(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 145 733 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.01.2010 Bulletin 2010/03

(51) Int Cl.:
B24D 9/08 *(2006.01)* ***B24B 55/10*** *(2006.01)*

(21) Application number: **09165057.2**

(22) Date of filing: **09.07.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(30) Priority: **15.07.2008 IT MI20080222 U**

(71) Applicant: **Valentini, Guido**
20122 Milano (IT)

(72) Inventor: **Valentini, Guido**
20122 Milano (IT)

(74) Representative: **Mittler, Enrico**
Mittler & C. s.r.l.
Viale Lombardia, 20
20131 Milano (IT)

(54) **Pad for machining surfaces with curved aspiration channels**

(57) A pad is disclosed comprising a monobloc body (10, 11), traversed by a plurality of peripheral through holes (3) for aspirating dust, wherein channels (4) are formed that extend parallel to the lower surface of the pad connecting a lower central aspiration hole (33) of said pad with peripheral holes (3C). Said channels (4) intercept lower internal holes (101) of the pad that do not pass through the monobloc (10, 11) that are suitable for conveying the abraded dust from the central part of the pad to the peripheral holes (3C) through the channels (4) (Fig. 5).

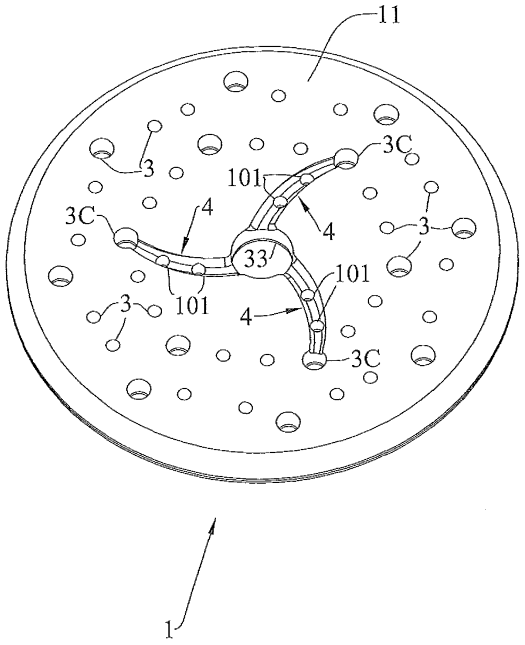

FIG.5

EP 2 145 733 A1

Description

[0001] The present invention relates to a pad for machining surfaces with curved aspiration channels.

[0002] Currently known pads consist of a body that is circular or has another shape, which is provided with a central shank for fitting to a portable tool and is traversed by axial holes for the machining dust, which is suitably aspirated by aspirating systems associated with the tool.

[0003] The aspirating system connected to the portable tool causes the dust to move through the through holes of the pad to the upper part of the pad on which a guard rests that conveys the removed material to an aspirating pipe.

[0004] The aspirating holes are usually concentrated in the outermost part of the pad and anyway inside the conveying guard, because the central part of the pad consists of a stiff support embedded in a flexible body that is stiffly commanded to rotate by the central attachment shank.

[0005] Pads are known with an external circumferal series of through holes with a rectilinear channel that connects the centre drilled below of the pad to the periphery drilled at a plurality of points.

[0006] Nevertheless, abrasive paper to be attached to the bottom of the pad with many more holes than those of common pads, especially internally, is known, that do not thus exploit above all the most internal holes of said abrasive paper.

[0007] An object of the present invention is to make a pad with internal aspirating channels that enable an aspirating equilibrium to be obtained between the central zone and the peripheral zone of the pad in consideration of the fact that below the central zone of the pad the dust accumulates.

[0008] According to the invention this object is achieved with a pad comprising a monobloc body traversed by a plurality of peripheral through holes for aspirating dust, in which channels are formed that extend parallel to the lower surface of the pad, connecting a lower central aspiration hole of said pad with peripheral holes, characterised in that said channels intercept lower internal holes of the pad that do not pass through the monobloc that are suitable for conveying the abraded dust from the central part of the pad to the peripheral through holes through the channels.

