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(54) **Title:** GRINDING HEAD

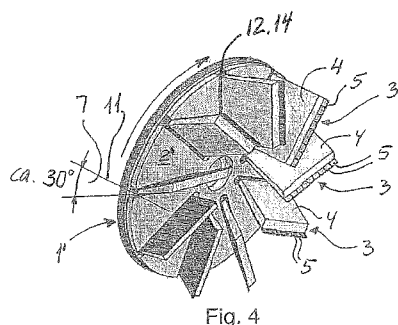


Fig. 4

INVENTION

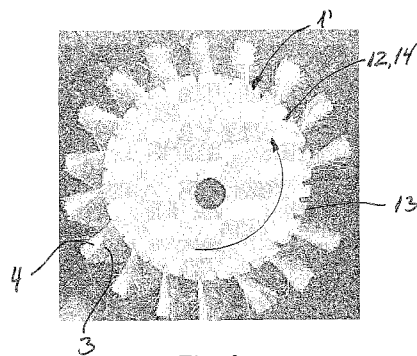


Fig. 8

(57) **Abstract:** Grinding head (1') adapted to rotate about a central axis, having a surface (2') selected between a plane surface and a cylindrical surface, and which is provided with retainer grooves for edge profile parts (14) of a number of abrasive paper members (3) with associated support brushes (4), wherein the abrasive paper members (3) are mounted at an angle of 20-40°, preferably about 30°, directed obliquely forward in the direction of rotation of the plane surface (2') and the tangential plane of the cylindrical surface, respectively, wherein the retainer grooves (12) for the edge profile parts (14) of the abrasive paper members (3) extends obliquely rearwards in the direction of rotation of the plane surface (2') at an angle (8) of 3-10° relative to a radial extension, or wherein the retainer grooves (12) of the edge profile parts (14) of the abrasive paper members (3) extend obliquely rearwards in the direction of rotation of the cylindrical surface (13) at an angle of 3-10° relative to an axially parallel generatrix of the cylindrical surface (13). In a simple way is hereby readily achieved a more optimal abrading of particularly outer side edges and edge areas of plate-shaped items.



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TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, **Published:**  
ML, MR, NE, SN, TD, TG).

— *with international search report (Art. 21(3))*

## GRINDING HEAD

### Field of the Invention

The present invention concerns a grinding head of the kind indicated in the preamble of claim 1.

### 5 Background of the Invention

EP 1633530 B1 describes a grinding head or an abrading disc of the kind indicated in the preamble of claim 1, intended for being rotated about a central axis. The abrading disc has a surface with radial retainer grooves for end parts of abrasive paper members with associated support brushes with a radial extension over the greater part of radius  
10 of the surface which has increasing height inwardly from the periphery.

The abrading disc is designed such that the surface has increasing height inwardly from a periphery of the surface, and so that the abrasive paper members have approximately radial extension across the greater part of radius of the surface. Hereby  
15 is ensured a stable and uniform grinding which is suited for grinding concave, convex and plane surfaces and recesses/countersinks.

In order to achieve a more stable and good grinding of a surface, the abrasive paper members are distributed diametrically and evenly on the surface of the grinding disc  
20 such that the abrasive paper members here cover the greater part of the radius of the surface, entailing that the greater part of the grinding disc surface can be used for counter grinding.

That the surface has increasing height inwards from the periphery of the surface causes  
25 the grinding wheel to be felt very stable as it is the centre part of the grinding disc which strikes the surface to be ground first. Around the centre part of the grinding wheel there will be no large lateral forces pulling the grinding disc across the surface, and therefore it will be easy to hold the grinding disc against the surface.

### Object of the Invention

30 On this background, the purpose of the invention is to indicate a further improved grinding head which makes it easier to achieve a more optimal grinding particularly of

side edges and edge areas of plate-shaped items, e.g. blockboard and furniture doors, or corresponding plate-shaped items.

