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(71) Applicant: **Koti Onroerend Goed b.v.**
6003 DG Weert (NL)

(72) Inventor: **Huybreckx, Micel, Jozef, Rene, Lambert**
3910 Neerpelt (BE)

(54) Rotating conical cup brush for sweeping machines

(57) The invention relates to an improved rotating conical cup brush for sweeping machines, consisting of a number of variations of a circle shaped base plate (2, 3, 4) with along the circumference specifically adjusted brush elements (5, 6, 7), which by rotation of the circle shaped base plate (2, 3, 4) are locked in several inventive ways by locking ribs (8), or by a remaining edge width (43) or by a circle shaped ring (37), which falls around the brush element (5, 6, 7) and the whole is locked with a so called counter plate (15, 40, 36), through which after wear of the mentioned brush elements (5, 6, 7) these can be produced in a simple, fast and economical way, in which, with regard to logistics, the brush elements (5, 6, 7) can be transported compactly in, for example, boxes.

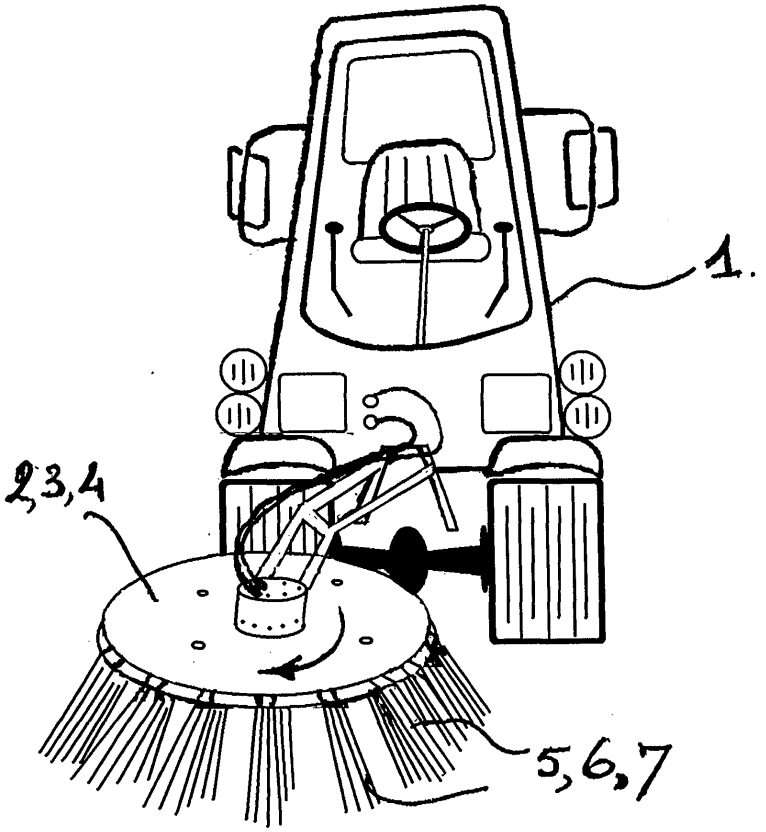

FIG.1.

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Description

[0001] The present invention relates to a device constructed as a rotating conical cup brush for sweeping machines, in which the rotating conical cup brush is constructed as a composition of several brush elements and a circle shaped base plate with diameter D with recesses along the circumference for placement of mentioned brush elements, in which the circle shaped base plate with the brush elements is mountable against the corresponding counter plate of the sweeping machine for cleaning and/or sweeping surfaces, in which the brush elements are constructed of a number of sweeping wires or fibres in a brush block.

[0002] KOTI B.V., Celsiusstraat 18, 6003 DG WEERT, the Netherlands has many years of experience with the production of gutter brushes and with the necessary research KOTI has come to a disposable brush system in a rotating base plate shape with brush elements on it. The disposable brush system has advantages during use, because along the circumference of the circle shaped base plate a large amount of brush elements are fixable, attachable or mountable for each sweeping capacity and for each type of sweeping machine, in which the disposable system, whether or not with the base plate, should be rather simply replaceable after wear.

[0003] Further, the mentioned disposable brush system consists of a circle shaped base plate with along the circumference of it brush elements with fibres or sweeping wires at an angle of approximately 60 degrees (sweeping angle) with the base plate. Due to the aforementioned adjustments of the brush elements a larger cleaning efficiency is reached by:

- the fixed and special sweeping angle;
- a longer life, because due to the suitable occupation with the brush elements along the edges of the circle shaped base plate wear is uniformly distributed;
- the material of the fibres or wires of the brush elements can be chosen optimally.

