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NONSOLUBLE CUTTING OIL

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9 Claims. (Cl. 252—33.4)

This invention relates to cutting oils, and it is among the objects of the invention to provide products avoiding inclusion of the water customarily employed. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

The oil base which I prefer is prepared by reacting phosphorus pentasulphide with mineral oil, one-half to 5 per cent, or more, up to 40 per cent, depending upon the particular oil involved. Thus, paraffinic oils as customary in lubricating stocks use smaller amounts of phosphorus pentasulphide, while such lubricating products as polymerized olefines use 20 or 30 to 40 per cent. The viscosity of the lubricating stock may vary, depending upon the particular kind of machine tool operation for which it is intended. Generally, 60 to 200 sec. viscosity at 100° F. is desirable. The phosphorus pentasulphide is heated with the oil at a temperature of 200–450° F., for 1 to 8 or 10 hours. If a product without corrosive character is desired, there may be then added up to 15 per cent of a fatty acid ester, such as a fatty oil or wax, cotton seed oil, corn oil, degras, lard oil, sperm oil, tallow etc. The fats incorporated are of unsaturated nature in order to present reactive double bonds for the residual corrosive sulphur. Preferred fats are those having an iodine number above 75, e. g. especially, as castor oil, cod liver oil, cotton seed oil, corn oil, linseed oil, menhaden oil, perilla oil, soya bean oil, sperm oil, etc. The product may be finally treated with clay or with sulphuric acid, or both. With the prepared oil base I incorporate one or more detergents, these being higher molecular weight ketones, alcohols, alcoholates having wetting properties, salts of organic acids as carboxylic acids, higher fatty acids, naphthenic acid, sulphonic or sulphate acids, etc., the latter including such compounds or esters as dioctyl ester of sodium sulphosuccinic acid and analogous compounds. Acids such as the higher fatty acids, naphthenic acid, organic sulphuric acids, etc., are involved, and the base which is combined may be an alkali metal, alkaline earth metal, ammonia, amine, etc. Particularly desirable are heavy metal salts, as chromium, copper, lead, etc. The detergent compound may be added to hot or cold oil. Any precipitate may be filtered out. The detergent compound acts primarily by increasing the wetting of the metal by the cutting oil. This enables an increased speed of cutting. Also the detergent causes a "weaker" cutting oil, i. e. one in which the sulphur reacts with the metal surface more slowly, to do the work of a "stronger" but corrosive oil. In some cases, instead of the specially prepared oil base, mineral oils without the sulphide treatment may be applied with the detergent, and certain of the advantages of the invention will be obtained. Also, such mineral oil bases as mineral oil containing halogenated compounds, e. g. chlorinated wax, or mineral oils containing phosphorus salts, e. g. tricresyl or other organic phosphates, or other organic phosphites, may be similarly compounded with the detergent in accordance with the present invention.

As an example: A mineral oil of 100 sec. Saybolt Universal viscosity at 100° F. is heated with 3 per cent of phosphorus pentasulphide for 6 hours at 330° F. Then 3 per cent of cotton seed oil is added and the temperature maintained for a half hour longer. Then one-half of 1 per cent of dioctyl ester of sodium sulpho-succinic acid and one-half per cent of lead naphthenate are incorporated. The product is particularly desirable for such usages as thread-cutting machines.

Another example: 20 per cent of phosphorus pentasulphide is reacted with polypropylene for 6 hours at 330° F. The product in amount of 10 per cent is then incorporated together with one-half per cent of a dioctyl ester of sodium sulphosuccinic acid, in 89.5 per cent of mineral oil.

As another example: Chlorinated wax 5 per cent, and dioctyl ester of sodium sulpho-succinic acid one-half per cent are incorporated with 94.5 per cent of mineral oil.

Tricresyl phosphite may be substituted for the chlorinated wax in the foregoing, with good results.

In general, the amount of organic salt or soap is small, very small in contrast to the old practice with water-containing oils, and in general less than 1 per cent is satisfactory. Furthermore, it will be noticed that the salts employed in accordance with the present invention are oil-soluble, which again is in contrast to the water-soluble, oil-insoluble soaps customarily used in cutting oils.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the

features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil residual corrosiveness being eliminated by an unsaturated fat, and with the inclusion of dioctyl ester of sodium sulpho-succinic acid.

2. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil, and an oil soluble detergent organic sulphate.

3. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil, and an oil soluble detergent.

4. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil, and having corrosiveness eliminated by a fatty oil.

5. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil, and an oil soluble detergent copper salt.

6. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil, and an oil soluble detergent lead salt.

7. A waterless cutting oil, comprising a reaction product of phosphorus pentasulphide and a mineral oil, residual corrosiveness being eliminated by an unsaturated fatty acid ester, and with the inclusion of a detergent.

8. A waterless cutting oil comprising a reaction product of phosphorus pentasulfide and a mineral oil, an unsaturated fatty oil, and an oil soluble detergent.

9. A waterless cutting oil comprising a mineral oil, a reaction product of phosphorus pentasulfide and a hydrocarbon oil, and an oil soluble detergent.

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