

(19)



(11)

EP 2 476 847 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
05.09.2018 Bulletin 2018/36

(51) Int Cl.:
E05F 15/614 ^(2015.01)

(21) Application number: **11425008.7**

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

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

Antriebsvorrichtung zum Bewegen eines Tors oder einer Absperrung oder ähnlichem

Dispositif d'actionnement pour le mouvement d'un portail, d'une barrière ou similaire

(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**

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

(73) Proprietor: **Nice Spa**
31046 Oderzo (TV) (IT)

(72) Inventor: **Galberti, Lorenzo**
30024 Musile di Piave (VE) (IT)

(74) Representative: **De Bortoli, Eros et al**
Zanoli & Giavarini S.p.A.
Via Melchiorre Gioia, 64
20125 Milano (IT)

(56) References cited:
EP-A1- 1 050 656 EP-A2- 2 055 880
DE-A1-102004 061 913

EP 2 476 847 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention refers to a gate with an actuation device for the movement of said 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. EP-A-2055880 discloses a known example of a gate or barrier having the features of the preamble of claim 1 and being provided with an actuation device to rotationally move a swinging leaf. The main aim of the present invention is to provide a gate with an actuation device for the movement of said gate or barrier of similar type which solves the above drawbacks.

[0008] In the context of this aim, one object of the present invention is to provide a gate with an actuation device which has a relatively simple overall structure with reduced overall dimensions.

[0009] A further object of the present invention is to provide a gate with an actuation device which entails relatively simple operational installation.

[0010] Last but not least, a further object of the present invention is to provide a gate with an actuation device which can be easily produced at industrial level, at competitive costs.

[0011] This aim, in addition to said and further objects which will be illustrated in greater detail below, are achieved by a gate with an actuation device for the movement of a gate or barrier of similar type according to claim 1 below.

[0012] The actuation device, of the gate according to the present invention, has a very compact overall structure with relatively reduced overall dimensions.

[0013] This allows simple and rapid operational instal-

lation in the field, with consequent limitation of installation times and costs.

[0014] The gate and 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.

[0015] 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.

[0016] 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.

[0017] The gate 100 can be, for example, a swing gate with one or two leaves.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] The supporting portion 3 can advantageously consist of a supporting upright for the leaf 2, as illustrated in the figures cited.

[0022] It can be rotationally combined with at least one second hinge structure 9, integrally connected to the fixed support 5.

[0023] 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.

[0024] 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.

[0025] 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.

[0026] Also the gearmotor 10 preferably has a substantially tubular overall structure which develops along said axis, as illustrated in the figures cited.

[0027] According to the invention, the actuation device 1 comprises a first movement transmission unit 14, operationally distinct and physically separable from the gearmotor 10.

[0028] 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.

[0029] 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.

[0030] The movement transmission unit 14 is operationally combined with the gearmotor 10 by means of the movement transmission member 17.

[0031] 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.

[0032] 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. As will be seen better below, the movement transmission member 143 is mechanically coupled with a wall 411 of the hinge structure 4. 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 leaf 2.

[0033] 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.

[0034] Alternatively, the casing 18 can be fixed to a wall of the cavity 33 by appropriate fastening means.

[0035] 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.

[0036] 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. 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.

[0037] 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.

[0038] 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.

[0039] Preferably, the movement transmission unit 14 is operationally positioned at the hinge structure 4.

[0040] 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. The hinge structure 4 comprises a base 41 integrally connected to the fixed support 5 and shaped so as to define the cavity 43.

[0041] 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).

[0042] 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.

[0043] 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.

[0044] 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. 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.

[0045] 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.

[0046] Said movement transmission mechanism is designed to mechanically couple with the wall 411 of the

base 42.

[0047] 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. The teeth of the gear wheels 142 engage directly with a toothed crown wheel 411A obtained at the wall 411 of the base 41.

[0048] 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.

[0049] 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.

[0050] 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.

[0051] 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. In practice it has been ascertained that the actuation device according to the present invention achieves the set aims and objects.

[0052] 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.

[0053] 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.

[0054] 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.

[0055] 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.

[0056] 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.

[0057] 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.

[0058] It is evident that said advantages provide a significant reduction in production and installation costs with respect to the actuation devices of known type.

[0059] The actuation device 1 can be easily installed in existing gates or barriers.

[0060] The characteristics of the movement installation unit 14 can be easily adapted also to the type of gate to be moved.

[0061] 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.

[0062] 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 leaf 2.

[0063] From the above it is evident that the actuation device 1 has a relatively simple overall structure with reduced overall dimensions.

[0064] Operational installation is therefore easy and the device is particularly simple and inexpensive to produce and assemble at industrial level.

