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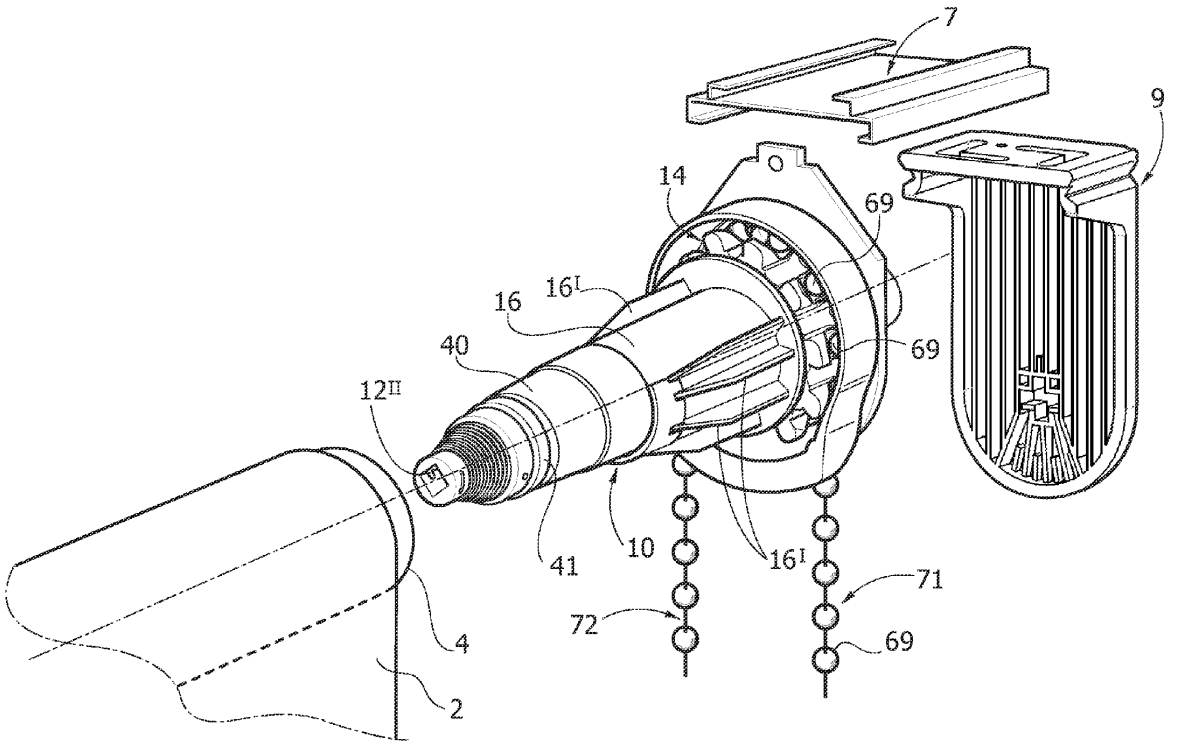
(54) **Device for controlling a roller blind**

(57) A device for controlling the roller (4) on which the covering cloth of a roller blind is wound, the device being designed to be coupled to one end of said roller (4) and installed on the supporting structure of said blind in such a way that said end is rotatably supported about a horizontal axis by said supporting structure.

FIG. 2



EP 2 458 129 A1

Description

[0001] The present invention relates to a device for controlling the roller on which the covering cloth of a roller blind is wound. In particular, the present description regards a device that is designed to be coupled to one end of the aforesaid roller and installed on the supporting structure of the blind in such a way that said end is rotatably supported about a horizontal axis by the supporting structure. In general, said device comprises:

- a structure, designed to be mounted fixed on the supporting structure;
- a first body, rotatably mounted on said fixed structure, in a first direction of rotation and in a second direction of rotation opposite to one another, and designed to be fixedly coupled in rotation to said roller;
- a control pulley, rotatably mounted on said fixed structure and actuatable in said first and second directions of rotation; and
- transmission means, designed to transmit to said first body the motion of rotation in said first direction of said pulley and to disconnect said pulley from said first body when said pulley is actuated in said second direction.

[0002] A device of this sort is designed to provide a manual control for turning the roller to which it is associated in the aforesaid first direction and to provide a control on an automatic control or control means, in turn associated to said roller, which is designed to turn said roller in the aforesaid second direction. In the specific case, in its inoperative condition the device blocks any rotation of the roller governed by said control or control means, and only following upon actuation of the pulley in the aforesaid second direction, for an angular interval sufficient for releasing the roller from the pulley, is drawing of the roller by said control means enabled.

[0003] A control device of this type is described in the European patent application No. EP-0717166 B1 filed in the name of the present applicant.

[0004] As is described in the above document, conventionally a device of the type referred to above is coupled to the roller of the blind in such a way that it is unwinding of the cloth carried by said roller that can be governed manually via the device. Winding of said cloth is instead governed by an automatic means that is controlled by a user via the device. In this case, the device is consequently coupled to the roller of the blind so as to cause the first body to turn in the first direction for unwinding the cloth and the first body to turn in the second direction for winding it. The automatic control or control means may, for example, be constituted by elastic elements with which said roller is provided, which are designed to recall the roller into a resting position, in which the cloth is completely wound thereon.

[0005] The aim of the present invention is to provide a device of the type referred to above that is simpler and more reliable, and characterized by a mode of operation that is more precise and quiet.

[0006] The purpose referred to above is achieved via a device having the characteristics specified in Claim 1.

[0007] The claims form an integral part of the technical teaching provided herein in relation to the invention.

