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(54) **DRIVE FOR GATES OR DOORS**

ANTRIEB FÜR TORE ODER TÜRE

ENTRAÎNEMENT DE PORTAIL OU PORTE

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Description

[0001] The invention relates to a drive operator for gates or doors.

[0002] The gates or doors are often moved by electric drive operators which have a wall-casing from which comes out a horizontally swivelling articulated arm, which transmits the motion from the drive operator to the gate or door.

[0003] Currently marketed are two different types of drive operators, characterized by different structures and mechanical components.

[0004] The most common type includes drive operators with a casing that contains the electric motor, the control electronics and the mechanical gearbox. The latter transmits the motion to the articulated arm through an appropriate output shaft, placed at the lower end of the operator, which moves the gate or door.

[0005] It is easy to guess that, though not essential, the electric motor, the mechanical gearbox and the articulated arm are turnable with respect to the same vertical axis.

[0006] The electric motor is of commercial type, the mechanical gearbox is made with known techniques and technologies, and the interconnection of the output shaft of the gearbox to the articulated arm is accomplished with special care and special materials, since it is subject to severe stress due to the movement imparted by the drive to the gate, or to stresses by the user directly on the gate, or to weather agents.

[0007] Other drive operators have a different manner of interconnecting the mechanical gearbox to the articulated arm. The electric motor and the mechanical gearbox are produced according to known methods, but the output shaft of the gearbox interacts with the toothing made inside the annular extremity of the articulated arm, placed in the lower region of the drive operator. This implies that the axis of rotation of the motor and the mechanical gearbox is different from the axis of rotation of the articulated arm.

[0008] This construction, especially for high power motors designed to move heavy industrial doors, is critical in performance. Since only a couple of teeth of a pinion meshes on the crown gear, on these teeth a considerable stress discharges. The pinion therefore must be made from resistant and thus expensive metal.

[0009] The stability of the articulated arm is affected too, because the external forces acting on the arm itself, e.g. an impact or wind on the gate door, must be countered eccentrically by the crown and the pinion as well as by the support means of the articulated arm. The condition of eccentricity of the pinion also imposes the use of centering and/or alignment and/or support means for the articulated arm on the casing, which complicate the structure.

[0010] An example of this type of construction is described in document U.S. 5 102 377.

[0011] In both types of drive operators, the increase of

power in the electric motor and consequently in the weight of the gate call for a structural-technical adjustment of many mechanical parts, but particularly of the interconnection between the mechanical gearbox and the articulated arm. In both cases, the interconnection will use valuable and expensive materials. WO2008/053393 discloses a drive operator according to the preamble of claim 1. The main object of the invention is to improve the stability of the arm by lowering and balancing the internal stresses, particularly in the interconnection between the mechanical gearbox and the articulated arm.

[0012] A further object is to reduce production costs in spite of ensuring the necessary performance.

[0013] These objects are achieved by a drive operator as defined in claim 1, while preferred variants are defined in the dependent claims.

[0014] According to specific needs, a 2-, 3- or 4-g geared epicyclic kinematic arrangement can be obtained. Keeping unchanged the size of the crown gear of the articulated arm and of the output shaft of the mechanical gearbox, in the space inside the crown gear there can be placed at least 4 equal gears. According to the needs, a minimum of 2 teeth in mesh (2 gears), at least 3 teeth in mesh (3 gears) or a minimum of 4 teeth in mesh (4 gears) are obtained.

[0015] The drive operator comprises an upper and a lower plate between which there is enclosed and mounted swivelly the arm, thus stability thereof is enhanced.

[0016] To facilitate the mounting of the satellite gears the lower plate comprises on the surface facing the articulated arm, pivoting means for the satellite gears, e.g. seats or holes or pins arranged like the vertices of an equilateral triangle and/or a square.

[0017] The advantages and features of the invention will be more apparent from the following description of an exemplary embodiment, with the attached drawing in which:

Fig. 1 shows an exploded view of a drive operator according to the invention;

Fig. 2 shows a second exploded view of the operator of Fig. 1 with some components assembled;

Fig. 3 shows a three-dimensional view from below of the operator of Fig. 1;

Fig. 4 shows schematically a variant of drive operator, which is not part of the invention.

