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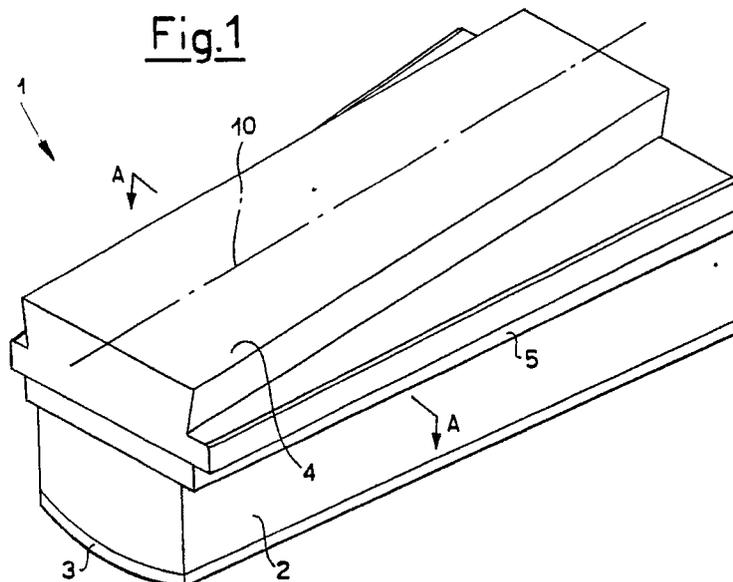
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Tool for the working heads of polishing machines for stone material or the like.

The tool (1) for the working heads of polishing machines for stone material or the like comprises a dovetail support (4), a base (2) and an abrasive layer (3) of sintered diamond dust material supported by said base (2).

A layer of elastic material (5) is interposed between the base (2) and the dovetail support (4) to damp the forces which are generated during machining, thus favourably affecting the machining quality and the life of the abrasive layer (3).



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This invention relates to a tool for the working heads of polishing machines for stone material and the like comprising a base and an abrasive layer supported by said base; said abrasive layer being formed of sintered diamond dust material, said base comprising means for fixing the tool to the working head of the polishing machine.

The stone material tool is mounted together with other identical tools on one of the working heads of the polishing machine. The head subjects the tools to their cutting movement while the workpiece on the machine bench is advanced.

The tool abrasive layers are formed from a mixture of a binder (inert in the machining process) and a granular material (the bound material) which is active in the machining process. The purpose of the inert material is to bind the granular material. The purpose of the granular material is to abrade the surface being machined.

The inert material is chosen mainly on the basis of its tenacity, or its capacity to retain the abrasive granular material.

The abrasive material is chosen on the basis of its particle size and hardness and thus wear resistance, and its capacity to scratch the surface to be machined.

Tools comprising an abrasive layer of sintered diamond dust material and commonly known as "diamond-clad tools" are currently in use.

These tools have well known technical characteristics which make them extremely attractive compared with the more traditional tools in which the inert material is normally a cement conglomerate and the abrasive material mostly comprises silicon carbide.

Compared with diamond-clad tools, the more traditional tools have the drawback of wearing more rapidly to produce large quantities of sludge in relation to the surface machined.

In contrast, the wear of diamond-clad tools is extremely limited in relation to the surface machined. In addition, this wear does not increase substantially even at cutting speeds considered to be high. In diamond-clad tools the material sintering ensures optimum tenacity in relation to the extreme hardness of the diamond dust. However diamond is not only extremely hard but is also extremely fragile, and therefore particularly sensitive to the impacts and microimpacts (vibration) deriving from the nature of the operation involved in polishing or facing stone material or the like, such as granite, stoneware, marble, marble agglomerate, glass ceramic and other materials of similar hardness and consistency.

In this respect, the surfaces of the workpiece to be polished are rough and its edges are a source of impact with the tool when operating along them.

Because of their sensitivity to impacts and

microimpacts which occur during machining, diamond-clad tools cannot currently be generally used for all polishing machines, all machining operations and/or all materials. If this were in fact possible it would constitute considerable technical progress in this sector. The object of the present invention is to obviate the aforesaid drawback.

This object is attained by a tool for the working heads of polishing machines for stone material or the like comprising a base and an abrasive layer supported by said base, said abrasive layer being formed of sintered diamond dust material, said base comprising means for fixing the tool to the working head of the polishing machine, characterised in that elastic means are interposed between said base and said means for fixing the tool to the working head.

