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(54) **Gearmotor, particularly for sliding gates**

(57) A gearmotor (1) particularly for sliding gates, comprising a transmission shaft (1a) constituted by a hollow shaft (2) which has a first axial seat (2a) for jointly rotationally coupling a complementarily shaped driving shaft (4). Means that can be accessed by the user are provided in order to adjust the axial position of a pinion (14) that is jointly connected to the driving shaft (4) with respect to the hollow shaft (2).

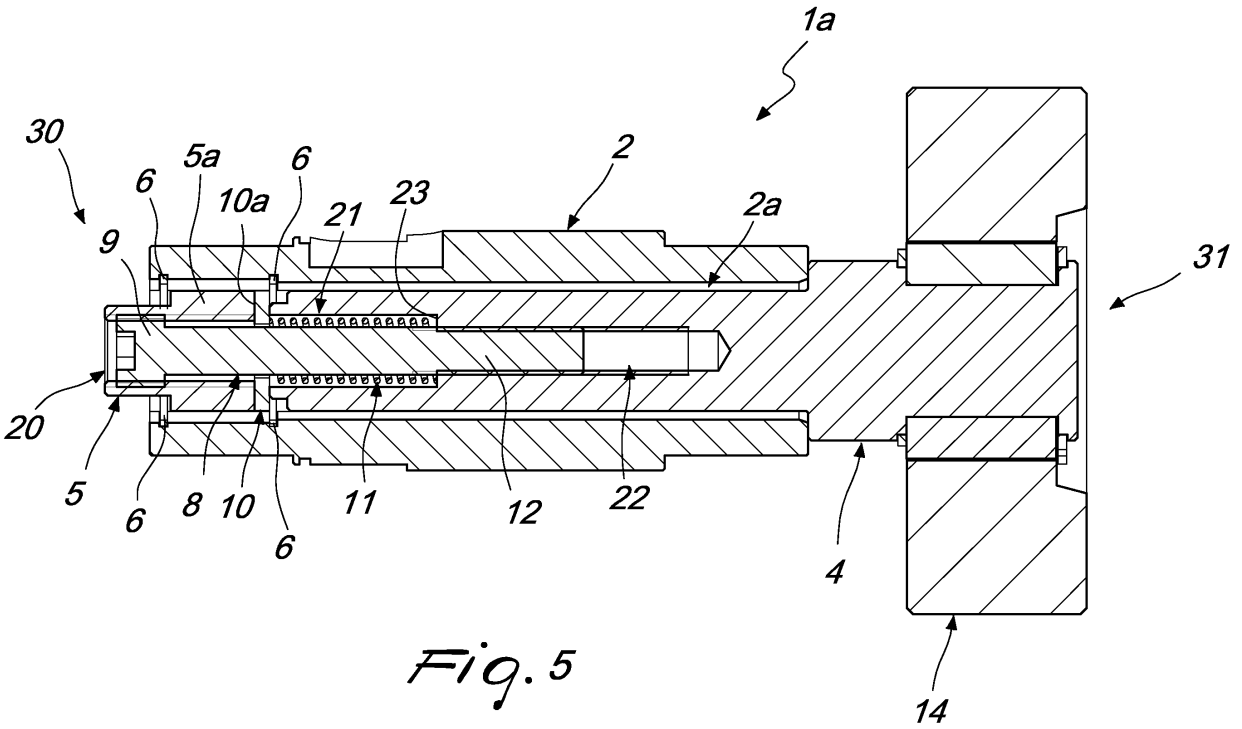

Fig. 5

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Description

[0001] The present invention relates to a gearmotor, particularly for sliding gates.

[0002] In the field of automation, the movement of sliding gates is entrusted to movement systems that generally comprise a gearmotor on the output shaft of which a pinion is fitted which can engage a rack that is jointly connected to the gate that must be made to slide on appropriately provided guides.

[0003] Nowadays it is known to insert the gear motor within a post that constitutes the gate; in this case, it is necessary to provide on the post an opening, which is usually oversized and therefore aesthetically not pleasant, to allow the exit of the shaft.

[0004] Although mounting the gearmotor in the supporting post of the sliding gate can be performed precisely, it nonetheless requires tuning during installation, in order to check that the gate operates correctly without jamming or high friction.

