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(54) Hogging tool for working edges of panels, and method and apparatus for utilising such hogging tool

(57) The invention relates to a hogging tool for working edges of panels. The hogging tool has a circular circumference (2) and an axially oriented surface (3). The hogging tool is provided with at least one chip breaking cutting edge (5) extending along the circumference of the hogging tool and at least one chip cutting edge (6,7) extending along the axially oriented surface. The at least one cutting edge extending along the peripheral circumference form an angle (γ) with a radius of the hogging tool, when viewed in the intended circumferential direction of the hogging tool, the angle (γ) formed with the radius has a value of at least minus 5 degrees. Alternatively or additionally, the cutting edges are divided into at least one first cutting edge and one second cutting edge. The radial extension of the at least one first cutting edge is less than the radial extension of the at least one second cutting edge and a number of second cutting edges is at least only half a number of first cutting edges.

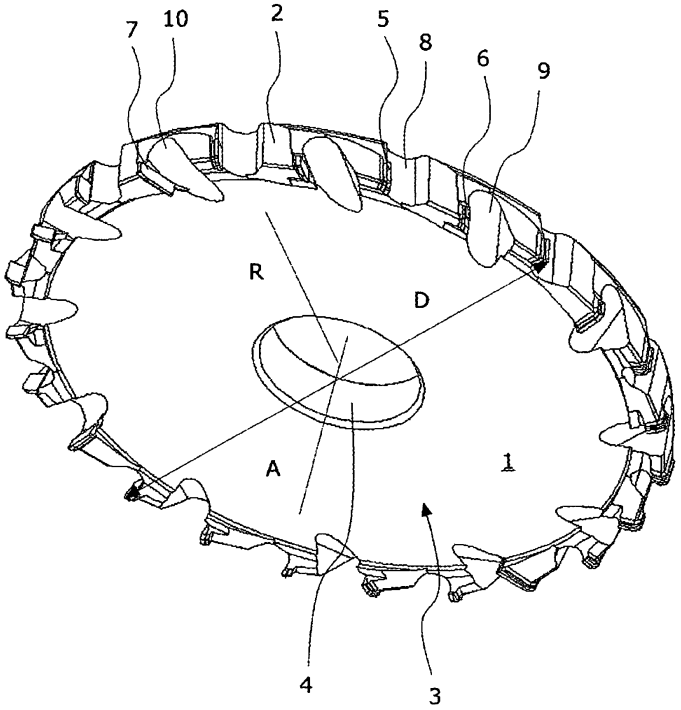

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a hogging tool for working edges of panels, said hogging tool having a body with a circular circumference and an axially oriented surface, and where the hogging tool is provided with at least one chip breaking cutting edge extending along the circumference of the hogging tool and at least one chip cutting edge extending along the axially oriented surface and intended for working the edge of the wooden panel. The invention also relates to a method utilising the hogging tool and to an apparatus for utilising the hogging tool.

BACKGROUND OF THE INVENTION

[0002] Working of edges of panels is used when an edging foil or other lining is to be attached to the edge of the panel. It is necessary that the edge is plane so that a secure attachment of the lining is possible. If the edge is not plane or the roughness of the edge is too coarse, the lining may detach.

[0003] In order to obtain a sufficiently plane and a sufficiently fine roughness of the edge of the panel, a hogging tool may be used being provided with a plurality of cutting edges. The cutting edges are extending both along a circumference of the hogging tool and along an axially oriented surface of the hogging tool. The cutting edges running along the circumference are intended for pre-working the edge of the panel by engaging a top side of the panel and working a certain width off the edge of the panel. The cutting edges running along the axially oriented surface are intended for finishing working the edge of the panel by engaging the edge side of the panel and providing the surface of the edge.

[0004] US 6,039,096 discloses a tool for working edges of a panel. The hogging tool is having a front surface, a working plane and a circumferential surface, and defining an axis of rotation, comprising at least one row of cutter teeth extending about the circumferential surface, said cutter teeth serving for pre-working, and a row of teeth for finishing working, the teeth being situated on the front surface, wherein the teeth of both rows have radially cutting edges and axially cutting minor cutting edges, said minor cutting edges defining rotary surfaces which make a transition into each other such that the combined rotary surface forms a setting angle which is reduced according to one of: continuously or in sections, from being oriented radially outward to radially inward with respect to the working plane, the working plane extending perpendicularly to the axis of rotation.

[0005] The hogging tool of US 6,039,096 exhibits reduced noise emission. The reduction in noise emission is brought about by reducing the vibrations produced in the tool and work-piece and by proportioning the cut, machining being carried out in two stages. The greatest part of the chip volume is removed under favourable noise-emission conditions using a special cutting geometry. The tool and work-piece vibrations are reduced by a clearly reduced rise in the shear force pulse using a special cutting tooth geometry. The chip volume removed under these conditions is only small, and good quality machining can thus be attained.

