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(54) **A device for processing flat workpieces**

(57) The invention is related to a device for processing substantially flat workpieces (1), said device comprising a transport surface (4) for transporting each of the workpieces (1) through the device, and a processing unit (3), comprising of a processing element having an abrasive surface and being movable parallel to the transport surface (4) in order to come into contact with each of the workpieces (1) to be processed, a driving

shaft and a carrier (6) connected thereto for supporting the processing element, the driving shaft being transversally positioned with respect to the carrier (6) and the processing element comprising support members for supporting the abrasive surface, said support members being positioned at an angle of less than 90° with respect to the processing element, by which a multi-sided processing of the workpiece (1) is achieved.

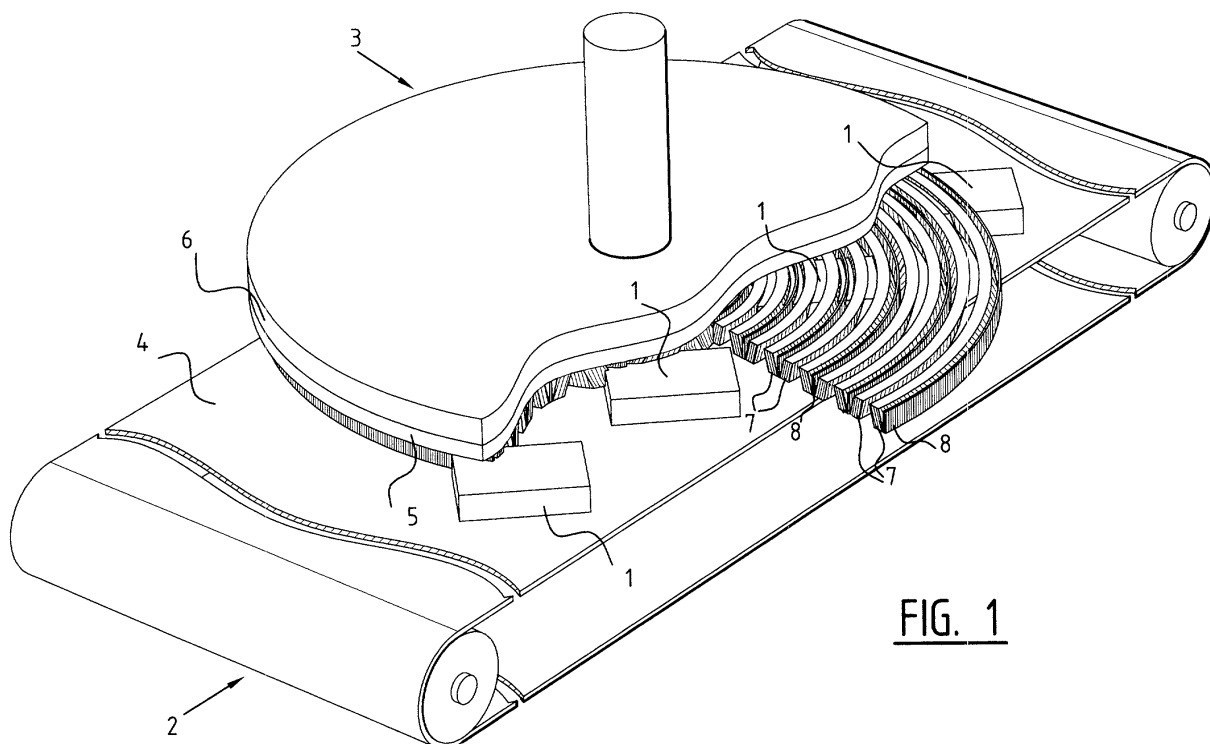


FIG. 1

EP 1 293 292 A1

Description

[0001] The present invention is related to a device for processing substantially flat workpieces, said device comprising a transport surface for transportation through the device of each of the workpieces, and a processing unit, comprising a processing element having an abrasive surface and which is moveable parallel to the transport surface in order to come into contact with each of the workpieces to be processed, a driving shaft and a carrier connected thereto for supporting the processing element, the driving shaft being transversely positioned on the carrier.

