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(54) **FIXING DEVICE FOR CUTTERS**

(57) A fixing device for cutters, comprising a block (3) housed inside a seat (11) formed on the body (1) of a cutter. A cutting tool or insert (4) is fixed laterally to the block (3) and, moreover, the block (3) has two side walls (9, 10) inserted into the seat (11), a flat base (12) and, on the opposite side with respect to the base (12) and facing the outside of the cutter's body (1), two curved

surface portions (6, 7), which are separated by an element (8) protruding with respect to the curved surface portions (6, 7) and arranged transversally with respect to the cutter's body (1). The protruding element (8) has a face completely turned towards the center of symmetry (O) of the cutter's body (1).

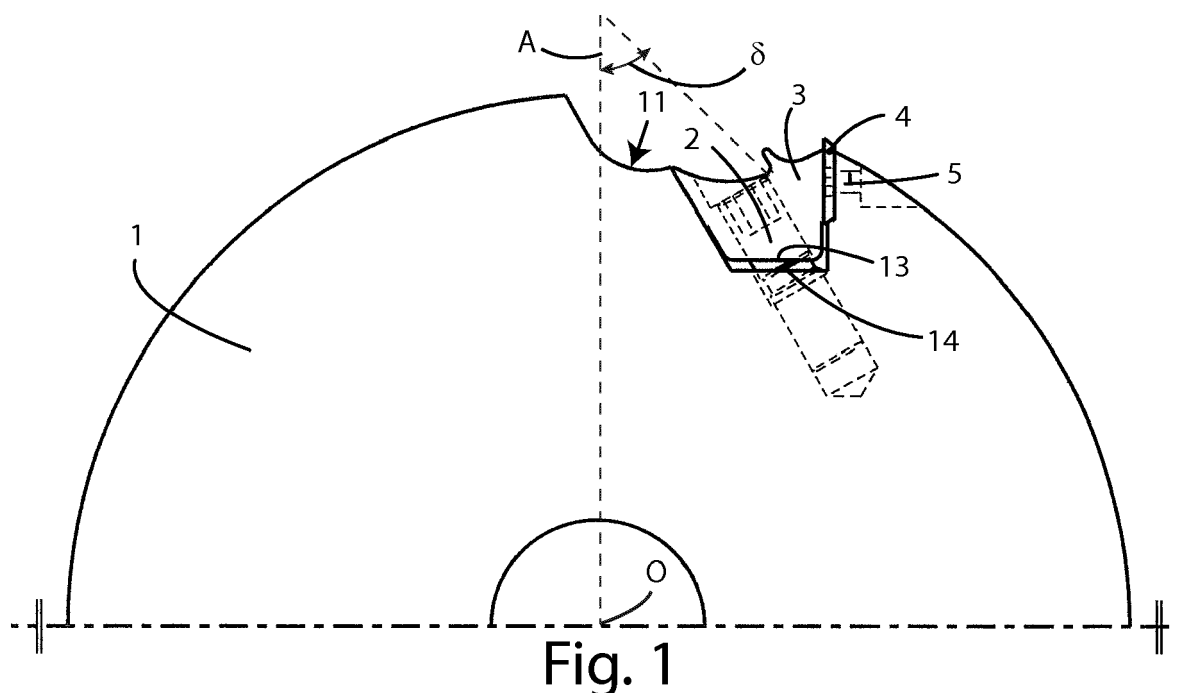


Fig. 1

Description

[0001] The present invention relates to mechanical fixing tools for working wood and similar materials and it generally refers to a fixing device for cutters. More particularly, the invention relates to a device for fixing the cutting inserts (also called knives) that are used in cutters, in particular in rotary-type cutters.

[0002] Specifically, the object of the present invention is a fixing device having geometrical features suitable for achieving an efficient evacuation of the shavings during processing, as well as a lower presence of chipping in the finished product, with respect to the known art; the device also guarantees high production performance, thus minimizing stops during processing and increasing the average working life of each knife in all working conditions. It is known that the cutting tool industry offers numerous and different applications depending on the type of mounting the cutters on respective supports; it is also known that for working wood, cutters, which usually have a cylindrical or pyramidal body on which a series of blades or cutting inserts are arranged, are used; the cutting edges are mechanically fixed to the metal body of the cutter and they can be replaced after consumption or regenerated by sharpening.

[0003] The cutting edges are fixed on the cutter's body by means of different systems and the main purpose is to allow a suitable locking, as well as a simple replacement of the inserts in case of deterioration or breakage due to wear or when they are turned (in case of reversible knives).

