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(54) Rotation-retarding device and use thereof
Rotationsverzögernde Vorrichtung und Benutzung derselben
Dispositif décélérateur de rotation et son utilisation

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(56) References cited:


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Description

[0001] The present invention relates to a rotation-retarding device comprising a first member and a second member having rotational movement relative to each other to be retarded.

[0002] Many members, such as the lids of make-up boxes, washing machines or automotive vehicle glove compartments, have their opening actuated, for example by springs, or are brought to the open position under the effect of gravity.

[0003] In practice, a rotation-retarding device is thus generally implemented to give smooth, dampened opening of the lid.

[0004] According to an arrangement already known, a viscous fluid, such as a silicone oil, is used to retard the rotation of a rotor with respect to a stator by virtue of its viscosity. This type of rotation-retarding device does not enable sufficient couples to be produced in a compact space, such as that available for a hinge of a make-up box.

[0005] According to another arrangement already known, the rotation-retarding device is obtained by deformation of elastically deformable flexible material. These friction-based rotation-retarding devices give a constant couple which does not guarantee opening that is complete and of good quality.

[0006] Other examples of rotation-retarding devices are disclosed by JP 2000199535 A and DE 19726536 A.

[0007] The present invention generally relates to a friction-based rotation-retarding device guaranteeing complete opening of good quality which leads, furthermore, to other advantages.

[0008] More particularly, it relates to a rotation-retarding device comprising a first member and a second member having rotational movement relative to each other to be retarded, the first member comprising an axle and the second member comprising a housing adapted to receive the axle of the first member, and means for retarding rotation by deformation of elastically deformable flexible material, the retarding means comprising at least a part of the wall bounding the housing, of elastically deformable flexible material and comprising at least one working surface of cam form, facing the axle of the first member, and at least one projection of rigid material on the axle of the first member, adapted to cooperate with a working surface associated therewith to retard the rotational movement with the resisting couple being adapted to the driving couple at each angular position, each projection being integral with the axle through being molded as a single part with the latter, characterized in that the elastically deformable flexible material has a viscoelastic behaviour.

[0009] The resisting couple generated by virtue of the cam form of this rotation-retarding device is thus matched with the driving couple provided, for example, by an opening actuator spring, which makes it possible to guarantee the quality of the opening movement as well as complete opening.

[0010] Furthermore, the manufacture of this rotation-retarding device proves to be relatively easy, given the small number of parts to produce and assemble, in particular in the case in which at least some of the parts are obtained by molding in a plastics material.

[0011] The rotation-retarding device according to the invention thus proves to be low cost.

[0012] Preferably, for reasons of economy, ease of manufacture, ease of assembly and/or efficacy of operation:

- the entire wall of the housing is of elastically deformable flexible material, and/or
- each working surface of cam form extends over the entire length of the wall of the housing, and/or
- the wall of the housing comprises two working surfaces of cam form which are symmetrical with respect to an axis of symmetry of the wall, and/or
- each projection is formed by a gadroon extending along a generatrix of the axle of the first member, and/or
- the wall comprises a hollow for each projection, by means of which each projection is housed in a resting position, and/or
- the wall comprises at least one groove of U-shaped cross-section, extending substantially parallel to the axis of symmetry of the wall and adapted to receive a gadroon in a resting position, and/or
- each groove is connected to a working surface adapted to cooperate with the gadroon housed in that groove in resting position, by a longitudinal recess formed by two facets which together form an obtuse angle, and/or
- the wall comprises two grooves, each adapted to receive one of the two gadroons diametrically opposite of the axle of the first member, these grooves and the adjacent recesses being respectively symmetrical with respect to the axis of symmetry of the wall of the housing, and/or
- the elastically deformable flexible material is a thermoplastic elastomer, and/or
- the thermoplastic elastomer has a hardness between a shore A value of 55 and a shore D value of 50, and/or
- the thermoplastic elastomer is Santoprene®, and/or
- the material of which the first member is made is a rigid material, preferably chosen from the group comprising a polyether, a polyolefin, or a polyamide, and/or
- the polyether is a polyacetal, and/or
- the first member is a rotor comprising, in a T-shaped general configuration, the axle extended by a coaxial head and the second member is a stator comprising an axially symmetrical tubular envelope forming the housing, and/or
- the head and the envelope each comprise connection means by which the rotor and the stator are re-
According to another aspect, the present invention also relates to the use of a rotation-retarding device as set out above in order to slow the rotational movement of an opening member. Retarding the rotation of an opening member in rotational movement with respect to another member thus proves particularly easy to implement.

