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LUBRICANT

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1 Claim. (Cl. 252—26)

This invention relates to the production of improved lubricants and particularly to the production of high pressure lubricants.

In recent years considerable attention has been devoted to the problems involved in high pressure lubrication, that is to say, in lubrication of metal parts operating under severe friction conditions as for example in the "running in" of pistons, bearings and the like. It was found in the past that under such drastic conditions normal lubricating films, such for example as those of saturated hydrocarbon oils, tend to break down and the metal parts tend to seize. In order to obviate this seizure a number of expedients have been suggested. One of these comprehends the idea of adding reactive substances like sulphur, phosphorous, arsenic, chlorine and the like to the oil. The rationale of this use is that such addition agents react with the surface of the metals in question to form relatively low melting compounds. In these circumstances when the generated frictional heat rises to an undesired extent such compounds are plasticized or melted and thus establish an additional lubricity between the parts. Another expedient proposed is to actually coat the metal parts with a fusible metal such as tin so that during running in of, for example, a piston, the coated metal forms a liquid lubricant.

It has now been found that improved high pressure lubricants may be produced by incorporating a flake metal in hydrocarbon lubricating oil and similar oleaginous vehicles.

In a preferred form of the invention special metals are utilized and particularly those which are characterized by a basal cleavage plane. Among such metals which are comprehended within the scope of the invention are antimony and bismuth. In producing the improved lubricants the metal may first be reduced to the form of a shrode in a suitable stamp mill. Thereafter the relatively finely divided metal may be reduced to the desired particle size by grinding in a ball mill. Metals which have a basal cleavage plane may be quickly reduced in size in a ball mill to produce flat plates of the metal. After treatment in the ball mill, the discrete flake metal may be screened or classified to produce flakes of the desired size. The metal flakes are then incorporated in a suitable lubricating oil such as a paraffinic base oil of the desired viscosity characteristics, or any other lubricating vehicle.

The quantity of the metal flakes which is embodied in the hydrocarbon base, as will be understood, may be widely varied depending upon the service conditions to which the lubricant is to be subjected.

Preferably the metal is reduced to a powder of from about 200 to 350 mesh or more although it will be understood that the particle size of the metal per se, is not essentially critical.

In order to improve the stability of the suspension of the metal flakes in the hydrocarbon oil base, stabilizers and/or leafing agents such as stearic acid may be utilized. In these circumstances the stabilizing or leafing agent preferably is applied to the metal flakes prior to its incorporation in the lubricating vehicle.

It will be appreciated that this type of lubricant presents decidedly improved characteristics which renders it especially efficacious for high pressure lubrication. Metals which have a basal cleavage plane such, for example, as antimony and bismuth are characterized by an "oily" or unctuous surface which renders them excellent lubricating agents of themselves. This unctuousness is also characteristic of aluminum flake and the utilization of aluminum flake metal embodied in hydrocarbon lubricating oils is directly contemplated within the scope of the present invention.

The particular metal which is chosen for the addition agent to the lubricating oil, as will be appreciated, will depend to no inconsiderable degree upon the use to which the lubricating medium is to be put. Both antimony and bismuth are not only unctuous metals and hence characterized by an improved lubricity, but are also highly resistant to chemical attack and in this latter aspect are to be preferred over aluminum. Again while bismuth is much more expensive than either antimony or aluminum it has one attribute in its favor, namely, a much lower melting point. This factor is of importance for machine and engine lubricants for, as is known on starting and stopping, local frictional heat may reach a very high value. The improved lubricants of the present invention, with proper modifications, may be used for cutting lubricants as well as for "running in" lubricants. When utilized for cutting lubricants the new products have added advantages. By properly proportioning the amount of metal dispersed in the hydrocarbon base oil the unctuous lubricating metal is thus interposed between the work and the tool and a truly protective metal such as antimony can to a considerable degree be peened on the cut or worked surfaces. In these circumstances these worked surfaces, which as

is known, are more susceptible to corrosion than the uncut surfaces are thus coated to a considerable degree with a protective metal surface thus insuring a continued protection for the base metal.

It will be understood, of course, that whenever desired, predetermined percentages of different metals, such as aluminum, antimony and bismuth, may be incorporated in the one lubricating vehicle so as to secure an improved correlated effect from the several components.

As noted previously the amount of the flake metal added to the lubricant will depend to large degree on the conditions of use of the lubricant; for less drastic conditions of lubrication relatively small amounts of the order of from 0.1 part by volume of metal to 5.0 parts or more per 100 parts of hydrocarbon oil may be utilized. For more rigorous conditions a larger proportion of the metal phase may be employed.

It will be understood that the present invention enables the utilization of cheaper forms of lubricating oils for certain purposes. Other things being equal a saturated hydrocarbon oil, i. e., a paraffinic stock is preferred for most lubrication services. However, in the oil industry today, as a result of the wide use of selective solvent extraction of paraffinic oil, there is available a large quantity of naphthenic oil. These naphthenic fractions, of the same boiling range as paraffinic fractions, do not have the desired viscosity characteristics as the paraffinic oils. However, they serve well as light lubricants and when utilized according to the present invention, i. e., when there is added to these naphthenic oils a predetermined amount of a flake metal such oils are then rendered available for much heavier lubricating services.

It will thus be understood that the invention comprehends the production of improved lubricants, suitable for heavy duty and particularly for those services where high frictional heats may be developed, which is made up of a preponderant amount of lubricating oil having the characteristic viscosity of lubricating oil fractions and in which there is embodied a sufficient amount of an unctuous flaked metal of suitable particle size to impart high pressure lubricity to the composition. Thus while preferred embodiments of the invention have been described, it is to be understood that these are given as exemplifying the underlying principles involved and not as exclusively defining the compositions within the scope of the invention.

I claim:

An improved high pressure lubricant which comprises a preponderant amount of a lubricating oil having the characteristic viscosity of lubricating oil fractions and a smaller amount of bismuth, in flake form, dispersed therein.

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