

Description

[0001] The invention is related to a treatment article for rotational surface treatment of an object, such as an object of e.g. stone, wood, linoleum, concrete, terrazzo and the like, comprising a pad having major surfaces facing away from each other and a plurality of abrasive flaps on one of said major surfaces of the pad, which flaps at least partly cover the pad, a rotation axis being defined perpendicular with respect to the major surfaces.

[0002] A treatment article of this kind is disclosed in US-A-6234886. Said prior art treatment article has a plurality of abrasive sheets. Said abrasive sheets are spaced from each other and are arranged according to specific patterns on the surface of the pad. The abrasive article may be used for sanding operations, for buffing, polishing and the like depending on the abrasive character thereof.

[0003] The abrasive article can be applied to a floor treating machine which has a frame carrying a drive motor and one or more drive heads. The abrasive article is mounted onto a drive head; by controlling the drive motor the drive head is set in rotation. By means of a handle which is connected to the frame, the operator is able to direct the floor treating machine over a floor so as to carry out the treatment thereof. The pad, which is of lofty material, allows some adjustment of the abrasive flaps with respect to possible uneven floor parts.

[0004] The abrasive flaps are generally parallel to the surface of the pad and are connected thereto by means of hook shaped protrusions. It is a drawback of this arrangement that the maximum rotation speed of the abrasive article is limited. Relatively high rotation speeds would lead to a considerable temperature increase having regard to the fact that the full surface of the abrasive flaps is pressed into contact with the floor. Furthermore, the abrasive flaps may become disengaged from the pad. Thus, the productivity of these prior art abrasive articles is necessarily relatively low.

[0005] The object of the invention is to provide a treatment article by means of which the treatment of an object, in particular of a floor, can be carried out more efficiently and at higher speeds than possible with the prior art treatment articles. This object is achieved in that the flaps overlap each other in at least the circumferential direction of the pad and are each attached to a support layer interposed between the pad and the flaps.

[0006] According to the invention, the treatment article does have flaps for carrying out a certain treatment of e.g. a floor, supported by the pad. Thus, the treatment article is able to adjust to any uneven aspect of the floor in question. The flaps have a somewhat slanted position with respect to the floor surface as a result of the fact that said flaps overlap each other. Each flap at one end is positioned underneath a preceding flap and at the opposite end is positioned above a following flap, when seen in circumferential direction (roof tile fashion). Thereby, the area of contact between the flaps and the floor is

reduced. As a consequence, the heat generated during rotation of the treatment article over the floor is reduced. Thus, it is made possible to rotate the treatment article at a relatively high speed. Moreover, the flaps are firmly held to support layer on the pad in a mutually overlapping fashion, which further increases the resistance against disintegrating. As a result of the higher speeds, the productivity of the treatment article is increased.

[0007] The flaps may be arranged according to a series, preferably according to a series which is at least partly circular and concentric with respect to the rotation axis. Other arrangements are possible as well, for instance in the form of a series of flaps which is spiral shaped with respect to the rotation axis. According to a further embodiment, the flaps may be arranged according to an intermittent series comprising groups of flaps which are at a distance from each other. It is also possible to arrange the flaps in a series which is continuous in circumferential direction (360°). One or more series may be arranged in concentric fashion. In radial direction, the flaps may exactly cover each other. However, it is also possible to make the flaps overlap each other only partly in radial direction. Thus, the flaps may be offset laterally with respect to each other, in such a way that a series is obtained which is wider than the width of the individual flaps.

[0008] Furthermore, a circular ring shape of the series of abrasive flaps is more preferred as thereby the regular treatment of the floor is increased. Furthermore, the support layer may be ring shaped accordingly. Most preferably, the series of abrasive flaps and/or the support layer are/is located adjacent or bordering the outer circumference of the pad. The flaps may also be arranged in accordance with two or more concentric ring shapes.

[0009] The major surface central portion of the pad lofty material onto which the flaps are connected, may have a central portion which is free from flaps. Also the support layer may have a central portion which is free from flaps. The flaps are thus concentrated at the outer parts of the pad and/or of the support layer which have the highest circumferential speeds, which is favorable for the treatment action.

[0010] The flaps may be mounted in several ways onto the support layer and the pad. For instance the flaps may be clamped onto the pad, or be connected thereto by means of hooks and the like. Preferably however, the support layer is at least partly covered with a glue layer, one edge of each flap being embedded in said glue layer.