### **Description of the Invention**

- 5 The grinding head according to the invention is peculiar in that the abrasive paper members are mounted at an angle of 20-40°, preferably about 30°, directed obliquely forward in the direction of rotation of the plane surface and the tangential plane of the cylindrical surface, respectively. In a simple way is hereby readily achieved a more optimal abrading of particularly side edges and edge areas of plate-shaped items.
- 10 For example, it is to be emphasised that grinding of outer edges of laser-cut items of metal sheeting can be optimised by the oblique angle directed forward in the direction of rotation, further facilitating the making of a slight chamfer or rounding of outer top side edges of laser-cut items of metal sheeting.
- 15 The grinding head according to the invention is designed such that the retainer grooves for the edge profile parts of the abrasive paper members extend obliquely rearwards in the direction of rotation of the plane surface at an angle of 3-10° relative to a radial extension.
- 20 Alternatively, the grinding head according to the invention is designed such that the retainer grooves for the edge profile parts of the abrasive paper members extend obliquely rearwards in direction of rotation of the cylindrical surface at an angle of 3-10° relative to an axially parallel generatrix of the cylindrical surface.
- 25 The grinding head according to the invention may advantageously be designed such that the plane surface between the retainer grooves for the edge profile parts of the abrasive paper members is designed with radial suction apertures, and that the grinding head includes an enclosing housing which is provided along its periphery with an annular lip seal.
- 30 The grinding head according to the invention may further suitably be designed such that the lip seal is constituted by brushes made of an electrically conducting material, e.g. carbon fibre brushes.

With the object of further optimising the grinding head according to the invention, it can be designed such that side edges of the radial suction apertures have an inclined course downwards in the direction of rotation such that rotation of the plane surface can cause a sucking effect by itself.

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Suitably, the grinding head according to the invention is designed so that the support brushes consist of relatively soft brushes of pig's bristles.

10

Alternatively, the grinding head according to the invention can be designed so that the support brushes consist of soft horsehair brushes.

Or the grinding head according to the invention can be designed so that the support brushes consist of stiff brushes of Tampico fibres.

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It will furthermore be possible, with the object of optimisation for specific tasks, that the support brushes consist of a suitable mixture of pig's bristles, horsehair and Tampico fibres.

### **Description of the Drawing**

20

The invention is explained more closely in the following with reference to the drawing, on which:

Fig. 1 shows a plan view of a prior art abrading disc; and

25

Fig. 2 shows a plan view in section of the prior art abrasive disc according to Fig. 1;

Fig. 3 shows a plan view of an embodiment of a grinding head according to the invention, as shown during grinding of a plate item;

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Fig. 4 shows a perspective view of the grinding head according to the invention shown in Fig. 3 for illustrating an oblique angular position of the abrasive paper members;

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Fig. 5 shows a perspective view of the grinding head according to the invention shown in Fig. 3 for illustrating an angular displacement relative to radial of the abrasive paper members;

Fig. 6 shows a plan view of a prior art cylindrical grinding head with longitudinal retainer grooves for radial abrasive paper members;

Fig. 7 shows a plan view in detail of the grinding head shown in Fig. 6;

5

Fig. 8 shows a perspective view of an embodiment of a cylindrical grinding head according to the invention where the abrasive paper members are angled forward in the direction of rotation relative to a tangent plane of cylindrical surface of the grinding head;

10

Fig. 9 shows a perspective view in detail of the grinding head shown in Fig. 8;

15

Fig. 10 shows a perspective view of a modified embodiment of a grinding head according to the invention where the plane grinding head includes an enclosing housing which is provided along its periphery with an annular lip seal; and

Fig. 11 shows a perspective view of the grinding head shown in Fig. 10, as seen from its outer side.

## 20 Detailed Description of Embodiments of the Invention

Fig. 1 shows a prior art grinding head 1 e.g. as in EP 1 633 530 B1, having a surface 2 to which a number of abrasive paper members 3 are fastened, and having a radial extension across the greater part of the surface 2. Behind each abrasive paper member 3, the grinding disc 1 is provided with a row of support brushes 4.

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The number of abrasive paper members 3 and support brushes 4 can be arbitrary. In the shown prior art embodiment of a grinding head 1, there are eight radial abrasive paper members with associated single rows of support brushes 4.

30

Fig. 2 shows the prior art grinding head 1 with two abrasive paper members 3 which are slit such that the abrasive paper members 3 are divided into a number of abrading strips 5. The abrasive paper members 3 are fastened in a surface of the grinding head 1. The surface 2 has increasing height inwards from its periphery 6. Behind the

abrasive paper members 3, support brushes 4 are provided, with uniform height such that the polishing pressure becomes uniform in height.

