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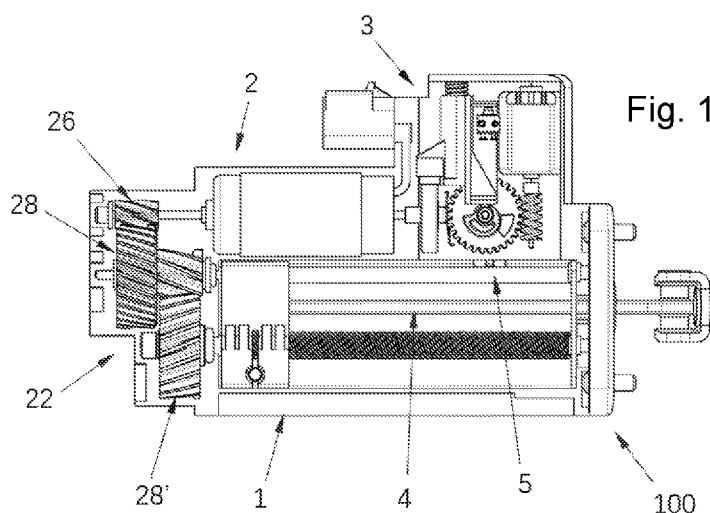
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(54) Title: DRIVER FOR VEHICLE SIDE DOOR AND VEHICLE COMPRISING THE SAME



(57) Abstract: The present disclosure relates to a driver (100) for a vehicle side door. The driver (100) comprises: a housing (1) in which an accommodating cavity is formed, a driving device (2) and a holding device (3) provided in the accommodating cavity, and an actuating member (4) which can be driven by the driving device (2), wherein one end of the actuating member is arranged in the accommodating cavity and the other end extends out of the housing (1), wherein the driving device (2) is configured to apply a driving action to the actuating member (4) to make the actuating member (4) move linearly. To this end, the driving device (2) comprises a gear set consisting of a first helical gear (26), an intermediate helical gear (28), and a third helical gear (28'); and the holding device (3) is configured to apply a holding function to the driving device (2) to prevent the actuating member (4) from acting. The present disclosure also relates to a vehicle comprising the driver.

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DRIVER FOR VEHICLE SIDE DOOR
AND VEHICLE COMPRISING THE SAME

Technical Field

5 The present disclosure relates to the application of vehicle technology, in particular to a driver for opening/closing a side door of a vehicle, which comprises a motor and an actuating member loaded by a motor via a transmission system. The present disclosure also relates to a vehicle comprising the driver.

10 **Background Art**

 Today's vehicles are increasingly equipped with comfort functions. For example, in order to facilitate access to the vehicle and promote aesthetic and aerodynamic styling, the vehicle is not equipped with an external door handle. It is also conceivable to have an outer door handle, which, however, only transmits the switch signal to the
15 vehicle door lock for opening. A so-called opening device, vehicle door mover, or door position holder/door opener is used to ease and automate boarding and help board, for example, a vehicle without an external door handle.

 The existing driver for opening/closing the vehicle door has the following disadvantages: the driver includes a conventional mechanical stopper, but the vehicle
20 door can be only suspended in a fixed gear, instead of at any opening angle. At present, there are also electric door mechanisms, most of which involve such parts as cables/racks/hinge shafts, featuring numerous parts, complex structure and large space occupied.

 Therefore, it is necessary to provide an improved driver for opening and closing
25 vehicle doors.

Summary

 It is an object of the present disclosure to solve at least one of the above problems and defects existing in the prior art.

30 According to one aspect of the present disclosure, there is provided a driver for a vehicle side door. The driver comprises: a housing in which an accommodating cavity is formed; a driving device and a holding device provided in the accommodating cavity; an actuating member which can be driven by the driving device, wherein one end of the actuating member is arranged in the accommodating cavity and the other end extends

out of the housing; and a guide member, wherein the driving device is configured to apply a driving action to the actuating member to make the actuating member move linearly; and the holding device is configured to apply a holding action to the driving device to prevent the actuating member from acting. In this way, resistance can be applied to the driving chain for the driving device by means of the holding device to prevent the vehicle door from moving under the influence of gravity or crosswind on the slope.

The driving device comprises a driving motor with an output shaft, and a transmission system, and the driving motor applies the driving action to the actuating member via the output shaft and the transmission system, and the transmission system comprises: a lead screw assembly comprising a lead screw and a slider in threaded connection with the lead screw, wherein the slider is connected to the actuating member; a first helical gear provided at the end of the output shaft of the driving motor; an intermediate helical gear comprising a first part and a second part which are configured to be coaxially and adjacently provided on a separate rotating shaft near one end of the guide member, wherein the first part of the intermediate helical gear meshes with the first helical gear; and a third helical gear provided at one end of the lead screw and meshed with the second part of the intermediate helical gear, wherein the output shaft of the driving motor and the lead screw are arranged so that their central axes are parallel to each other.