[0005] More precisely, it is necessary to ensure that the pinion works correctly with the rack in order to avoid meshings that are defective and/or noisy and/or subject to irregular wear.

[0006] These gearmotors of the known type are not free from drawbacks, which include the fact that the output shaft of the gearmotor, which supports the pinion for meshing with the rack, is coupled axially to the gearmotor and therefore it is not possible to perform any adjustment of the meshing between the pinion and the rack, and this requires, if it is necessary to perform maintenance interventions, the disassembly of the gearmotor from the post of the sliding gate.

[0007] Finally, if it is necessary to free the sliding of the gate with respect to the rack, for example in case of lack of electric power supply, it is necessary to act on multiple elements and in long times.

[0008] The aim of the present invention is to eliminate the above-mentioned drawback, by providing a gearmotor, particularly for the movement of sliding gates, that allows to achieve rapidly and easily the adjustment of the correct and optimum meshing between the pinion and the rack both during and after its installation.

[0009] Within this aim, an object of the present invention is to provide a gearmotor that allows to perform installation and maintenance operations without requiring its disassembly.

[0010] Another object of the invention is to be able to provide a gearmotor that allows to uncouple rapidly and simply the mating between the pinion and the rack without necessarily having to remove the gearmotor from its seat.

[0011] Another object of the present invention is to provide a gearmotor that uses components that are common and widespread in the field and have low costs and is therefore commercially competitive.

[0012] This aim and these and other objects, that will become better apparent hereinafter, are achieved by a gearmotor particularly for sliding gates, **characterized in that** it comprises a transmission shaft constituted by a hollow shaft which has a first axial seat for the rotationally joined mating of a complementarily shaped driving shaft, means that can be accessed by the user being provided in order to adjust the axial position of a pinion that is jointly connected to said driving shaft with respect to said hollow shaft.

[0013] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of an embodiment of a gearmotor with a device for axial adjustment of the driving shaft, according to the present invention, integrated in a post of a sliding gate;

Figure 2 is a partially exploded perspective view of the gearmotor shown in Figure 1;

Figure 3 is a perspective view of the gearmotor shown in Figure 1, with the driving shaft not adjusted correctly;

Figure 4 is a perspective view of the output shaft of the gearmotor show in Figure 1, with the driving shaft in the minimum extension configuration;

Figure 5 is a sectional view of the output shaft and of the driving shaft, shown in Figure 4 along a longitudinal axis;

Figure 6 is a perspective view of the output shaft of the gearmotor show in Figure 1, with the driving shaft in the maximum extension configuration;

Figure 7 is a sectional view of the output shaft and of the driving shaft, shown in Figure 6, taken along a longitudinal axis.

[0014] In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0015] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0016] With reference to the figures, the reference numeral 1 designates a gearmotor, which can be inserted within an appropriately provided post 13.

[0017] The gearmotor 1 comprises a transmission shaft 1a, with which it is possible to associate axially a hollow shaft 2.

[0018] The hollow shaft 2, whose outside diameter has a circular shape, has a first axial seat 2a for the jointly rotational coupling of a complementarily shaped driving shaft 4.

[0019] The joint rotation between the driving shaft 4 and the hollow shaft 2 can be allowed thanks to the fact that the hollow shaft 2 has the first axial seat 2a which has a square or polygonal shape.

[0020] Of course, it is possible to provide other systems for preventing relative rotations, such as for example a splined profile.

[0021] The first axial seat 2a is closed at a first end by means of a closure plug 5, which has a T-shaped cross-section and has a second threaded axial seat 20 (for example with a right-handed thread); a head 5a of the closure plug 5 is arranged within the hollow shaft 2 and locked in position thereat by means of two pairs of retention rings 6, which are positioned between the two opposite surfaces of the head 5a and are partially accommodated in two grooves that are formed internally and radially with respect to the hollow shaft 2.

[0022] The transmission shaft 1a has, at a first end 30, means which can be accessed by the user outside the post 13 to adjust the axial position of a pinion 14, which is jointly connected to a second end 31 of the driving shaft 4, with respect to the hollow shaft 2.