This aspect of the invention is moreover very desirable in the case in which the opening member is a make-up box lid.

The description of the present invention will continue with the description of a preferred embodiment, given below by way of non-limiting example, with reference to the accompanying drawings in which:

- Figure 1 is a perspective view of a rotation-retarding device according to the preferred embodiment of the present invention;
- Figure 2 is a perspective view of the rotor of the rotation-retarding device of Figure 1;
- Figure 3 is a longitudinal section view of this rotation-retarding device, taken on III-III of Figure 1;
- Figure 4 is a section view similar to that of Figure 3, which shows only the stator of the rotation-retarding device according to the present invention;
- Figure 5 is a cross-section view on line V-V of Figure 4; and
- Figure 6 is a section view, to a higher scale, similar to that of Figure 5, on line VI-VI of Figure 3.

In the form of embodiment shown, the rotation-retarding device 10 according to the invention comprises a stator 11 and a rotor 12 adapted to be given the rotational movement to be retarded.

In practice, in the embodiment shown, the rotor 12 comprises, in a T-shaped general configuration and as is best seen in Figure 2, an axle 13 with a generally cylindrical surface and a head 14 with a generally cylindrical surface.

The axle 13 has a frusto-conical free end 15 and comprises two diametrically opposite gadroons 16 extending along a generatrix of the axle.

A plurality of axial ribs 17, of rectangular cross-section, project from the cylindrical surface of the head 14 and are uniformly spaced around the periphery of this head 14.

These ribs 17 serve to block the rotation of the rotor 12 in a housing of cross-section complementary to that of the head 14, formed in a part, such as an opening member, of which the rotational movement is to be retarded. In the example described and shown, the rotor 13 is adapted to cooperate with a make-up box lid of which the opening is actuated by a spring.

A diametral slot 18 is furthermore formed in the head 14, on its side opposite to that from which the axle 13 projects, for the angular positioning of the rotor 12 in the housing already mentioned.

This axially symmetrical rotor 12 is a one-piece molding in plastics material. Preferably, as is the case of the embodiment shown, this rotor 12 is formed by molding in polyacetal.

As for the stator 11, this comprises an axially symmetrical tubular envelope 19, which also comprises axial ribs 20, of rectangular transverse section, projecting from the cylindrical surface of the envelope 19.

These ribs 20 extend from the closed end 21 of the envelope 19 to the vicinity of an opening 22 of this envelope 19 and serve to block the rotation of the stator 11 in a housing of cross-section complementary to that of the exterior of the envelope 19, formed in a support member on which the opening member is rotatably mounted. In the example described and shown, this is a lug of a container of a make-up box.

The rotation-retarding device 10 thus constitutes a hinge of this make-up box.

In the embodiment shown, this tubular envelope 19 is a one-piece molding in elastically deformable flexible material. More particularly, the material is a thermoplastic elastomer with a hardness between a shore A value of 55 and a shore D value of 50.

Preferably, as is the case of the embodiment shown, this thermoplastic elastomer is Santoprene®.

It should also be noted, in this connection, that the end wall forming the closed end 21 of the tubular envelope 19 has, projecting from its outer surface, a rib 23 for angular positioning of the stator 11 in the matching housing with which it is adapted to cooperate.

