(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 690 634 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.08.2006 Bulletin 2006/33

(51) Int Cl.:
B24D 7/06 *(2006.01)* ***B24D 5/06*** *(2006.01)*

(21) Application number: **06001486.7**

(22) Date of filing: **25.01.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **10.02.2005 IT VI20050036**

(71) Applicant: **Benvenuto, Silvano**
36100 Vicenza (DE)

(72) Inventor: **Benvenuto, Silvano**
36100 Vicenza (DE)

(74) Representative: **Bettello, Pietro**
Via Col d'Echele, 25
36100 Vicenza (IT)

(54) Diamond cutting blades and discs

(57) The finding regards diamond cutting blades and discs, to be employed in the field of working stone such as granite, marble, limestone, basalt, lava stone, tufa, slate, sandstone, travertine and the like; the cutting of these materials occurs by means of the diamond tools (1) which, with the rubbing on the stone and due to abrasion, realises the required cut. Such blades and discs are characterised in that the diamond segments (3) composing the so-called "teeth" are attached in removable manner on the support (2), whether this is composed of a laminar body or a steel disc.

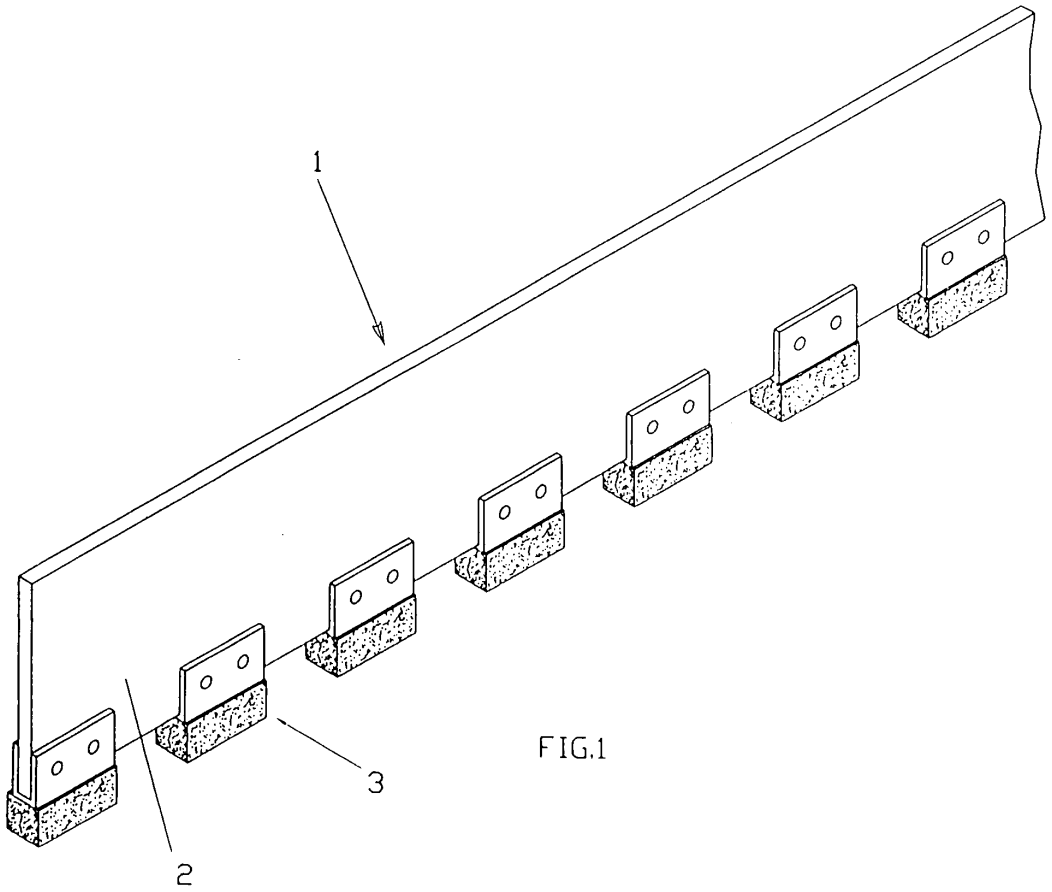

FIG.1

EP 1 690 634 A2

Description

[0001] The present finding regards the diamond cutting blades and discs, according to the general part of claim 1.