SUMMERY OF THE INVENTION

[0006] It is an object of the present invention to provide a hogging tool which improves the machining quality obtained along the edge of the panel. It may also be an object of the invention to provide a hogging tool where improvement in machining quality does not considerably increase the cost of the tool. Another object may be to increase the tool life of the hogging tool while still obtaining a satisfactory surface structure of the panel edge being worked.

[0007] It is also an object of the present invention to adopt a method utilising the hogging tool and to provide an apparatus for utilising the hogging tool, and where there is no need to introduce new apparatuses, but where existing manufacturing apparatuses are fully capable of utilising the hogging tool.

[0008] The panels are made of wood or are made of materials similar to the texture of wood, hereby meaning materials such as plastic materials or materials constituting a combination of wooden and plastic materials.

[0009] The object is obtained according to a first aspect of the invention being a hogging tool provided with

- at least one chip breaking cutting edge extending along the circumference of the hogging tool and at least one chip cutting edge extending along the axially oriented surface, said cutting edges along the axially oriented surface being Intended for working the edge of the wooden panel, and
- where the at least one cutting edge extending along the peripheral circumference forms an angle with a radius of the hogging tool when viewed in the intended circumferential direction of the hogging tool,
- said angle formed with the radius having a value of at least minus 5 degrees, possibly between minus 5 and minus 45 degrees, preferably between minus 5 degrees and minus 25 degrees.

[0010] An angle as stated has proven to decrease the roughness of the micro-structure of the surface of the edge of the panel. In the present context, micro-structure signifies the often rippled surface occurring after working of the edge. The rippled structure is often called cutting-marks and is formed by one or more cutting edges passing the panel edge at intervals being dependent on the rotational speed of the hogging tool, on the plurality of cutting edges of the hogging tool, on the diameter of the hogging tool and on the linear forwarding speed of the panel when being machined by the hogging tool. A possible tool life of the hogging tool having the above-men-

tioned features may be at least well above 1 million meters of panel edge being worked, even proven to be above 1.5 million meters of panel edge being worked, and possibly up to or more than 2 million meters of panel edge being worked.

[0011] According to a preferred embodiment and angular inclination of the at least one cutting edge

- the at least one cutting edge is extending along the peripheral circumference and forms an angle with a rotational axis of the hogging tool, when viewed in a direction from the axially oriented surface, and
- said angle being formed with the rotational axis having a value of at least minus 0 degrees, possibly between plus 5 and plus 30 degrees, preferably between plus 10 degrees and plus 20 degrees.

[0012] The object may also be obtained by a second aspect of the invention being a hogging tool provided with

- at least one chip breaking cutting edge extending along the circumference of the hogging tool and at least one chip cutting edge extending along the axially oriented surface, said cutting edges along the axially oriented surface being intended for working the edge of the wooden panel, and
- where the cutting edges are divided into at least one first cutting edge and one second cutting edge,
- where the radial extension of the at least one first cutting edge is less than the radial extension of the at least one second cutting edge,
- said at least one first cutting edge being intended for at least pre-working along at least the circumference of the hogging tool, and
- said at least one second cutting edge being intended for at least finishing working along the axial surface of the hogging tool, and
- where the a number of second cutting edges is at least only half the a number of first cutting edges.

[0013] A limited number of second cutting edges have also proven to decrease the roughness of the micro-structure of the surface of the edge of the panel. As mentioned above, in the present context, micro-structure signifies the often rippled surface occurring after working of the edge. The rippled structure is often called cutting-marks and is formed by one or more cutting edges passing the panel edge at intervals being dependent on the rotational speed of the hogging tool, on the plurality of cutting edges of the hogging tool, on the diameter of the hogging tool and on the linear forwarding speed of the panel when being machined by the hogging tool. A possible tool life of the hogging tool having the above-mentioned features may be at least well above 1 million meters of panel edge being worked, even proven to be above 1.5 million meters of panel edge being worked, and possibly up to or more than 2 million meters of panel edge being worked.

[0014] According to possible numbers of the two different at least one cutting edges, the number of second cutting edges is less than half the number of first cutting edges, or the number of second cutting edges is only a quarter of the number of first cutting edges, or the number of second cutting edges is four and where the number of first cutting edges is at least eight.

[0015] The objects may also be obtained by a third aspect of the invention being a hogging tool provided with

- at least one first cutting edge extending along an axially oriented surface of the hogging tool and at least one second chip cutting edge also extending along an axially oriented surface, said cutting edges being intended for working the edge of the wooden panel, and
- where the radial extension of the at least one first cutting edge is less than the radial extension of the at least one second cutting edge,
- said at least one first cutting edge being intended for pre-working along at least the circumference of the hogging tool,
- said at least one second cutting edge being intended for finishing working along the axial surface of the hogging tool,
- where the at least one first cutting edge extends from the circumference of the hogging tool and along the axial surface of the hogging tool, and
- where also the at least one second cutting edge extends from the circumference of the hogging tool and along the axial surface of the hogging tool.

