

UNITED STATES PATENT OFFICE

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ABRASIVE TOOL

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1 Claim. (Cl. 51—307)

This invention relates to the production of abrasive tools which grind, polish or cut the work by abrasive action and, in particular, to tools incorporating diamond dust or fragments or any other abrasive bonded together to form an abrasive body or slab.

The invention is more particularly although not exclusively concerned with abrasive tools which comprise a tool carrier and an abrasive slab made up of abrasive dust or fragments suitably bonded together mounted thereon.

Various materials have been used for the purpose of bonding together the abrasive particles or fragments but, in many instances, they have proved unsatisfactory.

According to the present invention, an improved form of tool is provided by the employment, as a bonding agent, of a material such as a metallic carbide other than the carbides of tungsten, molybdenum, titanium or cobalt, or a mixture of carbides which, in addition to possessing bonding properties, is adapted to function as a secondary abrasive or has, in some measure, abrasive properties in addition to its bonding properties.

Thus, in carrying the invention into effect there is used for the bonding agent, a relatively hard material such as a metallic carbide or mixture of carbides which is capable, in some measure, of assisting in carrying out the work to be performed by the diamond dust or other primary abrasive used. In this connection, it has been found that certain carbides, e. g., the carbides of tungsten, molybdenum, titanium and cobalt are not satisfactory or entirely satisfactory but that others are eminently suitable for the purpose in view and give remarkably satisfactory results.

The carbide selected in any given case will be dependent upon the requirements of the finished tool. Examples of carbides which have been found suitable for use in carrying out the present invention are boron carbide, silicon carbide, zirconium carbide, nickel carbide, chromium carbide and the carbides of iron. In some instances, however, an oxide such as boron oxide, silicon oxide, aluminum oxide or corundum may be used for the relatively hard bonding agent instead of a carbide.

In one form of the invention, the diamond dust or the like is bonded together by the bonding

agent to form an abrasive slab which is applied to or mounted on a tool carrier so that the slab becomes firmly anchored in position on the carrier. For this purpose, a slab-receiving face of the carrier is preferably formed with a plurality of keys and/or recesses and the slab is anchored to the carrier as is described in copending application No. 11,439/42. As is pointed out in the Specification of application No. 11,439/42, the keys or recesses may be of any preferred form and the slab material may be applied in plastic conditions to the face of a carrier preformed with the said recesses, in such manner that the slab material is forced into the recesses before it is allowed to set and this may be effected in various ways.

According to one embodiment of the invention, a bonding agent consisting of a mixture of silicon carbide, boron carbide and aluminum oxide is used. The three ingredients are mixed in powder form, heated to a sintering temperature, cooled, crushed and graded, and the appropriate grading is subsequently admixed with the diamond dust or other abrasive to form a mixture in which the bonding agent is not less than four times by volume the quantity of diamond present and from which the abrasive slab is produced. In forming the rotary tool, the mixture of diamond dust and bonding agent may be placed in the lower part of a mould of circular cross section and a disc-like carrier composed of a relatively soft metal such as aluminum is placed in position thereon, the underside of the carrier being formed with a plurality of keyways or recesses so that the keying effect above described may ultimately be obtained. The whole is then heated to a temperature of the order of 800° C. until the metal of the carrier fuses and the mixture becomes plastic. Thereupon, the whole is allowed to cool in a press whilst a moderate or low pressure of the order of 1 ton per square inch or less is applied thereto.

I claim:

An abrasive or cutting tool of the character described comprising a body formed of diamond particles bonded together by a bond which functions as a secondary abrasive and consists of a mixture of boron carbide, silicon carbide and at least one metallic carbide.

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