According to the invention, and as is the case in the embodiment shown, the axially symmetrical tubular envelope 19 forms the wall 24 of a housing 25 adapted to receive the axle 13 of the rotor 12, with slight radial compression of said material making up the wall 24 (see Figure 6), by means of which this rotor 12 is engaged with the stator 11.

The resting position of the rotation-retarding device 10 is however arranged in such a manner that the elastically deformable flexible material is not subject to a high level of stress at the location of the gadroons 16, in order to avoid persisting deformation of this material, and so avoid variations in the performance (position registering) of the rotation-retarding device 10 during its life.

To this end, the wall 24 comprises, for each gadroon 16 of the rotor 12, a groove 26 of U-shaped cross-section, extending substantially parallel to the axis of symmetry 27 of the wall 27 of the housing 25. As may be seen on Figure 6, the gadroons 16 are each housed in one of these grooves 26 in a resting position which, in practice, corresponds to the closed position of the make-up box, that is to say the position which the latter occupies most often.

According to the invention, as is the case for the embodiment shown, the wall 24 of the housing 25...
also has, facing the axis 13 of the rotor 12, two working surfaces 28 of cam form, which are symmetrical with respect to the axis of symmetry 27, and each adapted to cooperate with one of the gadroons 16 of the rotor 12 to retard the movement of this rotor 12 when it is caused to rotate by an opening member, such as the lid of the make-up box.

[0033] In practice, the braking or resisting couple is generated partly by friction between the axle 13 and the wall 24 of the housing 25, and the remaining part by deformation of the elastomer of the wall 24 by means of the gadroons 16 (viscoelastic behavior).

[0034] Preferably, the friction is limited in favor of the deformation, since the latter is less sensitive to environmental factors (greater or lesser ambient humidity, possible pollution, etc.).

[0035] It should be noted in this connection, that the level of the braking couple may easily be modified according to circumstances by selecting the hardness of the thermoplastic elastomer and/or the level of interference between the gadroons 16 and the cam formations of the working surfaces 28 associated with these gadroons 16.

[0036] Furthermore, according to the invention, the resisting couple is adapted to the driving couple at each angular position by virtue of the use of the working surfaces 28 of cam form. In practice, this cam form is defined so as to adapt the resisting couple to the driving couple at each angular position in a given application. Thus, in the case of the application to an opening member actuated to open by a spring, the resisting couple generated by the gadroons 16 passing over the cam forms matches with the couple generated by the weight of the opening member to be braked and with the couple provided by the spring, in order to guarantee the quality of movement as well as complete opening.

[0037] Preferably, as is the case in the embodiment shown, the working surfaces 28 of cam form extend the entire length of the wall 24 of the housing 25 and are each linked to one of the grooves 26 by a longitudinal recess 29 formed by two facets 30 and 31 which together form an obtuse angle. These recesses 29 and grooves 26 are, like the working surfaces 28, symmetrical in relation to the axis of symmetry 27 of the wall 24.

[0038] Thus, in practice, the gadroons 16 are housed in the grooves 26 while the opening member is in the resting position, that is to say in the closed position (horizontal position here), when the opening member is, for example, a make-up box lid.

[0039] Next, when the opening member passes from its closed position to its open position, the gadroons 16 pass firstly over the recesses 29 which create a relatively low resisting couple, giving way to the large driving couple provided by the spring of the opening member at the start of travel in the opening movement of the latter.

[0040] Next, the gadroons 16 come into engagement with the working surfaces 28 of cam form, of which the configuration is such that the resisting couple generated is initially relatively great then decreases progressively in order to achieve complete opening of the opening member with progressive retarding.

[0041] Numerous variants are possible according to circumstances.

[0042] In particular, a cam form corresponding to another type of opening could be implemented, such as the passage of an opening member from a vertical position to a horizontal position, in particular under the sole action of gravity.

[0043] It should be noted in this connection, that a rotation-retarding device as described above could serve for two different types of opening, according to whether it is placed on one side or the other of the opening member.