[0008] The invention will now be described, purely by way of non-limiting example, with reference to the annexed drawings, in which:

- Figure 1 is a front view of a blind provided with the device described herein;
- Figure 2 is an exploded perspective view of the blind of Figure 1;
- Figure 3 is a longitudinal cross-sectional view of a preferred embodiment of the control device described herein in a condition in which said device is coupled to the roller of a blind;
- Figure 4 is a cross-sectional view according to the line IV-IV of Figure 3;
- Figure 5 illustrates an exploded perspective view of the device of Figure 2;
- Figure 6 is a perspective view of a detail of the device of Figure 2;
- Figure 7 is a perspective view of a detail of the device of Figure 2;
- Figure 8 illustrates the detail VIII of Figure 9;
- Figure 9 illustrates a perspective cross-sectional view of the device of Figure 3 in a first operating condition;
- Figure 10 illustrates the detail X of Figure 11; and
- Figure 11 is a perspective cross-sectional view of the device of Figure 3 in a second operating condition.

[0009] Illustrated in the ensuing description are various specific details aimed at an in-depth understanding of the embodiments. The embodiments can be obtained without one or more of the specific details, or with other methods, components or materials, etc. In other cases, known structures, materials or operations are not illustrated or described in detail so that various aspects of the embodiments will not be obscured.

[0010] The references used herein are only for convenience and hence do not define the sphere of protection or the scope of the embodiments.

[0011] In the drawings, the reference number 1 designates as a whole a roller blind comprising a blind cloth 2 having a bottom edge stiffened by a rod 3 and a top edge (not visible in the drawings) anchored to a roller 4 for winding the cloth, which is rotatably supported about a horizontal axis 5 by a fixed supporting structure 6 (Figure 1).

[0012] The fixed supporting structure 6 includes two end heads 9 that support the roller 4 to which a control device 10 is associated.

[0013] In various embodiments, as in the one illustrated in Figures 1 and 2, the supporting structure 6 moreover

includes a metal sectional element 7, to which the end heads 9 are fixed and which is designed to be anchored with any fixing means of a known type to a ceiling 8 or a wall, for example above a window opening that the blind 1 is designed to cover. In alternative embodiments, the end heads 9 can be directly anchored to the walls without any need to provide the sectional element 7.

[0014] With reference to Figures 2 to 5, the device 10 comprises a structure 12 that is designed to be mounted fixed on the supporting structure 6. In various embodiments, as in the one illustrated, the structure 12 comprises a shaft 12^{I} designed to be fixed, at one of its end, to one of the end heads 9 of the supporting structure 6.

[0015] The device 10 comprises a first body 16 that is mounted on the structure 12 so as to be rotatable in a first direction of rotation and in a second direction of rotation opposite to one another, and is designed to be fixedly coupled in rotation to the roller 4.

[0016] Said device further comprises a control pulley 14 rotatably mounted on the shaft 12^{I} and actuatable in said first and second directions of rotation.

[0017] The device 10 further comprises transmission means designed to transmit to the first body the motion of rotation of the control pulley in the aforesaid first direction and to disconnect said pulley from the first body when said pulley is actuated in the aforesaid second direction.

[0018] In particular, the control device described herein has transmission means that envisage a front-meshing joint designed to connect in rotation the pulley to the first body, and cam means designed to deactivate said joint as a result of actuation of the pulley in the aforesaid second direction. In various embodiments, as in the one illustrated, said joint operates in a direction substantially coaxial to the control pulley.

[0019] In various embodiments, as in the one illustrated in the figures, said joint comprises a meshing member 18 that is mounted on the fixed structure 12 in such a way as to be fixed with respect to the pulley 14 during a rotation in the aforesaid first direction, and blocked, instead, with respect to a rotation in the aforesaid second direction. Said meshing member is moreover mobile along the axis of said pulley, between a meshing condition governed by elastic means 20 (see Figures 8 and 9), in which it engages a meshing portion 22 fixed in rotation with respect to the first body 16, and an unmeshing condition (see Figures 10 and 11). In various embodiments, the portion 22 is a contrate-gear portion, preferably having a tapering to favour meshing by the member 18. In various embodiments, as in the one illustrated in the figures, the aforesaid cam means engage the meshing member 18 whenever the pulley is actuated in the aforesaid second direction, and induce, as a result of a rotation of the pulley 14 in said second direction, and against the action of the elastic means 20, an axial displacement of the member 18 from the meshing condition to the unmeshing condition. In various embodiments, as in the one illustrated in the figures, the aforesaid cam means comprise at least one substantially helical surface 24, coaxial to the pulley 14 and rigidly connected thereto, which engages said member 18 in the way referred to above.

[0020] In various embodiments, as in the one illustrated in the figures, the helical surface 24 is made of a single piece with the pulley 14. In various embodiments, as in the one illustrated in Figure 6, the pulley 14 comprises a disk-shaped portion 14^{I}, designed to be engaged by a control member, as will be better described in what follows, and a hub portion 14^{II}, in turn comprising a central sleeve rotatably mounted on the shaft 12^{I} (see Figure 2) and about which the helical surface 24 extends.

[0021] In various embodiments, as in the one illustrated, set facing said helical surface the pulley has a contrast surface 26, which engages the meshing member 18 whenever the pulley is actuated in the aforesaid first direction and is designed to transmit the motion of rotation in said direction to the meshing member 18. In various embodiments, the surface 26 defines a substantially helical surface characterized by an angle of helix of high value, which, as a result of its interaction with the member 18, pushes said member against the pulley 14 and the meshing portion 22 in order to prevent any possible unmeshing that were not caused by an actuation of the pulley in the aforesaid second direction of rotation.

[0022] In various embodiments, as in the one illustrated, the first body 16 has a substantially tubular conformation, provided inside which is the meshing portion 22. Preferably, said body 16 is rotatably mounted on the pulley 14 via interposition of bearing members 28 and surrounds the meshing member 18 with the meshing portion 22 facing the latter.

[0023] In various embodiments, as in the one illustrated in the figures, the meshing member 18 has a sleeve 18^{I}, which is rotatably mounted and mobile axially on the shaft 12^{I} and is equipped with an annular portion 18^{II}, provided on which is a contrate gear 30, designed to engage the meshing portion 22. In various embodiments, as in the one illustrated, the teeth 30 have a tapering designed to facilitate meshing thereof on said portion 22. The member 18 moreover has at least one tab 32, which is designed to engage the helical surface 24 and the contrast surface 26 and projects from the annular portion on the side opposite to that of the sleeve in a direction substantially parallel to the axial direction of the meshing member.

