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LUBRICANT

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The invention relates to lubricants of the class containing solid matter dispersed therein and consists in such a lubricant having special advantages not alone as respects reduction of friction but also as respects durability under heavy duty and minimization of bearing wear as well as other advantages. More particularly the invention consists in the combination of a proper lubricating oily base and a small portion, preferably about 5% by weight, of zinc oxide well dispersed therein, all as below explained.

Certain virtues of this particular material, zinc oxide, as well as of other solid materials incorporated in oily bases, have long ago obtained recognition in the lubricating art and to some extent such compositions with solid matter have gone into practical use. With the exception however of those oily bases which contain graphite, these mixtures are subject to the objection, often not immediately realized by the users, that while they appear to effect an immediate or temporary improvement in operating conditions, eventually they result in excessive and progressive wear of the relatively moving parts. This is on account of the abrasive effect contributed by the solid particles in the medium and indeed it is only because of such abrasion that the use of these lubricants has become at all desirable. When they are fed to overheated, scored or badly worn bearings, they have the temporary beneficial effect of smoothing and polishing the roughened surfaces, giving a corresponding reduction of friction and power loss and to that extent arresting the rapid rate of wear that has already started. For this purpose the type of lubricants referred to has a special advantage, but for continued use they are not to be recommended for obvious reasons.

The present invention makes use of the abrasive action of zinc oxide in an oily base. It rests on the discovery that if the oxide is of adequate fineness, and sufficiently well dispersed and is present only within certain percentage limits, the abrasive effect is limited to the development of a certain desirable degree of polish of the relatively moving surfaces and does not persist or continue to any appreciable extent when that desirable surface condition has been attained. It is not progressive as in the case of prior lubricants containing zinc oxide or other solid matter, and in consequence lubricants according to this invention are usable with advantage generally, in new as well as worn bearings having always the advantage that they produce an optimum condition for the relatively moving surfaces and maintain such condition for indefinite periods. These results accrue whether the friction to be moderated is rolling or sliding, that is to say whether the bearings are of the roller or ball bearing type on the one hand, or solid or babbitted bearings on the other hand. In both cases improvement in the surface texture of the relatively moving parts results from the use of these lubricants, being commonly referred to as a plating effect on account of the polish and high lustre of the wearing surfaces. There is reason to assume that metallic zinc becomes deposited in microscopic amount upon the surface of the bearing aiding or contributing to the smoothness that is produced. While it is not possible at this time to establish that any actual deposit of metallic zinc occurs, in any event the wearing surfaces become so substantially improved that the rate of wear is appreciably reduced as soon as the smooth lustrous condition is attained.

The invention is carried into effect by very thoroughly mixing or dispersing zinc oxide into an oily base possessing in itself good lubricating qualities and preferably containing some ingredient which aids in maintaining the dispersion or suspension of the zinc oxide therein so that it will not settle to the bottom under lapse of time. For this purpose oils of animal origin are useful additions and ordinarily about 15% of animal oil, e. g. lard oil, is added to the mixture, either being first mixed with the zinc oxide or the main oily base, as desired. The main bulk of the lubricant is desirably composed of mineral oil of the type known as "cylinder stock" or the like, preferably also containing a small portion of sulphur in a proper form to improve the film strength. The following formula represents a satisfactory composition for the improved lubricant which will suffice for purposes of illustration:

	Per cent
Animal fats	15
Refined mineral oils	35
Cylinder stock oil	40
Sulphur	5
Zinc oxide	5

In all cases the zinc content is within the limits of two to ten per cent. by weight of the mixture, which amount is sufficient not only to produce the effect above referred to but is also sufficient to impart to the lubricant a white color which persists even after long-continued use, which is to say, the lubricant does not turn black with wear, making it especially desirable from the point of view of cleanliness. When used in auto-

mobile transmissions and differentials any drip on the garage floor is a white rather than a black stain. This effect may be taken as a further indication of the efficiency of the new lubricant inasmuch as the blackness of ordinary oils is attributed to the abraded particles of the bearing which become mixed therewith.

It will be understood that the oily base is compounded with reference to the general characteristics required of the final product and that provided the peculiar action of the zinc oxide is preserved by keeping the content of that ingredient within the specified limits, the others are subject to variation in character or quantity to adapt the lubricant to the nature of the work. For example, for applications requiring a somewhat lighter density of lubricant the following is a satisfactory composition:

	Per cent
Animal fats	10
Refined light oils	82
Sulphur	3
Zinc oxide	5

While these two grades of lubricant are both of liquid density the invention is by no means confined to the compounding of oils since like amounts of zinc oxide incorporated in suitable greases have been found to be of equal benefit and to function as above described, whether the grease be of the conventional calcium or sodium soap base or otherwise. Aluminum and other stearates have, for example, been used as grease bases with equal success. In each case, however, between 2 and 10% zinc oxide is used, being preferably added to and dispersed in the grease after the latter is fully processed.

I claim:

1. A lubricant of the class consisting of oils and greases characterized by its non-progressive abrasive action on the wear surfaces to which applied and containing finely divided zinc oxide dispersed therein to the extent of not less than 2% and not more than 10% by weight.

2. A lubricant of the class consisting of oils and greases characterized by its non-progressive abrasive action on the wear surfaces to which applied and comprising an oil base having approximately 5% by weight of finely divided zinc oxide dispersed therein.

3. A lubricant of the class consisting of oils and greases characterized by its non-progressive abrasive action on the wear surfaces to which applied, and comprising animal fats and oils and having not less than 2% and not more than 10% by weight of finely divided zinc oxide dispersed therein.

4. A lubricant characterized by its non-progressive abrasive action on the wear surfaces to which applied and containing by weight 5–20% animal fats, 30–90% cylinder stock and refined oils, and 2–10% finely divided zinc oxide in a dispersed state.

5. A lubricant of the class consisting of oils and greases characterized by its non-progressive abrasive action on the wear surfaces to which applied and containing animal fats, cylinder stock, refined oils and approximately 5% by weight of finely divided zinc oxide in a dispersed state.

6. A lubricant of the class consisting of oils and greases characterized by its non-progressive abrasive action on the wear surfaces to which applied and comprising a grease, oils and finely divided zinc oxide dispersed therein to the extent of not less than 2% and not more than 10%.

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