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(54) **A dispenser assembly**

(57) A dispenser assembly (1) for dispensing a sheet (2) from a roll of sheet material (3), the dispenser assembly (1) comprising:  
 - a roll holder (5) for removably holding the roll of sheet material (3), the roll of sheet material (3) being free to rotate relatively to the roll holder (5);  
 - a supporting base (4) for supporting the roll holder (5) and for coupling the dispenser assembly (1) with an environment structure (7);  
 - a housing cover (6) being pivotally coupled to the supporting base (4) by means of a hinge arrangement (10);

wherein the hinge arrangement (10) comprises an internal braking mechanism arranged to brake the opening of the housing cover falling down under the action of gravity.

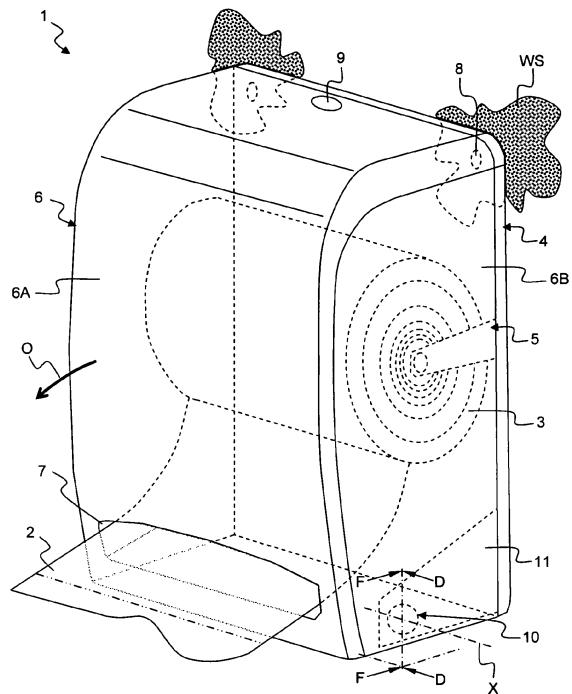


FIG. 1

**Description****FIELD OF THE INVENTION**

**[0001]** An aspect of the invention relates to a dispenser assembly. Such a dispenser assembly finds a particular, though non exclusive, application in dispensing a paper towel roll.

**BACKGROUND OF THE INVENTION**

**[0002]** The document US 2006/0102769 describes a dual-mount roll dispenser having a cover and a body. The body portion is adapted for recess mounting but is also suitable to be exposed in a wall mount application. The hinge or pivots that permit the cover to be opened are positioned sufficiently far forward that, together with the shape of the cover, the cover can be opened wide even when more than half the depth of the dispenser is recessed with a surrounding wall.

**[0003]** However, this dispenser is not satisfactory because at a maintenance operation, for example when the dispenser is refilled with a new paper towel roll, after being unlocked, the cover falls down rapidly during the opening phase under the action of gravity. The action of gravity is further enhanced by the facts that the cover typically weights around 1 kg and is overhanging.

**SUMMARY OF THE INVENTION**

**[0004]** It is an object of the invention to propose a dispenser assembly that overcomes the above mentioned drawback, and in particular improve the opening phase.

**[0005]** According to the invention, a braking mechanism is proposed. The braking mechanism enables a smooth opening of the cover.

**[0006]** According to one aspect, there is provided a dispenser assembly for dispensing a sheet from a roll of sheet material, the dispenser assembly comprising:

- a roll holder for removably holding the roll of sheet material, the roll of sheet material being free to rotate relatively to the roll holder;
- a supporting base for supporting the roll holder and for coupling the dispenser assembly with an environment structure; and
- a housing cover being pivotally coupled to the supporting base by means of a hinge arrangement;

wherein the hinge arrangement comprises an internal braking mechanism arranged to brake the opening of the housing cover falling down under the action of gravity.

**[0007]** The hinge arrangement may comprise a first part coupled to the supporting base and a second part coupled to the housing cover, the hinge arrangement pivotally coupling the first part and the second part that have a rotational movement relative to each other when the housing cover is opened relatively to the supporting base,

and wherein the hinge arrangement further comprises a deformable element interposed between the first part and the second part.

**[0008]** The first part may be realized under the form of a retaining housing provided in a lateral portion of the supporting base. The second part may be realized under the form of a cylinder extending from a lateral portion of the housing cover, the cylinder comprising at least one projection extending outwardly substantially radially from the periphery of the cylinder, the projection being positioned at a distal end of the cylinder. The retaining housing may define an internal space for receiving the cylinder together with the at least one projection that are free to rotate within said internal space.

**[0009]** Said projection may be an angular sector in a transverse section, a periphery of said projection defining a curved frictional surface.

**[0010]** The cylinder may comprise two projections that are asymmetrically positioned around a periphery of the cylinder.

**[0011]** The deformable element may be a washer having a cylindrical shape and comprising at least one inwardly and axially directed braking portion, the braking portion defining an inversely curved frictional surface.

**[0012]** The deformable element may comprise two braking portions that are symmetrically positioned around the washer.

**[0013]** The cylinder may comprise at least two projections and the deformable element may comprise at least two braking portions, said projections and braking portions being asymmetrically positioned relatively to each other such as to substantially continuously brake the housing cover during an opening phase.

**[0014]** The attacking edge of the projections may be provided with a rounded profile.

**[0015]** The internal periphery of the washer may have a first diameter such that the cylinder together with said projection is free to rotate within the washer, and a second diameter at said braking portion lower than the diameter of the cylinder together with said projection.

**[0016]** The deformable element may comprise at least one feather extending longitudinally or radially from the external periphery of the deformable element and arranged to be received within a respective longitudinally or radially extending recess in the retaining housing.

**[0017]** The feathers may be positioned outside zones defined by the braking portions.

**[0018]** The cylinder together with the projection may be made of a rigid plastic material, and the deformable element may be made of an elastically deformable flexible material.

**[0019]** The deformable element may be made of poly-oxymethylene.

**[0020]** The roll of sheet material may be a paper towel roll.

**[0021]** According to another aspect, there is provided a deformable element arranged to be used in a dispenser assembly according to the present invention.

**[0022]** According to a further aspect, there is provided a method of manufacturing a dispenser assembly comprising coupling a housing cover to a supporting base by means of a hinge arrangement, wherein the hinge arrangement is provided with an internal braking mechanism for the dispenser assembly according to the present invention.

**[0023]** The invention enables improving the safety of the maintenance operation requiring the opening of the cover by reducing the risk of injury due to a cover falling down rapidly by the action of gravity, in particular onto the operator. This may be particularly advantageous during maintenance of dispenser assembly used in a private application context, for example when the refilling is performed by an individual with disability. It further enables limiting the intensity of the impact of the cover onto the supporting wall of the dispenser assembly.

**[0024]** Other advantages will become apparent from the hereinafter description of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0025]** The present invention is illustrated by way of examples and not limited to the accompanying drawings, in which like references indicate similar elements:

- FIG. 1 is a perspective partially transparent view schematically illustrating an embodiment of a dispenser assembly of the invention;
- FIGS. 2 to 4 are a perspective sectional cut-away view along plane D-D, a cross section view along plane D-D, and a cross section view along plane FF schematically illustrating a first embodiment of a hinge arrangement adapted for the dispenser assembly of FIG. 1, respectively;
- FIG. 5 is a perspective view of a deformable element used in the hinge arrangement of FIGS. 2, 3 and 4;
- FIGS. 6 to 8 are cross section views along plane D-D schematically illustrating a second embodiment of a hinge arrangement adapted for the dispenser assembly of FIG. 1 at different stages of the opening of the cover, respectively; and
- FIGS. 9 to 10 are cross section views along plane D-D schematically illustrating a third embodiment of a hinge arrangement adapted for the dispenser assembly of FIG. 1 at different stages of the opening of the cover, respectively.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0026]** In the following description, the terminology "a roll of sheet material" has a large meaning encompassing, as examples, the rolls of paper towels, toilet tissues, plastic sheets or the like, metal sheets (e.g. aluminum) sheets or the like, food preservation bags, wraps, etc... The sheet material may be rolled as a continuous non-perforated sheet or pre-perforated sheets. Further, the terminology "roll of sheet material" also covers either roll

of sheet material having a core, or roll of sheet material being coreless. In particular, during the manufacturing process of the roll of sheet material, either the sheet material is wound into a cylinder onto a core (as an example a hollow cylinder made of cardboard, or a plastic mandrel, or a metallic axle, etc...), or the sheet material is wound into a cylinder on itself such as to define a central hollow cavity of substantially cylindrical shape and of variable size extending longitudinally.