[0018] With 10 is shown a drive operator according to the invention for a gate or door CG. It comprises a casing 12 which contains therein an electric motor and a gearbox assembly (72) (not shown). The gearbox assembly (72) is connected to the first output shaft and comprises a second output shaft, to which a pinion (70) is connected. The pinion 70 goes through a plate 14 which forms the bottom of the casing 12, and transmits the motion to an internal toothing 36 provided on an end or hollow annular portion 34 of a swivel arm 30 having an actuation seg-

ment 32 articulated with a segment S connected to the gate CG. The arm 30 is swivelly mounted around the vertical axis X of the output shaft of the gearbox 72 between the plate 14, the upper one, and another, lower support plate 50. The two plates 14, 50 are clamped together in well-known manner at the time of assembly.

[0019] The annular end 34 rests on the plate 50 and contains in its lower part a circular crown or pedestal 52 facing the arm 30.

[0020] The pinion 70 is positioned at the center of the annular portion 34 and transmits rotary motion to the toothing 36 through the engagement of three equal satellite gears 60 which in turn mesh on the toothing 36. The gears 60 are mounted within the annular portion 34, arranged as the vertices of an equilateral triangle, and rotatably pivoted around a fixed axis through pins (not shown) anchored in holes 54 obtained on the circular crown 52.

[0021] Note that the holes 54 are seven, and arranged so that the axial pins and the gears 60 may be arranged in 3 different configurations. On a straight line and in opposite position (at 180 degrees), according to the vertices of an equilateral triangle (at 120 degrees) or by the vertices of a square (at 90 degrees), so that also four equal gears 60 can be used for different variants of increased stability and power. From the three configurations at least 2 meshing teeth (2 gears), at least 3 meshing teeth (3 gears) or a minimum of 4 meshing teeth (4 gears) are obtained.

[0022] It is apparent that when the pinion 70 rotates, it brings into rotation the gears 60 which in turn make the arm 30 rotate. Now the thrust on the toothing 36 is imparted by the contact teeth of all the gears 60, which also prevent decentralization thereof.

[0023] Note that the motor and/or the casing 12 may also lie under the swivel arm, essentially in a mirror structure to the one described.

[0024] Fig. 4 shows a, which is not part of the invention, of the invention, demonstrating how the position of the toothing on the swivel arm can be varied.

[0025] A swivel arm 132 has this time an annular portion 134 with an outer toothing 136. Two or more satellite gears 160 mesh with a toothing 161 thereof on the toothing 136. The gears 160 are driven through a toothing 163 thereof on a larger diameter by a central pinion 170 driven by the motor of the drive operator. The development circumferences of the toothings 161, 163 are coaxial and integral with each other.

[0026] The torque on the pinion 170 is discharged on the toothings 163, which in turn make the gears 161 rotate. These act on the toothing 136 rotating the arm 132.

Claims

1. Drive operator (10), for gates (CG) or doors, adapted to be fixed to a wall comprising

- a casing (12) which contains an electric motor with a first output shaft,
- an articulated arm (30) comprising an actuation segment (32), to be connected to the gate (CG) or door, said articulated arm (30, 132) being turnable and comprising at one end (34) an internal crown gear (36),
- a transmission member (70),
- an upper plate (14) and a lower support plate (50) which are clamped together and between which the articulated arm (30) is enclosed and mounted swivelly, wherein the transmission member (70) goes through the upper plate (14), which forms the bottom of the casing (12), the drive operator (10) being **characterized in that** the casing (12) further contains a gearbox assembly (72), which is connected to the first output shaft and which comprises a second output shaft;

in that the transmission member (70) is connected to the second output shaft for transmitting the rotary motion of said second output shaft to the internal crown gear (36);

in that multiple satellite gears (60) are placed between the transmission member (70) and the internal crown gear (36), so that the transmission member (70), the satellite gears (60) and the internal crown gear (36) form a kinematic arrangement of the epicyclic type, wherein the centers of the satellite gears (36) are arranged symmetrically around the center of the internal crown gear (36);

and **in that** the lower plate (50) comprises, on the surface facing the articulated arm (30), pivoting means (54) for the satellite gears (60).