Optionally, the actuating member, the guide member and the lead screw are connected by a slider and are arranged so that the actuating member is positioned between the guide member and the lead screw in the direction perpendicular to the central axis of the output shaft of the driving motor.

Optionally, the central axes of the guide member and the lead screw are parallel to each other.

Optionally, the slider is configured so that one end of the slider is threadedly connected to the lead screw, so that the slider can be rotationally driven by the lead screw; the other end of the slider is sleeved on the guide member so that the slider can slide relative to the guide member with the rotational driving of the lead screw; and the slider is connected at the middle part thereof to one end of the actuating member to drive the actuating member to move linearly.

Optionally, the lead screw, the slider and the actuating member are arranged to urge the actuating member out of the housing further when the slider moves in a

direction away from the intermediate helical gear and the third helical gear, and cause the actuating member to retract into the accommodating cavity inside the housing when the slider moves towards the intermediate helical gear and the third helical gear.

5 Optionally, the holding device comprises a holding mechanism motor and a holding mechanism, and the holding mechanism motor can act on the driving chain for the driving motor via the holding mechanism to prevent the actuating member from acting.

The driving chain refers to all moving parts that transfer the driving force of the driving motor to the outside (such as the vehicle door).

10 Optionally, the holding mechanism motor is arranged such that the central axes of the output shaft of the holding mechanism motor and the output shaft of the driving motor are perpendicular to each other, and the holding mechanism motor and the driving motor are arranged on a side of the guide member opposite to the actuating member.

15 Optionally, the holding mechanism comprises: a brake wheel connected to the output shaft of the driving motor; a cam member comprising a gear part and a cam part which are coaxially arranged, wherein the gear part is matched with a holding mechanism worm provided at the end of the output shaft of the holding mechanism motor, so that the holding mechanism motor can drive, through the holding mechanism worm, the cam member to rotate; a brake member controlled by the cam part of the cam member to move between a first position and a second position, wherein the brake member engages with the brake wheel to exert a holding action on it at the first position, and disengages from the brake wheel to release it at the second position; and a spring for applying a biasing force to the brake member to bias the brake member towards the cam member and the brake wheel.

25 Optionally, the brake member comprises a hollow cylindrical part for accommodating the spring, and a first protruding part and a second protruding part respectively extending outward from two radial sides of the cylindrical part; the cam part of the cam member includes a bottom and a top that rises relative to the bottom; and the cylindrical part of the brake member is arranged so that the longitudinal axis of the cylindrical part is parallel to the central axis of the output shaft of the holding mechanism motor, the first protruding part is configured to be close to the bottom of the cam part in the first position and abut against the top of the cam part in the second position, and the second protruding part is configured to engage with the brake wheel

at the first position, so as to apply pressure to the brake wheel to prevent it from rotating and then prevent the actuating member from acting, and to disengage from the brake wheel at the second position, thereby releasing the brake wheel to allow it to rotate and then allow the actuating member to act.

5 Optionally, a friction braking part made of friction material is provided on the surface of the second protruding part facing the brake wheel, for holding the brake wheel so as to prevent it from rotating.

According to another aspect of the present disclosure, there is provided a vehicle comprising the abovementioned driver for a vehicle side door.

10 The driver of the present disclosure can produce at least one of the following advantages and technical effects:

- 1) a compact structure,
- 2) a substantially symmetrical design,
- 3) a better waterproof performance,

15 4) keeping the structure/device equipped with the driver at a desired position, and suspending the mechanical holding mechanism for a long time without consuming the power of the vehicle, and

- 5) optimizing the layout of internal space with the addition of a holding device.

20 **Brief Description of the Drawings**

The present disclosure is described in detail below in conjunction with non-limiting embodiments with reference to the accompanying drawings. The drawings are only schematic and not necessarily drawn to scale. In addition, they only show the parts necessary to illustrate the present disclosure, and other parts may be omitted or merely
25 simply illustrated. That is, in addition to the parts shown in the drawings, the present disclosure may also include other parts.

Fig. 1 is a schematic sectional view of a driver for a vehicle side door according to the present disclosure, in which the housing has been partially cut out to show the internal structure of the driver.

30 Fig. 2 is a schematic side view of the internal structure of the driver shown in Fig. 1, in which a driving device and a holding device are shown.

Fig. 3 is a schematic perspective view of the holding device of the drive shown in Fig. 1, in which the brake member of the holding device is in a first position.

Fig. 4 is a schematic side view of the holding device shown in Fig. 3.