[0023] More precisely, the means for axial adjustment of the pinion 14 can be constituted by a screw 8, or by a similar threaded element, which has a head 9 that is threaded complementarily with respect to the second axial seat 20 of the closure plug 5.

[0024] The head 9 can thus perform an axial movement, with respect to the closure plug 5, which is limited by the presence of a stroke limiting disk 10 which is perforated and interposed between the closure plug 5 and one of the pairs of retention rings 6 that is arranged in the direction of the pinion 14.

[0025] The screw 8 therefore has a stem 12 that is provided with a thread that is opposite with respect to the thread of the head 9 (for example left-handed).

[0026] A first cavity 21 is provided axially with respect to the hollow shaft 2, on the opposite side with respect to the pinion 14, has a larger diameter than the outside diameter of the stem 12 of the screw 8, and is followed by a third seat 22 that is threaded complementarily with respect to the stem 12 of the screw 8.

[0027] The pinion 14 cantilevers out of the post 13 through an appropriately provided opening formed thereon for engagement with a rack 15, which is associated with the movable part of the sliding gate for the movement of such gate.

[0028] Starting from the condition shown in Figure 5, a rotation of the head 9 of the screw 8 that forces an axial movement thereof in the direction of the pinion 14 is matched by a movement of the driving shaft 4 and therefore of the pinion 14 toward the outside of the gearmotor 1 and therefore of the post 13, to a condition of maximum protrusion shown in Figure 7.

[0029] In order to prevent vibrations from changing the selected position between the hollow shaft 2 and the driving shaft 4, there are elastic means 11 interposed between the stroke limiting disk 10 and a pusher plane 23 that is formed in the connecting region between the first cavity 21 and the third seat 22.

[0030] More precisely, the elastic means 11 comprise a spiral spring, which is inserted coaxially with respect to the stem 12 of the screw 8 and is initially accommodated within the first cavity 21.

[0031] The spring therefore pushes at all times.

[0032] The operation of the gearmotor 1 according to the invention is as follows.

[0033] In particular, it must be stressed that it is possible to adjust the mating between the pinion 14 and the rack 15 without removing the gearmotor 1 from its seat but simply by acting on the screw 8, screwing it or unscrewing it with respect to the hollow shaft 2, which is axially fixed with respect to the gearmotor 1.

[0034] More precisely, it is possible to make the driving shaft 4 slide with respect to the hollow shaft 2 from a point of minimum extension to a point of maximum extension for a total translational motion of approximately 30 mm.

[0035] In this manner it is possible to perform fine adjustments at any time both before installation and during installation as well as after the installation of the gate and of the gearmotor 1.

[0036] In practice it has been found that the gearmotor according to the present invention fully achieves the intended aim and objects, since it allows to produce the translational motion of the driving shaft along its axis, allowing to adjust and/or uncouple the transmission means associated with the movable part of the sliding gate.

[0037] Moreover, the gearmotor according to the present invention uses, for its production, components that are easily available, entailing a low cost thereof.

[0038] Further, the gearmotor allows to disengage rapidly and simply the coupling between the pinion and the rack without necessarily having to remove it from its seat.

[0039] The gearmotor thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. All the details may further be replaced with other technically equivalent elements. In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0040] The disclosures in Italian Patent Application No. TV2008A000095 from which this application claims priority are incorporated herein by reference.

[0041] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A gearmotor (1) particularly for sliding gates, **characterized in that** it comprises a transmission shaft (1a) constituted by a hollow shaft (2) which has a

first axial seat (2a) for jointly rotationally coupling a complementarily shaped driving shaft (4), means that can be accessed by the user being provided in order to adjust the axial position of a pinion (14) that is jointly connected to said driving shaft (4) with respect to said hollow shaft (2).

2. The gearmotor according to claim 1, **characterized in that** said hollow shaft (2), whose outside diameter has a circular shape, is provided with a first axial seat (2a), which has a polygonal plan shape or is slotted internally for jointly rotationally coupling said complementarily shaped driving shaft (4), said first axial seat (2a) being closed at a first end by means of a closure plug (5), which has a T-shaped cross-section and has a second threaded axial seat (20).