**[0027]** The dispenser assembly may be used for residential or commercial applications for dispensing multiple of the hereinbefore mentioned sheets of material from a roll of sheet material.

**[0028]** The dispenser assembly may dispense the sheets of material from the roll of sheet material either manually (a user may pull the sheet of material with a hand) or motor assisted (a motor may assist in automatically dispensing the sheet of material on wish). There are numerous mechanisms to automatically dispense the sheet of material, and also to cut the sheet of material at the user requested length. These mechanisms are not germane to the present invention and will not be further described in details.

**[0029]** FIG. 1 is a perspective partially transparent view schematically illustrating an embodiment of a dispenser assembly 1 according to the invention. The dispenser assembly 1 is used to dispense a sheet 2 from a roll of sheet material 3.

**[0030]** The dispenser assembly 1 may comprise a supporting base 4, a roll holder 5 and a housing cover 6.

**[0031]** In the embodiment depicted in FIG. 1, only one roll holder 5 having the form of an arm coupled to one edge of the roll of sheet material 3 is depicted. Alternatively, the roll of sheet material 3 may be held on both edges, i.e. by two arms. These are particular examples; other ways of holding the roll of sheet material within the dispenser assembly may be alternatively used. The roll holder 5 may hold in a removable manner the roll of sheet material 3. The roll of sheet material 3 is free to rotate relatively to the roll holder 5.

**[0032]** The supporting base 4 may support the roll holder 5. The supporting base 4 further couples the dispenser assembly 1 with an environment supporting structure WS, for example a wall, by means of appropriate securing elements 8 (screwing arrangement, gluing arrangement, etc.).

**[0033]** The supporting base 4 is further coupled to the housing cover 6 forming some kind of hood. The housing cover 6 protects the interior of the dispenser with respect to various alterations potentially caused by the external environment (e.g. persons, humidity, etc...). The housing cover 6 comprises a front portion 6A provided with a slit 7 that is adapted to dispense sheets 2 of material. The housing cover 6 comprises a lateral portion 6B that extends substantially perpendicular to the front portion 6A and substantially perpendicular to the supporting base 4. Alternatively, for reasons of design, the lateral portion 6B may extend at an angle from the front portion 6A to-

wards the supporting base 4.

**[0034]** The housing cover 6 is pivotally mounted to the supporting base 4 by means of a hinge arrangement 10. The pivotal movement of the housing cover 6 relatively to the supporting base 4 is illustrated by the arrow O. This movement occurs when an operator opens the dispensing assembly 1. The terminology "hinge arrangement" has a broad meaning and encompasses any arrangement enabling the housing cover 6 to be pivotally mounted to the supporting base 4. In the exemplary embodiment of FIG. 1, the supporting base 4, which comprises a main surface extending substantially parallel to the supporting structure WS (e.g. the wall), further comprises a supporting base lateral portion 11 extending substantially perpendicular to the supporting base 4. The hinge arrangement 10 is provided between the lateral portion 11 of the supporting base 4 and the lateral portion 6B of the housing cover 6. The position of the hinge arrangement is defined by the relative shapes of the supporting base 4 and/or the housing cover 6. Practically, it can be positioned at any position between the supporting base 4 and the front part 6A of the housing cover 6 provided that the pivotal movement is not impaired.

**[0035]** The housing cover 6 may be held in place onto the supporting base 4 by means of a locking arrangement 9.

**[0036]** The housing cover 6 is closed during the use of the dispenser assembly, and opened during loading or unloading operation of the roll of sheet material 3 into the dispenser assembly 1. FIG. 1 illustrates a dispenser assembly in a closed state.

**[0037]** All the hereinbefore mentioned parts of the dispensing assembly 1 may be made by injection molding of plastic. However, some parts made of metal may be included.

**[0038]** FIGS. 2 to 4 are a perspective sectional cutaway view along plane D-D, a cross section view along plane D-D, and a cross section view along plane FF schematically illustrating a hinge arrangement 10 according to a first embodiment adapted for the dispenser assembly of FIG. 1, respectively. FIGS. 6 to 8 and FIGS. 9 to 10 are cross section views along plane D-D schematically illustrating a second and third embodiment, respectively.

**[0039]** The hinge arrangement 10 comprises a first part 12 coupled to the supporting base 4, and a second part 14 coupled to the housing cover 6. The first part 12 and the second part 14 have a rotational movement relative to each other when the housing cover 6 is opened relatively to the supporting base 4 that stays fixed/stationary relatively to the supporting structure WS. According to the invention, the hinge arrangement 10 applies a mechanical braking that is counter-acting against a sudden opening (arrow O in FIG. 1) of the housing cover 6 relatively to the supporting base 4. This results in slowing the opening of the housing cover 6. The hereinbefore mentioned effect is obtained by interposing a deformable element 17 between the first part 12 and the second part 14.

**[0040]** In the first embodiment, the first part is realized under the form of a retaining housing 12 provided in the supporting base lateral portion 11. The housing 12 has a longitudinal axis X that may extend substantially parallel to the supporting base 4. The housing 12 defines an internal space 13 (e.g. a parallelepipedic volume) for receiving the second part 14. The second part 14 is realized under the form of a cylinder 15 that may be formed integrally with the housing cover 6. The cylinder 15 may have the same longitudinal axis X as the housing 12. The cylinder 15 may extend perpendicularly to a housing cover lateral portion 6B. The cylinder 15 may be a hollow cylinder. The cylinder 15 further comprises at least one projection 16A, 16B extending outwardly from the periphery of the cylinder 15 substantially radially, i.e. perpendicularly to the longitudinal axis X. In the embodiment depicted in FIGS. 2-5, the cylinder 15 comprises a first 16A and second 16B projection. Each projection 16A, 16B being an angular sector in a transverse section and having a rectangular axial section has the shape of an ear. The projections 16A, 16B may be positioned at a distal end of the cylinder 15 farthest from the housing cover 6. The cylinder 15 together with the at least one projection 16A, 16B is free to rotate within the internal space 13. The periphery of each projection 16A, 16B defines a curved frictional surface 22A, 22B. The cylinder 15 together with the projection 16A, 16B has the function of a rotor, while the housing 12 has the function of a stator. The two projections 16A, 16B are separated by a separation angle c (see in particular FIG. 3) such that they have asymmetrical positions on the cylinder 15.

**[0041]** The housing 12 and the cylinder 15 together with the projection 16A, 16B may be made of a rigid plastic material. The cylinder 15 and the projections 16A, 16B may be formed integrally by injection molding of plastic. The housing cover 6, the cylinder 15 and the projections 16A, 16B may be molded as a single piece of plastic.

**[0042]** An example of a deformable element 17 is depicted in perspective in FIG. 5. The deformable element 17 is a washer 18 having a general cylindrical shape comprising at least one inwardly and axially directed braking portion 19A, 19B. Each braking portion 19A, 19B are forming a boss directed towards the longitudinal axis X. The internal periphery of the washer has a first diameter e (see in particular FIG. 4) such as to enable, on the one hand, the cylinder 15 with its projections 16A, 16B to freely rotate, and, on the other hand, mounting or dismantling the cover 6 from the supporting base 4 (e.g. during the manufacturing process or a maintenance operation). The internal periphery of the washer has also a second diameter (at the braking portion 19A, 19B) lower than the diameter of the cylinder 15 with its projections 16A, 16B. Each braking portion 19A, 19B has an inverted curvature (relatively to the general cylindrical shape) forming a frictional surface 23A, 23B. The deformable element 17 has the same longitudinal axis X as the housing 12 and the cylinder 15. The deformable element 17 has a rectangular axial section. In the embodiment de-

picted in FIGS. 2-5, the deformable element 17 comprises a first 19A and second 19B braking portion. Each braking portion 19A, 19B may have an angular extension b equal or lower than the separation angle c of the two projections 16A, 16B around the cylinder 15 (see in particular FIG. 3). The deformable element 17 further comprises at least one longitudinal feather 20A, 20B. In the embodiment depicted in FIGS. 3-5, the deformable element 17 comprises a first 20A and second 20B feather. The feathers 20A, 20B are locking protrusions used to block in place the deformable element 17 thereby preventing any pivotal movement within the housing 12 when the second part 14 rotates within the housing 12. As best seen in FIG. 4, each feather 20A, 20B is received within a respective longitudinally extending recess 21A, 21B appropriately positioned within the housing 12.

**[0043]** The deformable element 17 is made of an elastically deformable flexible material. As an example, the deformable element is made of Silicon. As another example, the deformable element is made of a polymer like acetal, polyacetal, polyoxymethylene (POM) or polyformaldehyde. In particular POM material shows a high strength, modulus and resistance to fatigue that is adapted to the use as a reliable deformable element in the present hinge arrangement.

