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[54] **COATING FOR FLEXIBLE ABRASIVE BANDS**

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[51] **Int. Cl.** **C08g 51/12**

[58] **Field of Search** 51/295, 296, 305, 306, 51/298

[56] **References Cited**

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[57] **ABSTRACT**

A binder for the grinding grains of grinding bodies comprising animal glues or synthetic resins and fillers, to which is added 1 to 50%, and preferably 10 to 30%, by weight of a chlorinated paraffin or other organic halogen compound, to improve the grinding efficiency.

5 Claims, No Drawings

COATING FOR FLEXIBLE ABRASIVE BANDS

This a division of application Ser. No. 98,964, filed Dec. 16, 1970, and now abandoned.

The invention relates to a binder for the grinding grains of grinding bodies.

The removal of workpiece material in grinding processes is accompanied by a blunting of the grinding grains of the grinding body, which grains are held to one another by binders.

The binders which are used are mixtures of fillers with animal glues or synthetic resins, for example, phenol-formaldehyde or urea-formaldehyde resins. Fillers which are based, for example, on calcium carbonate, kaolin, heavy spar, powdered quartz, etc., are referred to as inert fillers, whereas substances such as cryolite, potassium fluoroborate, zinc sulphide, potassium sulphate, potassium chloride, iron sulphides (pyrites), antimony trisulphide (arsenic-free), etc., are known as active fillers because they improve the grinding effect technically.

The blunting of a grinding body is due to the mechanical wear of the grinding grains and also the degradation thereof resulting from chemical reactions at high temperatures (above 500° C), which can occur in the zones of contact between the grinding grains and the material to be ground.

As criteria for the blunting effect, it is possible to use the grinding efficiency, i.e., the quantity ground from the material being worked in grammes per unit of time, and also the life of the grinding device. The life is defined as the time in which the grinding efficiency, for example, of a grinding band on a flexible support, falls below a certain quantity by weight of ground material per minute.

When grinding high duty alloyed or stainless steels, it is found that the grinding efficiency and the life, and hence the total quantity of ground material per grinding body, is considerably lower than with grinding operations carried out on ordinary steels, using the same grinding means.

One object of the invention is therefore to improve the grinding efficiency of a grinding medium or abrasive on high duty alloyed steels.

According to the invention, this is achieved by the binder containing an addition of 1 – 50% by weight of organic halogen compounds, based on the weight of the complete mixture.

It has been surprisingly found that by this means premature blunting of the grinding grains is substantially prevented or retarded. The grinding efficiency and the life of a grinding body are thus considerably improved.

Suitable as organic halogen compounds for this purpose are, for example, liquid and/or solid halogenated paraffins, more especially chlorinated paraffin hydrocarbons with a chlorine content of at least 30% by weight, and also brominated or fluorinated paraffin hydrocarbons with a halogen content which likewise is at least 30% by weight. Suitable are both halogenated paraffins of relatively high molecular weight, more especially chlorinated paraffins, with a viscosity at 20°C of at least 500 cP, such as those used as extender plasticisers for polymers, and low molecular weight types, e.g., hexachlorethane or mixed halogenated paraffins, for example, 1,3-dibromohexafluopropane, and also halogen-containing organic acids, such as trichloracetic or tribromoacetic acid, halogen-containing aldehydes,

such as trichloracetaldehyde, halogen-containing aromatic compounds, such as pentachlorophenol, tribromophenol and triiodophenol m-xylenehexachloride, m-xylenehexafluoride, m-trifluomethylaniline, benzotrifluoride, halogen-containing cycloaliphatic compounds, such as hexachlorocyclohexane, and also polymer dispersions, such as polyvinylidene chloride dispersions or solutions of halogen-containing polymers, such as chlorinated rubber in toluene.

If aqueous animal glues or resin systems, e.g., phenol-formaldehyde or urea-formaldehyde resins, are used in the binders, difficulties may arise in respect of the compatibility of the organic halogen compounds with such resins.

The aqueous phenol-formaldehyde or urea-formaldehyde resins are alkali-adjusted condensation products of phenol and urea, respectively, with aqueous formaldehyde solution (37% by weight) in a molar ratio from 1:1.3 to 1:1.8, preferably between 1:1.5 and 1:1.6. By vacuum distillation, the aqueous resin solution is increased in concentration to a solid content of about 80% by weight. As regards the animal glues, these are 30 to 40% by weight aqueous skin or hide glue solutions. Adopted as factors of quality are the viscosity (mP) according to Bloom, of at least 100 mP after 1 hour at 60°C, and the jelly strength of at least 300° Bloom. The aforesaid difficulties as regards compatibility are avoided by the substances being incorporated in pulverised or dispersed form into the mass of binder.

The incorporation of the resins is effected with use of solution-promoting additives, more especially low molecular weight alcohols or ketones, and particularly advantageously methanol and/or ethanol and/or acetone and/or methyl ethyl ketone. Depending on the required viscosity of the binder mass (between 500 and 2,000 cP), the addition of solvent varies between 5 and 30% by weight, related to the total weight of the mixture. The components of the binder mixture are homogenized by means of mechanical stirrer mechanisms or ultra-Turrax stirrers, without any particular additional measures. If aqueous, animal glue solutions are used in the binders, the incorporation can be effected in similar manner to the synthetic resins.

Furthermore, the halogen compounds can be reacted with ammonia and/or amines, in order to obtain a better compatibility with the aqueous resin systems. The reaction starts at temperatures above 30°C and can be carried on up to 130°C. The reaction is stopped before the free amino groups of the amines are completely neutralised by split-off hydrogen halide, due to salt formation or due to the hydrohalogen compounds, so that free hydrohalic acid is not formed in this simple reaction as known per se.

