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(54) Door for access to a compartment, for vending machines and the like

(57) A door for access to a compartment, for vending machines and the like, including a movable panel that is supported slidingly in a frame so as to define at least two positions: a closed position, in which the panel obstructs an opening, and an open position, in which the panel clears the opening; the door includes a motor-driven actuation means provided with a magnetic clutch adapted to prevent injury to the users, during the motion of the closure panel, and a means for the safety locking of the panel in the closed position.

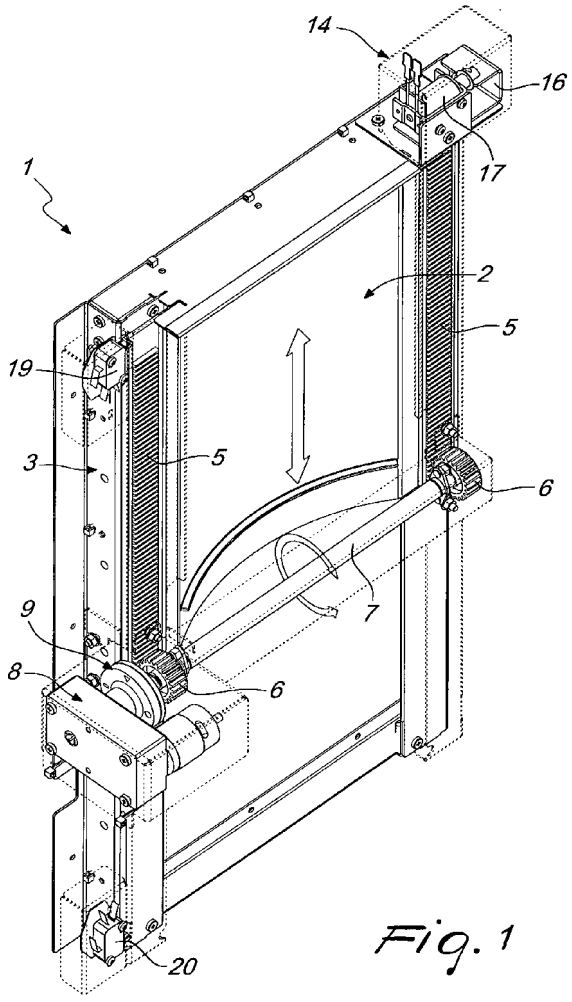

Fig. 1

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Description

[0001] The present invention relates to a door for access to a compartment, for vending machines and the like.

[0002] As is known, vending machines are generally provided with a compartment from which the user picks up the dispensed product.

[0003] The compartment is generally protected by a movable door, which can be opened manually or automatically in order to pick up the product.

[0004] In some cases the door must be locked in order to prevent access when no product is dispensed.

[0005] Various systems for moving and locking the door, which can be pivoted or movable in a shutter-like manner, are known.

[0006] JP-2002245539 discloses a sliding door for accessing a goods delivery compartment in a vending machine. The door is actuated by a gear motor, through a rack and pinion mechanism, and is provided with a lock mechanism.

[0007] The aim of the present invention is to provide a door for access to a compartment, particularly for vending machines and the like, that has a compact structure in order to reduce the space occupation in the apparatus to which it is applied.

[0008] Within the scope of this aim, an object of the invention is to provide an automatically-operated door capable of preventing injury to the limbs of the user during its motion.

[0009] A further object of the invention is to provide a door that ensures, in the closed position, the inaccessibility of the compartment.

[0010] A further object of the invention is to provide a door that avoids permanent damage to the gear motor, with consequent failure of the door, caused by the presence of a foreign object between the closed state and the open state.

[0011] A further object of the present invention is to provide a door which, by virtue of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

[0012] This aim and these and other objects which will become better apparent hereinafter are achieved by a door for access to a compartment, for vending machines and the like, comprising a movable panel that is slidingly supported in a frame so as to define at least two positions: a closed position, in which said panel obstructs an opening, and an open position, in which said panel clears said opening; said door further comprising locking means for locking said panel at least in said closed position; said door being **characterized in that** it comprises a motor-driven means provided with a magnetic clutch.

[0013] Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the door according to the present invention;

Figure 2 is a partially sectional plan view of the door;

Figure 3 is a view of the rear part of the door, shown in the closed position;

Figure 4 is a view, similar to the preceding one, illustrating the door in the opening step;

Figure 5 is an exploded perspective view of the motor-driven means for the actuation of the door;

Figure 6 is a sectional plan view, in enlarged scale with respect to Figure 2, which illustrates in detail the actuation means of the door;

Figure 7 is a perspective view of the closure micro-switch;

Figure 8 is a perspective view of the safety locking means.

[0014] With reference to the cited figures, the door according to the invention, generally designated by the reference numeral 1, has a movable panel 2, which is supported slidingly in a frame 3, so as to define at least two positions: a closed position, in which the panel 2 obstructs an opening 4, and an open position, in which the panel 2 clears the opening 4.