[0004] Furthermore, according to the known state of the art all kinds of constructions have been invented for whether or not temporarily attaching the brush elements to a rotating base plate, which then whether or not is mountable against a so called counter plate of the rotating mechanism of the sweeping machine. This is mostly done with bolt and nut constructions near the circumference and on the circumference are also catch slots located for transferring the rotation torque onto the brush disk and further onto the brush elements.

[0005] In practice it seems that a handy, effective and optimally strong interconnecting at the brush element with a relatively small width and a circle shaped base plate with counter plate with the existing system is less suitable. Besides, there are base plates with fixed brush elements known, which take a lot of volume during transport.

[0006] The aim of the present invention is to provide such a modified and improved rotating conical cup brush for sweeping machines, in which the aforementioned disadvantages are solved and which have much more workability. Besides, one must be able to adjust the compositions of the base disk brush elements to ones own judgement. Further, a transport volume as small as possible is important as regards cost and the weight must be divided (Occupational Health and Safety Act).

[0007] For this, a rotating conical cup brush for sweeping machines, constructed as a composition of a circle shaped base plate with along the edge several loose brush elements according to the invention is developed and/or modified in an inventive way, characterized in that the brush block of the mentioned brush elements is provided with a cover flange with a projection length for adjoining on at least two edges of the recesses with width B along the circumference of the circle shaped base plate and that further in centrifugal direction of the recesses a special locking construction for the brush elements is applied.

[0008] The advantage is a much tighter clamped brush element, which has a larger width B, and therefore a larger sweeping capacity and in which it has a much more effective special locking construction when rotating in centrifugal direction, which according to the dependant claims is further worked out in several surprisingly inventive ways.

[0009] Furthermore, the device according to the invention is further developed in such a way, that the width B of the recesses along the circumference of the circle shaped base plate is between 20 and 60 mm, preferably approximately 40 mm, and that the mentioned projection length A of the brush block is between 1 mm and 10 mm, preferably 4-5 mm.

[0010] The advantages are a considerably larger sweeping capacity due to a larger brush width B and a robust supporting or fixing by the projection length A between the circle shaped base plate and the counter plate placed on top.

[0011] Furthermore, the device according to the invention is further developed in such a way, that as a first embodiment the mentioned horizontal locking construction consists of a pair of further radially outwardly formed vertical locking ribs.

[0012] The advantage is a robust horizontal centrifugal locking construction, in which also the loose brush elements are easily horizontally mountable and remain directly in that position (under the required sweeping angle), in which the sweeping angle in figure 2D is indicated with α.

[0013] Furthermore, the device according to the invention is further developed in such a way, that the mentioned horizontal locking construction consists of the remaining edge width of the circle shaped plate edge left intact with a width between 2 mm and 20 mm, preferably approximately 8-10 mm, in which the brush block under the sweeping angle in the circle shaped base plate is

aligned and is remained in that position by means of a springy locking rib.

[0014] The advantages are as above, but the base plate is less subject to damage when touching obstacles, such as, for example, the kerb, due to the continuous plate edge, and this is not the case with the radially outwardly continued backs between the recesses of the other embodiments.

[0015] Furthermore, the device according to the invention is further developed in such a way, that the mentioned horizontal locking construction consist of a locked circle shaped ring, which falls around the brush elements, in which the mentioned sweeping wires or fibres consist of plastic with circle shaped cross-sections with a diameter between, for example, 1 mm and 6 mm, preferably 2-3 mm, in which the mentioned brush block is also of the same kind of plastic.

[0016] The advantages are, a composition of a circle shaped base plate with directly slidable brush elements, in which the locking is secured by means of a circle shaped ring, which falls around the brush element under the counter plate.

[0017] The preferred construction of the invention will be described by way of example, and with reference to the accompanying drawing.

[0018] In which:

Fig. 1	shows a front view in oblique projection of a sweeping machine provided with an improved rotating brush disk;
Fig. 2A up to 2D	top and side view of the first variation of the embodiment of the circle shaped base plate and the matching design of the brush block of the brush element according to the invention;
Fig. 3A up to 3G	top and side view as well as front views in oblique projection of the second variation of the embodiment of the circle shaped base plate and the matching design of the brush block of the brush element according to the invention; and
Fig. 4A up to 4D	top and side view of the third variation of the embodiment of the circle shaped base plate and the matching design of the brush block of the brush element according to the invention.

[0019] Figure 1 shows a front view in oblique projection of a sweeping machine 1 provided with one of the variations of the improved rotating circle shaped base plates 2, 3, 4 with specifically matching brush elements 5, 6, 7.

[0020] For the several preferred embodiments of the base plates 2, 3, 4, see also the figures 2A and 2C, 3A and 3C and 4A and 4C.