**[0044]** The cylinder 15 (including the projections 16A, 16B) and the deformable element 17 dimensions are such that this assembly fits into the internal space 13 of the housing 12, is free to rotate within the housing 12 while being retained in place.

**[0045]** As an example, the dimension of a hinge arrangement 10 adapted for a dispenser assembly having a height of around 440 mm, a width of around 330 mm and a depth of around 150 mm may be as follows:

- the size of the housing in cross-section may be around 26 mmx26 mm;
- the radius g of the cylinder including a projection may be around 10 mm;
- the first diameter e of the washer may be around 17 mm;
- the second diameter f of the washer may be around 22 mm;
- the size of the washer in cross-section may be around 4 mmx4 mm; and
- the angular sector a defined by the projections 16A, 16B, the separation angle c between two projections 16A, 16B, and the angular extension b of the braking portion 19A, 19B, all may be around 60°.

**[0046]** FIGS. 6 to 8 are cross section views along plane D-D schematically illustrating a hinge arrangement 10 according to a second embodiment adapted for the dispenser assembly of FIG. 1.

**[0047]** The second embodiment differs from the first embodiment in that the deformable element 17 comprises multiple radial feathers 24A, 24B, 24C, 24D and 24E replacing the longitudinal feathers 20A, 20B. A better

blocking in rotation of the deformable element 17 within the housing 12 is achieved with the second embodiment compared to first one. In the embodiment depicted in FIGS. 6-8, the deformable element 17 comprises five radial feathers positioned around the external periphery of the deformable element 17. For example, three radial feathers 24A, 24B and 24C are positioned on a top portion of the deformable element 17 and two radial feathers 24D and 24E are positioned on a bottom portion of the deformable element 17. Each radial feather 24A, 24B, 24C, 24D and 24E is received within a respective radially extending recess 21A, 21B, 21C, 21D and 21E appropriately positioned within the housing 12. The cooperation between the radial feathers 24A, 24B, 24C, 24D and 24E and the recesses 21A, 21B, 21C, 21D and 21E enables locking in place the deformable element 17 and avoids any pivotal movement within the housing 12 when the second part 14 rotates within the housing 12. Each radial feather is received within the corresponding radially extending recess such that, on the one hand, said feather is not able to leave said recess, and on the other hand, a radial clearance authorizes a slight movement of said feather within said recess while the washer is deforming. The radial feathers 24A, 24B, 24C, 24D and 24E may be positioned anywhere around the external periphery of deformable element 17 including the zone defined by the braking portions 19A and 19B. Alternatively, the radial feathers 24A, 24B, 24C, 24D and 24E may be positioned outside the zone defined by the braking portions 19A and 19B in order to limit the interference with the deformation of the braking portions 19A and 19B during the opening of the housing cover 6. The number and position of the axial feathers may be varied provided that an appropriate locking of the deformable element is obtained.

**[0048]** FIGS. 6 to 8 also illustrate an example of the operation of the hinge arrangement 10 at different stages of the opening of the cover. In particular, FIGS. 6, 7 and 8 illustrate the hinge arrangement 10 at the beginning of the opening phase after the housing cover 6 is unlocked from the supporting base 4, during the braked opening phase when the housing cover 6 is opened at, for example, an angle around 90° relatively to the supporting base 4, and at the end of the opening phase when the housing cover 6 is opened at an appropriate angle, respectively.

**[0049]** The housing cover 6 is unlocked and pulled from the supporting base 4 and begins to fall under the action of the gravity.

**[0050]** At the beginning of the opening phase (FIG. 6), the cylinder 15 with its projections 16A, 16B begins to freely rotate (arrow R1) within the deformable element 17 when the housing cover 6 is opened from the supporting base 4.

**[0051]** During the braked opening phase (FIG. 7), a first braking phase is obtained when the curved frictional surface 22A of the first projections 16A contacts the inversely curved frictional surface 23A of the first braking portion 19A of the deformable element 17. Due to the

elasticity of the deformable element 17 and the hardness of the cylinder 15 with its projections 16A, the curved frictional surface 22A compresses and deforms outwardly the inversely curved frictional surface 23A of the braking portion 19A of the deformable element 17. This is represented by the arrow D1 and the dash lines, the dash line schematically representing the ovalization of the washer resulting from the deformation of the inversely curved frictional surface. A second braking phase is obtained when the curved frictional surface 22B of the second projections 16B then contacts the inversely curved frictional surface 23B of the second braking portion 19B of the deformable element 17. Due to the elasticity of the deformable element 17 and the hardness of the cylinder 15 with its projections 16B, the curved frictional surface 22B compresses and deforms (arrow D2) the inversely curved frictional surface 23B of the braking portion 19B of the deformable element 17. The effects of these deformations and these frictions are to apply a deformation effort and a mechanical braking torque that is counteracting against the rotation (arrow R2), though not blocking the rotation of the cylinder 15 with its projections 16A, 16B within the deformable element 17. The braking resulting from the deformation effort appears to be of superior intensity than the braking resulting from the mechanical braking torque.

**[0052]** As depicted in the drawings, the first 16A and second 16B projections of the cylinder 15 are positioned asymmetrically around the periphery of the cylinder 15 while the first 19A and second 19B braking portions of the deformable element 17 are positioned symmetrically around the washer 18. This results in an asymmetrical relative position of the first 16A and second 16B projections relatively to the first 19A and second 19B braking portions. Consequently during the opening of the cover, as illustrated in FIG. 7, the first projection 16A contacts the first braking portion 19A and then the second projection 16B contacts the second braking portion 19B in desynchronization. A first braking phase is directly followed by a second braking phase. This sequence results in a continuous or at least pseudo-continuous braking effect. The fact that the first 16A and second 16B projections of the cylinder 15 are positioned asymmetrically around the periphery of the cylinder 15, while the first 19A and second 19B braking portions of the deformable element 17 are positioned symmetrically around the washer 18, as illustrated in the drawings, is a mere example. What matter in order to obtain the continuous or at least pseudo-continuous braking effect is the relative position of the projections 16A, 16B relatively to the braking portion 19A, 19B. This can be achieved in various other ways, for example with the first 16A and second 16B projections of the cylinder 15 positioned symmetrically around the periphery of the cylinder 15, while the first 19A and second 19B braking portions of the deformable element 17 are positioned asymmetrically around the washer 18.

**[0053]** The situation depicted in FIG.7 shows the first projection is ending braking while the second projection

is beginning braking. However, depending on the relative position of the projections 16A, 16B relatively to the braking portion 19A, 19B, either the two projections may be braked simultaneously, or each projection may be braked at different time. The braking zone positions may be adapted in order to obtain an adjusted braking effect during the opening phase. For example, a discontinuous braking effect during the opening phase can be achieved when each projection is braked at different time.

**[0054]** At the end of the opening phase, when the housing cover 6 is opened at an appropriate angle, the projections 16A, 16B of the cylinder 15 are in a resting position relatively to the braking portions 19A, 19B of the deformable element 17. The resting position may correspond to a position where the projections 16A, 16B are not deforming the braking portions 19A, 19B. The resting position may also be preferred when the housing cover 6 is locked onto the supporting base 4. The resting position avoids a deformation of the deformable element 17 during a long period of time (long relatively to the duration of the opening of the cover). As a consequence, the property of elasticity of the deformable element 17 can be maintained over a long period of time, i.e. at least the mean lifetime of the dispenser assembly. This may be further improved by providing the attacking edge of the projections 16A, 16B of the cylinder 15 with a rounded profile 25 instead of a sharp perpendicular profile.

**[0055]** FIGS. 9 and 10 are cross section views along plane D-D schematically illustrating a third embodiment of a hinge arrangement adapted for the dispenser assembly of FIG. 1 at different stages of the opening of the cover, respectively.

**[0056]** The third embodiment differs from the second embodiment in that the deformable element 17 comprises less radial feathers 24A, 24B, 24C and 24D, and only one braking portion 19C. The deformable element 17 is still formed as a washer 18 having a general cylindrical shape comprising a unique inwardly and axially directed braking portion 19C. The braking portion 19C is forming a boss directed towards the longitudinal axis X. The braking portion 19C has an inverted curvature (relatively to the general cylindrical shape) forming a frictional surface 23C. The braking portion 19C may have an angular extension b substantially equal or lower than 180°.

**[0057]** FIGS. 9 and 10 also illustrate an example of the operation of the hinge arrangement 10 at different stages of the opening of the cover. In particular, FIG. 9 and 10 illustrate the hinge arrangement 10 at two moments during the braked opening phase when the housing cover 6 is opened.