5 Figs. 3-5 show a preferred embodiment of a grinding head 1' according to the invention where the grinding head 1' in Fig. 3 during rotation is moved towards the right side of the drawing, along an outer side edge 9 of a plate-shaped item 10 to be abraded.

10 Fig. 4 illustrates that the abrasive paper members 3 with associated support brushes 4 are mounted in retainer grooves 12 in the grinding head 1' at an oblique angle 7 of 20-40°, preferably about 30°, directed forward in the direction of rotation of a plane surface 2'. It is to be mentioned that the oblique angle 7 is measured in relation to a generatrix 11 standing perpendicularly to the periphery of the grinding head 1'.

15 Fig. 5 illustrates that the retainer grooves 12 for the edge profile parts 14 of the abrasive paper members 3 extend obliquely rearwards in the direction of rotation of the plane surface 2' at an angle 8 of 3-10° relative to a radial extension, i.e. the abrasive paper members 3 are angularly displaced relative to a central axis.

20 Fig. 6 shows a prior art cylindrical grinding head 19 e.g. as in EP 1 509 365 B1, having longitudinal retainer grooves 20 for receiving edge profile parts 21 of abrasive paper members 3 with associated support brushes 4, whereas Fig. 7 shows a detail view of retainer grooves 20 and edge profile parts 21, respectively, for reception in retainer grooves 20.

25 Fig. 8 shows a modified embodiment of a grinding head 1' with a large number of retainer grooves 12 for edge profile parts 14, where the retainer grooves 12 have an inclined orientation of 20-40°, preferably about 30°, forward in the direction of rotation as well as the retainer grooves 12 for the edge profile parts 14 of the abrasive  
30 paper members 3 extend obliquely rearwards in the direction of rotation of the cylindrical surface 13 at an angle of 3-10° relative to the tangent plane of the cylindrical surface 13.

Figs. 10 and 11 show a grinding head 1'' with a plane surface 2' which between the  
retainer grooves 12 for the abrasive paper members 3 and the support brushes 4,  
respectively, is designed with radial suction apertures 15, and which includes an  
enclosing housing 16 which is provided along its periphery with an annular lip seal 17  
5 and an external suction branch 22. This is intended for connection with a hose for a  
suction cleaner or a central suction system.

The lip seal 7 is constituted by brushes that are made of an electrically conducting  
material, e.g. carbon fibre brushes 18, such that static electricity can be earthed thereby  
10 via the carbon fibre brushes 17, of course on the condition that the grinding head 1''  
with the carbon fibre brushes 17 as such is provided with a potential equalisation  
connection (earth connection).