[0021] For the several preferred embodiments of the matching brush element, see figures 2Band 2D, 3B and 3D, 3F and 3G and 4B and 4D.

[0022] Following, the advantages of the different embodiments of the rotating circle shaped base plates 2, 3, 4 and the specifically matching brush elements 5, 6, 7 are described in the above mentioned figures.

[0023] Figures 2A up to 2D show two top views of the rotating circle shaped base plate 2 and two side views, cross-sections respectively of the brush element 5 according to a first embodiment or variation of the invention. Here, it is shown that the cover flange 12 has an extra width or supporting length of approximately 2-5 mm and the vertical downwards standing locking ribs 8 also have a supporting thickness of approximately 2-5 mm. The brush element 5 pulled radially from the outside, over the height of the rib 8, can be slided in a recess 9 of the circle shaped base plate 5 and be pulled vertically downwards into place. Also the rotation of the catch slot 10 is visible. Due to the rib 8 in the slot 11 of the recess, the brush element 5 remains immediately in the correct position under a sweeping angle α of approximately 60 degrees; for sweeping angle see angle α in figure 2D. The length L of the brush element, or better, the brush block 13 is approximately 80 mm. The sweeping wires or fibres 14 can be made of, for example sheet steel or plastic, such as, for example, polypropylene.

[0024] Figure 2D shows the circle shaped locking plate or counter plate 15, so that during use the brush elements 5 do not shoot out. The circle shaped base plate 2 and the mentioned counter plate 15 are interconnected by means of not indicated pins and bolts through bores 16, 17, 18, 19.

[0025] Figure 3A up to 3G show top and side views and also front views in oblique projection of the second variation of the preferred embodiment of the circle shaped base plate 3 and the matching brush element 6 of the invention. Here, it concerns a circle shaped base plate 3 with closed recesses 20, as shown in figures 3A and 3C. Further, the base plate 3 is provided with catch slots 21 and mounting bores 22, 23, 24, 25 of the not indicated pins and bolts. The brush block 26 is provided with the aforementioned cover flange 27, the springy lip 28 and remains immediately after mounting under the correct sweeping angle α of approximately 60 degrees. The length L of the block is approximately 70 mm. The sweeping wires or fibres 29 are attached in the brush block 26. The width B stays the same, just like the supporting length of approximately 5 mm of the cover flange 27.

[0026] Figures 3E up to 3G show several front views in oblique projection of the base plate 3 and the matching specific brush element 6. The same parts are indicated with the same indication numbers. Here, in figure 3F the springy locking rib 28 can clearly be seen to keep the brush element 6 in the correct position immediately after application.

[0027] Figures 4A up to 4D show top and side views

of the circle shaped base plate 4 and the matching brush elements 7 as third variation of the embodiment. The base plate 4 has radially smooth outwardly projecting recesses 30, catch slots 31 and fixing bores 32, 33, 34, 35. The counter plate 36 has a circle shaped ring 37 at the bottom side, which falls around the brush elements 7. The cover flange 38 is shown in the figures 4B and 4D and has a length L of approximately 55 mm. The sweeping angle α is approximately 60 degrees. The sweeping wires or fibres 39 are also shown. In this third variation of the embodiment, the centrifugal locking is therefore done with the mentioned ring 37, which is located at the bottom side of the counter plate 36.

[0028] Finally it has to be emphasized, that the above description constitutes three preferred embodiments of the invention and that further variations and modifications are still possible without departing the scope of this patent description.

Claims

1. Device constructed as a rotating conical cup brush for sweeping machines (1), in which the rotating conical cup brush is constructed as a composition of several brush elements (5, 6, 7) and a circle shaped base plate (2, 3, 4) with diameter D with recesses (9, 20, 30) along the circumference for the placement of mentioned brush elements (5, 6, 7), in which the circle shaped base plate (2, 3, 4) with the brush elements (5, 6, 7) is mountable against the corresponding counter plate (15, 40, 36) of the sweeping machine (1) for cleaning and/or sweeping surfaces, in which the brush elements (5, 6, 7) are constructed of a number of sweeping wires or fibres (14, 29, 39) in a brush block (8, 41, 42), **characterized in that**, the brush block (8, 41, 42) of the mentioned brush elements (5, 6, 7) is provided with a cover flange (12, 27, 38) with a projection length adjacent to at least two edges of the recesses (9, 20, 30) with width B along the circumference of the circle shaped base plate (2, 3, 4) and that further in centrifugal direction of the recesses (9, 20, 30) a special locking construction (8, 43, 37) for the brush elements (5, 6, 7) is applied.