[0016] A division into at least one first cutting edge and at least one second cutting edge and where the at least one second cutting edge constitutes a cutting edge for finishing of the working of the panel edge, said cutting edge extending from the circumference of the hogging tool and along the axially oriented surface has also proven to decrease the roughness of the micro structure of the surface of the edge of the panel. As mentioned above, in the present context, micro-structure signifies the often rippled surface occurring after working of the edge. The rippled structure is often called cutting marks and is formed by one or more cutting edges passing the panel edge at intervals being dependent on the rotational speed of the hogging tool, on the plurality of cutting edges of the hogging tool, on the diameter of the hogging tool and on the linear forwarding speed of the panel when being machined by the hogging tool. A possible tool life of the hogging tool having the above-mentioned features may be at least well above 1 million meters of panel edge being worked, even proven to be above 1.5 million meters of panel edge being worked, and possibly up to or more than 2 million meters of panel edge being worked.

[0017] According to possible numbers of the two different at least one cutting edges, the number of second cutting edges is less than half the number of first cutting edges, or the number of second cutting edges is only a

quarter of the number of first cutting edges, or the number of second cutting edges is four and where the number of first cutting edges is at least eight.

[0018] According to a methodological aspect of the invention, the invention relates to a method for manufacturing panels having an edge to be milled, said method comprising

- providing a rotating hogging tool according to the invention and having at least one first cutting edge Intended for pre-working and at least one second cutting edge intended for finishing of the working of the panel edge,
- rotating said hogging tool around a rotational axis with said at least first cutting edge and said at least second cutting edge extending along a circumference of the hogging tool and
- with the at least first cutting edge being directed radially outwards in relation to the rotational axis and said at least one second cutting edge being directed axially in relation to the rotational axis,
- rotating said hogging tool with a chosen rotational speed, said rotational speed being chosen based on a radial extension of the at least one second cutting edge along the axially direction,
- establishing a mutual displacement of a panel in relation to a direction being perpendicular to the rotational axis of the hogging tool so that the at least first cutting edge engages a top surface of the panel and so that the at least second cutting edge engages an edge of the panel,
- said mutual displacement of the panel in relation of the rotational axis being performed at a displacement speed being chosen based on the rotational speed of the hogging tool.

[0019] A method as described above results in a very high precision of the milled edge of the panel. As a result, the micro-structure of rippled structure often referred to as cutting marks and being formed by the one or more cutting edges passing the panel edge at intervals being dependent on the rotational speed of the hogging tool, on the plurality of cutting edges of the hogging tool, on the diameter of the hogging tool and on the linear forwarding speed of the panel when being machined by the hogging tool, is decreased considerably.

[0020] According to a use of the hogging tool according to the invention, the invention furthermore relates to an apparatus for manufacturing panels having an edge to be milled, said apparatus comprising

- a rotating hogging tool according to the invention and having at least one first cutting edge intended for pre-working and at least one second cutting edge intended for finishing,
- said at least first cutting edge and said at least second cutting edge extending along a circumference of the hogging tool being mounted to a rotational axis of the apparatus, and
- with the at least first cutting edge being directed radially outwards in relation to the rotational axis and said at least one second cutting edge being directed axially in relation to the rotational axis,
- means for controlling a rotational speed of the rotational axis and means for controlling a displacement of support for a panel past the hogging tool being mounted to the rotational axis,
- means for controlling the speed of displacement of the support for the panel past the hogging tool mounted to the rotational axis and based on the rotational speed of the rotational axis.

[0021] An apparatus as described above using a hogging tool as described earlier results in a very high precision of the milled edge of the panel. An apparatus as described above results in a very high precision of the milled edge of the panel. The micro-structure of rippled structure often referred to as cutting marks and being formed by the one or more cutting edges passing the panel edge at intervals being dependent on the rotational speed of the hogging tool, on the plurality of cutting edges of the hogging tool, on the diameter of the hogging tool and on the linear forwarding speed of the panel when being machined by the hogging tool, is decreased considerably.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The invention will hereafter be described with reference to the drawings, where:

Fig. 1 is a perspective view of an embodiment of a hogging tool according to the Invention,
Fig. 2 is a plane view of different cutting edges of the hogging tool, and
Fig. 3 is a plane view of details of the cutting edges and of chip removal channels of the hogging tool.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Fig. 1 is perspective view of a hogging tool incorporating three different aspects of the invention. The hogging tool has a body 1 with a circumference 2 and an axially oriented surface 3. A hole 4 is provided in the central part of the body 1 of the hogging tool for mounting the hogging tool to a spindle (not shown) of a double end tenoner. During working, the circumference 2 is intended for facing a top surface of a panel being milled, and during working, the axially oriented surface 3 is intended for facing the edge of the panel being milled, which edge is to be machined for obtaining a high surface quality.