Detailed Description of the Embodiments

The driver according to embodiments of the present disclosure is described below with reference to the drawings. In the following description, numerous specific details
5 are set forth in order to make a person skilled in the art fully understand the present disclosure. However, it will be appreciated to the skilled person that the present disclosure may be implemented without some of these specific features. Furthermore, it will be appreciated that the present disclosure is not limited to the specific embodiments described herein.

10 In the description of the present disclosure, it will be appreciated that the directions or positional relationships indicated by terms such as “center”, “lateral”, “longitudinal”, “front”, “back”, “left”, “right”, “up”, “down”, “vertical”, “horizontal”, “top”, “bottom”, “inside” and “outside” are based on the directions or positional relationships shown in the accompanying drawings and are only for the convenience of describing the present
15 disclosure and simplifying the description. They do not indicate or imply that the device or element referred to must be oriented, constructed or operated in a specific direction. Therefore, they should not be construed as limiting the scope of protection of the present disclosure.

Figs. 1 and 2 schematically show a driver 100 for a vehicle side door according to
20 an embodiment of the present disclosure.

As shown in Fig. 1, the driver 100 may include a housing 1, in which an accommodating cavity is formed, and a driving device 2 and a holding device 3 may be accommodated in the accommodating cavity.

The driving device 2 and the holding device 3 can be arranged in an upper area of
25 the driver 100, which performs a waterproof function, because even if water enters the accommodating cavity of the housing 1, it is not easy to gather in the area where the driving device 2 and the holding device 3 are arranged.

The driver 100 may further include an actuating member 4, one end of which may be arranged in the accommodating cavity, and the other end may extend out of the
30 housing 1. The actuating member 4 can be driven by the driving device 2 to move linearly, for example, to transmit thrust and/or pull to a component (not shown) connected to the actuating member, thereby driving the component to move.

As an example, the driver 100 may be used to open/close a vehicle side door, and the actuating member 4 may be a rod-shaped member such as a connecting rod or a

push rod. The driving device 2 can be arranged on a side door of a vehicle, and one end of the actuating member 4 in the form of a connecting rod or a push rod is connected to a driving force output end of the driving device 2, and the other end of the actuating member 4 is bolted to a pillar A or pillar B of the vehicle body, so that the actuating member 4 can transmit thrust/pull to the side door to open or close the side door.

The holding device 3 can exert a holding action on the driving device 2 to prevent the actuating member 4 from acting under the influence of an external force (e.g. when the vehicle is on a steep slope or when the wind acts on a side door), so as to keep the actuating member 4 and the components connected thereto in place. For example, when the driver 100 is installed in a side door of a vehicle, the side door can be held in a suspending position by the holding device 3 (see below for the details).

As shown in Figs. 1 and 2, the driving device 2 may include a driving motor 20 with an output shaft and a transmission system 22, and the driving motor 20 may exert a driving action on the actuating member 4 through the output shaft and the transmission system 22.

The transmission system 22 may include a lead screw assembly 24. The lead screw assembly 24 may include a lead screw 240 and a slider 242 in threaded connection with the lead screw 240. The slider 242 may be connected to the actuating member 4.

The output shaft of the driving motor 20 and the lead screw 240 may be arranged such that their central axes are parallel to each other. Due to the parallel arrangement of the motor output shaft and the lead screw, a particularly compact (in particular in the vertical direction) structure can be created, as detailed in the following analysis.

The driver 100 may further include a guide member 5, and the actuating member 4, the guide member 5, and the lead screw 240 may be connected to each other via the slider 242 and arranged such that the actuating member 4 is positioned between the guide member 5 and the lead screw 240 when viewed in the direction perpendicular to the central axis of the output shaft of the driving motor 20. In this way, the slider 242 can move smoothly along the guide member 5, thereby driving the actuating member 4 to move linearly.

When the driver 100 is installed at a side door of a vehicle, the direction perpendicular to the central axis of the output shaft of the driving motor may be a substantially vertical direction. In this case, the driving device 2, the holding device 3, the guide member 5, the actuating member 4 and the lead screw 240 are sequentially arranged from top to bottom (see Fig. 2).

The transmission system 22 may further include a gear set consisting of a first helical gear 26, an intermediate helical gear (or a second helical gear) 28, and a third helical gear 28'. The first helical gear 26 may be arranged at an end of the output shaft of the driving motor 20; the intermediate helical gear 28 includes an intermediate helical gear first part (or a second helical gear first part) 28a, and an intermediate helical gear second part (or a second helical gear second part) 28b. The intermediate helical gear first part 28a and the intermediate helical gear second part 28b may be coaxially and adjacently provided on a separate rotating shaft near one end of the guide member 5 (see Fig. 2), and wherein the intermediate helical gear first part 28a may mesh with the first helical gear 26; the third helical gear 28' may be disposed at one end of the lead screw 240 and may mesh with the intermediate helical gear second part 28b. The driving force of the driving motor 20 can be transmitted to the lead screw 240 by means of the first, intermediate and third helical gear and their corresponding arrangements. The output shaft or the lead screw can mate with the corresponding helical gears (i.e., the first and third helical gears 26, 28') through, for example, shaft holes or spline features therebetween.

