



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.04.2019 Bulletin 2019/15

(51) Int Cl.:
B24B 3/34 (2006.01) **B24D 3/28 (2006.01)**
B24D 5/08 (2006.01) **B24D 7/08 (2006.01)**
B24D 18/00 (2006.01)

(21) Application number: **18197913.9**

(22) Date of filing: **01.10.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME
 Designated Validation States:
KH MA MD TN

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(30) Priority: **04.10.2017 IT 201700110864**

(54) **SHARPENING TOOL**

(57) The present invention relates to a sharpening tool (10), particularly for high-precision sharpening, of the type comprising a body (11) provided with a diamond

band (12), wherein it comprises a reinforcement band (13) which is adjacent to the surface (26) of the diamond band (12), proximate to the lip of the cutting edge.

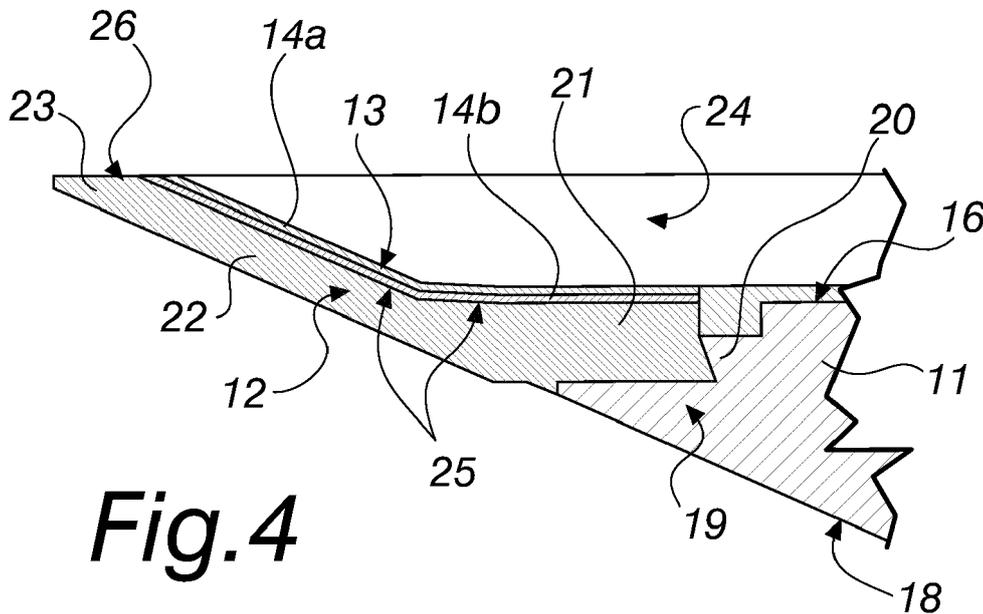


Fig. 4

Description

[0001] The present invention relates to a sharpening tool.

[0002] The invention can be applied in an industrial context, in particular in the industrial sector of abrasive tools for the production and maintenance of cutting tools.

[0003] Nowadays in the industry for producing wood-cutting tools, abrasive tools are known and widespread for the production and maintenance of circular blades.

[0004] Usually, grinding wheels are used for such operations.

[0005] One type of circular blade that is very common is the type that has an insert made of hard metal.

[0006] Figure 1 is a cross-sectional view of a detail of the operation to sharpen a blade with a grinding wheel. With reference to Figure 1, a circular blade A, made of metal, has a plurality of teeth B. On each tooth B there is a reinforcement C of hard metal to define the face D of the individual tooth B.

[0007] For the finishing, production, and maintenance of the line of teeth B, grinding wheels E are usually used, which have a diamond band F that interfaces with the blade A.

[0008] Owing to the narrow space between the teeth B within which the grinding wheel E has to pass in order to sharpen its face D, the grinding wheel has a perimetric edge that is very thin.

[0009] However, this characteristic of the grinding wheel makes it fragile and it happens that, over time, owing to impacts on the diamond band, the grinding wheel breaks and becomes unusable.

[0010] In order to overcome this drawback, in the last few years many producers have started to reinforce the grinding wheel, for example by modifying the width of the diamond band or by inserting a layer of resin of a different nature inside it.

[0011] By adopting such conventional techniques, the mechanical strength of the product is improved, but not significantly.

[0012] Alternatively (Figure 2), some producers put a reinforcement H inside the grinding wheel G, for supporting the diamond band I, made of the same material as the body M of the grinding wheel.