[0009] These and other features of the present invention will be made clearer by the following detailed description of a practical embodiment thereof illustrated by way of non-limiting example in the attached drawings, in which:

figure 1 shows a top plan view of a pad according to the present invention;
figure 2 shows a bottom plan view of the pad in figure 1;
figure 3 shows a section view according to line III-III in figure 2;
figure 4 shows a section view according to line IV-IV in figure 3;
figure 5 shows a sectioned perspective view that is similar to that in figure 4, the dashed section lines not being traced for the sake of clarity.

[0010] A pad 1 of circular shape consists of a monobloc body 2 consisting of a drilled stiff support 10 and a drilled flexible body 11, preferably made of expanded polyurethane, in which said stiff support 10 is embedded.

[0011] Said pad 1, with an outside diameter equal to about 148 mm, comprises a plurality of peripheral through holes 3 distributed according to concentric circumferences, in particular (figure 2):

- peripheral through holes 3A from 7-9 mm on the circumference 3A with a diameter of 116-119 mm;
- peripheral through holes 3B from 3-5 mm on the circumference 3B with a diameter of 105-110 mm;
- peripheral through holes 3C from 7-9 mm on the circumference 3C with a diameter of 78-82 mm;.
- peripheral through holes 3D from 3-5 mm on the circumference 3D with a diameter of 72-76 mm.

[0012] The measurements indicated here and below, whilst not being limitative, constitute a preferred embodiment for pads with an external diameter equal to about 148 mm or the like.

[0013] Said pad 1 is further provided with curved channels 4 that connect, extending parallel to the abrasive surface of the pad, a lower central hole 33 with a diameter of 16-20 mm with the peripheral holes 3C that permit aspiration through an upper guard 9, and is placed in circular motion or rotary-orbital motion with respect to the portable tool that supports the pad by a mechanism (not shown in the figures) that is part of a portable tool and is connected to a pin or central shank 5 that is suitably shaped, fixed to the support 10.

[0014] The curved channels 4 intercept lower internal holes 101 having a diameter of 3-5 mm of the pad (figure 2-5) that do not pass through the monobloc 2 that are arranged along concentric circumferences 101A (diameter 56-59 mm) and 101B (diameter 37-39 mm) and are suitable for conveying the abraded dust from the central part of the pad, between the lower central hole 33 and the peripheral through holes 3C to said peripheral holes 3C through the curved channels 4.

[0015] Substantially, the present invention enables several holes 101 to be obtained in the central part without the need to drill the monobloc 2 centrally, i.e. the thickest part of the pad.

[0016] A thin layer of Velcro 100 covers the lower surface of the pad 1, enabling a sheet of abrasive material to adhere (not shown), that is intended to interact with the surface to be machined, said abrasive sheet normally having a number of holes that is appropriate to the number of holes of the pad.

[0017] The external edge of the body 2 of the pad 1 is

shaped in such a way as to be able to mount thereupon the guard 9 with which the portable tool is provided in order to contain and convey to an aspirating tube the dust attracted into the interior thereof through the holes 3 and the channels 4.

[0018] During the work step the pad moves with a circular or rotary-orbital motion with respect to the tool to which it is linked and the dust produced by the interaction of the abrasive sheet with the surface to be machined is removed by means of an aspirating system that is not shown in the figures.

[0019] The dust particles move from the centre to the exterior of the pad through the curved channels 4 and reach the upper part of the pad 1 through the holes 3C.

[0020] The abrasive sheet with curved series of holes is mounted so as to superimpose on the curved channels 4 of the pad at least some of said curved series of holes, i.e. by superimposing on the holes 101 inside the curved channels 4 at least some of the holes of the abrasive sheet, the curvatures of said series of holes of the abrasive sheet following the same route as the curved channels 4.