The driving device 2, holding device 3, guide member 5, actuating member 4 and lead screw 240 are sequentially arranged from top to bottom, and the gear transmission part (including the first, intermediate and third helical gears) of the transmission system 22 is arranged on one side of the driver 100 in its lateral direction (horizontal direction in the installed state). In addition, the central axis of the guide member 5 and the central axis of the intermediate transmission gear set consisting of the intermediate helical gear first part 28a and second part 28b are merged into the same axis, thus occupying as little space as possible in the vertical direction, ensuring a compact structure, and improving the transmission of driving force from the lead screw 240 to the actuating member 4, because the actuating member 4 and the lead screw 240 can be arranged adjacent to each other.

As shown in Fig. 2, the central axes of the guide member 5 and the lead screw 240 may be parallel to each other. Therefore, the driver 100 can be configured to be substantially symmetrical with respect to the above plane. This is conducive to reducing the thickness of the driver 100 and further improving the structural compactness.

As better shown in Fig. 2, one end (lower end in Fig. 2) of the slider 242 can be threadedly connected to the lead screw 240, so that the slider 242 can be driven to move by the rotation of the lead screw 240. The other end (the upper end in Fig. 2) of the

slider 242 can be sleeved on the guide member 5, so that the slider 242 can slide relative to the guide member 5 under the rotary drive of the lead screw 240. In addition, the middle part of the slider 242 is connected to one end of the actuating member 4 by bolts or pins, for example, to bring the actuating member 4 to move linearly.

5 In the embodiment shown in Figs. 1 and 2, the lead screw 240, the slider 242 and the actuating member 4 are arranged such that when the slider 242 moves away from the gear set, the actuating member 4 is further extended to the outside of the housing 1, and when the slider 242 moves towards the gear set, the actuating member 4 is retracted to the accommodating cavity inside the housing 1.

10 For example, the driver 100 can be installed inside a side door of a vehicle, and the end of the actuating member 4 in the form of a push rod extending out of the housing 1 can be hinged to the vehicle body. When the slider 242 moves away from the gear set, the actuating member 4 applies a thrust to the vehicle body, pushing the vehicle door to pivot in the opening direction (the direction away from the vehicle body) to
15 automatically open the vehicle door. When the slider 242 moves towards the gear set, the actuating member 4 applies a pulling force to the vehicle body, and the pulling force reacts on the vehicle door (that is, pulls the vehicle door), making the vehicle door pivot in the closing direction (the direction towards the vehicle body) to automatically close the vehicle door.

20 The holding device 3 according to one embodiment of the present disclosure will be described below with reference to Figs. 3 and 4.

As shown in Fig. 3, the holding device 3 may include a holding mechanism motor 30 and a holding mechanism 32. As described in detail below, the holding mechanism motor 30 can exert a holding action on the driving chain for the driving motor 20 via
25 the holding mechanism 32, to prevent the actuating member 4 from acting, thereby holding the positions of the actuating member 4 and the components connected thereto (not shown).

The holding mechanism motor 30 may be arranged such that the central axes of the output shaft of the holding mechanism motor 30 and the output shaft of the driving
30 motor 20 are perpendicular to each other, and the holding mechanism motor 30 and the driving motor 20 are arranged on the side of the guide member 5 opposite to the actuating member 4. For example, in Fig. 2, the actuating member 4 is located at the lower side of the guide member 5, while both the holding mechanism motor 30 and the driving motor 20 are located above the guide member 5, thus making the driving device

2 and the holding device 3 arranged substantially side by side. In this way, the spatial layout inside the driver 100 is optimized, and a compact structure is ensured even if a holding device 3 is added.

As better shown in Fig. 4, the holding mechanism 32 may include a brake wheel 34, a cam member 36, a brake member 38 and a spring 40.

The brake wheel 34 can be connected to the output shaft of the driving motor 20.

The cam member 36 may include a gear part 360 and a cam part 362 arranged coaxially. The gear part 360 can cooperate with a holding mechanism worm 302 provided at an end of the output shaft of the holding mechanism motor 30, so that the holding mechanism motor 30 can drive the cam member 36 to rotate via the holding mechanism worm 302.

Due to the control by the cam part 362 of the cam member 36, the brake member 38 can move between a first position (see Figs. 3 and 4) in which the brake member 38 is engaged with the brake wheel 34 to exert a holding effect on the brake wheel 34, and a second position (not shown) in which the brake member 38 is disengaged from the brake wheel 34 to release the brake wheel.