Claims

1. Gate (100) or barrier of similar type comprising at least one rotating leaf (2) comprising a supporting portion (3) having a first cavity (33), said supporting portion being combined in a rotating manner, at a rotation axis (90), with at least one first hinge structure (4) of the gate, said first hinge structure (4) having a base (41) integrally connected to a fixed support (5) and said base (41) defining a second cavity (43), said gate comprising an actuation device comprising a gear motor (10) including a casing (18), an electric motor and one or more reduction stages, said gear motor (10) transmitting a rotational movement to a first movement transmission member (17) formed by a drive shaft, said gear motor (10) being housed in the first cavity (33) of said supporting portion (3) and having said casing (18) mechanically coupled or fixed with a wall of said first cavity (33), so that said gear motor (10) is integral with said supporting portion (3); **characterised in that** said actuation device comprises furthermore a first movement transmission unit (14) operationally distinct and physically separable from said gear motor (10), said first movement transmission unit (14) being operationally combined with said gear motor (10) by means of said first movement transmission member (17), said first movement transmission unit (14) being housed in the second cavity (43) of said hinge structure (4), said first movement transmission unit (14) compris-

ing 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 (41), and a plurality of toothed gear wheels (142) operationally combined with said pinion gear so as to form an epicyclic movement transmission mechanism (141, 142) mechanically coupled with a second wall (411) of said base (41), the teeth (143) of said gear wheels (142) engaging with a toothed crown wheel (411A) obtained at the second wall (411) of said base (41), the teeth (143) of said gear wheels forming a second transmission member, said first movement transmission unit (14) transmitting to said second transmission member (143) a rotational movement having a number of r.p.m. below the number of r.p.m. of the rotational movement of said first movement transmission member (17), the rotational movement of said second transmission member (143) determining the rotation of said supporting portion (3) with respect to said first hinge structure (4) and the consequent movement of said rotating leaf (2).

2. Gate, according to claim 1, **characterised in that** the casing (18) of said gear motor is shaped so as to couple mechanically with a wall of said first cavity (33) by means of mating surfaces.
3. Gate, according to one or more of the previous claims, **characterised in that** said supporting portion (3) develops along said axis of rotation (90) in a substantially perpendicular manner with respect to a base surface (200) of said gate, said first cavity (33) and said first hinge structure (4) being positioned near a lower end (31) of said supporting portion.

Patentansprüche

1. Tor (100) oder Absperrung ähnlicher Art, umfassend mindestens ein rotierendes Blatt (2), das einen Stützabschnitt (3) umfasst, der einen ersten Hohlraum (33) hat, wobei der Stützabschnitt in einer rotierenden Weise, auf einer Rotationsachse (90), mit mindestens einer ersten Scharnierstruktur (4) des Tors zusammengesetzt ist, wobei die erste Scharnierstruktur (4) eine Basis (41) hat, die mit einer fixierten Stütze (5) integral verbunden ist, und wobei die Basis (41) einen zweiten Hohlraum (43) definiert, wobei das Tor eine Betätigungseinrichtung umfasst, die einen Getriebemotor (10) umfasst, der ein Gehäuse (18), einen Elektromotor und eine oder mehrere Reduktionsstufen einschließt, wobei der Getriebemotor (10) eine Rotationsbewegung an ein erstes Bewegungsübertragungsglied (17) überträgt, das durch eine Antriebswelle gebildet ist, wobei der Ge-

triebemotor (10) in dem ersten Hohlraum (33) des Stützabschnitts (3) eingehaust ist und das Gehäuse (18) mit einer Wand des ersten Hohlraums (33) mechanisch gekoppelt oder fixiert hat, sodass der Getriebemotor (10) mit dem Stützabschnitt (3) integral ist;

dadurch gekennzeichnet, dass die Betätigungseinrichtung weiterhin eine erste Bewegungsübertragungseinheit (14) umfasst, die betriebswirksam von dem Getriebemotor (10) verschieden und physisch von ihm trennbar ist, wobei die erste Bewegungsübertragungseinheit (14) mittels des ersten Bewegungsübertragungsglieds (17) betriebswirksam mit dem Getriebemotor (10) gekoppelt ist, wobei die erste Bewegungsübertragungseinheit (14) in dem zweiten Hohlraum (43) der Scharnierstruktur (4) eingehaust ist, wobei die erste Bewegungsübertragungseinheit (14) ein Zahnstangengetriebe (141), das ein erstes Ende, das betriebswirksam mit dem ersten Bewegungsübertragungsglied (17) kombiniert ist, und ein zweites Ende, das in einer rotierenden Weise mit einer ersten Wand (412A) der Basis (41) kombiniert ist, umfasst, und eine Vielzahl von Zahngetrieberädern (142), die betriebswirksam mit dem Stangengetriebe kombiniert ist, umfasst, um einen epizyklischen Bewegungsübertragungsmechanismus (141, 142) zu bilden, der mechanisch mit einer zweiten Wand (411) der Basis (41) gekoppelt ist, wobei die Zähne (143) der Getrieberäder (142) in ein Zahnkronenrad (411A), das an der zweiten Wand (411) der Basis (41) erhalten wird, eingreift, wobei die Zähne (143) der Getrieberäder ein zweites Übertragungsglied bilden, wobei die erste Bewegungsübertragungseinheit (14) eine Rotationsbewegung an das zweite Übertragungsglied (143) überträgt, die eine Zahl von U/min unterhalb der Zahl von U/min der Rotationsbewegung des ersten Bewegungsübertragungsglieds (17) hat, wobei die Rotationsbewegung des zweiten Übertragungsglieds (143) die Rotation des Stützabschnitts (3) in Bezug auf die erste Scharnierstruktur (4) und die nachfolgende Bewegung des rotierenden Blatts (2) bestimmt.