[0002] Such a device is known from US 4,704,823.

[0003] In this text, processing is taken to mean, among others, the deburring, grinding and sanding of substantially flat workpieces. Semi-finished products punched or laser-cut from plate material are deburred at the edges or polished on the surface with the aid of the device described above. The device of US 4,704,823 hereto comprises a processing disc which rotates in the horizontal plane under which a workpiece is transported. A drawback of said known device is that the workpiece is processed only on the side which is located parallel to the processing disc.

[0004] Further, from US 5,105,583 a similar device for processing flat workpieces is also known. The processing disc of the device is provided with brush hairs transversely positioned thereon. It is possible to tilt the driving shaft, so that the processing disc will be inclined at a smaller angle with respect to the transport surface. In this event, the brush hairs also stand at an angle that is less than 90° with respect to the transport surface. The effect is a nonuniform pressing force. The drawback with this arrangement is that one disc does not allow a workpiece to be processed uniformly.

[0005] From EP 0 924 031, a brush disc with brush hairs is known in which the brush hairs are directed tangentially in the same direction of rotation as the disc, at an angle which is less than 90° with respect to the disc. Experimentally it was found that the brush hairs quickly have the tendency to bend permanently, thus shortening the life cycle of the brush.

[0006] The object of the present invention is to provide an improved device which is capable of multi-sided processing of substantially flat workpieces, including the removal of the oxide layer on the edge of the plate material as a result of laser cutting.

[0007] The device according to the invention is characterised in that the processing element comprises support members for supporting the abrasive surface, said support members being positioned at an angle of less than 90° with respect to the processing element. By providing the abrasive surface at an inclination with respect to the processing element, it is assured that the workpiece is not only processed on the edges and on either the upper or lower side, but also on the sides, that is, the surfaces at right angles to the upper and lower side.

[0008] According to the invention, the support members are at least radially directed with respect to the driving shaft of the carrier. Experimentally it has been found that when the support members are not tangentially directed, that is to say in the direction of rotation, the abrasive surface has a much longer life cycle. In comparison with the tangentially directed brush hairs, as is the case in EP 0 924 031, a processing element provided with radially, or at least partly radially directed support members is much less susceptible to wear.

[0009] The greatest effect is achieved if the support members are substantially radially directed with respect to the driving shaft.

[0010] The support members are preferably substantially inclined towards and/or away from the driving shaft in order to reinforce the processing effect.

[0011] In a preferred embodiment, the processing element comprises brush hairs as support members. Experimentally it has been found that brush hairs which are not at right angles with respect to the processing element have a high impact on the side of the workpiece, with a sufficient processing result as a consequence.

[0012] In this regard, the brush hairs may be impregnated with abrasive particles or themselves be made of steel, preferably stainless-steel, in order to obtain an abrasive surface.

[0013] The surface of the processing element with support members not positioned at right angles can be combined with already known processing surfaces, such as a web of nonwoven synthetic fibres provided with sanding grains, which material is sold under the name Scotch-Brite, or brush hairs, impregnated with abrasive particles, positioned at right angles with respect to the transport surface. With such a processing element, a further processing of the edges and either the upper or lower surface of the workpieces can be achieved.

[0014] In a further embodiment of the invention, the processing element further comprises brush hairs, placed between the support members at right angles to the processing element, which are preferably made of nylon. Said nylon hairs are provided to press the workpiece against the transport surface in order to prevent it from shooting away.

[0015] If the processing element is formed by at least one flat round disc, while the carrier is capable of being rotationally driven, the multi-sided processing of a workpiece, such as described in US 4,704,823, is assured.

[0016] The diameter of the disc is preferably greater than the width of the transport surface, so that each workpiece will be processed by the abrasive surface of the processing element in at least two directions, regardless of the position of the workpiece on the transport surface.

[0017] The processing element is preferably removably connected to the carrier in order to allow the disc to be replaced in the event of wear of the abrasive surface.

[0018] Finally, the invention is also related to a

processing element for application in a device for processing substantially flat workpieces according to the invention.