[0015] The movable panel 2 has a pair of racks 5, arranged at the sides of the panel and advantageously integrated therein, which allow the translational motion of the panel in cooperation with a pair of gears 6 which are keyed on a motor-driven shaft 7.

[0016] Instead of the movement system illustrated in the present constructive example, constituted by the pair of racks with corresponding pinions, it is possible to use other movement systems, such as for example rubber wheels which slide on a suitably rough surface, or a transmission with a toothed belt, chain, cable, etc.

[0017] The shaft 7 is actuated by a gear motor 8 by means of a magnetic clutch transmission, generally designated by the reference numeral 9.

[0018] The clutch transmission 9 includes a hub 10 which is keyed on a reduction shaft 11 and is adapted to accommodate a plurality of magnetic elements 12.

[0019] The magnetic elements 12 are preferably constituted by permanent magnets which are accommodated in axial seats provided in the hub 10, which is preferably made of plastic.

[0020] The magnetic elements 12 are in contact with a disk 13 made of ferromagnetic material, which is keyed on the shaft 7 and therefore rotates rigidly with the gears 6.

[0021] The door 1 also has a safety locking means, generally designated by the reference numeral 14, which are constituted by a tab 15 which is integral with the panel 2 and interacts with a slider 16, which is actuated by an electromagnet 17.

[0022] The slider 16 has a slot 18 which, according to the position of the slider, allows the passage of the tab 15, and therefore the translation of the panel 2, or engages the tab, locking the panel.

[0023] The door 1 comprises at least two motion control members, which are constituted by a closure switch 19 and by an opening switch 20, which are arranged at the ends of the stroke of the panel 2.

[0024] The operation of the door according to the present invention is as follows.

[0025] The panel 2 in the closed position is retained in this position by the electromechanical lock 14.

[0026] The slider 16 is in the position for the engagement of the tab 15, visible in Figure 8, by virtue of the action of the electromagnet 17, which causes its translation.

[0027] In this manner, the panel 2, despite having a clutch, cannot be opened from the outside once it has been closed.

[0028] For opening, the electromagnet 17 is energized, moves the slider 16 and frees the tab 15. Then the gear motor 8 is powered and, through the magnetic clutch, transmits the motion to the shaft 7. The gears 6 are integral with the shaft and, by rotating on the racks, lower or raise the panel 2, depending on the direction of rotation.

[0029] The rotation of the gear motor is interrupted when the state of one of the two switches 19 or 20 is switched.

[0030] If, anywhere between the closed position and the open position, the door encounters a foreign object that jams it, the magnetic clutch intervenes.

[0031] If the transmissible torque, constituted by the sliding friction generated by the magnets 12 on the disk 13, is exceeded, the door remains stationary and the gear motor can rotate idly, avoiding breakages.

[0032] When the external obstacle is removed, the door resumes its rising or descending motion until it encounters one of the two end switches 19, 20.

[0033] It is also possible to set a maximum time for the upward and downward motion of the door time, and if that time is not met, the gear motor is powered off.

[0034] The traction torque can be set according to the number of permanent magnets used and according to the diameter on which they are arranged.

[0035] Also, the clutch is capable of absorbing plays of the axial and radial type.

[0036] In practice it has been found that the invention achieves the intended aim and objects, an electric closing door with adjustable magnetic clutch and electromechanical safety lock having been provided which is capable of opening and closing electrically a compartment that can be accessed by the public, preventing injury to the limbs during movement, by virtue of the magnetic clutch and ensuring, in the closed position, the inaccessibility of the compartment by means of an effective electromechanical lock.

[0037] The device according to the present invention has a compact structure and allows to reduce the space occupation.

[0038] The magnetic clutch of the present invention is very compact and provides the required safety to the door operation, contrary to the prior art systems, namely JP-2002245539, which does not disclose a clutch means and which would require a substantial modification of its structure, and a substantial increase of size, in order to include a clutch or analogous mechanism.

Claims

1. A door for access to a compartment, for vending machines and the like, comprising a movable panel that is slidingly supported in a frame so as to define at least two positions: a closed position, in which said panel obstructs an opening, and an open position, in which said panel clears said opening; said door further comprising locking means for locking said panel at least in said closed position; said door being **characterized in that** it comprises a motor-driven means provided with a magnetic clutch.

2. The door according to claim 1, **characterized in that** said drive means comprises a pair of racks arranged at the sides of said panel, said racks allowing a translatory motion of said panel in cooperation with a pair of gears keyed on a drive shaft.

3. The door according to claim 2, **characterized in that** said drive shaft is actuated by a gear motor by means of a clutch transmission.

4. The door according to claim 2, **characterized in that** said drive shaft is driven by gear motor by means of a magnetic clutch transmission.

5. The door according to claim 4, **characterized in that** said magnetic clutch transmission comprises a hub which is keyed on a reducer shaft and accommodates a plurality of magnetic elements constituted by permanent magnets accommodated in axial seats formed in said hub; said magnetic elements being in contact with a disk which is made of ferromagnetic material, is keyed on said drive shaft and is associated, during rotation, with said gears.

