



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.11.2014 Bulletin 2014/45

(51) Int Cl.:
E05F 15/14 (2006.01)

(21) Application number: **14166477.1**

(22) Date of filing: **29.04.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventors:
• **Pagliarani, Imerio**
47035 Gambettola (IT)
• **Paoli, Giuseppe**
47521 Cesena (IT)

(30) Priority: **29.04.2013 IT BO20130189**

(74) Representative: **Manconi, Stefano et al**
Studio Torta S.p.A.
Via Viotti, 9
10121 Torino (IT)

(71) Applicant: **MITEC S.r.l. con unico socio**
Cesena (IT)

(54) **Sliding gate**

(57) A sliding gate is provided with a rack (17) coupled to a gear (28) fitted on a transmission shaft (24) mounted to rotate due to the thrust of an electric motor (19); the gear (28) being axially movable between a coupling position, in which the gear (28) is coupled in an

angularly fixed manner to a grooved coupling portion (37) of the transmission shaft (24), and a release position, in which the gear (28) is coupled in a rotatory manner to the transmission shaft (24) by way of the interposition of a freewheel (33).

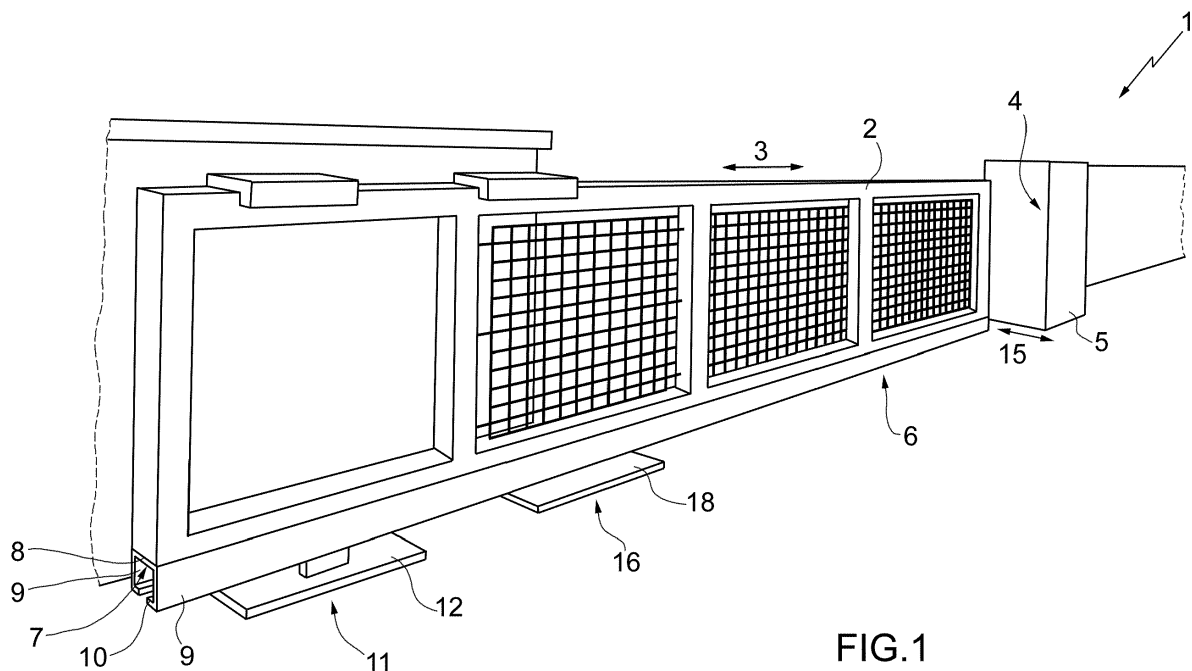


FIG.1

Description

[0001] The present invention relates to a sliding gate.

[0002] In particular, the present invention relates to a sliding gate of the type comprising a panel movable in a travelling direction between an open and a closed position; a lower guide arranged below the panel parallel to the travelling direction; at least one guiding and supporting wheel engaged in a rotary manner in the lower guide; and an actuating device to move the panel between its open and closed positions.

[0003] The actuating device comprises a rack mounted inside the lower guide parallel to the travelling direction, a gear coupled to the rack, and an electric motor for actuating the gear.

[0004] The electric motor and gear are mounted on a support frame hinged, in turn, to an anchor plate secured to the ground.