[0021] The distribution of both the peripheral holes 3 and of the internal holes 101 is not random but optimal owing to the performance of the pad according to the embodiment shown in the figures. In particular, observing figures 2 and 4, the axes X and Y having been defined:

- the straight lines h and k intersecting the centres of the internal holes 101h and 101k form with the axes Y angles of respectively 9-11° and 19-22°;
- the straight lines 1 and m intersecting the centres of the internal holes 3Cl and 3Dm form with the axis X angles of respectively 28-32° and 8-12°;
- the straight lines n, o, q and r, intersecting the centres of the holes 3Bn, 3Bo, 3Bq and 3Br, form with the axis X angles of respectively 15-17°, 27-29°, 56-58° and 76-78°.

[0022] As the channels 4 and the relative internal holes 101 are the same as one another and repeated every 120°, the angular arrangement of the other holes 141 is easily obtainable.

[0023] The arrangement of the peripheral holes 3, on the other hand, is repeated every 90°, it being necessary to emphasise the angular regularity of the peripheral through holes 3 measuring 7-9 mm that on the other hand follow one another at regular intervals of 45°. This occurs to adapt better the mounting of the external deflector, which is not shown in the figures, on the pad.

[0024] By positioning the holes 3 and 101 as disclosed, an aspirating balance is obtained between the peripheral zone and the central zone.

[0025] As a result, there is a growing abrasive power from the centre to the exterior that is due to a growing aspirating power from the centre to the exterior.

[0026] At the exterior, the pad tends to centrifuge the dust, in the interior the pad tends to retain the dust. The pad according to the present invention thus captures the dust where it forms through the effect of the abrasion in a varied manner, depending on the different abrasive power generated by the rotary-orbital action of the pad.

[0027] In this manner, the aspirating aspect and the abrading aspect are equalised, obtaining not only perfect aspiration but also avoiding a dangerous accumulation of dust on the abrasive paper, the latter being the cause of faulty machinings.

[0028] Said curved channels 4 are preferably the same as one another, placed at a constant angular distance around the central hole 33 of the pad, and preferably terminate at a first series of the external holes 3C that are not adjacent to the external edge of the pad.

[0029] The present embodiment shows three curved channels 4 and two holes 101 for each channel 4, but it is possible to provide a different number of channels 4 and holes 101 in function of the dimensions and required performance of the pad.

[0030] A further embodiment of the present invention provides internal rectilinear and non curved channels (4), i.e. in function of the arrangement of the holes of the sheet of abrasive paper.

[0031] Lastly, it is possible to provide a soft layer between the pad and the abrasive sheet. Said soft sheet is, for example, mounted on the pad by means of a plush that is coupled with the layer of Velcro 100, and to which the abrasive paper is attached by means of a new Velcro fastening. Said soft layer is ideal for abrasive paper of grade 500 and above for ultra-fine finishes and has a number and an arrangement of holes coinciding with the pad.

Claims

1. Pad comprising a monobloc body (10, 11), traversed by a plurality of peripheral through holes (3) for aspirating dust, wherein channels (4) are formed that extend parallel to the lower surface of the pad, connecting a lower central aspiration hole (33) of said pad with peripheral holes (3C), **characterised in that** said channels (4) intercept lower internal holes (101) of the pad that do not pass through the monobloc (10, 11) that are suitable for conveying the abraded dust from the central part of the pad to the peripheral through holes (3C) through the channels (4).

2. Pad according to claim 1, **characterised in that** said lower internal holes (101) are arranged according to concentric circumferences (101A, 101B).

3. Pad according to claim 2, **characterised in that** said peripheral through holes (3) are arranged according to concentric circumferences (3A, 3B, 3C, 3D) outside the circumference (101A, 101B) of the lower internal holes (101).