[0011] The flaps may comprise abrasive particles, such as particles of diamond, cubic boron nitride, aluminium oxide, silicon carbide, zirconium or any other abrasive substance or polishing compound. However, the flaps need not always have an abrasive character. It is also possible that the flaps have a treatment surface which is fit for daily or weekly maintenance of a floor, or for cleaning the floor. Furthermore, it is possible to have flaps which are fit for increasing the gloss of a floor, e.g. of a marble or granite floor and the like.

[0012] The pad may also be carried out in different ways; preferably, the pad has a lofty character and comprises a nonwoven three dimensional web of fibers which are bonded to one another at points of mutual contact. The support layer may comprise a textile layer which is adhered to a resin layer through a very thin glue layer. Such support layer is relatively stiff in bending and may yet flex somewhat under the influence of the floor irregularities encountered when operating the floor machine onto which the abrasive article is mounted. The textile material may be located on the side of the support layer which faces the flaps. As mentioned, the support layer is at least partly covered with a glue layer. One edge of each flap is embedded in said glue layer and is adhered to the textile layer of the support layer by said glue layer. The somewhat rough character of the textile material promotes a reliable bond between the support layer and the flaps. In particular, the tensile stiffness of the support layer may be higher than the tensile stiffness of the lofty pad. The diameter of the treatment article may be selected in accordance with the envisaged application.

[0013] The invention is furthermore related to a floor treatment machine comprising a frame, at least on rotary drive head, drive means for driving the rotary drive head in rotation about the axis thereof, handling means for controlling and steering the machine over a floor to be treated as well as a treatment article according to any of the preceding claims for rotational surface treatment of an object, such as an object of e.g. stone, wood, linoleum, concrete, terrazzo and the like, comprising a pad having major surfaces facing away from each other and a plurality of flaps on one of said major surfaces of the pad and which at least partly cover the pad.

[0014] Such a floor treatment machine is disclosed in US-A-6234886 as well. According to the invention, this floor treatment machine is characterized in that the flaps overlap each other in the circumferential direction of the pad and are each attached to a support layer interposed between the pad and the members and in that the other major surface of the pad is supported against the rotary drive head.

[0015] As mentioned before, the floor treatment machine may be used more efficiently and at relatively high speeds. Thus, it is preferred that the treatment article, which is in contact with a floor, and the associated rotary drive head are rotated at a rotational speed of at least 175 rpm, preferably at least 800 rpm. Preferably, the rotational speed is in the range of 175-2000 rpm.

[0016] The pad may be carried out in different ways, and may e.g. comprise a lofty material of entangled fibers which enclose open pores, or of an expanded PVC material and the like.

[0017] The floor treatment machine may be carried out with a single treatment head. Such type of floor treatment machine may be used for grinding or polishing purposes. Also the floor treatment machine may be carried out as a so-called burnisher which usually are operated at relatively high speeds for e.g. buffing, cleaning or polishing.

Furthermore, the floor treatment machine may be carried out as a cleaning machine or so-called auto-scrubber or scrubber dryer. Also, the treatment article may be used on a single head cleaning machine or so-called "swing machine". The treatment article may be used under dry conditions, or in the presence of liquids which act as e.g. a coolant and/or as dust control.

[0018] The invention will be described further with reference to the drawings.

Figure 1 shows a view of the underside of the treatment article.

Figure 2 shows a section according to II-II of figure 1.

Figure 3 shows a section according to II-II of figure 1.

Figure 4 shows a view on a second embodiment.

Figure 5 shows a view on a third embodiment.

Figure 6 shows a floor treatment machine with the treatment article according to figures 1-3.

[0019] The treatment article 1 as shown in figures 1 and 3-5 consists of a pad 2 having opposing major surfaces 3, 4. In use, the major surface 3 is the lower surface, the major surface 4 is the upper surface. The pad may consist of several materials, for instance a material with a lofty character having entangled fibers. Alternatively, the pad may consist of polyvinylchloride (PVC) with a foam character, such as expanded PVC or "Foamex".