The spring 40 may be used to apply a biasing force to the brake member 38 to bias the brake member 38 towards the cam member 36 and the brake wheel 34.

In the embodiment shown in Figs. 3 and 4, the brake member 38 may include a hollow cylindrical part 380 for accommodating a spring, and a first protruding part 382 and a second protruding part 384 extending outward from two radial sides of the cylindrical part, respectively. The cam part 362 of the cam member 36 may include a cam bottom 364 and a cam top 366 that is raised (in the radial direction) relative to the cam bottom 364.

The cylindrical part 380 of the brake member 38 may be arranged such that the longitudinal axis of the cylindrical part 380 is parallel to the central axis of the output shaft of the holding mechanism motor 30. The first protruding part 382 may be configured to be adjacent to or close to the cam bottom 364 of the cam part 362 in a first position, and abut against the cam top 366 of the cam part 362 in a second position.

Starting from the second position, with the rotation of the cam member 36 (it is conceivable to rotate clockwise in Fig. 4), the first protruding part 382 originally abutting on the cam top 366 gradually loses contact with the cam part 362, and the brake member 38 moves to the first position due to the bias of the spring 40. In the first position, the first protruding part 382 can be adjacent to the cam bottom 364 of the cam

part 362, making the second protruding part 384 engaged with the brake wheel 34, thereby exerting pressure on the brake wheel to restrain the rotation of the brake wheel, and preventing the actuating member 4 from acting. In this way, the vehicle door can be kept at any opening angle. To this end, the brake member 38 and the cam member
5 36 may be configured in such a way that a small gap (for example, 0.5 mm) is provided between the first protruding part 382 and the cam bottom 364 in the first position to ensure that the spring force of the spring 40 is fully applied to the brake wheel 34.

Starting from the first position, with the reverse rotation of the cam member 36 (counterclockwise rotation in Fig. 4), the first protruding part 382, which was originally
10 adjacent to the cam bottom 364, gradually contacts the cam part 362, and the brake member 38 can move to the second position against the biasing force of the spring 40. In the second position, the first protruding part 382 can abut against the cam top 366 of the cam part 362, making the second protruding part 384 disengaged from the brake wheel 34, thereby releasing the brake wheel and allowing it to rotate, then allowing the
15 actuating member 4 to act.

With reference to Fig. 4, the surface of the second protruding part 384 facing the brake wheel 34 may be provided with a friction braking part 386 made of a friction material for holding the brake wheel 34 and preventing it from rotating. The friction material can be synthetic rubber or other friction materials.

The application of the driver to a vehicle side door is exemplarily described herein,
20 but its application is not limited thereto. The driver for a vehicle side door can also serve for other functions of a vehicle, such as electrically closing a front cover, rear cover or sliding door. However, these are also just examples, which shall not limit the application field of the driver.

It will be appreciated that the embodiments described above are exemplary, and
25 can be improved by a person skilled in the art, and the structures described in the embodiments can be combined freely if without conflicts in structure or principle.

The preferred embodiments of the present disclosure are described above in detail, and it is apparent to a person skilled in the art that various changes can be made without
30 departing from the scope and spirit of the appended claims, and the present disclosure is not limited to the exemplary embodiments illustrated in the Specification.

List of reference numerals:

100	Driver	302	Holding mechanism worm
1	Housing	32	Holding mechanism
2	Driving device	34	Brake wheel
20	Driving motor	36	Cam member
22	Transmission system	362	Cam part
24	Lead screw assembly	364	Cam bottom
240	Lead screw	366	Cam top
242	Slider	38	Brake member
26	First helical gear	380	Cylindrical part
28	Intermediate helical gear	382	First protruding part
28a	Intermediate helical gear first part	384	Second protruding part
28b	Intermediate helical gear second part	386	Friction braking part
28'	Third helical gear	40	Spring
3	Holding device	4	Actuating member
30	Holding mechanism motor	5	Guide member