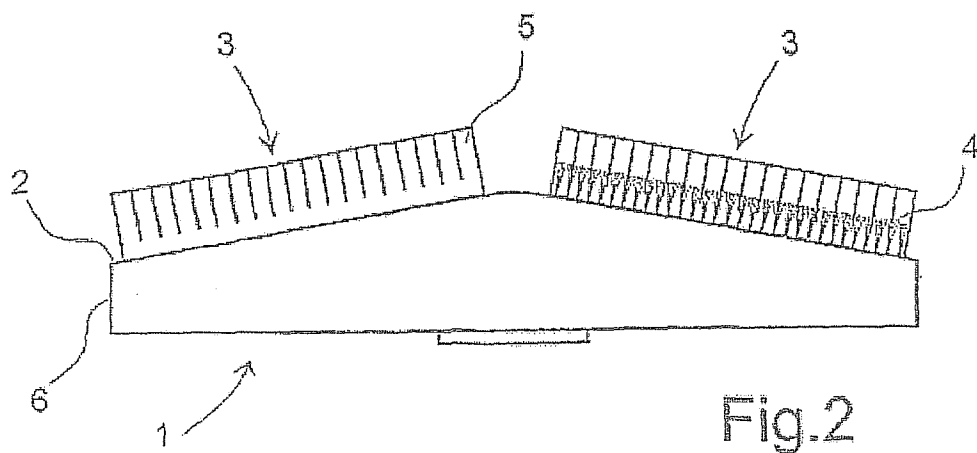
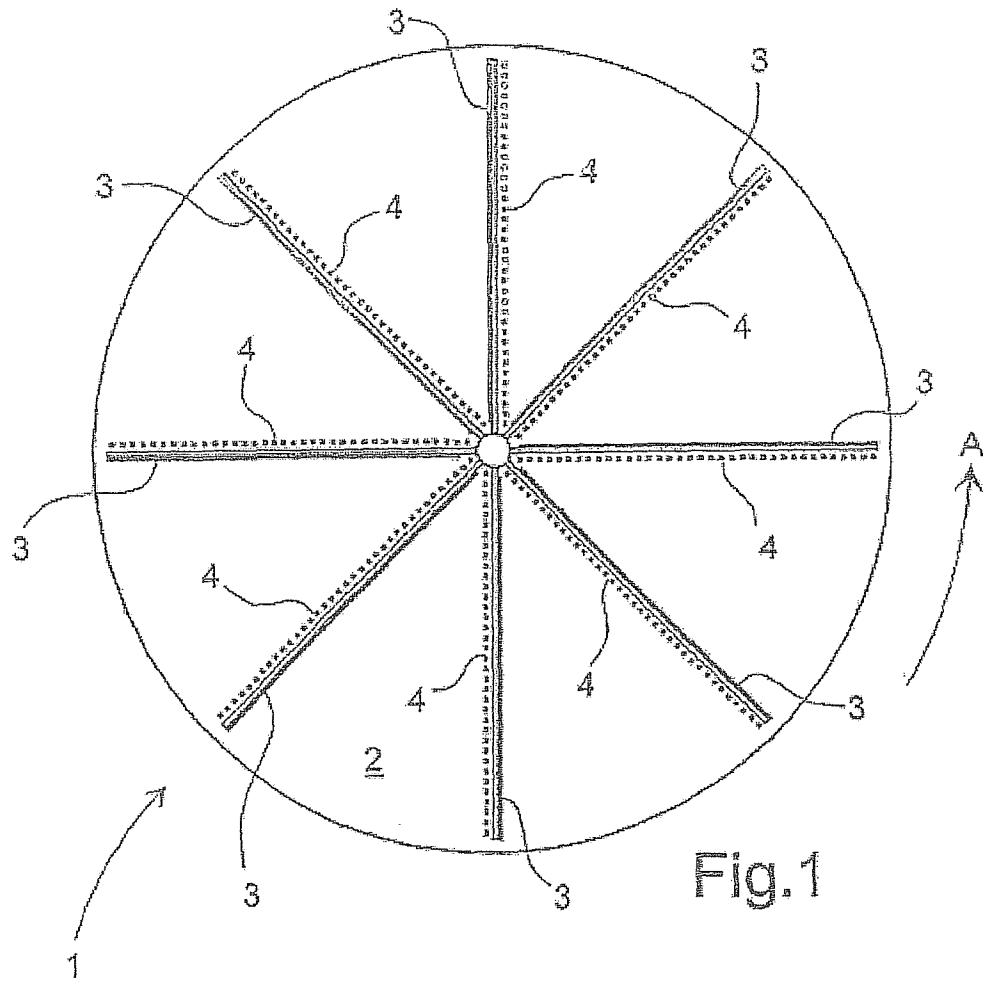
Side edges 19 of the radial suction apertures 15 have an inclined course downwards  
15 against lower sharp edges in the direction of rotation such that rotation of the plane  
surface 2' only can cause a substantial sucking effect by itself.