2. Device as claimed in claim 1, **characterized in that**, the width B of the recesses (9, 20, 30) along the circumference of the circle shaped base plate (2, 3, 4) is between 20 and 60 mm, preferably approximately 40 mm.

3. Device as claimed in claim 1, **characterized in that**, the mentioned projection length A of the brush block (8, 41, 42) is between 1 mm and 10 mm, preferably 4-5 mm.

4. Device as claimed in claim 1, **characterized in that**, the mentioned horizontal locking construction (8) as first embodiment consists of a pair of further radially outwardly formed vertical locking ribs (8).

5. Device as claimed in claim 1, **characterized in that**, the mentioned horizontal locking construction (43) consists of the remaining edge width (43) of the circle shaped plate edge left intact with a width between 2 mm and 20 mm, preferably approximately 8-10 mm.

6. Device as claimed in claim 1, **characterized in that**, the mentioned horizontal locking construction consists of a circle shaped ring (37), which at the bottom side of the circumference of the counter plate (36) falls around the brush elements (7) and thus provides in a radial locking.

7. Device as claimed in claim 6, **characterized in that**, the cross-section of the ring (37) can be approximately 8 mm x 8 mm.

8. Device as claimed in claim 1, **characterized in that**, the mentioned sweeping wires or fibres consist of bunches of sheet steel with a cross-section of, for example, 0,5 x 4 mm^2, and in which the bunches of sheet steel are placed in successive rows receding in the mentioned brush block (5).

9. Device as claimed in claim 1, **characterized in that**, the mentioned sweeping wires or fibres (14, 29, 39) consist of plastic with circle shaped cross-sections with a diameter between, for example, 1 mm and 6 mm, preferably 2-3 mm, in which the mentioned brush block (8, 41, 42) is also of the same kind of plastic.

10. Device as claimed in aforementioned claims, **characterized in that**, the mentioned diameter D of the circle shaped base plate (2, 3, 4) is between 100 mm and 2000 mm, preferably approximately 800 mm.

11. Device as claimed in claim 1 and 9, **characterized in that**, the mentioned brush block (41) in the circle shaped base plate (3) is immediately fixed by means of a springy locking lip (28).

12. Device as claimed in claim 1, **characterized in that**, the mentioned circle shaped base plate (2, 3, 4,) and similar shaped counter plate (15, 40, 36) are made of steel and are interconnected by means of pins and bolts through the indicated bores (16-19, 22-25, 32-35).