[0005] The support frame is movable, with respect to the anchor plate, around a pivot axis transverse to the travelling direction between a coupling position of the gear with the rack and a release position of the gear from the rack itself.

[0006] The support frame is moved, and normally maintained in its coupling position by a spring interposed between the anchor plate and the support frame, and is moved manually, against the action of the spring, from its coupling position to its release position.

[0007] The displacement of the support frame in its release position allows to disengage the gear from the rack and to move the sliding gate in the travelling direction in case of malfunction or power failure of the electric motor.

[0008] Due to the presence of the anchor plate, of the support frame, and of the spring, the sliding gates of the known type described above have some drawbacks, mainly in that the actuating device has a relatively high number of components, it is, therefore, relatively complex and expensive, and involves a relatively long and difficult assembly.

[0009] It is an object of the present invention to provide a sliding gate which is free from the above drawbacks and which is simple and inexpensive to implement.

[0010] According to the present invention, there is provided a sliding gate as claimed in the appended claims.

[0011] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting embodiment, wherein:

Figure 1 is a schematic perspective view of a preferred embodiment of the sliding gate of the present invention;

Figure 2 is a schematic side view of a detail of the sliding gate of Figure 1;

Figure 3 is a schematic perspective view, with parts removed for clarity, of a first detail of Figure 2; and
Figure 4 is a schematic sectional view of a second detail of Figure 2.

[0012] With reference to figure 1, with 1 is indicated, as a whole, a sliding gate comprising an elongated panel 2, which extends in a direction 3, is mounted for the closing of an opening 4 obtained through a wall structure 5, and is provided with a profiled element 6, which is substantially C-shaped, and is fixed to a lower edge of the panel 2 with its concavity facing downwards.

[0013] The element 6 defines a guide 7, which extends parallel to the direction 3, is limited by a substantially flat top wall 8, and is limited, furthermore, by two substantially flat side walls 9, whose free ends 10 are folded perpendicular to the walls 9 so as to be substantially parallel to the wall 8.

[0014] As illustrated in Figures 1 and 2, the sliding gate 1 is movable in the direction 3 between an open and a closed position of the opening 4, and is supported in sliding manner by a pair of guiding and supporting carriages 11 arranged in succession along the guide 7.

[0015] Each carriage 11 comprises a support bracket 12 fixed to the ground and supporting at least one wheel 13, which extends inside the guide 7, is arranged in contact with the wall 8, and is coupled in a rotatory manner to the bracket 12 to rotate, with respect to the bracket 12 itself, about an axis 14 of rotation parallel to a direction 15 transverse to the direction 3.

[0016] The sliding gate 1 is moved in the direction 3 between its open and closed positions by way of an actuating device 16 comprising a rack 17 fixed to the wall 8 of the guide 7 parallel to the direction 3, a support frame 18 fixed to the ground between the two carriages 11, and an electric motor 19 fixed to the frame 18 parallel to the direction 3 itself.

[0017] With reference to Figures 2, 3, and 4, the device 16 has, in addition, a gear train 20 comprising a gear 21 keyed on a first transmission shaft (not shown), which is mounted to rotate, with respect to the frame 18, around a respective longitudinal axis 22 parallel to direction 15, and is coupled to an output shaft (not shown) of the electric motor 19 by way of the interposition of a gear-motor 23.

[0018] The gear train 20 comprises, furthermore, a second transmission shaft 24, which extends through the gear-motor 23 parallel to the direction 15, and is coupled in a rotatory manner to the gear-motor 23 by way of the interposition of a pair of rolling bearings 25 to rotate, with respect to frame 18, about a respective longitudinal axis 26 parallel to the axis 22.

[0019] The shaft 24 supports a first gear 27, which is coupled in an axially and angularly fixed manner to the shaft 24, and is coupled, also, to the gear 21.

[0020] The shaft 24 also supports a second gear 28, which has a cup shape, and is limited by a substantially flat annular bottom wall 29, which is engaged on the shaft 24 perpendicularly to the axis 26, is coupled in sliding manner to the shaft 24, and has a grooved central hole 30 coaxial with the axis 26 itself.

[0021] The gear 28 is limited, also, by a substantially cylindrical side wall 31 projecting axially from the wall 29,

and is provided with an external toothing 32 coupled to the rack 17.