The elastic means suitably reduce the rigidity of the connection between the working head which delivers the cutting force and the layer of abrasive material which transmits it to the surface of the workpiece being machined. They provide greater vibration absorption and softening of the impacts which the tool generates against the edges or any deep roughness of the workpiece.

In this respect, it should be noted that in the metal machine-chipping field it is already known to use diamond-clad tools, ie tools in which the cutter is diamond.

In applying these tools to the relative chipping machines substantially the same problems arise concerning the fragility of the diamond which, again in this sector, is potentially able to offer the same advantages in terms of increased cutting speed, life, wear resistance and reduction in machining costs.

In the case of machine tools for metal machining the problem has been substantially solved by supporting the diamond cutter as rigidly as possible, ie by a method exactly the opposite to that proposed by the invention, in which the cutter is supported elastically. It should however be noted that the diamond-clad tool according to the invention offers its full advantage only if the machine using it is a high-precision machine and is mounted on as rigid supports as possible, to prevent the damping capacity of the tool being undermined by the lack of rigidity of the machine which, if not sufficiently rigid, would transmit its vibration to the tool.

The invention is illustrated by way of non-limited example in the figures of the accompanying drawings, in which:

Figure 1 is a perspective schematic view of a generic tool according to the invention;

Figures 2 to 7 are sections on the line A-A of Figure 1 of various embodiments of tools according to the invention.

With reference to said figures and in particular to Figure 1, the tool according to the invention, indicated overall by 1, can be in various forms, all of which have the following elements in common: a base 2, an abrasive layer 3, means for fixing the tool to the working head of the polishing machine, and elastic means interposed between the base 2 and said means for fixing the tool to the working head. The means for fixing the tool to the working head comprise for example a dovetail support 4, and the elastic means comprise for example a layer 5 of rubber such as para rubber.

The abrasive material layer 3 is made to adhere to the respective surface of the base 2 for example by sintering or cementing.

The base 2 can be joined to the dovetail support 4 by vulcanizing or cementing the interposed rubber layer (see Figures 1, 4, 5, 6), or by screw means as shown in Figures 2 and 3.

Figure 2 shows a single series of socket head screws 6 whereas Figure 3 shows two series of screws 7.

One of the two series of screws 7 can be arranged quincunx to the remainder. The use of screws means that the rubber layer 5 can be prestressed according to the rigidity/elasticity required of the tool 1 on the basis of the working parameters.

The screws 6 and 7 also constitute centering means for the base 2 and therefore for the abrasive layer 3 about the support 4 and thus about the working head of the machine (not shown). If screws are not provided, centering can be achieved by mutually engaging male and female elements.

With particular reference to Figures 4 to 6, the male element and female element comprise respectively at least one rib 8 and at least one recess 9 extending along the longitudinal axis 10 of the tool and having a trapezoidal cross-section. The rubber layer 5 is usually interposed between the rib 8 and recess 9.

With particular reference to Figure 7, the tool centering means shown therein are formed by sawtoothing the surfaces along which the base 2 engages the dovetail support 4.

In the embodiments shown in Figures 1 to 6 the base 2 comprises substantially a first and a second portion. The first portion supports the abrasive sintered material layer 3 whereas the second portion is associated with means for fixing the tool 1 to the working head.

With particular reference to Figure 7, the tool fixing means, ie the dovetail support 4, and the elastic means, ie the rubber layer 5, can be formed as a single block 4-5 of elastic material, such as para rubber or another rubber generally having a coefficient of elasticity which varies according to the position within the block.

The material is of substantially greater rigidity and hence of greater coefficient of elasticity at the outer portions and in particular the portions about the support 4, whereas it is of lesser rigidity and thus of lesser coefficient of elasticity in the core and in proximity to the surface along which it joins to the base 2.

The materials used to form the base 2 and dovetail support in the case of the tools of Figures 1 to 6 can be either metal or plastics. In the former case the metals used to best effect are bronze or steel in general.

The abrasive layer 3 of each tool of Figures 1 to 7 is formed by sintering diamond dust in metal alloy or by dispersing diamond dust in a mixture of hardening resins. The thickness of the abrasive layer 3 varies between 3 and 5 mm. During use the tool is arranged together with other similar tools radially on a working head which drives it with a first translational movement along a circular trajectory perpendicular to its longitudinal axis 10 and a simultaneous second oscillation movement about said longitudinal axis 10 so that the entire arched surface of the abrasive layer 3 interferes with the surface of the workpiece being machined.

