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(54) **Sanding tool mounting device**

Schleifwerkzeughaltevorrichtung

Dispositif de montage d'un outil de ponçage

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Description

[0001] The present invention relates to a support disc for an electrical disc sanding apparatus and an electrical disc sanding apparatus in which a circular sheet of abrasive material is rotated, as per the preambles of claim 1 and 13 respectively.

[0002] Such apparatus is well known in the art, see for example FR-A-2 701 417. Typically a thin, flexible sheet of abrasive material is mounted on a more rigid disc-shaped support which in turn is coupled to an electric motor for rotating the support disc. In some prior art configurations the sheet may be held in place by a mechanical arrangement of a bolt and dished washer, the bolt penetrating the centre of the sheet and disc, and the bolt head and washer being accommodated in a recess. More recently, an arrangement has been provided in which a layer of woven hook material, of a hook and loop fastener, is bonded to the underside of the disc. The sheet of abrasive material has a layer of loop material on its upper surface, and so is pressed on to the hook layer to fix the abrasive sheet in place.

[0003] Referring to Figure 1, this shows a cross section through a diameter of a prior art disc and sheet of abrasive material.

[0004] A circular support disc 2 moulded of plastics material has a central metal ring 4 in an aperture 6, for coupling the disc to an electric motor. Smaller apertures 8 extend through the disc to allow dust, generated in a sanding operation, to be vented through the disc. A layer of woven hook material 10 is bonded to the underside 12 of the disc 2 with adhesive 11. Such woven hook material is well known. The hooks may be formed by weaving loops of relatively stiff filament, which are then cut to form the hooks. Apertures 26 in the layer 10 align with apertures 8 in the disc 2 and a central aperture 27 aligns with aperture 6.

[0005] A sheet of abrasive material 14, which may be of paper, cloth or other composite material as well known in the art, which has an abrasive material layer 15, which may be of paper or cloth, carries abrasive grains 16 on its underside 18, and a layer of loop material 20 on its upper side 22. The loops are woven loops, such as a plush pile. Again this is well known in the art of hook and loop fastener.

[0006] The sheet 14 may be of laminated construction, as shown, with the loop material layer 20 bonded to the abrasive layer 15 with adhesive 30, though other constructions are possible.

[0007] To attach the sheet 14 to the disc, the sheet is simply pressed onto the disc. Apertures 24 in the sheet are aligned with apertures 8, 26 in the disc assembly 2 when attaching the sheet.

[0008] We have found that although this system is very convenient, the hook system deteriorates over time, probably due to the heat and pressure generated during use. The sheet is thus not attached as well to the disc. Also, even with a good condition hook surface, there is a tendency for the abrasive sheet to separate from the disc.

[0009] FR-A-2701417 shows a supporting disc having hooks on its underside for attachment of an abrasive sheet. US-A-2001001088 shows an abrasive sheet having hooks on it.

[0010] The present invention provides a support disc for an electrical disc sanding apparatus, as set forth in claim 1, and an electrical disc sander including such a support disc, as set forth in claim 13. The moulded hooks may be formed on a layer of material which is bonded to the main body of the disc, for example by heat or ultrasonic welding or adhesive. Preferably the hooks are integrally formed on the disc body, being moulded as part of the body proper.

[0011] By provided moulded hooks, different constructions of abrasive sheet may be used. For example, moulded hooks are better able to attach a non-woven fabric layers and so a non-woven material may be used on the upper surface of the abrasive sheet.

[0012] The moulded hooks may be oriented in different directions. It is believed that this is better able to withstand the forces generated in the sanding operation. Thus, books may be formed in groups which face radially outwards - that is the crook of the hook faces the perimeter of the disc. The hooks may be in groups which are oriented out at an angle to the hooks of another group. The hooks may also be oriented circumferentially of the disc, to optimise the shear strength of the hook and loop fastener in the direction of rotation of the disc.

[0013] Other advantages and preferred features of the invention will be apparent from the following description.

[0014] The invention will be further described by way of example with reference to the accompanying drawings, in which

Figure 1 is a cross-section through a prior art support disc and abrasive sheet material;

Figure 2 is a perspective view of an electrical disc sander incorporating an embodiment of the invention;

Figure 3 is a cross-section through a first embodiment of the invention;

Figure 4 is a cross-section through a second embodiment of the invention;

Figures 5, 6 and 7 show modifications of the embodiments of Figures 3 and 4;

Figure 8 shows a modification of the arrangements of Figures 5 to 7;

Figure 9 illustrates a typical moulded hook shape which may be used in the embodiments of the in-

vention;

Figure 10 illustrates another embodiment of the invention similar to the embodiment of Figure 5, and

Figure 11 shows a hook formation of the embodiment of Figure 10.

[0015] Referring to Figure 2, a disc type electrical sander has a housing 100 which houses an electrical motor (not shown), a handle 102 carrying a switch 104, and a power cord 106. A support disc 108 is rotatably mounted below the housing 100, by being coupled to a shaft of the electrical motor, as well known in the art. A sheet 110 of abrasive material is attached to the underside 112 of the disc 108, as will be described in more detail hereinafter. Typically the support disc may be attached directly to an extension of the motor shaft, or mounted on another disc attached to the shaft, Various configurations are possible and known in the art. Also the disc may be driven via gearing if the motor is oriented differently.