[0022] The device 16 also comprises a freewheel 33, which is mounted inside the wall 31 coaxially with the axis 26, is provided with an outer ring 34 coupled in an angularly and axially fixed manner to the wall 31, and has an inner ring 35 keyed on a grooved bushing 36.

[0023] The bushing 36 is engaged on the shaft 24 coaxially with the axis 26, and is coupled in an angularly fixed and axially sliding manner with a grooved coupling portion 37 of the shaft 24 itself.

[0024] The assembly defined by the gear 28, by the freewheel 33, and by the bushing 36 is movable along the shaft 24 in the direction 15 between a coupling position, in which the hole 30 is coupled to the portion 37, and a release position, in which the hole 30 disengages the portion 37 for coupling with a smooth release portion 38 of the shaft 24.

[0025] In other words, when the gear 28 moves in its coupling position, the shaft 24 and the gear 28 are connected in an angularly fixed manner to each other by way of a grooved coupling, while, when the gear 28 moves in its release position, the shaft 24 and the gear 28 are coupled in rotary manner one with the other.

[0026] The assembly defined by the gear 28, by the freewheel 33, and by the bushing 36 is moved, and normally maintained, in its coupling position by a spring 39 interposed between the shaft 24 and the wall 29, and is moved manually in its release position against the action of the spring 39 by way of a release lever 40 engaged in rotary and axially fixed manner by the bushing 36.

[0027] In case of correct operation of the electric motor 19, the gear 28 is arranged in its coupling position and the assembly defined by the gear 28, by the freewheel 33, and by the bushing 36 is moved about the axis 26 due to the thrust of the electric motor 19 itself.

[0028] In case of power failure of the electric motor 19, the gear 28 is moved by the lever 40 in its release position so as to be uncoupled from the portion 37 of the shaft 24. In this condition, the freewheel 33 allows the rotation of the gear 28 and of the outer ring 34 in a rotation direction and stops the rotation of the gear 28 and of the outer ring 34 in the opposite rotation direction.

[0029] Consequently, when the sliding gate 1 is mounted on a support surface tilted with respect to a horizontal plane, the freewheel 33 allows exclusively the rise of the sliding gate 1 preventing a sudden and dangerous descent that may compromise the safety of the people present.

[0030] According to a variant not shown, the freewheel 33 is eliminated and the sliding gate 1 is mounted, preferably, on a substantially horizontal support surface.

[0031] According to a further variant not shown, the smooth release portion 38 is eliminated and replaced with a grooved coupling portion, and the gear 28 is always coupled in a sliding and angularly fixed manner to the shaft 24 and is moved in the direction 15 between a coupling position with the rack 17 and a release position from

the rack 17 itself.

[0032] The sliding gate 1 has some advantages mainly deriving from the fact that, in all the embodiments described:

the actuating device 16 and, therefore, the electric motor 19 are directly fixed to the ground by way of a single component, namely the support frame 18; and the gear 28 is coupled to the grooved coupling portion 37 or with the rack 17 by way of a shift of the gear 28, itself, in one direction, namely the direction 15.

Claims

1. A sliding gate comprising a panel (2) movable in a first direction (3) between an open and a closed position; at least one guiding and supporting wheel (11) of the panel (2); and an actuating device (16) to move the panel (2) in the first direction (3); the actuating device (16) comprising a rack (17) fixed to the panel (2) parallel to the first direction (3), a gear (28) coupled to the rack (17), an electric motor (19), and a transmission shaft (24), which extends through the gear (28), is mounted to rotate, due to the thrust of the electric motor (19), around a respective longitudinal axis (26) parallel to a second direction (15) substantially transverse to the first direction (3), and comprises a grooved coupling portion (37); and **characterized in that** the gear (28) has the shape of a cup-shaped body, and is limited by a grooved bottom wall (29) of annular shape and by a side wall (31) projecting axially from the bottom wall (29) itself and **in that** the actuating device (16) also comprises a freewheel (33), which is coupled in an angularly fixed and axially sliding manner to the grooved coupling portion (37), and has an outer ring (34) coupled in an axially and angularly fixed manner to the side wall (31); the transmission shaft (24) and the gear (28) being movable one with respect to the other in the second direction (15) between a coupling position, in which the grooved bottom wall (29) is coupled in an angularly fixed manner to the grooved coupling portion (37), and a release position, in which the grooved bottom wall (29) disengages the grooved coupling portion (37) to allow the gear (28) to rotate with respect to the transmission shaft (24).
2. The sliding gate according to claim 1, wherein the bottom wall (29) has a grooved central hole (30).
3. The sliding gate according to claim 1 or 2, wherein the actuating device (16) also comprises a support frame (18) fixed to the ground; the electric motor (19) being fixed to the support frame (18) and the gear (28) being coupled to the support frame (18) so as

to move, with respect to the support frame (18) itself, exclusively in the second direction (15).