13. Device as claimed in claim 1, **characterized in that**, the mentioned plastic, for example, is polypropylene.

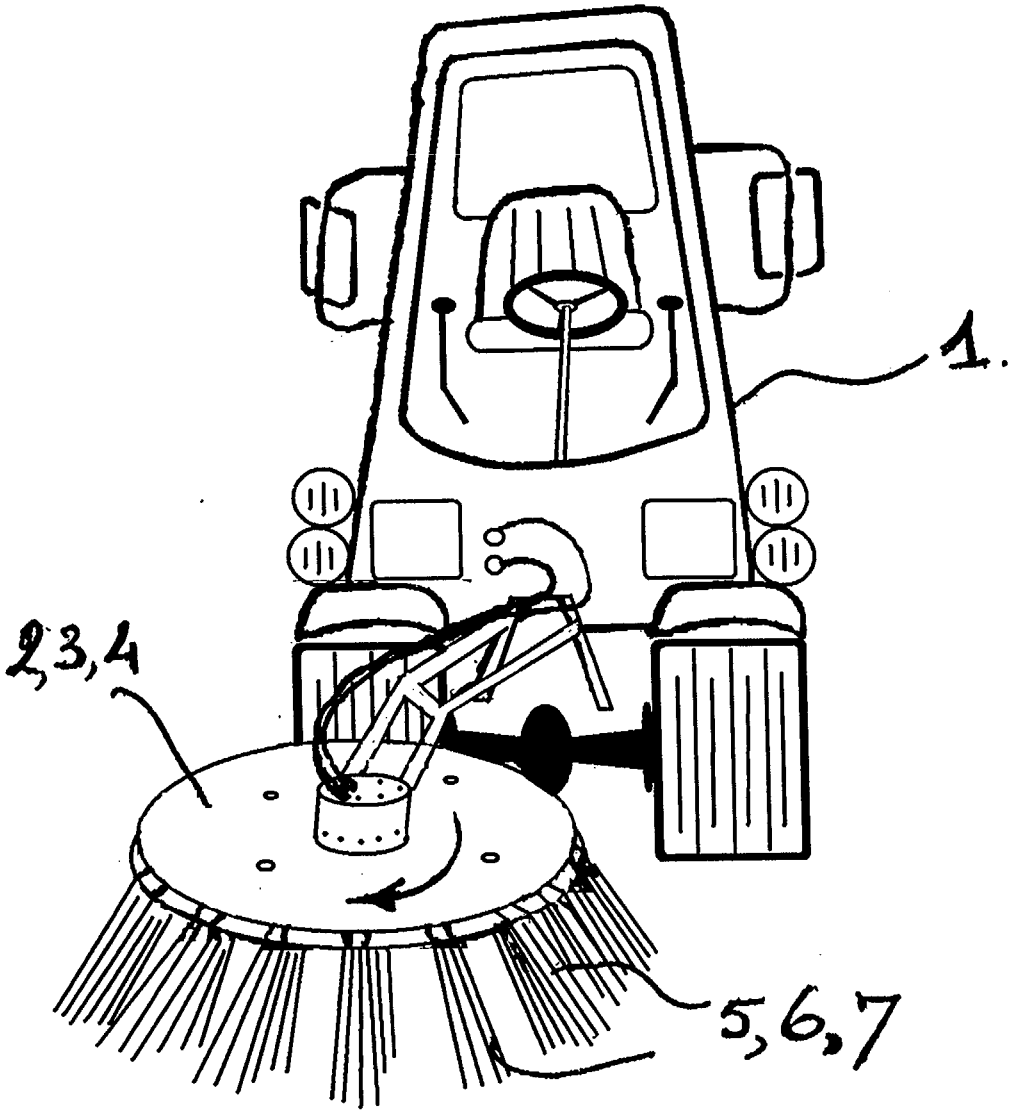

FIG.1.

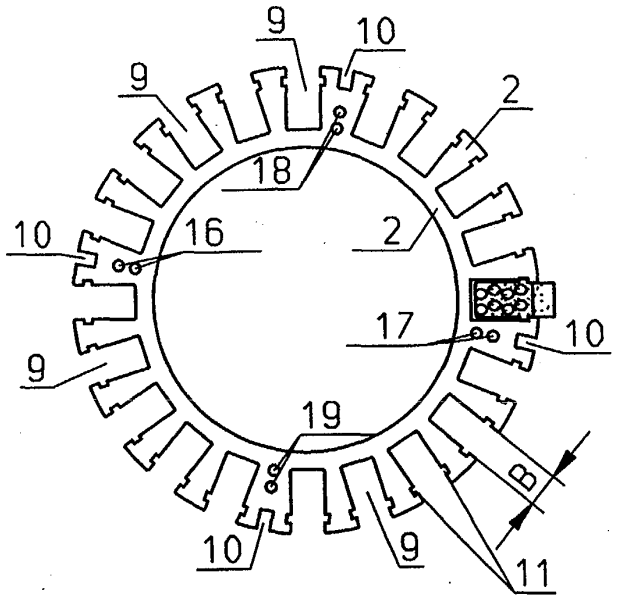

FIG. 2. A.

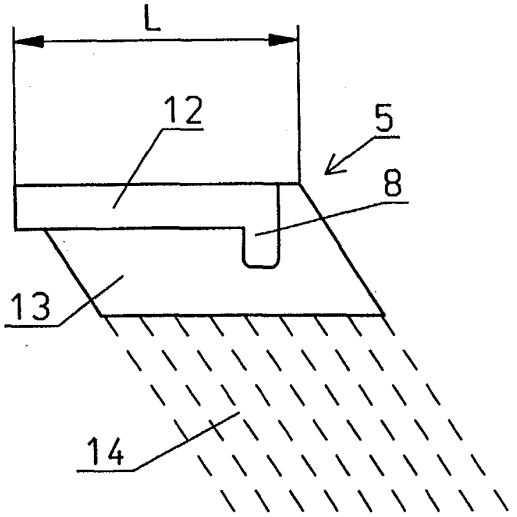

FIG. 2. B.

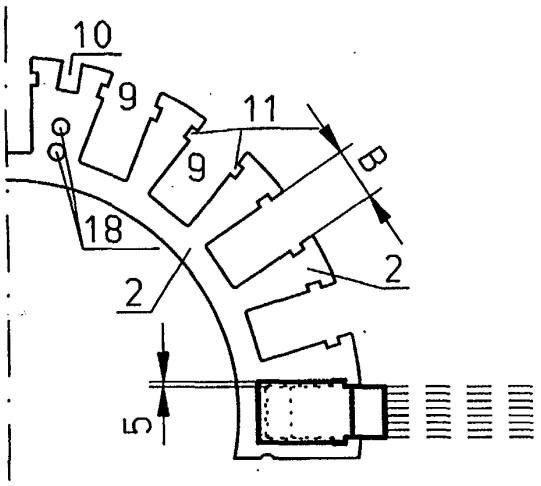

FIG. 2. C.