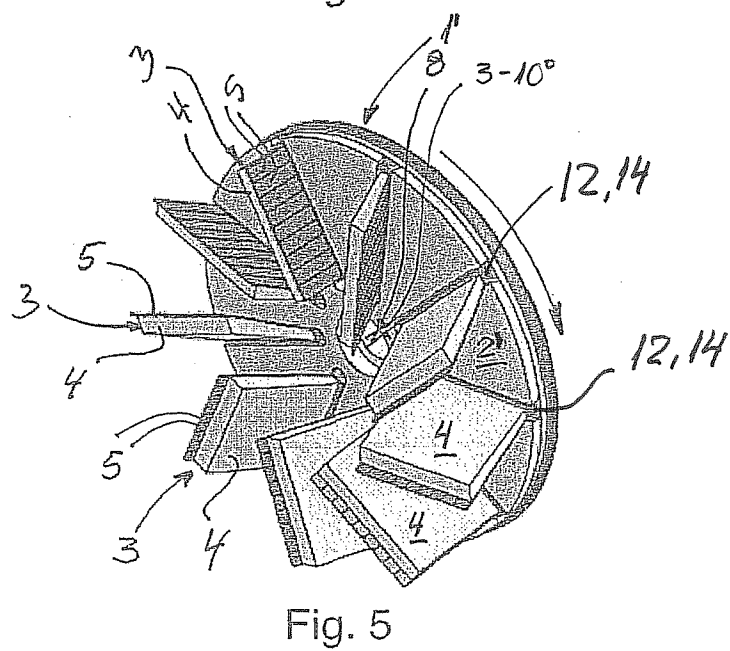
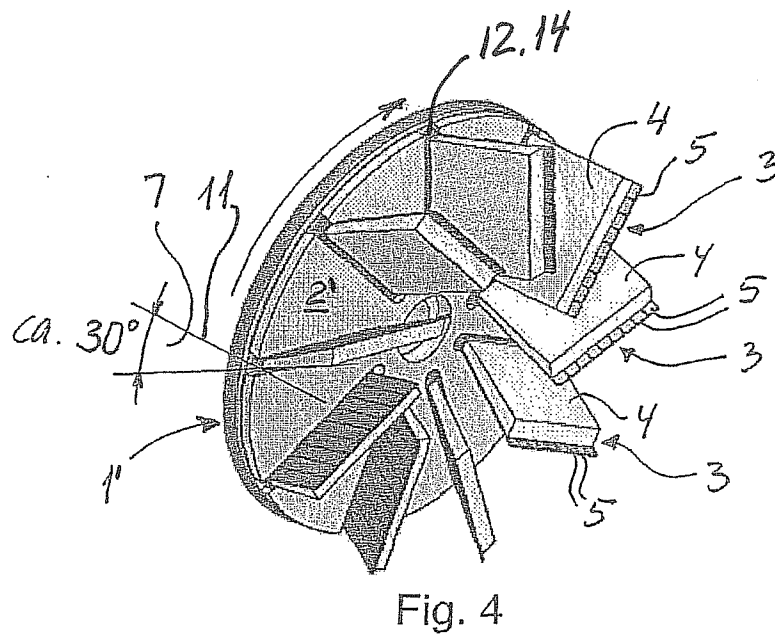
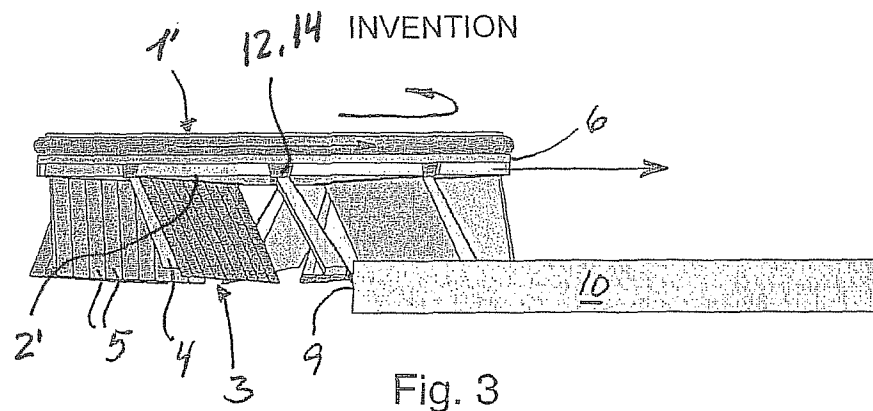
## CLAIMS