4. The sliding gate according to any preceding claims, wherein the actuating device (16) comprises, furthermore, actuating means (39, 40) to move the gear (28) in the second direction (15) between its coupling and release positions. 5
5. The sliding gate according to claim 4, wherein the actuating means (39, 40) comprise elastic pushing means (39) to move, and normally maintain, the gear (28) in its coupling position and pulling means (40) to move the gear (28) from the coupling position to the release position against the action of the elastic pushing means (39). 10 15
6. The sliding gate according to claim 5, wherein the pulling means (40) comprise a release lever coupled to the gear (28) in an axially fixed manner. 20
7. The sliding gate according to any preceding claims, wherein the panel (2) has a lower guide (7), which extends in the first direction (3), and houses in the inside the rack (17), the guiding and supporting wheels (11), and the electric motor (19). 25
8. The sliding gate according to claim 7, wherein the guiding and supporting wheel (11) is arranged in contact with an inner face of the upper wall (8) of the lower guide (7). 30

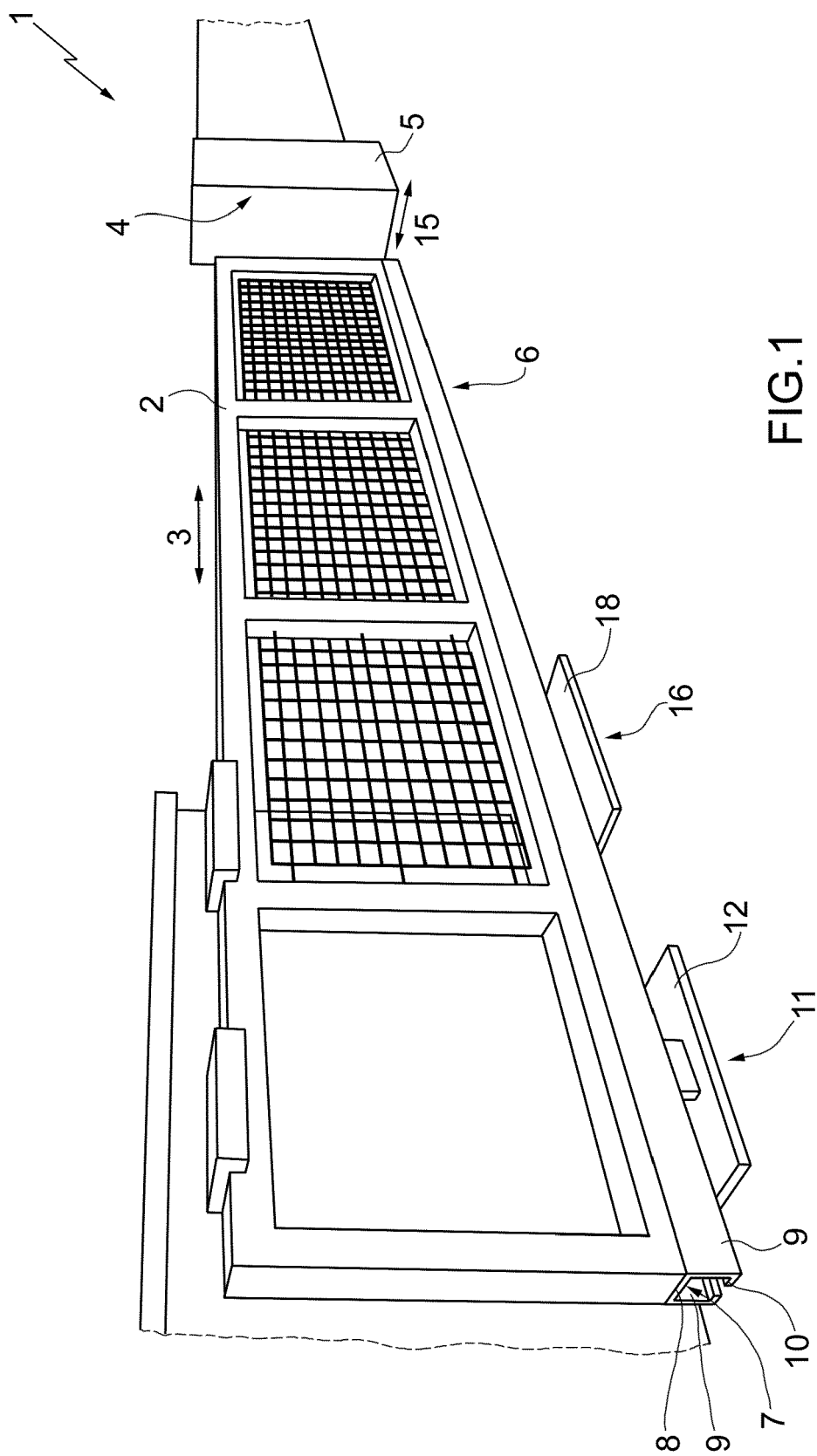
35

40

45

50

55