[0016] The housing 100 has inlet vents 114, and a fan arrangement (not shown) on the motor draws air in through the vents 114, and dust through apertures 24 in the abrasive sheet 110 and disc 108, to deposit the abrasive dust in a bag 116 mounted on the housing. This arrangement is well known.

[0017] Referring to Figure 3, the disc 108 has a body 109 moulded of plastics material and has a metal disc 120 insert moulded in a central aperture 122. A polyester elastomer is a suitable plastics material for the disc. The metal disc 120 has an aperture 124 to receive a bolt for coupling the disc to the electrical motor. Ventilation apertures 126 are positioned around the central aperture 122.

[0018] A layer 128 of moulded hook material, moulded of plastics material, is attached to the underside 129 of the disc body by adhesive 133. Other attachment systems could be used, for example ultrasonic welding. The production of moulded hook material is well known. The material could be produced as sheets, from which the layer 128 is cut, or the layer 128 may be moulded to shape.

[0019] The arrangement of the moulded hooks 130 on the underside 132 of the layer 128 will be described more fully in relation to Figures 5 to 8. Referring firstly to Figure 9, a base layer 131 has a multiplicity of hooks 130 integrally moulded on one surface. Figure 9 shows a well known crook-shaped moulded hook used in hook and loop fastener systems. The hook 130 has a crook portion 140 which faces to the right of the drawing, in the direction A. Typically such hooks may be 1 or 2 mm high, but smaller hooks may be produced. When a material, such as a loop material is attached to the hook, the system has a high shear strength, resistance to shear, in the direction opposite to the facing direction A of the crook.

[0020] Figure 3, and the other figures are schematic in showing only a small number of hooks and/or loops and of exaggerated dimension. The number and size of hooks and loops may be varied over a wide range and tailored to meet the mechanical requirements of the product.

[0021] The abrasive sheet 110 may be of typical construction, as described above with references to Figure 1. However, moulded hooks are better able to be attached to a wide variety of materials, including non-woven or spun-bonded materials. Thus layer 134 of non-woven material which will couple to the hooks 130 may be provided on the upper surface of the sheet 110 in place of loop material layer 20.

[0022] Referring to Figure 4, in a particularly preferred embodiment, the hooks 130 are integrally moulded on the underside 129 of the disc body 109.

[0023] Referring to Figure 5, the underside of the layer 128 of Figure 3, or the underside 129 of the disc body 109' of Figure 4, is shown. The moulded hooks 130 are arranged in four groups 150 of generally identical pattern, each group occupying a quarter of the disc surface and the groups being rotated through 90 degrees around the disc so that the hooks face generally in the same direction relative to the rotation of the disc. Where a support disc is to be rotated in a single direction B, the crook shape hooks will preferably be oriented with their facing direction A generally in the direction B to resist the shear created by the abrasive material in use. It will be appreciated that the hooks within a group may be oriented in different directions.

[0024] Referring to Figure 6, this shows a hook arrangement with the hooks in groups 160 which extend radially of the disc, the hook facing radially outwards.

[0025] Referring to Figure 7, the hooks 130 face in the circumferential direction, in the direction of rotation B. The hooks may be arranged in circles about the centre of the disc, or spiral radially outward. As mentioned above, only a small number of hooks is shown, in practice the surface of the disc or layer will be populated with a high number of hooks, typically 10 to 50 per sq. cm.

[0026] Referring to Figure 8, the size of the hooks 130 may be varied across the area of the disc 108. For example, it may be beneficial to have hooks with a greater height midway between the disc centre and the edge of the disc.

[0027] Ribs 180 or other supporting surfaces may be moulded on to the surface 131 of sheet 128, in the Figure 3 embodiment, or surface 129 of disc 109' in the figure 4 embodiment, see for example Figures 5, 6 and 9. Fewer hooks may be used, and the ribs support the sheet 14(110). Also, this may be particularly useful to avoid deformation of the hooks under pressure.

[0028] In the embodiment of Figure 10, the hooks 130 are arranged in groups 190 with an axis of alignment C similar to the embodiment of Figure 5. Only one group is shown, and the other groups will have their axis rotated through 90 degrees as in the embodiment of Figure

5.In this embodiment, the hooks are crook shape hooks, as in Figure 9, but are in pairs, with the hooks of a pair facing in opposite directions, as shown more clearly in Figure 11. Also, ribs 191 extend up between and adjacent the hooks 130. The ribs are contiguous with the hooks and serve to reinforce the hooks against being crushed in use, and to improve the shear strength.

[0029] Hooks patterns with adjacent hooks facing at an angle, particularly 90 degrees, to each other are also possible.

[0030] It will be appreciated than although we refer particularly to sheets of abrasive material and to a sanding operation, the invention is also applicable to polishing discs and the like. Also, other moulded hooks shapes are known in the art and may be used.