[0024] A first aspect relates to the angles α,β,γ formed by the cutting edges in relation to a radius R of the hogging tool. The first aspect is better illustrated in Fig. 2 and therefore reference is made to Fig. 2.

[0025] A second aspect relates to at least one, prefer-

ably a plurality of cutting edges, each one belonging to a certain set of cutting edges. The plurality of cutting edges in the embodiment illustrated is twenty-four along the circumference 2 of a hogging tool, said hogging tool having a largest diameter D between 150 mm and 300 mm, possibly a largest diameter D between 220 mm and 260 mm, possibly a largest diameter of 250 mm. The number of cutting edges is divided into two different sets of cutting edges.

[0026] At least one of a first set of cutting edges 5,6 constitutes pre-working cutting edges. The pre-working cutting edges 5 are further divided into at least one cutting edge of a circumferential set of cutting edges 5 and at least one cutting edge of an axial set of cutting edges 6. The circumferential set of cutting edges 5 is intended for primarily cutting along the circumference 2 of the hogging tool, and the axial set of cutting edges 6 is intended for primarily cutting along the axially oriented surface 3 of the hogging tool.

[0027] The circumferential set of cutting edges 5 has a cutting edge primarily oriented along the circumference 2 of the hogging tool. The circumferential set of cutting edges 5 is intended for initiating the formation of chip from the panel during working. The number of circumferential cutting edges 5 is twelve, said circumferential cutting edges being distributed along the circumference 2 as every second cutting edge of the total of twenty-four cutting edges.

[0028] The axial set of cutting edges 6 has a cutting edge primarily oriented along the axially oriented surface 3 of the hogging tool. The axial set of cutting edges 6 is intended for pre-working the edge of the panel during working. The number of axial cutting edges 6 is eight being distributed along the circumference as every second cutting edge of the total of twenty-four cutting edges, apart from four times along the circumference, where the axial cutting edges 6 are substituted by a cutting edge being part of a second set of cutting edges (see description below).

[0029] At least one of the second set of cutting edges 7 constitutes cutting edges for finishing. The cutting edges 7 for finishing, which constitute the second set of cutting edges, are intended for only cutting along the axial surface 3 of the of the hogging tool.

[0030] The second set of cutting edges 7 for finishing has a cutting edge only oriented along the axially oriented surface 2 of the hogging tool. The second set of cutting edges 7 for finishing is Intended for finishing the edge of the panel during working.

[0031] The second set of cutting edges 7 for finishing forms an angle y of between at least minus 5 degrees, possibly between minus 5 and minus 45 degrees, preferably between minus 5 degrees and minus 25 degrees, in the embodiment shown forming an angle of minus 20 degrees with radii R of the hogging tool. The number of edges 7 for finishing is four being distributed along the circumference as every sixth cutting edge of the total of twenty-four cutting edges.

[0032] The total number of cutting edges may be different depending on the diameter D of the hogging tool and depending on the material from which the panel to be milled is made. The relative number of circumferential pre-working cutting edges, of axial pre-working cutting edges and of cutting edges for finishing, respectively, may be different depending on the material from which the panel to be milled is made.

[0033] Thus, panels being made of a more durable material may need more circumferential cutting edges compared to the number of axial cutting edges, e.g. possibly sixteen circumferential pre-working cutting edges and only four axial pre-working cutting edges. Panels being made of a softer material may need less circumferential cutting edges compared to the number of axial cutting edges, e.g. possibly only eight circumferential pre-working cutting edges and twelve axial pre-working cutting edges.

[0034] The total number of working edges 7 for finishing is determined solely by the diameter D of the hogging tool, by the intended rotational speed of the hogging tool and by the intended linear forwarding speed of the panel being milled. The number of cutting edges 7 for finishing, i.e. the number of cutting edges of the second set of cutting edges, is thus always limited, compared to the number of circumferential cutting edges 5 and axial cutting edges 6, i.e. compared to the number of cutting edges of the first set of cutting edges.

[0035] Fig. 2 is a plane view of a section of the embodiment of the hogging tool shown in fig. 1. The section shows two pre-working circumferential cutting edges 5, one pre-working axial cutting edge 6 and one cutting edge 7 for finishing. The different cutting edges each form different angles α,β,γ with radii R of the hogging tool.

[0036] The circumferential cutting edges 5 of the first set of cutting edges form an angle α of between plus 20 degrees (+20°) and minus 10 degrees (-10°) with radii R of the hogging tool, preferably forming an angle between plus 10 degrees (+10°) and minus 5 degrees (-5°) with radii R of the hogging tool.

[0037] The axial cutting edges of the first set of cutting edges form an angle β of between minus 5 degrees (-5°) and plus 30 degrees (+30°) with radii R of the hogging tool, preferably forming an angle between minus 15 degrees (-15°) and minus 25 degrees (-25°) degrees with radii R of the hogging tool.