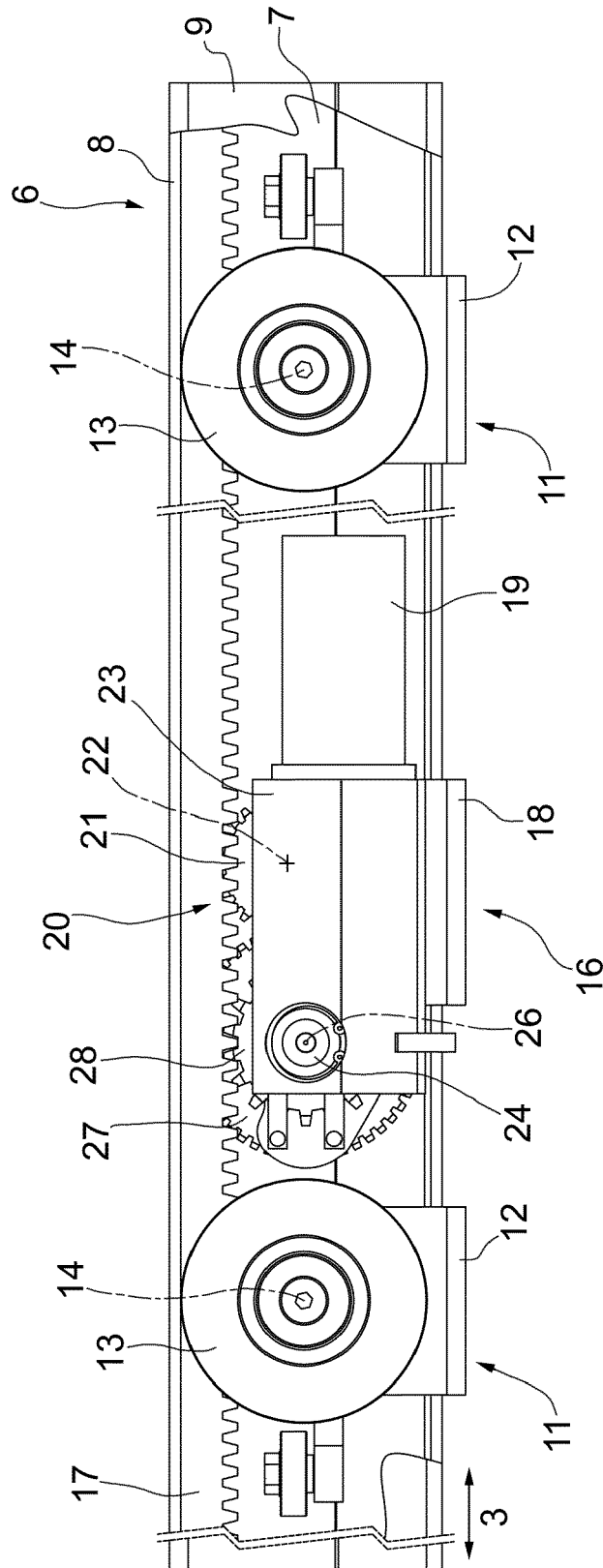


FIG.2

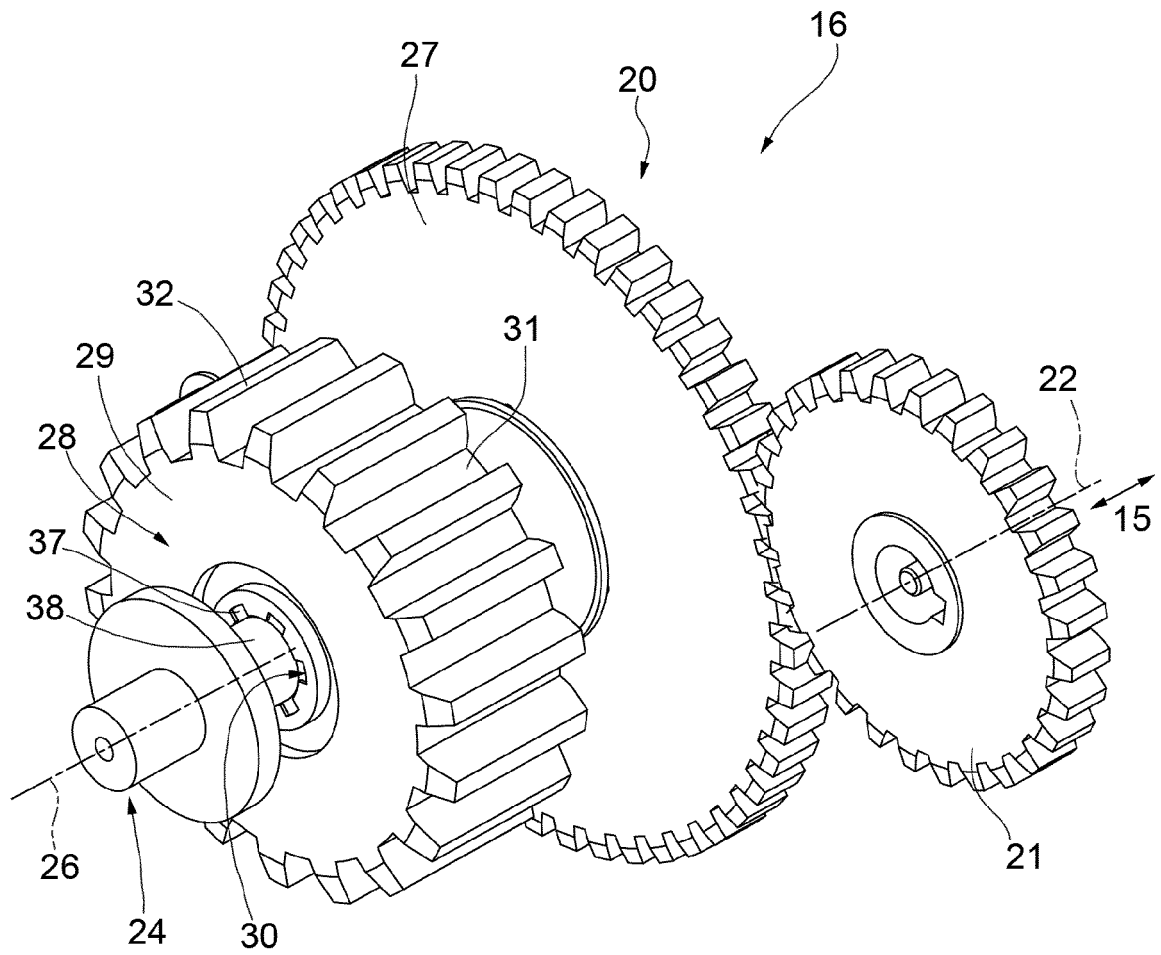


FIG.3

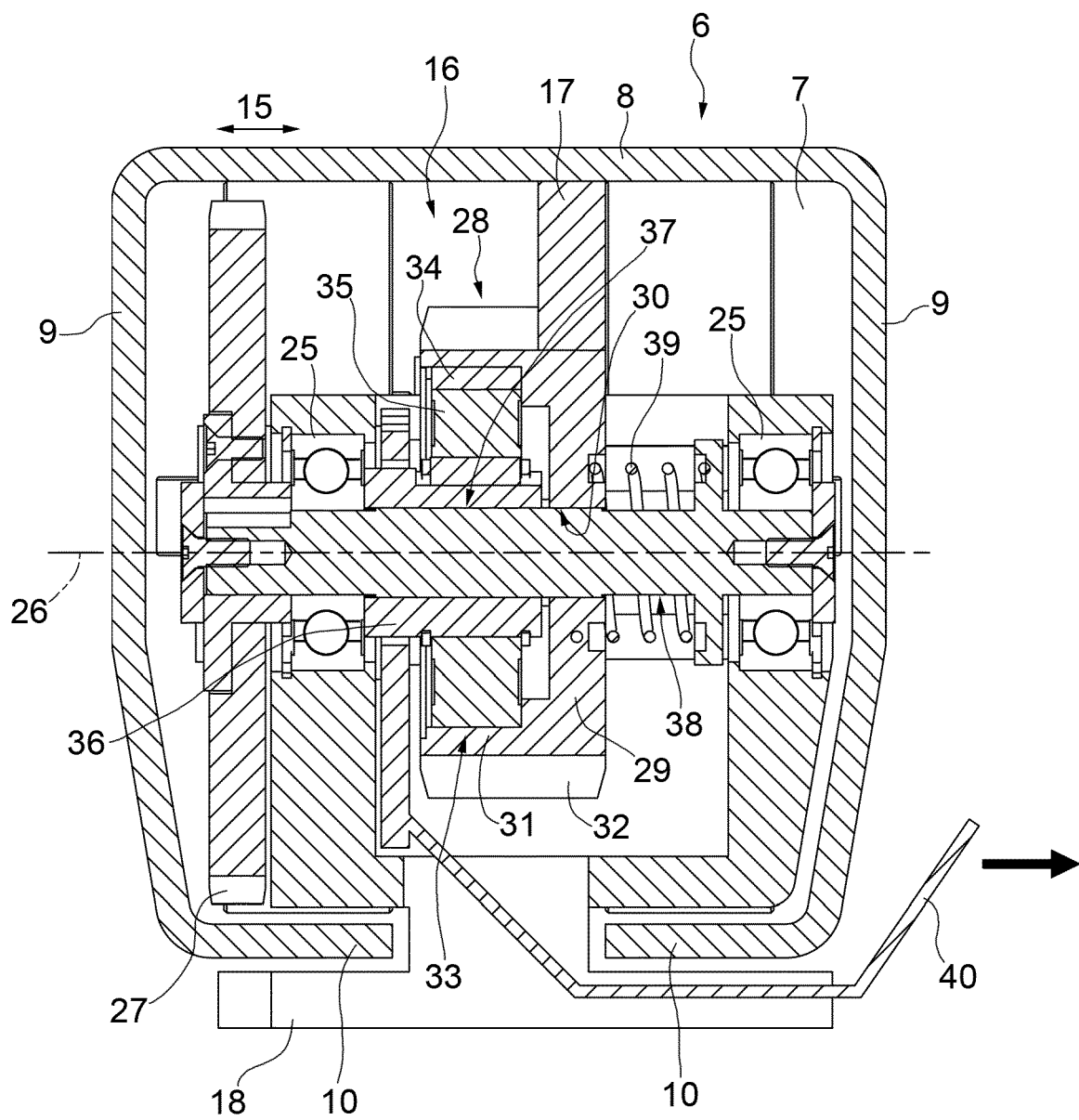


FIG.4



EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6477

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 903 447 A1 (LE BRUN YANCK [FR]) 11 January 2008 (2008-01-11) * page 4, line 18 - page 6, line 30 * * figures 1-5 *	1-8	INV. E05F15/14
A	EP 2 146 035 A1 (CARDIN ELETTRONICA SPA [IT]) 20 January 2010 (2010-01-20) * paragraph [0016] - paragraph [0028] * * figures 1-7 *	1	
A	US 6 062 363 A (CLINE RUSSELL [US]) 16 May 2000 (2000-05-16) * column 4, line 1 - column 6, line 18 * * figures 1-4 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 July 2014	Examiner Prieto, Daniel
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

1
EPO FORM 1503 03.02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 14 16 6477

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-07-2014

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2903447	A1	11-01-2008	NONE
EP 2146035	A1	20-01-2010	NONE
US 6062363	A	16-05-2000	US 6062363 A 16-05-2000
			US 6230864 B1 15-05-2001

20

25

30

35

40

45

50

55

EPO FORM P0459

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