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HYDRAULIC FLUID

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This invention relates to fluid mixtures and more especially to fluid mixtures which are useful as hydraulic fluids for the transmission of power.

The most common fluids of this type are composed of castor oil solubilized in organic solvents and diluents with additions of materials which impart special characteristics to the fluid, such as constant viscosity, anti-corrosive properties, and homogeneity throughout a wide temperature range.

The deleterious effect of castor oil base fluids on the metal and rubber, and particularly the latter, in hydraulic systems is a commercially important consideration and considerable research has been directed to counteracting this effect without completely satisfactory results.

The present invention circumvents the difficulty caused by use of base lubricants whose destructive tendencies cannot be completely inhibited by providing a fluid which utilizes a lubricant base, the objectionable properties of which can be completely neutralized by the use of inexpensive and easily handled compounds. The fluid proposed by this invention is also miscible with and useful in conjunction with the oil-base type of fluids. More specifically, this invention contemplates a brake fluid with a glycerine base which also includes compounds which completely neutralize the corrosive effect of the glycerine on the metal and rubber elements of the hydraulic system which the fluid ordinarily contacts.

Furthermore, this invention provides a hydraulic fluid which is composed completely of materials which are inexpensive and the supplies of which are independent of foreign sources.

Glycerine has been previously used in hydraulic fluid supplementary to other lubricants such as animal and vegetable oils and fats and soaps and modified fatty acids; but the use has always been restricted to modifying the properties of a base lubricant.

This invention involves the use of glycerine as the base lubricant in a hydraulic fluid, the corrosive effect of the glycerine being neutralized by addition of borax to produce a fluid which retains the desired lubricating effect and which does not have the deleterious effect on rubber and metal which is exhibited by glycerine.

Glycerine is solubilized in a mixture of an alcohol and a glycol and borax may be added to this solution to react with the glycerine producing glycerol borate, or glycerol borate may be added to the solution in amounts chemically equivalent to the borax which otherwise would be used. The alcohol may be any one of or a mixture of those commonly used in this type of composition such as propanol, isopropanol, butanol, isobutanol or other lower aliphatic alcohols and their isomers. Glycols commonly used are ethylene glycol, propylene glycol, tetraethylene glycol, hexaethylene glycol, and nonaethylene glycol, all of which are suitable for the present invention.

The characteristics of the fluid such as viscosity, boiling and freezing point, are determined by the relative amount of the constituents of the fluid. The present invention contemplates a fluid with a viscosity comparable to the usual oil-base fluids and for this purpose the following range of percentages of constituents by volume has been found to be useful. The glycerine may vary from 5% to 40%, the glycol from 2% to 50%, the alcohol from 30% to 80% and the borax from .7 to 3.5 oz. per gallon of finished fluid.

Due to the varying viscosities of different glycols the quantity of glycerine and, consequently, the quantity of alcohol and borax are dependent on the kind and amount of glycol used in the particular composition. The proper proportions of all ingredients are determined best by trial mixtures brought to satisfactory viscosity, low rate of viscosity change with temperature decrease, and satisfactory stability characteristics under conditions which simulate those of severe usage. The smallest amount of borax or glycerol borate which is necessary to prevent corrosive effects can also be easily determined by trial.

The composition of some typical satisfactory fluids are set forth in the following table. These examples, however, are not to be construed as a limitation of the invention but only as illustrative of some of the compositions embraced by the present invention.

Glycerine (parts by volume)	30	25	20	40	35	15
Propylene glycol (parts by volume)	10	8	15	10	15	20
Isobutyl alcohol (parts by volume)	60	67	65	50	50	70
Borax (oz. per gal. fluid)					.7 to 3.5	

A particularly suitable fluid comprises, by volume, 30.4 parts glycerine, 8.7 parts propylene glycol, 60.9 parts isobutyl alcohol, and sufficient borax to inhibit the glycerine (from .7 to 3.5 oz. per gallon of fluid, depending on the quality of glycerine).

The method of compounding the ingredients is not critical and a suitable procedure consists in adding the borax to the glycerol and glycol, heat-

ing to aid the solution of the borax and thereafter removing the heat and adding the alcohol, or by dissolving the borax in the alcohol and thereafter mixing the solution thus formed with the glycerol and glycol.

Hydraulic fluids made according to the present invention are inexpensive, devoid of objectionable properties, and are miscible with the common oil-base fluids and therefore suitable for use in refilling hydraulic systems already containing an oil-base fluid as well as for use in any hydraulic system in which oil-base types of fluid are commonly used.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A substantially non-aqueous hydraulic fluid comprising by volume approximately 30 parts glycerine, 9 parts propylene glycol, 61 parts isobutanol and a quantity of borate only sufficient to inhibit the corrosive tendencies of the glycerine.

2. A substantially non-aqueous hydraulic fluid consisting of, by volume, from about 5% to about 40% of glycerine, from about 30% to about 80% of monohydric alcohol, from about 2% to about 50% of a glycol and a glycerol borate in sufficient quantity to inhibit corrosive tendencies of the glycerine.

3. A substantialy non-aqueous hydraulic fluid consisting of, by volume, from about 5% to about 40% glycerine, from about 30% to about 80% of monohydric alcohol, from about 2% to about 50% of a glycol and a borate only in sufficient quantity to inhibit the corrosive tendencies of the glycerine.

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