[0004] Therefore, the cutting inserts are normally inserted in suitable seats made on the body of the cutter and the relative locking is carried out by using fastening devices, a sort of plugs or blocks, which are retained with screws arranged in a radial or tangential direction with respect to the workpiece. The shape of said known plugs or blocks, however, does not allow to quickly and effectively evacuate the chip forming as a result of the cutting phase and/or the processing carried out by the insert, with possible consequent stops and/or malfunctions of the cutter and with the further drawback given by the fact that deposits of resin scales are formed in correspondence with the tightening screw of the plug, due to the presence of wood residues in the tightening zone.

[0005] An object of the present invention is therefore to obviate the above mentioned drawbacks and, in particular, to provide a fixing device for cutters, which allows evacuation of shavings formed during the working of wood in an effective and fast manner, with respect to the prior art. Another object of the present invention is to provide a fixing device for cutters, which allows to perform optimal wood processing, with reduced chipping of the finished piece, with respect to the prior art.

[0006] A further object of the present invention is to provide a fixing device for cutters, which allows a safety locking of both the block and the insert, thus avoiding the accumulation of resin at the tightening screws of the

block.

[0007] These and other objects, according to the present invention, are achieved by providing a fixing device for cutters according to the enclosed claim 1; other detailed features are described in the dependent claims.

[0008] Further characteristics and advantages of the fixing device for cutters, according to the invention, will become more clear from the following description, relating to a preferred but not limiting embodiment of the fixing device of the invention, and referring to the enclosed drawings, in which:

- figure 1 shows a partial frontal view and partially a section view of a cutting to which the fixing device of the present invention is applied;
- figure 2 shows a perspective view of a double-threaded grain used for tightening the fixing device on the body of the cutter, according to the present invention;
- figure 3 shows a perspective view of a preferred but not limiting embodiment of a cutting insert coupled with the fixing device, according to the invention;
- figures 4 and 5 show two perspective views of the fixing device according to the invention;
- figure 6a shows an enlarged side view of the fixing device according to the invention;
- figure 6b shows an enlarged side view of the fixing device according to the invention in which a detail showing the different heights of the constituent elements is sketched.

[0009] With reference to the above mentioned figures, 1 shows the body of a cutter, preferably made of steel or aluminum alloy and having a substantially cylindrical shape, with a symmetry axis A and a center of symmetry O.

[0010] A series of seats 11, where the cutting tools or inserts 4 are kept in position by means of centering elements 5, are formed on said body of the cutter 1.

[0011] Each seat 11 houses, at least partially, a plug or block 3, to which the cutting insert 4 is fixed, in a lateral position, so as to ensure maximum tightness and precision of the system in all working conditions; in particular, the seat 11 is able to withstand the high speeds of rotation of the cutter's body 1 without causing variations on the initial positioning of the cutting insert 4.

[0012] In particular, the block 3, which is inserted in the seat 11, has a flat base or bottom 12, while, in correspondence of the upper face facing outwards and opposite to the base 12, has two curved surface portions 6, 7, which are separated by a projection 8 formed transversely on the entire outer face of the block 3.

[0013] Advantageously, the vertex of the projection 8 is preferably directed transversely and in a radial direction with respect to the axis of symmetry A of the cutter's body 1; said vertex forms an angle δ , preferably less than 90° , with the axis A and the projection 8 has a face completely turned towards the center of symmetry O of the

cutter, as shown in detail in fig. 1. Advantageously, one of the side walls 9 of the insert 3 (in particular, the side wall on which the cutting insert 4 is fixed) is substantially vertical, while the other side wall 10 of the insert 3 is inclined so as to form an angle α that is substantially equal to 30° with the vertical wall 9.

[0014] Again advantageously, the straight line S tangent to the curved profile of the surface 6 at the point of contact T between the block 3 and the insert 4 forms an angle γ (that is equal substantially to 65°) with the vertical wall 9; it follows that the angle β formed by the straight line S and the vertical line V constituting the extension of the vertical wall 9 of the block 3 on the opposite side with respect to the base 12, is substantially equal to 115° . Preferably, each curved surface portions 6 and 7 of the block 3 has a cross-section profile which is similar to a hyperbola and the projection 8, which divides the two surface portions 6 and 7 in a transverse direction, has a vertex whose distance from the base 12 (the distance H1 shown in fig. 6b) is equal to or greater than the distance H between the point T and the level of said base 12.

[0015] Furthermore, the distance between the apex of the cutting insert 4 and the base 12 (the distance H2 of fig. 6b) is equal to or greater than H1.