[0038] The second set of cutting edges for finishing forms an angle γ of at least minus 5 degrees, possibly between minus 5 and minus 45 degrees, preferably between minus 5 degrees and minus 25 degrees, in the embodiment shown forming an angle of minus 20 degrees with radii R of the hogging tool.

[0039] Fig. 3 is a plane view of cutting edges 5,6 of the first set of cutting edges. Axial cutting edges 6 are shown to the right and to the left, and a circumferential cutting edge 5 is shown in the middle. Chip removal channels 8,9 are shown In conjunction with each of the cutting edges.

[0040] The chip removal channels 8 of the circumferential cutting edges 5 lie primarily in the circumference 2 of the hogging tool and converge, within the circumference 2 of the hogging tool, from the axially oriented surface 3 to a surface 11 opposite the axially oriented surface 3 of the hogging tool (see also fig. 1). The circumferential cutting edges 5 form an angle θ of at least 0 degrees, possibly between plus 5 degrees and plus 30 degrees with a rotational axis A of the hogging tool, preferably forming an angle of plus 15 degrees with the rotational axis A of the hogging tool.

[0041] The chip removal channels 9 of the axial cutting edges 6 lie primarily in the axially oriented surface 3 of the hogging tool and extend within the body 1 of the hogging tool, along the axially oriented surface 3 and towards the circumference 2 of the hogging tool (see also fig. 1), The axial cutting edges 6 form an angle φ of at least 0 degrees, possibly between plus 5 degrees and plus 30 degrees with a rotational axis A of the hogging tool, preferably forming an angle of plus 15 degrees with the rotational axis A of the hogging tool.

[0042] The cutting edges 7 for finishing, being part of the second set of cutting edges and chip removal channels 10 In conjunction herewith is not shown In fig. 3, however see fig. 1. The chip removal channels 10 of the cutting edges 7 for finishing are similar to the chip removal channels 9 of the axial cutting edges 6 and lie primarily in the axially oriented surface 3 of the hogging tool and extend within the body 1 of the hogging tool, along the axially oriented surface 3 and towards the circumference 2 of the hogging tool (see also fig. 1).

[0043] The cutting edges 7 for finishing form an angle ρ of at least 0 degrees, possibly between plus 5 degrees and plus 30 degrees with a rotational axis A of the hogging tool, preferably forming an angle of plus 15 degrees with the rotational axis A of the hogging tool.

[0044] A third aspect of the invention relates to the radial extension of the pre-working axial cutting edges 6 of the first set of cutting edges in comparison with the radial extension of the cutting edges 7 for finishing, being part of the second set of cutting edges.

[0045] The axial cutting edges 6 extend from the circumference 2 of the hogging tool and along the axially oriented surface 3. Also, the cutting edges 7 for finishing extend from the circumference 2 of the hogging tool and along the axially oriented surface 3. However, the cutting edges 7 for finishing extend further along the axially oriented surface 3 than the axial cutting edges 6.

[0046] The cutting edges 7 for finishing extend at least double the distance along the axially oriented surface 3 than the axial cutting edges 6. The difference between the extension of the cutting edges 7 for finishing and the axial cutting edges 6 is determined empirically depending on the thickness of the panel to be milled, and depending on the durability, i.e. hard or soft, of the material which the panel to be milled is made of. The difference between the extension of the cutting edges 7 for finishing and the axial cutting edges 6, respectively may also be determined empirically depending on the diameter D of the hogging tool, and depending on the intended rotational speed of the hogging tool and depending on the intended linear forwarding speed of the panel to be milled.

[0047] In the embodiment shown, the diameter D of the hogging tool is approximately 250 mm, the length L6 of the axial cutting edges 6 is approximately 6 mm, and the length L7 of the cutting edges 7 for finishing is approximately 13 mm. The length L6,L7 of the cutting edges 6,7 is the linear extension along the cutting edge as such, and is not the linear extension along a radius of the hogging tool.

[0048] The invention is described with reference to a specific embodiment of the invention. However, different embodiment may be envisaged within the cope of protection as defined in the claims. Thus, the number of the different cutting edges, i.e. the circumferential cutting edges, the axial cutting edges and the cutting edges for finishing may differ absolutely and relatively. Furthermore, the angles, which the different cutting edges form with radii of the hogging tool may differ, and the angles which the chip removal channels form with the axis of rotation may also differ.

Claims

1. A hogging tool for working edges of panels, said hogging tool having a circular circumference and an axially oriented surface, the hogging tool being provided with

   - at least one chip breaking cutting edge extending along the circumference of the hogging tool and at least one chip cutting edge extending along the axially oriented surface, said at least one cutting edge along the axially oriented surface being intended for working the edge of the wooden panel, and
   - where the at least one cutting edge extending along the peripheral circumference form an angle (Υ) with a radius of the hogging tool when viewed in the intended circumferential direction of the hogging tool,
   - said angle (γ) formed with the radius having a value of at least minus 5 degrees, possibly between minus 5 and minus 45 degrees, preferably between minus 5 degrees and minus 25 degrees.