[0020] Onto the major surface 3 of the pad 2, a ring shaped support layer 5 is applied as shown in figures 2 and 3 by means of a thin glue layer 24. This support may be carried out with a stretch resistant textile layer 16 and a resin layer 17. By means of a very thin glue layer 23, the textile layer is adhered to the resin layer at the lower surface thereof and forms a relatively rigid yet somewhat flexible base for the abrasive flaps 6.

[0021] The flaps 6 are arranged according to a ring shaped series 7 which is concentric to the mounting hole 18 in the pad 2 and which generally covers the ring shaped support layer 5. By means of a thick glue layer 10, one of the edges 8 of each flap 6 is embedded in a glue layer 10; thereby the flaps are firmly adhered to the textile layer 16 of the support layer 5. The textile layer 16 which is on the lower surface of the resin layer and which has a certain roughness, promotes the formation of a strong and reliable bond with respect to the glue layer 10 and the flaps 6.

[0022] Adjacent flaps are arranged in the way of overlapping roof tiles, in such a way that the opposite end 9 of the flaps is free. Each flap is partly covered by a preceding flap 6', seen in the direction of movement of the series 7 of flaps 6 as depicted by the arrows in figures 1 and 2. Said flap 6 in turn partly covers a following flap 6", and so on. Each flap 6 has a surface 15 facing away from the pad 2 which is provided with e.g. abrasive particles. The surface 15 of each flap 6 is in contact with the floor to be treated, in so far as the surface 15 extends beyond the preceding flap 6' as shown in figure 2.

[0023] The major surface 3 of the pad 2 is covered only

over a ring shaped part at the outer circumference; the central part 11 of the major surface is completely uncovered. The uncovered surface of the pad may be smaller in case a second ring shaped series (not shown) of flaps is arranged inside the outer series.

[0024] The embodiment of figure 4 shows an alternative arrangement of the flaps 6 according to several spiral shaped series 7'. These series are regularly distributed in the circumferential direction of the pad 2, in such a way that the treatment article is well balanced.

[0025] The alternative embodiment of figure 5 shows flaps (6) which are arranged according to an intermittent series 7", 7"". These series comprise groups 21 of flaps which are formed according to a part of a circle which is concentric with respect to the rotation axis 19. In the embodiment shown, the groups are equidistant to the rotation axis and are at a distance from each other in circumferential direction. Here as well, the distribution of the groups of flaps is such that the treatment article is well balanced.

[0026] Although in the embodiments shown subsequent flaps cover each other fully in radial direction, it is also possible to make subsequent pads overlap each other with some offset in radial direction.

[0027] For the purpose of mounting the treatment article 1 onto the treating machine, the upper surface 4 of the pad is provided with a releasable loop layer 18. Conversely, the drive head 12 is equipped with a hook layer which connects to the loop layer. It is also possible to apply the loop layer on the drive head, and the hook layer on the pad. By means of these hook and loop fasteners, the opposite major surface 4 of the pad 2 is connected to the lower surface of the drive head 12 of a floor treating machine 13 as shown in figure 6. The series 7 of flaps 6 is resting on the floor surface to be treated. Once the operator sets the drive head 12 with the treatment article 1 in rotary motion, the floor treatment machine 13 is controlled by means of the handle 14 over the floor so as to obtain the required treatment thereof.

List of reference numerals

[0028]

1. Treatment article
2. Pad
3. Lower surface pad
4. Upper surface pad
5. Support layer
- 6., 6', .. Flap
- 7., 7', .. Ring shaped series of flaps
8. Edge of flap
9. Free end of flap
10. Thick glue layer
11. Central part of support layer 5
12. Drive head
13. Floor treating machine
14. Handle

15. Surface of flap
16. Textile layer
17. Resin layer
18. Loops
- 5 19. Hole in pad
20. Axis of rotation
21. Spiral shaped group of flaps
22. Circular group of flaps
23. Thin glue layer
- 10 24. Thin glue layer