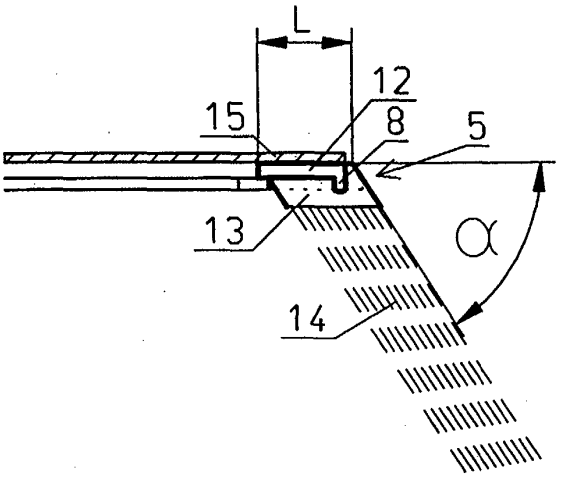

FIG. 2. D.

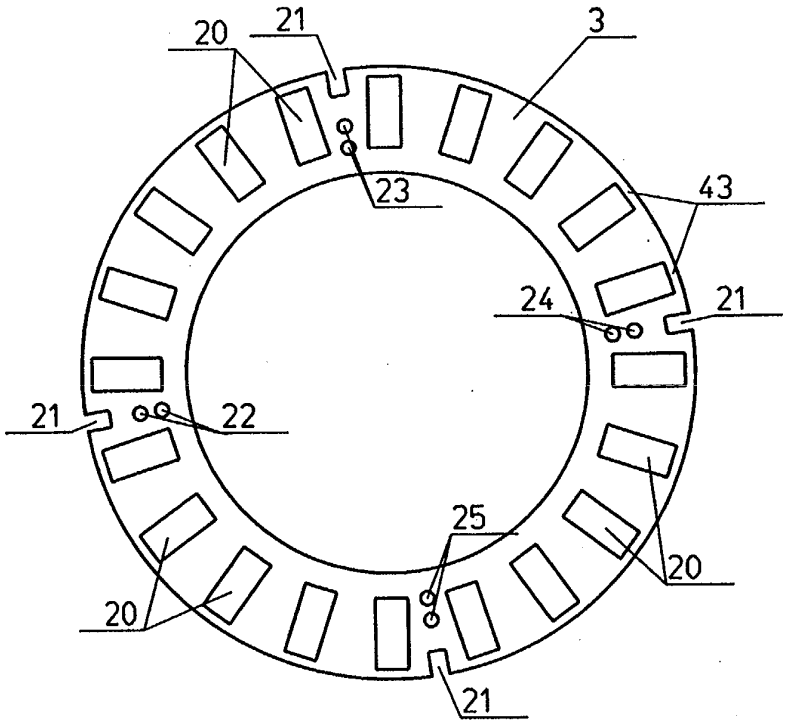

FIG. 3. A.

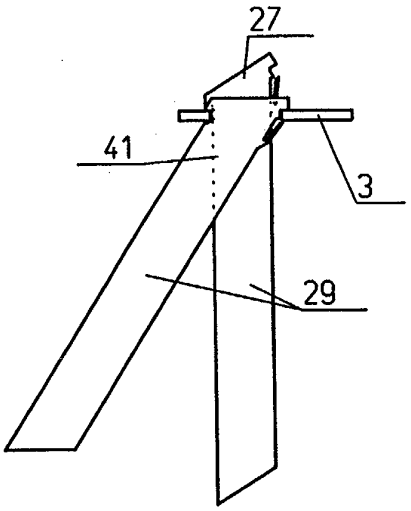

FIG. 3. B.

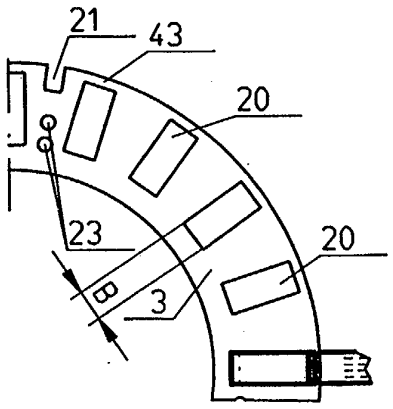

FIG. 3. C.