1. Grinding head (1') adapted to rotate about a central axis, having a surface which is selected between a plane surface (2') and a cylindrical surface (13), and which is provided with retainer grooves (12) for edge profile parts (14) of a number of abrasive paper members (3) with associated support brushes (4), **characterised in** that the abrasive paper members (3) are mounted at an angle of 20-40°, preferably about 30°, directed obliquely forward in the direction of rotation of the plane surface (2') and the tangential plane of the cylindrical surface (13), respectively,
2. Grinding head (1') according to claim 1, **characterised in** that the retainer grooves (12) for the edge profile parts (14) of the abrasive paper members (3) extend obliquely rearwards in the direction of rotation of the plane surface (2') at an angle (8) of 3-10° relative to a radial extension.
3. Grinding head (1') according to claim 1, **characterised in** that the retainer grooves (12) of the edge profile parts (14) of the abrasive paper members (3) extend obliquely rearwards in the direction of rotation of the cylindrical surface (13) at an angle (3) of about 3-10° relative to an axially parallel generatrix of the cylindrical surface (13).
4. Grinding head (1'') according to claim 1 and 2, **characterised in** that the plane surface (2') between the retainer grooves (12) for the edge profile parts (14) of the abrasive paper members (3) is designed with radial suction apertures (15), and that the grinding head (1'') includes an enclosing housing (16) which is provided along its periphery with an annular lip seal (17).
5. Grinding head (1'') according to claim 4, **characterised in** that the lip seal (17) is constituted by brushes made of an electrically conducting material, e.g. carbon fibre brushes (18).
6. Grinding head (1'') according to claim 4, **characterised in** that side edges (19) of the radial suction apertures (15) have an inclined course downwards in the direction of rotation such that rotation of the plane surface (2') can cause a sucking effect by itself.

7. Grinding head (1', 1'') according to any preceding claim, **characterised in** that the support brushes (4) consist of relatively soft brushes of pig's bristles.
- 5 8. Grinding head (1', 1'') according to any preceding claim, **characterised in** that the support brushes (4) consist of soft horsehair brushes.
9. Grinding head (1', 1'') according to any preceding claim, **characterised in** that the support brushes (4) consist of relatively stiff brushes of Tampico fibres.
- 10 10. Grinding head (1', 1'') according to any preceding claim, **characterised in** that the support brushes (4) consist of a mixture of pig's bristles, horsehair and Tampico fibres.

PRIOR ART  
(EP 1 633 530 B1)





PRIOR ART  
(EP 1 509 365 B1)