2. A hogging tool according to claim 1, where

   - the at least one cutting edge extending along the peripheral circumference form an angle with a rotational axis of the hogging tool, when viewed In a direction from the axially oriented surface, and
   - said angle formed with the rotational axis hav-

ing a value of at least minus 0 degrees, possibly between plus 5 and plus 30 degrees, preferably between plus 10 degrees and plus 20 degrees.

3. A hogging tool for working edges of wooden panels, said hogging tool having a circular circumference and an axial surface intended for abutting the edge of the wooden panel, the hogging tool being provided with

- at least one chip breaking cutting edge extending along the circumference of the hogging tool and at least one chip cutting edge extending along the axially oriented surface, said at least one cutting edge along the axially oriented surface being intended for working the edge of the wooden panel, and
- where the cutting edges are divided into at least one first cutting edge and one second cutting edge,
- where the radial extension of the at least one first cutting edge is less than the radial extension of the at least one second cutting edge,
- said at least one first cutting edge intended for at least pre-working along at least the circumference of the hogging tool, and
- said at least one second cutting edge intended for at least finishing working along the axial surface of the hogging tool, and
- where a number of second cutting edges is at least only half a number of first cutting edges.

4. A hogging tool according to claim 3, where the number of second cutting edges is less than half the number of first cutting edges.

5. A hogging tool according to claim 3, where the number of second cutting edges is only a quarter of the number of first cutting edges.

6. A hogging tool according to claim 3, where the number of second cutting edges is four and where the number of first cutting edges is at last eight.

7. A hogging tool according to any of claims 3-6, where the at least one second cutting edge extends from the circumference of the hogging tool and along the axial surface of the hogging tool.

8. A hogging tool according to any of claims 3-7, where the at least one second cutting edge extends from the circumference of the hogging tool and along the axially oriented surface of the hogging tool forming an angle with a radius of the hogging tool, when viewed in the Intended circumferential direction of the hogging tool, said angle having a value of minimum minus 5 degrees, possibly between minus 5 and plus 25 degrees, preferably between minus 5 degrees and plus 5 degrees.

9. A hogging tool according to any of claims 3-8, where the at least one second cutting edge extends from the axially oriented surface of the hogging tool and along the circumference of the hogging tool forming an angle with a rotational axis of the hogging tool, when viewed in a direction from the axially oriented surface of the hogging tool, said angle having a value of at least 0 degrees, possibly between plus 5 and plus 30 degrees, preferably between plus 10 degrees and plus 20 degrees.

10. A hogging tool according to any of claims 3-9, where the at least one first cutting edge are divided into at least a number of circumferential cutting edges and an a number of axial cutting edges, said number of circumferential cutting edges intended for primarily cutting along a circumference of the hogging tool, and said number of axial cutting edges being intended for primarily cutting along the axial surface of the hogging tool.

11. A hogging tool according to claim 10, where the number of circumferential set of cutting edges is at least the same as the number of axial set of cutting edges.

12. A hogging tool according to claim 10, where the number of circumferential set of cutting is at least one and half the number of axial set of cutting edges.

13. A hogging tool according to claim 10, where the number of circumferential set of cutting is at least the double of the number of axial set of cutting edges.

14. A hogging tool according to claim 10, where the number of circumferential set of cutting is eight and the number of axial set of cutting edges is four.

15. A hogging tool for working edges of wooden panels, said hogging tool having a circular circumference and an axial surface intended for abutting the edge of the wooden panel, the hogging tool being provided with

- at least one first chip cutting edge extending along an axially oriented surface of the hogging tool and at least one second chip cutting edge also extending along an axially oriented surface, said cutting edges being intended for working the edge of the wooden panel, and
- where the radial extension of the at least one first cutting edge is less than the radial extension of the at least one second cutting edge,
- said at least one first cutting edge Intended for pre-working along at least the circumference of the hogging tool,

- said at least one second cutting edge intended for finishing working along the axial surface of the hogging tool,
- where the at least one first cutting edge extends from the circumference of the hogging tool and along the axial surface of the hogging tool, and
- where also the at least one second cutting edge extends from the circumference of the hogging tool and along the axial surface of the hogging tool.

16. A hogging tool according to claim 15, where the number of second cutting edges is less than half the number of first cutting edges.

17. A hogging tool according to claim 15, where the number of second cutting edges is only a quarter of the number of first cutting edges.

18. A hogging tool according to claim 15, where the number of second cutting edges is four and where the number of first cutting edges is at last eight.

