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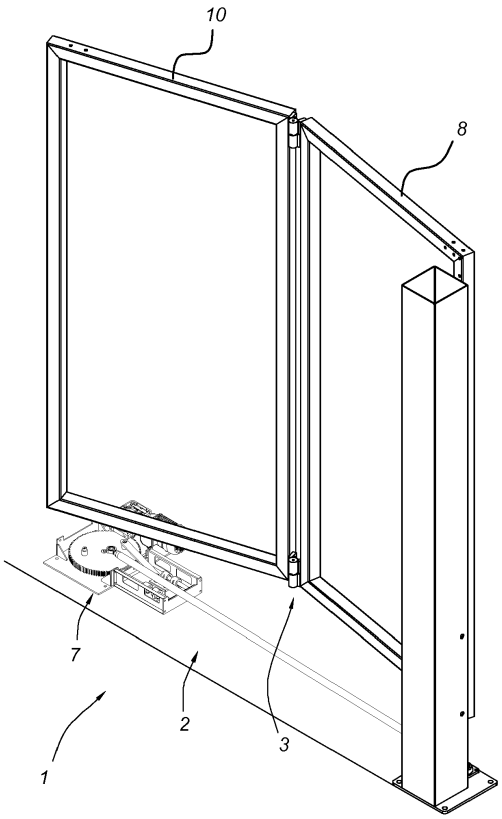
(54) **Access gate**

(57) The invention relates to an access gate (1) for the opening and closing of an access. The access gate comprises a frame (2, at least one door (3) provided with hinge pins placed in the frame, and a drive (7) for moving the door from a first position to a second position, wherein a horizontal part of the frame (2) contains the drive (7) and the drive further comprises a drive wheel (23) and a drive rod (12), which drive wheel is respectively coupled to the doors via the drive rod, wherein the articulated rod comprises a first part-rod and a second part-rod, which are rotatably coupled to each other via a coupling, wherein the coupling comprises a slide (32) and a guide device (33) for guiding the slide in one guide direction.

Fig 1



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Description

[0001] The invention relates to an access gate for the opening and closing of an access, and to a drive for the opening and closing of the access gate.

[0002] As an example of such an access gate, a speedgate is cited. Such a speedgate is used, inter alia, for the rapid opening and closure of access roads for vehicles and persons to buildings and sites, for example police stations, commercial buildings, prisons, car parks, harbour sites and industrial sites.

[0003] Such an access gate is known from NL2001007. The known access gate for the opening and closing of an access road comprises a frame, two symmetrically interacting doors provided with hinge pins, which are placed in the frame, and a drive for moving the symmetrically interacting doors from a first position to a second position. In the known access gate, the drive can be housed in a horizontal connecting part. The horizontal connecting part lies flush with the road surface of the access road. The drive comprises a drive wheel, which is respectively coupled to the symmetrically interacting doors via the respective drive rods, wherein a first end of the drive rod is rotatably fastened on the drive wheel and a second end of the drive rod is fastened on a pin, which at a distance from the hinge pin is fastened on an underside of the door. In the horizontal connecting part of the frame are also placed arc-shaped slots, whereby the pins can move during the opening and closing of the doors.

[0004] It is a drawback of the known access gate that dirt and water can get into the frame via the arc-shaped slots. A further drawback is that, through the use of these arc-shaped slots with the pins movable therein, extra provisions may be necessary to meet the safety requirements. A further drawback is that the reinforcing elements of the horizontal connecting part must be adapted for different widths of the access gate, whereby it is difficult to obtain a modular construction for access gates for different widths.

[0005] It is an object of the invention to provide an access gate which requires less maintenance, wherein fewer provisions are necessary to meet the safety requirements, and which offers more flexibility during the maintenance.

[0006] According to a first aspect of the invention, this object is achieved by an access gate as defined in Claim 1. By means of the articulated rod and the lever which is fitted to the hinge pin of the door, it is possible to make a compact drive which converts the rotary motion of the drive into a translation motion of the drive rod. This drive can be accommodated wholly within the horizontal part of the frame. The horizontal part of the frame is only provided with a relatively small opening, through which the hinge pin juts. The penetration of water and/or dirt into the horizontal part of the frame and the drive is hereby prevented. A further drawback is that no supplementary safety provisions are necessary, because the horizontal part of the frame is closed off, except for this opening for the hinge pin.

[0007] The drive can be easily accommodated in a module, so that during the maintenance the modules can, where necessary, be replaced, whereby the maintenance can be carried out more quickly and more flexibly.

[0008] The access gate further comprises the articulated drive rod, the first part-rod and the second part-rod, which are rotatably connected to each other via a coupling. By means of this rotatable coupling, an included angle between the first part-rod and the second part-rod can vary during the movement of the access gates. A further advantage of the coupling is that the access gate can be modularly constructed to include a drive part, a connecting part and a hinged part. The drive part here comprises the drive wheel and the first part-rod and the coupling, the connecting part comprises the second drive rod, and the hinged part comprises the lever.

[0009] The coupling comprises the slide and the guide device for guiding the slide in one guide direction. As a result of the guide device, the slide is forced to move in a single direction during the opening and closing of the doors.