[0002] In the field of working stone such as granite, marble, limestone, basalt, lava stone, tufa, slate, sandstone, travertine and the like, the cutting of these materials takes place by means of diamond tools which, with the rubbing on the stone and due to abrasion, realise the required cut.

[0003] Such diamond tools are subdivided into two types: the diamond blades and the diamond discs.

[0004] The diamond blade is composed of a straight steel blade on which elements of parallelepiped form are welded, defined with the term "diamond segments".

[0005] The straight diamond blades are mounted on machines called "frames" of mono-blade, vertical multi-blade and horizontal multi-blade type.

[0006] Two movements are given to the blade: a reciprocating movement, called "stroke" and measured in strokes per minute, comprised between 70 and 160 strokes / minute and an advancing movement, called "travel" and measured in millimetres, comprised between 300 and 1000 mm/h and also above such value.

[0007] The blades of most common use have a width comprised between 100-180 mm, a length comprised between 2500 mm and 4600 mm and a thickness of the steel body of 2.5 - 3 or 3.5 mm, while the thickness of the diamond segments may be of 4.1 - 4.8 - 5.2 - 5.4 or 6 mm.

[0008] The diamond segments are realised with an alloy of industrial diamond granules and metallic powders, hot-pressed through a process of "sintering", thus forming parallelepiped blocks of various sizes, which are welded directly onto the steel blade.

[0009] The diamond disc is composed of a steel core of circular shape on which the diamond segments are welded on the outer circumference, positioned in mutually equidistant manner.

[0010] The machines which use the diamond discs are subdivided into following types:

- Giant disc block cutters: mount discs of 2000 mm to 3500 mm diameter;
- Monodisc block cutters: mount discs of 900 mm to 1800 mm diameter;
- Multidisc block cutters: mount up to 100 discs, having a diameter from 700 mm up to 1600 mm.
- Milling cutters - Cross-cutting machines - Splitting machines: mount discs of 250 mm to 825 mm diameter.

[0011] The steel cores of the discs have a variable thickness from 1.8 mm to 9.5 mm, while the thickness of the diamond segments varies from 2.5 mm to 13 mm.

[0012] Both in the blades and in the discs, the number of diamond segments present on the tool and the "step", i.e. the mutual distance between the same, is in relation with the type stone to be worked and with the "yield", i.e. square metre quantity of cut product required by the operator.

[0013] The employment of the diamond blades and diamond discs known at the state of the art has drawbacks due to the fact that:

- when the diamond tool (blade or disc) has consumed the diamond segments, it must be sent to the builder in order to be regenerated, and in addition to a cost for the forwarding and delivery transportation, this also leads to a loss of time while waiting for the tool itself to be regenerated.
- during the period of tool regeneration, the user in order to not remain with the operating machine down, is forced to acquire additional tools adapted to cut the specific material, or rather is forced to maintain a supply on hand, therefore further increasing the cost of cutting operations;
- for each type of stone, the operator must use the tools having the diamond sectors realised with a very precise mixture or "diamond mixture", so that it is necessary to have on hand a considerable quantity of tools (blades or discs) in relation with the stones to be cut, thus increasing the cost of stockpiling the storehouse.

[0014] During the operative step, the "teeth" may come out from the support of the diamond discs due to the vibrations or impact that the disc undergoes during work, and this may cause the breaking of other teeth; in the worst conditions there is the breaking of the disc itself.

[0015] Object of the present finding is that of realising diamond cutting blades and discs which lack the drawbacks of the similar products of known type.

[0016] Such object is obtained with cutting blades and discs which are characterised in that the diamond segments composing the so-called teeth are attached in removable manner on the support, whether this is composed of a steel blade or disc.

[0017] The removable locking of the diamond segment of the (blade or disc) support is realised by means of a mechanical connection, utilising screws, rivets or other devices known at the state of the art or future realisation, provided that they are adapted for the purpose.