2. Drive operator (10) according to claim 1, comprising two satellite gears (60) with rotation centers located on a line, in position opposite to the center of the internal crown gear (36) of the articulated arm (30).
3. Drive operator (10) according to claim 1, comprising three satellite gears (60) with centers arranged like the vertices of an equilateral triangle.
4. Drive operator (10) according to claim 1, comprising four satellite gears (60) with centers arranged like the vertices of a square.
5. Drive operator (10) according to claim 1, wherein the pivoting means comprise seats or holes (54) or pins arranged like the vertices of an equilateral triangle and/or a square.
6. Drive operator (10) according to any of the preceding claims, wherein the satellite gears (60) are made of plastic.

Patentansprüche

1. Antrieb (10) für Tore (CG) oder Türen, der an einer Wand befestigt wird, bestehend aus

- einem Gehäuse (12), welches einen Elektromotor mit einer ersten Antriebswelle enthält,
- einem Gelenkarm (30) mit einem Antriebssegment (32) zum Anschluss am Tor (CG) oder an der Tür,
- besagter Gelenkarm (30; 132) ist drehbar und umfasst an einem Ende (34) ein inneres Kronrad (36)
- einem Übertragungselement (70),
- einer oberen Platte (14) und einer unteren Platte (50), die miteinander zusammengesetzt sind und zwischen denen der Gelenkarm (30) drehbar umschlossen und befestigt ist, in welchem

das Übertragungselement (70) die obere Platte (14) durchläuft, welche die Unterseite des Gehäuses (12) bildet,

wobei der Antrieb **dadurch gekennzeichnet ist,**

dass das Gehäuse (12) zudem einen Getriebemotor (72) enthält, der mit der ersten Antriebswelle verbunden ist und eine zweite Antriebswelle enthält;

dass das Übertragungselement (70) mit der zweiten Antriebswelle verbunden ist, um die Drehbewegung der besagten zweiten Antriebswelle an das innere Kronrad (36) zu übertragen;

dass mehrere Satellitengetrieberäder (60) zwischen dem Übertragungselement (70) und dem inneren Kronrad (36) liegen, so dass das Übertragungselement (70), die Satellitengetrieberäder (60) und das innere Kronrad (36) eine kinematische Anordnung vom Typ Untersetzungsgetriebe bilden, in welchem die Mittelpunkte der Satellitengetrieberäder (60) symmetrisch um den Mittelpunkt vom inneren Kronrad (36) angeordnet sind;

und **dass** die untere Platte (50) auf der Oberfläche, die zum Gelenkarm (30) gerichtet ist, Schwenkvorrichtungen (54) für die Satellitengetrieberäder (60) enthält.

2. Antrieb (10) nach Anspruch 1, bestehend aus zwei Satellitengetrieberädern (60) mit Drehpunkten, die in einer Linie direkt gegenüber vom Mittelpunkt des inneren Kronrads (36) vom Gelenkarm (30) angeordnet sind.

3. Antrieb (10) nach Anspruch 1, bestehend aus drei Satellitengetrieberädern (60) mit Mittelpunkten, die entsprechend den Eckpunkten von einem gleichseitigen Dreieck angeordnet sind.

4. Antrieb (10) nach Anspruch 1, bestehend aus vier Satellitengetrieberädern (60) mit Mittelpunkten, die entsprechend den Eckpunkten eines Quadrats an-

geordnet sind.

5. Antrieb (10) nach Anspruch 1, wobei die Schwenkvorrichtung Plätze oder Löcher (54) bzw. Bolzen enthält, die entsprechend den Eckpunkten eines gleichseitigen Dreiecks und/oder Quadrats angeordnet sind.