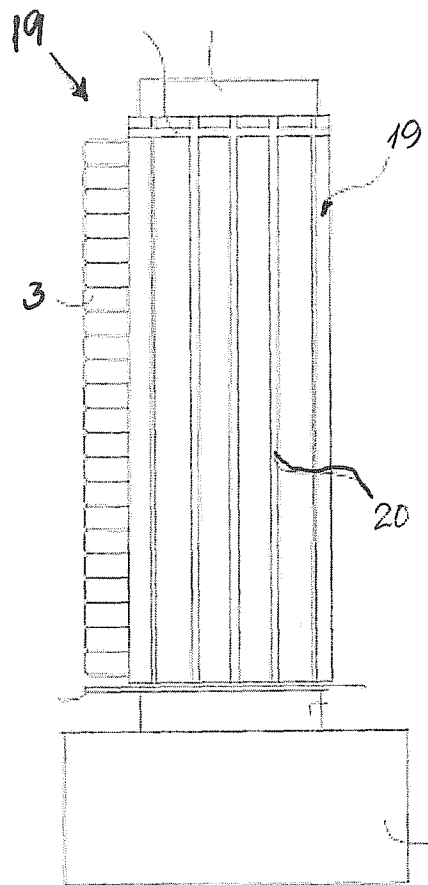


Fig. 6

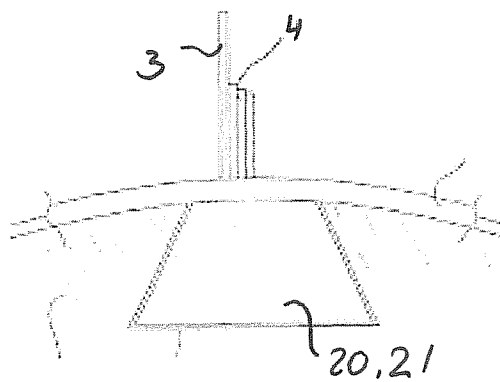


Fig. 7

INVENTION

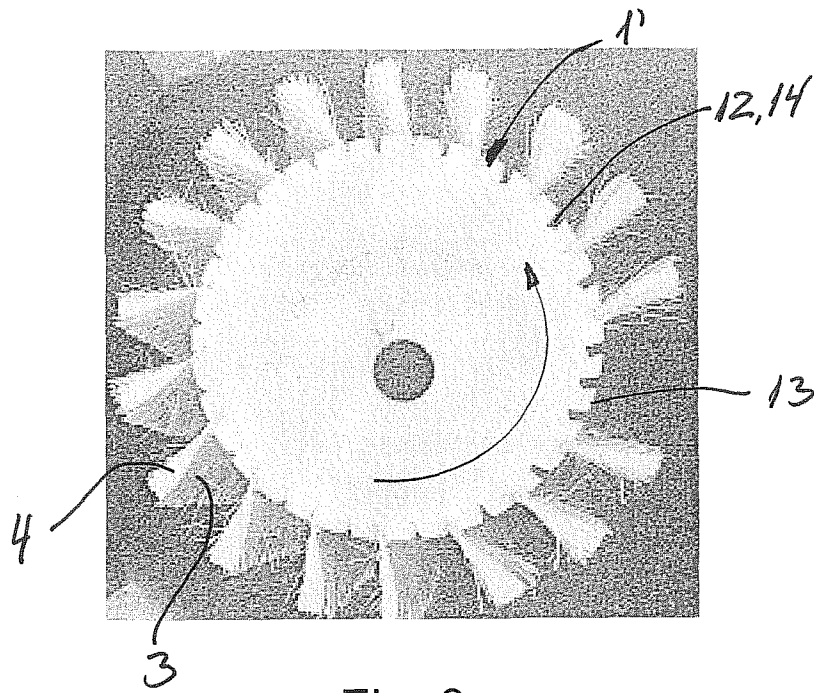


Fig. 8

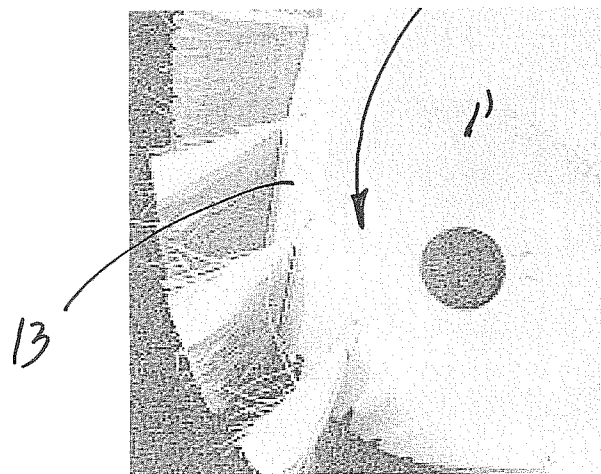


Fig. 9

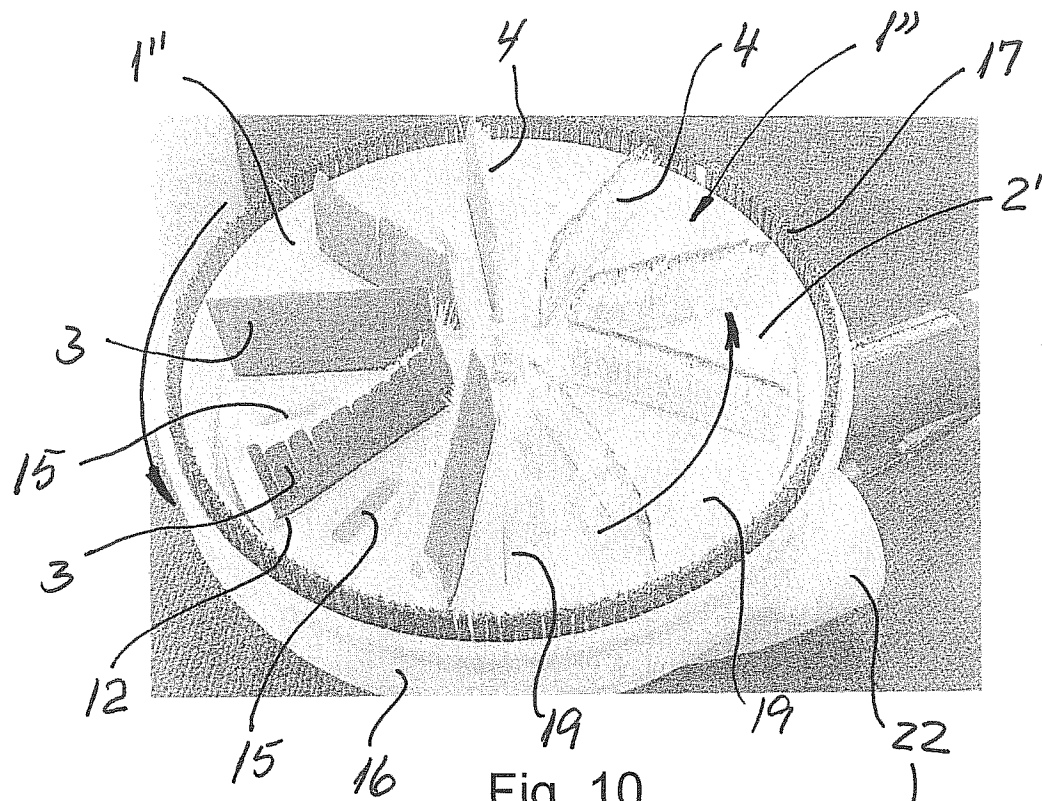


Fig. 10

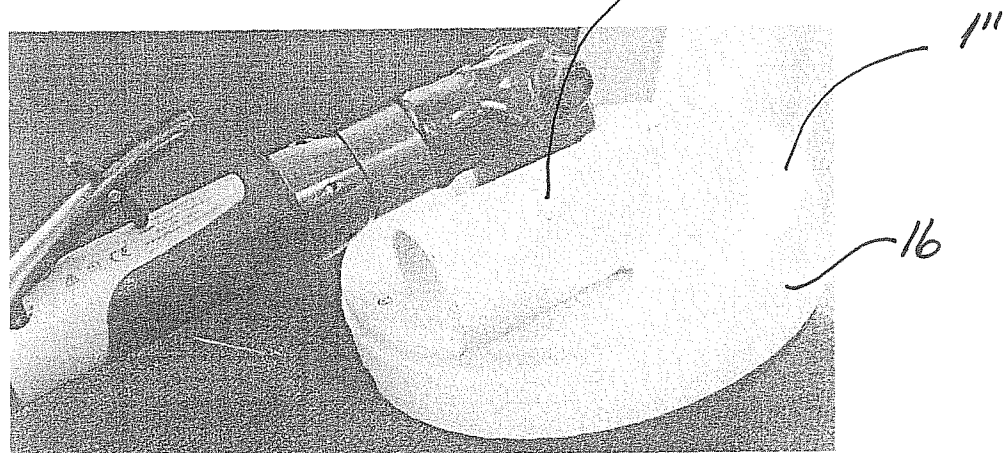


Fig. 11

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK2012/050181

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>B24D 13/04 (2006.01), B24D 13/06 (2006.01), B24D 13/14 (2006.01)<br>According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC/ECLA: B24D                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>DK, NO, SE, FI: Classes as above.                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>EPODOC, WPI, TXTE                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Relevant to claim No. |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EP 0315107 A2 (BANDELLI, D.) 1989.05.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EP 0077165 A1 (MINNESOTA MINING & MFG [US]) 1983.04.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                     |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
| * Special categories of cited documents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |
| "A" document defining the general state of the art which is not considered to be of particular relevance<br><br>"E" earlier application or patent but published on or after the international filing date<br><br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br><br>"O" document referring to an oral disclosure, use, exhibition or other means<br><br>"P" document published prior to the international filing date but later than the priority date claimed | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br><br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br><br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br><br>"&" document member of the same patent family |                       |
| Date of the actual completion of the international search<br><br>31/07/2012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Date of mailing of the international search report<br><br>16/08/2012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |
| Name and mailing address of the ISA<br>Nordic Patent Institute<br>Helgeshøj Allé 81<br>DK - 2630 Taastrup, Denmark.<br>Facsimile No. + 45 43 50 80 08                                                                                                                                                                                                                                                                                                                                                                                                                                      | Authorized officer<br><br>Dmitri Burdykin<br>Telephone No. +45 43 50 83 71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |

## INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT/DK2012/050181

| Patent document cited in search report / Publication date |            | Patent family member(s) / Publication date |            |
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