[0044] The rotor 12 and stator 11 may also be changed over in their function (the rotor can be the stator and vice versa).

[0045] Furthermore, it is also possible to employ only a single gadroon, in which case one of the working surfaces then has a profile of an arc of a circle.

[0046] It is, of course, also possible to use more than two gadroons (with a corresponding number of working surfaces of cam form), or even to replace them by another form of projection, such as a stud or a line of studs. It is then sufficient for one or more parts of the wall of the housing to be of elastically deformable flexible material and for each working surface of cam form to extend over one or more parts of the length of that wall.

[0047] A housing wall consisting of a cylindrical part of elastically deformable flexible material housed in a rigid tubular envelope could also be used.

[0048] The material making up the rotor can also be a polyolefin, such as polypropylene, or a polyamide.

[0049] The axial ribs of the rotor and stator can also be replaced by other connection means by which they are respectively connected to a first and a second part having rotational movement relative to each other to be retarded.

[0050] Finally, it should be noted in this regard that the invention is not limited to the form of the embodiment described and represented, but only by the scope of the appended claim.

Claims

1. A rotation-retarding device (10) comprising a first member (12) and a second member (11) having rotational movement relative to each other to be retarded, the first member (12) comprising an axle (13) and the second member (11) comprising a housing (25) adapted to receive the axle (13) of the first member (12), and means (16, 24, 28) for retarding rotation by deformation of elastically deformable flexible material, the retarding means (16, 24, 28) comprising at least a part of the wall (24) bounding the housing (25), of elastically deformable flexible material and
comprising at least one working surface (28) of cam form, facing the axle (13) of the first member (12), and at least one projection (16) of rigid material on the axle (13) of the first member (12), adapted to cooperate with a working surface (28) associated therewith to retard the rotational movement with the resisting couple being adapted to the driving couple at each angular position, each projection (16) being integral with the axle (13) through being molded as a single part with latter, characterized in that the elastically deformable flexible material has a viscoelastic behaviour.

2. A rotation-retarding device according to claim 1, characterized in that the entire wall (24) of the housing (25) is of elastically deformable flexible material.

3. A rotation-retarding device according to claim 2, characterized in that the entire wall (24) defines an external surface of the rotation-retarding device (10).

4. A rotation-retarding device according to claim 3, characterized in that each working surface (28) of cam form extends over the entire length (24) of the wall of the housing (25).

5. A rotation-retarding device according to claim 4, characterized in that the wall (24) of the housing (25) comprises two working surfaces (28) of cam form which are symmetrical with respect to an axis of symmetry (27) of the wall (24).

6. A rotation-retarding device according to any one of claims 1 to 5, characterized in that each projection is formed by a gadroon (16) extending along a generatrix of the axle (13) of the first member (12).

7. A rotation-retarding device according to any one of claims 1 to 6, characterized in that the wall (24) comprises a hollow (26) for each projection (16), by means of which each projection (16) is housed in a resting position.

8. A rotation-retarding device according to claims 6 and 7, characterized in that the wall (24) comprises at least one groove (26) of U-shaped cross-section, extending substantially parallel to the axis of symmetry (27) of the wall (24) and adapted to receive a gadroon (16) in a resting position.

9. A rotation-retarding device according to claim 8, characterized in that each groove (26) is connected to a working surface (28) adapted to cooperate with the gadroon (16) housed in that groove (26) in resting position, by a longitudinal recess (29) formed by two facets (30, 31) which together form an obtuse angle.

10. A rotation-retarding device according to claims 5 and 9, characterized in that the wall (24) comprises two grooves (26), each adapted to receive one of the two gadroons (16) diametrically opposite of the axle (13) of the first member (12), these grooves (26) and the adjacent recesses (29) being respectively symmetrical with respect to the axis of symmetry (27) of the wall (24) of the housing (25).

