(19) Europäisches Patentamt
European Patent Office
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(11) EP 2 476 847 A1

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**18.07.2012 Bulletin 2012/29**

(51) Int Cl.:
***E05F 15/12*** *(2006.01)*

(21) Application number: **11425008.7**

(22) Date of filing: **18.01.2011**

(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**

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## (54) Actuation device for movement of a gate or barrier or similar

(57) Actuation device for movement of a gate or barrier of similar type comprising a gearmotor, positioned in a cavity of a supporting portion of a leaf of said gate, and a first movement transmission unit, functionally and physically distinct from said gearmotor.

The gearmotor and the first movement transmission unit are operationally designed to determine the rotation of said supporting portion with respect to a first hinge structure integral with a fixed support.

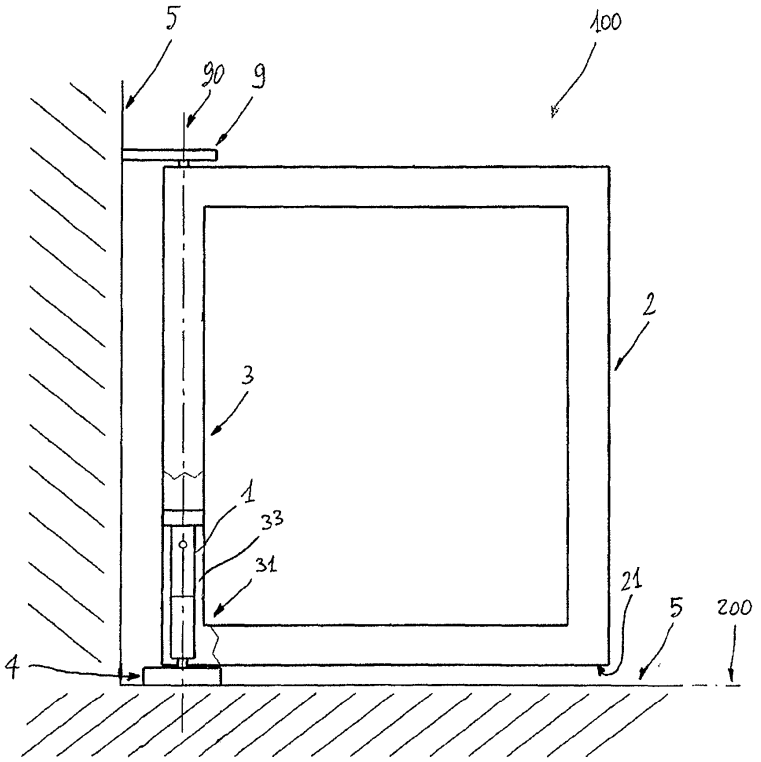


FIG. 1

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## Description

**[0001]** The present invention refers to an actuation device for the movement of a gate or barrier of similar type, in particular a swing gate.

**[0002]** Numerous examples of actuation devices for the movement of gates are known.

**[0003]** Some actuation devices of known type comprise a gearmotor positioned underground below a gate supporting upright.

**[0004]** In other solutions the gearmotor is installed exposed to view, outside the gate structure.

**[0005]** In further solutions the gearmotor is housed in a cavity of the gate supporting upright. Typically, in actuation devices for the movement of gates, the structure of the gearmotor is purposely designed to ensure appropriate movement of the gate which, as is known, must occur at a relatively low speed with limited travel.

**[0006]** The actuation devices currently available generally involve the use of gearmotors with relatively complex structures, costly to produce at industrial level and entailing difficult operational installation, especially if the gearmotor has to be housed in the gate supporting structure.

**[0007]** Currently, furthermore, to ensure the client a sufficiently wide and varied commercial offering, each model of actuation device must be provided with a series of gearmotors of different type, each of which can be used in relation to a certain class of gates to be moved. Obviously this significantly increases production and warehouse management costs.

**[0008]** The main aim of the present invention is to provide an actuation device for the movement of a gate or barrier of similar type which solves the above drawbacks.

**[0009]** In the context of this aim, one object of the present invention is to provide an actuation device which has a relatively simple overall structure with reduced overall dimensions.

**[0010]** A further object of the present invention is to provide an actuation device which entails relatively simple operational installation.

**[0011]** Last but not least, a further object of the present invention is to provide an actuation device which can be easily produced at industrial level, at competitive costs.

**[0012]** This aim, in addition to said and further objects which will be illustrated in greater detail below, are achieved by an actuation device for the movement of a gate or barrier of similar type according to claim 1 below.

**[0013]** The actuation device, according to the present invention, has a very compact overall structure with relatively reduced overall dimensions.

**[0014]** This allows simple and rapid operational installation in the field, with consequent limitation of installation times and costs.

**[0015]** The actuation device according to the present invention features a substantially modular structure, with a relatively limited number of parts which can be easily assembled, and is easy and inexpensive to produce on an industrial scale.

**[0016]** Further characteristics and advantages of the present invention will be illustrated in greater detail in the description of preferred but not exclusive embodiments of the actuation device according to the invention illustrated by way of non-limiting example in the accompanying drawings in which:

- figures 1-2 schematically illustrate the structure of a gate which comprises the actuation device, according to the invention; and
- figures 3-7 partially illustrate, in a schematic manner, exploded views of a portion of the actuation device according to the present invention in some examples of operational installation of the same.

**[0017]** With reference to the figures cited, the present invention refers to an actuation device 1 for the movement of a gate 100 or barrier of similar type.

**[0018]** The gate 100 can be, for example, a swing gate with one or two leaves.

**[0019]** It comprises at least one rotating leaf 2, which comprises a supporting portion 3 positioned in the vicinity of a hinge zone, where the leaf 2 is combined in a rotating manner with a fixed support 5, for example a wall or supporting column or the ground.