[0024] In various embodiments, as in the one illustrated, the meshing member 18 is coupled to blocking means designed to prevent any rotation thereof in the aforesaid second direction.

[0025] In various embodiments, as in the one illustrated, said blocking means comprise a second tubular body 34, which is fitted on the sleeve of the meshing member 18 in such a way as to be, with respect to said member, fixed in rotation but at the same time axially slidable so as to enable it to move between the conditions of meshing and unmeshing described above. In various embodi-

ments, as in the one illustrated in the figures, for said purpose the sleeve 18 has on its outer surface at least one longitudinal relief 18^{III}, designed to engage a corresponding groove provided on the inner surface of the second tubular body 34.

[0026] Said blocking means further comprise a third tubular body 36, which is fitted fixed on the shaft 12^{I} and surrounds the second body 34 in such a way as to define an annular space therewith. Set within said space is a unidirectional elastic joint 38 designed to block the second body 34 to the third body 36 when the body 34 tends to turn in the aforesaid second direction. In various embodiments, as in the one illustrated, the joint 38 is formed by a helical spring constrained, at one end, to the second body 34 (see Figure 4) and such as to expand against the internal walls of the third body 36 as a result of an action on said second body tending to turn it in the aforesaid second direction so as to prevent the latter from turning. In particular, the helix of the spring 39 has a direction of winding concordant with the aforesaid second direction so that the forces of friction that are generated between said spring and the internal walls of the body 36 as a result of the aforesaid action on the second body 34 cause a partial unwinding thereof, to which the expansion described above corresponds.

[0027] In various embodiments, as in the one illustrated, a shell 40 is anchored to the body 16 so as to constitute therewith a casing that encloses the elements described above of the device, with the exception of the disk-shaped portion 14^{I} of the pulley 14, which remains in fact on the outside, alongside the body 16. In various embodiments, as in the one illustrated in the figures, the end of the shell 40 opposite to the body 16 is supported in rotation by a bearing member 42, which is in turn carried by a lid 44 fitted fixed to the shaft 12^{I}.

[0028] The control device described herein is designed to be coupled to one end of the roller 4. In various embodiments, as in the one illustrated, the body 16 has on its outer surface longitudinal ribbings 16^{I} designed to engage in rotation the end of the roller to which the device is to be coupled. In various embodiments, as in the one illustrated, the shell 40 has a portion that partially envelops the body 16 and that defines, with its end edge, slits 40^{I} designed to engage the ribbings 16^{I} so as to connect the shell 40 in rotation to the body 16.

[0029] In order to manoeuvre the blind using the device described above, the portion 14^{I} of the control pulley 14 is engaged by a flexible control member 68, which in the example illustrated is constituted by a chain of balls 69 designed to engage seats 70 made on the periphery of the pulley 14. With reference to Figure 2, the ball chain 68 has two vertical branches 71, 72 that extend sufficiently downwards to enable convenient manoeuvring by the user and that must be pulled downwards in order to determine actuation of the pulley in the aforesaid first and second directions of rotation.

[0030] As described previously, generally a device of the type referred to above is coupled to the roller of the blind so as to make rotation of the roller in the first direction correspond to the unwinding of the cloth carried thereby and rotation of the roller in the second direction correspond to its winding (see Figures 2 to 4). Once again as mentioned previously, in this way the device provides a manually actuated control for unwinding the cloth of the blind, whilst winding of said cloth is governed by an automatic means associated to said roller, which is controlled by a user via the device. As mentioned previously, in said type of application said control means is constituted by elastic means. In the example illustrated in the figures, a return spring is anchored to one end 12^{II} of the fixed structure 12 and is designed to recall the roller into a resting condition, in which the cloth is completely wound.

[0031] Hereinafter, operation of the control device illustrated above will be described in detail with reference to the conventional application referred to previously.

[0032] Assuming that the cloth 2 of the blind is completely wound on the roller, unwinding can be governed by exerting a continuous pull on the branch 71 of the chain of balls so as to cause a rotation in the first direction (clockwise, as viewed in Figure 2) of the control pulley. Said rotation is transmitted to the body 16 and then to the roller 4 via the front-meshing joint provided in the device. In particular, the pulley 14 drives in rotation the meshing member 18, which by engaging the meshing area 22 draws along with it the body 16.

[0033] The roller is thus forced to turn in a clockwise direction, consequently causing lowering of the cloth 2 of the blind.

[0034] As the pull on the branch 71 of the chain 68 ceases, the cloth 2 of the blind remains blocked in the lowered position reached, whatever this may be. In fact, the return spring associated to the roller would tend to turn said roller in the second direction (i.e., in a counterclockwise direction, as viewed in Figure 2). However, said rotation is prevented in that, in said condition, the body 16 continues to be engaged by the meshing member 18, which is blocked, as described in detail above, with respect to a rotation in the second direction.

[0035] Once the blind has remained blocked in any partially or completely lowered position, it can be unblocked to enable fast return of the cloth 2 into the raised condition by exerting a pull on the branch 72 of the chain 68. In fact, said pull causes the pulley 14 to turn in the second direction (i.e., in a counterclockwise direction, as viewed in Figure 2) so as to cause interaction of the helical surface 24 with the meshing member 18, which, being blocked with respect to a rotation in the aforesaid second direction (or counterclockwise direction, as viewed in Figure 2), cannot but be displaced axially from the meshing condition (Figures 8 and 9) to the unmeshing condition (Figures 10 and 11). In the unmeshing condition of the member 18, the body 16 thus becomes free to turn in the second direction (i.e., in a counterclockwise direction, as viewed in Figure 2), together with the roller, under the action of the return spring of the latter. In this way, the

roller rewinds the cloth 2 rapidly.