Claims

- 15 1. Treatment article (1) for rotational surface treatment of an object, such as an object of e.g. stone, wood, linoleum, concrete, terrazzo and the like, comprising a pad (2) having major surfaces (3, 4) facing away from each other and a plurality of flaps (6) on one (3) of said major surfaces of the pad, which flaps at least partly cover the pad, a rotation axis (20) being defined perpendicular with respect to the major surfaces (3, 4), **characterized in that** the flaps (6) overlap each other at least in the circumferential direction of the pad (2) and are each attached to a support layer (5) interposed between the pad (2) and the flaps (6).
- 20 2. Treatment article (1) according to claim 1, wherein each flap (6) at one end (8) is positioned underneath a preceding flap (6') and at the opposite end (9) is positioned above a following flap (6''), when seen in circumferential direction (roof tile fashion).
- 25 3. Treatment article (1) according to claim 1 or 2, wherein each flap (6) has a treatment surface facing (15) away from the pad (2).
- 30 4. Treatment article (1) according to any of the preceding claims, wherein flaps (6) are arranged according to a series (7) which is at least partly circular and concentric with respect to the rotation axis (20), and/or wherein flaps (6) are arranged according to series (7') comprising groups (22) of flaps which are spiral shaped with respect to the rotation axis (20).
- 35 45 5. Treatment article (1) according to any of the preceding claims, wherein flaps (6) are arranged according to an intermittent series (7'', 7''') comprising groups (21) of flaps which are formed according to a part of a circle concentric with respect to the rotation axis (19), which are equidistant to the rotation axis and which are at a distance from each other in circumferential direction.
- 40 50 6. Treatment article (1) according to any of the preceding claims, wherein the major surface (3) of the pad (2) onto which the flaps (6) are connected, has a
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central portion (11) which is free from flaps (6).

7. Treatment article (1) according to any of the preceding claims, wherein the flaps (6) comprise abrasive particles, such as particles of diamond, cubic boron nitride, aluminium oxide, silicon carbide, zirconium or any other abrasive substance or polishing compound. 5
8. Treatment article (1) according to any of the preceding claims, wherein the pad (2) comprises a lofty material, e.g. a nonwoven three dimensional web of fibers which are bonded to one another at points of mutual contact, and/or wherein the pad is of an expanded PVC material. 10 15
9. Treatment article (1) according to any of the preceding claims, wherein the support layer (5) comprises a textile layer (16), a resin layer (17) and a thin glue layer (23) and wherein the textile layer (16) is adhered to the resin layer (17) through said thin glue layer (23). 20
10. Treatment article (1) according to claim 9, wherein the support layer (5) is at least partly covered with a glue layer (10), one edge (8) of each flap (6) being embedded in said glue layer (10) and being adhered to the textile layer (16) of the support layer (5) by said glue layer (10). 25 30
11. Treatment article according to any of the preceding claims, wherein the support layer (5) is adhered to the pad (2) through a thin glue layer (24).
12. Treatment article according to any of the preceding claims, wherein the tensile stiffness of the support layer (5) is higher than the tensile stiffness of the pad (2). 35
13. Floor treatment machine (13) comprising a frame, at least one rotary drive head (12), drive means for driving the rotary drive head in rotation about the axis thereof, handling means (14) for controlling and steering the machine over a floor (15) to be treated as well as a treatment article (1) according to any of the preceding claims for rotational surface treatment of an object, such as an object of e.g. stone, wood, linoleum and the like, comprising a pad (2) having major surfaces (3, 4) facing away from each other and a plurality of flaps (6) on one of said major surfaces of the pad (2) and which at least partly cover the pad, **characterized in that** the flaps (6) overlap each other in the circumferential direction of the pad (2) and are each attached to a support layer (5) interposed between the pad (2) and the pad members (6) and **in that** the other major surface (4) of the pad (6) is supported against the rotary drive head (12). 40 45 50 55

14. Method for operating the floor treatment device (13) according to claim 13, wherein treatment article (1) is in contact with a floor and said treatment article with the associated rotary drive head (12) are rotated at a rotational speed of at least 175 rpm, preferably at least 800 rpm.