**[0020]** The supporting portion 3 is combined in a rotating manner with at least one first hinge structure 4, integrally connected to the fixed support 5, at a rotation axis 90, which can coincide with (figures 5-6) or be different from (figure 4) a rotation axis of the leaf 2 with respect to the fixed support 5. In the latter case, the hinge structure 4 obviously does not have the function of supporting the leaf 2.

**[0021]** Preferably, the supporting portion 3 develops along the rotation axis 90 in a substantially perpendicular manner with respect to a base surface 200 of the gate 100, for example the surface of the ground.

**[0022]** The supporting portion 3 can advantageously consist of a supporting upright for the leaf 2, as illustrated in the figures cited.

**[0023]** It can be rotationally combined with at least one second hinge structure 9, integrally connected to the fixed support 5.

**[0024]** Preferably the hinge structure 4 is positioned in the vicinity of a lower end 31 of the supporting portion 3, advantageously below the leaf 2, in a space between the lower edge 21 of the leaf and the ground or fixed support 5.

**[0025]** The actuation device 1 comprises a gearmotor 10 for the transmission of a rotational movement to a first movement transmission member 17, preferably a drive shaft.

**[0026]** The gearmotor 10 is housed in a first cavity 33 of the supporting portion 3, which is preferably positioned in the vicinity of the lower end 31 of the supporting portion and develops along the rotation axis 10.

**[0027]** Also the gearmotor 10 preferably has a sub-

stantially tubular overall structure which develops along said axis, as illustrated in the figures cited.

**[0028]** According to the invention, the actuation device 1 comprises a first movement transmission unit 14, operationally distinct and physically separable from the gearmotor 10.

**[0029]** The term "functionally distinct" indicates that the movement transmission unit 14 has its own operation, different from that of the gearmotor 10 or the parts thereof.

**[0030]** The term "physically distinct" indicates that the movement transmission unit has its own autonomous structure, which can be separated from that of the gearmotor 10 or the parts thereof, for example so that it can be installed or removed without intervening on the gearmotor 10 or without compromising the structural integrity of the latter.

**[0031]** The movement transmission unit 14 is operationally combined with the gearmotor 10 by means of the movement transmission member 17.

**[0032]** It is designed to transmit to a second movement transmission member 143 a rotational movement with r.p.m. below that of the rotational movement of the movement transmission member 17.

**[0033]** According to the invention, the gearmotor 10 and the movement transmission unit 14 are operationally combined respectively with the supporting portion 3 and the hinge structure 4 so that the rotational movement of the movement transmission member 143 determines the rotation of the supporting portion 3 with respect to the hinge structure 4 and consequent movement of the rotating leaf 2.

**[0034]** Preferably, as will be seen better below, the movement transmission member 143 is mechanically coupled with a wall 411 of the hinge structure 4.

**[0035]** Preferably, furthermore, the gearmotor 10 is operationally combined, advantageously at a head 13, with a wall of the cavity 33, so that it is integral with the supporting portion 3 of the leaf2.

**[0036]** The head 13 can also have a shape complementary to the respective cavity 33, consequently excluding the need for additional mechanical fastenings. For said purpose, a casing 18 of the gearmotor 10 can be shaped so as to couple mechanically with a wall of the cavity 33 by means of mating surfaces.

**[0037]** Alternatively, the casing 18 can be fixed to a wall of the cavity 33 by appropriate fastening means.

**[0038]** Preferably, the gearmotor 10 comprises the casing 18, an electric motor (not illustrated) and one or more reduction stages (not illustrated) suitable for reducing the number of r.p.m. of the rotational movement imparted by the electric motor.

**[0039]** The gearmotor 10 can be produced in a traditional way. In particular, it can be a gearmotor designed and used in applications of different type, for example a tubular gearmotor for the movement of curtains and shutters.

**[0040]** In principle, the movement transmission unit 14 can be housed in the same cavity 33 as the supporting portion 3 which houses the gearmotor 10.

**[0041]** Preferably, however, the movement transmission unit 14 is operationally positioned so as to be separate from the structure of the leaf 2, in particular the supporting portion 3.

**[0042]** In this way, the actuation device 1 can be easily adapted to different gate types and structures, using the same type of tubular gearmotor 10 and simply modifying some technical*-construction characteristics of the transmission unit 14.

**[0043]** Furthermore, by positioning the movement transmission unit 14 outside the structure of the leaf 2, it is possible to simplify the structure of the unit, minimising the number of stages of transformation of the movement necessary to obtain the desired rotation speed for the leaf 2, with consequent reduction of the overall dimensions and costs.

**[0044]** Preferably, the movement transmission unit 14 is operationally positioned at the hinge structure 4.

**[0045]** In one embodiment of the present invention, illustrated in the figures cited, the movement transmission unit 14 is advantageously housed in a second cavity 43, defined in the hinge structure 4.

**[0046]** Preferably, the hinge structure 4 comprises a base 41 integrally connected to the fixed support 5 and shaped so as to define the cavity 43.

**[0047]** The base 41 can comprise a plate 412, which can be fixed to the support 5 by fastening means 81 and 82, and advantageously shaped so that it can be easily fixed directly to the ground (figures 3-5) or to a supporting column or wall positioned laterally with respect to the supporting portion 3 of the leaf 2 (figures 6-7).

**[0048]** Preferably, from a first wall 412A of the plate 412, shaped so that it is substantially parallel to the base surface 200, a second wall 411 of the base 41 rises vertically, shaped so as to define the cavity 43, in cooperation with the wall 412A.

**[0049]** The wall 411 can be advantageously shaped in a ring and arranged so that it is centred with respect to the axis of rotation 90.

**[0050]** The cavity 43 can therefore substantially be a blind cavity with cylindrical shape, having a lateral wall and a bottom wall defined respectively by the walls 411 and 412A of the base 41. Preferably, the hinge structure 4 comprises a cover 42 integrally combined with the supporting portion 3 of the leaf 2 and rotationally combined with the base 41, advantageously at the wall 411.

**[0051]** In one embodiment of the present invention, illustrated in the figures cited, the movement transmission unit 14 comprises a toothed pinion gear 141 comprising a first end operationally combined with the movement transmission member 17 and a second end combined in a rotating manner with the wall 412A of the base 42, at a suitable coupling hole.