[0013] This technique, although it improves the mechanical strength characteristics of the grinding wheel, worsens the usability by the user because as the diamond band is worn away, the reinforcement materials used are also worn away, breaking off from their portion of origin and ending up on the surface L of the diamond band, which is the surface that slides on the face C in order to sharpen it.

[0014] This compromises the abrasion characteristic of the diamond band, thus impairing the effectiveness of the action of the grinding wheel.

[0015] The aim of the present invention is to provide a sharpening tool, particularly for high-precision sharpening, which is capable of improving the known art in one

or more of the above mentioned aspects.

[0016] Within this aim, an object of the invention is to provide a sharpening tool, particularly for high-precision sharpening, that has a greater mechanical strength than conventional tools and, as a consequence, a greater lifetime under operating conditions.

[0017] Another object of the invention is to provide a sharpening tool, particularly for high-precision sharpening, that is simple to use.

[0018] A still further object of the present invention is to overcome the drawbacks of the known art in an alternative manner to any existing solutions.

[0019] Another object of the invention is to provide a sharpening tool, particularly for high-precision sharpening, that is highly reliable, easy to implement and at low cost.

[0020] This aim and these and other objects which will become better apparent hereinafter are achieved by a sharpening tool, particularly for high-precision sharpening, of the type comprising a body provided with a diamond band, characterized in that it comprises a reinforcement band which is adjacent to the surface of the diamond band, proximate to the lip of the cutting edge.

[0021] Further characteristics and advantages of the invention will become better apparent from the detailed description that follows of a preferred, but not exclusive, embodiment of the sharpening tool, particularly for high-precision sharpening, according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings, wherein:

- Figure 3 is a cross-sectional view of a sharpening tool, particularly for high-precision sharpening, according to the invention;
- Figure 4 is a detail of the sharpening tool, according to the invention, in Figure 3.

[0022] With reference to the figures, a sharpening tool, particularly for high-precision sharpening, according to the invention, in this example a grinding wheel, is generally designated by the reference numeral 10.

[0023] The example in Figures 3 and 4 shows a model of grinding wheel known also as "12V2" or "4V2". The figures are purely indicative and not limiting, in that the invention can also be made with other models of sharpening tool.

[0024] The grinding wheel 10 comprises a body 11, in the example substantially frustum-shaped, which has a central through hole 15 which is adapted for the insertion of a spindle in order to be turned.

[0025] The body 11 is made of aluminum, or the like.

[0026] Advantageously the body 11 can be made of another material.

[0027] The frustum-shaped body 11 comprises a first disk-shaped surface 16, a second disk-shaped surface 17, opposite to the first, with a smaller diameter than the first disk-shaped surface 16, but with a center aligned with the center of the first disk-shaped surface 16, along

an axis X, which corresponds to the axis of extension of the hole 15. The body 11 also comprises a lateral surface 18 between the first disk-shaped surface 16 and the second surface disk-like 17, which is inclined.

[0028] Advantageously, the body 11, the first surface 16 and the second surface 17 can have different shapes.

[0029] In particular the first disk-shaped surface 16 is shaped advantageously along its perimetric edge 19 so as to define a step 20.

[0030] A diamond band 12 is provided, on the perimetric edge 19 and at the step 20 of the first disk-shaped surface 16, with an inclined surface that is adapted to generate an inclination that is comparable with that of the lateral surface 18, thus defining an extension of such lateral surface 18.

[0031] In particular, with reference to Figure 4, the diamond band 12 has: a first portion 21, which is integral with the body 11, and a second portion 22, which comprises a section that is parallel to the lateral surface 18 of the body 11, so as to define a concave section 24 of the grinding wheel 10, and an end 23 that is sufficiently thin to be inserted into the narrow space located between two contiguous teeth of a circular blade.

[0032] The diamond band 12 is constituted by conventional abrasive grit, such as, for example, diamond embedded in a matrix of phenolic resin. Advantageously, the abrasive grit can be embedded in a matrix of other polymers.

[0033] A peculiarity of the invention consists of the presence of a reinforcement band 13, which is adjacent to the surface 26 of the diamond band 12, proximate to the lip of the cutting edge to be sharpened.

[0034] In the example, the reinforcement band 13 is facing toward the internal surface 25 of the diamond band 12, corresponding to the internal surface 25 of the diamond band 12.

