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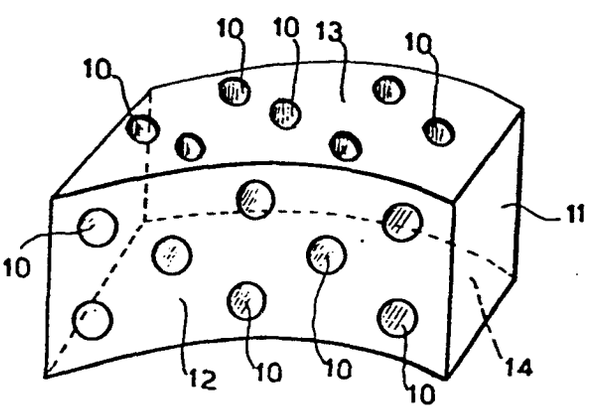
(54) Improvements in diamond-set segments and inserts.

(57) A diamond-set segment of insert (11) is provided with a plurality of through bores (10) between its side (12) and/or front faces (13, 14); the bores (10) can be left free so as to improve tool cooling during machining by virtue of the fact that the cooling liquid passes through them, and at the same time allow better discharge of the removed material; alternatively they can be filled with mixtures of resins and diamond dust or other abrasive or non-abrasive metal elements, so as to improve the surface of the cut material by acting against it during cutting.



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DESCRIPTION

This invention relates to diamond-set segments and inserts.

In the cutting and/or polishing of stones, marble, concrete, asphalt and similar hard materials, discs, cutters and saws provided with diamond-set segments or inserts are currently used.

As the term itself implies, synthetic or natural diamonds are the basic constituent of diamond-set segments or inserts. Each segment or insert is constituted by a certain number of diamonds, of varying size and concentration according to the application of the tool, and bonded by a binder in order to form the segment or insert. Every expert of the art is familiar with the functions of these two components, and thus knows the importance of choosing and mixing them carefully in order to obtain optimum machining and maximum tool life.

One of the greatest problems of this technology is the difficulty of cooling the tool during cutting, this being very important in order to prevent graphitizing of the diamond and/or its premature crumbling, with serious repercussions on the life and cutting capacity of the tool, this being especially the case when a hard stone or concrete has to be cut under conditions in which it is difficult for the cooling liquid to coat the tool by penetrating between the walls of the material being cut.

A second problem is to provide a cut surface free from roughness, even if not perfectly bright, in that the currently used diamond-set tools are employed essentially as cutters, and leave a surface of greater or lesser roughness which always requires a subsequent smoothing and often polishing operation, for which a number of

different passes are required using a like number of different substances in order to gradually improve the surfaces, and this leads to obvious increases in operating costs.

The object of the invention is to propose a type of diamond-set segment or insert provided with means which enable the aforesaid problems to be obviated, ie such as to ensure a continuous and total cooling of the tool during machining and to obtain a cut surface free from roughness, by carrying out an initial surface polishing which in most cases can be considered as the finishing operation itself.

These and further objects which will be more apparent hereinafter are attained according to the invention by a diamond-set segment and/or insert characterised by being provided with through bores which can be either left free in order to improve cooling or can be filled with mixtures of resins and dusts in order to improve the surface of the cut material.

The invention is described hereinafter with reference to the accompanying drawings in which:

Figures 1, 2, 3 and 4 are front views of a first embodiment of the diamond-set segments and/or inserts according to the invention;

Figures 5 and 6 are perspective views of two further embodiments of the diamond-set segments and/or inserts according to the invention.

As stated, the method proposed by the invention for attaining its objects is to provide through bores 10 in the segment and/or insert 11. In Figures 1 to 4, the through bores pass between the side faces 12, these figures showing just a few possible bore configurations, namely circular in Figure 1, slotted in Figure 2, triangular in

Figure 3 and rhomboidal in Figure 4.

The bore configuration and sizes will be determined by the type of machining to be carried out by the tool, its size and the conditions under which it is to work.

The figures show an arcuate segment and/or insert, ie designed for fitting to circular discs, but it is obvious that the segment and/or insert can be of the flat type designed for linear saw blades and/or of other forms.

The bores 10 in Figures 1 to 4 are advantageously provided in a direction orthogonal to the tool feed direction, between the side faces of the tool, so that their mouths are contained in those two side surfaces of the tool which face the surfaces of the cut material.

The bores can be kept empty and thus facilitate tool cooling in that during machining the cooling liquid is not restricted to merely the top and/or between the side walls of the segment and/or insert and the cut surfaces, but can also penetrate through the bores to completely cool the tool to thus prevent heating of the diamonds and at the same time discharge the removed material.