[0010] In a further embodiment of the access gate, the guide device comprises two parallel guides. By means of two parallel guides, the slide can be slidably fastened on the guides via, for example, four corner points, so that a torsion of the slide in the plane of the guides is prevented.

[0011] In a further embodiment of the access gate, the slide is coupled via plain bearings to the respective guides. Linear ball bearings are known plain bearings which prevent torsion about an axis perpendicular to the plane of the guides.

[0012] In a further embodiment of the access gate, a first end of the first part-rod is rotatably connected to the drive wheel and a second end of the first part-rod is rotatably connected to the slide, and a first end of the second part-rod is rotatably connected to the slide and a second end of the second part-rod is rotatably connected to the lever.

[0013] In a further embodiment of the access gate, the drive comprises an over-centre lock mechanism comprising the first part-rod and the drive wheel. Through the use of such a mechanism, an extra resistance is introduced when the doors of the access gate are in the open or closed position. Accidental opening or closing of the doors, other than by the drive, are hereby prevented.

[0014] This is advantageous because, during a power failure, for example, the access gate can remain in a desired position and cannot accidentally be opened or closed. In another embodiment of the access gate, the drive further comprises a motor and a reduction device for reducing a rev speed of the motor and increasing the torque, which reduction device is coupled between the motor and the drive wheel.

[0015] In another embodiment of the access gate, the drive is further provided with a braking device for locking

the doors in a braking state. Such a braking device can be combined with a motor. The braking device can be designed such that, in the braking state, it is dependent on the presence of a voltage for the motor.

[0016] In another embodiment of the access gate, the drive further comprises an angle transmission coupled between the motor and the drive wheel.

[0017] In a further embodiment of the access gate, the drive wheel is incorporated in the angle transmission. An angle transmission makes a compact construction of the drive possible.

[0018] In a further embodiment of the access gate, the drive wheel comprises a first bevel gear and the angle transmission further comprises a second bevel gear which engages the first bevel gear.

[0019] In another embodiment of the access gate, the drive wheel comprises a gearwheel and the angle transmission further comprises a worm gear which engages the gearwheel. In combination with a suitably chosen transmission ratio of the reduction device, a drive device is hereupon formed, whereby it is very difficult, in the event of a power failure, to accidentally open or close the doors by applying a force thereto.

[0020] In a further embodiment, the access gate is provided with a second door, which is provided with a further hinge pin placed rotatably in the frame, wherein the drive is further designed to move the first and the second door to respectively the first and the second position, wherein the drive comprises a further drive rod and a further lever, which further drive rod comprises a further articulated rod and the further lever is rotatably coupled to the articulated rods and is fixedly fastened to the further hinge pin of the door.

[0021] In another embodiment of the access gate, the access gate is further provided with a device for determining a reference position of the drive wheel. For the determination of the angle of rotation of the drive wheel, it is necessary to know at least one reference position of the drive wheel, in which case the angle of rotation can be determined by means of, for example, a pulse transmitter on the motor.

[0022] Although the invention will be described with reference to a number of preferred embodiments, the invention is not limited thereto.

[0023] The embodiments to be discussed are only examples of possible interpretations of the invention and it will be clear to the person skilled in the art that the advantages of the invention can also be achieved differently.

[0024] The invention will be further described with reference to the illustrative embodiments represented in the drawings.

Fig. 1 shows a diagrammatic side view of an access gate having a single door;
Fig. 2 shows a diagrammatic side view of an access gate having a double door;
Fig. 3 shows a diagrammatic top view of the frame and drive of the access gate;
Fig. 4 shows the coupling and the part-rods;
Fig. 5 shows in diagrammatic representation a drive provided with an over-centre lock mechanism;
Fig. 6 shows in diagrammatic representation an angle transmission comprising two bevel gearwheels;
Fig. 7 shows in diagrammatic representation an angle transmission comprising a worm gear and a gearwheel; and
Fig. 8 shows in diagrammatic representation a part of the drive comprising a sensor.

[0025] In the figures, same components are denoted by identical reference numerals.

[0026] Fig.1 shows in diagrammatic representation a side view of a first embodiment of an access gate 1. The access gate 1 or speedgate comprises a frame 2, a door 3, which is placed with a hinge pin in the frame 2, and a drive 7 for moving the door 3 from a first, closed position to a second, open position.

[0027] In one embodiment, the door can be provided with an extra hinge pin provided on the frame 2. The door 3 can comprise a first panel 8 and a second panel 10, which are placed movably in the frame 2, wherein the first panel 8 and the second panel 10 mutually interact in a concertina-like manner during the opening and closing of the access gate. In a horizontal part of the frame 2, which can be located in the road surface of an access road, the drive 7 can be housed. In one embodiment of the access gate, the horizontal part of the frame 2 can also be found above the door 3. In one embodiment, the access gate 1 or speedgate can comprise two symmetrically interacting doors 3, 4, which are placed rotatably in the frame 2. In one embodiment, the doors 3, 4 can be provided with extra hinges, which are fastened to the frame 2.