[0018] With such embodiment, the user of the diamond tools according to the finding may substitute the worn diamond segments and substitute them with new segments of the same or different type, all this in a very quick and simple manner.

[0019] The finding will be better understood by means of the description of two of its possible embodiments,

given as only non-limiting example, with the aid of the attached drawing tables, where:

- Figures 1 and 2 (Table I) respectively represent the perspective and detail view of a diamond blade according to the finding;

- Figures 3 and 4 (Table II) respectively show the frontal and detail view of a diamond disc according to the finding.

[0020] As is visible in fig. 1, a diamond blade according to the finding, indicated in its entirety with 1, is composed of a steel laminar support 2 on which the so-called abrasive teeth are attached, indicated overall with 3 and arranged aligned and mutually distanced.

[0021] As is visible in fig. 2, each abrasive tooth 3 is composed of an abrasive material plate 4, welded on a shaped bracket 5, which is engaged on the laminar body 2 and is locked through a movable connection, realised with the screws 6 or with rivets, which is engaged in the corresponding holes 7.1 and 7.2 made in the aforementioned bracket and on the aforementioned body.

[0022] As is visible in fig. 3, a diamond disc according to the finding, indicated in its entirety with 11, is composed of a steel disc 12 on which the abrasive teeth are applied, indicated overall with 13, arranged equidistant along the outer circumference.

[0023] As is visible in fig. 4, each abrasive tooth is composed of an abrasive material plate 14, welded on a shaped bracket 15, which hooks onto the disc 12 through the movable connection realised with the screw 16 or with a rivet, which is engaged in the corresponding holes 17.1 and 17.2 made in the aforementioned bracket and on the aforementioned disc.

[0024] Furthermore, in order to ensure the correct positioning of the abrasive teeth 13 on the disc 12, it is foreseen that the bracket 15 is equipped with two projecting tabs 18 which, in operating condition, are inserted in the corresponding seats 19 made on the aforementioned disc.

[0025] From that mentioned above, the advantages gained with the use of the diamond blades and discs according to the finding are evident, since:

- when the diamond segments are worn, the operator may immediately substitute them, in an easy manner and short time period, thus eliminating the transportation expenses and down times which, on the other hand, were necessary in order to send tools of known type to be regenerated;

- the operator is no longer forced to carry a costly stock of diamond tools in his storehouse in order to substitute the products send to be regenerated;

- the operator uses a single support (laminar or disc body), so that he is no longer forced to store supplies of complete diamond tools of different sizes, but only less bulky abrasive teeth, on whose non-abrasive material portion the material type (20) on which the tool may operate is stamped, for example, granite, sandstone, basalt, marble, limestone, travertine or others;

- the possibility of breaking the abrasive teeth is eliminated, since the removable mechanical coupling between tooth and support permits a certain level of elasticity between the parts, so be able to absorb the impacts and vibrations which are generated when the tool is operating.

[0026] Of course, embodiments are possible of the abrasive teeth even considerably different from that described, as there may different modes of removable connection between the teeth and the (blade or disc) support, with leaving the scope of the claims as defined below.

Claims

1. DIAMOND CUTTING BLADES AND DISCS, to be employed in the field of working stone such as granite, marble, limestone, basalt, lava stone, tufa, slate, sandstone, travertine and the like and where the cutting of these materials occurs by means of diamond tools which, with the rubbing on the stone and due to abrasion, realises the required cut,
said blades and said discs **characterised in that** the diamond segments composing the so-called "teeth" are attached in removable manner on the support, whether this is composed of a laminar body or a steel disc.

2. DIAMOND CUTTING BLADES AND DISCS, according to claim 1, **characterised in that** the removable locking of the diamond segment on the (blade or disc) support is realised by means of a movable mechanical connection, realised by using screws, rivets or other devices known at the state of the art or future realisation, provided that they are adapted for the purpose.