[0036] Even though the application described above is the preferred one, the device 10 described herein can, however, be used also according to applications in which winding of the cloth is to be governed manually, whilst its unwinding is automatic and controllable via the device. Operation of the device is, however, also in this case, the same as the one described above. Yet, it should be noted that in this case automatic unwinding could be governed even just by the weight of the cloth itself, without the need to provide any automatic control or control means to be associated to the roller. The roller could in any case be equipped with elastic means for assisting manual control of winding of the cloth so as to prevent a user from having to exert a force equal to or higher than the weight of the cloth in order to govern winding thereof.

[0037] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary, even significantly, with respect to what is illustrated purely by way of non-limiting example herein, without thereby departing from the scope of the invention, as defined by the annexed claims.

Claims

1. A device for controlling the roller (4) on which the covering cloth of a roller blind is wound, said device being designed to be coupled to one end of said roller (4) and installed on the supporting structure of said blind in such a way that said end is rotatably supported about a horizontal axis by said supporting structure,
said device comprising:

- a structure (12), designed to be mounted fixed on said supporting structure;
- a first body (16), rotatably mounted on said fixed structure, in a first direction of rotation and in a second direction of rotation opposite to one another, and designed to be rigidly coupled in rotation to said roller;
- a control pulley (14), rotatably mounted on said fixed structure and actuatable in said first and second directions of rotation; and
- transmission means designed to transmit to said first body the motion of rotation of said pulley in said first direction and to disconnect said pulley from said first body when said pulley is actuated in said second direction,

said device being **characterized in that** said transmission means comprise a front-meshing joint (18, 22), designed to connect in rotation said pulley to said first body, and cam means (24), designed to deactivate said joint as a result of actuation of said pulley in said second direction.

2. The device according to Claim 1, wherein said joint comprises a meshing member (18) that is mounted on said fixed structure (12) in such a way as to be fixed with respect to said pulley during a rotation in said first direction and blocked, instead, with respect to a rotation in said second direction, said meshing member being moreover mobile along the axis of said pulley between a meshing condition governed by elastic means (20), in which it engages a meshing portion (22) fixed in rotation with respect to said first body (16), and an unmeshing condition,
wherein said cam means are designed to engage said meshing member (18) whenever the pulley is actuated in the aforesaid second direction, and to induce, as a result of a rotation of said pulley (14) in said second direction, and against the action of said elastic means (20), an axial displacement of said member (18) from the meshing condition to the unmeshing condition.

3. The device according to Claim 2, wherein said cam means comprise at least one substantially helical surface (24), coaxial to said pulley (14) and rigidly connected thereto.

4. The device according to Claim 3, wherein said helical surface (24) is made of a single piece with said pulley (14).

5. The device according to any one of Claims 2 to 4, wherein said pulley (14) has a contrast surface (26), designed to engage said meshing member (18) so as to transmit thereto the motion of rotation of said pulley in said first direction.

6. The device according to any one of Claims 2 to 5, wherein said first body (16) has a substantially tubular conformation inside which said meshing portion (22) is obtained.

7. The device according to any one of Claims 2 to 6, wherein said meshing member is coupled to blocking means designed to prevent rotation thereof in the second direction.

8. The device according to Claim 7, wherein said meshing member (18) has a sleeve (18^{I}), rotatably mounted and axially mobile on said fixed structure (12), and equipped with an annular portion (18^{II}), made on which is a set of contrate gear teeth (30) designed to engage said meshing portion (22), and wherein said blocking means comprise a second tubular body (34), which is fitted on said sleeve of said meshing member (18) in such a way as to be fixed in rotation with respect thereto but axially slidable with respect thereto, and a third tubular body (36) that envelops said second body (34) and is fixed on said fixed structure (12), there being set between said second and

third body a unidirectional elastic joint (38) that blocks said second body to said third body when said second body tends to turn in said second direction.

9. The device according to Claim 8, wherein said sleeve has on its outer surface at least one longitudinal relief (18^{III}), designed to engage a corresponding groove (34^{I}) provided on the inner surface of the second tubular body (34).