6. Antrieb nach einem der vorstehenden Ansprüche, bei dem die Satellitengetrieberäder aus Kunststoff gefertigt sind.

Revendications

1. Dispositif d'entraînement (10) de portails (CG) ou de portes, conçu pour être fixé à un mur, comprenant

- un boîtier (12) contenant un moteur électrique doté d'un premier arbre de sortie,
- un bras articulé (30) comprenant un segment d'actionnement (32) devant être relié au portail (CG) ou à la porte,

ce bras articulé (30; 132) étant pivotant et comportant, à l'une de ses extrémités (34), une couronne dentée interne (36)

- un élément de transmission (70),
- une plaque supérieure (14) et une plaque inférieure (50) qui sont serrées l'une contre l'autre et entre lesquelles le bras articulé est encastré et monté de manière pivotante (30), où

l'élément de transmission (70) passe à travers la plaque supérieure (14) formant le fond du boîtier (12), le dispositif d'entraînement étant **caractérisé par le fait que** le boîtier (12) contient en outre un motoréducteur (72) qui est relié au premier arbre de sortie et qui comprend un deuxième arbre de sortie ; **par le fait que** l'élément de transmission (70) est relié au deuxième arbre de sortie pour transmettre le mouvement de rotation du deuxième arbre de sortie à la couronne dentée interne (36) ;

par le fait que plusieurs engrenages satellites (60) sont placés entre l'élément de transmission (70) et la couronne dentée interne (36), de manière à ce que l'élément de transmission (70), les engrenages satellites (60) et la couronne dentée interne (36) constituent un agencement cinématique de type épicycloïdal, dans lequel les centres des engrenages satellites (60) sont disposés symétriquement autour du centre de la couronne dentée interne (36) ; et **par le fait que** la plaque inférieure (50) comprend, sur sa surface tournée vers le bras articulé (30), des moyens de pivotement (54) destinés aux engrenages satellites (60).

2. Dispositif d'entraînement (10) selon la revendication 1, comprenant deux engrenages satellites (60) dont les centres de rotation sont disposés sur une ligne droite, en position opposée par rapport au centre de la couronne dentée interne (36) du bras articulé (30). 5
3. Dispositif d'entraînement (10) selon la revendication 1, comprenant trois engrenages satellites (60) dont les centres sont disposés comme les sommets d'un triangle équilatéral. 10
4. Dispositif d'entraînement (10) selon la revendication 1, comprenant quatre engrenages satellites (60) dont les centres sont disposés comme les sommets d'un carré. 15
5. Dispositif d'entraînement (10) selon la revendication 1, dans lequel les moyens de pivotement comprennent des logements, des orifices (54) ou des pivots disposés comme les sommets d'un triangle équilatéral et/ou d'un carré. 20
6. Dispositif d'entraînement selon l'une quelconque des revendications précédentes, dans lequel les engrenages satellites sont réalisés en matière plastique. 25