[0035] "Internal surface" means the internal surface of the concave section 24 of the grinding wheel 10.

[0036] In particular, the reinforcement band 13 is integral with the diamond band 12 and is provided with a composite material based on epoxy resin and a strengthener, such as for example fiberglass, carbon fiber, Kevlar or the like.

[0037] The reinforcement band 13 is, for example, provided by way of the superimposition of two layers 14a and 14b of strengthener impregnated with epoxy resin.

[0038] Advantageously, the reinforcement band 13 can also be provided with more than two layers of strengthener.

[0039] Each layer has, for example, a thickness of 0.15 millimeters.

[0040] A peculiarity of the invention lies in its production process.

[0041] In fact, the diamond band 12 and the reinforcement band 13 are co-molded directly on the perimetric edge 19 of the aluminum body 11 of the grinding wheel 10.

[0042] The production method consists of:

- suitably arranging a body 11 for the tool inside the mold,
- arranging uniformly along the perimetric edge 19 of the body 11 the initial base of the diamond band 12 composed of abrasive grit, in this case diamond, and phenolic resin,
- arranging on this base two layers 14a and 14b of glass fiber or carbon or Kevlar, such layers being pre-impregnated with epoxy resin,
- closing the mold and pressing the assembly,
- heating the mold in order to cause the cross-linking of the resins,
- cooling the assembly,
- extracting the assembly and grinding the edge.

[0043] As an alternative to the layers of pre-impregnated strengthener, it is possible to use layers that are not pre-impregnated with resin and spread them directly in the mold.

[0044] Use of the tool 10 is the following.

[0045] The tool is fixed to a spindle, inserted into the hole 25, with the concave section 24 on the opposite side to the side with the spindle. The tool 10 is then made to rotate. The end 23 is inserted between the teeth of the circular blade to be sharpened, so as to slide on the face of one of these teeth. By virtue of its abrasive characteristic, the diamond band 12 sharpens the face of the tooth in question. Because of the sliding, over time the diamond band 12 wears away, and, at the same rate, the reinforcement band 13 also wears away, thus exposing a new working end 23.

[0046] From static breakage tests, carried out during development of the product, it emerged that the invention requires, on average, double the pressure in order to reach breaking point with respect to a similar grinding wheel with a diamond band but without a reinforcement band.

[0047] It should be noted that the invention provides a sharpening tool, particularly for high-precision sharpening, that ensures greater mechanical strength than conventional tools, thus resulting in a longer life over time.

[0048] It should also be noted that the invention provides a sharpening tool, particularly for high-precision sharpening, that improves the usability of the tool by the operator, with respect to similar tools present on the market.

[0049] In practice it has been found that the invention fully achieves the intended aim and objects by providing a sharpening tool, particularly for high-precision sharpening, of the type comprising a body provided with a diamond band, comprising a reinforcement band which is adjacent to the surface of the diamond band, proximate to the lip of the cutting edge.