Claims

1. A driver for a vehicle side door, characterized in that the driver (100) comprises:
a housing (1) in which an accommodating cavity is formed,
5 a driving device (2) and a holding device (3) provided in the accommodating cavity,
an actuating member (4) which can be driven by the driving device (2), wherein
one end of the actuating member is arranged in the accommodating cavity and the other
end extends out of the housing (1), and
a guide member (5),
10 wherein the driving device (2) is configured to apply a driving action to the
actuating member (4) to make the actuating member (4) move linearly; and wherein the
holding device (3) is configured to apply a holding action to the driving device (2) to
prevent the actuating member (4) from acting, and
wherein the driving device (2) comprises a driving motor (20) with an output shaft,
15 and a transmission system (22), and the driving motor (20) applies the driving action to
the actuating member (4) via the output shaft and the transmission system (22), and the
transmission system (22) comprises:
a lead screw assembly (24) comprising a lead screw (240) and a slider (242) in
threaded connection with the lead screw, wherein the slider (242) is connected to the
20 actuating member (4);
a first helical gear (26) provided at the end of the output shaft of the driving motor
(20);
an intermediate helical gear (28) comprising a first part (28a) and a second part
(28b) which are configured to be coaxially and adjacently provided on a separate
25 rotating shaft near one end of the guide member (5), wherein the first part (28a) of the
intermediate helical gear meshes with the first helical gear (26); and
a third helical gear (28') provided at one end of the lead screw (240) and meshed
with the second part (28b) of the intermediate helical gear,
wherein the output shaft of the driving motor (20) and the lead screw (240) are
30 arranged so that their central axes are parallel to each other.
2. The driver according to claim 1, characterized in that the actuating member (4),
the guide member (5) and the lead screw (240) are connected by a slider (242) and are
arranged so that the actuating member (4) is positioned between the guide member (5)

and the lead screw (240) in the direction perpendicular to the central axis of the output shaft of the driving motor (20).

3. The driver according to claim 2, characterized in that the central axes of the
5 guide member (5) and the lead screw (240) are parallel to each other.

4. The driver according to claim 3, wherein the slider (242) is configured so that,
one end of the slider (242) is threadedly connected to the lead screw, so that the
slider can be rotationally driven by the lead screw;

10 the other end of the slider (242) is sleeved on the guide member (5) so that the
slider can slide relative to the guide member (5) with the rotational driving of the lead
screw (240); and

the slider (242) is connected at the middle part thereof to one end of the actuating
member (4) to drive the actuating member (4) to move linearly.

15

5. The driver according to any one of claims 1 to 4, characterized in that the lead
screw (240), the slider (242) and the actuating member (4) are arranged to urge the
actuating member (4) out of the housing (1) further when the slider (242) moves in a
direction away from the intermediate helical gear (28) and the third helical gear (28'),
20 and cause the actuating member (4) to retract into the accommodating cavity inside the
housing (1) when the slider (242) moves towards the intermediate helical gear (28) and
the third helical gear (28').

6. The driver according to any one of claims 1 to 4, characterized in that the
25 holding device (3) comprises a holding mechanism motor (30) and a holding
mechanism (32), and the holding mechanism motor (30) can act on the driving chain
for the driving motor (20) via the holding mechanism (32) to prevent the actuating
member (4) from acting.

30 7. The driver according to claim 6, characterized in that the holding mechanism
motor (30) is arranged such that the central axes of the output shaft of the holding
mechanism motor (30) and the output shaft of the driving motor (20) are perpendicular
to each other, and the holding mechanism motor (30) and the driving motor (20) are
arranged on a side of the guide member (5) opposite to the actuating member (4).

8. The driver according to claim 7, wherein the holding mechanism (32) comprises:

a brake wheel (34) connected to the output shaft of the driving motor (20);

5 a cam member (36) comprising a gear part (360) and a cam part (362) which are coaxially arranged, wherein the gear part (360) is matched with a holding mechanism worm (302) provided at the end of the output shaft of the holding mechanism motor (30), so that the holding mechanism motor can drive, through the holding mechanism worm, the cam member (36) to rotate;

10 a brake member (38) controlled by the cam part (362) of the cam member (36) to move between a first position and a second position, wherein the brake member (38) engages with the brake wheel (34) to exert a holding action on it at the first position, and disengages from the brake wheel (34) to release it at the second position; and

a spring (40) for applying a biasing force to the brake member (38) to bias the
15 brake member towards the cam member (36) and the brake wheel (34).

9. The driver according to claim 8, wherein,

the brake member (38) comprises a hollow cylindrical part (380) for accommodating the spring, and a first protruding part (382) and a second protruding
20 part (384) respectively extending outward from two radial sides of the cylindrical part;

the cam part (362) of the cam member (36) includes a bottom (364) and a top (366) that rises relative to the bottom; and

the cylindrical part (380) of the brake member (38) is arranged so that the longitudinal axis of the cylindrical part (380) is parallel to the central axis of the output
25 shaft of the holding mechanism motor (30), the first protruding part (382) is configured to be close to the bottom (364) of the cam part (362) in the first position and abut against the top (366) of the cam part (362) in the second position, and the second protruding part (384) is configured to engage with the brake wheel (34) at the first position, so as to apply pressure to the brake wheel to prevent it from rotating and then prevent the
30 actuating member (4) from acting, and to disengage from the brake wheel (34) at the second position, thereby releasing the brake wheel to allow it to rotate and then allow the actuating member (4) to act.