This also results in improved cutting balance for the tool and thus a more uniform and correct wear thereof.

Alternatively, the cores can be filled by inserting resins mixed with diamond dust or other metal, resinous or any other elements designed to improve the cut surface.

In this respect, these inserts are provided in the sides and/or in the top of the segments, and machine the surface as it is being cut, so that because of the abrasive material which they contain, the surface becomes polished and in many cases requires no further

machining.

The inserts can be forced in or cast hot or inserted in any other suitable manner.

If required, it is also possible to form the inserts first, and then construct the segment around them by casting it over the inserts themselves, if all the bores are to be filled by said inserts.

In Figure 5, the through bores 10 are provided not only between the sides 12 but also between the top 13 and base 14 so as to either provide complete cooling if they are all left empty, or to enable the bores provided between the side faces 12 to be filled with said inserts while leaving the through bores between the top 13 and base 14 free so as to provide the segment or insert 11 with both the advantages of cooling and smoothing simultaneously.

In Figure 6 the bores extend between the top 13 and base 14 to favour cooling if kept empty, whereas in special cases they can be filled with said inserts in order to improve polishing.

The configuration, dimensions and location of the bores depend on the machining operation and the result to be obtained, and thus these requirements determine said parameters in any given case.

PATENT CLAIMS

1. A diamond-set segment or insert, characterised by comprising through bores.

2. A diamond-set tool as claimed in claim 1, characterised in that the bores are provided in the side faces and/or top of the segment, and extend into it in a direction orthogonal to the tool feed direction.

3. A diamond-set tool as claimed in claims 1 and 2, characterised in that the bores are left empty.

4. A diamond-set tool as claimed in claims 1 and 2, characterised in that the bores are filled with inserts containing abrasive materials.

5. A diamond-set tool as claimed in claim 4, characterised in that the abrasive materials are diamond dust mixed with a binder of any kind.