[0016] Still advantageously, the transverse profile of the surface 6 extends from the point T to the vertex of the projection 8, while the transverse profile of the surface portion 7 extends from the vertex of the projection 8 to a point Z of the side wall 10 of the block 3; the point Z has a distance from the base 12 substantially equal to or less than the distance of the vertex of the projection 8 from the base 12.

[0017] The block 3 is fixed to the bottom of the seat 11 by threaded fixing means and, in particular, by means of a double-threaded grain 2, which is inserted into a through hole 13 made at the surface portion 7 of the block 3 and into a corresponding hole 14 formed on the surface of the cutter's body 1; this guarantees the proper contrast to the centrifugal force and also guarantees a perfect self-positioning of the block 3 and of the insert 4 in the seat 11, both radially and axially.

[0018] Said locking action also ensures the positioning stability of the insert 4, even at high speeds of the cutter, without any variations occurring in the position of the block 3 and/or of the insert 4.

[0019] The geometry of the block 3 as described above allows, first of all, to automatically empty the seat 11 from the processing residues, since the chip which forms at the cutting edge of the insert 4 and which is directed towards the inside of the block and towards the fixing grain 2 is easily evacuated thanks to the locking and deflection action carried out by the curved surface portion 6 and the projection 8.

[0020] This also causes the absence of any incrustations, which can be formed in correspondence with the fixing grain 2 and which are normally due to the stagnation of resin coming from the processing residues; in fact, in the present case, both features relating to the inclina-

tion of the projection 8 according to the angle δ with respect to the axis A of the cutter's body 1 and to the distance H1 which is equal to or greater than the distance H, prevent said residues to reach the seat where the fixing grain 2 is placed. Moreover, the conformation of the block 3 limits to the minimum the chipping due to the "chip breaker" effect.

[0021] It has thus been found that the solution object of the present invention allows to achieve the above mentioned objects and, in particular, allows the chip to be efficiently and rapidly evacuated during processing, even at high peripheral speeds of the cutter, with an increase in productivity and good working finishing.

[0022] Therefore, the characteristics of the fixing device for cutters, which is the object of the present invention, are clear from the above description, as well as the advantages thereof.

[0023] Finally, it is clear that numerous variations can be made to the fixing device of the invention, without departing from the novelty principles of the appended claims, as it is clear that, in the practical embodiment of the invention, materials, shapes and dimensions of the illustrated technical details may be any according to requirements and the same may be replaced with other technically equivalent ones.

Claims

1. A fixing device for cutters, comprising a block (3) housed inside a seat (11) formed on the body (1) of a cutter, said body (1) having an axis of symmetry (A) and a center of symmetry (O) and a cutting tool or insert (4) of said cutter also being laterally fixed to said block (3), **characterized in that** said block (3) has two side walls (9, 10) inserted in said seat (11), a flat base (12) and, on the opposite side with respect to said base (12) and facing the outside of said body (1), two curved surface portions (6, 7) that are separated by an element (8) protruding with respect to said curved surface portions (6, 7) and having a vertex which is arranged transversely in a radial direction with respect to said axis of symmetry (A) of said body (1) and which forms an angle (δ) of less than 90° with said axis of symmetry (A), said protruding element (8) also having a face completely turned towards the center of symmetry (O) of said body (1).
2. The fixing device as claimed in claim 1, **characterized in that** one of said side walls (9, 10) of the block (3) is a vertical wall (9), while the other side wall (10) of the block (3) is sloped so as to form an angle (α) substantially equal to 30° with said vertical wall (9).
3. The fixing device as claimed in claim 2, **characterized in that** a straight line (S), which is tangent to one of said curved surface portions (6, 7) at a point

(T) of contact between said block (3) and said cutting insert (4), forms an angle (γ) substantially equal to 65° with said vertical wall (9).

4. The fixing device according to at least one of the previous claims, **characterized in that** each curved surface portion (6, 7) of said block (3) has a section having a profile of a hyperbola. 5

5. The fixing device according to at least one of the previous claims, **characterized in that** said protruding element (8) has a vertex whose distance (H1) from said base (12) is equal to or greater than the distance (H) between said point (T) of contact between the block (3) and the cutting insert (4) and said base (12). 10 15

6. The fixing device according to at least one of the previous claims, **characterized in that** said cutting insert (4) has a vertex which has a distance (H2) from said base (12) equal to or greater than the distance (H1) between said vertex of the protruding element (8) and said base (12). 20