11. A rotation-retarding device according to any one of claims 1 to 10, characterized in that the elastically deformable flexible material is a thermoplastic elastomer.

12. A rotation-retarding device according to claim 11, characterized in that the thermoplastic elastomer has a hardness between a shore A value of 55 and a shore D value of 50.

13. A rotation-retarding device according to claim 11 or 12, characterized in that the thermoplastic elastomer is Santoprene®.

14. A rotation-retarding device according to any one of claims 1 to 13, characterized in that the material of which the first member (12) is made is a rigid material, preferably chosen from the group comprising a polyether, a polyolefin, and a polyamide.

15. A rotation-retarding device according to claim 14, characterized in that the polyether is a polyacetal.

16. A rotation-retarding device according to any one of claims 1 to 15, characterized in that the first member (12) is a rotor comprising, in a T-shaped general configuration, the axle (13) extended by a coaxial head (14) and the second member (11) is a stator comprising an axially symmetrical tubular envelope (19) forming the wall (24) of the housing (25).

17. A rotation-retarding device according to claim 16, characterized in that the head (14) and the envelope (19) each comprise connection means (17, 20) by which the rotor and the stator are respectively able to be connected to a first and a second part having rotational movement relative to each other to be retarded.

18. A rotation-retarding device according to any one of claims 1 to 17, characterized in that the axle (13) of the first member (12) is housed in the housing (25) of the second member (11) with radial compression of the elastically deformable flexible material.

19. Use of a rotation-retarding device according to any one of claims 1 to 18 for retarding the rotational movement of an opening member.
Rotationsverzögernde Vorrichtung nach einem der
Ansprüche 1 bis 5, dadurch gekennzeichnet, dass
die Wand (24) für jeden Vorsprung (16) eine Höhl-
kehle (26) umfasst, mittels derer jeder Vorsprung
(16) in einer Ruhestellung untergebracht wird.

Rotationsverzögernde Vorrichtung nach Ansprü-
chen 6 und 7, dadurch gekennzeichnet, dass
die Wand (24) mindestens eine Nut (26) mit U-förmigem
Querschnitt umfasst, die sich im Wesentlichen par-
allel zur Symmetrieachse (27) der Wand (24) er-
streckt und zur Aufnahme einer Auskragung (16) in
einer Ruhestellung ausgeführt ist.

Rotationsverzögernde Vorrichtung nach Anspruch
8, dadurch gekennzeichnet, dass jede Nut (26)
durch eine durch zwei Facetten (30, 31), die zusam-
men einen stumpfen Winkel bilden, ausgebildete
Längsaussparung (29) mit einer Arbeitsfläche (28)
verbunden ist, die dazu ausgeführt ist, mit der in Ru-
hestellung in der Nut (26) untergebrachten Auskra-
gung (16) zusammenzuwirken.

Rotationsverzögernde Vorrichtung nach den An-
sprüchen 5 und 9, dadurch gekennzeichnet, dass
die Wand (24) zwei Nuten (26) umfasst, wobei jede
der Aufnahme einer der beiden Auskragungen (16)
diametral gegenüber der Achse (13) des ersten
Glieds (12) ausgeführt ist, wobei diese Nuten (26) und
die benachbarten Aussparungen (29) jeweils
bezüglich der Symmetrieachse (27) der Wand (24)
der Aufnahme (25) symmetrisch sind.

Rotationsverzögernde Vorrichtung nach einem der
Ansprüche 1 bis 10, dadurch gekennzeichnet, dass
das elastisch verformbare flexible Material ein viskoelastisches
Verhalten aufweist.

Rotationsverzögernde Vorrichtung nach Anspruch
1, dadurch gekennzeichnet, dass die gesamte
Wand (24) der Aufnahme (25) aus elastisch verform-
barem flexiblem Material besteht.

Rotationsverzögernde Vorrichtung nach Anspruch
2, dadurch gekennzeichnet, dass die ganze Wand
(24) eine Außenfläche der rotationsverzögernden
Vorrichtung (10) definiert.

