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GRINDING COMPOSITIONS

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1

This invention relates to grinding compositions and more particularly is concerned with carrier bases for use in the preparation of grinding compositions employed in the grinding and lapping of metals and with grinding compositions incorporating such carriers.

A principal object is the provision of new carriers for abrasive materials for use in the production of grinding compositions, also referred to as grinding compounds. Other objects are:

(1) The provision of metal grinding compositions which have extremely low galling characteristics;

(2) The provision of grinding compositions which exhibit high degrees of cutting speed making possible the removal of a specified amount of metal with relatively small amounts of the compositions;

(3) The provision of grinding compositions which prevent abrasive grains from remaining in the ground metal;

(4) The provision of a carrier base for the preparation of grinding compositions for use in grinding and lapping of metals which may be employed with abrasive grains of various size, composition and abrasive qualities and which may be used with such abrasive materials in wide range of proportions of the carrier base to the abrasive;

(5) The provision of new fluid abrasive compositions, i. e., abrasive compositions having a consistency which may vary from a paste-like material to a very thin, non-viscous, water-like material;

(6) The provision of grinding compositions which spread readily upon the surface to be ground and maintain an even film upon the surface being abraded without having the composition run into the low points of the surface under treatment.

Still further objects and the entire scope of applicability of this invention will become apparent from the detailed description given hereinafter.

These objects are accomplished according to the present invention by forming a carrier base for use in the preparation of abrasive compositions by incorporating therein tacky polymers of butylene and phenolic resins. In addition to these ingredients, the abrasive carrier bases preferably include a lubricating oil, grease and/or wax and an acidic material.

The nature of the carrier bases and the abrasive compositions of this invention as well as the methods for their preparation will be more readily comprehended by reference to the following illustrative examples. It should be understood that all parts are by weight when mentioned in these examples and throughout this specification and its appending claims, unless the contrary is specified.

2

Example I

A carrier base for a metal grinding and lapping composition is prepared by charging nine parts of a tacky butylene polymer, such as that manufactured by the Standard Oil Company of New Jersey under the proprietary name "Paratac," 55 parts of petroluem jelly, 25 parts of heavy petroleum base lubricating oil and 3 parts of stearic acid into a suitable vessel, heating these ingredients in the vessel to a temperature of 150° F. and agitating the materials at this temperature for a sufficient length of time to produce a homogenous mass. The mixture is then cooled and a semi-solid mass is obtained. To this semi-solid mixture is added 6 parts of a liquid condensation product of phenol and formaldehyde. The phenolic resin is added slowly to the cooled mixture and the entire admixture is stirred until uniform. An abrasive carrier base of creamy consistency is obtained.

Example II

A grinding composition is prepared by mixing one part of a carrier base as prepared in Example I with one part of aluminum oxide grains of desired size. The abrasive grains are added to the carrier base and the mixture is sufficiently agitated so as to uniformly disperse the grains in the base. There results a grinding composition having a creamy consistency which has substantially no tendency of embedding the abrasive in the metal during use, thus leaving clean metal surfaces and which does not break down during grinding, particularly at the beginning of lapping operations, under high degrees of grinding pressures, so that no galling occurs.

In another case, a suitable abrasive composition is prepared by mixing 4 parts of the aluminum oxide abrasive grains with one part of a carrier base prepared as in Example I.

Example III

An abrasive composition carrier base is prepared by charging 6 parts of a tacky butylene polymer, 50 parts of paraffin wax, 20 parts of heavy petroleum naphtha and 2 parts of sulphuric acid into a suitable vessel, heating the ingredients to 150° F. and stirring until a homogenous mixture is obtained. Thereafter, the

mixture is allowed to cool and 4 parts of a liquid phenolic resin are added, and the entire mass stirred to obtain a uniform composition. There results a fluid carrier base from which a grinding or lapping compound can readily be prepared by incorporating therein abrasive grains.

Example IV

A carrier base for a grinding composition is prepared by placing in a suitable container 12 parts of a tacky polybutylene, 60 parts of heavy petroleum grease, 30 parts of light lubricating oil and 4 parts cocoanut oil fatty acids, heating the ingredients to 150° F. and stirring to form a homogenous mass. When uniformly mixed, the mass is permitted to cool and then 8 parts of a liquid phenol-formaldehyde condensation product is uniformly mixed into the mass. An aqueous emulsion is prepared from the mixture to form the carrier base by incorporating 8 parts of water into the admixture with vigorous agitation. A fluid abrasive composition carrier base results comprising an aqueous emulsion.