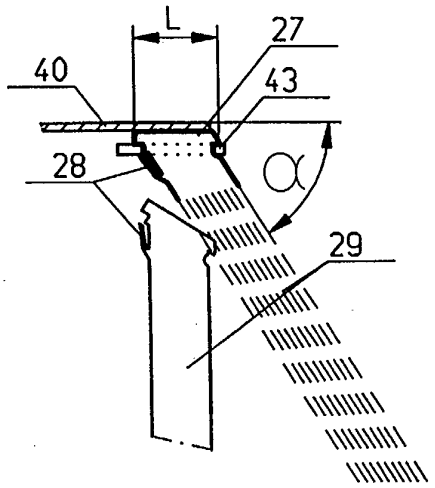

FIG. 3. D.

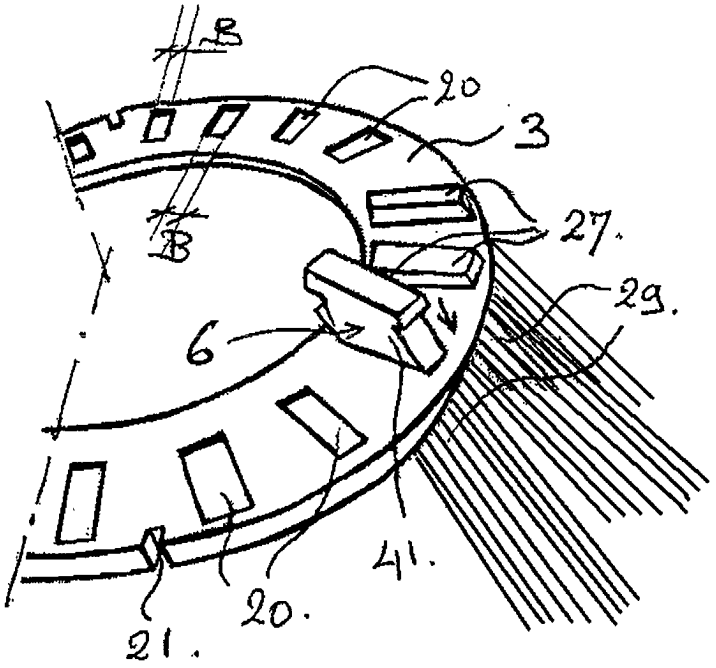

FIG.3E.

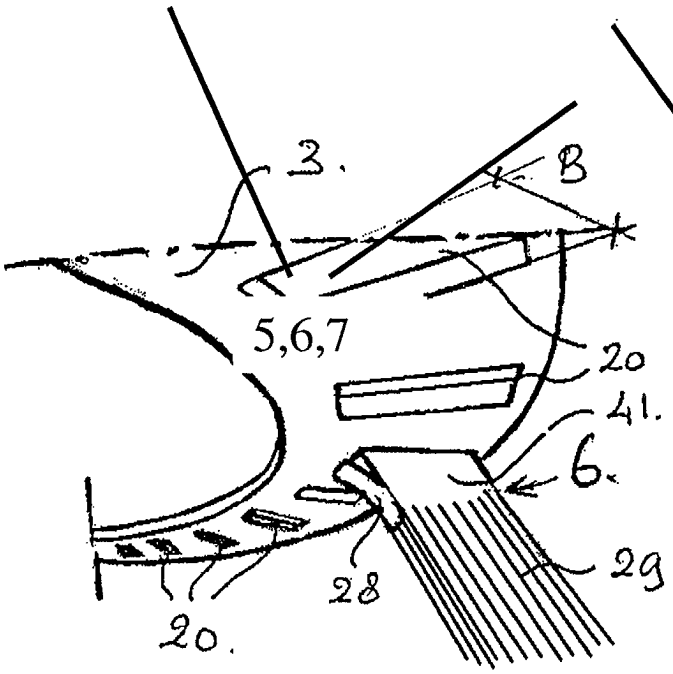

FIG.3F.

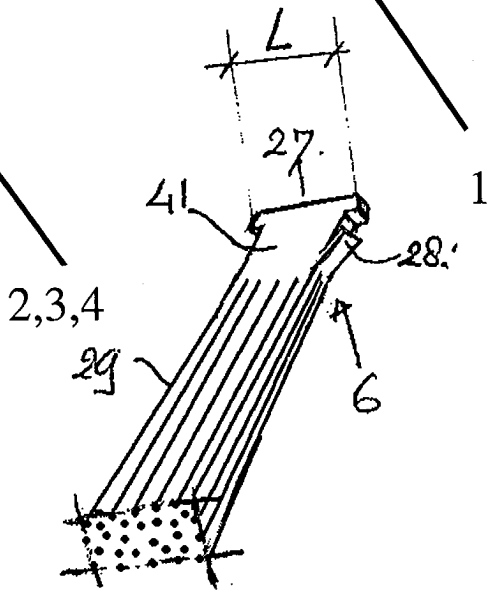

FIG.3G.