[0028] Fig. 2 shows a second embodiment of an access gate 100, which comprises two interacting doors 3, 4 comprises and comprises a drive 7 for moving the symmetrically interacting doors 3, 4 from a first, closed position to a second, open position. The doors 3, 4 respectively contain a first panel 8, 10 and a second panel 9, 11, which are placed movably and rotatably via hinge pins 5, 6 in the frame 2, wherein the first and second panels 8, 9, 10, 11 mutually interact in a concertina-like manner during the opening and closing of the access gate 1. In a horizontal part of the frame 2, which can be located in the road surface of an access road, the drive 7 can be housed.

[0029] In one embodiment of the access gate, the horizontal part of the frame 2 can also be found above the doors 3, 4.

[0030] Fig. 3 shows in diagrammatic representation a top view of the access gate 100 comprising the two doors 3, 4. In this embodiment, the drive 7 comprises two articulated drive rods 12, 13 and a drive wheel 23, which are fitted in the frame 2, wherein the respectively articulated drive rods 12, 13 are rotatably coupled to the drive

wheel 23 in mirror symmetry with respect to a centre point and along the diameter of the drive wheel 23. The articulated drive rods 12, 13 are connected to the hinge pins 5, 6 of the doors 3, 4 by means of levers 30, 31. In the embodiment in which only one door 3 is used, the drive 7 can contain a single articulated drive rod 12 for the movement of the door 3.

[0031] Fig. 4 shows in diagrammatic representation a detail of the drive 7 for an embodiment of an access gate provided with two doors 3, 4. The drive 7 comprises an electric motor 20, a reduction device 21, an angle transmission 22 and the drive wheel 23. The electric motor 20 has a power of, for example, 0.7 kW and is coupled to the drive wheel 23 via the reduction device 21 and the angle transmission 22. The reduction device has a reduction between an input shaft and an output shaft of, for example, 7.5:1.

[0032] Fig. 4 further shows the articulated drive rods 12, 13. The articulated drive rod 12 has an identical construction to the articulated drive rod 13. For the sake of simplicity, only the construction and working of the articulated drive rod 13 is described.

[0033] The articulated drive rod 13 comprises a first part-rod 25 and a second part-rod 27, which are rotatably connected to each other via a coupling.

[0034] The coupling comprises a slide 32 and a guide device 33 for guiding the slide 32 in one guide direction. The guide direction is parallel with and coincides with the direction of a centre axis 34 between the hinge pins 5, 6 of the interacting doors 3, 4 in the frame 2. The guide device can comprise two parallel guide shafts 35, 36. The slide 32 can be coupled to the guide shafts 35, 36 via plain bearings, for example four linear ball bearings 37, 38, 39, 40, which are respectively fastened on the corner points of the slide 32.

[0035] In addition, a first end of the first part-rod 25 is rotatably connected to the drive wheel 23. A second end of the first part-rod 25 is rotatably connected to a first end of the slide 32. A first end of the second part-rod 27 is rotatably connected to a second end of the slide 32, and a second end of the second part-rod 27 is rotatably coupled to the hinge pin 6 of the door 4 via the lever 31.

[0036] In one embodiment, the drive can further comprise a braking device 41. The braking device 41 can be integrated with the electric motor 20. The braking device can be of the normally-on type. The braking state of the braking device 40, wherein the electric motor 20, and hence the doors 3, 4, are locked, is here dependent on the presence of a voltage for driving of the electric motor 20. In the normally-on type, the braking state is released if this voltage is present.

[0037] Fig. 5 shows a view of a drive comprising an over-centre lock mechanism known to a person skilled in the art.

[0038] The coupling to the slide 32 and the guide device 33 is of the very same type as that of the drive described in relation to Fig. 3. The over-centre lock mechanism comprises the drive wheel 23 and the bent first part-rods 42, 43, which are bent in a plane parallel to the plane of rotation of the drive wheel 23. As a result, a maximum angle of displacement γ of the drive wheel 23, which is formed in the driving of the interacting doors 3, 4 from the first, open position to the second, closed position, can become greater than 180°, and the drive wheel 23 with the bent part-rods 42, 43 can enter into a position in which the connection points of the drive wheel 23 to the first part-rods 42, 43 are rotated to past a dead point on the centre axis 34. One advantage hereof is that, in this position, an extra resistance is present when the drive wheel 23 is rotated back to the position in which the angle of displacement $\gamma = 0$. This resistance must be overcome when the access gate is opened. As a result of this resistance, it becomes difficult to open the access gate without making use of the electric drive, for example by applying a force to the doors 3, 4 in the event of a power failure. This is advantageous if the access gate is used to protect entrances and exits of buildings in which the access must not be closed or opened accidentally.

[0039] Fig. 6 shows a first embodiment 50 of the angle transmission 22. The first embodiment 50 comprises a first bevel gear 51 and a second bevel gear 52, wherein the diameter of the first bevel gear 51 is smaller than the diameter of the second bevel gear 52 and the first bevel gear 51 engages the second bevel gear 52. The centre axis of the first bevel gear 51 is perpendicular to the centre axis of the second bevel gear 52. The second bevel gear 52 can be integrated with the drive wheel 23.