[0019] The invention will be further described below with reference to the attached drawings, wherein:

Figure 1 is a perspective, partially sectioned and schematic view of a device according to the invention,

Figure 2 is a detailed view of a processing unit for application in the device of Figure 1, and

Figure 3 is a schematic diagram for elucidating the effect of the invention.

[0020] Figure 1 shows a device for processing flat workpieces 1. The device comprises a conveyor 2 for transporting the workpieces 1 through the device. The conveyor 2 comprises a transport surface 4 on which the workpieces 1 rest during transport through the device. A processing unit 3 is arranged above the conveyor 2 and consists of a rotatable disc 5, parallel to the transport surface 4, with an abrasive surface which contacts each of the workpieces 1 to be processed. In addition, the processing unit 3 comprises a rotationally drivable carrier 6 for supporting the disc 5 in rotation. Instead of one large disc, it is also possible to have a number of smaller and proximately arranged discs as a processing element.

[0021] On the disc 5, rings of radially directed brush hairs 7 have been placed. As can be clearly seen in Figure 2, the brush hairs 7 have various orientations, that is to say, inclined towards and away from the rotational axis. The brush hairs 7 are preferably of stainless-steel. Experiments have shown that stainless-steel brush hairs provide the desired effect, that is to say, a high impact on the side of the workpiece with a sufficient processing result as a consequence. Further, nylon hairs 8 have been placed on the disc 5 between the brush hairs 7 and at right angles to the transport surface 4.

[0022] In Figure 3, the effect of the brush hairs 7 not being placed at right angles with respect to the transport surface 4 is shown. During the passage of a workpiece 1, the tops of the brush hairs 7 will have an impact on the side 9 of said workpiece 1, before being bent aside by the edge 10 of said workpiece 1. Thus, the brush hairs 7 not placed at right angles have a high impact on the side 9 of said workpiece 1, with a removal of the oxide layer resulting from laser-cutting as a consequence.

[0023] Instead of brush hairs 7, it is also possible to place support members of a different kind, not positioned at right angles to the disc, such that the tops thereof are not positioned at right angles to the processing disc 5, while said support members are provided with an abrasive surface. Said abrasive surface can be placed on the support element directly, for example by impregnating the support element with abrasive parti-

cles. It is also possible to have a strip or piece of abrasive material run along each support element. Another example is brush hairs provided with a thickening at the outer end, with which they come into contact with the surface to be processed in order to achieve a wear effect.

[0024] According to the embodiment shown, the carrier 6 is rotationally driven and the processing element follows the rotational movement. Of course the processing element can also carry out a translational movement or a movement of another kind, for example a rotational movement as well as an oscillating movement.

Claims

1. A device for processing substantially flat workpieces, said device comprising a transport surface for transporting each of the workpieces through the device, and a processing unit consisting of a processing element having an abrasive surface and being moveable parallel to the transport surface in order to come into contact with each of the workpieces to be processed, a driving shaft and a carrier connected thereto for supporting the processing element, the driving shaft being transversally positioned with respect to the carrier, **characterised in that** the processing element comprises support members for supporting the abrasive surface, said support members being positioned at an angle of less than 90° with respect to the processing element.
2. A device according to claim 1, in which the support members are directed at least radially with respect to the driving shaft of the carrier.
3. A device according to claim 2, in which the support members are substantially radially directed with respect to the driving shaft of the carrier.
4. A device according to claim 2 or 3, in which the support members are substantially inclined towards and/or away from the driving shaft.
5. A device according to any of the claims 1-4, in which the processing element comprises brush hairs as support members.
6. A device according to claim 5, in which the brush hairs are impregnated with abrasive particles.
7. A device according to claim 5, in which the brush hairs are made of steel, preferably stainless-steel.
8. A device according to any of the claims 1-7, in which the processing element further comprises a web of nonwoven synthetic fibres, provided with sanding grains.

9. A device according to any of the claims 1-8, in which the processing element further comprises brush hairs impregnated with abrasive particles or made of nylon, positioned at right angles to the processing element.

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10. A device according to any of the claims 1-9, in which the processing element is unremovably connected to the carrier.

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11. A processing element for application in a device for processing substantially flat workpieces according to any of the claims 1-10.