15. Method according to claim 14, wherein the rotational speed is in the range of 175-2000 rpm.

Fig. 1

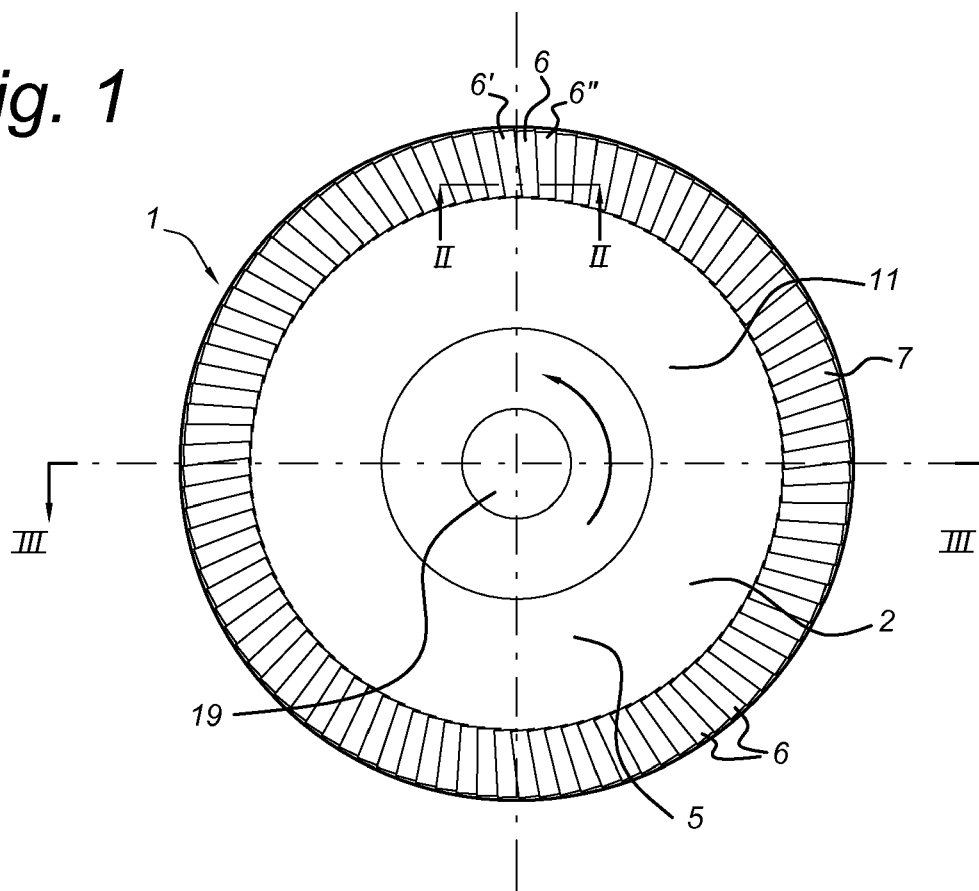


Fig. 2

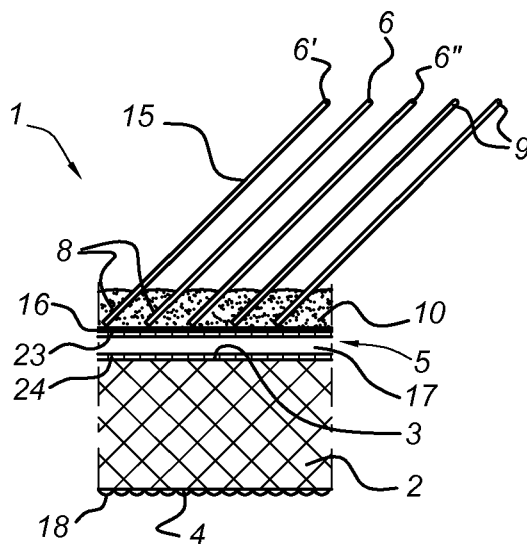


Fig. 3

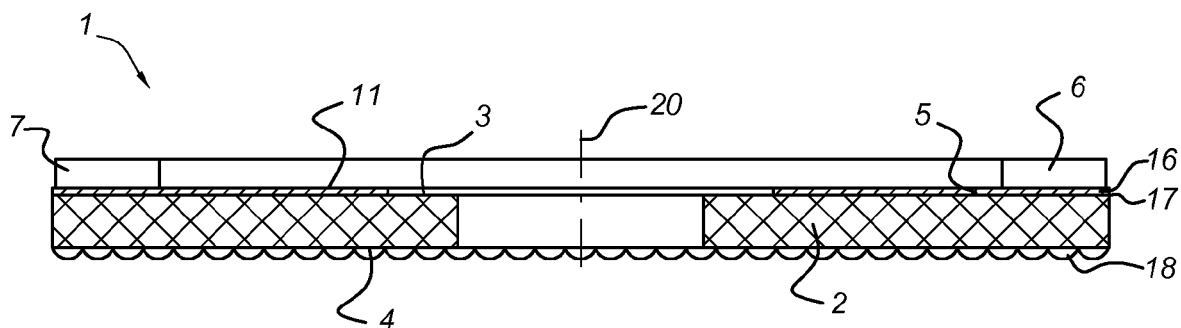


Fig. 4

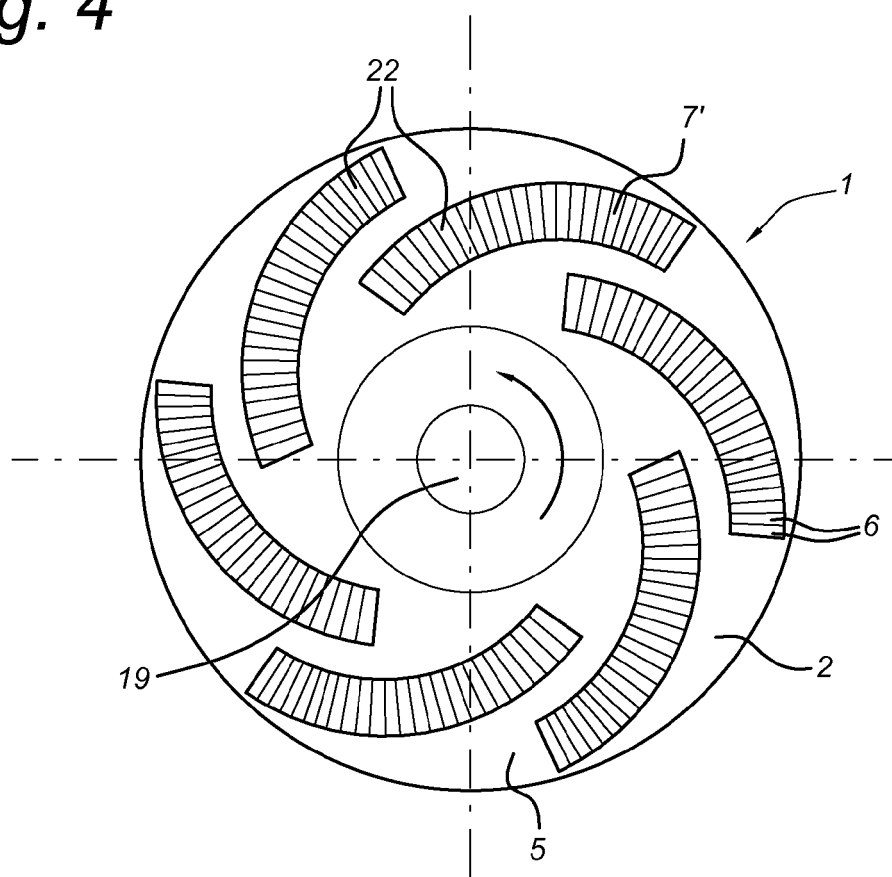


Fig. 5

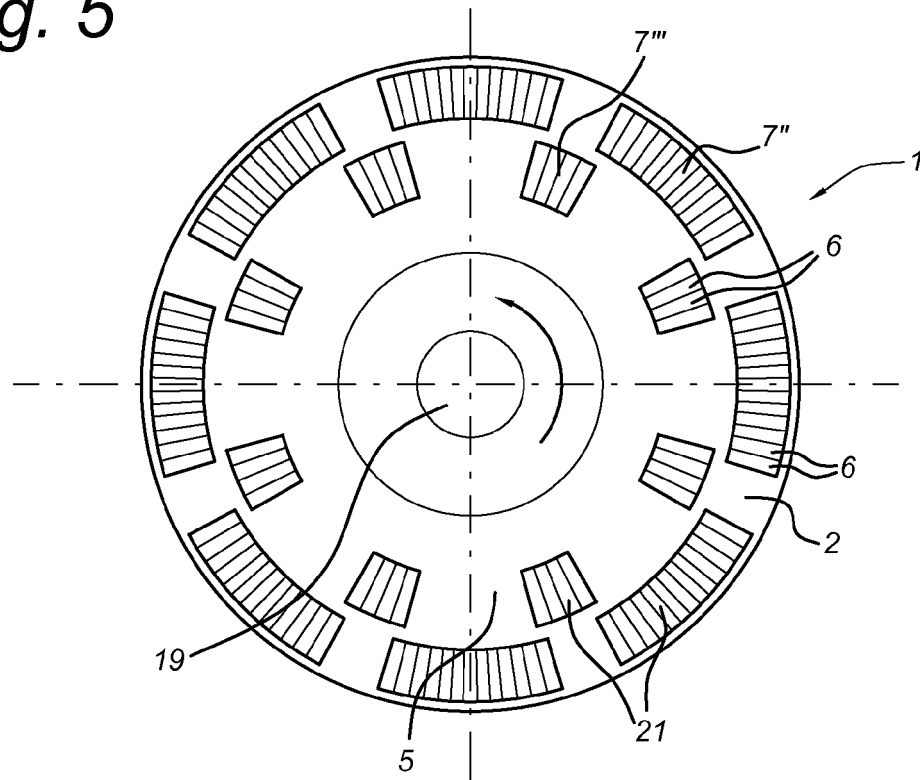