[0040] Fig. 7 shows a second embodiment 60 of the angle transmission 22. The second embodiment of this angle transmission comprises a first worm gear 61 and a gearwheel 62, wherein the first worm gear 61 engages the gearwheel 62. The gearwheel 62 can be integrated with the drive wheel 23 for the driving of the part-rods. An access gate provided with a drive comprising a combination of this second embodiment and the drive having the over-centre lock mechanism is advantageous, because a yet greater force is necessary on the access gate in order to open this in the event of a power failure.

[0041] Fig. 8 shows a part 70 of the drive that comprises the electric motor 20, the reduction device 21 and angle transmission 22, the drive wheel 23, a control unit 72 and a sensor 71. The sensor 71 can comprise an induction sensor, which is mounted close to the drive wheel 23, and a ferromagnetic element 73, which is mounted on the drive wheel 23. The sensor 71 is connected to the control unit 72. The control unit 72 is designed to control the electric motor 20 and to determine the reference position of the drive wheel 23 by means of a signal from the sensor 71. The control unit 72 is further designed to determine the angular displacement of the drive wheel 23 from the detected position of the ferromagnetic element 73 and the control signals to the electric motor 20.

[0042] It should be clear to the person skilled in the art that the invention is not limited to that which is described here, and that several equivalent embodiments of the

invention are possible.

Claims

1. Access gate for the opening and closing of an access, comprising a frame, at least a first door provided with a hinge pin placed rotatably in the frame, and a drive for moving the door from a first position to a second position, wherein a horizontal part of the frame comprises the drive, wherein the drive further comprises a drive wheel and a drive rod, which drive wheel is coupled to the door via the drive rod, in which the drive rod further comprises an articulated rod, and the drive further comprises a lever which is rotatably coupled to the articulated rod and is fixedly fastened to the hinge pin of the door,
wherein the articulated rod comprises a first part-rod and a second part-rod, which are rotatably connected to each other via a coupling, wherein the coupling comprises a slide and a guide device for guiding the slide in one guide direction.

2. Access gate according to Claim 1, wherein the guide device comprises two parallel guides.

3. Access gate according to Claim 2, wherein the slide is coupled via plain bearings to the respective guides.

4. Access gate according to one of Claims 1-3, wherein a first end of the first part-rod is rotatably connected to the drive wheel and a second end of the first part-rod is rotatably connected to the slide, and a first end of the second part-rod is rotatably connected to the slide and a second end of the second part-rod is rotatably connected to the lever.

5. Access gate according to one of Claims 1 to 4, wherein the drive is provided with an over-centre lock mechanism comprising the first part-rod and the drive wheel.

6. Access gate according to one of Claims 1 to 5, wherein the drive further comprises a motor and a reduction device coupled between the motor and the drive wheel.

7. Access gate according to one of Claims 1 to 6, wherein the drive is further provided with a braking device for locking the doors in a braking state.

8. Access gate according to one of Claims 1 to 7, wherein the drive further comprises an angle transmission coupled between the motor and the drive wheel.

9. Access gate according to Claim 8, wherein the drive wheel comprises a first bevel gear and the angle transmission further comprises a second bevel gear which engages the first bevel gear.

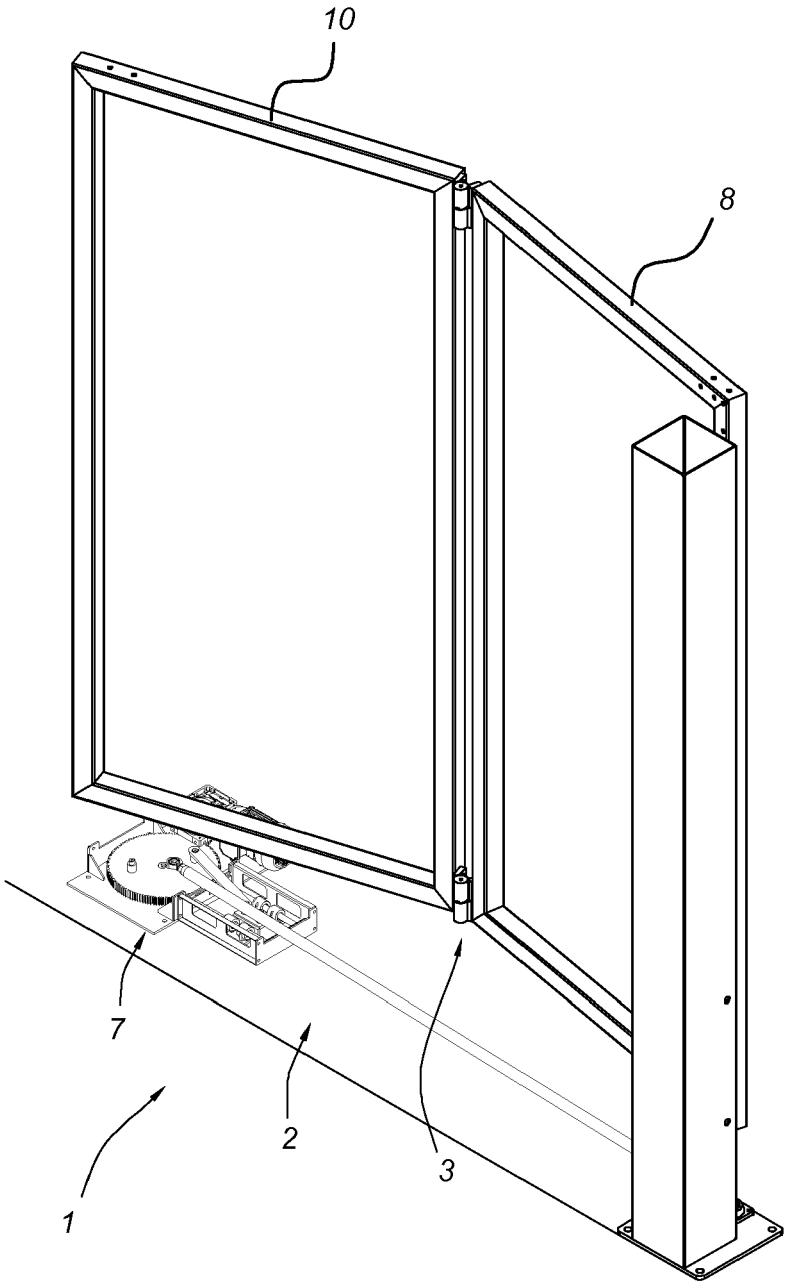
10. Access gate according to Claim 9, wherein the drive wheel comprises a gearwheel and the angle transmission further comprises a worm gear which engages the gearwheel.