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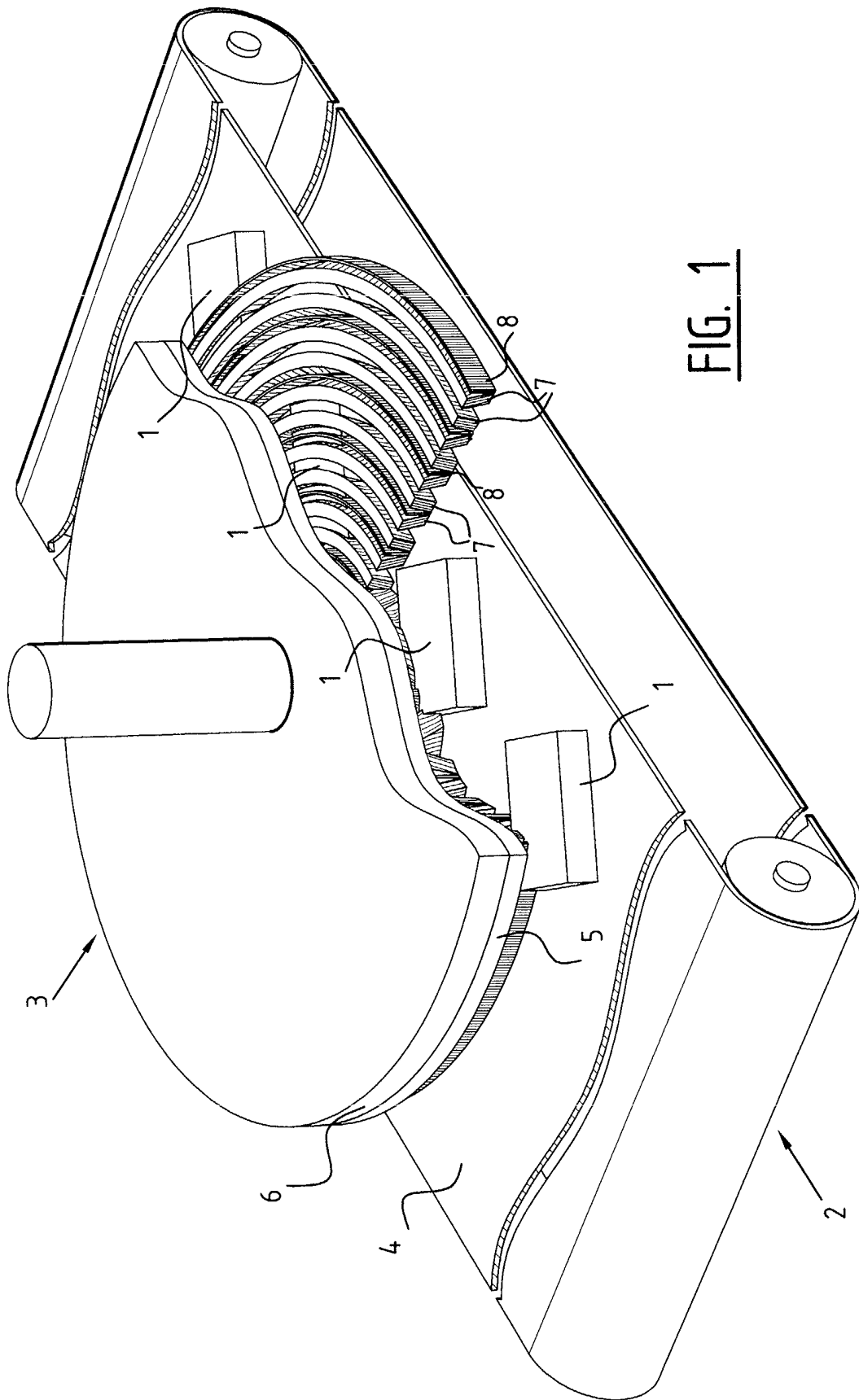
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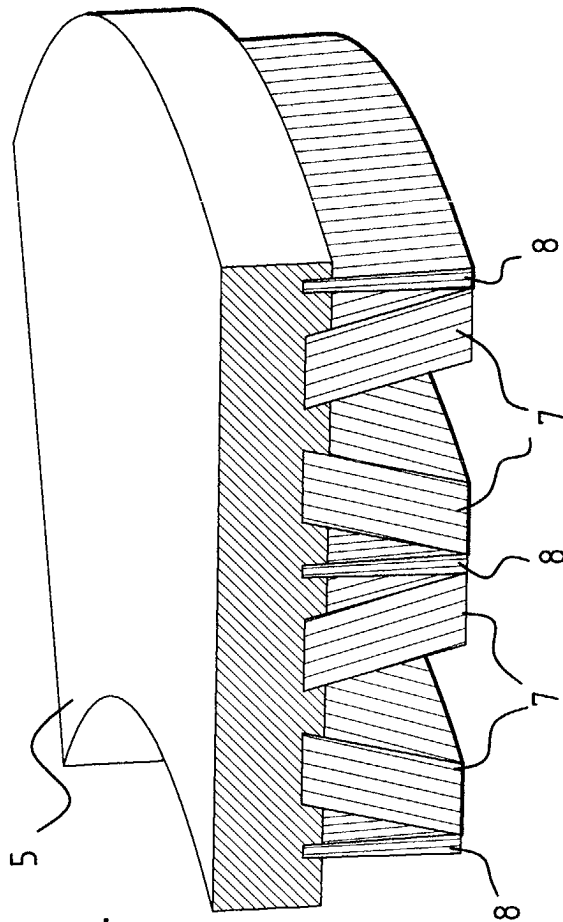