Rotationsverzögernde Vorrichtung nach Anspruch
3, dadurch gekennzeichnet, dass sich jede kur-
venförmige Arbeitsfläche (28) über die ganze Länge
(24) der Wand der Aufnahme (25) erstreckt.

Rotationsverzögernde Vorrichtung nach Anspruch
4, dadurch gekennzeichnet, dass die Wand (24)
der Aufnahme (25) zwei kurvenförmige Arbeitsflä-
chen (28) umfasst, die bezüglich einer Symmetrie-
achse (27) der Wand (24) symmetrisch sind.

Rotationsverzögernde Vorrichtung nach einem der
Ansprüche 1 bis 5, dadurch gekennzeichnet, dass
jeder Vorsprung durch eine Auskragung (16) geblit-
det wird, die sich entlang einer Erzeugenden der
Achse (13) des ersten Glieds (12) erstreckt.

Use according to claim 19, characterized in that
the opening member is a lid of a make-up box.
14. dadurch gekennzeichnet, dass das Polyether Polyacetal ist.


17. Rotationsverzögernde Vorrichtung nach Anspruch 16, dadurch gekennzeichnet, dass der Kopf (14) und der Mantel (19) jeweils Verbindungsmittel (17, 20) umfassen, durch die der Rotor und der Stator mit einem ersten bzw. einem zweiten Teil, die bezüglich einander in zu verzögernder Drehbewegung versetzt sind, verbunden werden können.

18. Rotationsverzögernde Vorrichtung nach einem der Ansprüche 1 bis 17, dadurch gekennzeichnet, dass die Achse (13) des ersten Glieds (12) in der Aufnahme (25) des zweiten Glieds (11) unter radialer Komprimierung des elastisch verformbaren flexiblen Materials untergebracht ist.

19. Verwendung einer rotationsverzögernden Vorrichtung nach einem der Ansprüche 1 bis 18 zum Verzögern der Drehbewegung eines Öffnungsglieds.


Revendications

1. Dispositif décelérateur de rotation (10) comprenant un premier élément (12) et un deuxième élément (11), animés l’un par rapport à l’autre d’un mouvement de rotation à décelérer, le premier élément (12) comportant un axe (13) et le deuxième élément (11) comportant un logement (25) adapté pour recevoir l’axe (13) du premier élément (12), et moyens (16, 24, 28) pour décelérer la rotation par déformation d’une matière flexible déformable élastiquement, les moyens de décelération (16, 24, 28) comprenant au moins une partie de la paroi (24) délimitant le logement (25) en matière flexible déformable élastiquement et comprenant au moins une surface active (28) en forme de came, en face de l’axe (13) du premier élément (12), et au moins une saillie (16) en matière rigide sur l’axe (13) du premier élément (12), adaptée pour coopérer avec une surface active (28) associée à celle-ci pour décelérer le mouvement de rotation avec le couple résistant qui est adapté au couple moteur à chaque position angulaire, chaque saillie (16) étant intégrée à l’axe (13) en étant mouillée d’un seul tenant avec ce dernier, caractérisé en ce que la matière flexible déformable élastiquement a un comportement viscoélastique.

2. Dispositif décelérateur de rotation selon la revendication 1, caractérisé en ce que la paroi entière (24) du logement (25) est en matière flexible déformable élastiquement.

3. Dispositif décelérateur de rotation selon la revendication 2, caractérisé en ce que la paroi entière (24) définit une surface externe du dispositif décelérateur de rotation (10).

4. Dispositif décelérateur de rotation selon la revendication 3, caractérisé en ce que chaque surface active (28) en forme de came s’étend sur toute la longueur (24) de la paroi du logement (25).

5. Dispositif décelérateur de rotation selon la revendication 4, caractérisé en ce que la paroi (24) du logement (25) comprend deux surfaces actives (28) en forme de came qui sont symétriques par rapport à un axe de symétrie (27) de la paroi (24).

