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# UNITED STATES PATENT OFFICE.

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## SOLUBLE OIL.

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This invention relates to soluble oils, such as are largely utilized in combination with water, in machine shops for lubricating and cooling purposes in connection with lathe-turning work or other similar metal-working operations.

In the past, soluble oils have been manufactured by making a suitable emulsifying agent, composed of a sodium or other soap of an inexpensive fatty or rosin acid, with a suitable and inexpensive mineral oil, while employing alcohol or ammonia, or the like, as a mutual or common solvent for the purpose of securing the desired degree of miscibility and stability. These mutual solvents temporarily effected their intended purpose but, on long standing, the oily mixtures tended to separate and revert to a non-miscible condition. As this reversion is particularly marked when the soluble oil is left partially open to the atmosphere, it is believed that this action is due largely to the low boiling points of the mutual solvents employed in the prior art, thus permitting ready evaporation thereof. Consequently, the character of the soluble oil is not fixed and the emulsifying agent and oil tend to separate as the mutual solvent is removed by evaporation.

Having in mind this difficulty of the prior art, it is an object of the present invention to provide an improved, substantially stable and permanent soluble oil by the utilization of a mutual solvent, preferably, a phenolic body, which has a relatively high boiling point, and which, therefore, will not evaporate readily under ordinary conditions. For this purpose I combine the usual emulsifying agent and the oil with a mutual solvent, preferably of a phenolic type, as cresol or phenol, either one of which serves the purpose of securing the desired solubility or miscibility of the other ingredients, while maintaining these properties without substantial change under ordinary conditions. The amount of the mutual solvent necessary may vary considerably, but is generally less than the corresponding amount of alcohol or ammonia required in the prior art.

It should be understood at the outset that the improved character of the soluble oil of the present invention is not attributed entirely to the high boiling point of the mutual solvent, as the physical and chemical properties of phenolic bodies are believed to be especially beneficial to the production and continued maintenance of an improved and superior commercial product.

The present invention may best be understood from the following description of a soluble oil constituting a preferred embodiment thereof.

The soluble oil base is first prepared, and subsequently is mixed with an inexpensive mineral oil in the proportions of about one part of the base to from two to six parts of oil.

The soluble oil base may be prepared from any well-known emulsifying agent, such as those made from sodium, potassium or ammonium soaps of inexpensive fatty or rosin acids, (for example—oleic, rosin or stearic) to which a small amount of a mutual or common solvent, preferably of the phenolic type, such as cresol (cresylic acid) or phenol (carbolic acid) is added. Phenol and cresol are particularly adapted for use as mutual solvents, both by reason of the peculiar properties of phenolic bodies, as well as their relatively high boiling points. Other mutual solvents having boiling points at least as high as 150° C. may also be employed, but it is preferred to use mutual solvents of the phenolic type, since I now consider that such products produce results of superior quality.

As an illustrative example of a soluble oil base that has been found satisfactory, the following ingredients are mixed in the proportions indicated below:

| | Per cent. |
|---|---|
| Sodium resinate | 44 |
| Elaine oil (oleic acid) | 16 |
| Water | 16 |
| Mineral oil | 13 |
| Cresol | 11 |

As already intimated, the emulsifying agent, constituting a part of the above base, may be composed of other well-known ingredients prepared in accordance with the practice familiar in the art, so that the elements and proportions above indicated are not in any way restrictive but merely exemplary.

Having mixed the soluble oil base in the general manner described above, it is subsequently added to a suitable inexpensive mineral oil, which may constitute most any oil having the proper lubricating properties. The proportions of the soluble oil base and

the oil will vary considerably in accordance with the particular ingredients employed and the results desired, but in general, it will be found that they should be mixed in about the proportions of one part of the soluble oil base to form two to six parts of the oil. After adding the oil to the base, it is desirable to effect a thorough mixture by agitating in a suitable manner until the desired solubility or miscibility of the various ingredients is effected. Through the agency of the mutual solvent, which operates in common on the aqueous emulsifying agent and the mineral oil, there is produced an absolutely miscible soluble oil of permanently stable character.

With due regard for the range of proportions of the soluble oil base and the oil hereinbefore mentioned, I have found that satisfactory soluble oils may be prepared having in general the following contents:

| | Per cent. |
|---|---|
| Emulsifying agent | 10 to 26 |
| Mineral oil | 88 to 71 |
| Common solvent | 1½ to 4 |

When one part of soluble oil base is mixed with about five parts of mineral oil, a particularly satisfactory product for most purposes is obtained, and comprises the following approximate proportions:

| | Per cent. |
|---|---|
| Emulsifying agent | 14 |
| Mineral oil | 84 |
| Common solvent | 2 |

Although a particular mode of procedure has been described, with respect to the steps of mixing the various ingredients, it will be understood that this particular order or sequence is not essential and satisfactory results may be secured by first mixing the mutual solvent with the mineral oil and then adding the emulsifying agent thereto, or even by mixing the emulsifying agent, the mutual solvent and the mineral oil together in a single batch. The mode of preparation, so far as the relative proportions of parts and sequence of steps is concerned, is not at all critical, but the essence of the invention resides in utilizing, in conjunction with an emulsifying agent, and a mineral oil, a mutual solvent, preferably of the phenolic type, having a relatively high boiling point, thereby preventing its own subsequent evaporation under ordinary conditions and thus insuring permanence and stability in the character of the soluble oil produced.

Only such limitations should be imposed as are indicated in the appended claims.

What I claim is:

1. A stable soluble oil comprising mineral oil, sodium resinate and a phenol as a mutual solvent.

2. A stable soluble oil comprising mineral oil, sodium resinate and cresol as a mutual solvent.

3. A stable soluble oil comprising mineral oil, sodium resinate, oleic acid and a phenol.

4. A stable soluble oil, comprising mineral oil, a soap, oleic acid and a phenol.

In witness whereof I have hereunto set my hand this 31st day of January, 1924.

HOWARD DIMMIG.