6. The door according to claim 1, **characterized in that** said means for locking said panel at least in said closed position comprises a tab associated with said panel and adapted to interact with a slider controlled by an electromagnet; said slider comprises a slot which, according to the position of said slider, allows the passage of said tab and therefore the translational motion of said panel or engages said tab, locking said panel.

7. The door according to claim 1, **characterized in that** it comprises at least two motion control members constituted by a closure switch and by an opening switch, which are arranged at the ends of the stroke

of said panel.

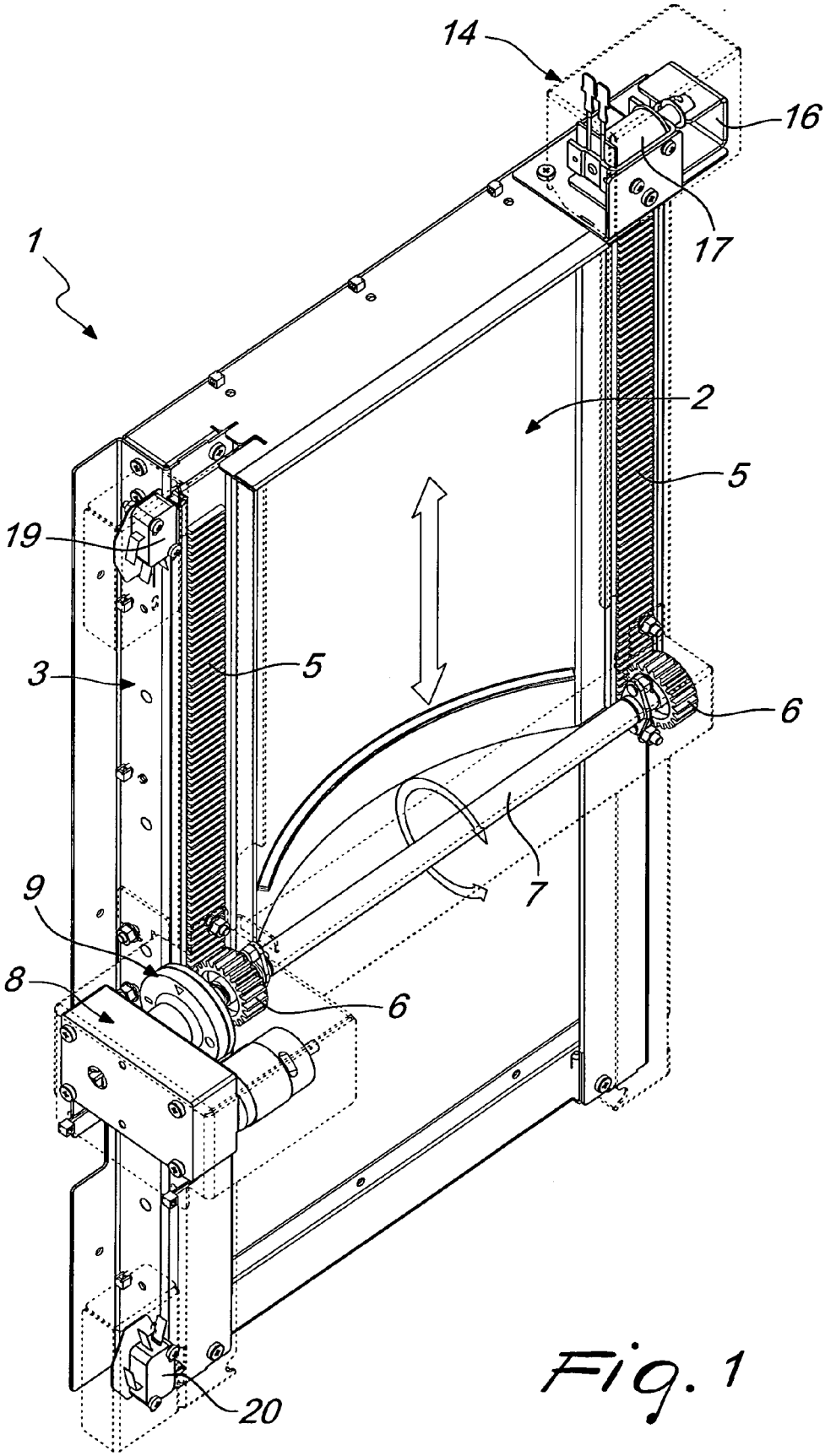

Fig. 1