**[0058]** At the beginning of the opening phase or when the housing cover 6 is locked with regards to the supporting base 4, and at the end of the opening phase when the housing cover 6 is opened at an appropriate angle, the projections 16A, 16B of the cylinder 15 are away from and not deforming the braking portion 19C.

**[0059]** During the braked opening phase, a first braking phase (FIG. 9) is obtained when the curved frictional sur-

face 22A of the first projections 16A contacts the inversely curved frictional surface 23C of the braking portion 19C of the deformable element 17. Due to the elasticity of the deformable element 17 and the hardness of the cylinder 15 with its projections 16A, the curved frictional surface 22A compresses and deforms outwardly the inversely curved frictional surface 23C of the braking portion 19C of the deformable element 17. This is represented by the arrow D3 and the dash line that schematically represents the ovalization of the washer resulting from the deformation of the inversely curved frictional surface. A second braking phase (FIG. 10) is obtained when the curved frictional surface 22B of the second projections 16B then contacts the inversely curved frictional surface 23C of the braking portion 19C of the deformable element 17. Due to the elasticity of the deformable element 17 and the hardness of the cylinder 15 with its projections 16B, the curved frictional surface 22C compresses and deforms (arrow D4) the inversely curved frictional surface 23C of the braking portion 19C of the deformable element 17. The effects of these deformations and these frictions are to apply a deformation effort and a mechanical braking torque that is counter-acting against the rotation (arrow R3), though not blocking the rotation of the cylinder 15 with its projections 16A, 16B within the deformable element 17. Consequently during the opening of the cover, as illustrated in FIGS. 9 and 10, the first projection 16A contacts the braking portion 19C and then the second projection 16B contacts the braking portion 19C in slight desynchronization. The first braking phase is just about to finish when the second braking phase begins. Once again, this sequence results in a continuous or at least pseudo-continuous braking effect.

**[0060]** In the hereinbefore described embodiments, a complete opening of the housing cover 6 is reached after one braked rotation of the cylinder within the housing and corresponds to approximately a rotation of 180° of the cover. In this position, an operator can easily access into the dispenser assembly, for example in order to load a new roll of sheet material.

**[0061]** Thus, the hinge arrangement 10 as hereinbefore described results in a smooth, damped and automatic (i.e. not manually assisted) opening of the housing cover 6 relatively to the supporting base 4.

**[0062]** The drawings and their descriptions hereinbefore illustrate rather than limit the invention.

**[0063]** The number, angles and positions of the projections 16 of the cylinder 15 and/or the braking portions 19 of the deformable element 17 in the depicted embodiments are non limitative examples. The skilled person will readily recognize that these number, angles and positions may be changed if desired or deemed necessary with respect to the required braking force or to adjust the speed of opening: for examples, the cylinder 15 may comprise only one projection 1, the deformable element 17 may comprise three braking portions symmetrically positioned, etc....

**[0064]** The depicted embodiment of dispenser assem-

bly illustrates a dispenser assembly comprising one hinge arrangement 10 for a mere clarity reason of the drawings. However, the dispenser assembly may comprise two hinge arrangements 10, one coupling each

5 edge of the cover 6 with the corresponding lateral portion 11 of the supporting base 4. Further, in this case, the respective hinge arrangements 10 may be different in term of the positioning of the braking portions with respect to the projection 16 of the cylinder in order to further adjust 10 the braking force and the speed of opening. For example, the hinge arrangement on the left of the cover may provide a braking phase that is not simultaneous with the hinge arrangement on the right of the cover.

**[0065]** The depicted embodiment of dispenser assembly 15 illustrates a particular example of a base comprising a closure according to a housing cover with a slit. However, other kind of base and housing cover may be convenient provided that they are coupled together by a hinge mechanism as hereinbefore described.

**[0066]** The depicted embodiment illustrates a dispenser assembly 20 wherein the roll of sheet material is positioned horizontally. However, it may also be positioned vertically, or at an angle.

**[0067]** Any reference sign in a claim should not be construed 25 as limiting the claim. The word "comprising" does not exclude the presence of other elements than those listed in a claim. The word "a" or "an" or "at least one" preceding an element does not exclude the presence of a plurality of such element.

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## Claims

1. A dispenser assembly (1) for dispensing a sheet (2) 35 from a roll of sheet material (3), the dispenser assembly (1) comprising:

40 - a roll holder (5) for removably holding the roll of sheet material (3), the roll of sheet material (3) being free to rotate relatively to the roll holder (5);  
 - a supporting base (4) for supporting the roll holder (5) and for coupling the dispenser assembly (1) with an environment structure (7); and  
 45 - a housing cover (6) being pivotally coupled to the supporting base (4) by means of a hinge arrangement (10);

50 wherein the hinge arrangement (10) comprises an internal braking mechanism arranged to brake the opening of the housing cover falling down under the action of gravity.

55 2. The dispenser assembly of claim 1, wherein the hinge arrangement (10) comprises a first part (12) coupled to the supporting base (4) and a second part (14) coupled to the housing cover (6), the hinge arrangement (10) pivotally coupling the first part (12)

and the second part (14) that have a rotational movement relative to each other when the housing cover (6) is opened relatively to the supporting base (4), and wherein the hinge arrangement (10) further comprises a deformable element (17) interposed between the first part (12) and the second part (14).

3. The dispenser assembly of claim 2, wherein:

- the first part is realized under the form of a retaining housing (12) provided in a lateral portion (11) of the supporting base (4);
- the second part is realized under the form of a cylinder (15) extending from a lateral portion (6B) of the housing cover (6), the cylinder (15) comprising at least one projection (16A, 16B) extending outwardly substantially radially from the periphery of the cylinder (15), the projection (16A, 16B) being positioned at a distal end of the cylinder (15); and
- the retaining housing (12) defines an internal space (13) for receiving the cylinder (15) together with the at least one projection (16A, 16B) that are free to rotate within said internal space (13).

4. The dispenser assembly according to anyone of the claims 2 to 3, wherein said projection (16A, 16B) is an angular sector in a transverse section, a periphery of said projection (16A, 16B) defining a curved frictional surface (22A, 22B).

5. The dispenser assembly according to anyone of the claims 2 to 4, wherein the cylinder (15) comprises two projections (16A, 16B) that are asymmetrically positioned around a periphery of the cylinder (15).

6. The dispenser assembly according to anyone of the claims 2 to 5, wherein the deformable element (17) is a washer (18) having a cylindrical shape and comprising at least one inwardly and axially directed braking portion (19A, 19B, 19C), the braking portion (19A, 19B, 19C) defining an inversely curved frictional surface (23A, 23B, 23C).

7. The dispenser assembly according to claim 6, wherein the deformable element (17) comprises two braking portions (19A, 19B) that are symmetrically positioned around the washer (18).

8. The dispenser assembly according to claims 3 and 6, wherein the cylinder (15) comprises at least two projections (16A, 16B) and the deformable element (17) comprises at least two braking portions (19A, 19B), said projections (16A, 16B) and braking portions (19A, 19B) being asymmetrically positioned relatively to each other such as to substantially continuously brake the housing cover (6) during an opening

phase.

9. The dispenser assembly according to anyone of the claims 2 to 8, wherein the attacking edge of the projections (16A, 16B) are provided with a rounded profile (25).

10. The dispenser assembly according to anyone of the claims 2 to 9, wherein the internal periphery of the washer (18) has a first diameter such that the cylinder (15) together with said projection (16A, 16B) is free to rotate within the washer (18), and a second diameter at said braking portion (19A, 19B, 19C) lower than the diameter of the cylinder (15) together with said projection (16A, 16B).

11. The dispenser assembly according to anyone of the claims 2 to 10, wherein the deformable element (17) comprises at least one feather (20A, 20B, 24A, 24B, 24C, 24D, 24E) extending longitudinally or radially from the external periphery of the deformable element (17) and arranged to be received within a respective longitudinally or radially extending recess (21A, 21B, 21C, 21D, 21E) in the retaining housing (12).

12. The dispenser assembly of claim 11, wherein the feathers (20A, 20B, 24A, 24B, 24C, 24D, 24E) are positioned outside zones defined by the braking portions (19A, 19B, 19C).