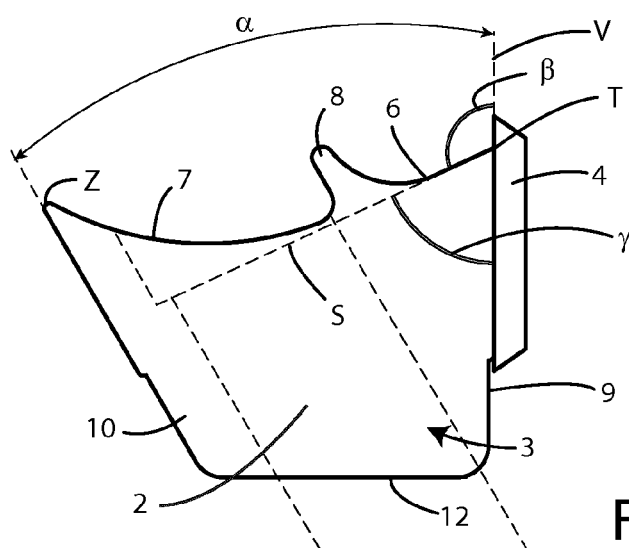
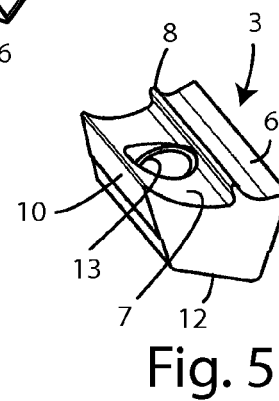
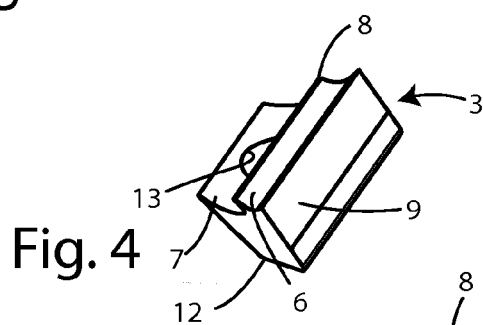
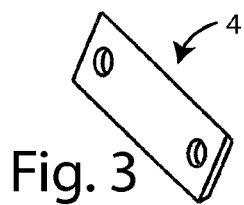
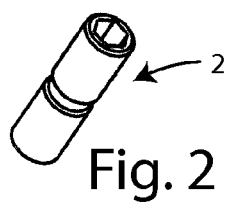
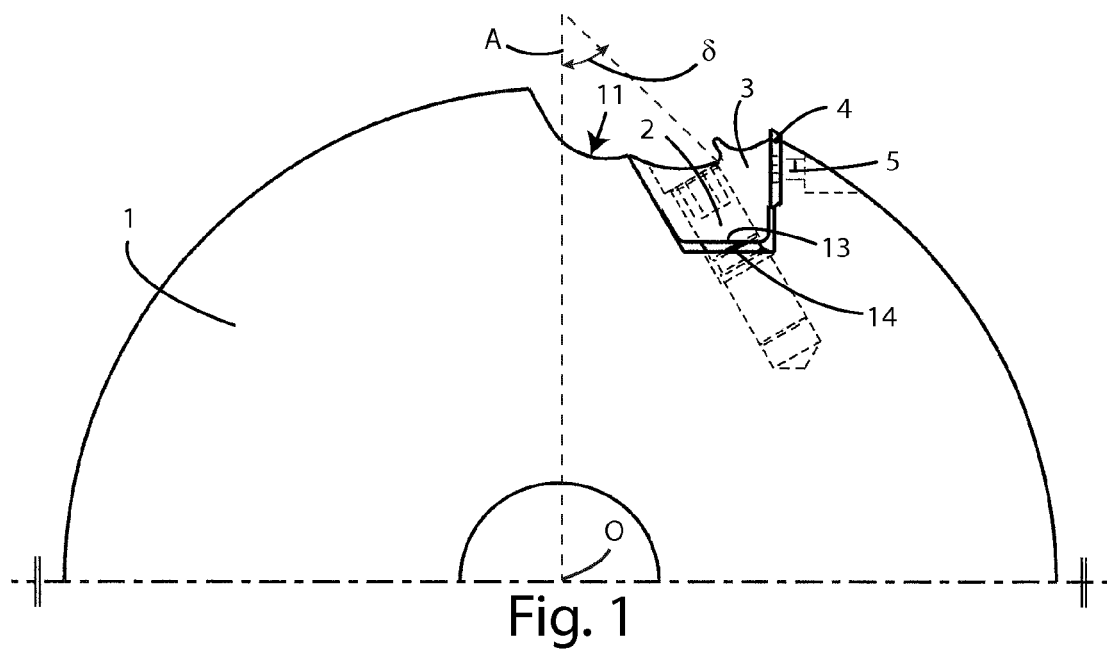
7. The fixing device as claimed in at least one of the previous claims, **characterized in that** a first curved surface portion (6) of said curved surface portions (6, 7) has a profile extending from said point (T) of contact between said block (3) and said cutting insert (4) to said vertex of the protruding element (8). 25 30