Claims

1. A support disc for an electrical disc sanding apparatus, the disc (108) having moulded hooks (130) on an underside (129) of the disc (108), for attachment of a cooperating sheet of abrasive material (140) to the disc, **characterised in that** a plurality of supporting ribs (180,191) are provided on the underside of the disc, adjacent the hooks (130).

2. A support disc as claimed in claim 1, wherein a supporting rib (191) is contiguous with a hook (130).

3. A support disc as claimed in claim 1 or 2, in which the moulded hooks are formed on a support layer (128), the support layer being bonded to the main body of the disc.

4. A support disc as claimed in claim 1 or 2, in which the hooks (130) are integrally formed on the disc body (109).

5. A support disc as claimed in claim 1, 2, 3 or 4, in which the moulded hooks (130) are oriented in different directions on the disc surface (129).

6. A support disc as claimed in claim 5, in which adjacent hooks (130) face in different directions.

7. A support disc as claimed in 5, in which a plurality of the hooks (130) are crook shaped and face radially outwards to the perimeter of the disc (108).

8. A support disc as claimed in claim 5, in which the hooks (130) are formed in a plurality of groups (150) on the disc surface (129), and each group (150) is rotated through an angle relative to an adjacent group (150) on the disc surface (129).

9. A support disc as claimed in claim 5, wherein the hooks face in the circumferential direction of the disc (108).

10. A support disc as claimed in claim 8 or 9, in which the hooks (130) are crook shaped.

11. A support disc as claimed in any one of claims 1 to 10, in which the hooks (130) have an asymmetrical response to shear when coupled to an abrasive sheet (110) and are aligned to provide a greater shear strength of the fastening in a direction of rotation (B) of the disc as compared to a diametral direction and/or the opposite rotational direction.

12. In combination, a support disc of any one of claims 1 to 11, and an abrasive sheet (110) having a non-woven fabric layer (134) on the upper surface of the abrasive sheet for attachment to the moulded hooks.

13. An electrical disc sander including a support disc (108) as claimed in any one of claims 1 to 11.

Patentansprüche

1. Stützscheibe für eine elektrische Scheibenschleifvorrichtung, wobei die Scheibe (108) Formhaken (130) auf einer Unterseite (129) der Scheibe (108) für die Befestigung eines zusammenwirkenden Bogens des Schleifmaterials (140) an der Scheibe aufweist, **dadurch gekennzeichnet, dass** eine Vielzahl von Stützrippen (180, 191) auf der Unterseite der Scheibe benachbart den Haken (130) vorhanden ist.

2. Stützscheibe nach Anspruch 1, bei der eine Stützrippe (191) mit einem Haken (130) benachbart ist.

3. Stützscheibe nach Anspruch 1 oder 2, bei der die Formhaken auf einer Stützschicht (128) gebildet werden, wobei die Stützschicht mit dem Hauptkörper der Scheibe verbunden ist.

4. Stützscheibe nach Anspruch 1 oder 2, bei der die Haken (130) zusammenhängend auf dem Scheibenkörper (109) gebildet werden.

5. Stützscheibe nach Anspruch 1, 2, 3 oder 4, bei der die Formhaken (130) in unterschiedlichen Richtungen auf der Scheibenoberfläche (129) ausgerichtet sind.

6. Stützscheibe nach Anspruch 5, bei der die benachbarten Haken (130) in unterschiedlichen Richtungen liegen.

7. Stützscheibe nach Anspruch 5, bei der eine Vielzahl von Haken (130) gekrümmt ist und radial nach au-

ßen zum Umfang der Scheibe (108) liegt.

8. Stützscheibe nach Anspruch 5, bei der die Haken (130) in einer Vielzahl von Gruppen (150) auf der Scheibenoberfläche (129) gebildet werden, und wobei eine jede Gruppe (150) um einen Winkel relativ zu einer benachbarten Gruppe (150) auf der Scheibenoberfläche (129) gedreht wird.

9. Stützscheibe nach Anspruch 5, bei der die Haken in der Umfangsrichtung der Scheibe (108) liegen.

10. Stützscheibe nach Anspruch 8 oder 9, bei der die Haken (130) gekrümmt sind.

11. Stützscheibe nach einem der Ansprüche 1 bis 10, bei der die Haken (130) eine asymmetrische Scherreaktion zeigen, wenn sie mit einem Schleifmittelbogen (110) verbunden und ausgerichtet sind, um eine größere Scherfestigkeit der Befestigung in einer Drehungsrichtung (B) der Scheibe bereitzustellen, verglichen mit einer diametralen Richtung und/oder der entgegengesetzten Drehungsrichtung.

12. In Kombination eine Stützscheibe nach einem der Ansprüche 1 bis 11 und einen Schleifmittelbogen (110) mit einer Vliesstoffschicht (134) auf der oberen Fläche des Schleifmittelbogens für eine Befestigung an den Formhaken.