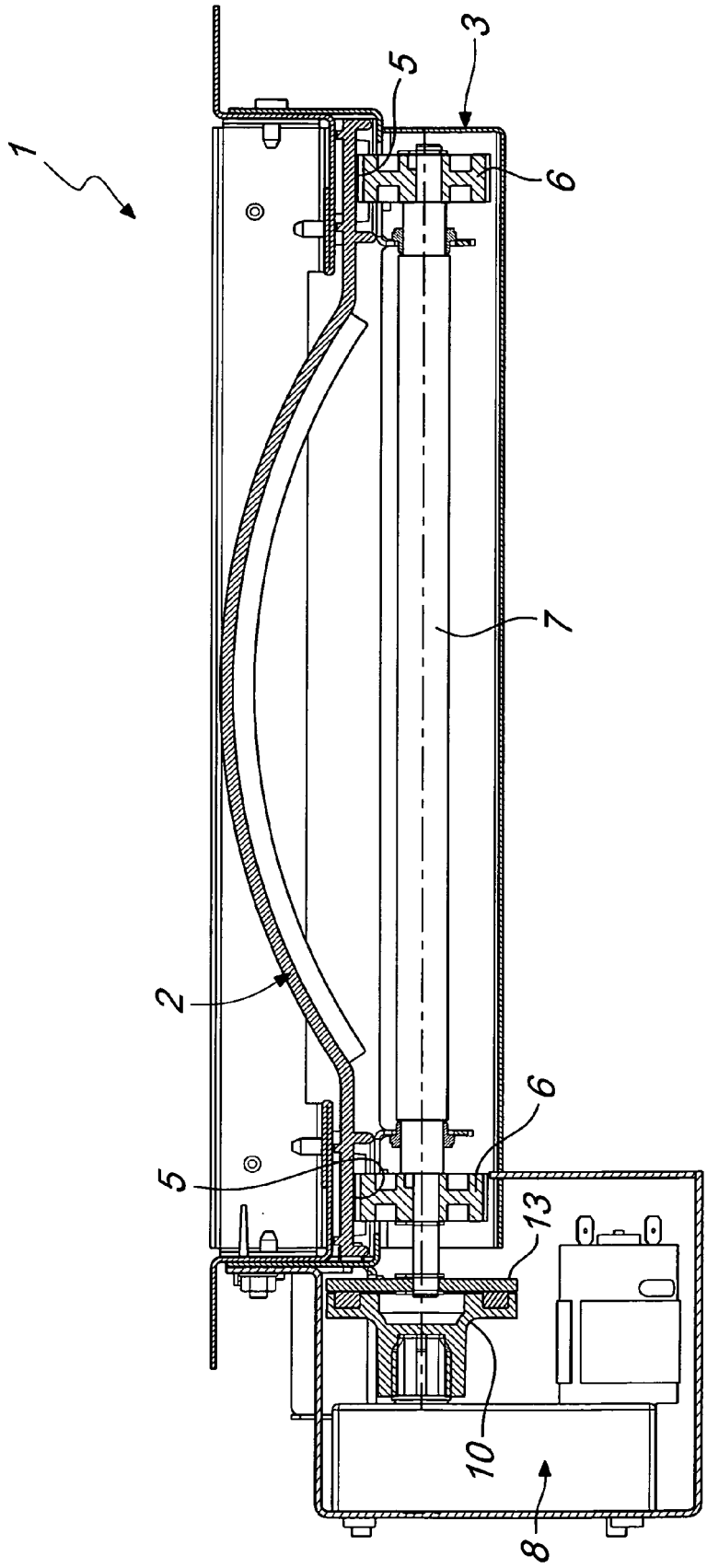

Fig. 2

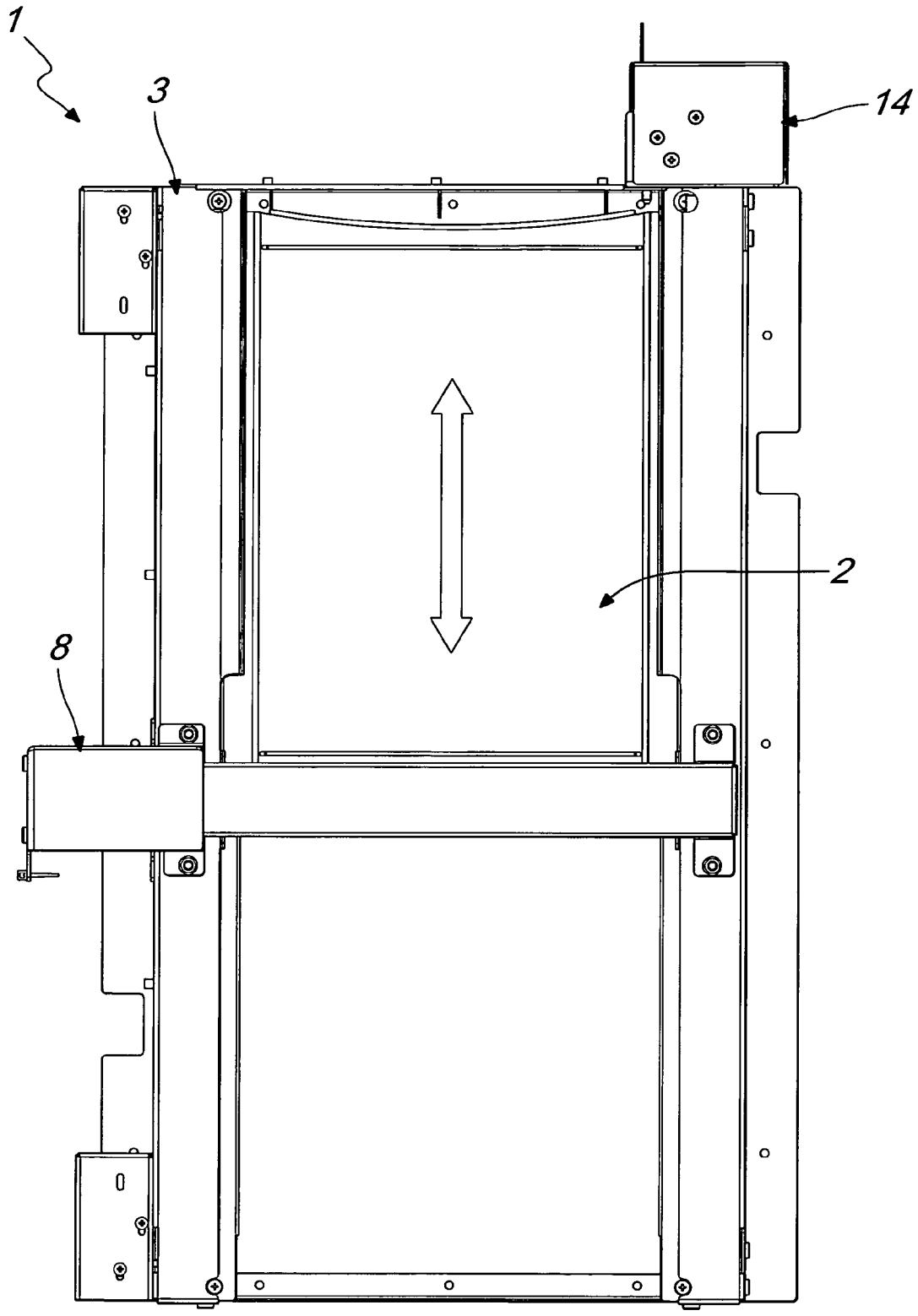

Fig. 3

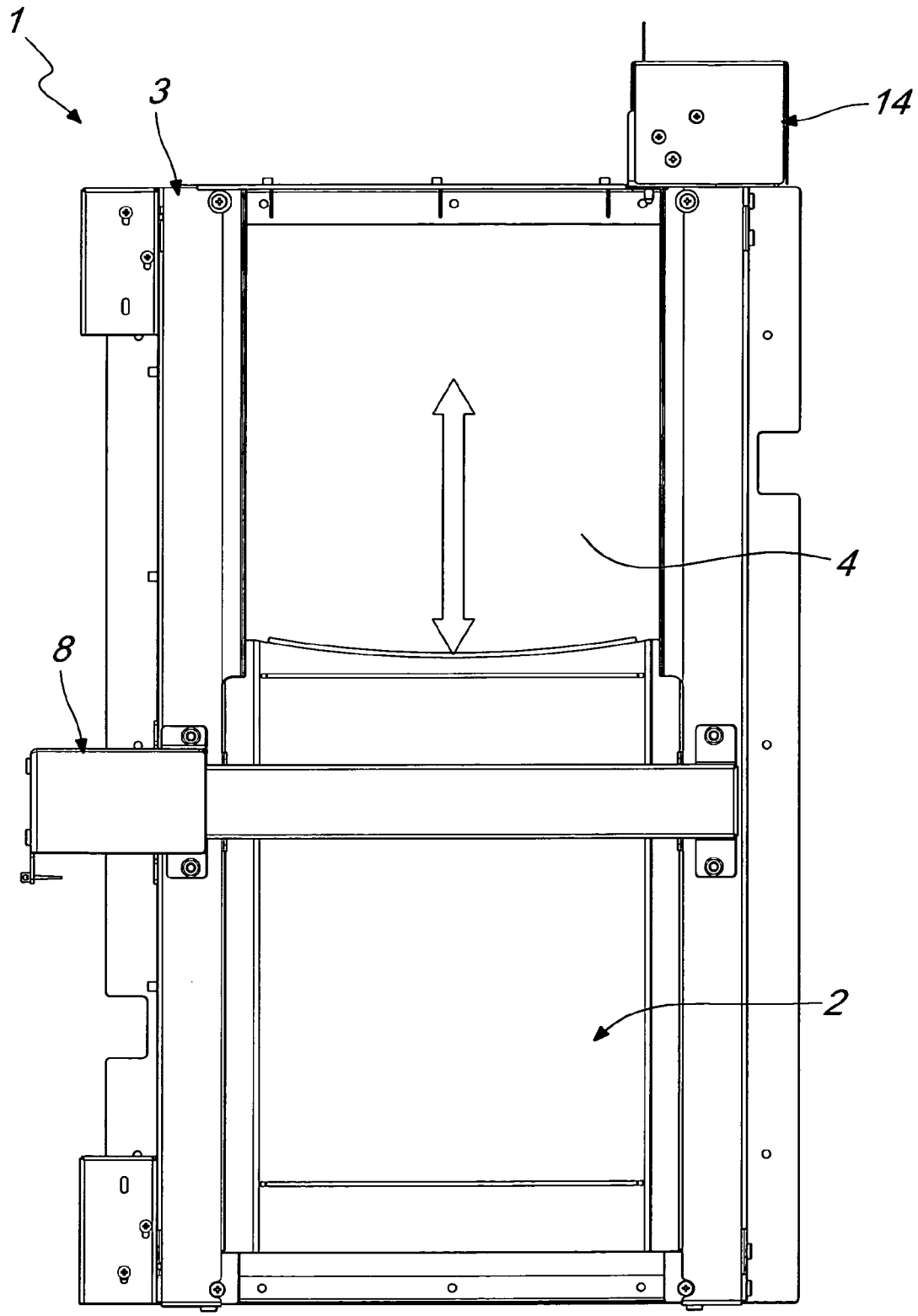

Fig. 4

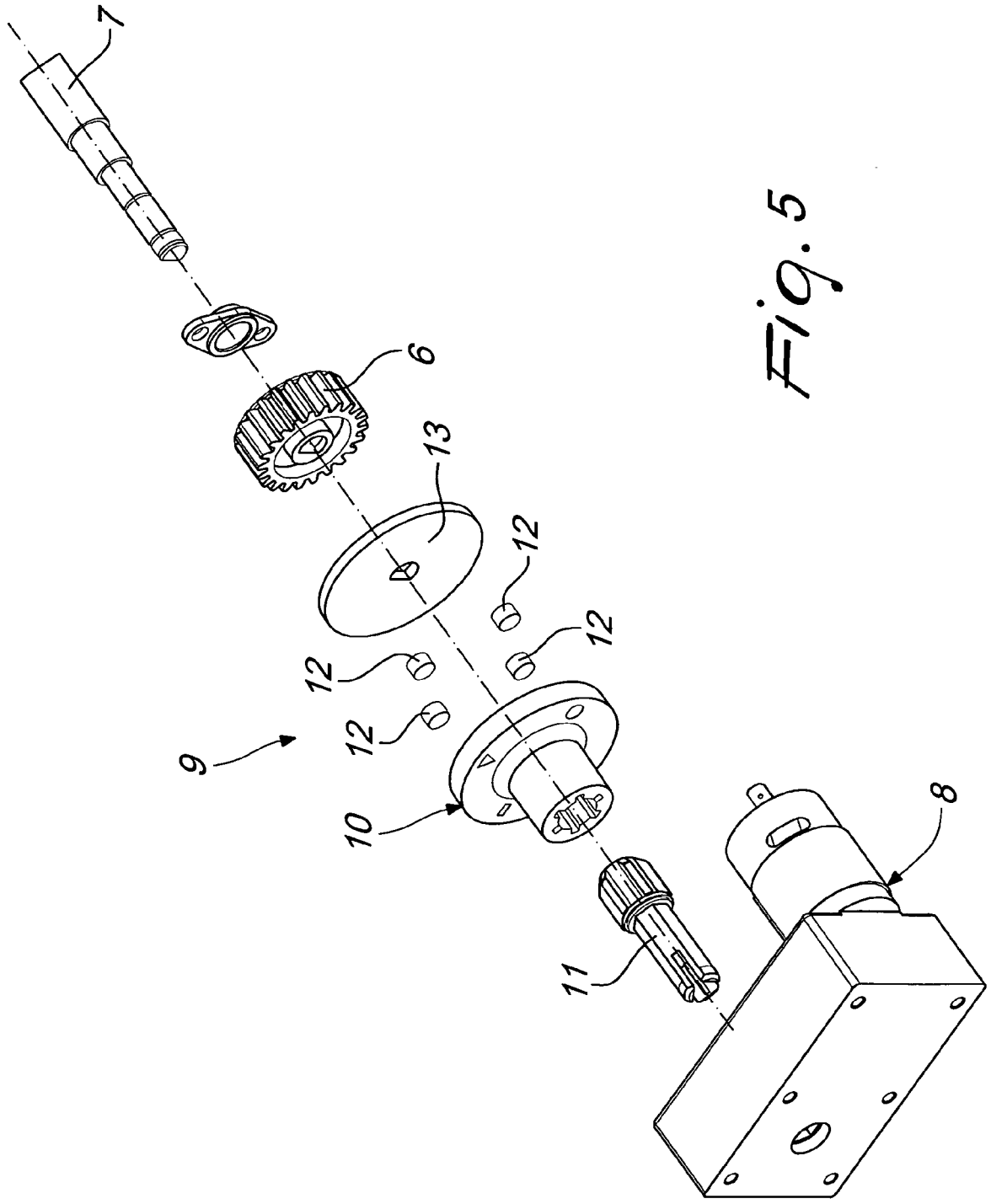

Fig. 5

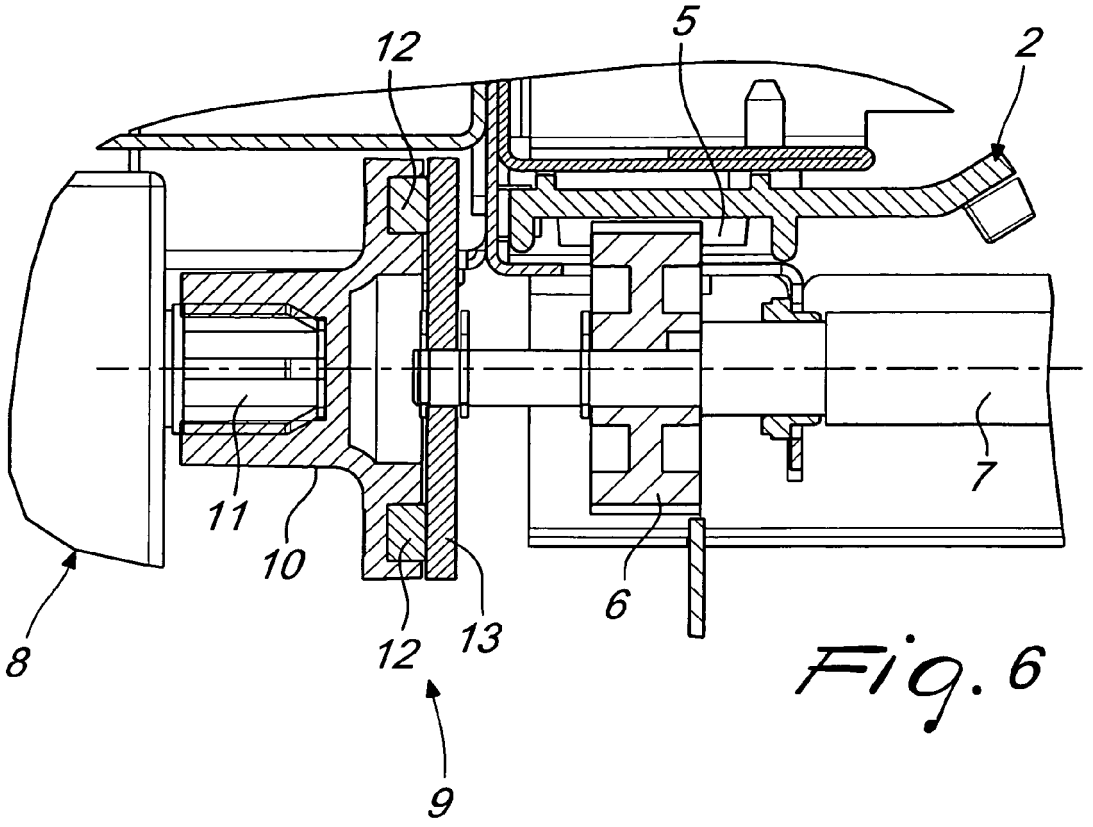

Fig. 6