8. The fixing device according to at least one of the previous claims, **characterized in that** a second curved surface portion (7) of said curved surface portions (6, 7) extends from said vertex of the protruding element (8) to a point (Z) of a side wall (10) of the block (3). 35

9. The fixing device according to at least one of the previous claims, **characterized in that** said block (3) is fixed, in correspondence with said base (12), on the bottom of said seat (11) by means of threaded fixing means (2), which are inserted into a first through hole (13) made at a curved surface portion (7) of the block (3) and into a second hole (14) made on the surface of said cutter's body (1). 40 45

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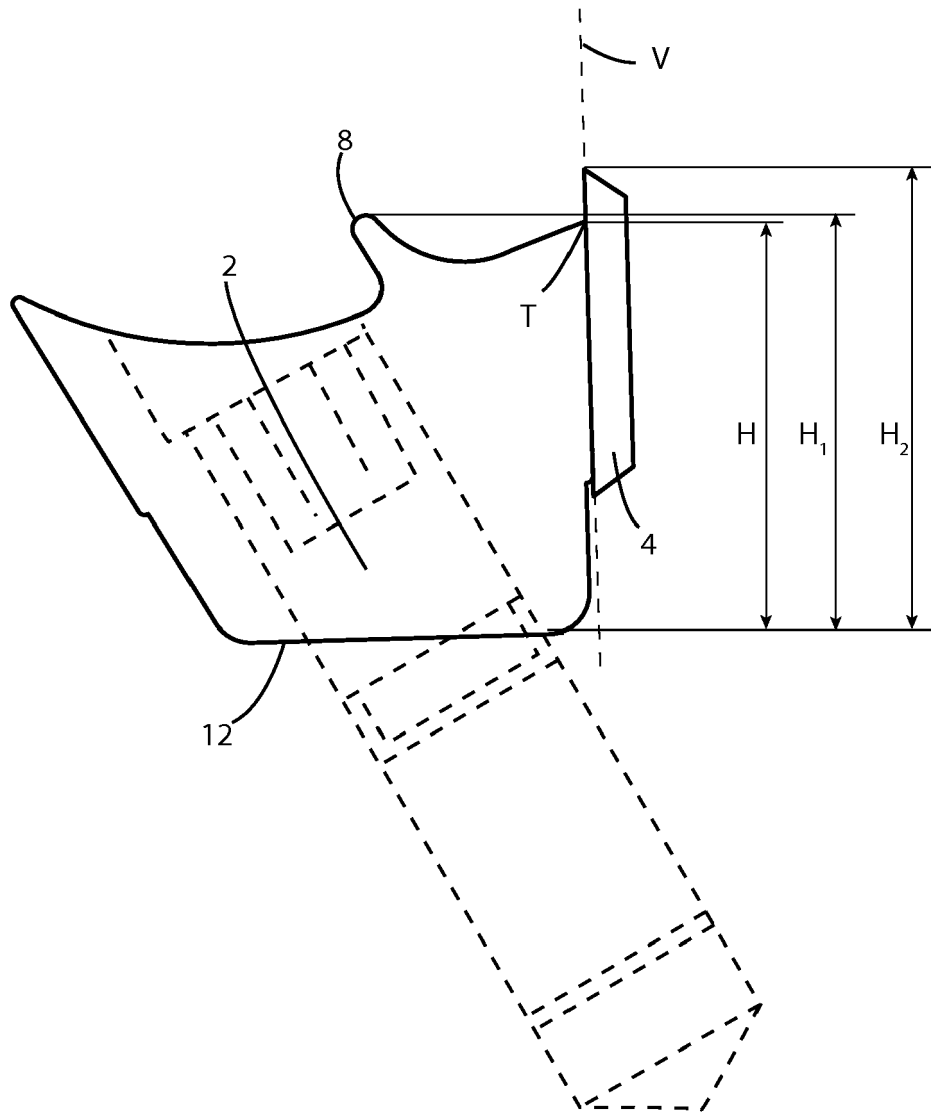


Fig. 6b



EUROPEAN SEARCH REPORT

 Application Number
 EP 19 20 4814

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		3 April 2020	Hamel, Pascal
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 20 4814

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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03-04-2020

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