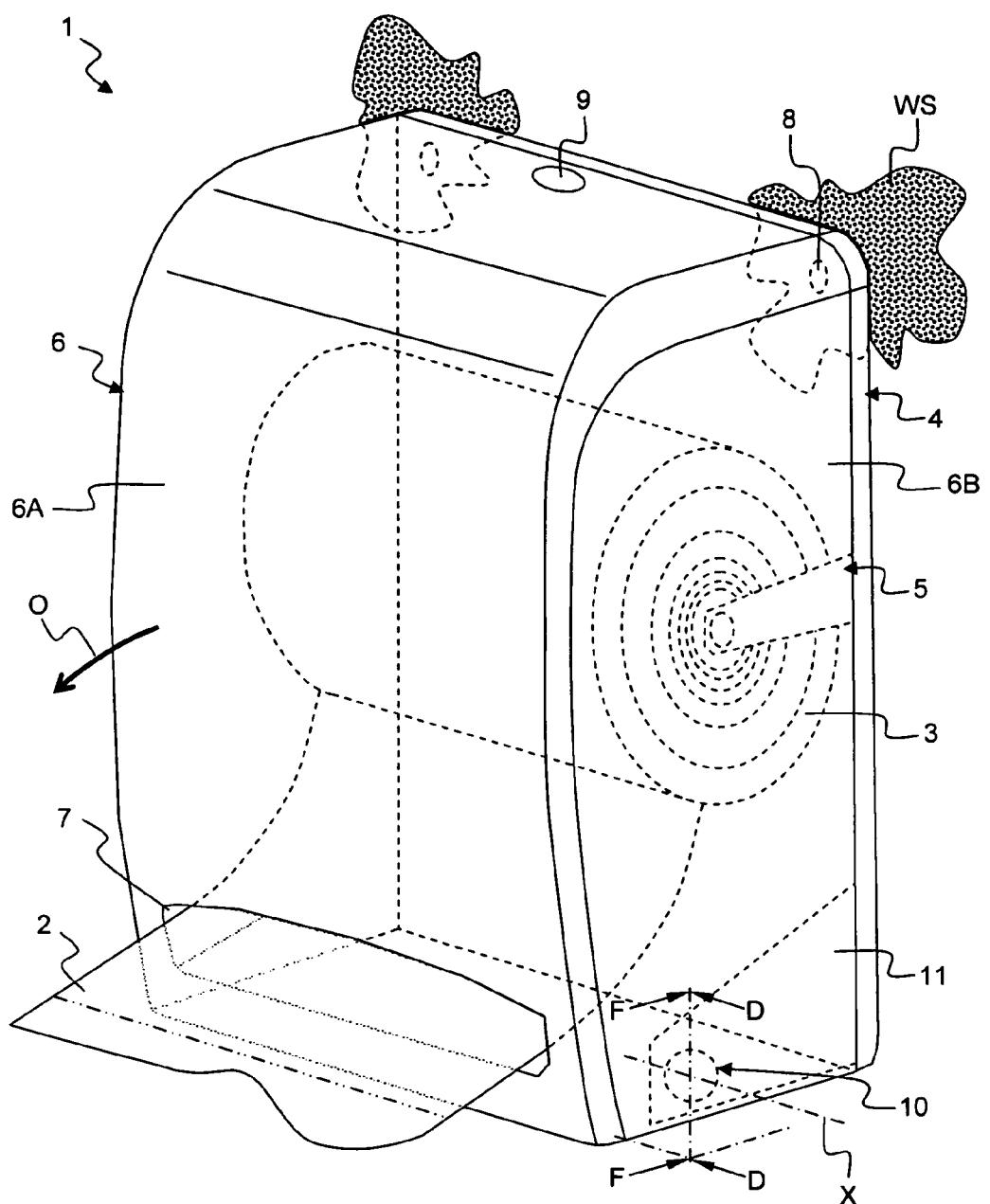
13. The dispenser assembly according to anyone of the claims 1 to 12, wherein the cylinder (15) together with the projection (16A, 16B) are made of a rigid plastic material, and the deformable element (17) is made of an elastically deformable flexible material.

14. The dispenser assembly of claim 13, wherein the deformable element (17) is made of polyoxymethylene (POM).

15. The dispenser assembly according to anyone of the claims 1 to 14, wherein the roll of sheet material (3) is a paper towel roll.

16. A deformable element (17) arranged to be used in a dispenser assembly (1) according to anyone of the claims 1 to 15.

17. A method of manufacturing a dispenser assembly (1) comprising coupling a housing cover (6) to a supporting base (4) by means of a hinge arrangement (10); wherein the hinge arrangement (10) is provided with an internal braking mechanism for the dispenser assembly (1) according to anyone of the claims 1 to 15.