[0050] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

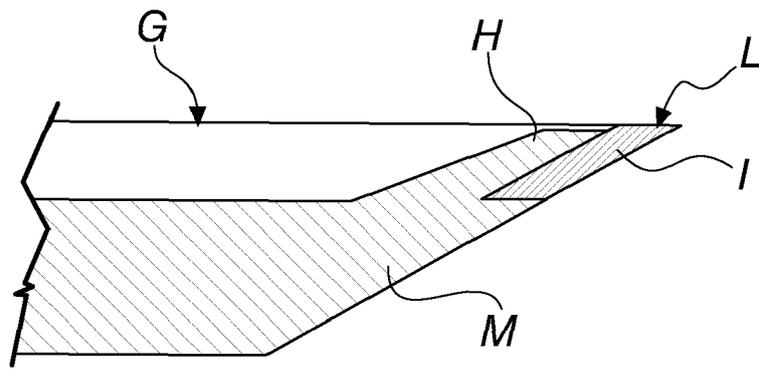
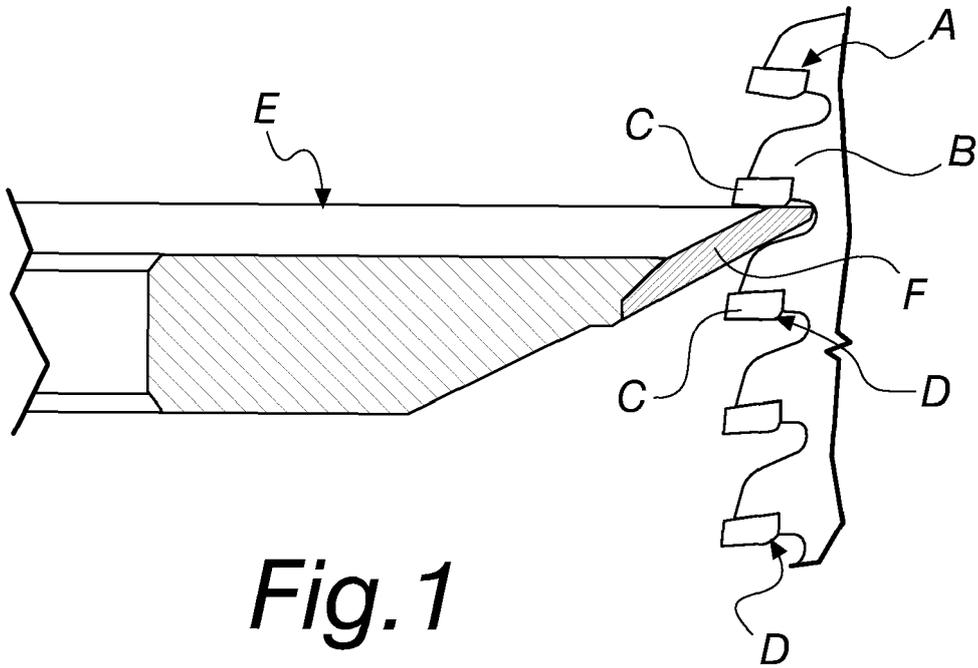
[0051] In practice the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

[0052] The disclosures in Italian Patent Application No. 102017000110864 from which this application claims priority are incorporated herein by reference.

[0053] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A sharpening tool (10), particularly for high-precision sharpening, of the type comprising a body (11) provided with a diamond band (12), **characterized in that** it comprises a reinforcement band (13) which is adjacent to the surface (26) of said diamond band (12), proximate to the lip of the cutting edge.
2. The sharpening tool (10) according to claim 1, **characterized in that** said reinforcement band (13) is made of composite material.
3. The sharpening tool (10) according to claim 2, **characterized in that** said composite material is constituted by at least two superimposed layers (14a, 14b) of carbon fiber or glass fiber or Kevlar or the like, impregnated with epoxy resin.
4. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said diamond band (12) comprises diamond grit embedded in a matrix of phenolic resin or of other polymers.
5. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said body (11) is made of aluminum or the like.
6. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said body (11) is frustum-shaped and has a central through hole (15).
7. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said frustum-shaped body (11) comprises a first disk-shaped surface (16), a second disk-shaped surface (17), with a smaller diameter than the first disk-shaped surface (16), but with a center aligned with the center of said first disk-shaped surface (16), along an axis (X), which corresponds to the axis of extension of said hole (15), and a lateral surface (18) between said first disk-shaped surface (16) and said second disk-shaped surface (17).
8. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said first disk-shaped surface (16) is shaped along its perimetric edge (19) so as to define a step (20).
9. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said diamond band (12) is provided, on said perimetric edge (19) and at said step (20) of said first disk-shaped surface (16), with an inclined surface, generating an inclination that is comparable with that of said lateral surface (18), thus defining an extension of said lateral surface (18).
10. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said diamond band (12) has: a first portion (21), which is integral with said body (11), and a second portion (22), which comprises a section that is parallel to the lateral surface (18) of said body (11), so as to define a concave section (24) of the tool (10), and a sharp end (23).
11. The sharpening tool (10) according to one or more of the preceding claims, **characterized in that** said reinforcement band (13) is facing toward the internal surface (25) of said diamond band (12) of said concave section (24), corresponding to said internal surface (25) of said diamond band (12).
12. A method for providing a sharpening tool (10) according to one or more of the preceding claims, which consists of:
 - arranging a body (11) for the tool inside the mold,
 - arranging uniformly along the perimetric edge (19) of the body (11) the initial base of the diamond band (12) composed of abrasive grit and phenolic resin,
 - arranging on this base two layers (14a, 14b) of glass fiber or carbon or Kevlar, said layers being pre-impregnated with epoxy resin,
 - closing the mold and pressing the assembly,
 - heating the mold in order to cause the cross-linking of the resins,
 - cooling the assembly,
 - extracting the assembly and grinding the edge.



