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Greenwood

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[54] **COATED ABRASIVE ARTICLES HAVING A PLASTICIZED POLYVINYL ACETATE SUPERSIZE COAT**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 38,504, May 18, 1970, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **51/295,** 51/298

[51] **Int. Cl.** **B24d 3/34**

[58] **Field of Search** 51/295, 298, 298.1

[56] **References Cited**

UNITED STATES PATENTS

3,619,150	11/1971	Rinker	51/295
3,256,076	6/1966	Duwell et al.	51/295
3,232,729	2/1966	Holland et al.	51/298

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[57] **ABSTRACT**

Coated abrasive articles which have been treated with a plasticized polyvinyl acetate supersize coating exhibit less tendency to become loaded with wood dust when used to sand wood, and can be used for a longer period of time.

6 Claims, No Drawings

COATED ABRASIVE ARTICLES HAVING A PLASTICIZED POLYVINYL ACETATE SUPERSIZE COAT

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation-in-part of application Ser. No. 38,504, filed May 18, 1970, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to abrasive coated materials such as paper and cloth, a class of goods including sandpaper, emery paper and emery cloth, but known in the trade under the generic term of coated abrasives.

One of the commonest problems connected with the use of coated abrasives for woodworking is that of loading (i.e., clogging) of the abrasive surface. This results in a greatly reduced rate of cut. By loading is meant filling of the spaces between the abrasive grains with the material being ground and subsequent buildup of that material so that areas of the abrasive surface are completely covered with the material being ground. This trouble is commonly experienced when using coated abrasive articles on such materials as wood, leather and plastics. Loading is to be distinguished from glazing, i.e., the problem experienced in metal grinding as a result of metal being welded to the abrasive grains during grinding. The effect obtained is that of the abrasive surface being smeared with metal. As the condition becomes worse the cutting ability of the coated abrasive article is progressively reduced.

Coated abrasives are normally made by adhesively coating the paper or cloth or other flexible backing material with, in sequence, (1) a first adhesive coat, known as the making coat; (2) a layer of abrasive grain of controlled grit size; and (3) a second adhesive coat, known as a size coat, whose function is to anchor the abrasive grains more firmly in position.

There have been many attempts to reduce loading and glazing by incorporating in the size coat various additives which act as lubricants or promote a beneficial chemical action at the grinding interface in metal grinding or provide a high gloss surface to inhibit adhesion of detritus.

More recently further improvements have been made in this direction by the use of a third coat, known as the supersize coat, whose function is not to act as an additional adhesive coat but to impart anti-glazing properties. Such supersize coat have usually been restricted to organic or inorganic compounds containing halogen or sulfur, and particularly directed to metal grinding. For example, U.S. Pat. No. 3,256,076 teaches the use of an organic polymer having chemically bound atoms of chlorine, bromine or divalent sulfur (which yield HCl, HBr, and H_2S upon heating) for grinding steel. There are, of course, situations where toxilogical considerations mitigate against the use of halogen- or sulfur-containing materials.

An effective anti-load or anti-glaze treatment during the manufacture of coated abrasive material is preferable to and more efficient than leaving the problem to be tackled by the user by the common practice of brushing the abrasive surface or applying some lubricant or anti-load or anti-glaze material to the abrasive surface at intervals during use.

It is, therefore, an object of the present invention to provide an improved coated abrasive article having improved anti-load characteristics, and in particular, such an article which does not contain halogen or sulfur.

DESCRIPTION OF THE INVENTION

According to the present invention, there is provided a coated abrasive article comprising a backing material having abrasive grain adhesively secured thereto, and a plasticized polyvinyl acetate supersize coat.

An embodiment of the present invention will now be described, by way of example, to illustrate the invention.

EXAMPLE

Four endless abrasive belts were made from abrasive coated roll stock material. The roll stock was prepared by coating paper of 130 pound weight (130 pounds per papermaker's ream of 480 sheets, 24 inches × 26 inches) with a first adhesive (making) coat of hide glue, followed by a layer of 80 grit abrasive and a second adhesive (size) coat of a phenolic (phenol-aldehyde) resin. The phenol-aldehyde resin was a caustic soda catalyzed resole, with a phenol:formaldehyde ratio of 1:1.56.

Two of the belts were treated according to this invention by the application of a thin film of a solution of plasticized polyvinyl acetate (PVA), to form a supersize coat on these two belts. Comparative tests carried out with the treated and untreated belts on the same sanding operation on beech wood test pieces showed that the PVA treated belts gave an increased performance in stock removal and exhibited much less tendency to become loaded with wood dust. These factors become more apparent as the tests progressed, indicating that the treated belt can be used for a much longer period than the untreated belt.