2. Tor nach Anspruch 1, **dadurch gekennzeichnet, dass** das Gehäuse (18) des Getriebemotors dafür geformt ist, sich mechanisch mit einer Wand des ersten Hohlraums (33) mittels Passoberflächen zu koppeln.

3. Tor nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** sich der Stützabschnitt (3) entlang der Rotationsachse (90) auf eine im Wesentlichen senkrechte Weise in Bezug auf eine Basisoberfläche (200) des Tors entwickelt, wobei der erste Hohlraum (33) und die erste Scharnierstruktur (4) nahe einem unteren Ende (31) des Stützabschnitts positioniert sind.

Revendications

1. Portail (100) ou barrière ou similaire, comprenant au moins un battant rotatif (2) comprenant une partie de support (3) ayant une première cavité (33), ladite partie de support étant combinée de manière rotative, au niveau d'un axe de rotation (90), avec au moins une première structure de charnière (4) du portail, ladite première structure de charnière (4) ayant une base (41) reliée d'un seul tenant à un support fixe (5) et ladite base (41) définissant une seconde cavité (43), ledit portail comprenant un dispositif d'actionnement comprenant un motoréducteur (10) comprenant un carter (18), un moteur électrique et un ou plusieurs étages de réduction, ledit motoréducteur (10) transmettant un mouvement de rotation à un premier élément de transmission de mouvement (17) formé par un arbre d'entraînement, ledit motoréducteur (10) étant logé dans la première cavité (33) de ladite partie de support (3) et ayant ledit carter (18) mécaniquement accouplé ou fixé à une paroi de ladite première cavité (33), de sorte que ledit motoréducteur (10) soit d'un seul tenant avec ladite partie de support (3) ; **caractérisé en ce que** ledit dispositif d'actionnement comprend en outre une première unité de transmission de mouvement (14) opérationnellement distincte et physiquement séparable dudit motoréducteur (10), ladite première unité de transmission de mouvement (14) étant fonctionnellement combinée audit motoréducteur (10) au moyen dudit premier élément de transmission de mouvement (17), ladite première unité de transmission de mouvement (14) étant logée dans la seconde cavité (43) de ladite structure de charnière (4), ladite première unité de transmission de mouvement (14) comprenant un engrenage à pignon denté (141) comprenant une première extrémité fonctionnellement combinée audit élément de transmission de mouvement (17) et une seconde extrémité combinée de manière rotative à une première paroi (412A) de ladite base (41), et une pluralité de roues d'engrenage dentées (142) fonctionnellement combinées audit engrenage à pignon denté de sorte à former un mécanisme de transmission à mouvement épicycloïdal (141, 142) mécaniquement accouplé à une seconde paroi (411) de ladite base (41), les dents (143) desdites roues d'engrenage (142) se mettant en prise avec une couronne (411A) obtenue au niveau de la seconde paroi (411) de ladite base (41), les dents (143) desdites roues d'engrenage formant un second élément de transmission, ladite première unité de transmission de mouvement (14) transmettant audit second élément de transmission (143) un mouvement de rotation ayant un nombre de tr/min inférieur au nombre de tr/min du mouvement de rotation dudit premier élément de transmission de mouvement (17), le mouvement de rotation dudit second élément de transmission (143) déterminant la rotation de ladite partie de support (3) par rapport à ladite première structure de charnière (4) et le mouvement consécutif dudit battant rotatif (2).
2. Portail, selon la revendication 1, **caractérisé en ce que** le carter (18) dudit motoréducteur est façonné de sorte à s'accoupler mécaniquement à une paroi de ladite première cavité (33) au moyen de surfaces conjuguées.
3. Portail selon l'une quelconque des revendications précédentes, caractérisé en ce que ladite partie de support (3) s'étend le long dudit axe de rotation (90) d'une manière sensiblement perpendiculaire par rapport à une surface de base (200) dudit portail, ladite première cavité (33) et ladite première structure de charnière (4) étant positionnées à proximité d'une extrémité inférieure (31) de ladite partie de support.