The polybutylene component of my compositions constitutes what might be termed an adhesive lubricant. Thus, this constituent appears to serve in the compositions to prevent the abrasive compound from running into the low points of the surface being abraded and gives even spreading and maintenance of the abrasive film while, at the same time, causing full abrasive action. Substantially, any type of butylene polymers of tacky quality may be used for this purpose, such as the type presently manufactured by the Standard Oil Company of New Jersey under the name of "Paratac."

Lubricating materials are incorporated in my compositions to provide good lubrication to the grinding operation and to aid in the even spreading of the composition upon the surfaces under treatment. Substantially any lubricating material known to be useful as base lubricants for this purpose may be employed but, I find that petroleum base lubricants are particularly useful. A lubricant composed of a single ingredient, such as heavy lubricating oil may be used or lubricants composed of the mixture of two or more such materials may be utilized, e. g., a mixture of petroleum jelly and lubricating oil, a mixture of an amorphous wax and a petroleum distillate, or the like. The use of a lubricating base composed of a mixture of a liquid lubricant and a solid lubricant is recommended since this permits the consistency of the final composition to be controlled by control of the proportions of liquid to solid lubricant.

An acidic material is incorporated in my compositions to prevent breakdown of the composition film under high pressures encountered in the grinding operation and to, thus, aid in preventing galling. Fatty acids, particularly those of molecular weight of 240 to 290, are specially well suited for this purpose, e. g., stearic acid, palmitic acid, lauric acid, mixtures of fatty acids, such as cocoanut oil fatty acids, soap stock, and the like. However, other acidic materials, such as mineral acids of the type used in high pressure lubricants, may be used.

The phenolic resin component in my compositions has been found to serve to clean the abrasive grains during use, so as to maintain good cutting action. At the same time, this component appears to reduce the embedding of the abrasive grains in the metal surface, thus, leaving very clean metal surfaces. The exact chemical composition of the

phenolic resin may vary widely, but I have found that liquid condensation products of phenol and formaldehyde are particularly useful, although other liquid phenolic resins, such as phenolformaldehyde-furfural or cresol-formaldehyde condensation products are useful.

Although the proportions of ingredients discussed above may be varied over considerable range, it should be understood, equally good results are not obtained with all proportions. The exact proportions of ingredients have been found to vary somewhat with the particular lubricant used, the particular polybutylene employed, and the acidic material which is used, and the like. For substantially all usable ingredients it has been found that the following proportions yield carrier bases which produce abrasive compositions exhibiting the best qualities:

Ingredient	Parts by weight of the total carrier base
Butylene Polymer	6–12
Base Lubricant	70–90
Acidic Component	2–4
Phenolic resin	4–8

In the formation of the final abrasive composition from these carrier bases, substantially any abrasive material in suitable state of subdivision may be employed. Aluminum oxide grains of proper size have been found to be most desirable. In operations which require extremely hard abrasive materials, substances such as diamond dust may be used. On the other hand, in operations requiring soft abrasives, materials such as silicon carbide may be used. The grit of the abrasive grains and the proportions of abrasive to the carrier base are varied, depending upon qualities desired in the abrasive composition and the polish desired in the surface ground with the composition.

Where particularly highly polished surfaces are desired, such as in finishing operations, water may be added to my compositions. When added to a uniform mixture of the other indicated components, the water forms therewith an aqueous emulsion. In the emulsion form, the grinding composition further loosens and removes grit from the surfaces under treatment but, at the same time, it does not reduce appreciably the lubricating qualities, so that as the grinding or lapping is continued, a very highly polished and clean metal surface is obtained with the emulsion type composition.

As many and varied modifications to this invention will become apparent to those skilled in the art from the detailed description given herein, it should be understood that this invention is to be restricted only in accordance with the appended claims.

I claim:

1. An abrasive composition for use in grinding and lapping operations comprising abrasive grains uniformly dispersed in a carrier base, comprising a tacky butylene polymer, a lubricating oil, a fatty acid, and a liquid phenol-formaldehyde resin.

2. An abrasive composition of the character described comprising abrasive grains uniformly dispersed in a carrier base comprising 6 to 12 parts by weight of a tacky polybutylene, 50 to 60 parts of petroleum jelly, 20 to 30 parts of a petroleum lubricating oil, 2 to 4 parts of a fatty

acid and 4 to 8 parts of a liquid phenol-formaldehyde resin.

3. An abrasive material of the character described comprising abrasive grains uniformly dispersed in an aqueous emulsion comprising a tacky polymer of butylene, a petroleum lubricant, a fatty acid, and a liquid phenol-formaldehyde resin.

4. An abrasive composition for use in grinding and lapping operations comprising abrasive grains uniformly dispersed in a carier base comprising 7.5 to 11.5 percent by weight of a butylene poymer, 79 to 85 percent of a petroleum lubricant, 2.5 to 3.5 percent of a fatty acid and 5 to 7 percent of a liquid phenol-formaldehyde resin.

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