**[0052]** The pinion gear 141, advantageously positioned along the axis of rotation 90, is mechanically coupled with a plurality of gear wheels 142, so as to form a

movement transmission mechanism of epicyclic type.

**[0053]** Said movement transmission mechanism is advantageously designed to mechanically couple with the wall 411 of the base 42.

**[0054]** Advantageously, the above-mentioned movement transmission mechanism comprises three gear wheels, arranged at 120° with respect to the pinion 141. Alternatively, four toothed gear wheels can be used arranged at 90° with respect to the pinion 141.

**[0055]** Preferably, the teeth of the gear wheels 142 engage directly with a toothed crown wheel 411A obtained at the wall 411 of the base 41.

**[0056]** The movement transmission unit 14 can advantageously comprise further structural elements suitable for ensuring optimal functioning, for example the thrust bearing 144 and the supporting elements 145 and 146, housed in the cavity 43.

**[0057]** From the above it is evident that, in this embodiment of the invention, the teeth 143 of the gear wheels 142 constitute the third movement transmission member of the movement transmission unit 14.

**[0058]** Since the crown wheel 411A is integrally fixed to the fixed support 5 and the gearmotor 10 integrally combined with the supporting portion 3 of the leaf 2, the constrain forces that arise in opposition to the rotational movement imparted by the teeth 143 determine the rotation of the supporting portion 3 with respect to the hinge structure 4, and the consequent movement of the leaf 2, with respect to the fixed support 5.

**[0059]** It should be noted that in the embodiment of the invention just described, the overall dimensions are greatly reduced, in particular as regards the movement transmission unit 14.

**[0060]** In practice it has been ascertained that the actuation device according to the present invention achieves the set aims and objects.

**[0061]** The actuation device 1 has a substantially modular structure, divided into sections separate in both functional and physical terms, in particular a first section comprising the gearmotor 10 and a second section comprising the first movement transmission unit 14.

**[0062]** Said solution allows for the use, even in very different operating situations, of one single type of gearmotor 10, given that the speed of the rotational movement transmitted by the actuation device 1 can be easily adapted to the installation requirements of the gate 100, thanks to the movement transmission unit 14.

**[0063]** The gearmotor 10 can therefore consist of a device having a standardised compact structure which is easy to produce with relatively low production costs and simple to install in the field. The gearmotor 10 can be of the traditional type, designed and used for applications of different type, for example for the movement of curtains and shutters.

**[0064]** The transmission unit 14 allows easy adaptation of the characteristics of said traditional gearmotor to the requirements of an installation for the movement of gates and barriers of similar type.

**[0065]** In fact, the structure of the transmission unit 14 can be easily modified to adapt the speed of the rotational movement transmitted by the latter to the installation needs in the field.

**[0066]** For example, with reference to the embodiment illustrated in figures 3 and 7, it is sufficient to appropriately modify the transmission ratio of the movement imparted by the epicyclic transmission mechanism consisting of the pinion 141 and gear wheels 142.

**[0067]** It is evident that said advantages provide a significant reduction in production and installation costs with respect to the actuation devices of known type.

**[0068]** The actuation device 1 can be easily installed in existing gates or barriers.

**[0069]** The characteristics of the movement installation unit 14 can be easily adapted also to the type of gate to be moved.

**[0070]** In particular, it is simple to modify the structure of the movement transmission unit 14 so as to adapt the functionality offered by the hinge structure 4 to contingent installation needs.

**[0071]** For example, for application in gates with two hinges (figure 4) it is sufficient to eliminate the thrust bearing 144 so that the hinge structure 4 does not have the function of supporting the leaf2.

**[0072]** From the above it is evident that the actuation device 1 has a relatively simple overall structure with reduced overall dimensions.

**[0073]** Operational installation is therefore easy and the device is particularly simple and inexpensive to produce and assemble at industrial level.

## Claims

1. Actuation device (1) for movement of a gate (100) or barrier of similar type, said gate comprising at least one rotating leaf (2) comprising a supporting portion (3) combined in a rotating manner, at a rotation axis (90), with at least one first hinge structure (4), integrally connected to a fixed support (5), said actuation device comprising a gearmotor (10) designed to transmit a rotational movement to a first movement transmission member (17), said gearmotor being housed in a first cavity (33) of said supporting portion, **characterised in that** it comprises a first movement transmission unit (14), functionally and physically distinct with respect to said gearmotor, said first movement transmission unit being operationally combined with said gearmotor by means of said first movement transmission member, said first movement transmission unit being arranged to transmit to a second movement transmission member (143) a rotational movement with number of r.p.m. below the number of r.p.m. of the rotational movement of said first movement transmission member, said gearmotor and said first movement transmission unit being operationally combined respectively with said sup-

porting portion and with said first hinge structure so that the rotational movement of said second movement transmission member determines the rotation of said supporting portion with respect to said first hinge structure and the consequent movement of said rotating leaf.

**2.** Actuation device, according to claim 1, **characterised in that** said first movement transmission unit is operationally positioned so that it is separate from said supporting portion.

**3.** Actuation device, according to claim 2, **characterised in that** said first movement transmission unit is operationally positioned at said first hinge structure.

**4.** Actuation device, according to claim 3, **characterised in that** said first movement transmission unit is housed in a second cavity (43) defined in said first hinge structure.

**5.** Actuation device, according to claim 4, **characterised in that** said first hinge structure (4) comprises a base (41), integrally connected with said fixed support (5) and shaped so as to define said second cavity.

**6.** Actuation device, according to one or more of the preceding claims, **characterised in that** said first movement transmission unit is mechanically coupled with a wall (411) of said first hinge structure by means of said second movement transmission member (143).