3. DIAMOND CUTTING BLADE (1), according to claim 1, which comprises a steel laminar support (2) on which the abrasive teeth (3) are attached, arranged aligned and mutually positioned in equidistant manner, **characterised in that** every abrasive tooth (3) is composed of a plate (4), in abrasive material, welded on a shaped bracket (5), said bracket engaging on the laminar body (2) and locking by means of the screws (6), which are engaged in the corresponding holes (7.1,7.2) respectively made in the aforementioned bracket and aforementioned body.

4. DIAMOND CUTTING DISC (11), according to claim

1, which comprises a steel disc (12) on which the abrasive teeth (13) are attached, mutually positioned in equidistant manner along the outer circumference, **characterised in that** every abrasive tooth (13) is composed of a abrasive material plate (14), welded on a shaped bracket (15), said bracket hooking onto the disc (12) by means of at least one screw (16) which is engaged in the corresponding holes (17.1, 17.2) made in the aforementioned bracket and aforementioned disc.

5. DIAMOND CUTTING DISC, according to claim 4, **characterised in that** the bracket (15) is equipped with projecting tabs (18), which in operating condition are inserted into the corresponding seats (19) made on the same disc.

6. DIAMOND CUTTING DISC, according to one or more of the previous claims, **characterised in that** on the non-abrasive material portion of the plate, the material type (20) on which the aforementioned discs may operate is stamped.