6. Dispositif décelérateur de rotation selon l’une quelconque des revendications 1 à 5, caractérisé en ce que chaque saillie est formée par un godron (16) s’étendant le long d’une génératrice de l’axe (13) du premier élément (12).

7. Dispositif décelérateur de rotation selon l’une quelconque des revendications 1 à 6, caractérisé en ce que la paroi (24) comprend un creux (26) pour chaque saillie (16), au moyen duquel chaque saillie (16) est placée dans une position de repos.

8. Dispositif décelérateur de rotation selon les revendications 6 et 7, caractérisé en ce que la paroi (24) comporte au moins une rainure (26) à section transversale en forme de U, s’étendant sensiblement parallèlement à l’axe de symétrie (27) de la paroi (24) et adaptée pour recevoir un godron (16) dans une position de repos.

9. Dispositif décelérateur de rotation selon la revendication 8, caractérisé en ce que chaque rainure (26) est raccordée à une surface active (28) adaptée pour coopérer avec le godron (16) logé dans cette rainure (26) en position de repos, par un évidement longitudinal (29) formé par deux facettes (30, 31) qui forment ensemble un angle obtus.

10. Dispositif décelérateur de rotation selon les revendications 5 et 9, caractérisé en ce que la paroi (24) comporte deux rainures (26), adaptées chacune
pour recevoir un des deux godrons (16) diamétralement opposés de l’axe (13) du premier élément (12), ces rainures (26) et les évidements adjacents (29) étant respectivement symétriques par rapport à l’axe de symétrie (27) de la paroi (24) du logement (25).

11. Dispositif décélérateur de rotation selon l’une quelconque des revendications 1 à 10, caractérisé en ce que la matière flexible déformable élastiquement est un élastomère thermoplastique.

12. Dispositif décélérateur de rotation selon la revendication 11, caractérisé en ce que l’élastomère thermoplastique a une dureté comprise entre une valeur Shore A de 55 et une valeur Shore D de 50.

13. Dispositif décélérateur de rotation selon la revendication 11 ou 12, caractérisé en ce que l’élastomère thermoplastique est le Santoprene®.

14. Dispositif décélérateur de rotation selon l’une quelconque des revendications 1 à 13, caractérisé en ce que la matière dont le premier élément (12) est fabriqué est une matière rigide, de préférence choisie dans le groupe comprenant un polyéther, une polyoléfine et un polyamide.

15. Dispositif décélérateur de rotation selon la revendication 14, caractérisé en ce que le polyéther est un polyacétal.

16. Dispositif décélérateur de rotation selon l’une quelconque des revendications 1 à 15, caractérisé en ce que le premier élément (12) est un rotor comprenant, dans une configuration générale en forme de T, l’axe (13) prolongé par une tête coaxiale (14) et le deuxième élément (11) est un stator comprenant une enveloppe tubulaire axialement symétrique (19) formant la paroi (24) du logement (25).

17. Dispositif décélérateur de rotation selon la revendication 16, caractérisé en ce que la tête (14) et l’enveloppe (19) comprennent chacune des moyens d’assemblage (17, 20) par lesquels le rotor et le stator sont respectivement capables d’être assemblés à une première et à une deuxième pièce animées l’une par rapport à l’autre d’un mouvement de rotation à décelérer.

18. Dispositif décélérateur de rotation selon l’une quelconque des revendications 1 à 17, caractérisé en ce que l’axe (13) du premier élément (12) est logé dans le logement (25) du deuxième élément (11) avec une compression radiale de la matière flexible déformable élastiquement.

19. Utilisation d’un dispositif décélérateur de rotation selon l’une quelconque des revendications 1 à 18 pour décélérer le mouvement de rotation d’un élément d’ouverture.

20. Utilisation selon la revendication 19, caractérisée en ce que l’élément d’ouverture est un couvercle d’une boîte de maquillage.