**7.** Actuation device, according to claims 5 and 6, **characterised in that** said first movement transmission unit comprises:

- a toothed pinion gear (141) comprising a first end, operationally combined with said first movement transmission member (17), and a second end, combined in a rotating manner with a first wall (412A) of said base; and
- a plurality of toothed gear wheels (142), operationally combined with said pinion gear so as to form an epicyclic movement transmission mechanism, mechanically coupled with a second wall (411) of said base.

**8.** Actuation device, according to claim 7, **characterised in that** the teeth of said gear wheels engage with a toothed crown wheel (411A) obtained in said second wall (411).

**9.** Actuation device, according to one or more of the preceding claims, **characterised in that** said gearmotor is operationally combined with a wall of said first cavity, so that it is integral with said supporting portion.

**10.** Actuation device, according to claim 9, **characterised in that** a casing (18) of said gearmotor is shaped so as to couple mechanically with a wall of said first cavity, by means of mating surfaces.

**11.** Actuation device, according to claim 1, **characterised in that** said first movement transmission unit is housed in said first cavity.

**12.** Actuation device, according to one or more of the preceding claims, **characterised in that** said supporting portion (3) develops along said axis of rotation in a substantially perpendicular manner with respect to a base surface (200) of said gate, said first cavity and said first hinge structure being positioned near a lower end (31) of said supporting portion.

**13.** Gate (100) or barrier of similar type **characterised in that** it comprises an actuation device, according to one or more of the preceding claims.