FIG. 1

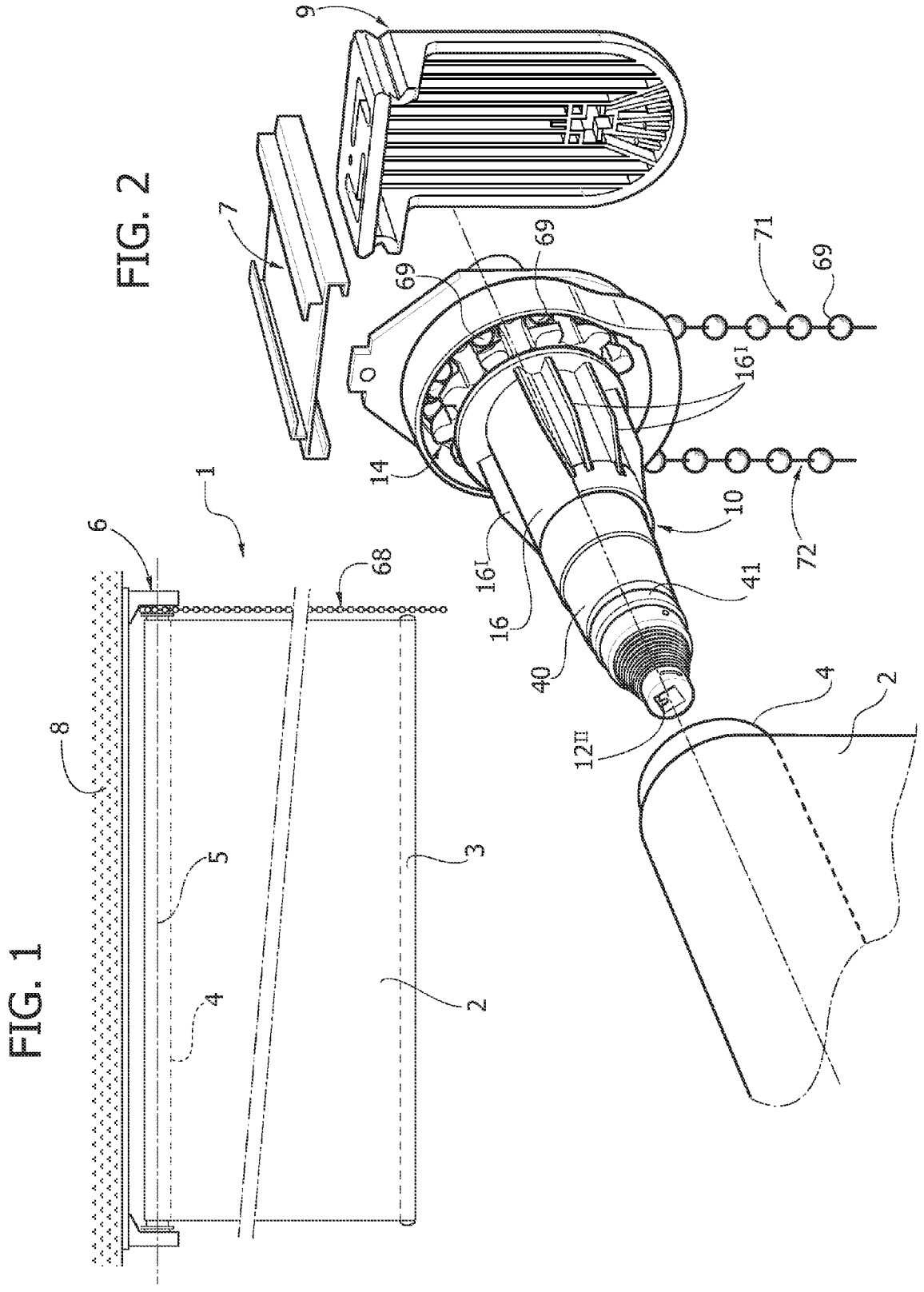


FIG. 2

FIG. 3

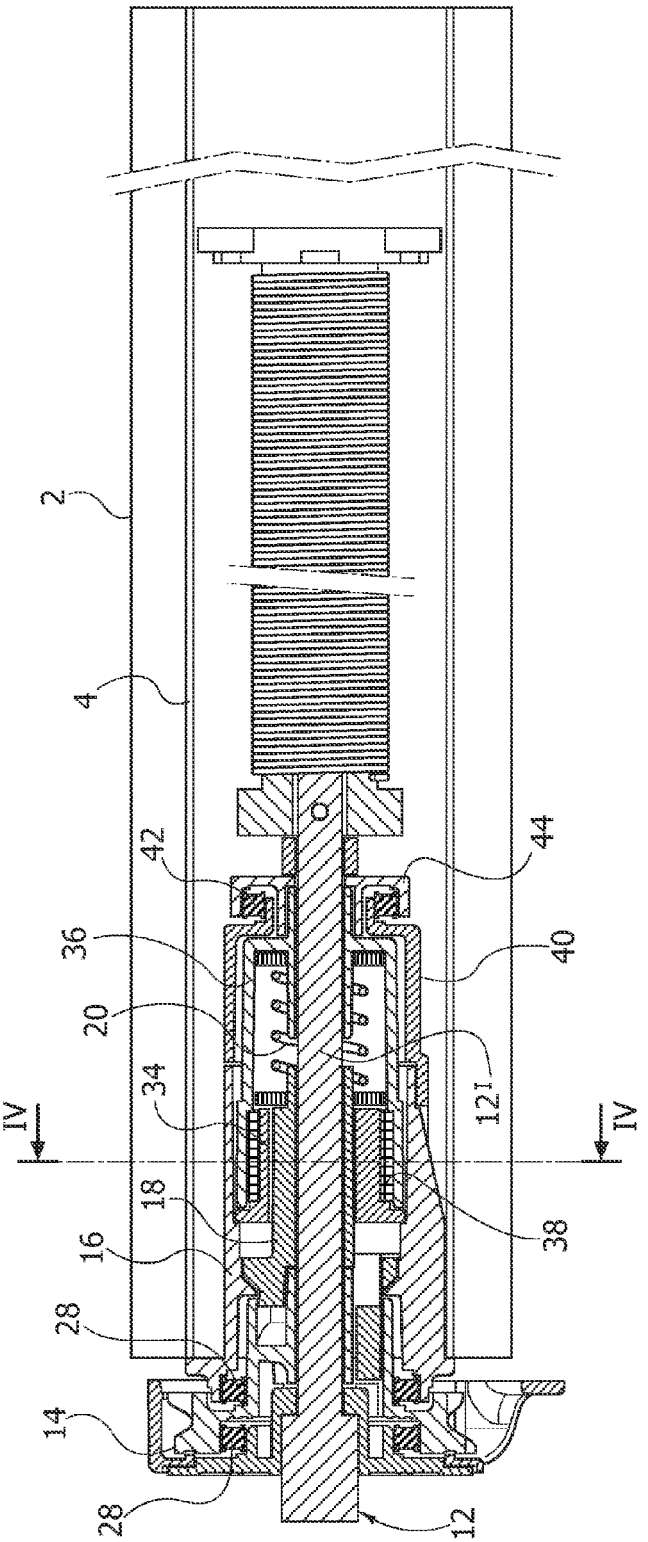


FIG. 4

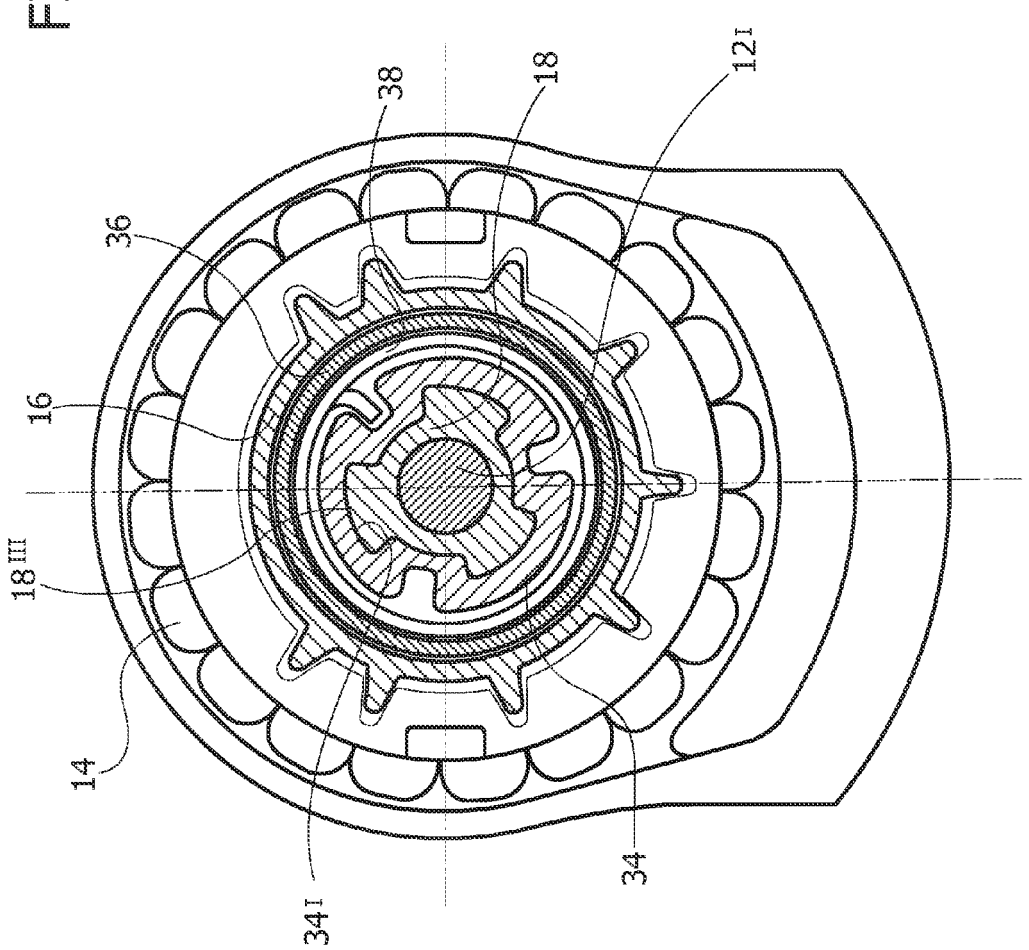


FIG. 5

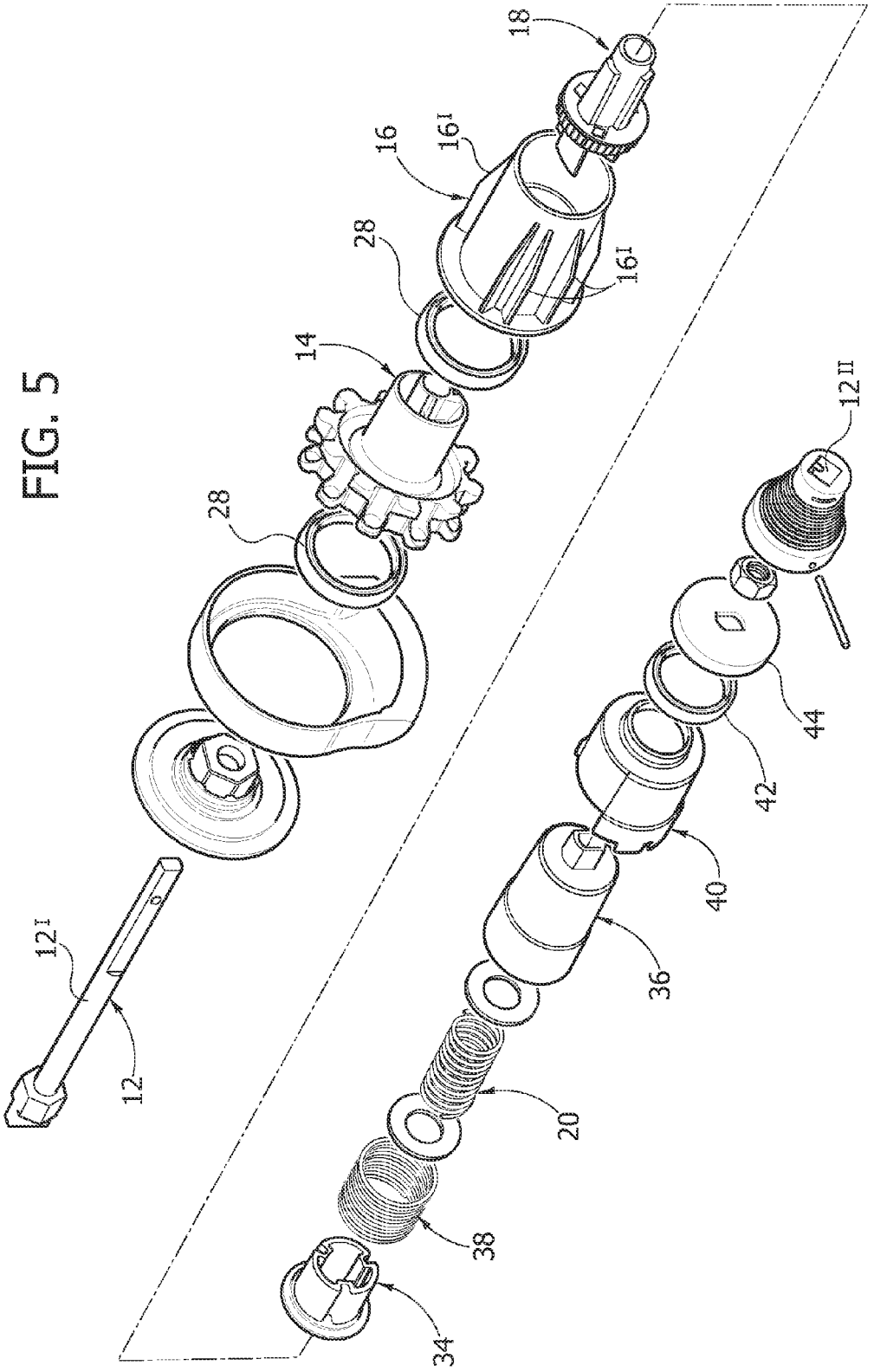


FIG. 7

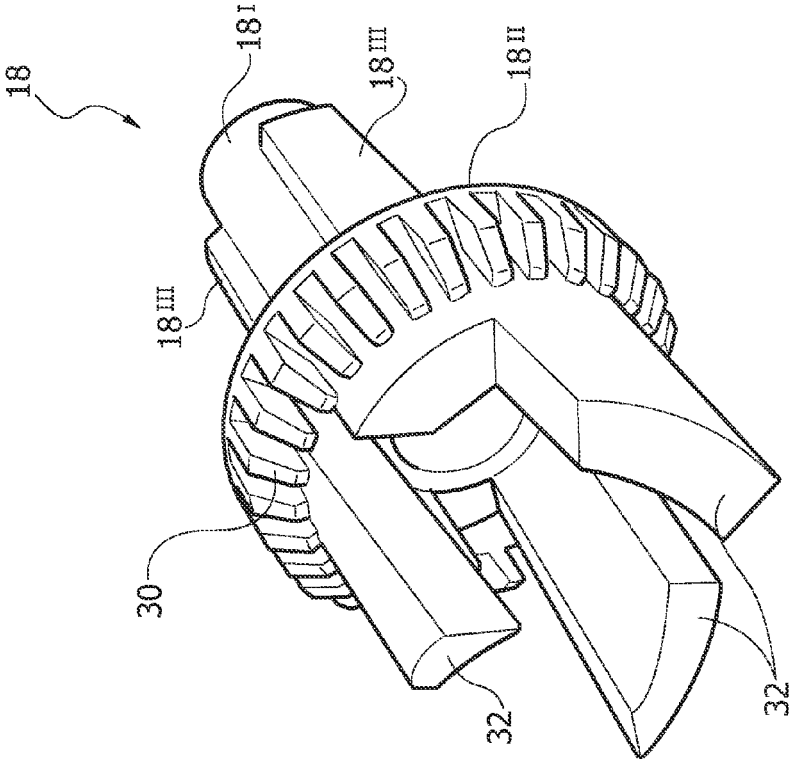


FIG. 6