**FIG. 1**

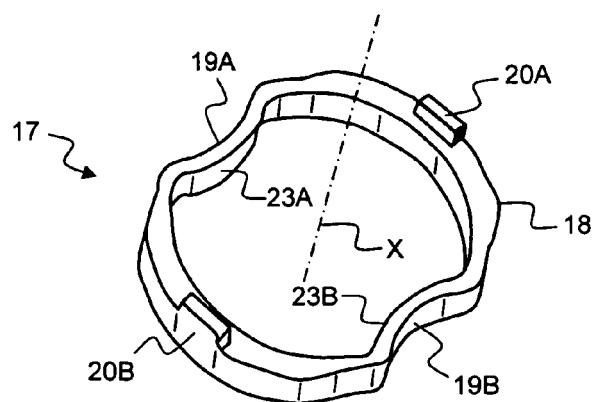


FIG. 5

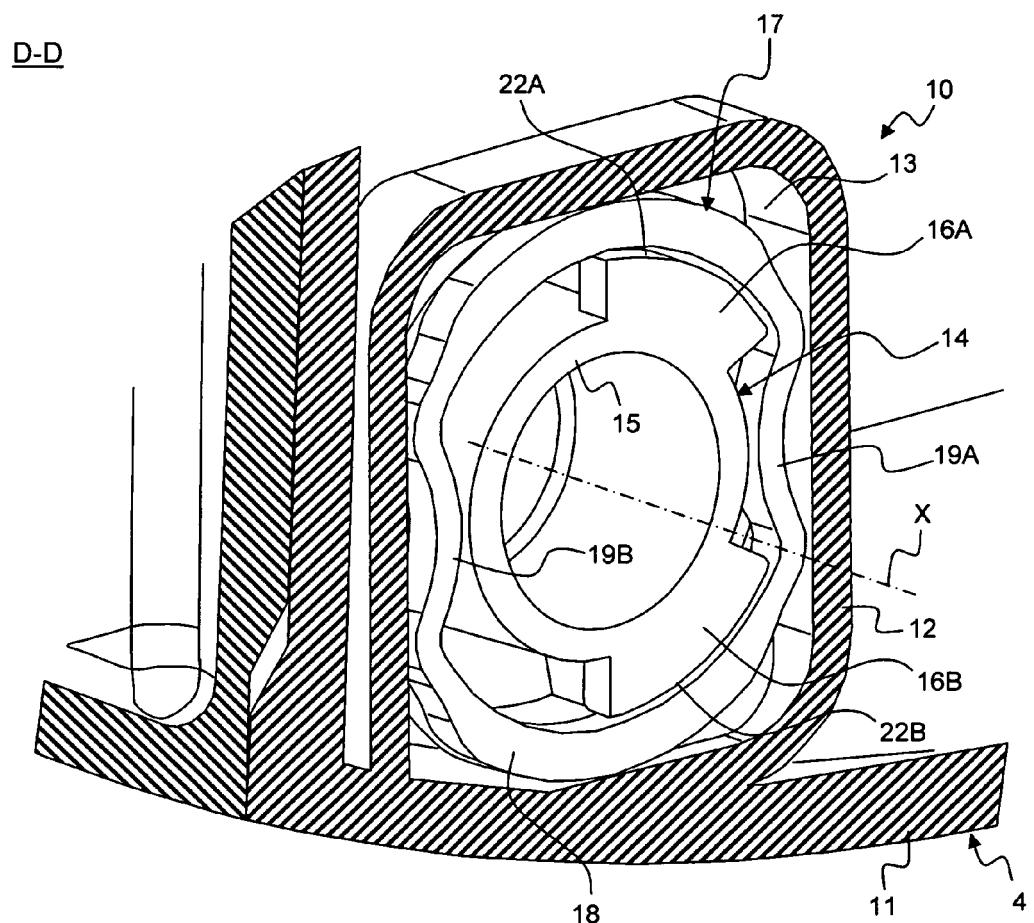


FIG. 2

D-D

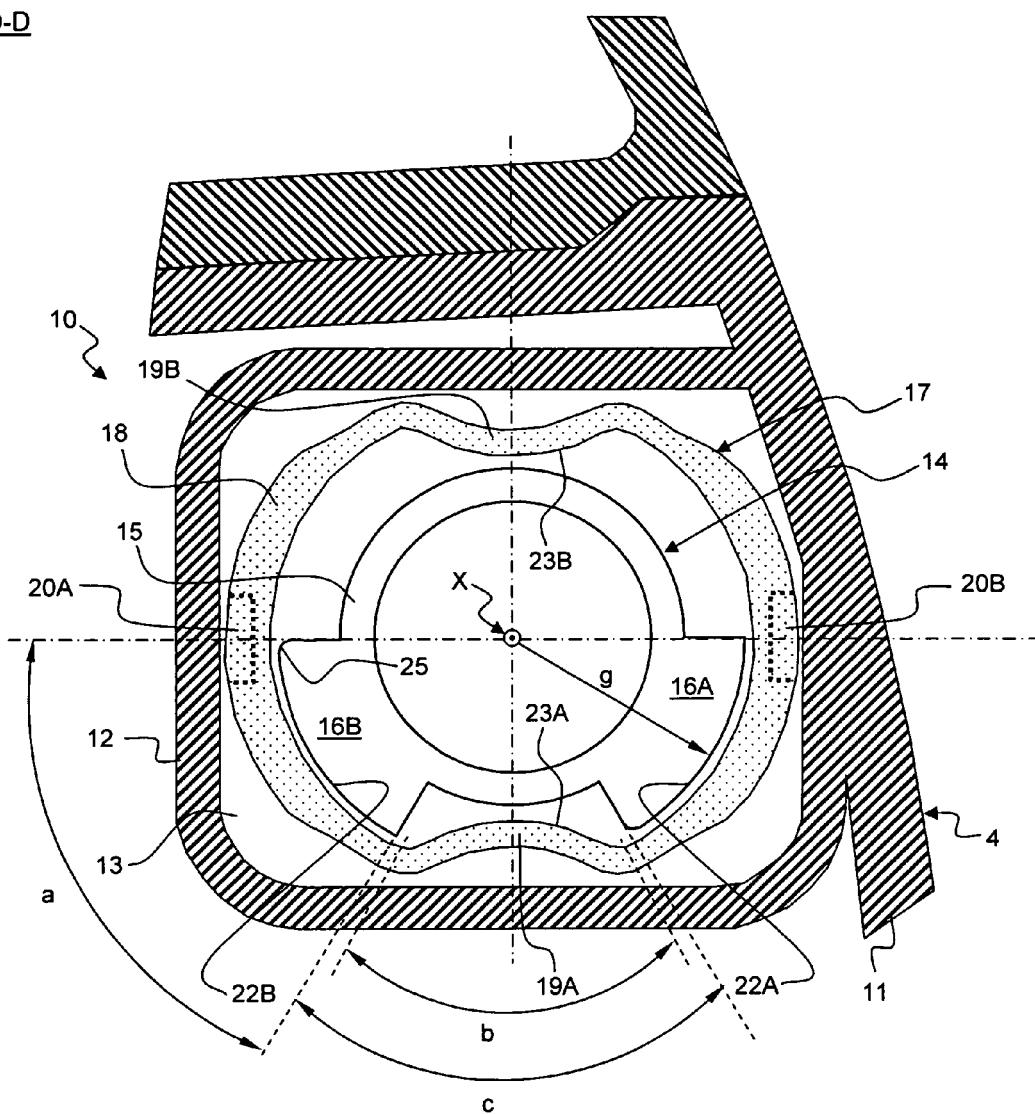
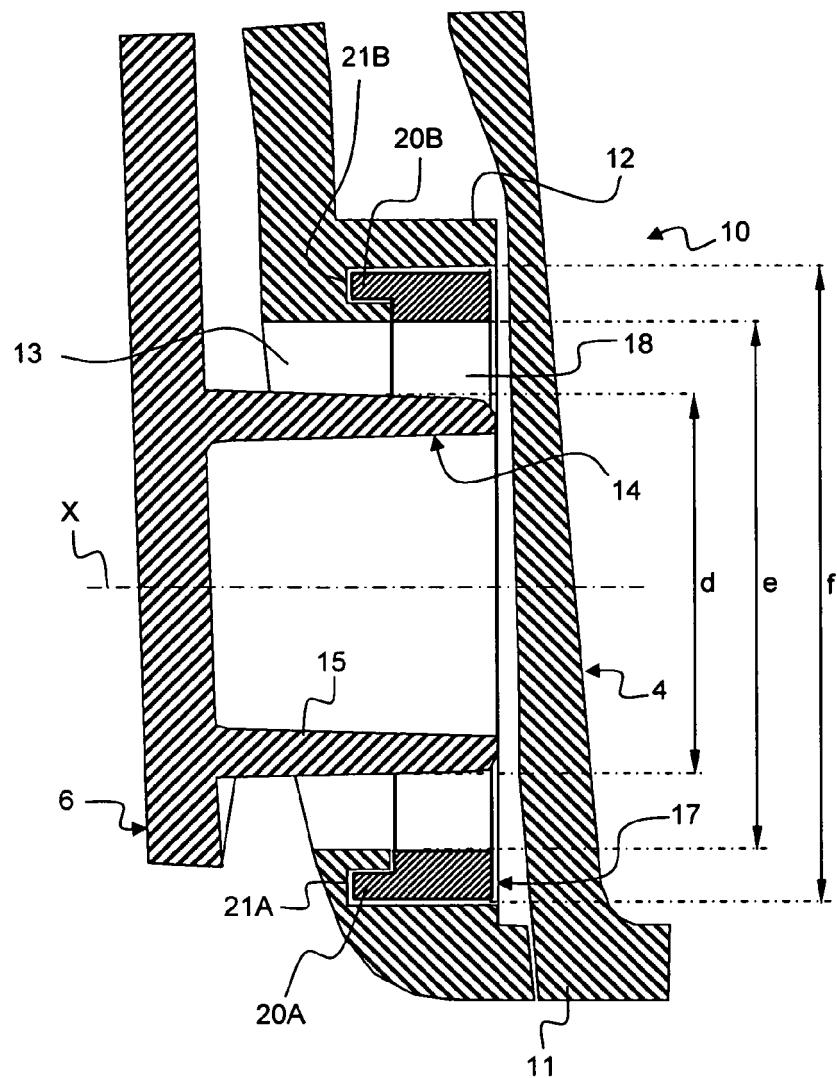