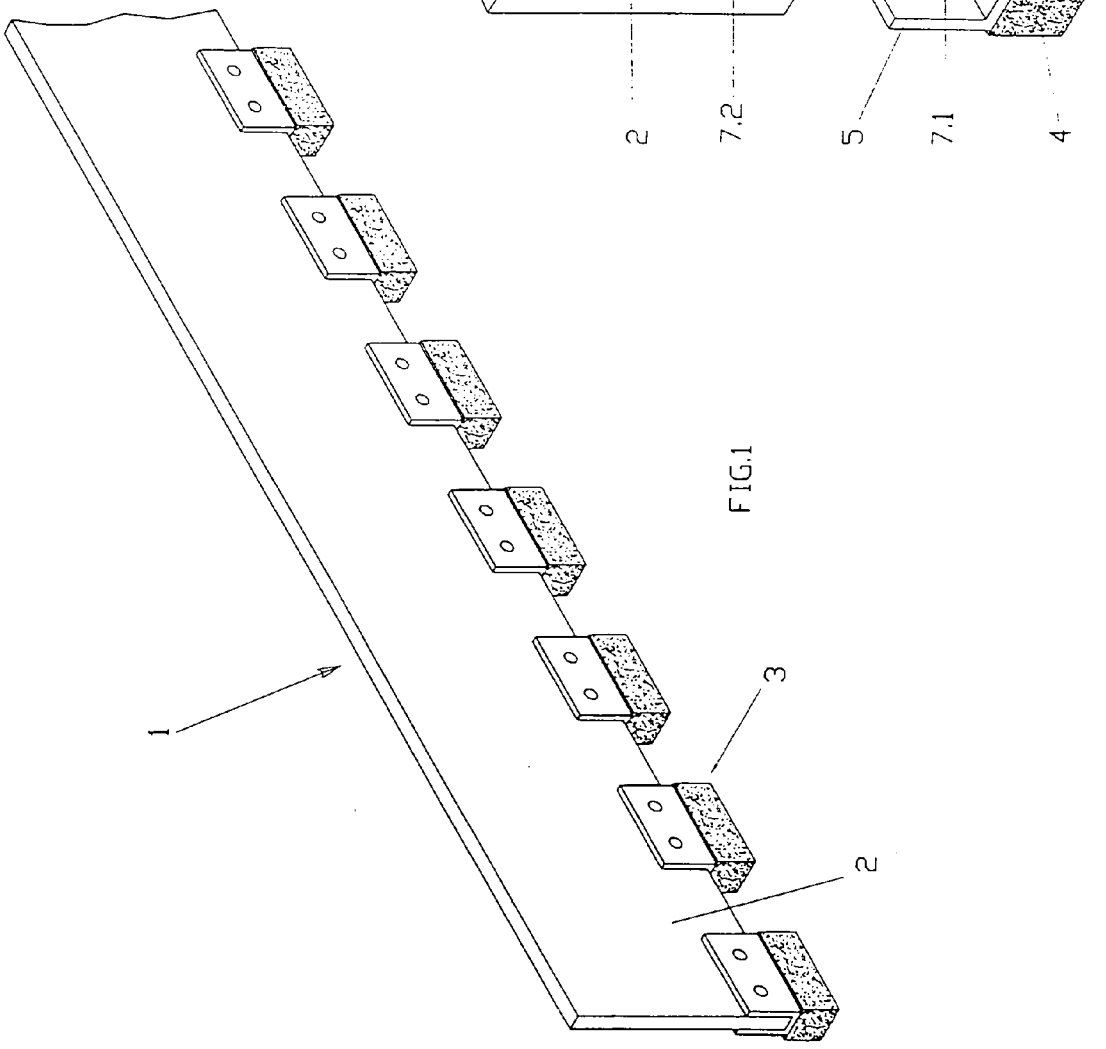

FIG.1

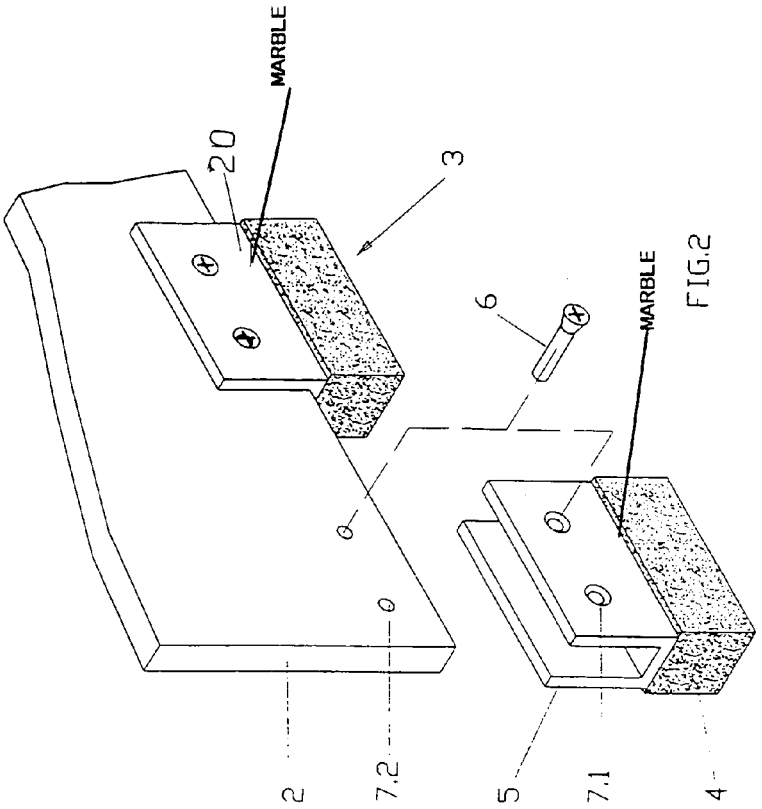

FIG.2