19. A method for manufacturing panels having an edge to be milled, said method comprising

- providing a rotating hogging tool having at least one first cutting edge intended for pre-working and at least one second cutting edge intended for finishing,
- rotating said hogging tool according to any of claims 1-18 around a rotational axis with said at least first cutting edge and said at least second cutting edge extending along a circumference of the hogging tool and
- with the at least first cutting edge being directed radially outwards in relation to the rotational axis and said at least one second cutting edge being directed axially in relation to the rotational axis,
- rotating said hogging tool with a chosen rotational speed, said rotational speed being chosen based on a radial extension of the at least one second cutting edge along the axially direction,
- establishing a mutual displacement of a panel In relation to a direction being perpendicular to the rotational axis of the hogging tool so that the at least first cutting edge engages a top surface of the panel and so that the at least second cutting edge engages an edge of the panel,
- said mutual displacement of the panel in relation of the rotational axis being performed at a displacement speed being chosen based on the rotational speed of the hogging tool.

20. An apparatus for manufacturing panels having an edge to be milled, said apparatus comprising

- a rotating hogging tool according to any of claims 1-18 and having at least one first cutting edge intended for pre-working and at least one second cutting edge intended for finishing,
- said at least first cutting edge and said at least second cutting edge extending along a circumference of the hogging tool being mounted to a rotational axis of the apparatus, and
- with the at least first cutting edge being directed radially outwards in relation to the rotational axis and said at least one second cutting edge being directed axially in relation to the rotational axis,
- means for controlling a rotational speed of the rotational axis and means for controlling a displacement of support for a panel past the hogging tool being mounted to the rotational axis,
- means for controlling the speed of displacement of the support for the panel past the hogging tool mounted to the rotational axis and based on the rotational speed of the rotational axis.