4. Pad according to claim 3, **characterised in that** at least part of the peripheral through holes (3) have a greater diameter than the lower internal holes (101).

5. Pad according to claim 4, **characterised in that** the peripheral through holes (3A, 3C) have a diameter of 7-9 mm and the lower internal holes (101) have a diameter of 3-5 mm.

6. Pad according to claim 5, **characterised in that** the peripheral through holes (3B, 3D) have a diameter of 3-5 mm.

7. Pad according to any preceding claim, **characterised in that** it comprises four series of peripheral through holes along four circumferences (3A, 3B, 3C, 3D) having a diameter of respectively 116-119 mm, 105-110 mm, 78-82 mm and 72-76 mm.

8. Pad according to any preceding claim, **characterised in that** it comprises two series of lower internal holes (101) along two concentric circumferences (101A, 101B) having a diameter that respectively equal to 56-59 mm and 37-39 mm.

9. Pad according to any preceding claim, **characterised in that** said channels (4) are the same as one another and are placed around said central hole (33) at regular angular intervals.

10. Pad according to any preceding claim, **characterised in that** said channels (4) are curved.

11. Pad according to claim 10, **characterised in that** the curvature of the channels (4) is continuous and devoid of concavities and inflection points.

12. Soft layer to be interposed between the pad and the abrasive sheet, **characterised in that** it provides a configuration of holes coinciding with that of the pad according to claims 1-11.