3. The gearmotor according to claims 1 and 2, **characterized in that** a head (5a) of said closure plug (5) is arranged within said hollow shaft (2) and is locked thereat in position by way of two pairs of retention rings (6), which are arranged between the two opposite surfaces of said head (5a) and are accommodated partially in two grooves formed internally and radially with respect to said hollow shaft (2).

4. The gearmotor according to claims 1 and 3, which can be accommodated within a suitably provided post (13), **characterized in that** said transmission shaft (1a) has, at a first end (30), means that can be accessed by the user outside said post (13) to adjust the axial position, with respect to said hollow shaft (2), of a pinion (14) that is jointly connected to the second end (31) of said driving shaft (4), said means being constituted by a screw (8) or a similar threaded element, which has a head (9) that is threaded complementarily with respect to said second axial seat (20) of said closure plug (5), said head (9) being able to perform an axial movement with respect to said closure plug (5) that is limited by the presence of a stroke limiting disk (10) that is perforated and interposed between said closure plug (5) and one of said pairs of retention rings (6) arranged in the direction of said pinion (14).

5. The gearmotor according to claims 1 and 4, **characterized in that** said screw (8) has a stem (12) provided with a thread that is advantageously opposite with respect to the thread of said head (9).

6. The gearmotor according to claims 1 and 5, **characterized in that** a first cavity (21) is formed axially with respect to said hollow shaft (2) on the opposite side with respect to said pinion (14) and has a larger diameter than the outside diameter of said stem (12) of said screw (8), followed by a third seat (22), which is threaded complementarily with respect to said stem (12) of said screw (8).

7. The gearmotor according to claims 1 and 6, **characterized in that** said pinion (14) cantilevers out from said post (13) through an appropriately provided opening formed therein to engage a rack (15) that is associated with the movable part of the sliding gate in order to move said gate.

8. The gearmotor according to one or more of the preceding claims, **characterized in that** starting from the condition in which said driving shaft (4) is in the condition of maximum insertion in said first axial seat (2a), a rotation of said head (9) of said screw (8) that imposes an axial movement thereof in the direction of said pinion (14) is matched by a movement of said driving shaft (4) toward the outside of said gearmotor (1) and therefore of said post (13).

9. The gearmotor according to one or more of the preceding claims, **characterized in that** in order to prevent vibrations from leading to a change in the selected mutual position of said hollow shaft (2) and said driving shaft (4), there are elastic means (11) which are interposed between said stroke limiting disk (10) and a pusher plane (23) formed in the region connecting said first cavity (21) and said third seat (22).

10. The gearmotor according to claims 1 and 9, **characterized in that** said elastic means (11) comprise a spiral spring, which is inserted coaxially with respect to said stem (12) of said screw (8) and is accommodated initially within said first cavity (21), said spring always acting by pushing.