13. Elektrische Scheibenschleifvorrichtung, die eine Stiftscheibe (108) nach einem der Ansprüche 1 bis 11 umfasst.

Revendications

1. Disque de support pour un dispositif de ponçage électrique à disque, le disque (108) comportant des crochets moulés (130) sur un côté inférieur (139) du disque (108), en vue d'une fixation d'une feuille coopérante de matériau abrasif (140 sur le disque, **caractérisé en ce que** plusieurs nervures de support (180, 191) sont agencées sur le côté inférieur du disque, en des points adjacents aux crochets (130).

2. Disque de support selon la revendication 1, dans lequel une nervure de support (1191) est contiguë à un crochet (130).

3. Disque de support selon les revendications 1 ou 2, dans lequel les crochets moulés sont formés sur une couche de support (128), la couche de support étant reliée au corps principal du disque.

4. Disque de support selon les revendications 1 ou 2, dans lequel les crochets (130) sont formés d'une seule pièce sur le corps du disque (109).

5. Disque de support selon les revendications 1, 2, 3 ou 4, dans lequel les crochets moulés (130) sont orientés dans des directions différentes sur la surface du disque (129).

6. Disque de support selon la revendication 5, dans lequel les crochets adjacents (130) sont orientés dans des directions différentes.

7. Disque de support selon la revendication 5, dans lequel plusieurs des crochets (130) ont une forme courbée et sont orientés radialement vers l'extérieur par rapport au périmètre du disque (108).

8. Disque de support selon la revendication 5, dans lequel les crochets (130) sont formés dans plusieurs groupes (150) sur la surface du disque (129), chaque groupe (150) étant tourné à travers un angle par rapport à un groupe adjacent (150) sur la surface du disque (129).

9. Disque de support selon la revendication 5, dans lequel les crochets sont orientés dans une direction circonférentielle du disque (108).

10. Disque de support selon les revendications 8 ou 9, dans lequel les crochets (130) ont une forme courbée.

11. Disque de support selon l'une quelconque des revendications 1 à 10, dans lequel les crochets (130) présentent une réponse asymétrique à un cisaillement lors de l'accouplement à une feuille abrasive (110) et sont alignés pour assurer une résistance au cisaillement accrue de la fixation dans une direction de rotation (B) du disque par rapport à une direction diamétrale et/ou à la direction de rotation opposée.

12. Combinaison d'un disque de support selon l'une quelconque des revendications 1 à 11 et d'une feuille abrasive (110) comportant une couche de tissu non tissé (134) sur la surface supérieure de la feuille abrasive destinée à être fixée sur les crochets moulés.

13. Dispositif de ponçage électrique à disque englobant un disque de support (108) selon l'une quelconque des revendications 1 à 11.