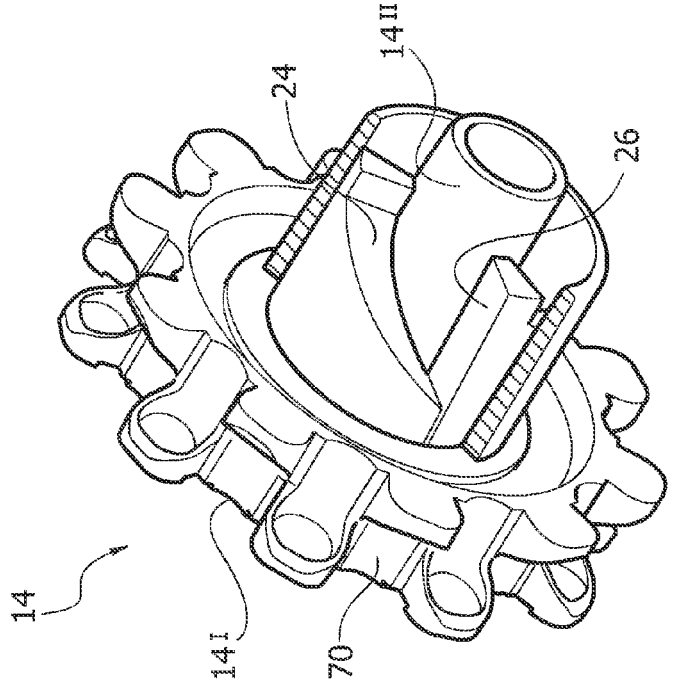


FIG. 9

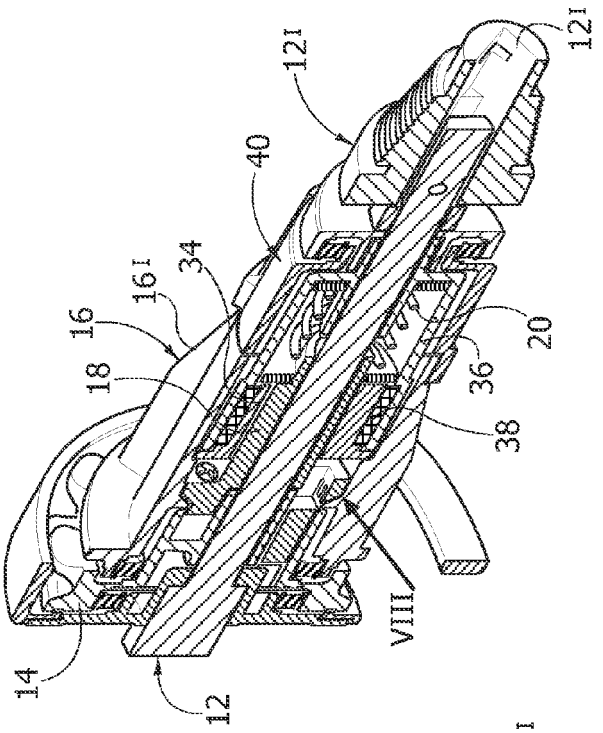


FIG. 8

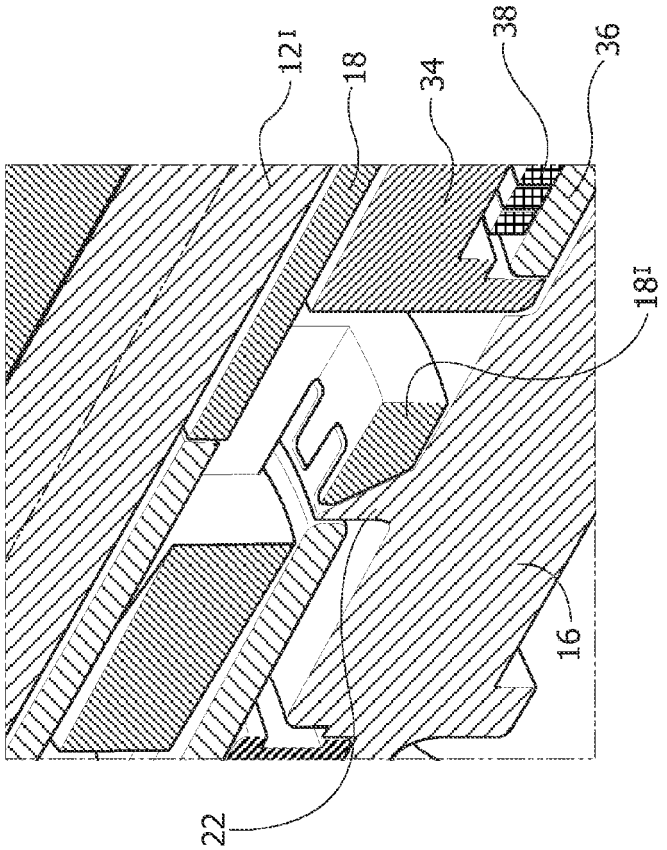


FIG. 11

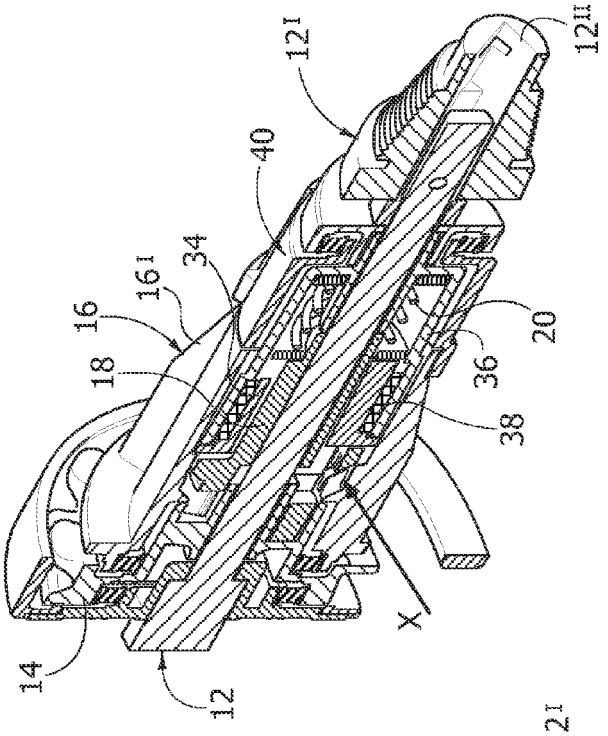
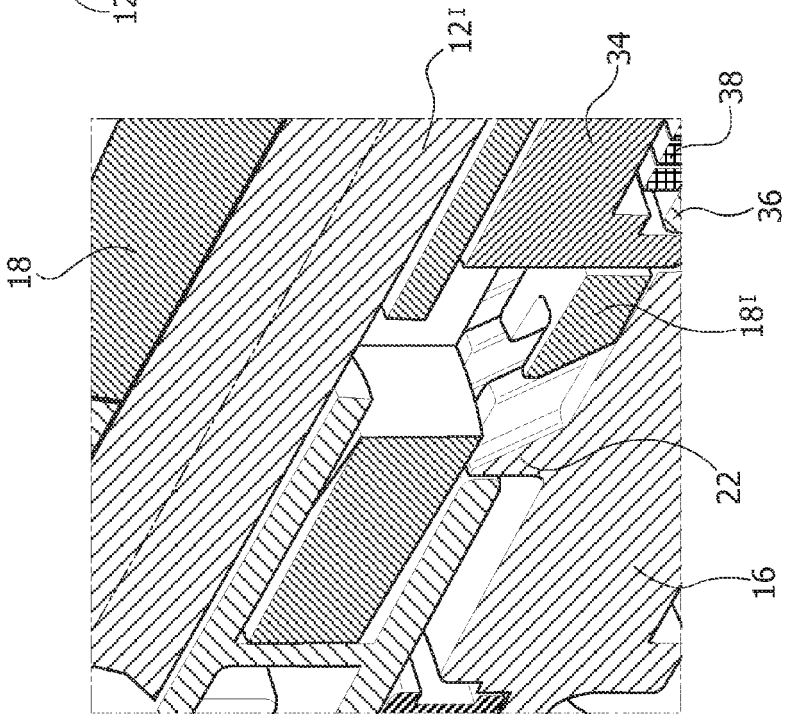


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 10 19 2796

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X	EP 0 627 542 A1 (NICHIBEI KK [JP]) 7 December 1994 (1994-12-07) * figures 14-18 * * abstract * * column 16, line 12 - column 20, line 16 *	1	
X	US 2009/120592 A1 (LESPERANCE LEO J [US]) 14 May 2009 (2009-05-14) * figures 6-9 * * abstract * * paragraphs [0060], [0065], [0066], [0085], [0087] *	1	TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 June 2011	Cornu, Olivier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0717166 B1 **[0003]**