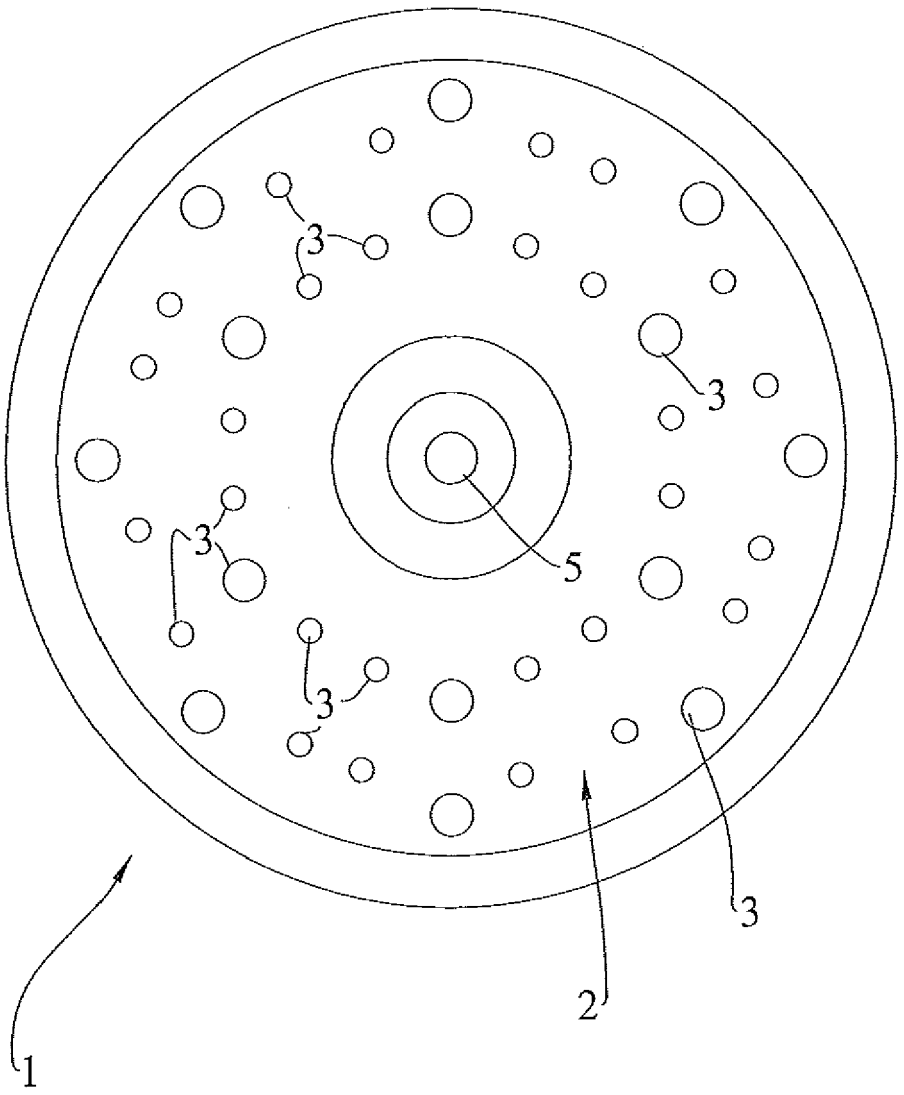

FIG.1

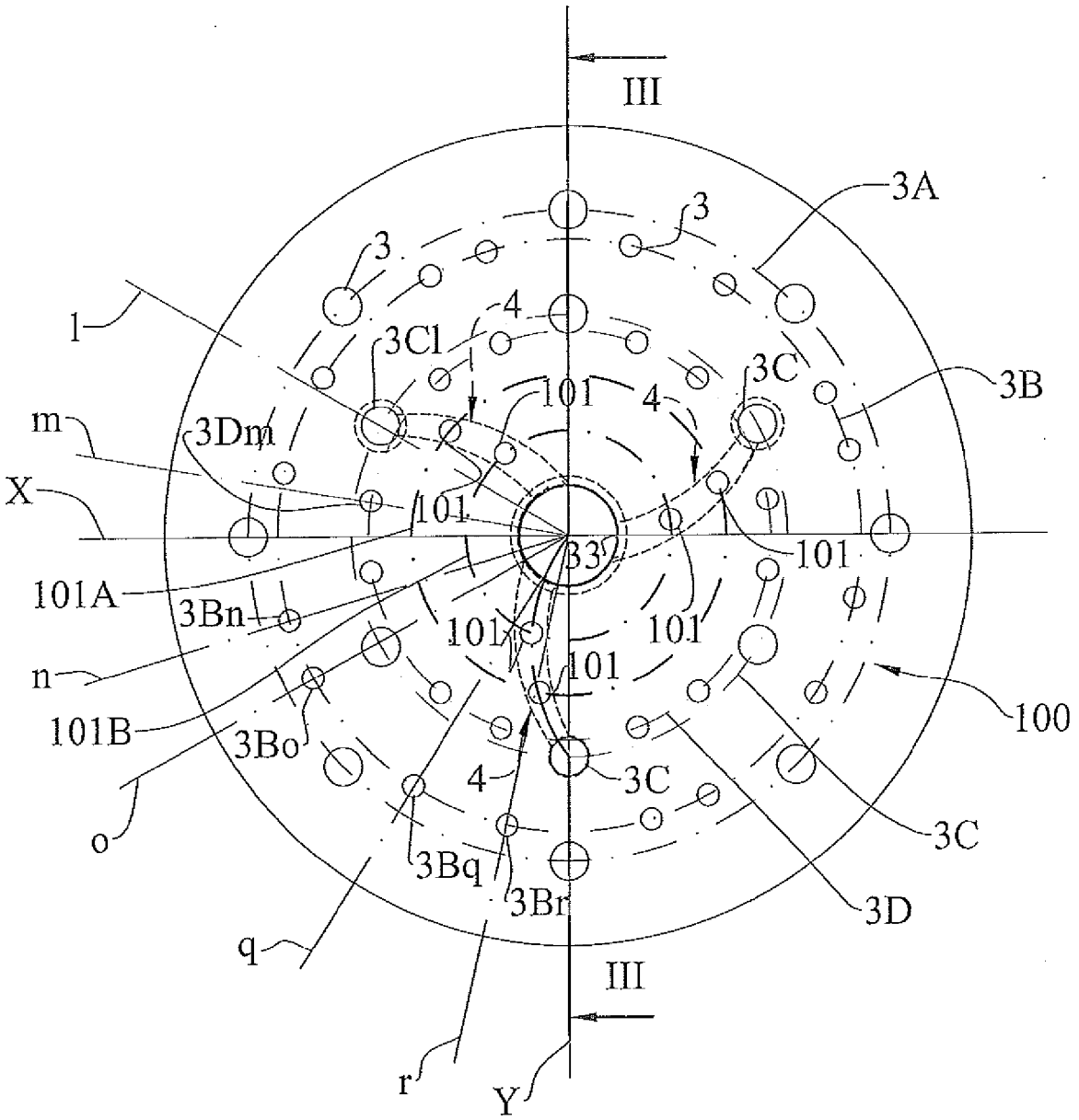
III
3A
3
3
1
4
3Cl
3C
101
4
3B
m
3Dm
X
101
101
33
101A
3Bn
101
101
n
101
100
101B
3Bo
4
3C
3C
o
3Bq
3Br
3D
q
III
r
Y