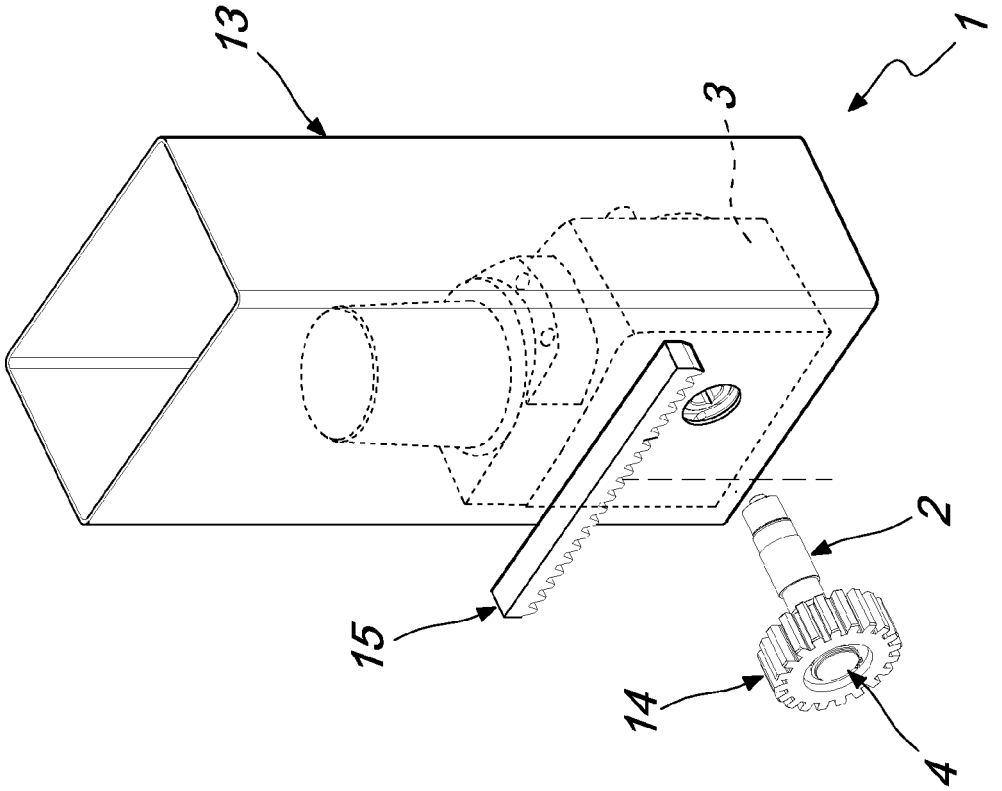

Fig. 2

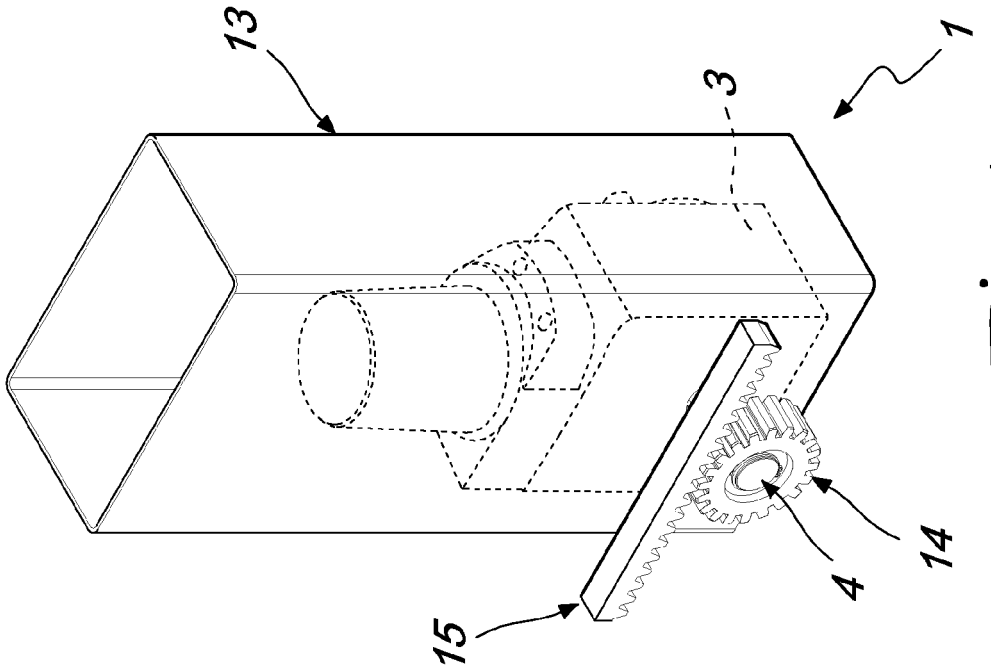

Fig. 1

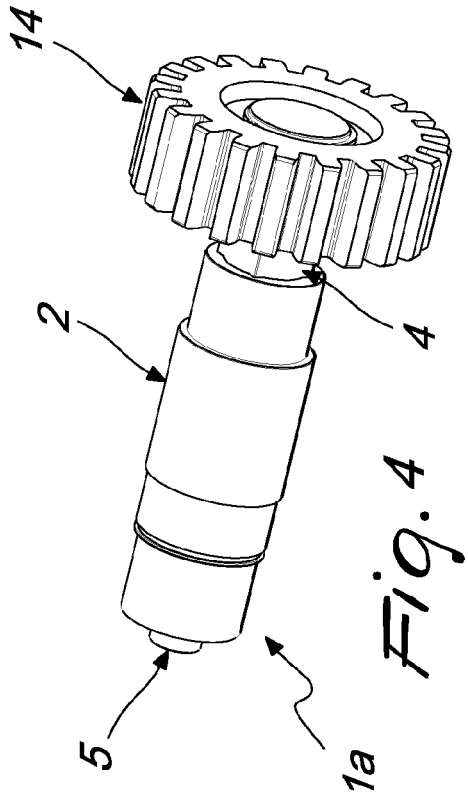

Fig. 4

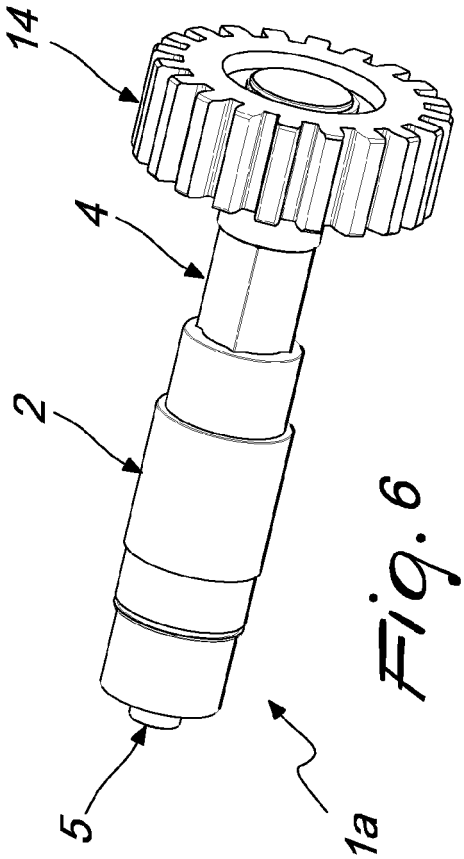

Fig. 6

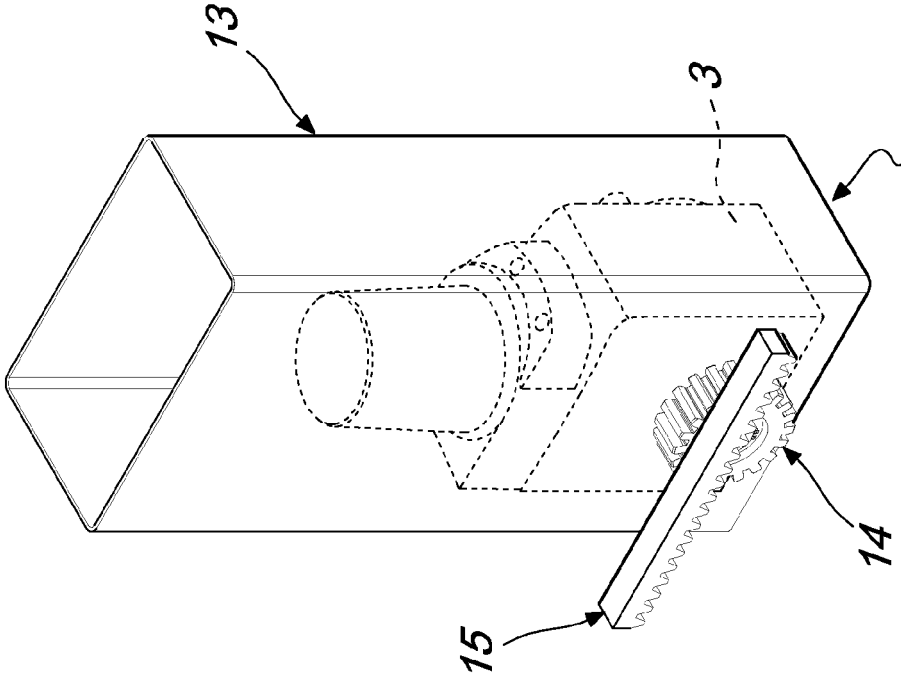

Fig. 3

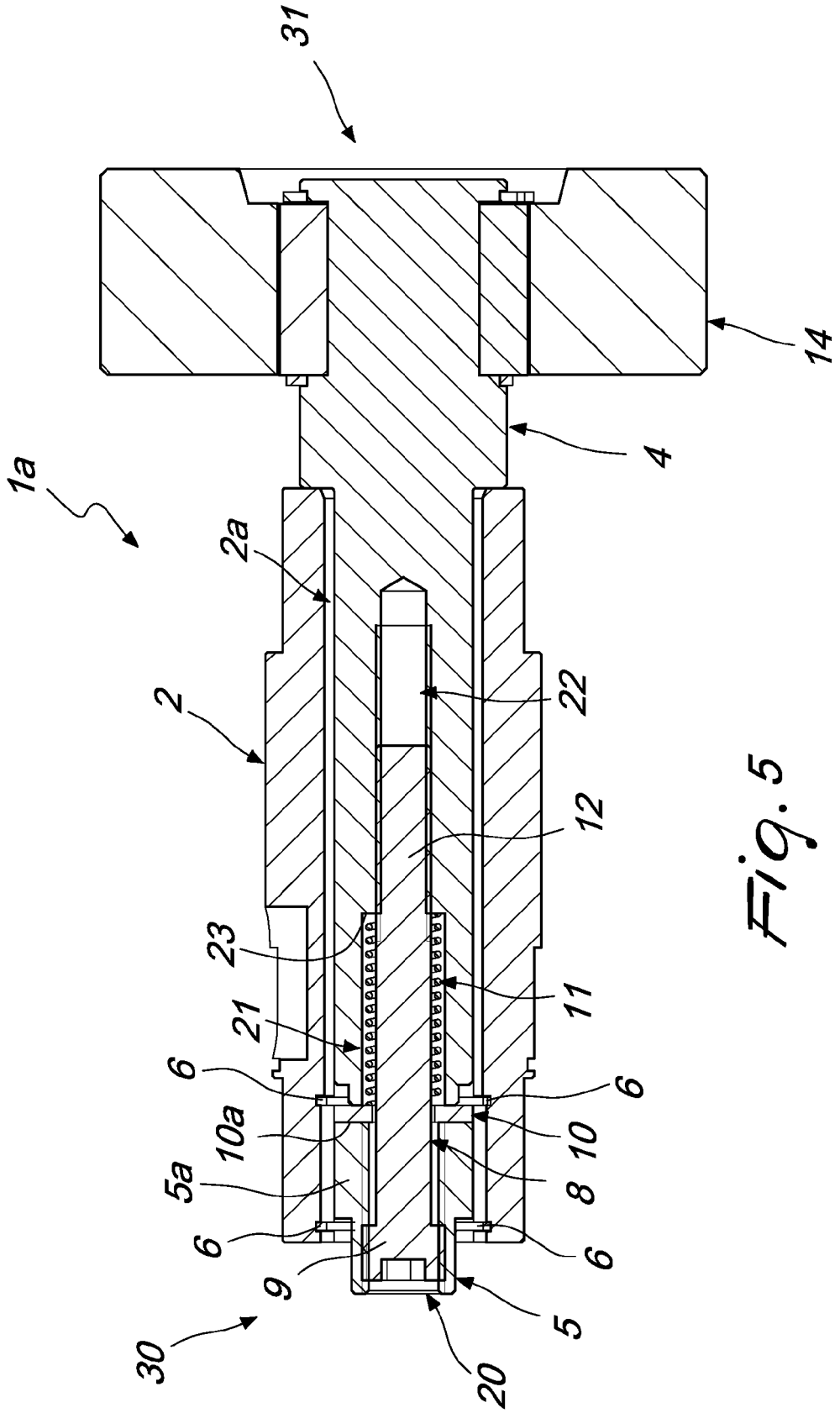

Fig. 5