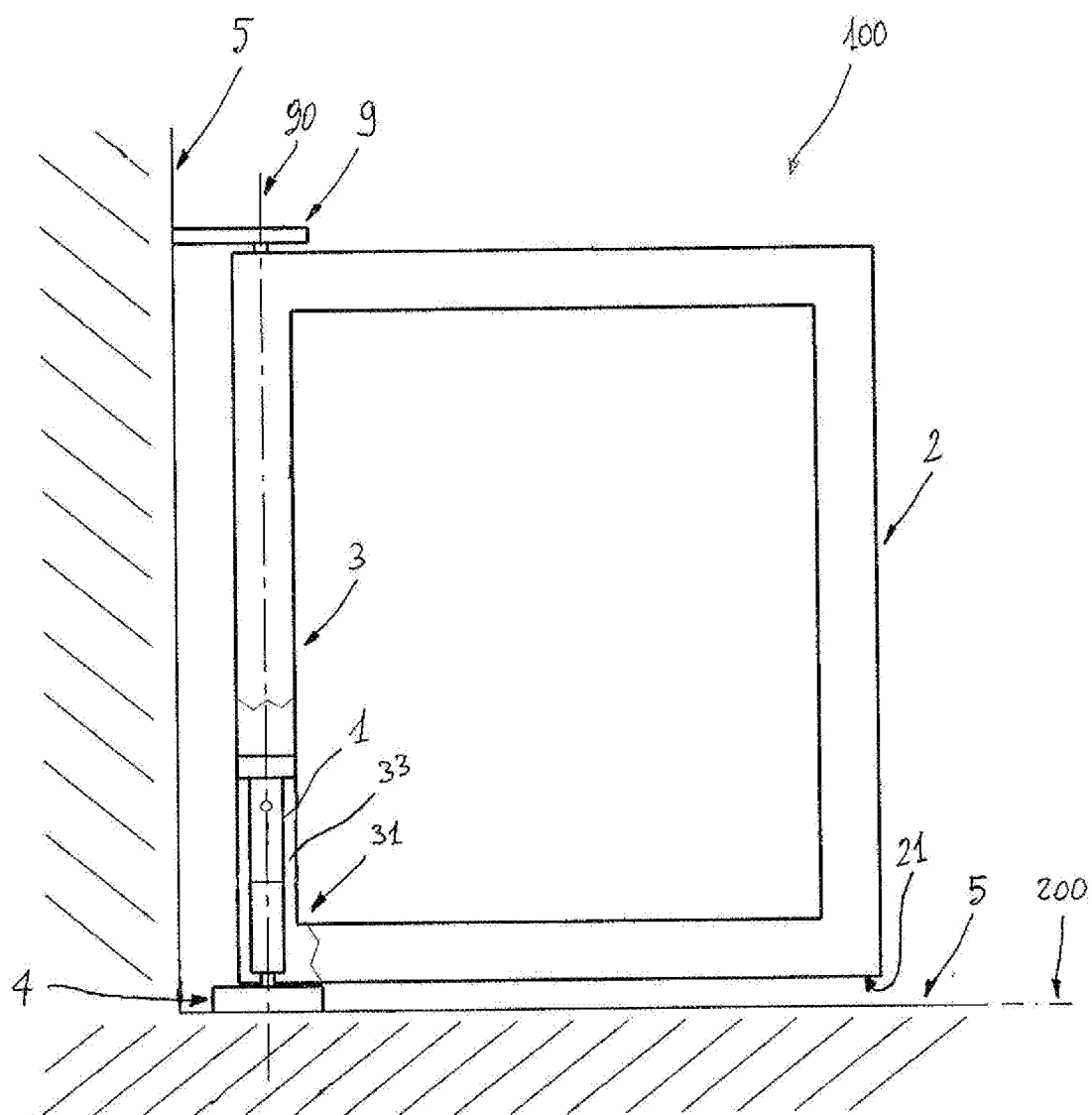


FIG. 1

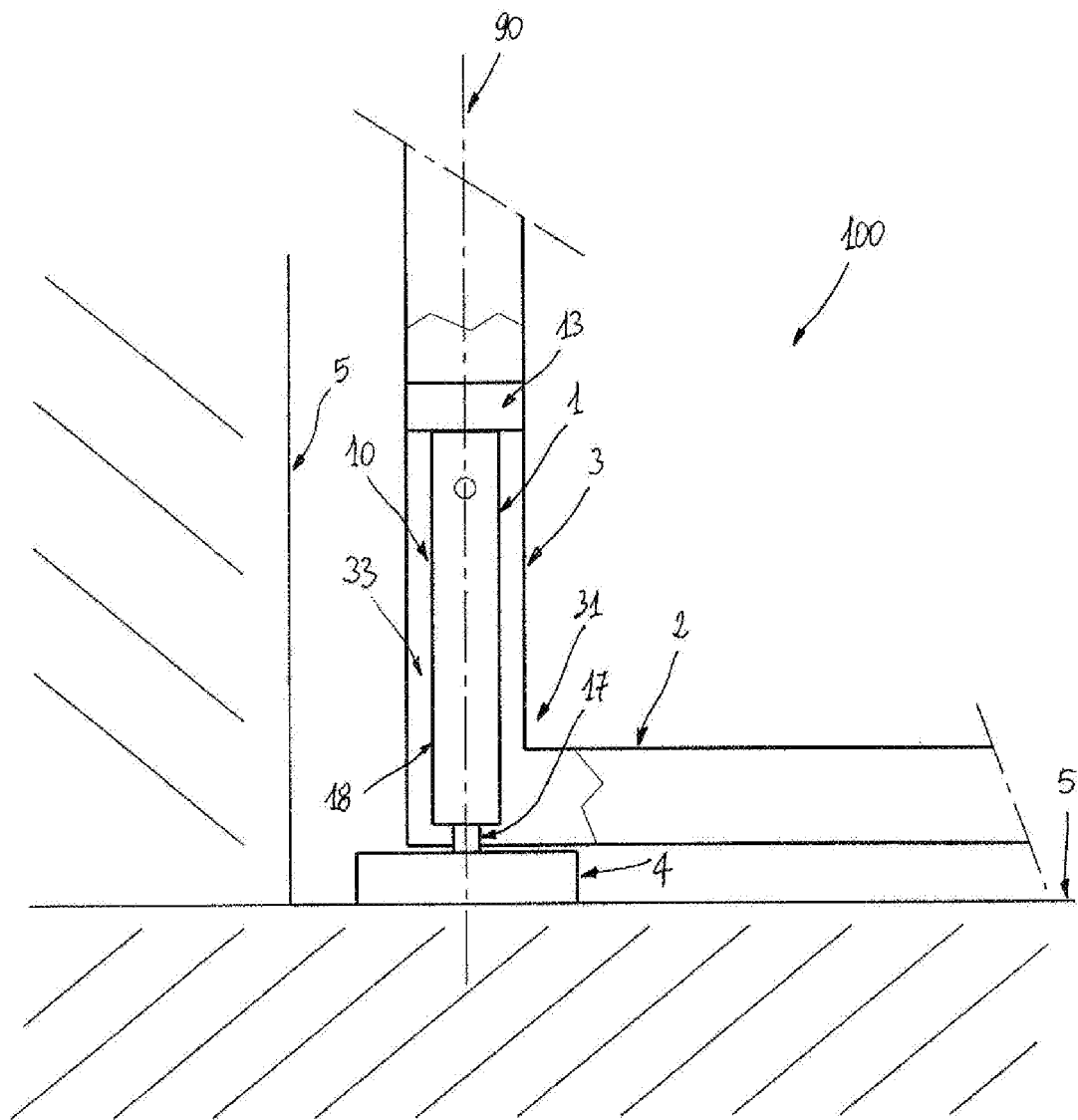