FIG. 2

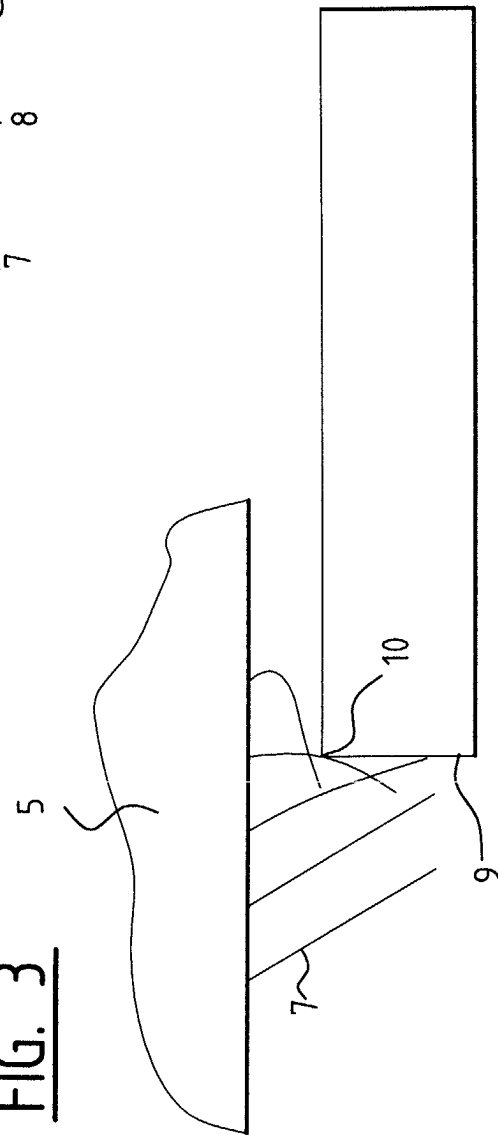


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 02 07 8756

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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D,A	EP 0 924 031 A (BOTECH AG GES FUER BERATUNG UN) 23 June 1999 (1999-06-23) * column 3, line 39 - column 4, line 5; claims 1,2; figures 3-6 *	1-11	
D,A	US 4 704 823 A (STEINBACK CLARENCE I) 10 November 1987 (1987-11-10) * column 6, line 46 - line 60; figure 1 *	1-11	
A	DE 201 02 690 U (MECHANIK CT ERLANGEN GMBH) 17 May 2001 (2001-05-17)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 December 2002	Examiner Eschbach, D
CATEGORY OF CITED DOCUMENTS		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	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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