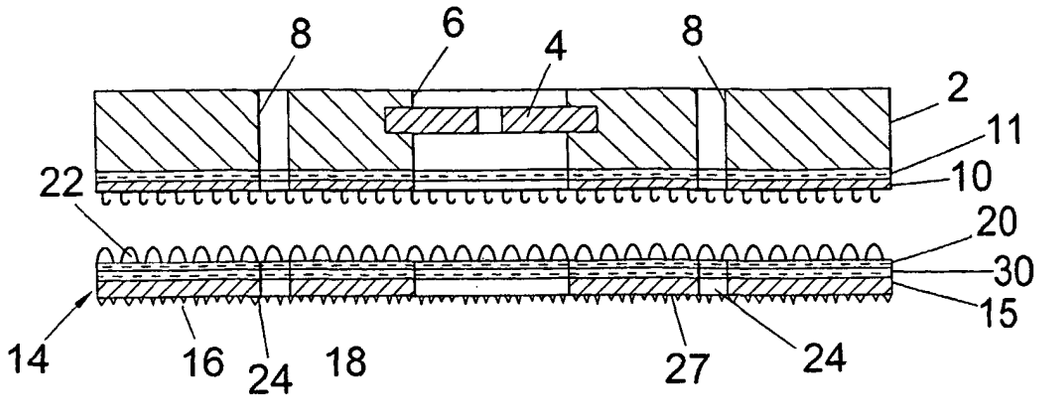

8
6
4
8
2
11
10
22
20
30
15
14
16
24
18
27
24

Fig. 1

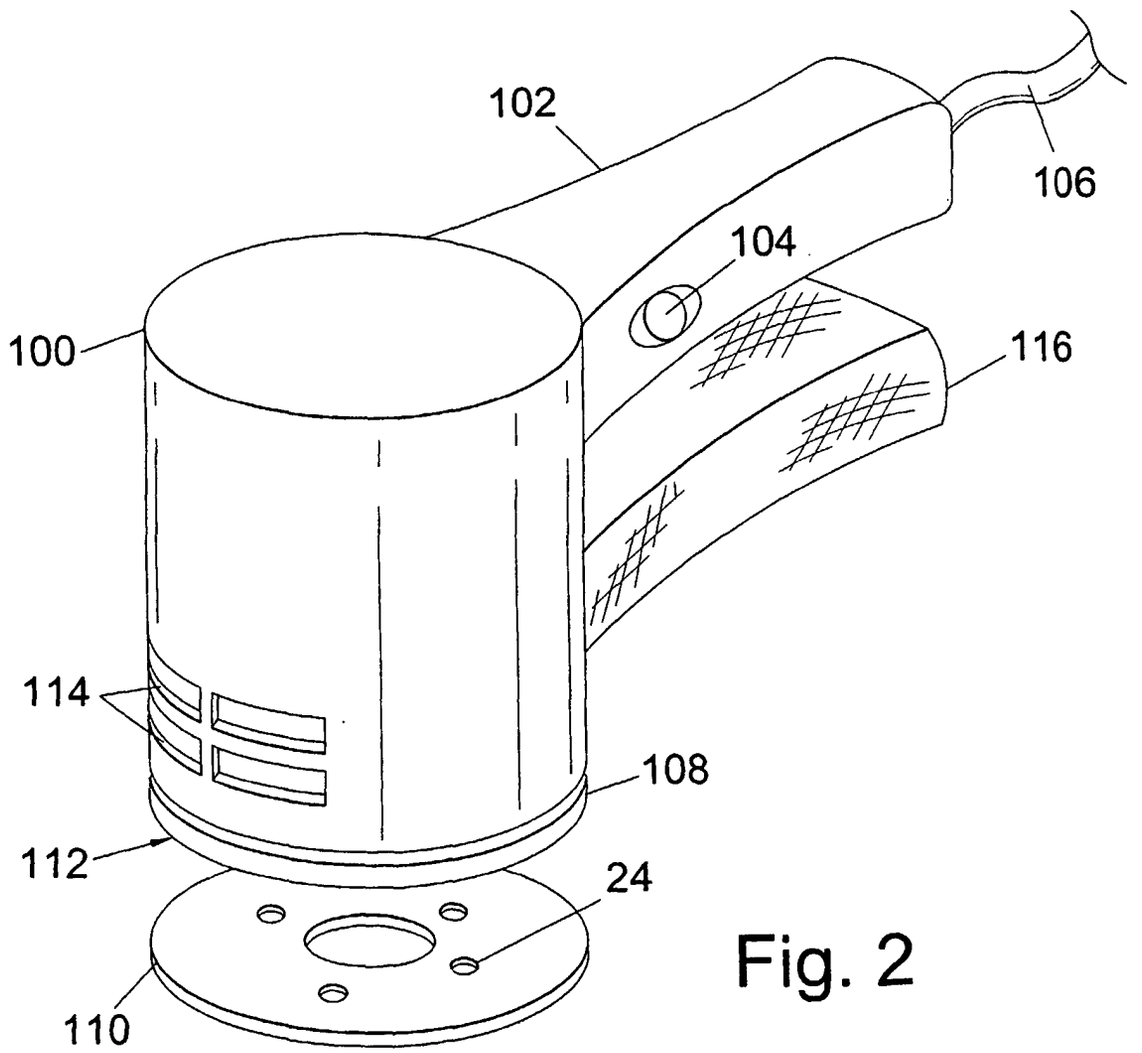

102
106
104
100
116
114
108
112
24
110

Fig. 2

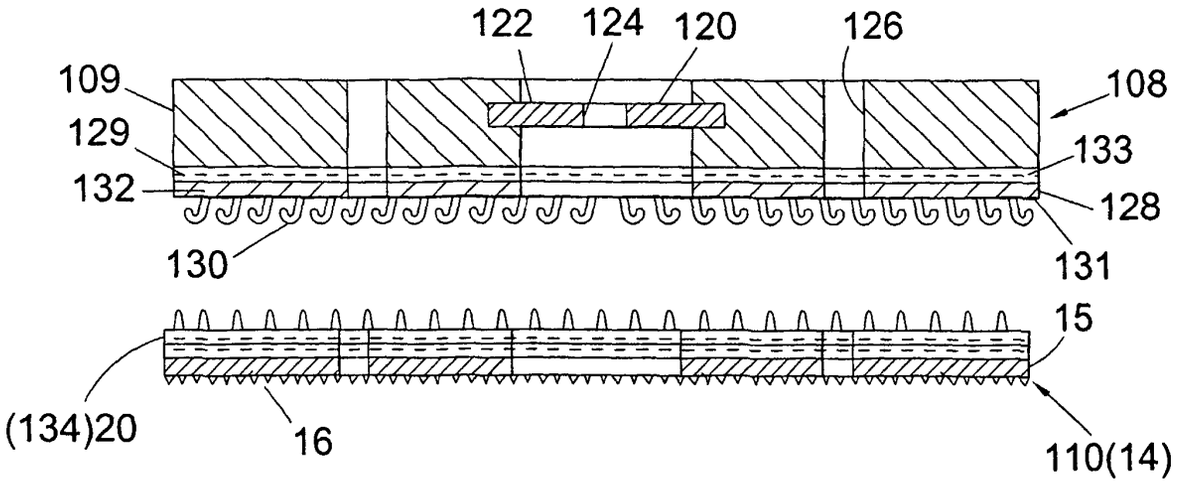

122
124
120
126
109
108
129
133
132
128
130
131
15
(134)20
16
110(14)