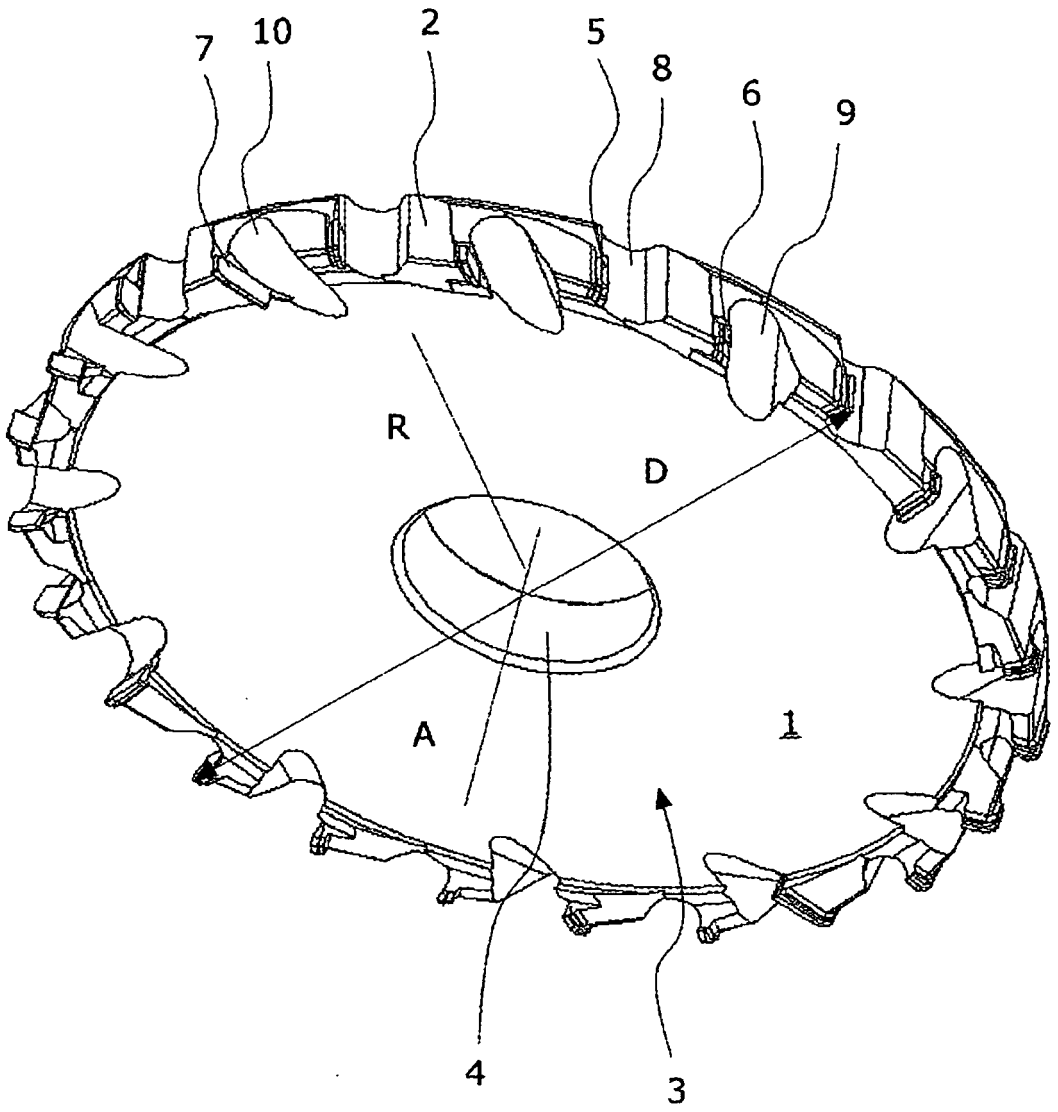

FIG. 1

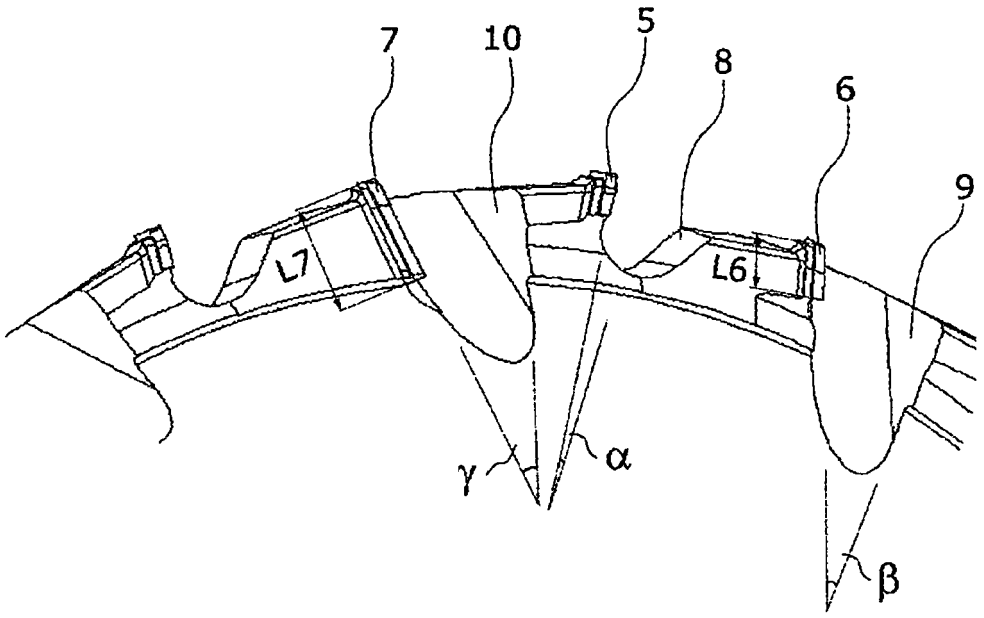

FIG. 2

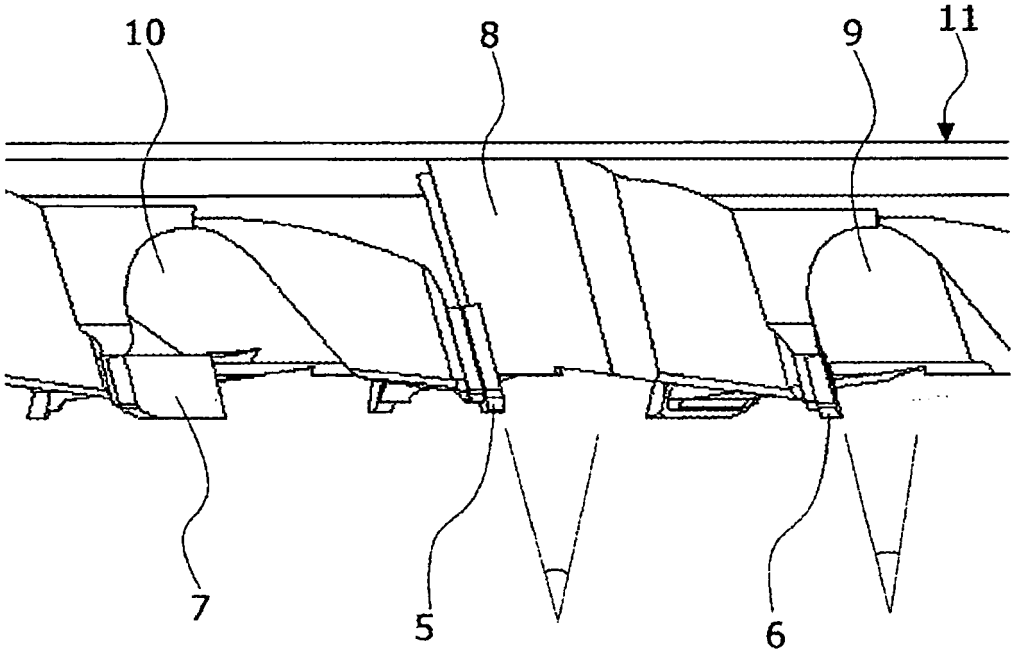

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 1594

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B27G
B27D
B27L
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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
Munich	1 February 2007	Meritano, Luciano

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