Claims

1. A tool (1) for the working heads of polishing machines for stone material or the like, comprising a base (2) and an abrasive layer (3) supported by said base (2), said abrasive layer (3) being essentially formed of sintered diamond dust material, said base (2) comprising means (4) for fixing the tool (1) to the working head of the polishing machine, characterised in that elastic means (5) are interposed between said base (2) and said means (4) for fixing the tool to the working head.

2. A tool as claimed in claim 1, characterised in that said base (2) comprises a first and a second portion between which the elastic means comprising an elastic material in the form of a layer (5) are interposed, said first portion supporting the abrasive layer (3), and said second portion comprising the means, in the form of a dovetail support (4), for fixing the tool (1) to the working head, said first and second portion being joined together by screw means (6, 7).

3. A tool as claimed in claim 2, characterised in that the elastic material layer (5) is rubber.

4. A tool as claimed in claim 2, characterised in that said first and said second portion are joined together by adhesion to the rubber layer (5).

5. A tool as claimed in claim 4, characterised in that the adhesion between the first and second portion and the elastic means is obtained by vulcanizing the rubber layer (5).

6. A tool as claimed in claim 1, characterized in that the first and second portion of the base comprise elements (8, 9) for their relative centering.

7. A tool as claimed in claim 6, characterised in that said centering elements comprise at least one female element (9) and at least one male element (8) which cooperate with each other and are associated respectively with the first and second portion of the base (2), said male (8) and female (9) elements being joined together by vulcanizing the interposed elastic means (5).

8. A tool as claimed in claim 1, characterised in that the tool fixing means (4) and the elastic means (5) are in the form of a single block of elastic material fixed to the base (2).

9. A tool as claimed in claim 8, characterised in that said single block (4-5) is made to adhere to the block (2) by vulcanization.

10. A tool as claimed in claim 8, characterised in that said single block (4-5) comprises portions having a different coefficient of elasticity from the remaining portions of said block (4-5).

11. A tool as claimed in claim 10, characterised in that relative centering means are interposed between said single block (4-5) and said base (2).

12. A tool as claimed in claim 11, characterised in that said relative centering means comprise two mutually knurled profiles.