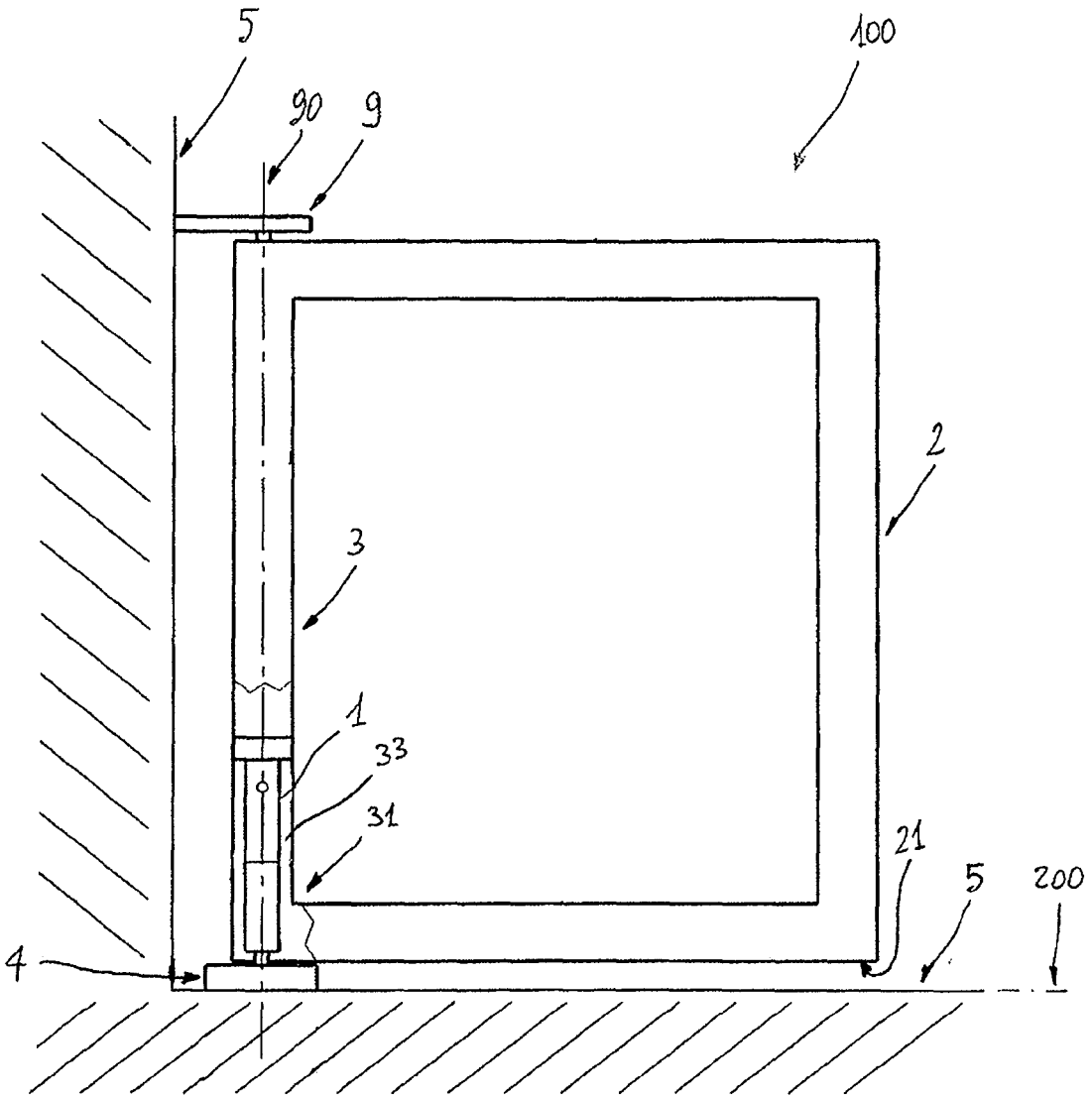


FIG. 1

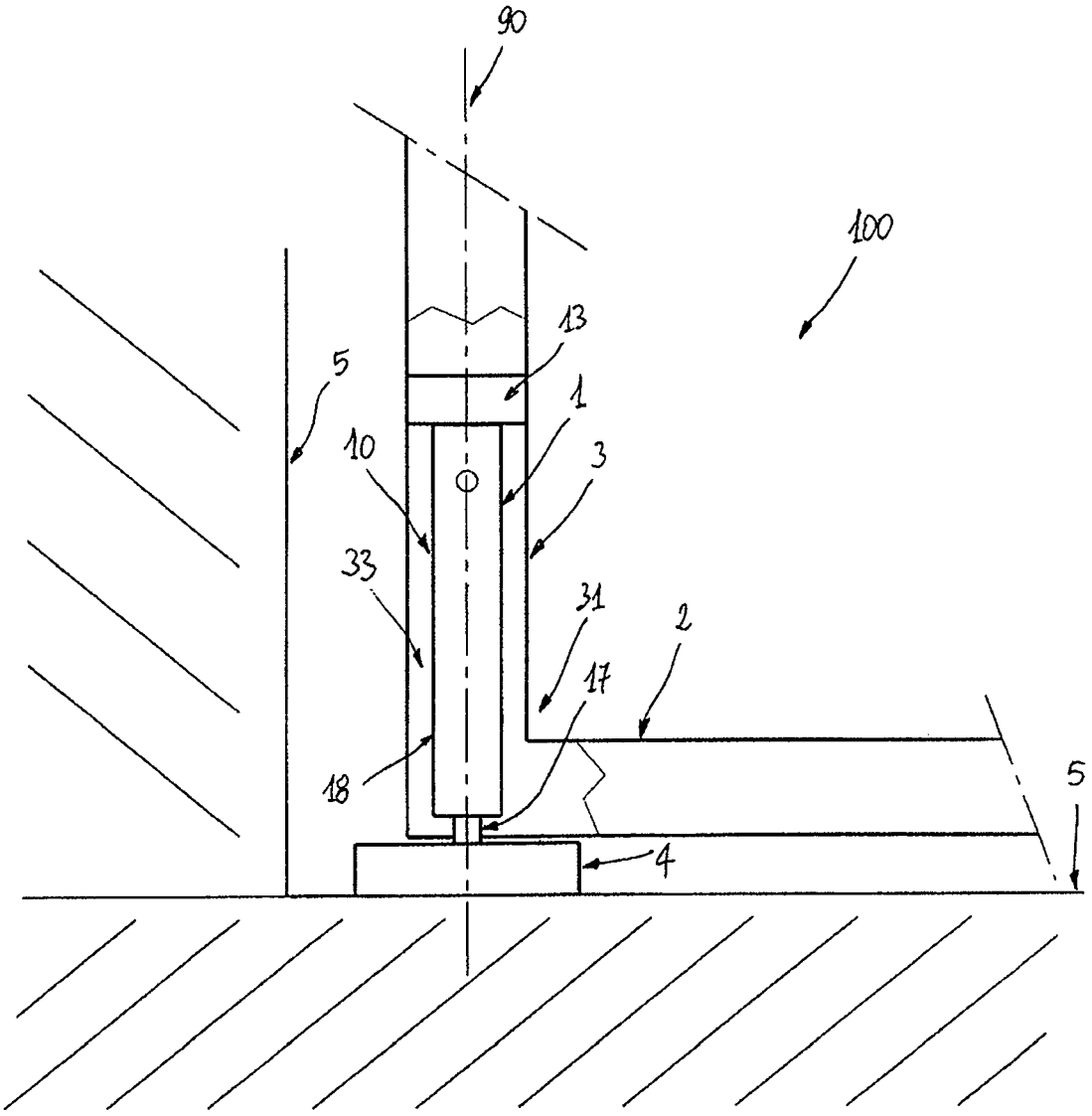


FIG. 2

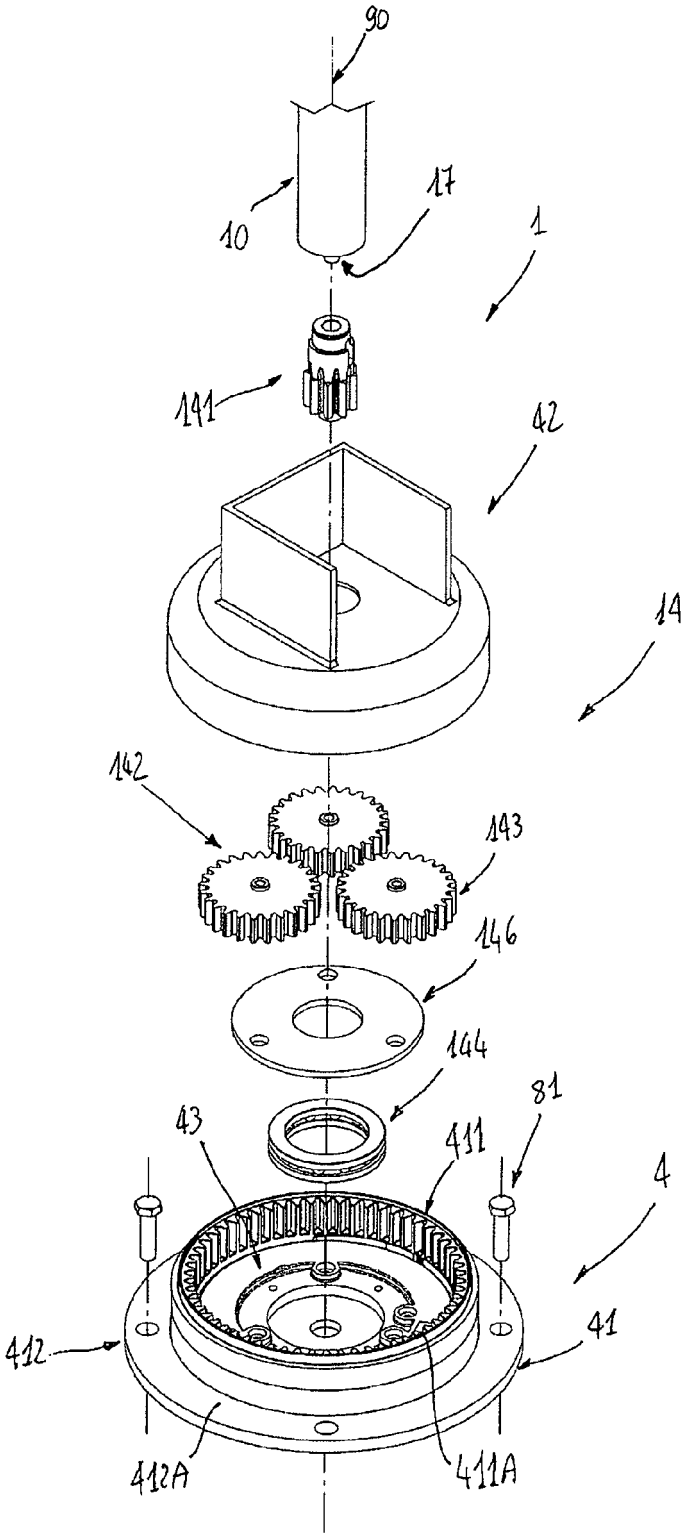


FIG. 3

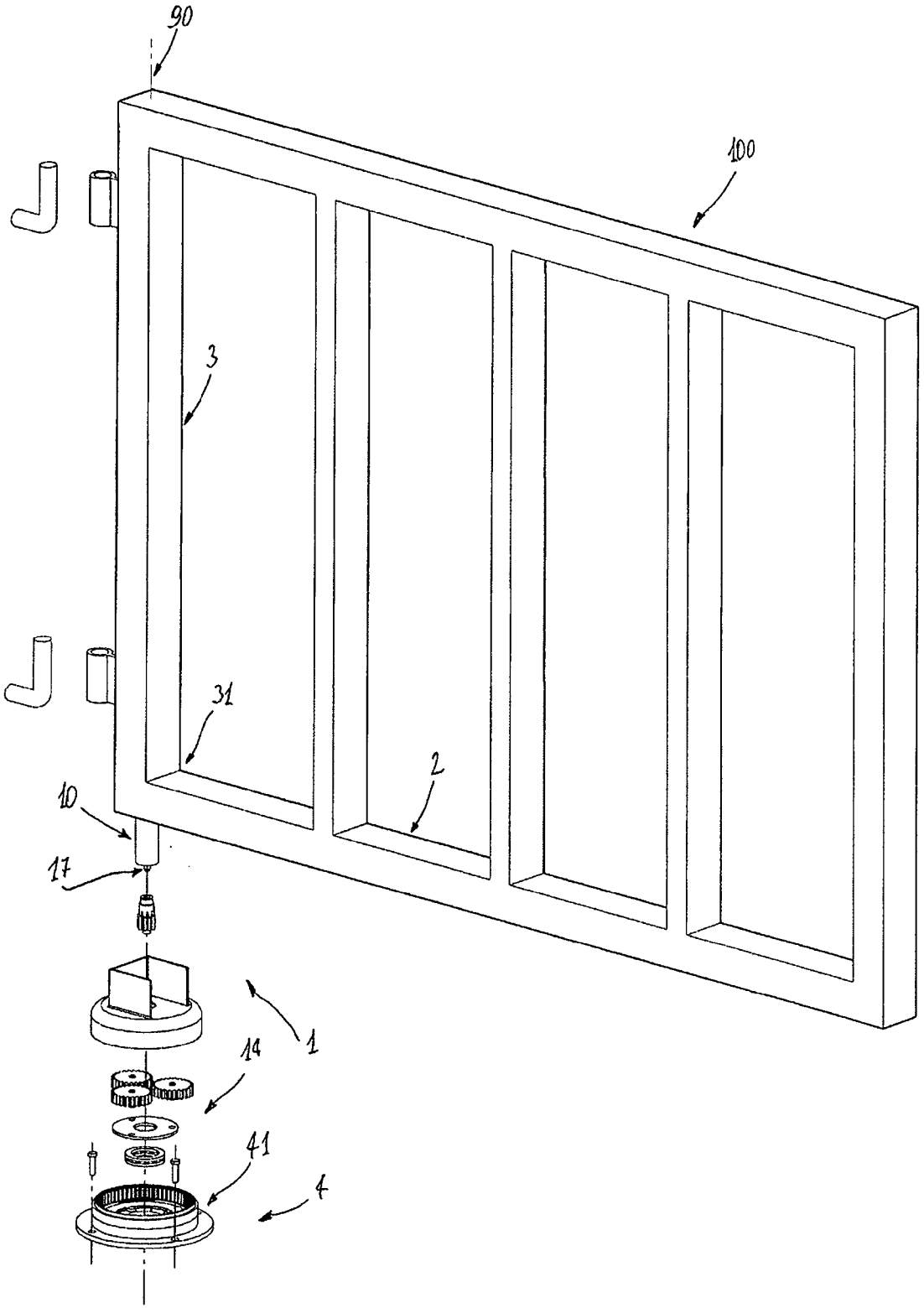


FIG. 4

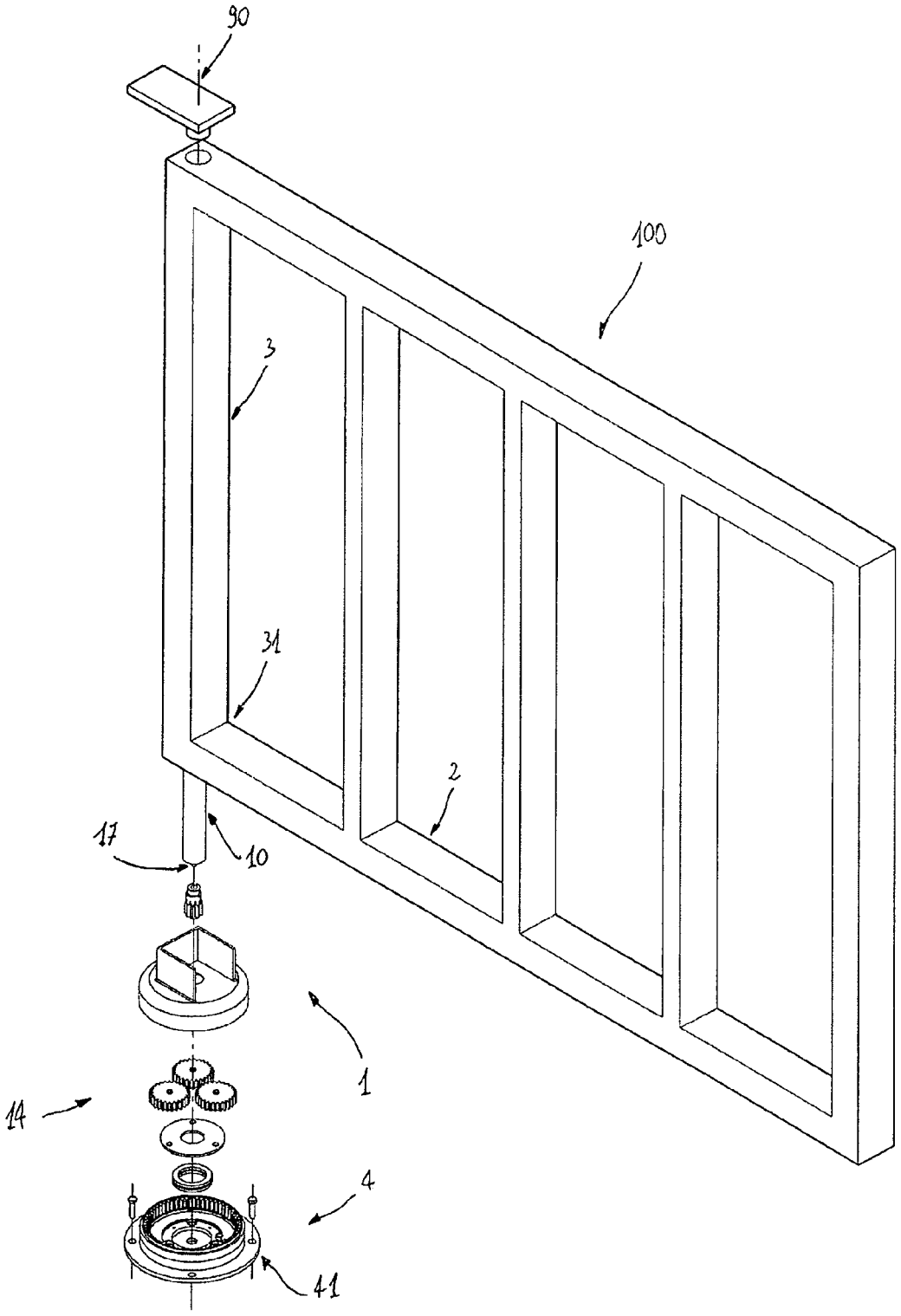


FIG. 5

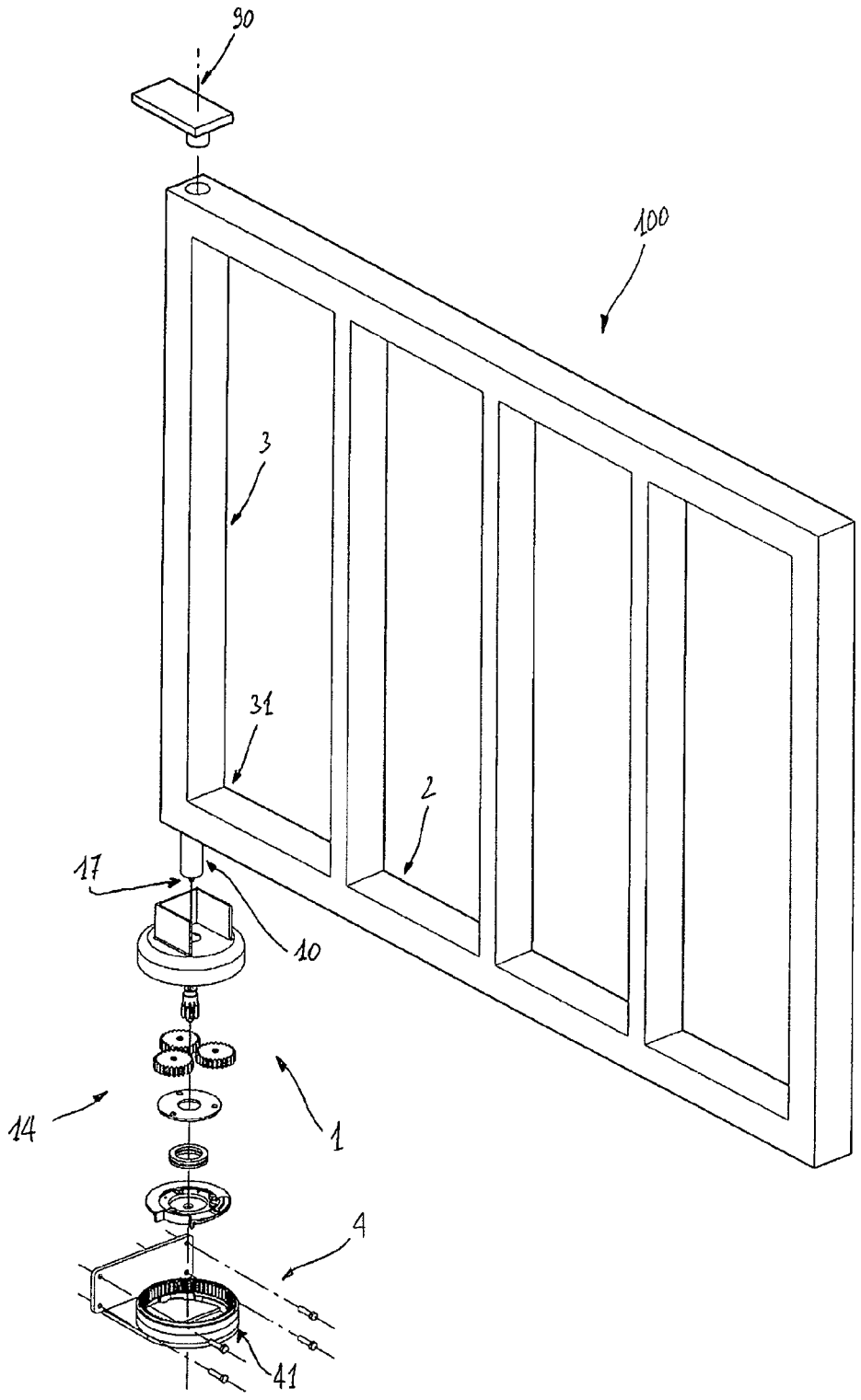


FIG. 6

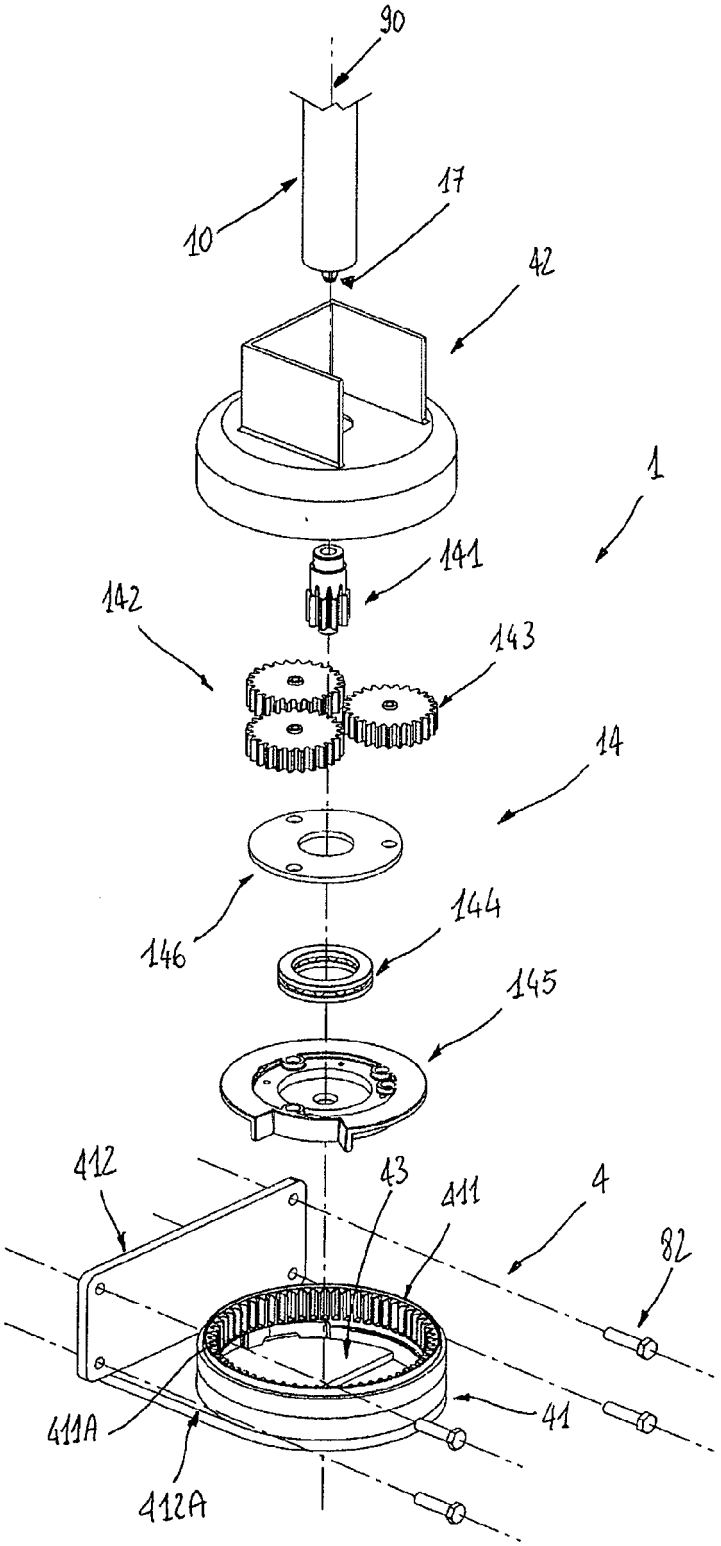
90
10
17
42
1
141
142
143
14
146
144
145
412
43
411
4
82
41
411A
412A

FIG. 7