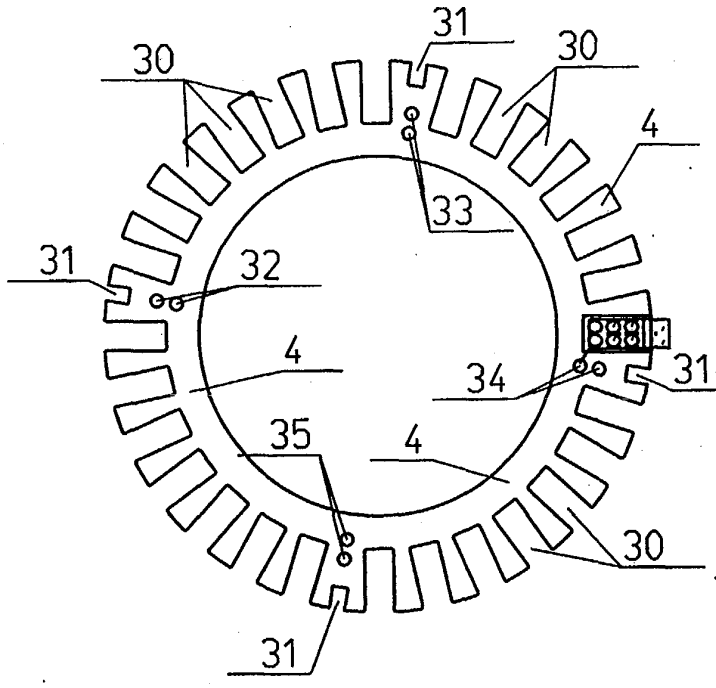

FIG. 4. A.

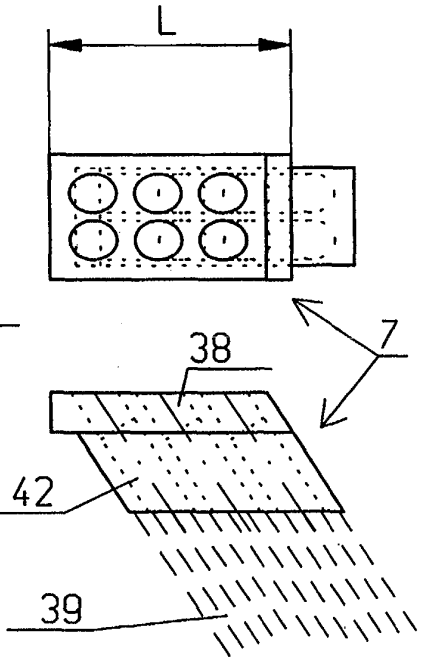

FIG. 4. B.

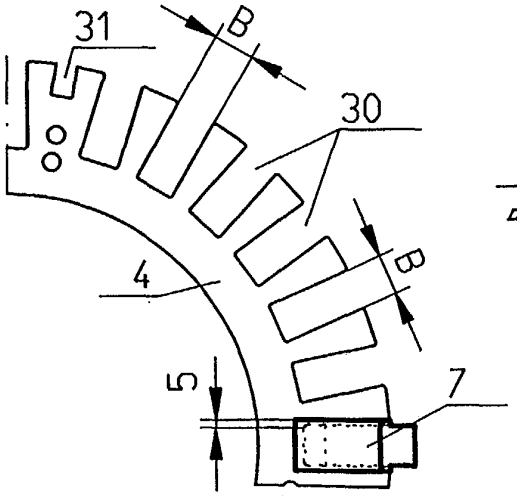

FIG. 4. C.

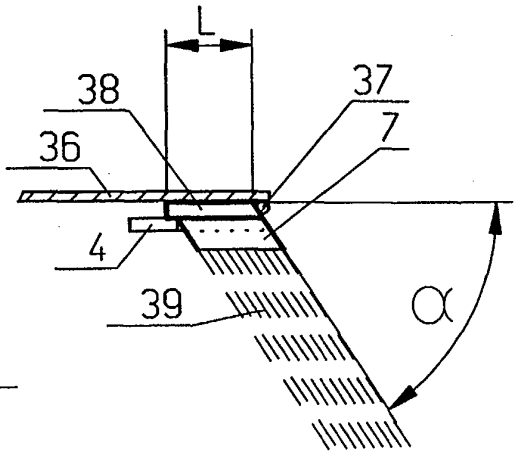

FIG. 4. D.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 07 7151

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Y	DE 202 18 585 U (BUERSTEN DEPOT WLAZIK GMBH) 6 February 2003 (2003-02-06) * page 3, line 33 - page 4, line 27 * * figures 1-5 *	4	
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A46B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 December 2004	Kerouach, M

CATEGORY OF CITED DOCUMENTS

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