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Fig.1

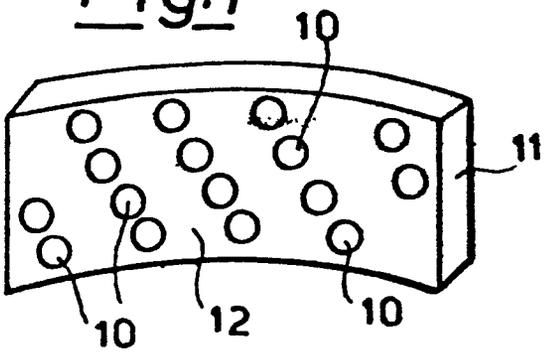


Fig.2

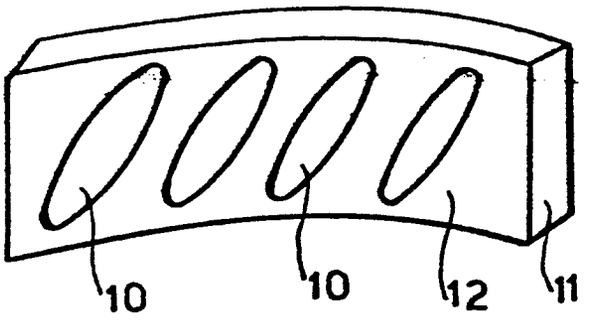


Fig.3

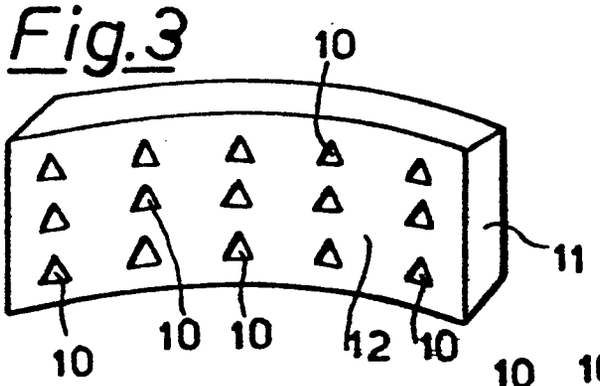


Fig.4

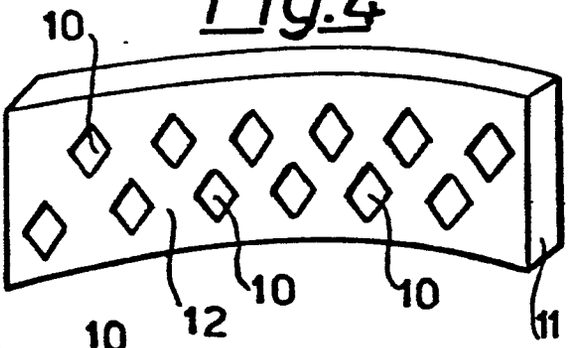


Fig.5

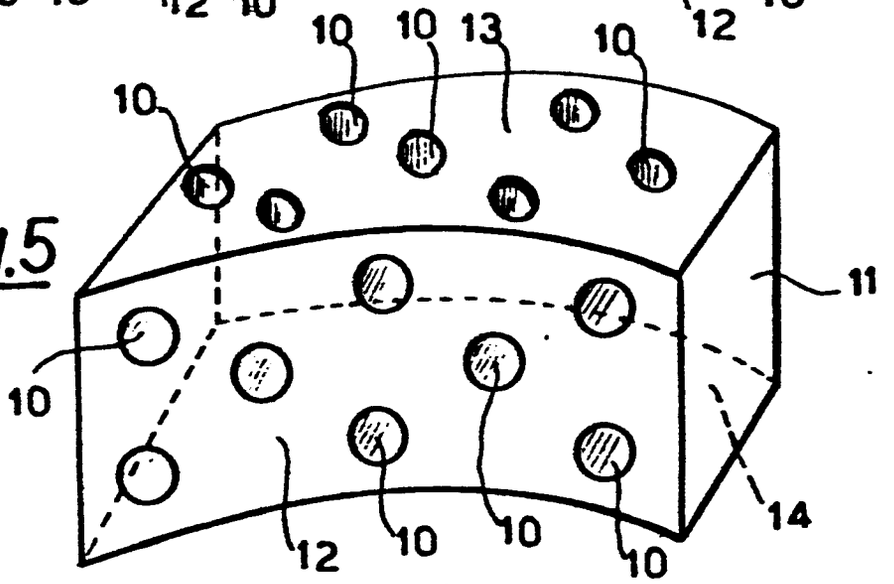
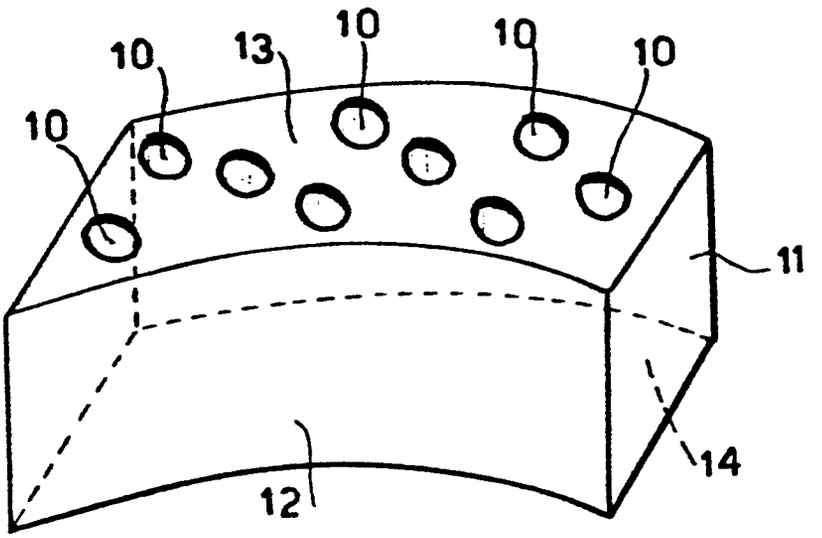


Fig.6



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EUROPEAN SEARCH REPORT

0138237
Application number

EP 84 20 1028

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-C- 956 742 (WINTER) * Claim; figures *	1	B 24 D 17/00 B 24 D 5/12
A	DE-C- 137 647 (VEREINIGTE SCHMIRGEL & MASCHINENFABRIKEN) * Claim; figures *	1-3	
A	DE-C- 172 813 (OFFENBACHER) * Claim; figures 3,4 *	1,2,4	
A	US-A-3 657 845 (SEKYIA) * Column 1, lines 35-48; figures 6-9; column 4, lines 13-48 *	2,4,5	
A	DE-C- 743 122 (PAHLITZSCH)		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	FR-A-1 195 595 (MASSON)		B 24 D B 24 B
A	US-A-3 041 799 (KEMMAN)		
A	US-A-3 440 773 (HAWKES)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23-11-1984	ESCHBACH D.P.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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