11. Access gate according to Claim 1, wherein the access gate is provided with a second door, which is provided with a further hinge pin placed rotatably in the frame, wherein the drive is further designed to move the first and the second door to respectively the first and the second position, wherein the drive comprises a further drive rod and a further lever, which further drive rod comprises a further articulated rod and the further lever is rotatably coupled to the further articulated rods and is fixedly fastened to the further hinge pin of the door.

12. Access gate according to Claim 11, wherein the articulated drive rod and the further articulated rod are rotatably coupled to the drive wheel symmetrically with respect to a centre point of the drive wheel.

13. Access gate according to one of the preceding claims, wherein the access gate is further provided with a sensor for determining a reference position of the drive wheel.

Fig 1



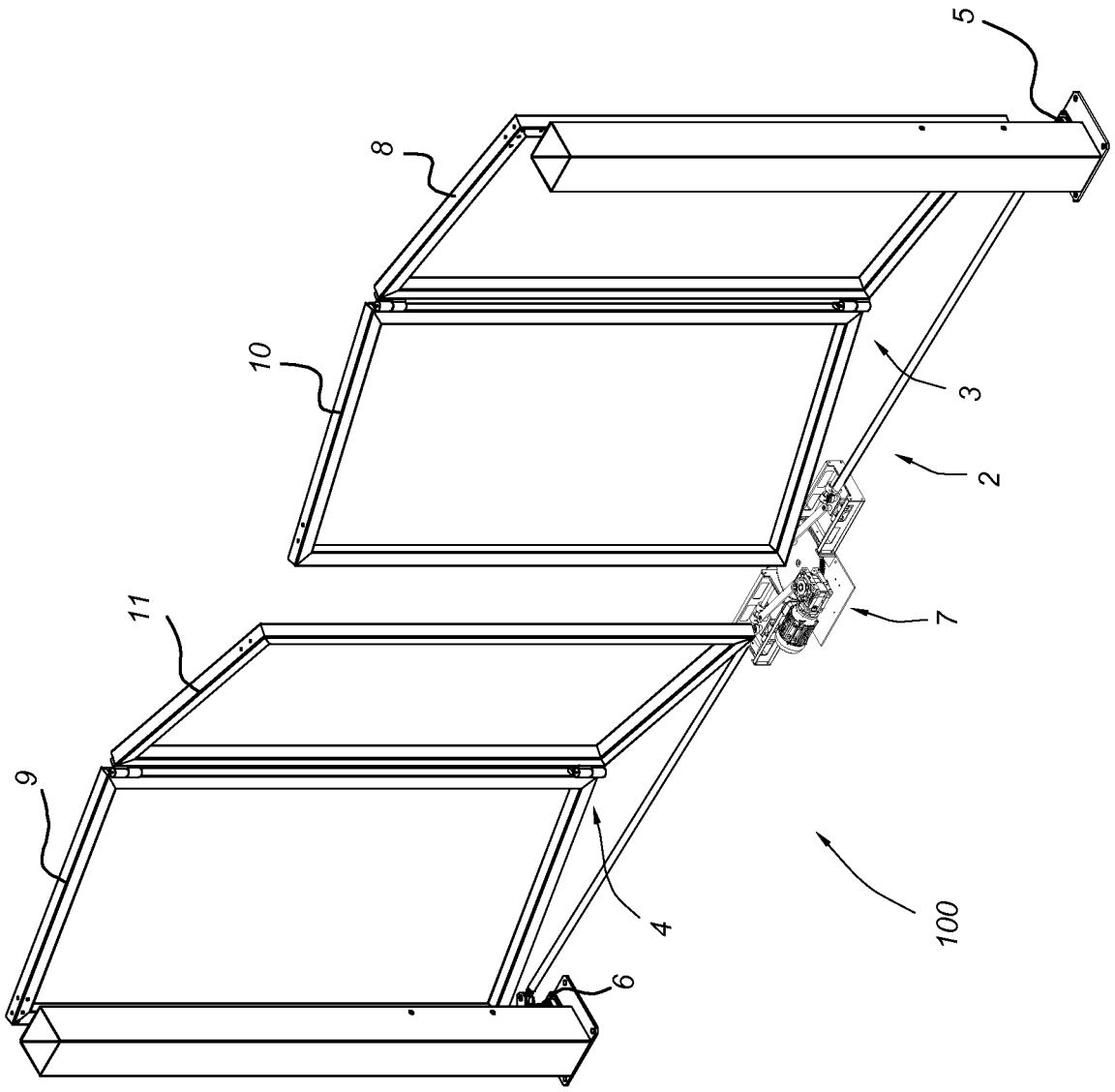


Fig 2

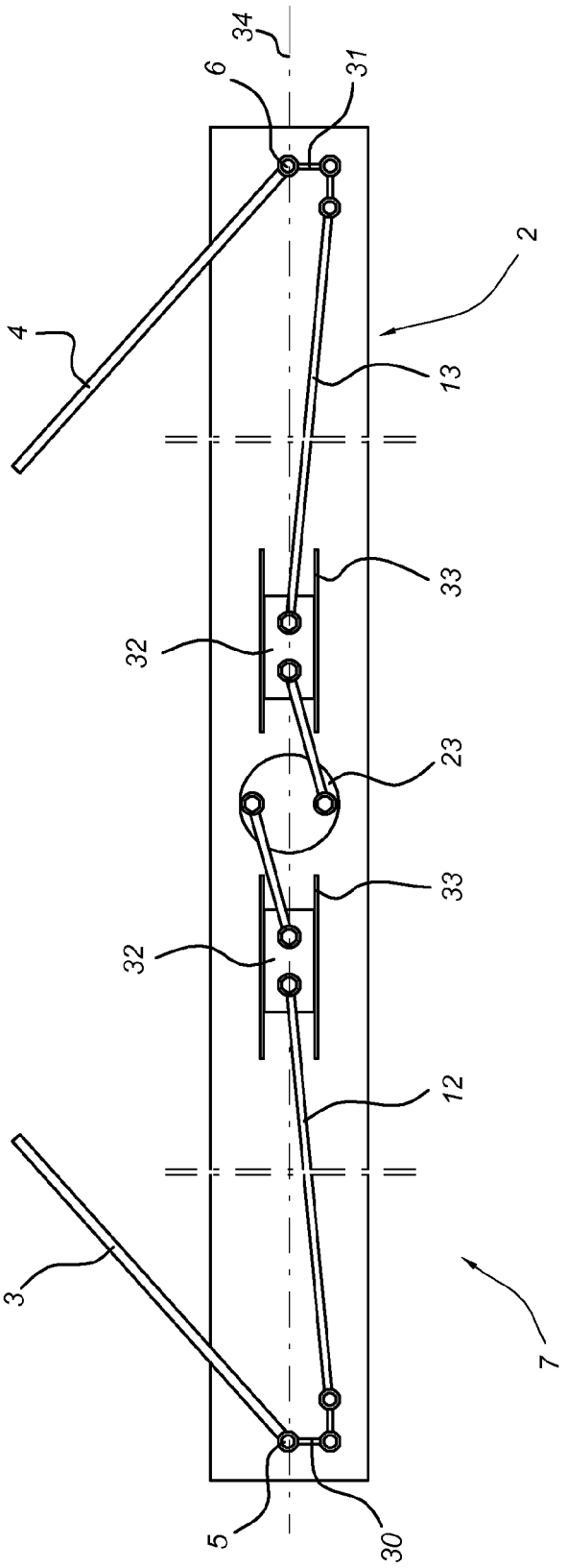