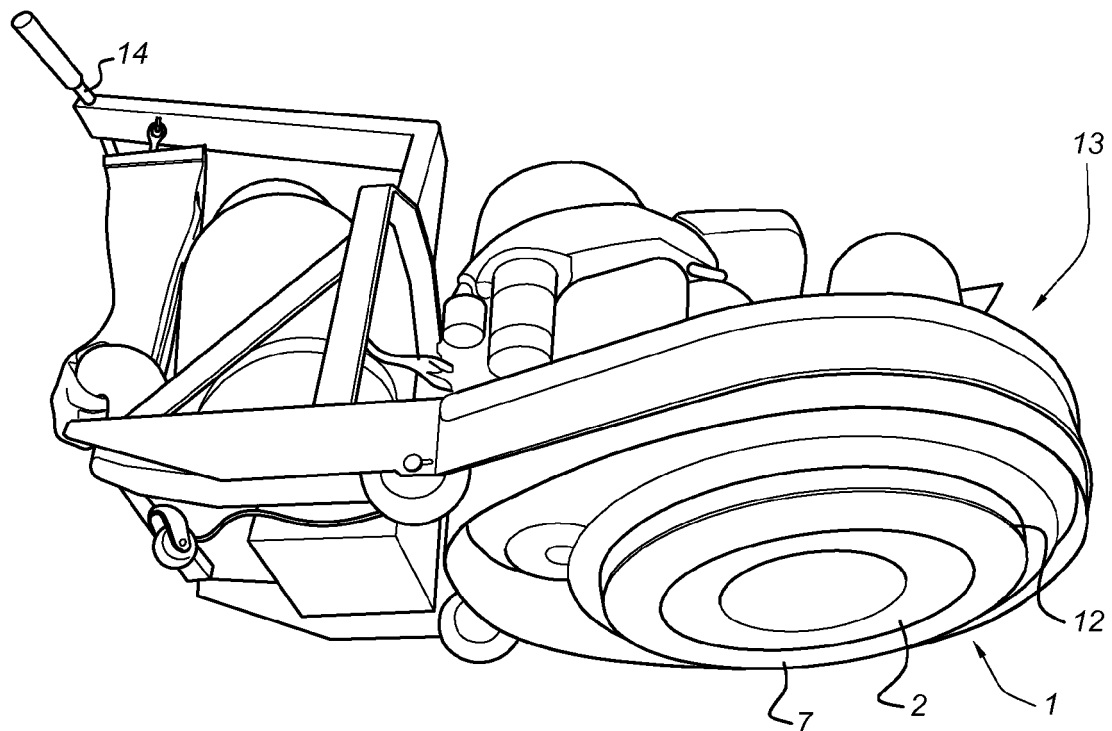


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 14 15 5226

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A	* page 5, line 7 - page 7, line 19; figures 1-4 *	4,5,12	
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A	* column 18 - column 23; figure 4 *	4,5,9-12	
X	GB 2 349 109 A (ELLIOTT IND LTD [GB]) 25 October 2000 (2000-10-25)	1-3,6-8, 13-15	
A	* page 5, line 25 - page 11, line 1; figures 1-6 *	4,5,9-12	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 April 2014	Examiner Blumenberg, Claus
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	
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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