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ABRASIVE SUSPENSIONS

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3 Claims. (Cl. 51—304)

1

This invention relates to abrasive suspensions and particularly to those in which finely divided abrasive particles are suspended in a liquid or semi-liquid medium.

Abrasive suspensions with which the present invention is concerned may be used for grinding or polishing various types of hard materials, such as metallic carbides, industrial diamonds, steel, brass, bronze or other metals, glass, gems or minerals. However, they find particular application in shaping tungsten carbide or diamond wire drawing dies.

The hardness of tungsten carbide and diamond is such that dies formed of these materials cannot be drilled or shaped by machine tools. The usual practice is to shape such dies with lapping tools and abrasive suspensions. The abrasive commonly employed on such dies is diamond, but for grinding and polishing operations on softer materials suspensions of boron carbide, silicon carbide, aluminum oxide or other abrasives may also be used. The abrasive particles are of a size of minus 200 mesh or finer and are suspended in a suitable liquid or semi-liquid medium, such as olive oil.

An object of the present invention is to provide abrasive suspensions consisting of the usual abrasive powders and improved suspending mediums, the latter being characterized by their ability to hold the abrasive particles in suspension, their non-volatility and their lack of lubricating qualities.

A further object of the invention is to provide improved abrasive suspensions in which the suspending medium is of relatively low cost material, besides having the aforementioned improved characteristics.

Improved mediums used in abrasive suspensions of the present invention consist of fatty acid esters of polyhydric alcohols. The fatty acid component may be either a saturated acid having a chain of 6 to 12 carbon atoms or an unsaturated acid having a chain of 10 to 18 carbon atoms and in which the unsaturation is confined to one double bond. Examples of suitable saturated acids are caproic, caprylic, capric and lauric. Examples of suitable unsaturated acids are oleic, palmitoleic ricinoleic and eleostearic. The polyhydric alcohol component of the ester may be either glycerol, ethylene glycol or diethylene glycol.

For abrasive suspensions used for grinding and polishing metals, I prefer esters in which all of the hydroxyl radicals have been reacted with fatty acids, while for non-metallic materials I

2

prefer esters that have one or more free hydroxyl radicals.

Specific examples of esters that I have found suitable as suspending mediums are as follows:

Glycerol monoricinoleate
Glycerol trioleate
Glycerol dioleate
Glycerol tricaprate
Glycerol dicaprate
Glycerol monocaprate
Ethylene glycol dioleate
Ethylene glycol mono-oleate
Ethylene glycol dicaprate
Ethylene glycol monocaprate
Diethylene glycol dioleate
Diethylene glycol mono-oleate
Diethylene glycol dicaprate
Diethylene glycol monocaprate
Diethylene glycol dilauryate
Diethylene glycol monolauryate

At present the preferred choices from among the foregoing esters are ethylene glycol dioleate and ethylene glycol mono-oleate.

The abrasive may be particles of diamond, boron carbide, silicon carbide or aluminum oxide or other known abrasives chemically inert to the medium and of a particle size of minus 200 mesh, or for fine work, minus 325 mesh.

In accordance with the usual practice, the operator mixes the abrasive powder and the suspending medium immediately prior to the grinding or polishing operation. The proportions and quantities used are determined empirically by the operator and are such as his experience dictates provides a satisfactory suspension for the particular operation. For diamond powder used for lapping wire drawing dies, approximately one carat of the abrasive powder per milliliter of ester usually forms a satisfactory suspension. Suitable proportions of other abrasives may likewise be determined in accordance with the particular operation.

Abrasive suspensions in which the suspending medium is one of the aforementioned esters show numerous improved properties over previous suspensions with which I am familiar. For example, the abrasive particles are held in suspension very successfully and the mediums are relatively non-volatile and non-lubricating. I find also that the abrasive material is conserved and there is a considerable time saving in grinding and polishing operations.

While I have disclosed but certain improved abrasive suspensions prepared in accordance with

the present invention, it is apparent that other preparations may be made without departing from the spirit of the invention. Therefore, I do not wish to be limited to the disclosure set forth, but only by the scope of the appended claims.

I claim:

1. An abrasive suspension consisting of abrasive particles and a medium in which said particles are suspended, said medium being of the group consisting of ethylene glycol dioleate and ethylene glycol mono-oleate.

2. An abrasive suspension consisting of abrasive particles and a medium in which said particles are suspended, said medium being ethylene glycol dioleate.

3. An abrasive suspension consisting of abrasive particles and a medium in which said particles are suspended, said medium being ethylene glycol mono-oleate.

WILLIS E. BOAK.

REFERENCES CITED

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