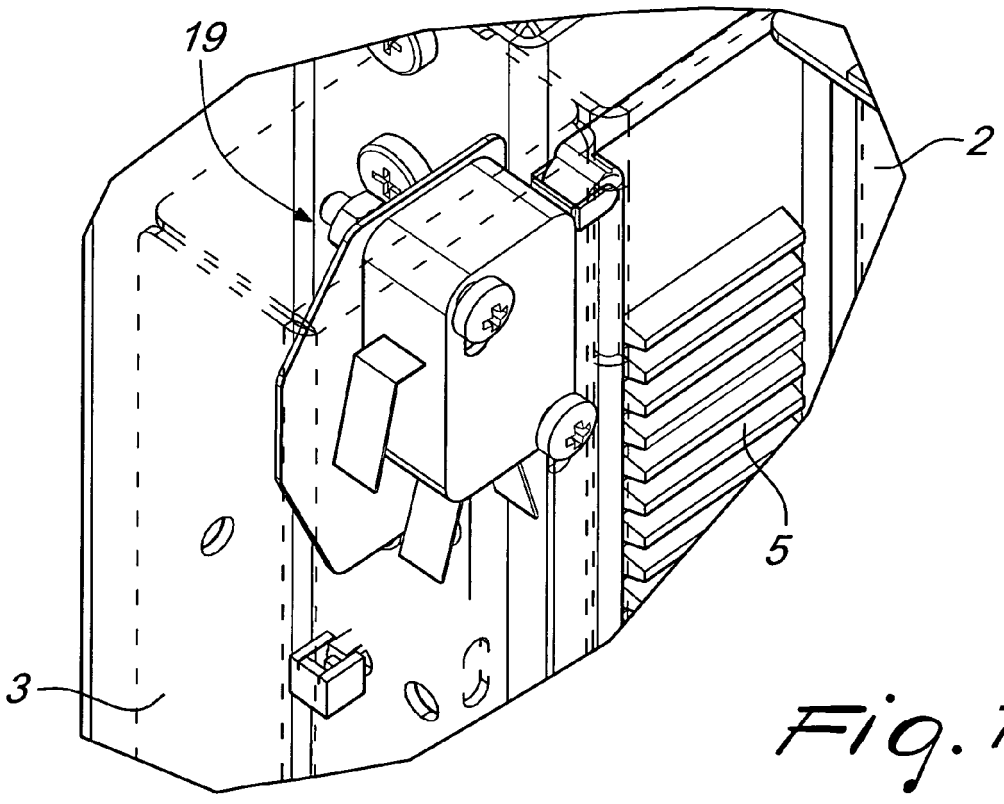

Fig. 7

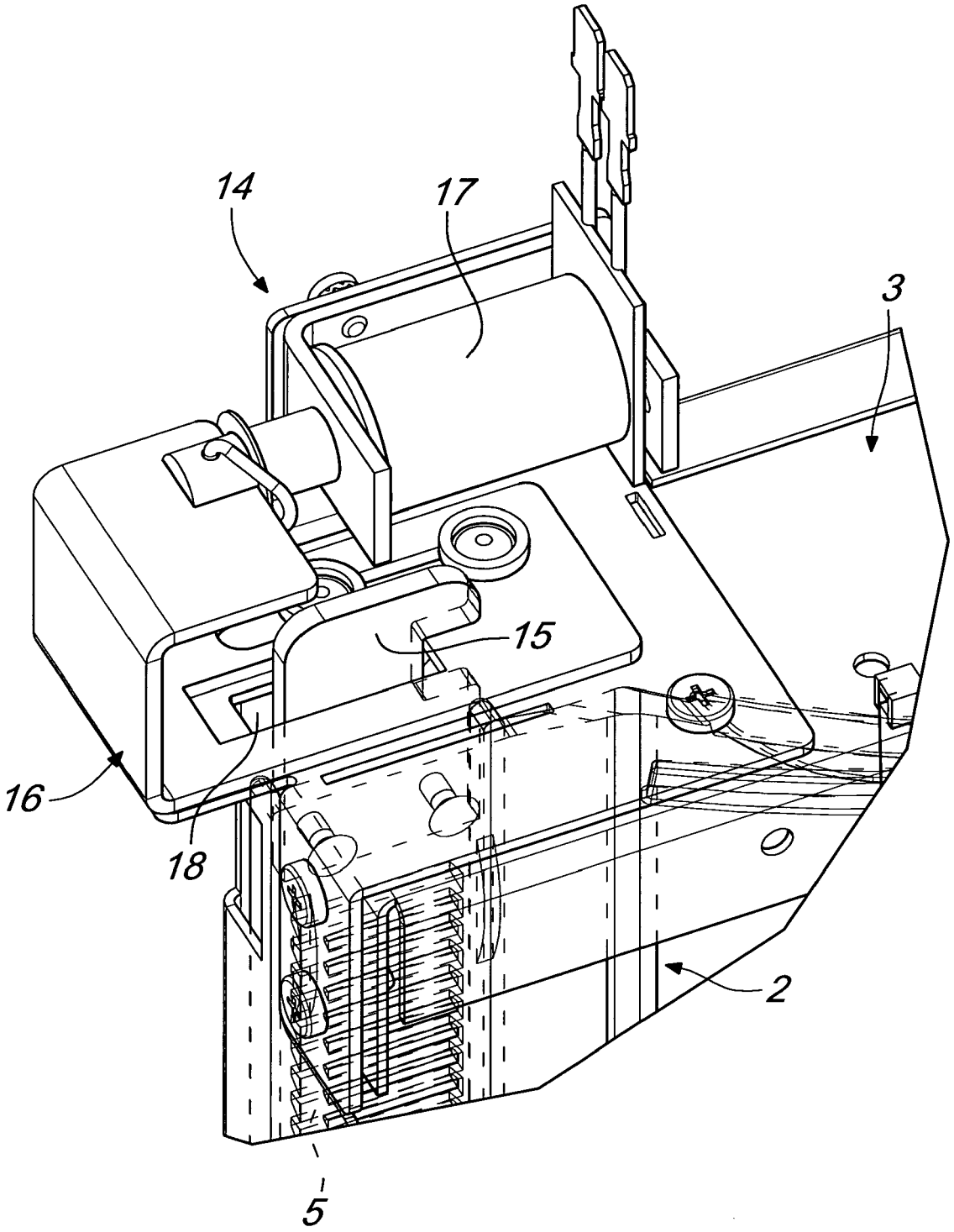

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 12 00 6016

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	GB 2 333 550 A (NAMCO EUROP LIMITED [GB]) 28 July 1999 (1999-07-28) * page 3; figure 1 *	1-5	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 January 2013	Lavin Liermo, Jesus

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

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