FIG. 2

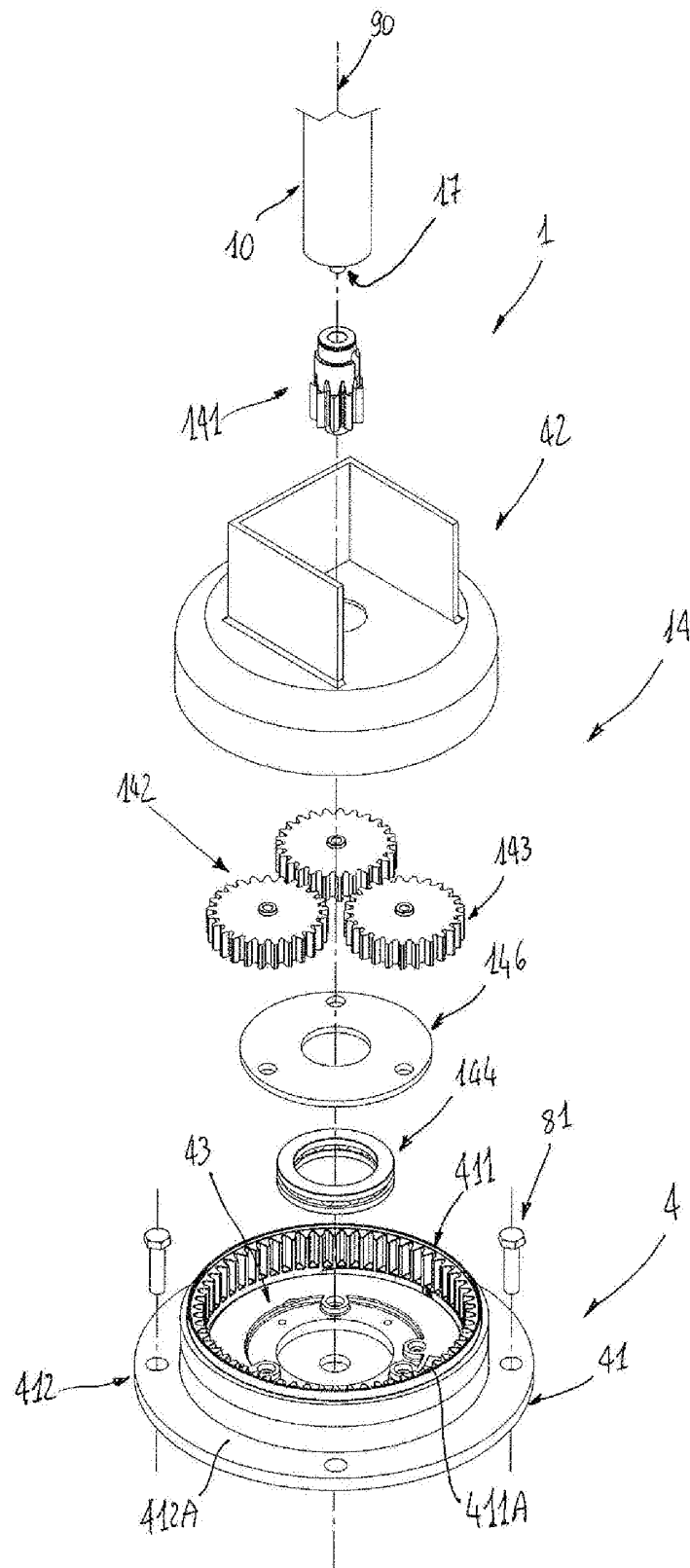


FIG. 3