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Fig.1

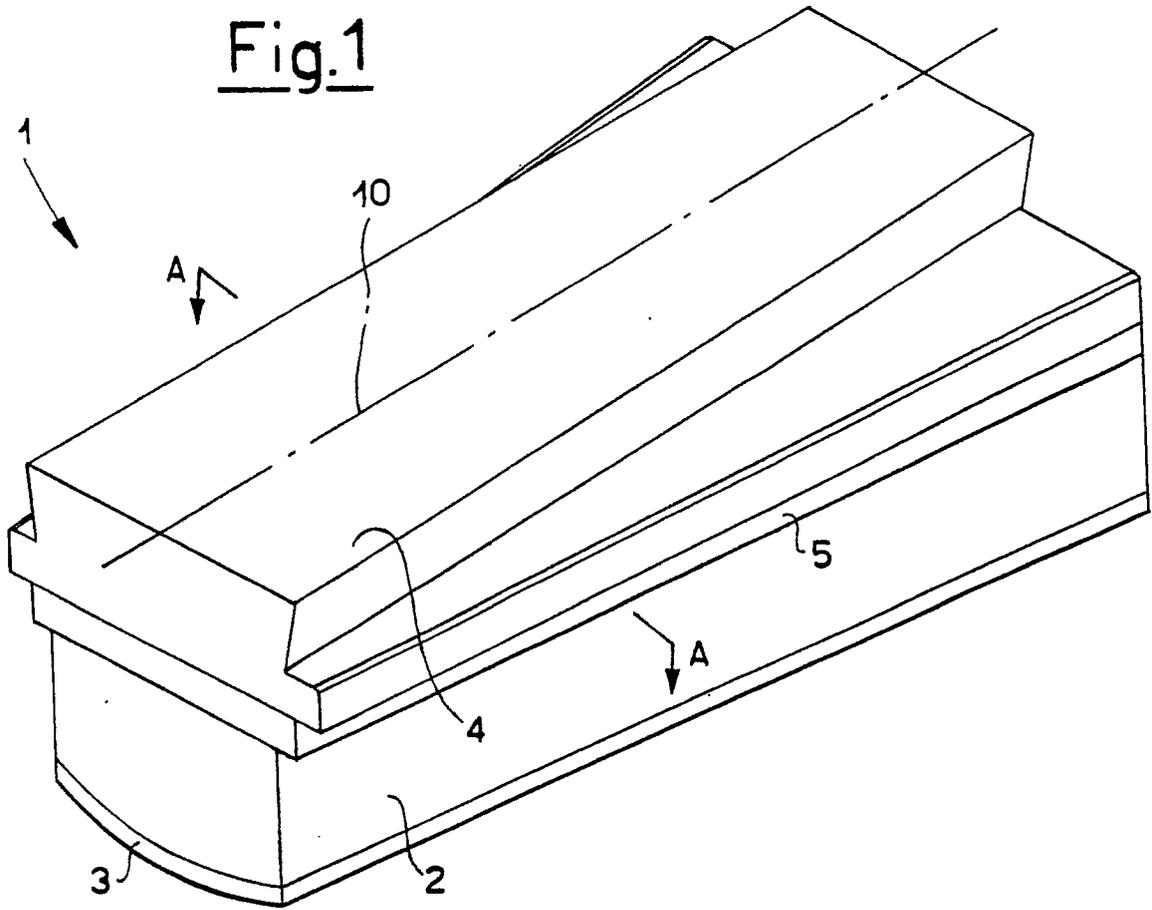


Fig.2

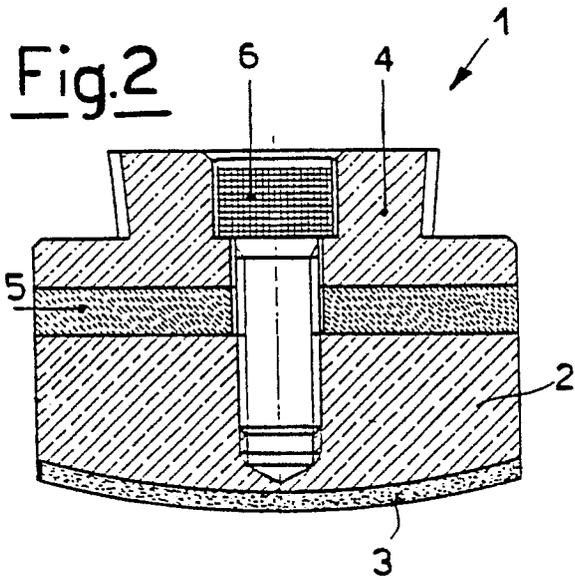


Fig.3

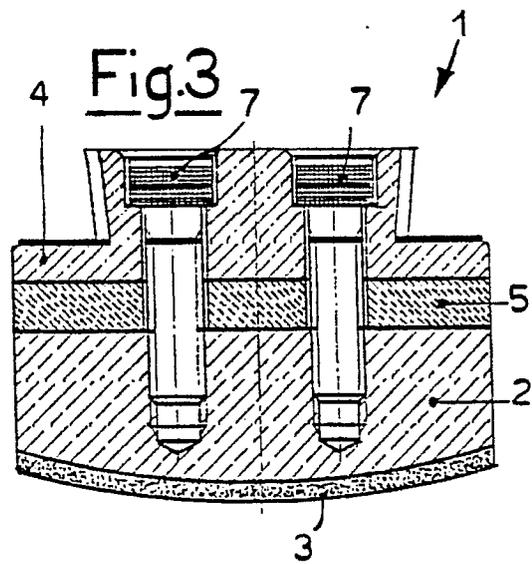


Fig.4

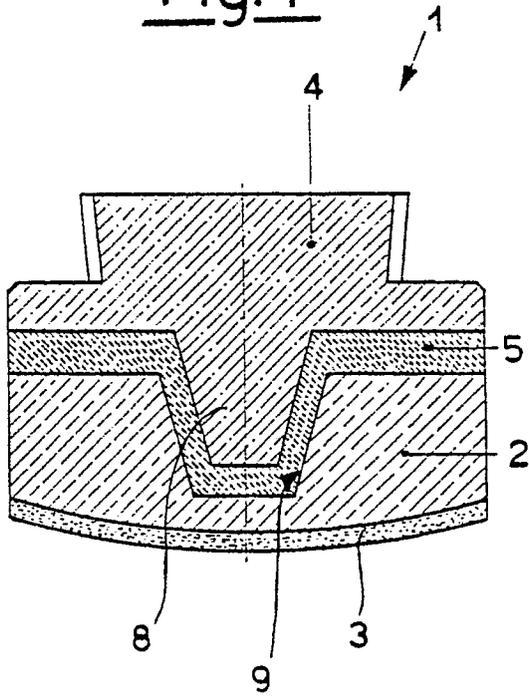


Fig.5

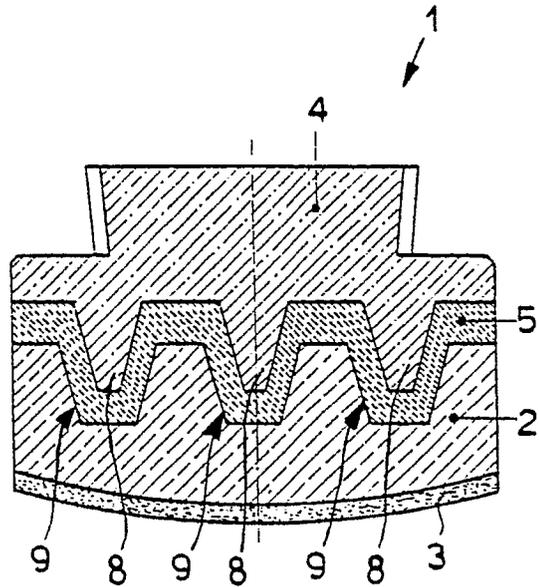


Fig.6

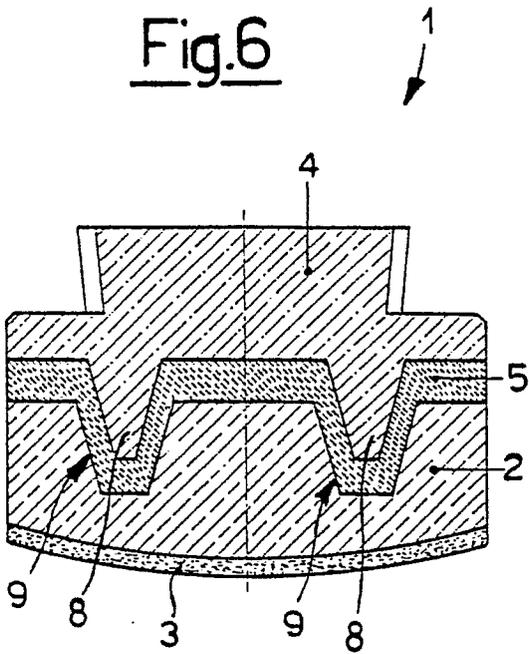
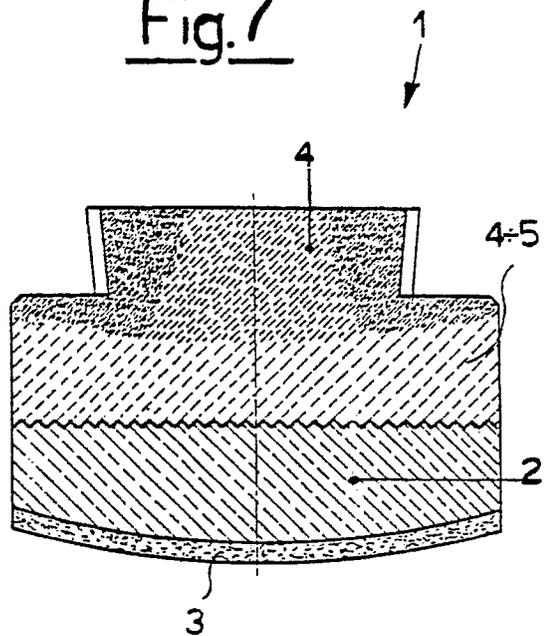


Fig.7





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90201013.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.)
X	<u>US - A - 3 464 166</u> (BOUVIER) * Fig. 2 * --	1,2	B 24 D 7/00
Y	<u>US - A - 2 267 938</u> (MC CRUM) * Column 1, lines 37-38; fig. 1 * --	1-12	
Y	<u>US - A - 2 823 496</u> (WINTER) * Column 1, line 71; fig. 1 * --	1-12	
A	<u>FR - A1 - 2 287 968</u> (SCHLEIFMITTELWERK) * Totality * --	1,2,3, 4,5	
A	<u>DE - A1 - 2 922 776</u> (HUNGER) * Page 9, line 4; fig. 2 * ----	1,2,3, 4,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			B 24 D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
VIENNA		19-07-1990	GLAUNACH
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	