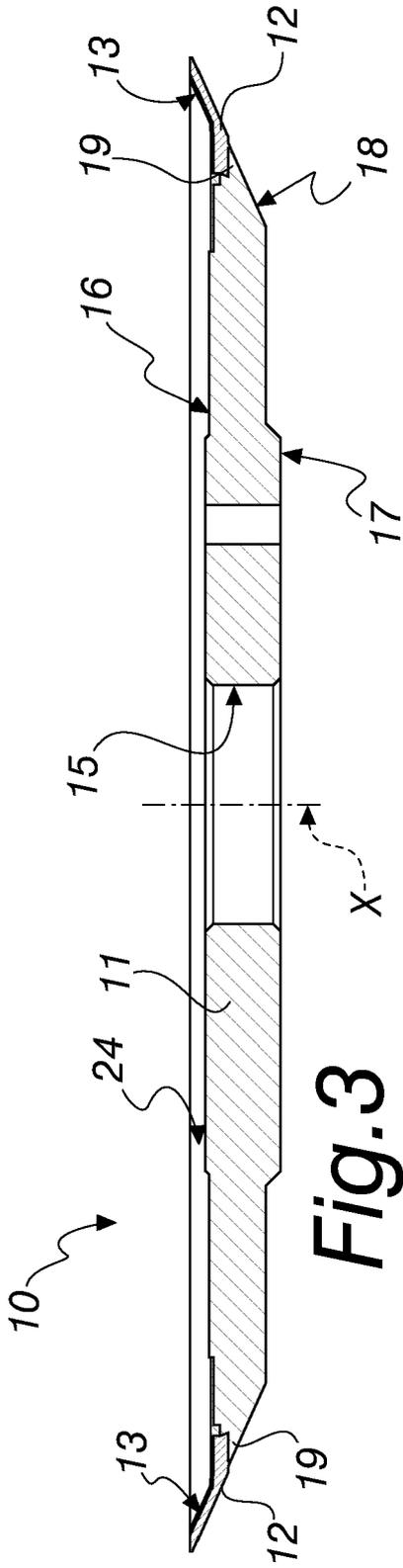


Fig. 3

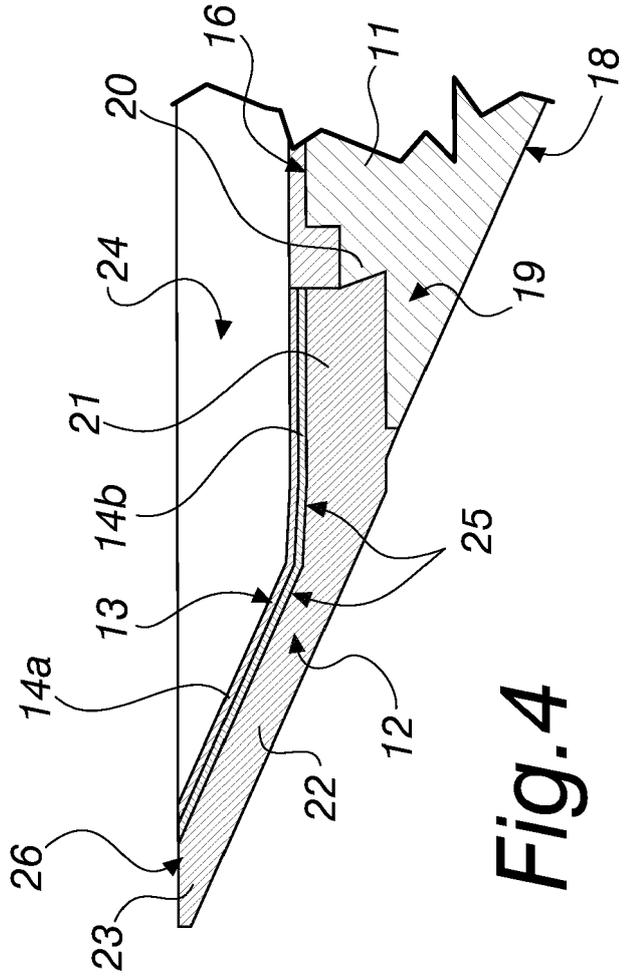


Fig. 4



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Application Number
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Place of search Munich		Date of completion of the search 24 October 2018	Examiner Endres, Mirja
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