Fig. 3

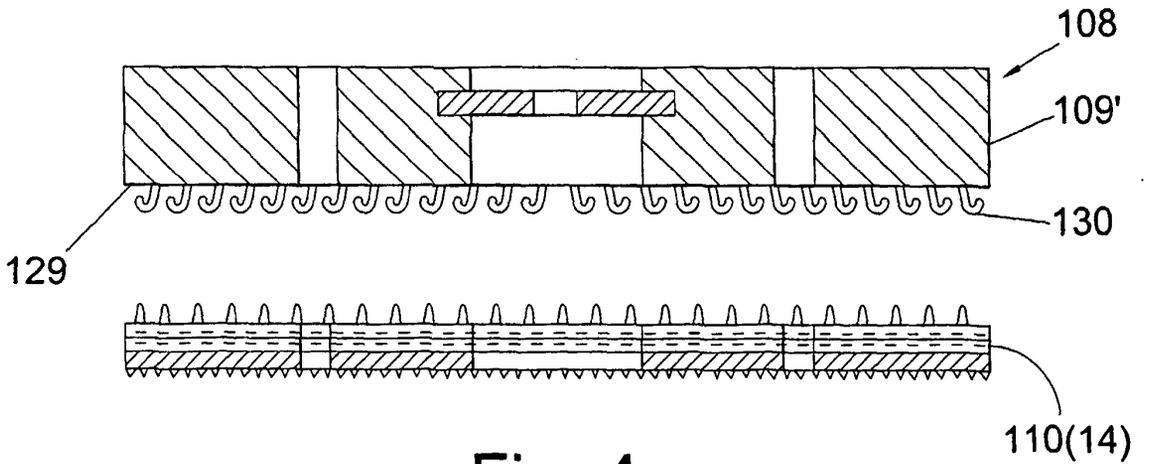

108
109'
130
129
110(14)