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# EUROPEAN SEARCH REPORT

Application Number
EP 11 42 5008

## 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 2 055 880 A2 (CARDIN ELETTRONICA SPA [IT]) 6 May 2009 (2009-05-06)<br>* paragraph [0019] - paragraph [0030] *<br>* paragraph [0036] - paragraph [0050]; figure 10 *<br>----- | 1-13 | INV.<br>E05F15/12 |
| X | EP 1 050 656 A1 (SYSTEMES D AUTOMATISMES FERMET [FR]) 8 November 2000 (2000-11-08)<br>* paragraph [0021] - paragraph [0029] *<br>* paragraph [0036] - paragraph [0039]; figures 1,2,4,5 *<br>----- | 1-6,9-13 | |
| X | DE 10 2004 061913 A1 (ISS AG VADUZ [LI]) 6 July 2006 (2006-07-06)<br>* paragraph [0043] - paragraph [0053]; figures 1-7 *<br>----- | 1-4,6,9, 10 | |
| | | | TECHNICAL FIELDS SEARCHED (IPC)<br>E05F |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 21 June 2011 | Guillaume, Geert |

CATEGORY OF CITED DOCUMENTS

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21-06-2011

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| EP 2055880 A2 | 06-05-2009 | IT VE20070039 U1 | 01-05-2009 |
| EP 1050656 A1 | 08-11-2000 | AT 260398 T | 15-03-2004 |
| | | DE 60008452 D1 | 01-04-2004 |
| | | FR 2793278 A1 | 10-11-2000 |
| DE 102004061913 A1 | 06-07-2006 | DE 202004021716 U1 | 09-09-2010 |
| | | EP 1828527 A1 | 05-09-2007 |
| | | WO 2006069679 A1 | 06-07-2006 |

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