Further tests were made using 6,700 mm long belts, 150 mm wide, made from standard coated abrasive roll stock which was prepared by coating paper with a first adhesive (making) coat of hide glue followed by a coating of 80 grit (210 microns) fused aluminum oxide abrasive before the glue dried, and finally coating with a second adhesive (size) coat of a liquid phenolic (phenolaldehyde) resin to anchor the abrasive particles in accordance with traditional practice. This phenolic resin was the resole described above, with a 1:1.56 phenol:formaldehyde ratio. The polyvinyl acetate, applied afterwards, is referred to as a supersize by way of distinction from the size coat.

The standard belts were used as controls for comparision with similar belts treated with a plasticized polyvinyl acetate super-size, applied at a weight of 2,720 g per sandpapermaker's ream (480 sheets, 280 × 230 mm) in the form of a latex having a viscosity of 2 poises at 25°C. The plasticized PVA was prepared by mixing equal amounts of a commercially available polyvinyl acetate latex having 50 percent solids and no plasticizer (sold by BP Plastics as "Type V 700") with a commercially available plasticized polyvinyl acetate latex which is the same as the unplasticized latex, except it contains 20 parts, per 100 parts of latex, of dibutyl phthalate plasticizer (sold by BP Plastics as "Type V 701"). The plasticized PVA solution used therefore contained 50 percent polyvinyl acetate solids and 10

percent dibutyl phthalate plasticizer, the balance being water.

The supersized belts were dried at 90°C. Sanding tests were carried out on a Wadkin overhead sanding machine, sanding 200 × 125 × 50 mm beech wood blocks.

One of the difficulties of obtaining accurate test results when using wood test pieces stems from the natural variation in the wood. To guard against false test conclusions the test results quoted below were obtained by alternating the order of sanding with successive test pieces. A standard belt was used first on one block of wood, and then a supersized belt was used. On a second block of wood, the order was reversed, i.e., the supersized belt was used first and then the standard belt, and so on, until each belt ground several blocks of wood. The pressure of the belt on the wood blocks was held constant by maintaining a load of 9 kg on the sanding machine.

Table I gives the results of one standard versus one supersized belt, the test being carried out as described above. Each test piece was ground 10 minutes for this test.

TABLE I

Test Piece	Stock Removal in Grams	
	Standard Belt	Supersized Belt
1	123	185
2	114	159
3	134	152
4	127	148
5	107	164
6	93	142
Total	698	950

Tables II and III give the results obtained with a second pair of belts running for 5 minutes on each block and a third pair running for 15 minutes on each block, respectively.

TABLE II

Test Piece	Stock Removal in Grams	
	Standard Belt	Supersized Belt
1	80	122
2	84	102
3	63	91
4	74	115
Total	301	430

TABLE III

Test Piece	Stock Removal in Grams	
	Standard Belt	Supersized Belt
1	135	220
2	147	258
Total	282	478

The three tables clearly illustrate the superiority of the supersized belts not only overall but also in the case of every individual test block.

All proportions herein are by weight, unless indicated otherwise.

Other variations are of course possible, within the scope of the invention. In particular, the types of backing material, abrasive and adhesives used are merely illustrative, and form no part of the invention. The use of a plasticizer in the polyvinyl acetate is preferred, to render the supersize coating more flexible, but the particular type of plasticizer used is not critical, and the amount of plasticizer used can be adjusted in accordance with the desired degree of flexibility.

I claim:

1. A coated abrasive article, comprising (1) a backing material, (2) abrasive grain, and (3) adhesive means for securing the abrasive grain to the backing material, said adhesive means consisting of a first adhesive coat of hyde glue and a second adhesive coat of phenol aldehyde resin, wherein the improvement comprises a coating over the adhesive means and abrasive grain, consisting essentially of plasticized polyvinyl acetate.

2. The abrasive article of claim **1**, wherein the backing material is flexible.

3. A process for making the coated abrasive article of claim **1**, comprising (1) coating a backing material with a first adhesive coating consisting of hyde glue, (2) applying abrasive grain of controlled grit size over the first adhesive coating and (3) applying a second adhesive coating consisting of phenol aldehyde resin over the first adhesive coating and abrasive grain, wherein the improvement comprises applying a latex of plasticized polyvinyl acetate over the second adhesive coating, and drying the latex to provide a coating consisting essentially of plasticized polyvinyl acetate.

4. The coated abrasive article of claim **1**, wherein said coated abrasive article does not contain halogen or sulfur.

5. The coated abrasive article of claim **2**, wherein said coated abrasive article does not contain halogen or sulfur.

6. The process of claim **3**, wherein said coated abrasive article does not contain halogen or sulfur.

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