Fig. 4

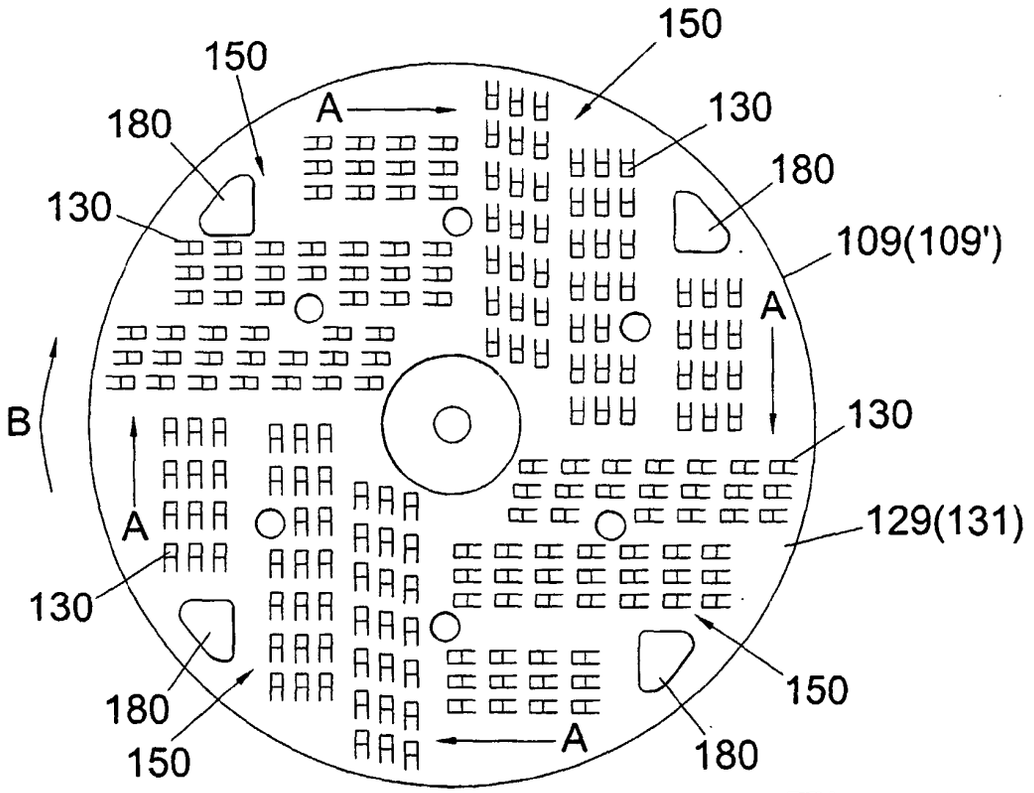

150
150
A
130
180
180
130
109(109')
A
B
130
A
129(131)
130
150
180
180
150
A

Fig. 5

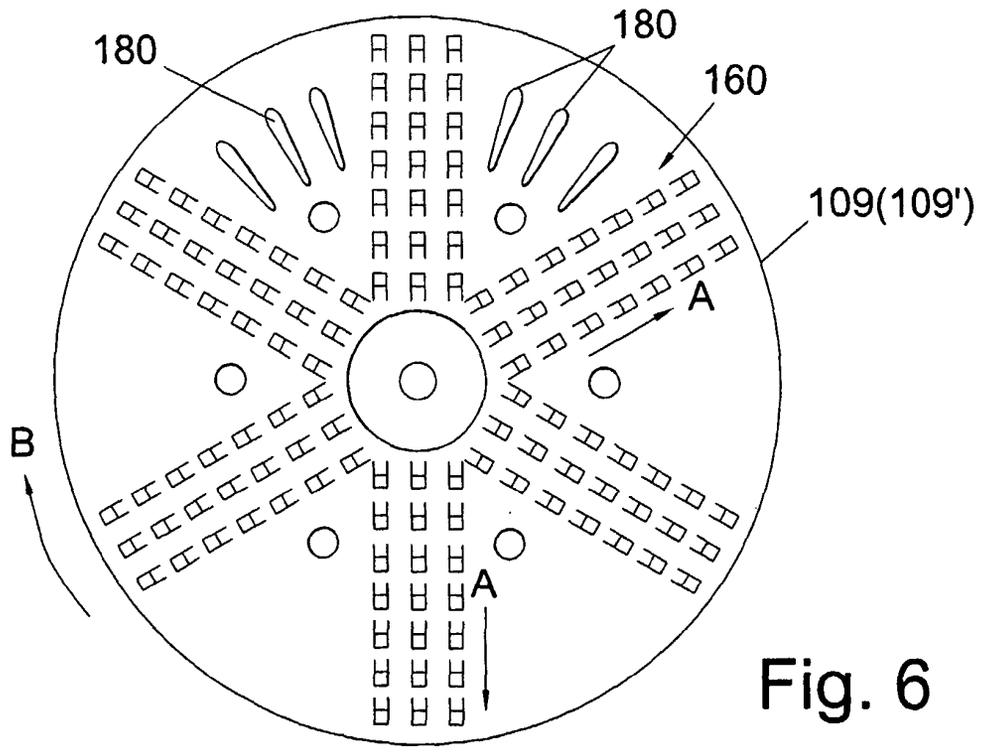

180
180
160
109(109')
A
B
A

Fig. 6