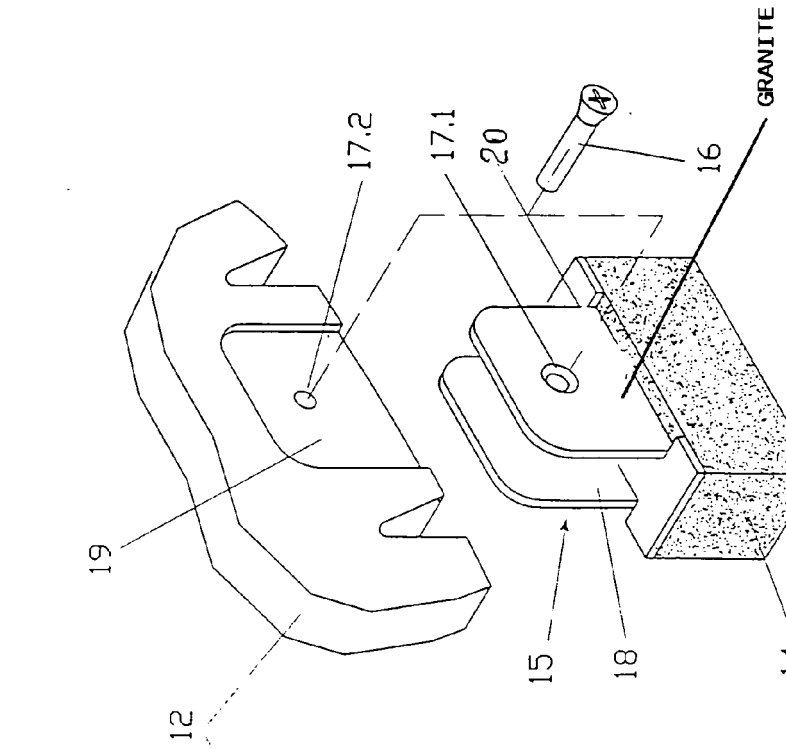

FIG.4

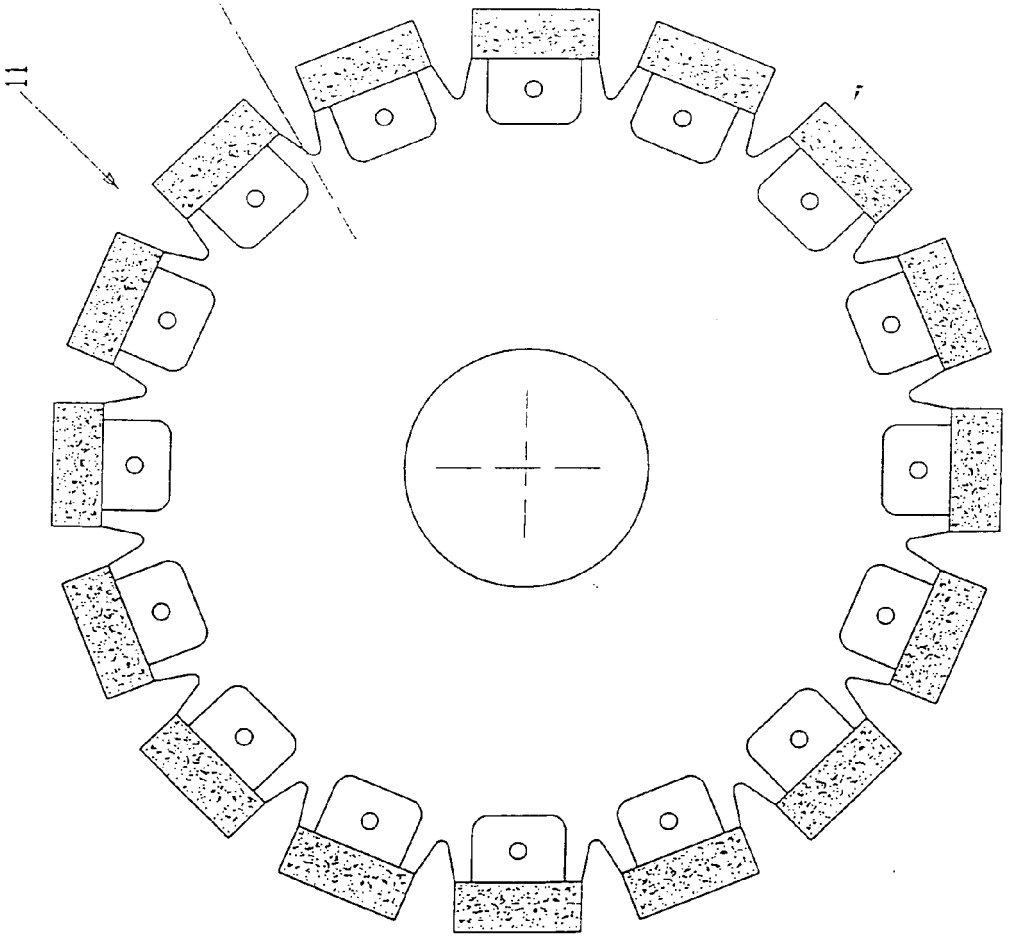

FIG.3