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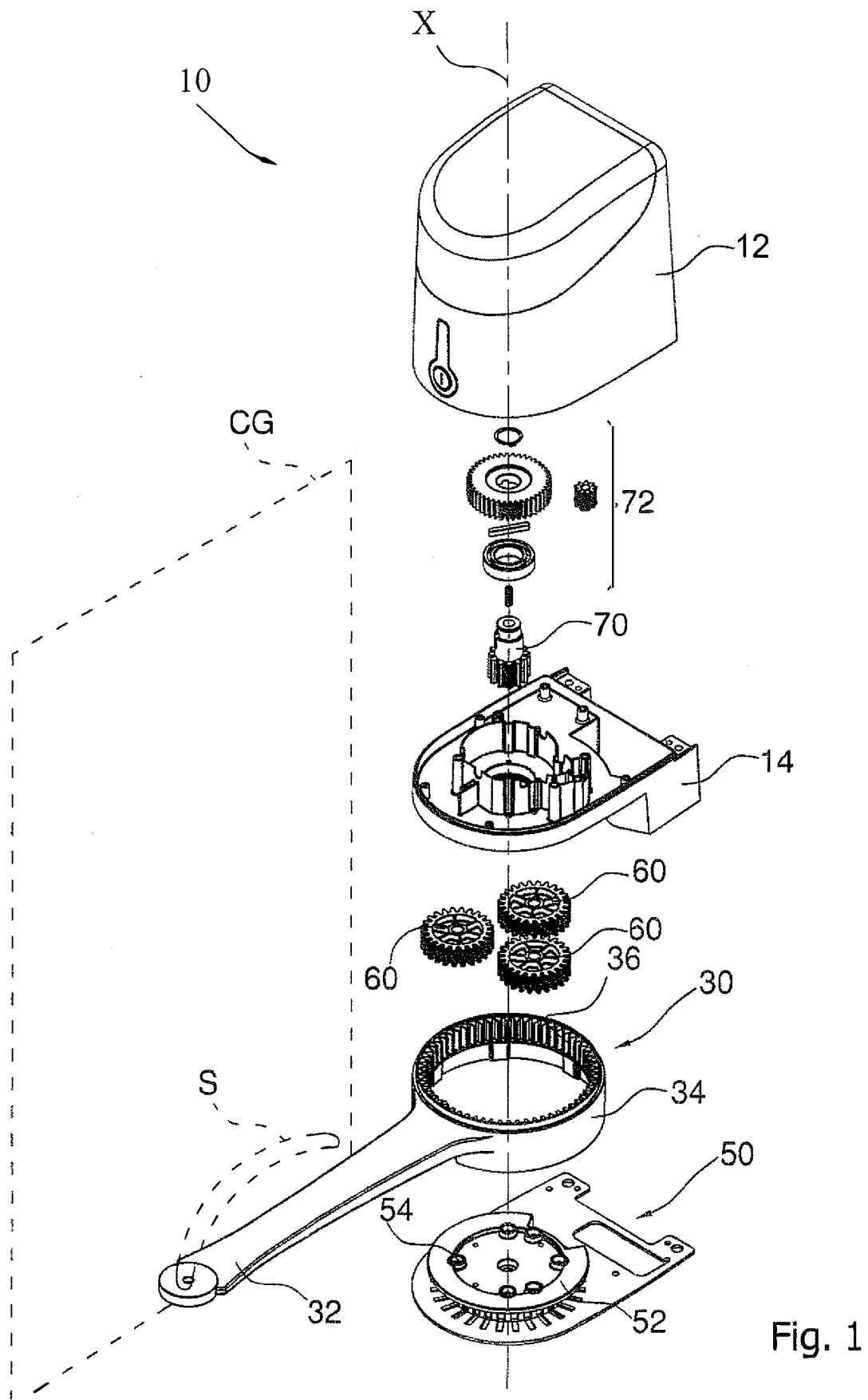