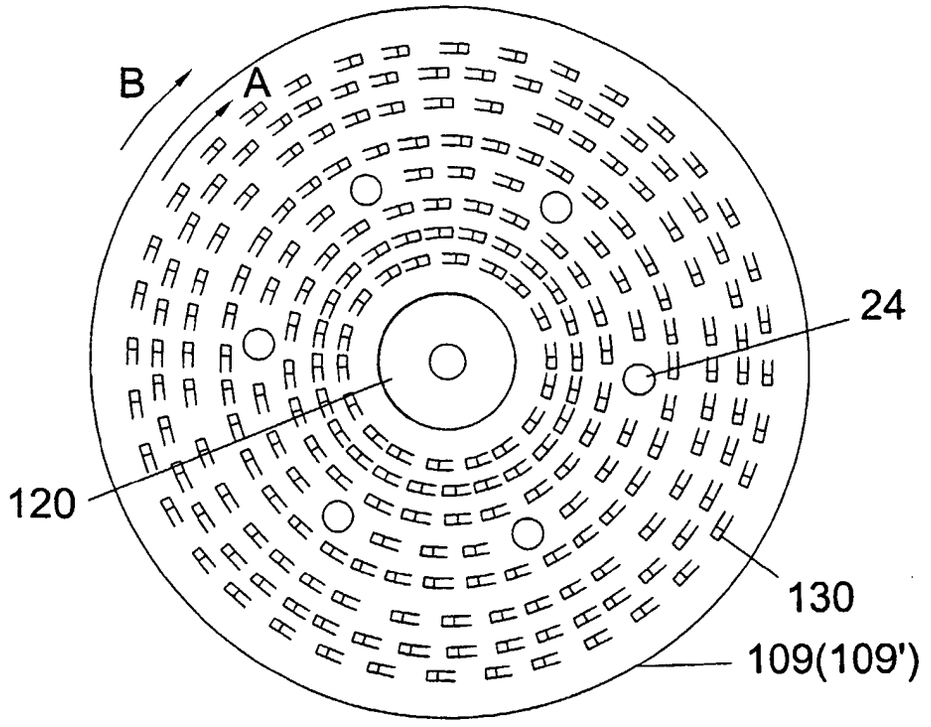


Fig. 7

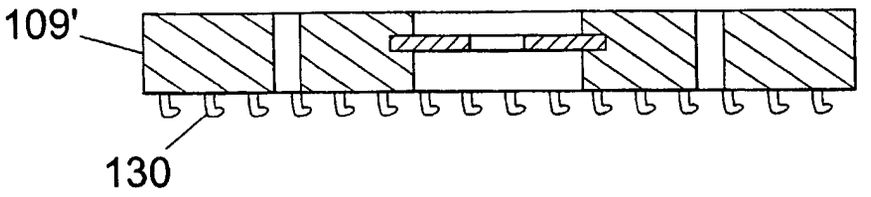


Fig. 8

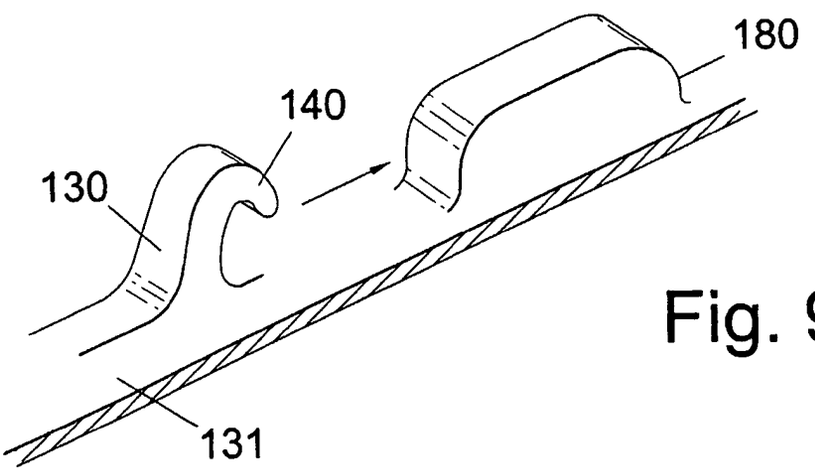


Fig. 9

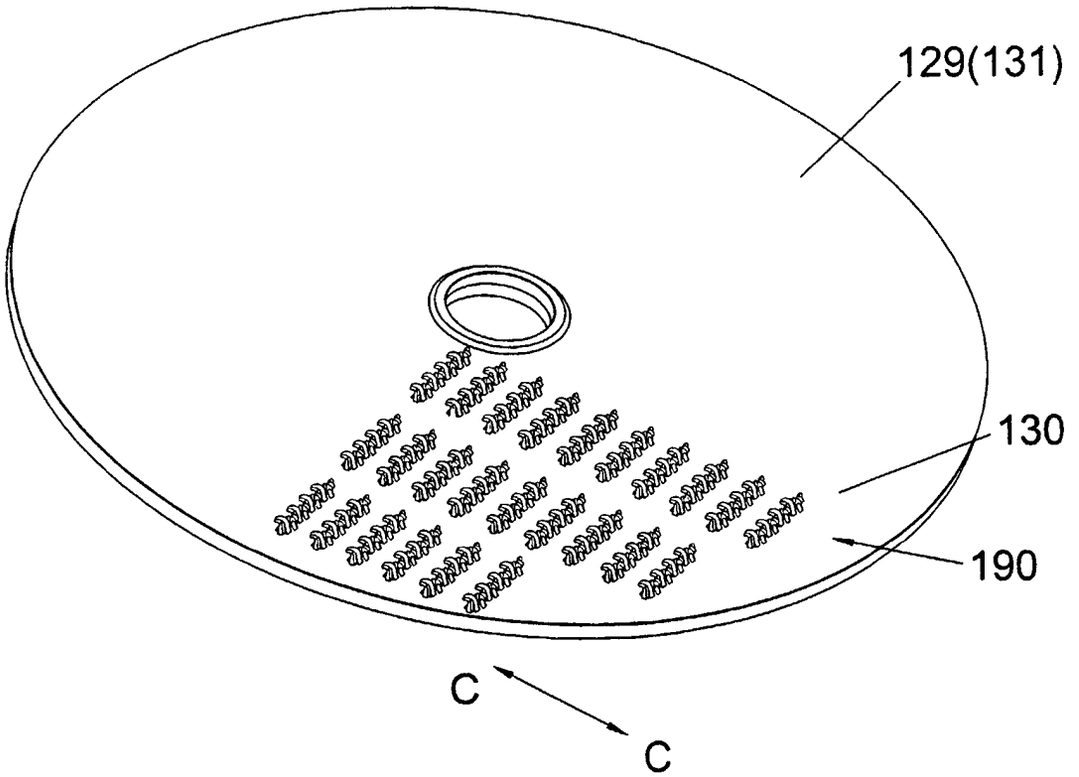


Fig. 10

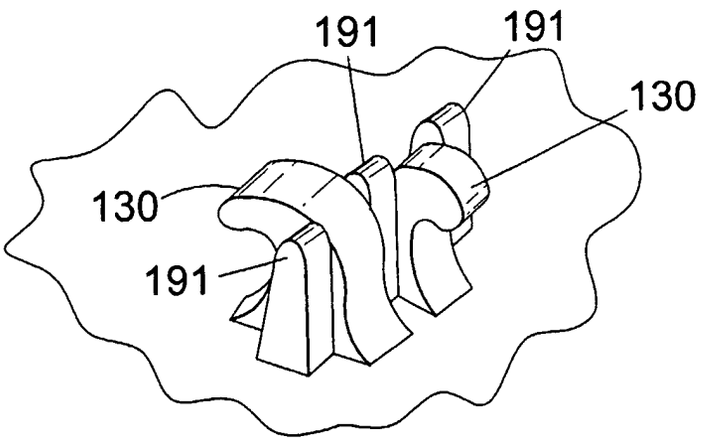


Fig. 11