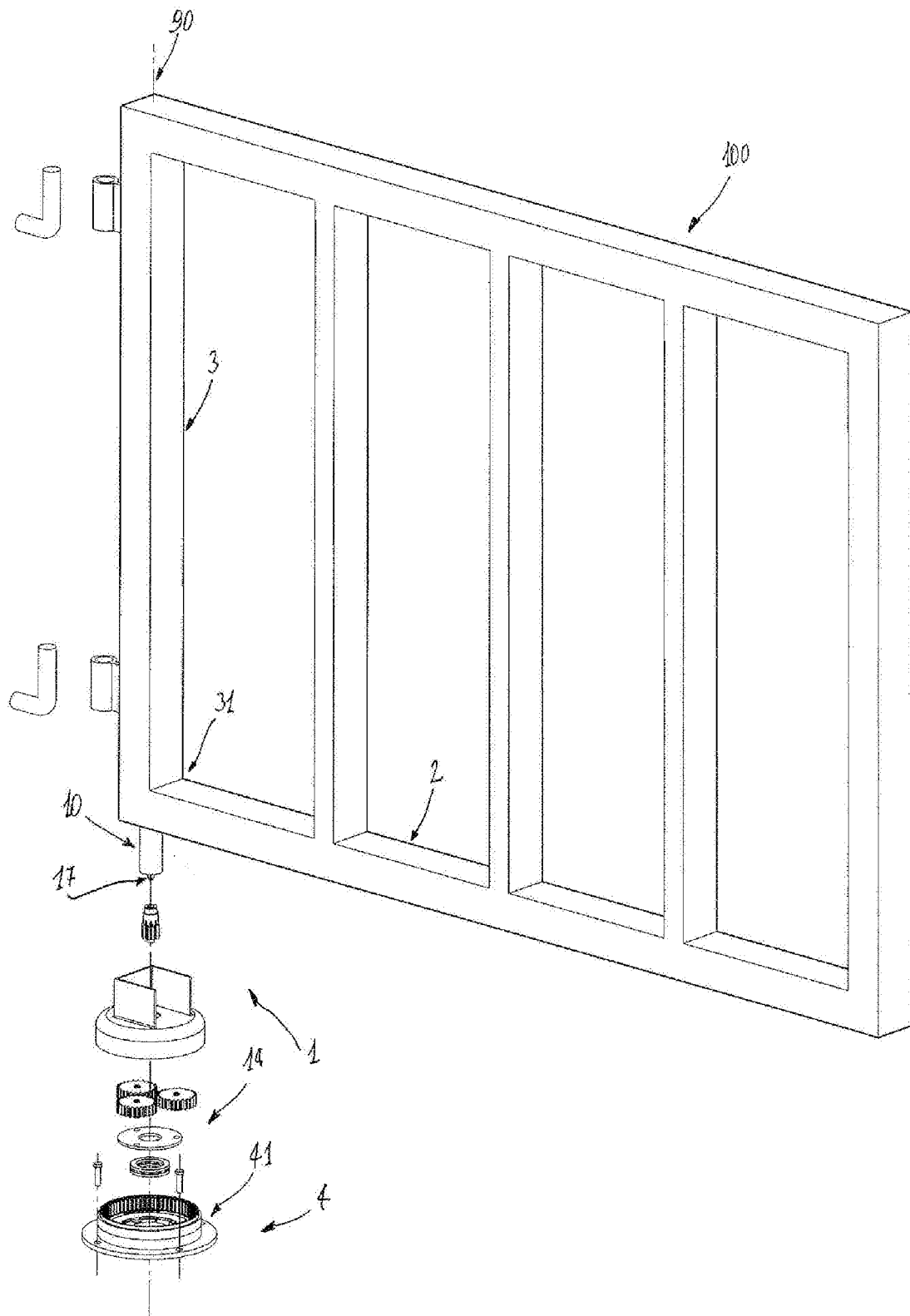


FIG. 4

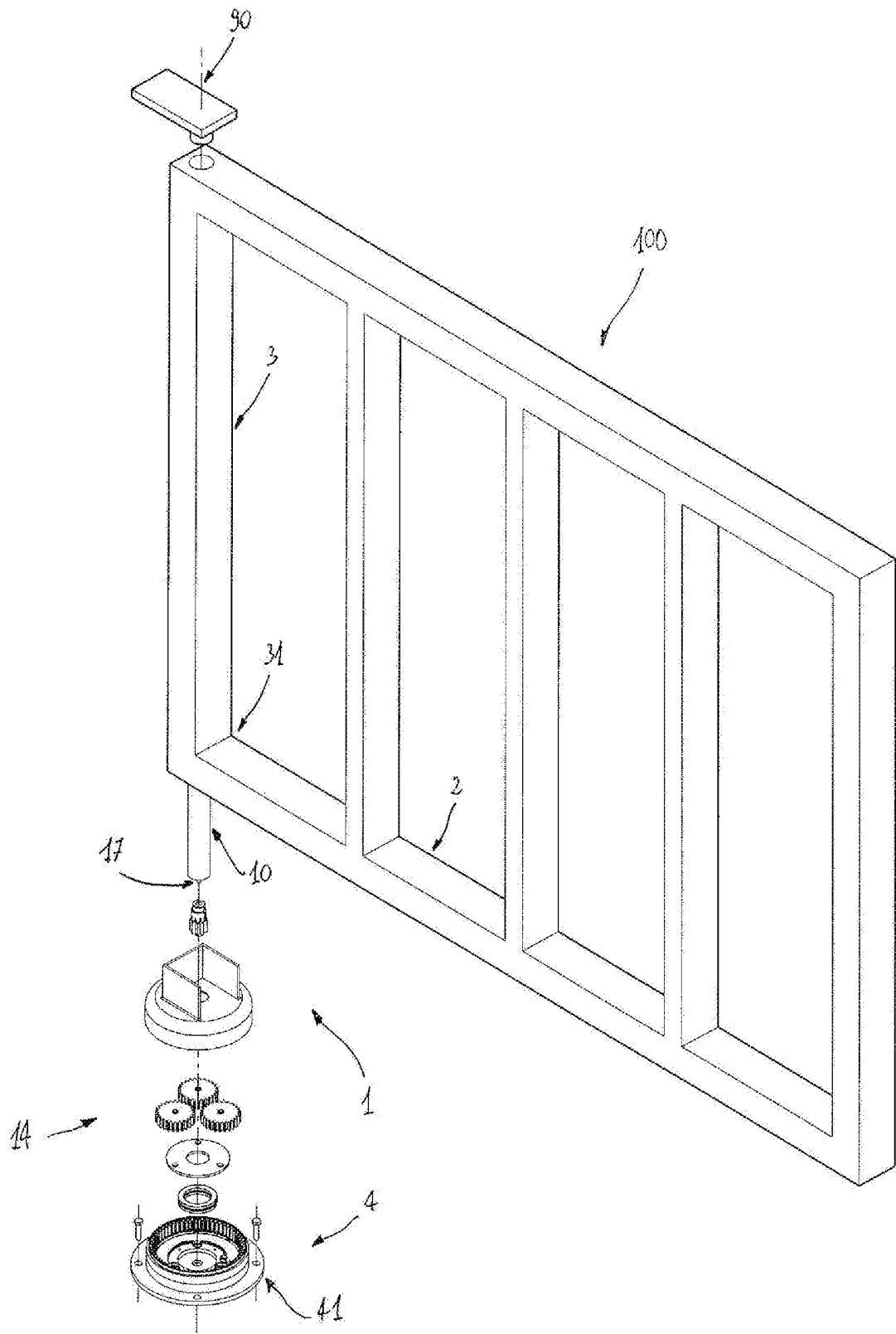