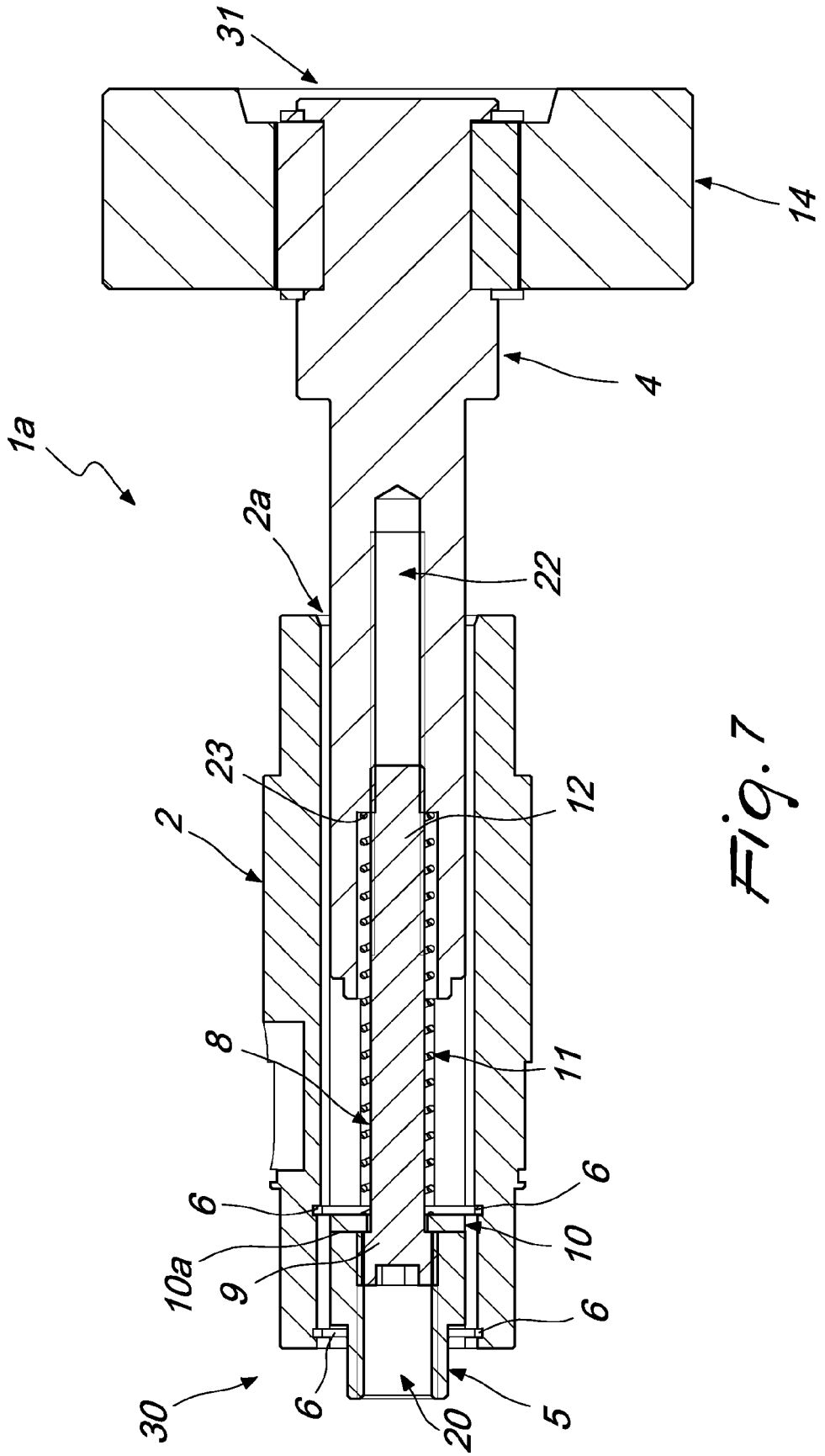

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 1500

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 528 207 A (RENE BOSMY SOC NORMANDE DE CLO [FR]) 4 May 2005 (2005-05-04) * paragraphs [0160] - [0165], [0176]; figures 16-18 *	1	INV. E05F15/14
X	FR 2 536 489 A (MARCHAL EQUIP AUTO [FR]) 25 May 1984 (1984-05-25) * page 14, lines 5-34; figure 10 *	1	
A	US 4 065 878 A (TSUGANE SACHIO) 3 January 1978 (1978-01-03) * column 2, lines 26-51; figure 1 *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

E05F
F16H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 June 2009	Witasse-Moreau, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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11-06-2009

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

REFERENCES CITED IN THE DESCRIPTION

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- IT TV20080095 A **[0040]**