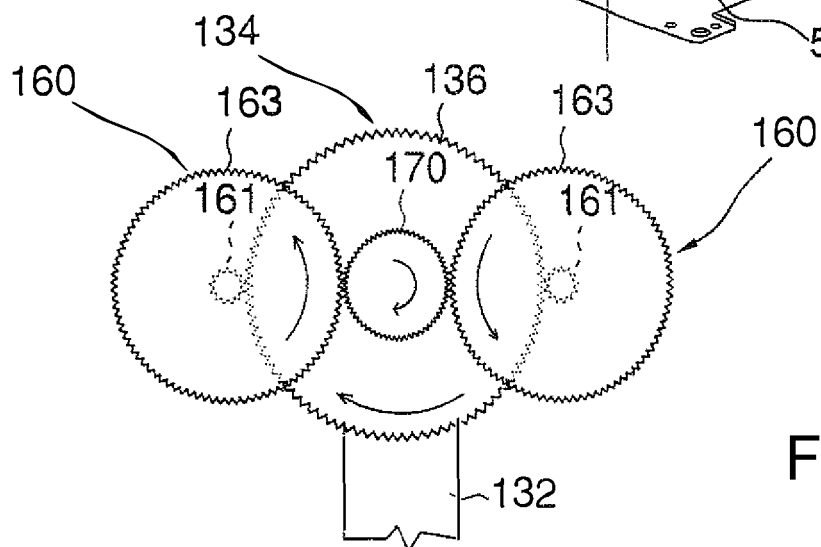
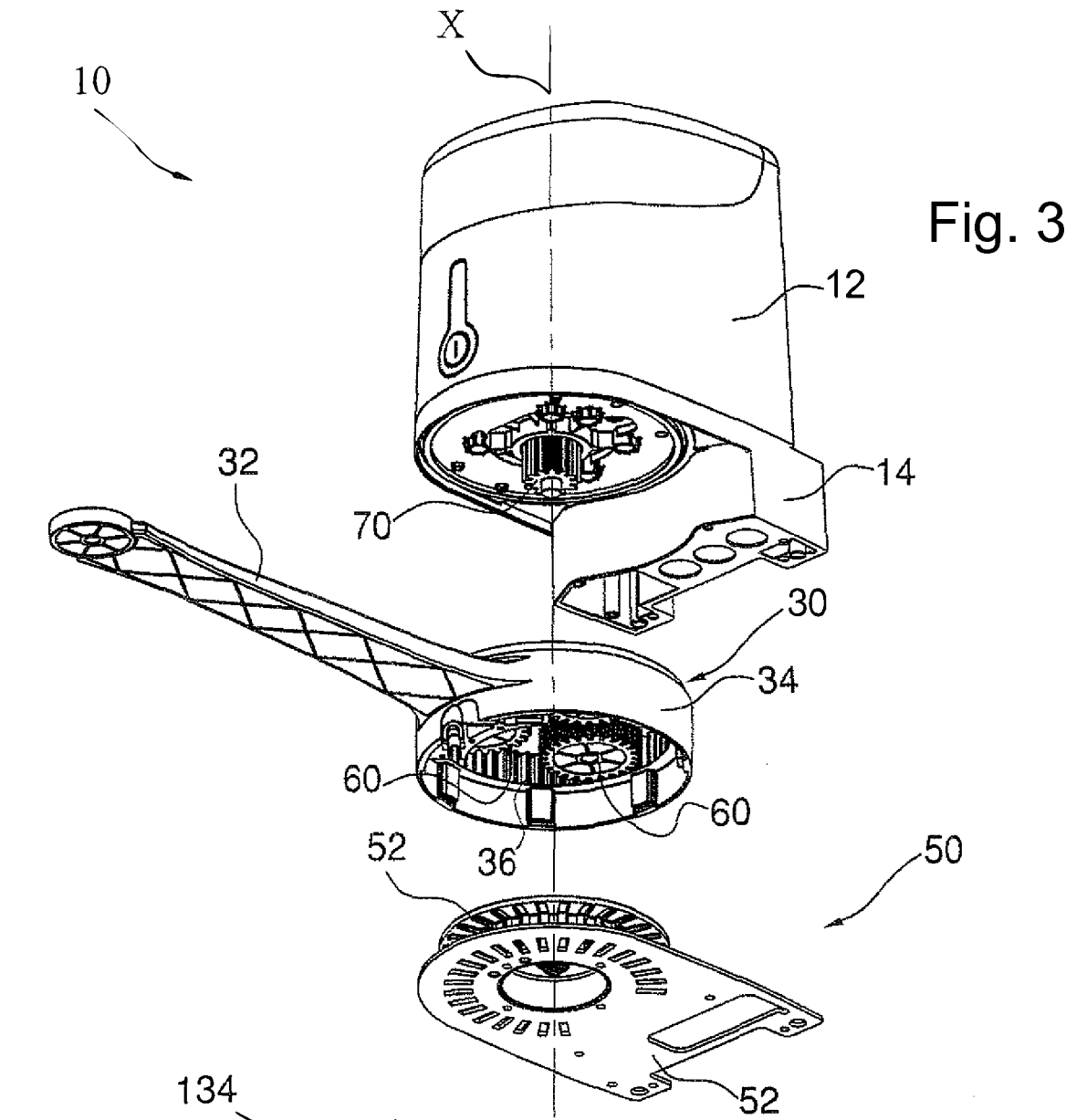
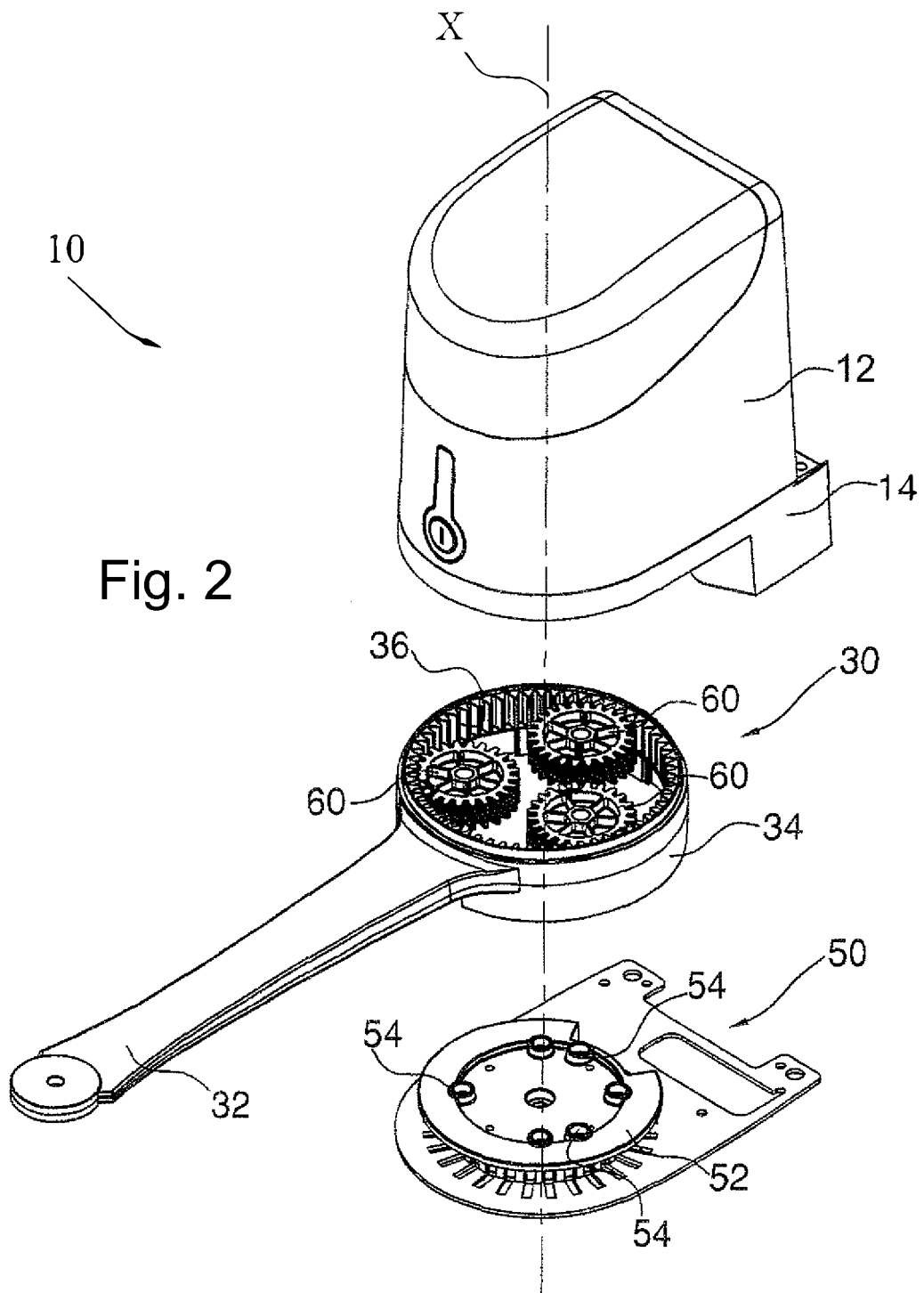


Fig. 1





REFERENCES CITED IN THE DESCRIPTION

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