Fig 3

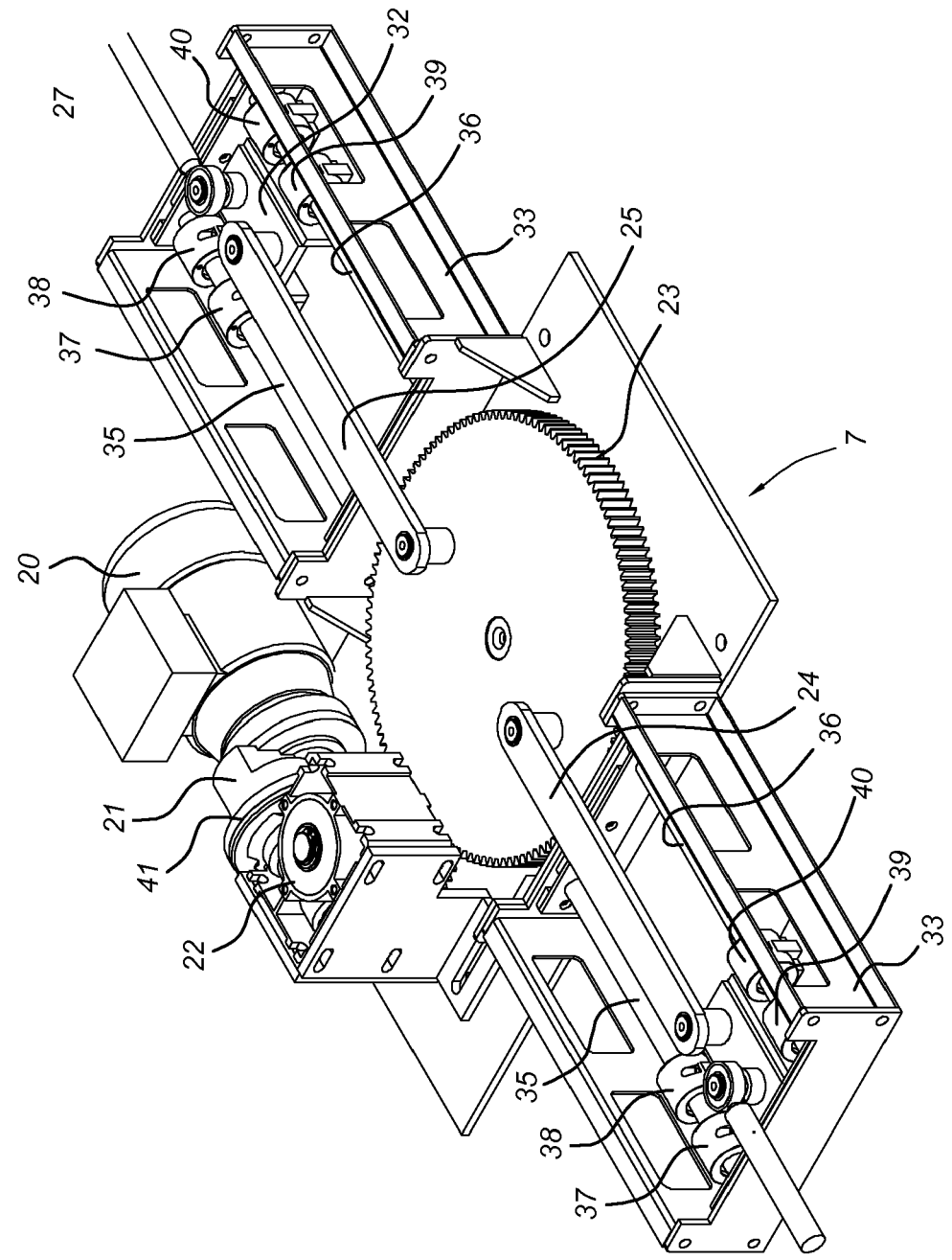


Fig 4

Fig 5

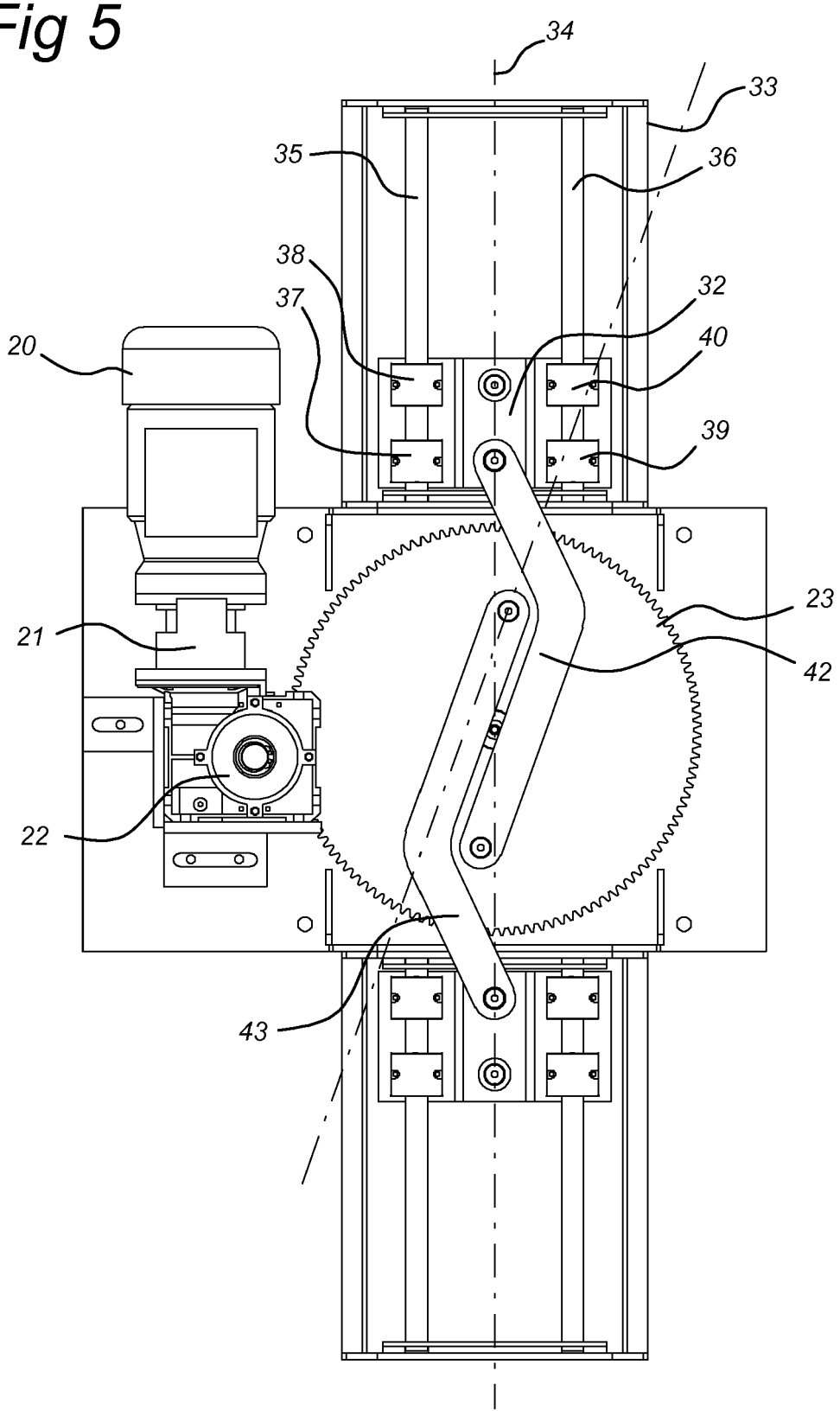


Fig 6

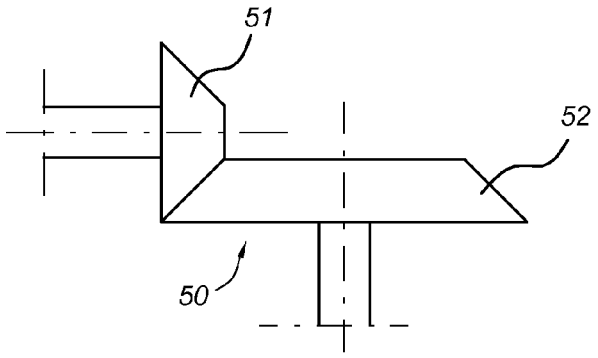


Fig 7

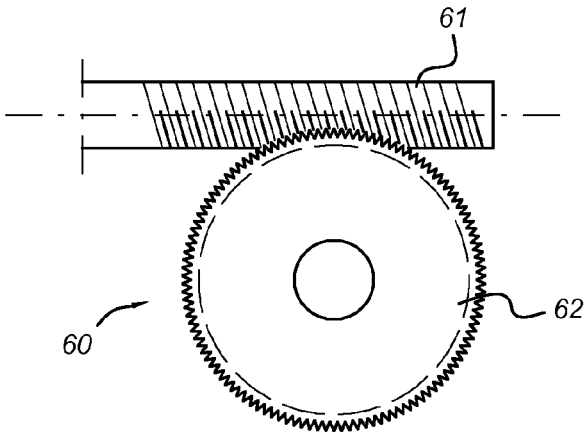
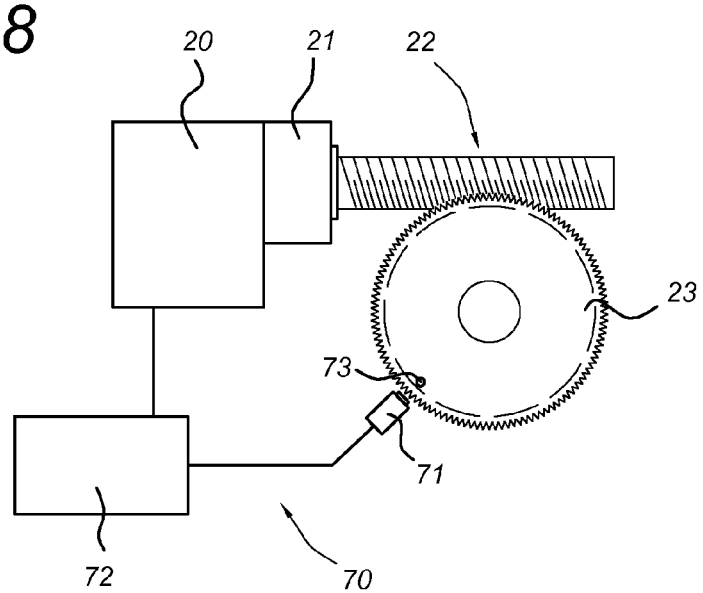


Fig 8



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EUROPEAN SEARCH REPORT

Application Number
EP 12 18 9962

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 1 760 062 A (HYNES LEE P) 27 May 1930 (1930-05-27) * page 2, line 70 - line 84 * * figure 5 * -----	1-13	INV. E05F15/10 E05F15/12
A,D	NL 2 001 007 C2 (BAVAK BEVEILIGINGSGROEP BV [NL]) 15 May 2009 (2009-05-15) * figures 2,3 * -----	1,6,8,11	

TECHNICAL FIELDS SEARCHED (IPC)

E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 January 2013	Van Kessel, Jeroen

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NL 2001007 C2	15-05-2009	NONE	

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Patent documents cited in the description

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