereby the suspended metallic particles are dispersed and maintained in a dispersed condition thereby enhancing the lubricating action of said oils and greases.

It is known that finely dispersed metals, especially soft metals such as lead, tin, silver, aluminum, cadmium, etc., increase the wear resisting qualities of oils and greases. However, such dispersed metallic particles tend to agglomerate or coagulate on long standing and especially when subjected to elevated temperatures. Such agglomeration on standing usually results in the settling out of the metallic particles and their beneficial effect is thus lost. Agglomeration during use due to elevated temperatures frequently results in the precipitation and deposition of relatively large metallic particles upon the metallic surfaces being lubricated. This latter deposition tends to roughen the surfaces involved and may even cause increased wear rather than decreased wear.

An object of this invention is the production of oils and greases having improved lubricating properties.

Another object of this invention is the development of means of stabilizing metallic dispersions in lubricating oils and greases whereby the lubricating action of said oils and greases is enhanced.

Still other objects and advantages will be apparent from a careful study of the following disclosure.

We have found that such colloidal, or near colloidal metallic suspensions in lubricants may be stabilized and their effectiveness in reducing wear improved by the addition of aryl-alkyl amino compounds containing a hydroxyl group to said lubricating compositions. Such aryl-alkyl amino compounds containing a hydroxyl group, when added in relatively small proportions, act as dispersing and protective agents to prevent agglomeration which would otherwise occur, without injurying other qualities of the lubricants, but rather improving them.

Thus for example, a dispersion of metallic particles, called a sol, reduced the wear of Babbitt bearing metal by a steel journal as follows:

Test No.	Metallic dispersion	Per cent wear (based on 100% wear using untreated oil)	Total time wear reduction is effective
		Per cent	*Minutes*
1	0.002% lead sol	100	Less than 15
2	0.07% lead sol	88	90
3	0.186% lead sol	72	240
4	0.04% cadmium sol	0	360
5	0.10% tin sol	67	360

When small concentrations, for example less than 5%, of aryl-alkyl amino compounds containing a hydroxyl group, such as phenyl ethanol amine, are added to metal dispersions in lubricants, such as oils and greases, the effectiveness of these sols as wear reducing additives, is increased. Concentrations of the aryl-alkyl hydroxylamines in lubricants may be as great as 2%, or as small as 1%, or 0.1% or even less and yet be effective in stabilizing the finely divided metal in the lubricant. In fact, optimum stabilization resulted when approximately 0.1% of the above mentioned amine was added to the metal containing lubricant.

For example, results on a lead sol are as follows:

Example No.	Metallic dispersion Aryl alkyl hydroxyl amine	Per cent wear (based on 100% wear using untreated oil)	Time to reach minimum rate of wear	Total time wear reduction is effective
		Per cent	*Minutes*	*Minutes*
1	0.002% lead sol +0.03% phenyl ethanolamine.	62.5	105	195
2	0.002% lead sol +0.07% phenyl ethanolamine.	12.5	195	435
3	0.002% lead sol +0.10% phenyl ethanolamine.	0.0	45	(1)
4	0.0004% lead sol +0.10% phenyl ethanolamine.	79.0	75	105
5	0.0012% lead sol +0.10% phenyl ethanolamine.	5.0	75	(2)
6	0.07% lead sol +0.10% phenyl ethanolamine.	0.0	90	(3)

[1] No wear after 405 min.
[2] More than 150 min. Action erratic.
[3] No wear after 495 min.

That the action of the phenyl ethanolamine is due to the stabilizing influence on the metal sol independent of the film strength and/or the oiliness properties of the phenyl ethanolamine itself, is shown by Examples 4, 5 and 6 above. At constant concentration of phenyl ethanolamine, the lubricating effect varied with the concentration of the dispersed metal present. Further, the phenyl ethanolamine is not as effective in reducing wear with a motor oil as the combination of the amine and metallic sol. For example, a concentration of 0.10% phenyl ethanolamine in a motor oil only reduces the wear to 95% of the wear with the untreated oil compared to a reduction in wear to nil when this same amount of amine was used with 0.002% and 0.07% lead sol, as in Examples 3 and 6 above.

We do not wish to be restricted to any theories as to the reasons for the beneficial results obtained by the use of our compounds in lubricating oils and greases but only by the limitation of the following claims.

We claim:

1. An improved lubricant of the class consisting

of oils and greases having incorporated therein a colloidal soft metal in amount varying from 0.002% to 0.186% and phenyl ethanol amine in an amount varying from 0.03% to 5% as a stabilizing agent, to improve the wear resisting properties of the so treated lubricant.

2. An improved lubricant of the class consisting of oils and greases having incorporated therein a colloidal metal selected from the group consisting of cadmium, tin, silver, aluminum, and lead in an amount varying from 0.002% to 0.186% and phenyl ethanol amine in an amount varying fror 0.03% to 5% as a stabilizing agent, to improv the wear resisting properties of the so treate lubricant.

3. An improved lubricant of the class consistin of oils and greases having incorporated therei 0.002% of colloidal lead and 0.10% phenyl ethanc amine, to improve the wear resisting propertie of the so treated lubricant.

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