The mixing of the components is again effected with normal mechanical stirrer mechanism or with an ultra-Turrax stirrer, it being possible to adjust the required viscosity with the said alcohols or ketones.

The mixing ratio between the organic halogen compound and ammonia and/or amines is between 20:1 and 4:1 by weight. Amines to be considered for use in this connection are: ethylene diamine, diethylene triamine, triethylene tetramine, tetraethylene pentamine, ethanolamine, diethanolamine and other amines of similar structure.

The quantity of the additive according to the invention of organic halogen compounds is between 1 and

50% by weight of the total binder mixture, but preferably between 10 and 30% by weight.

EXAMPLE 1

For this experiment, two identical grinding bands on a flexible support were prepared, with corundum grinding grains of grain size 80 and a binder of the described phenol-formaldehyde resin (80% by weight solid substance) and calcium carbonate as filler in the ratio by weight 1:1. One of these grinding bands was subsequently coated with a binder of the following composition:

30 parts by weight of the described phenol-formaldehyde resin (80% by weight solid substance)

10 parts by weight of chlorinated paraffin (60% by weight chlorine, density 1.41 g/ml at 60°C, viscosity 300 cP at 60°C),

60 parts by weight of filler (calcium carbonate).

The viscosity of the total mixture was adjusted with methanol to 1,000 cP at 20°C. Both grinding bands were ground under identical conditions against alloyed steel of the material number 4301 (18% chromium, 10% nickel). Using the grinding band without the addition of organic halogen compounds, altogether 220 g were ground off the said steel during the life of this grinding band, which was 60 minutes. With the second grinding band, subsequently coated with the binder mixture according to the invention, the quantity ground off after 60 minutes was 405 g. However, it was only after another 40 minutes that the grinding efficiency had fallen to the same value as the band without the subsequent coating. In this time, another 110 g of the steel were ground off. The life of the subsequently coated band was consequently 100 minutes and the total quantity ground off was 515 g. This corresponds to an improvement in the effective life of about 66% and of the quantity removed by grinding of about 134%.

EXAMPLE 2

As in Example 1, once again two identical grinding bands were prepared, one of these being subsequently coated with a binder of the following composition:

25 parts by weight of the described phenolformaldehyde resin (80% by weight solid substance),

20 parts by weight of chlorinated paraffin, (71% by weight chlorine, density 1.55 g/ml at 60°C, viscosity 1,500 cP at 60°C),

55 parts by weight of filler (calcium carbonate).

The viscosity of the total mixture was adjusted with methanol/acetone (mixing ratio 1:1) to 1,000 cP at 20°C and the mixture was homogenised with a Turrax stirrer mechanism. Both grinding bands were ground under identical conditions against alloyed steel of the material No. 4301. The quantity removed by grinding and the life of the uncoated band were the same as those of Example 1. As regards the subsequently coated band, the quantity removed by grinding after a grinding time of 60 minutes was 450 g. It was only after another 60 minutes that the grinding efficiency had fallen to the value of the uncoated band. In this time, another 140 g were ground off. The life was 120 minutes and had thus been increased by 100%. The total quantity removed by grinding was 590 g, which corresponds to an increase in the ground-off quantity of 168%.

EXAMPLE 3

For this experiment, one grinding band with corundum grains of grain size 80 and a binder of the described phenol-formaldehyde resin and filler in the ratio by weight of 1:1 was produced. A second grinding band was prepared with a binder of the following composition:

25 parts by weight of the described phenol-formaldehyde resin (80% by weight of solid substance),

25 parts by weight of chlorinated paraffin-amine reaction product (ratio by weight of chlorinated paraffin: triethylene tetramine of 9:1), (chlorinated paraffin 50% by weight, density 1.23 g/ml at 20°C, viscosity 1,000 cP at 20°C),

50 parts by weight of calcium carbonate as filler.

The viscosity of the total mixture was adjusted with acetone to 1,000 cP and homogenisation effected with a stirrer mechanism. The quantity removed by grinding and the life of the grinding band having the binder without the additive according to the invention were the same as the values in Example **1.** The grinding band of which the binder contained the additive according to the invention reached a life of 110 minutes and the total quantity removed by grinding was 570 g. This corresponds to an increase in the life of about 80% and of the quantity removed by grinding of about 160%.

We claim:

1. A coated flexible abrasive band comprising a flexible support and abrasive grinding grains bonded on the flexible support, said grinding grains coated with a final coating comprising

a. 25–30 parts by weight of phenol-formaldehyde resin in admixture with;

b. 10–25 parts by weight of a chlorinated paraffin having 50–70% by weight chlorine and selected from the group consisting of chlorinated solid paraffins and a liquid chlorinated paraffin oil having a viscosity at 20°C of at least 500 cp., and,

c. 50–60 parts by weight of calcium carbonate filler, said coating retarding the blunting of the grinding grains and improving the grinding efficiency and life of the band.

2. An abrasive band as in claim **1** wherein said chlorinated paraffin is uniformly distributed throughout said coating.

3. An abrasive band as in claim **1** wherein the paraffin in said coating is the reaction product of a nitrogen compound selected from the group consisting of ammonia and amines and said chlorinated paraffin selected from the group consisting of said chlorinated solid paraffin and said liquid chlorinated paraffin oil at a weight ratio of chlorinated paraffin to nitrogen compound between 20:1 and 4:1.

4. A abrasive band as in claim **3** wherein the amine is selected from the group consisting of ethylene diamine, diethylene triamine, triethylene tetramine, tetraethylene pentamine, ethanolamine and diethanol amine.

5. An abrasive band as in claim **1** wherein said resin is the alkali adjusted condensation product of formaldehyde and phenol.

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