FIG. 3

E-F



**FIG. 4**

D-D

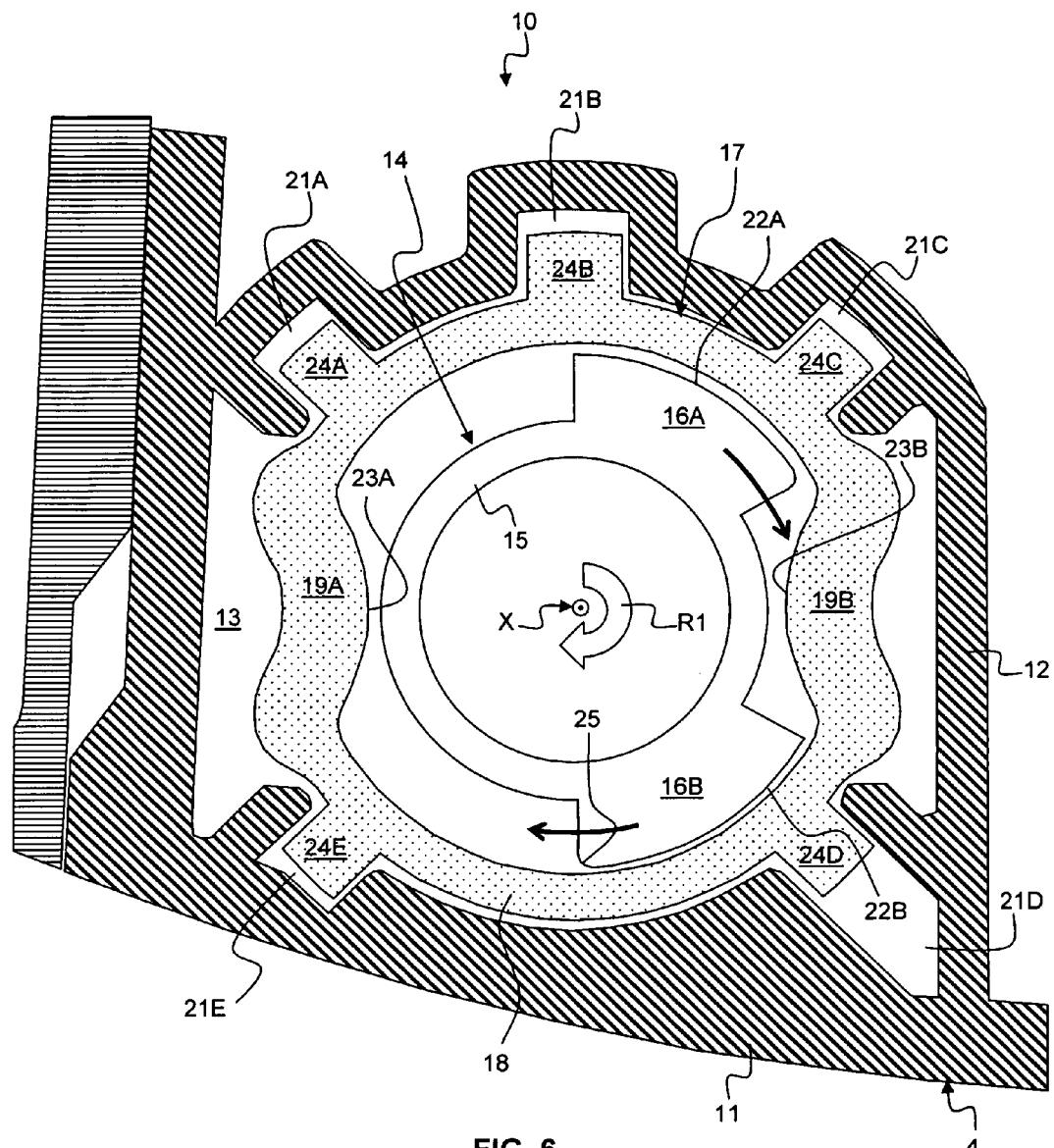


FIG. 6

D-D

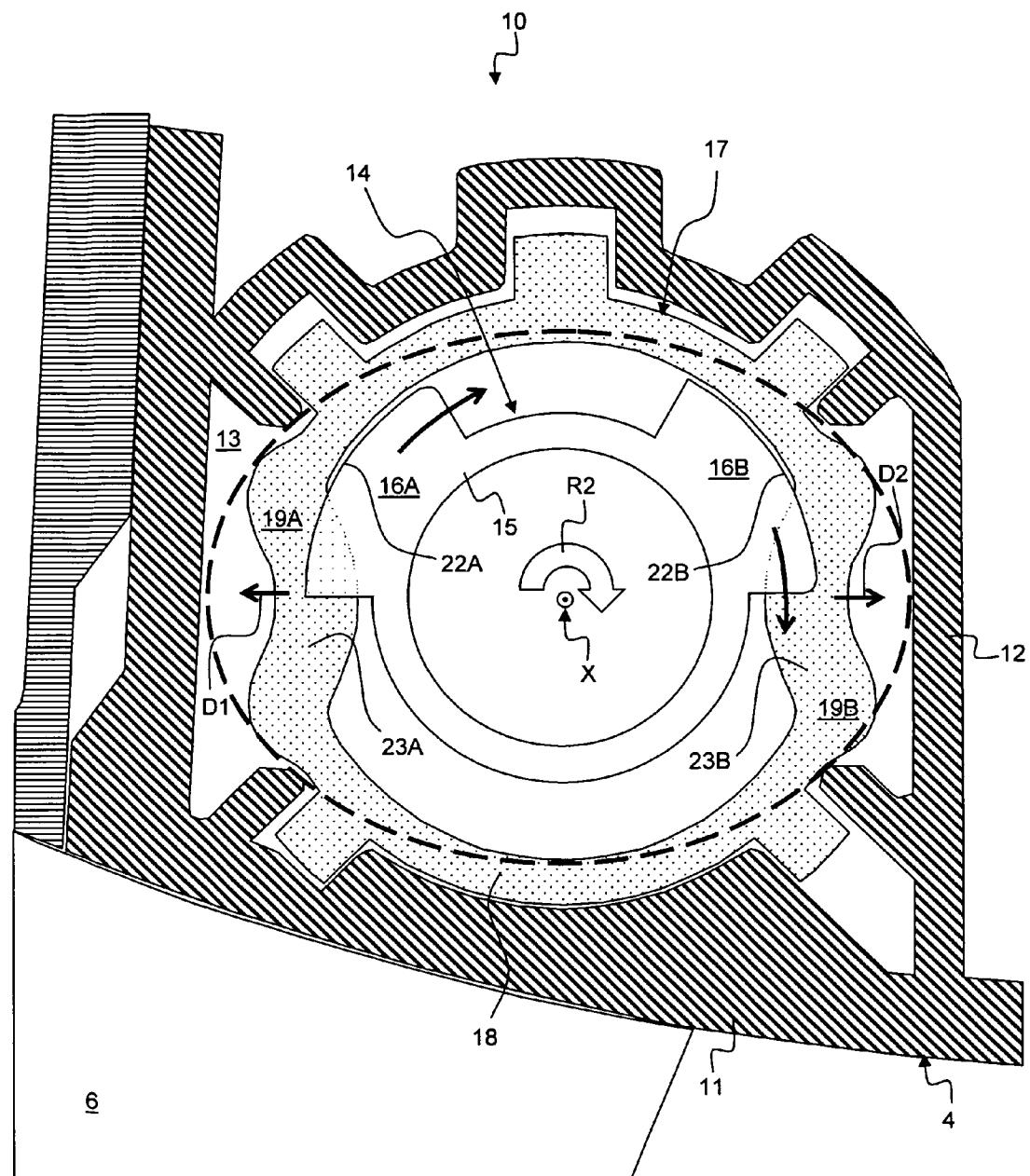


FIG. 7

D-D

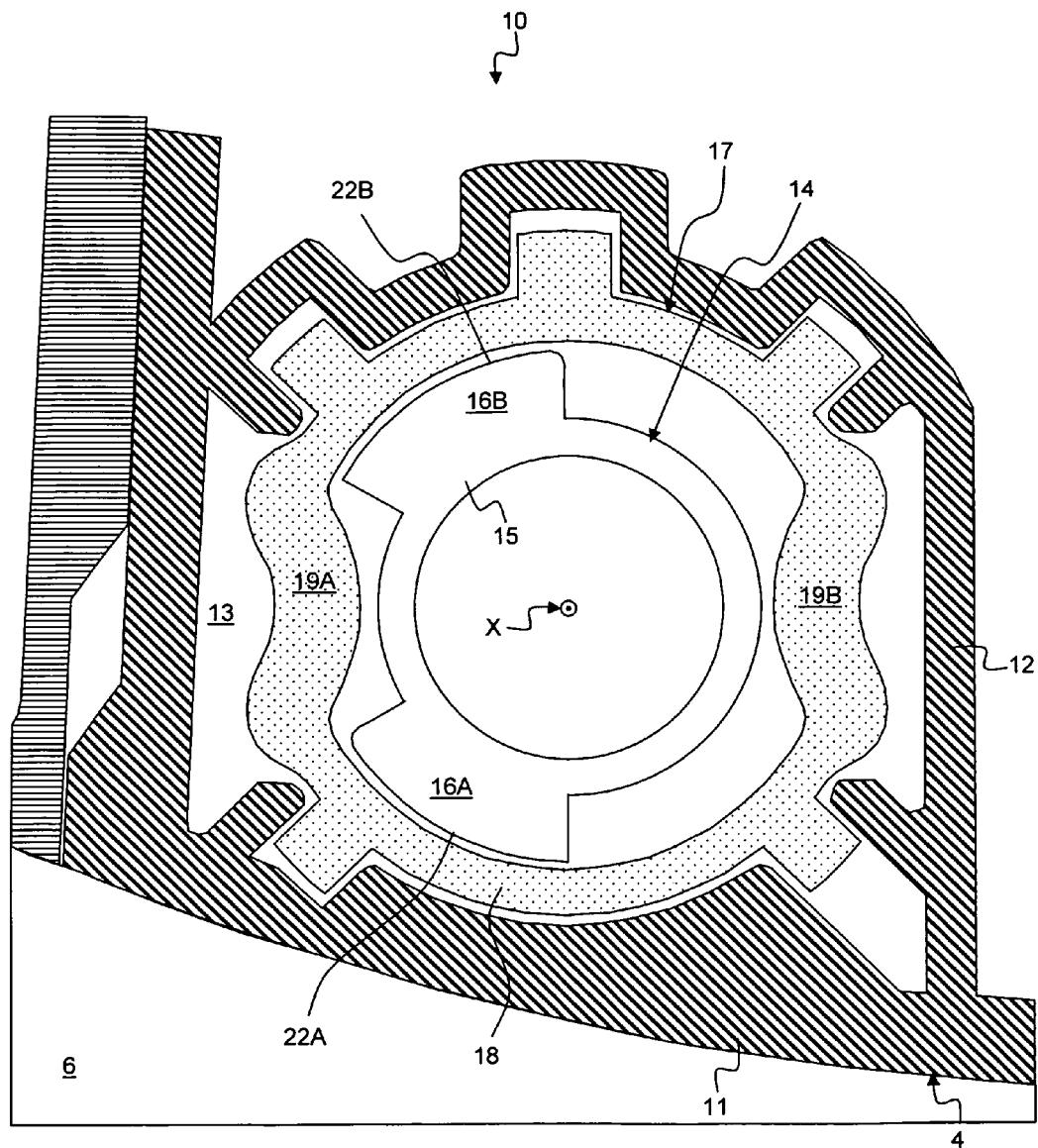


FIG. 8

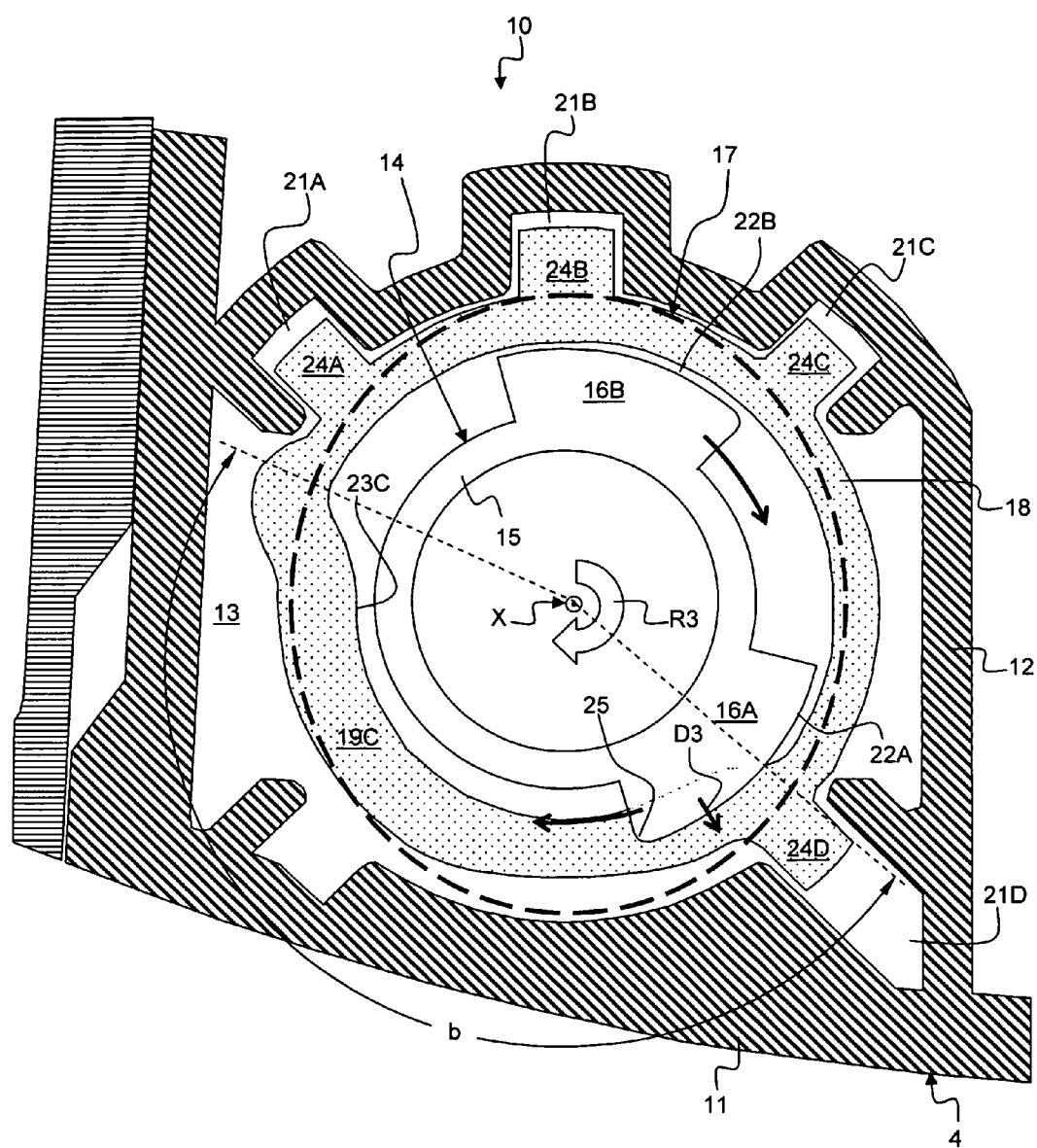
D-D

FIG. 9

D-D

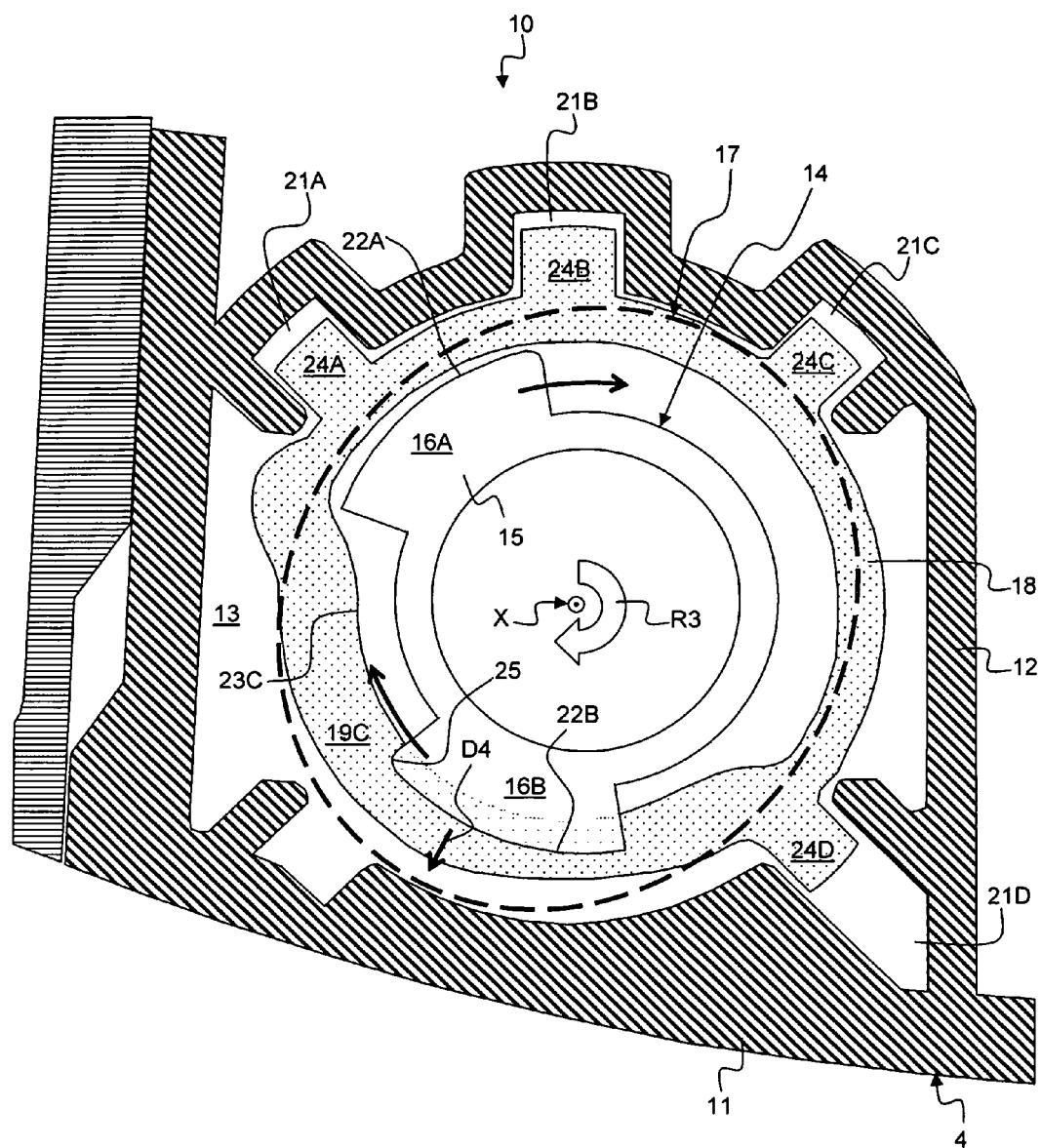


FIG. 10



## EUROPEAN SEARCH REPORT

Application Number

EP 12 00 2059

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
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			A47K E05D E03D
The present search report has been drawn up for all claims			
1	Place of search Munich	Date of completion of the search 24 August 2012	Examiner Isailovski, Marko
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24-08-2012

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