FIG.2

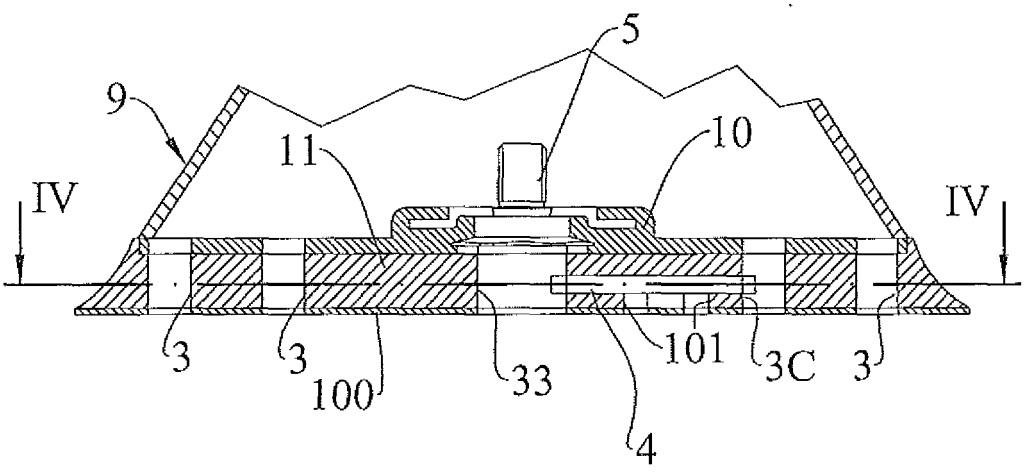

FIG.3

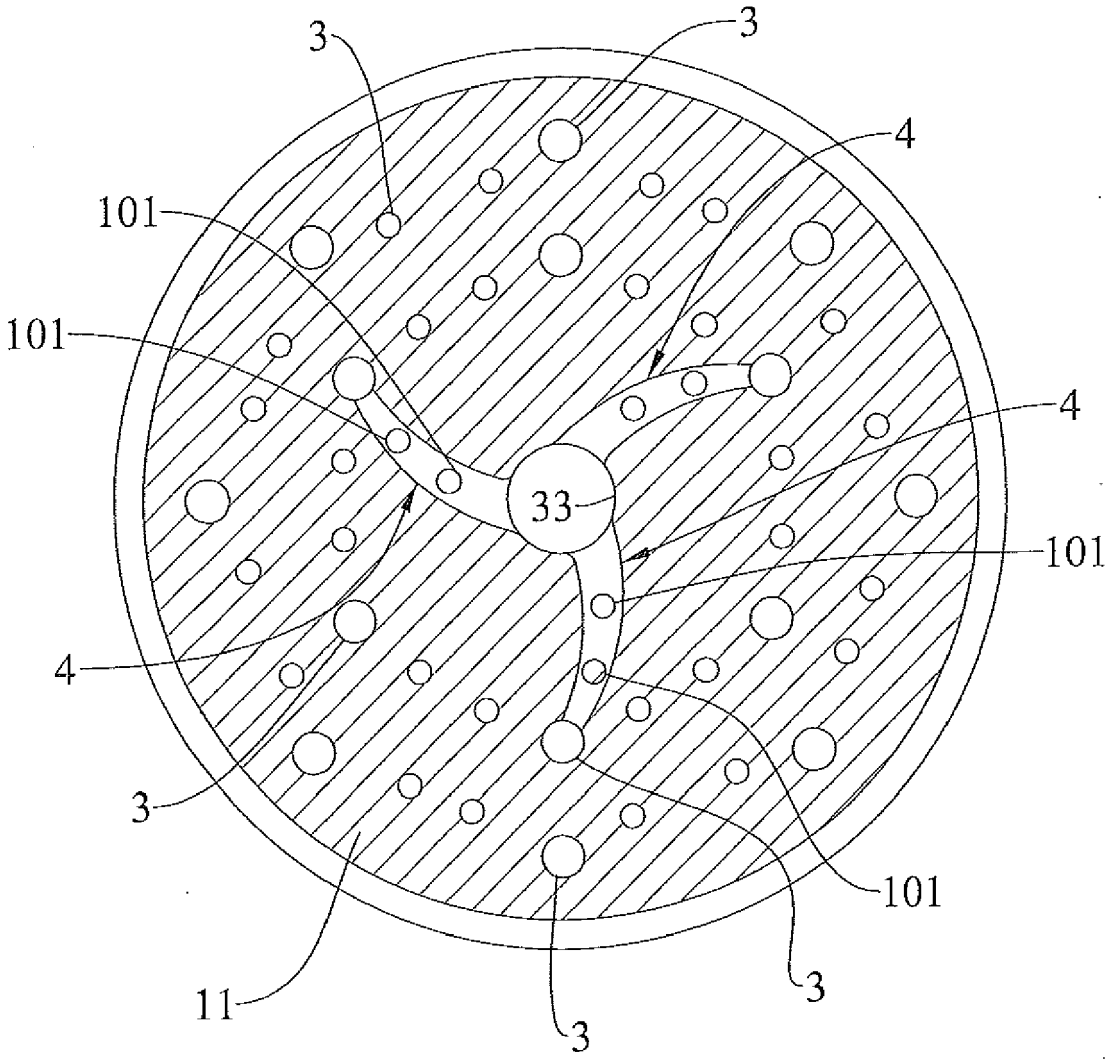

FIG.4

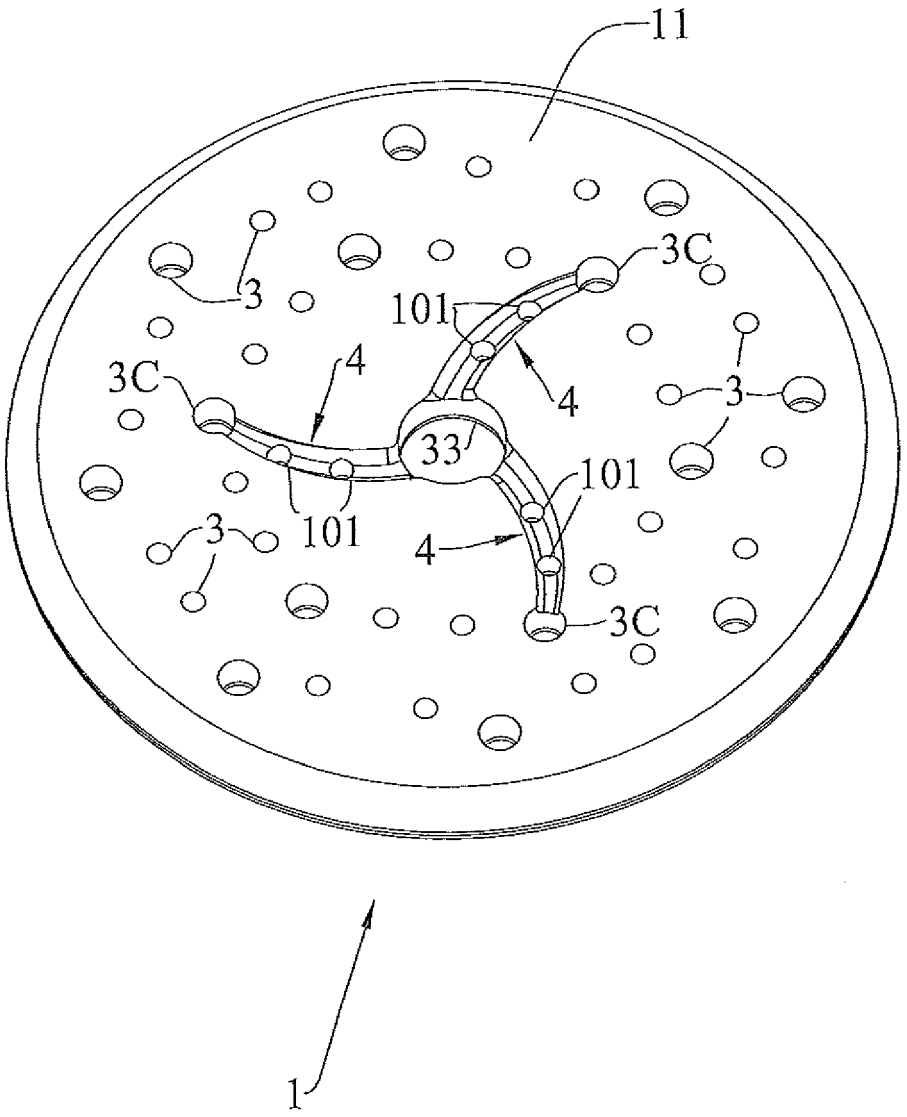

FIG.5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 16 5057

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 514 644 A (VALENTINI GUIDO [IT]) 16 March 2005 (2005-03-16) * figure 9 *	1-11	INV. B24D9/08 B24B55/10
A	WO 02/072313 A (VALENTINI GUIDO [IT]) 19 September 2002 (2002-09-19) * page 2, line 14 - page 3, line 30; figures 1-3 *	1-11	
A	WO 2007/143400 A (3M INNOVATIVE PROPERTIES CO [US]; ELSEY TERRY J [GB]; MARTIN DANIEL R) 13 December 2007 (2007-12-13) * page 1, lines 4-7 * * page 4, line 21 - page 7, line 5; figures 2,5,6,9,10 *	1	
A	WO 99/67057 A (EKAMANT AB [SE]; SANDELL TORSTEN [SE]) 29 December 1999 (1999-12-29)		

TECHNICAL FIELDS SEARCHED (IPC)

B24D
B24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 October 2009	Koller, Stefan

CATEGORY OF CITED DOCUMENTS

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

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 16 5057

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-10-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1514644 A	16-03-2005	US 2005058518 A1	17-03-2005
WO 02072313 A	19-09-2002	IT MI20010134 U1	12-09-2002
WO 2007143400 A	13-12-2007	NONE	
WO 9967057 A	29-12-1999	AU 4300499 A	10-01-2000
		BR 9911410 A	20-03-2001
		CA 2334586 A1	29-12-1999
		CN 1306468 A	01-08-2001
		EP 1089853 A1	11-04-2001
		ID 27779 A	26-04-2001
		JP 2002518196 T	25-06-2002
		SE 511708 C2	08-11-1999
		SE 9802220 A	08-11-1999
		US 2001005668 A1	28-06-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82