FIG. 5

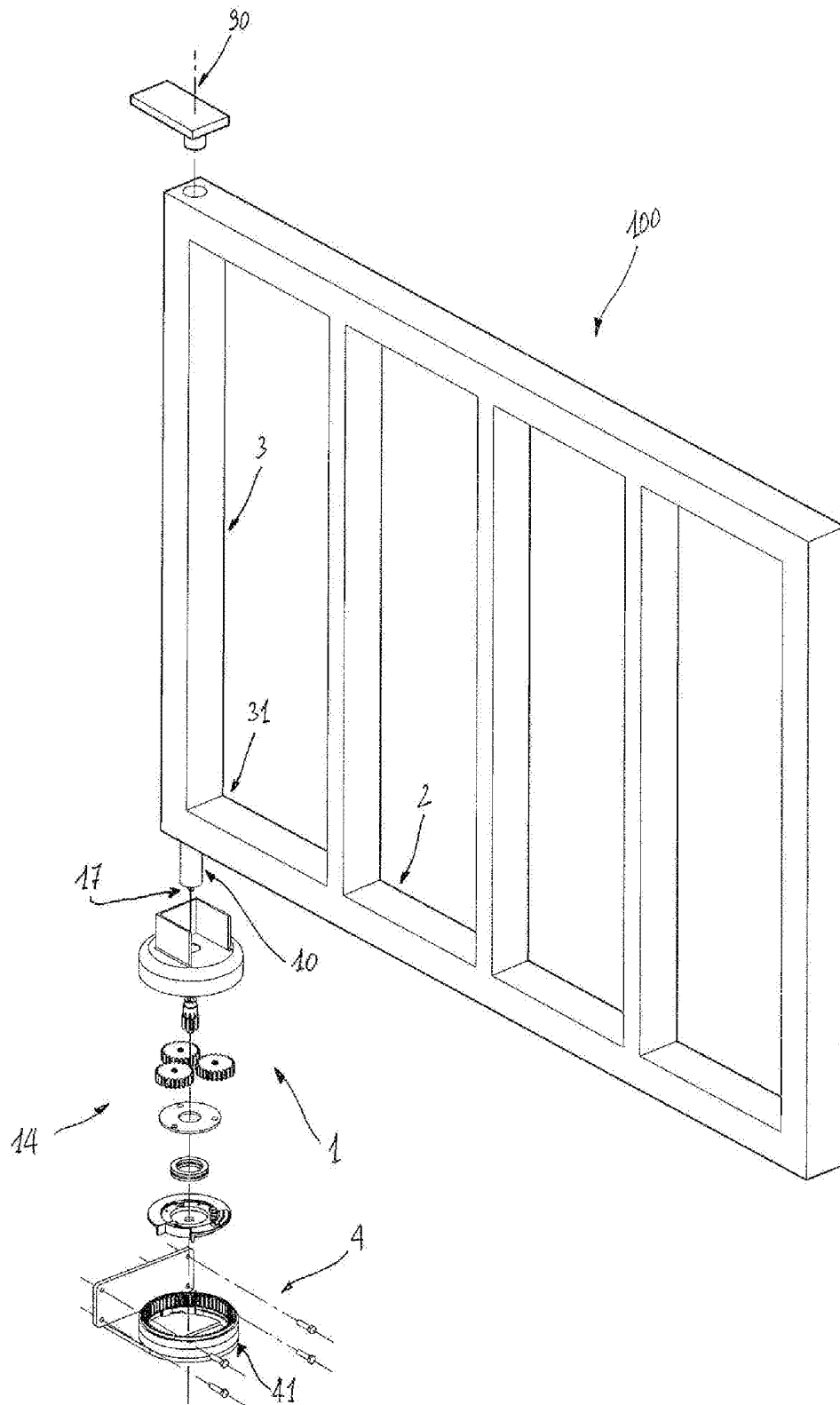


FIG. 6

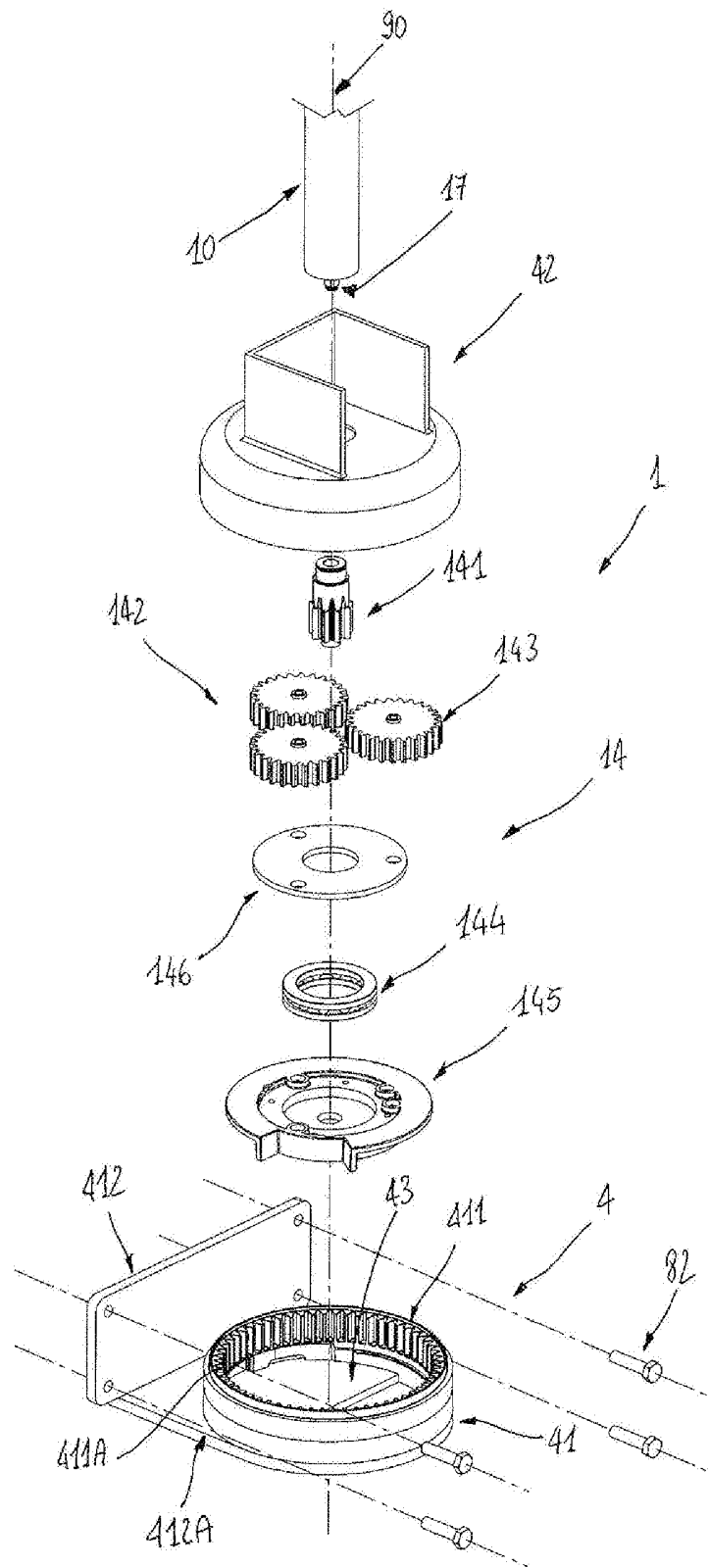


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2055880 A [0007]