10. The driver according to claim 9, characterized in that a friction braking part

(386) made of friction material is provided on the surface of the second protruding part (384) facing the brake wheel (34), for holding the brake wheel (34) so as to prevent it from rotating.

- 5 11. A vehicle comprising a driver for a vehicle side door according to any one of claims 1 to 10.

Fig. 1

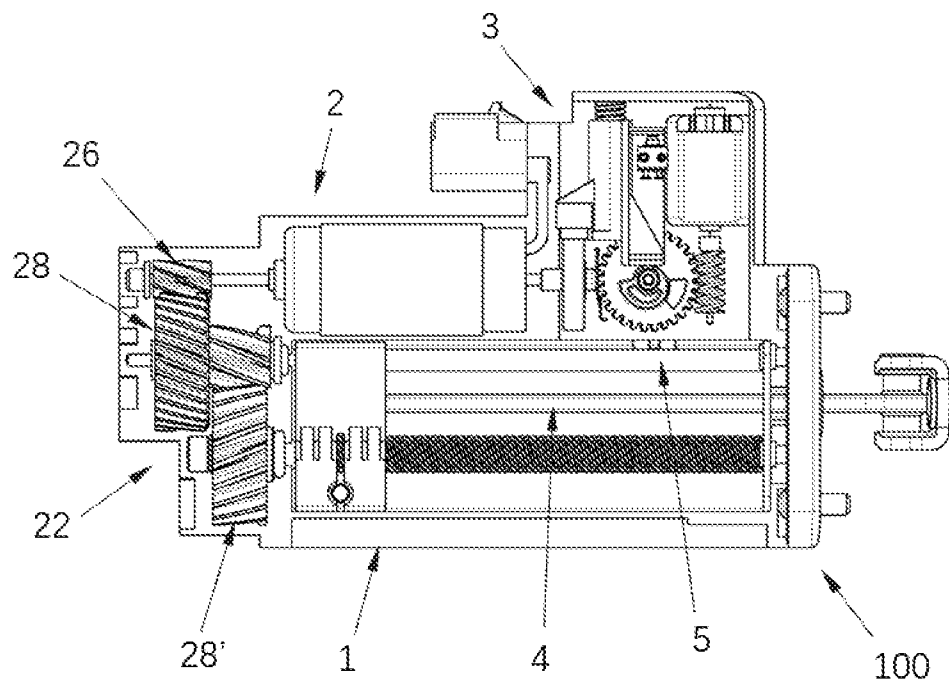


FIG. 2

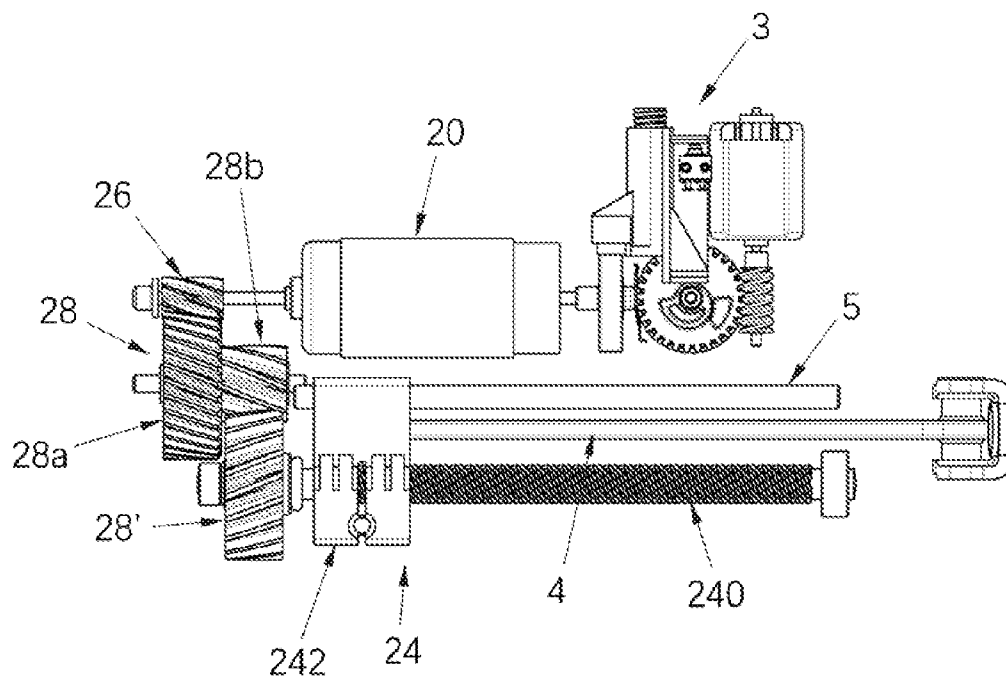


Fig. 3

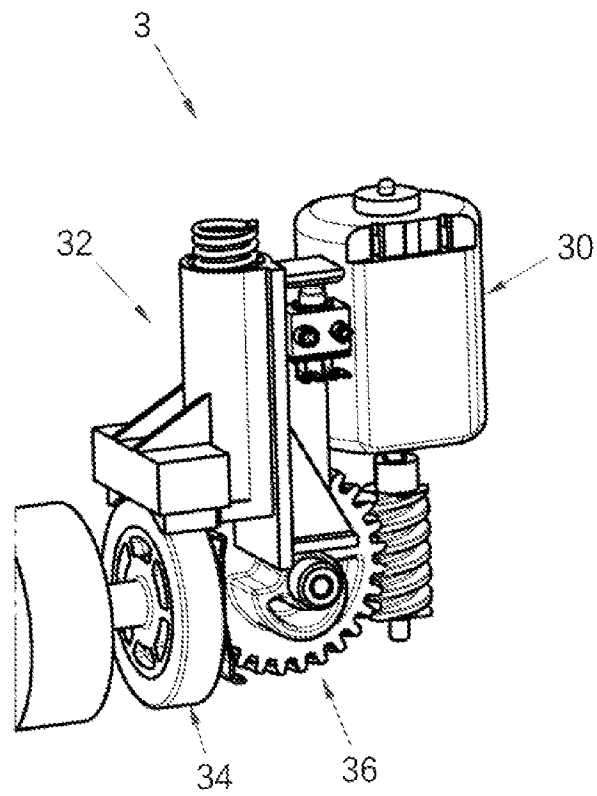
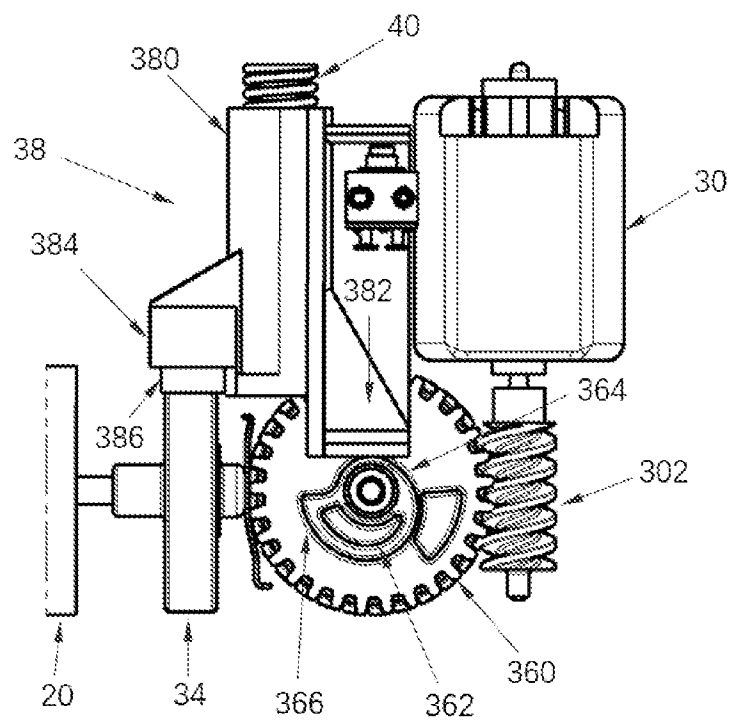


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No

PCT/CN2024/134196

A. CLASSIFICATION OF SUBJECT MATTER

INV. E05F15/616 E05F15/622

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X	CN 116 241 152 A (GUANGDONG DONGJIAN AUTOMOBILE TECH CO LTD [CN]) 9 June 2023 (2023-06-09)	1-3,5,11
Y	paragraphs [0034] - [0040]	4,6-8
A	figures abstract claim 10	9,10

Y	DE 10 2009 036870 A1 (KIEKERT AG [DE]) 13 January 2011 (2011-01-13)	6-8
A	paragraph [0028] figures	1,9-11

Y	WO 2023/088238 A1 (NINGBO SHINTAI MACHINES CO LTD [CN]) 25 May 2023 (2023-05-25)	1,5,11
A	page 3, line 29 - page 5, line 13 figures	2-4,6-10

	-/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

11 April 2025

Date of mailing of the international search report

25/04/2025

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INTERNATIONAL SEARCH REPORT

International application No

PCT/CN2024/134196

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	paragraphs [0032] - [0035] figure 3 -----	2-4, 6-10
Y	CN 114 718 410 A (NINGBO HUAKAI ELECTRONIC TECH CO LTD [CN]) 8 July 2022 (2022-07-08)	4
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International application No
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