

(19)



(11)

EP 3 919 712 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.12.2021 Bulletin 2021/49

(51) Int Cl.:
E05F 1/10 (2006.01) **B65F 1/16** (2006.01)
E05F 15/60 (2015.01) **E05F 15/63** (2015.01)

(21) Application number: **21175630.9**

(22) Date of filing: **25.05.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Soluciones Conceptuales E Innovacion S.L.**
Pontevedra (ES)

(72) Inventor: **PARCERO GONZALEZ, ANTONIO**
36690 PONTEVEDRA (ES)

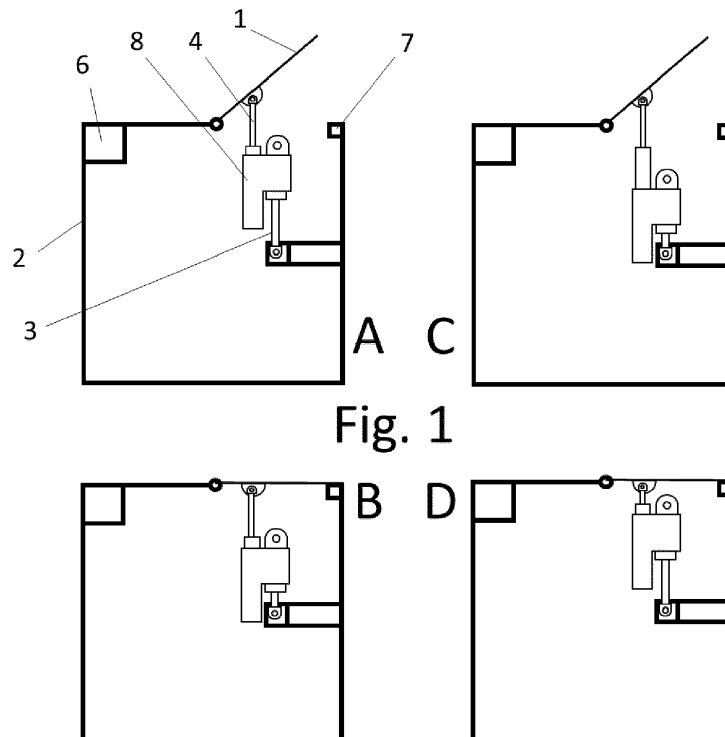
(74) Representative: **Álvarez Flores, Alberto**
Alvarez Real
Patentes y Marcas
Avda A Coruña, 39-43
27003 Lugo (ES)

(30) Priority: **01.06.2020 ES 202031098 U**

(54) DEVICE FOR AUTOMATIC OPENING AND CLOSING A GATE

(57) The present invention refers to an automated opening and closing device, of the type that carries out the automatic opening of a gate hinged to a base by means of an actuator connected directly to one of the elements and indirectly to the other element. The indirect connection of the actuator is carried out via a system

configured for absorbing the movement of the actuator in a first direction of movement against a resistance greater than the predefined; and decoupling the movement of the actuator with regard to the gate or the base in a second, opposite direction of movement.

**Fig. 1****EP 3 919 712 A1**

Description

BACKGROUND ART

[0001] The present invention refers to an automated opening and closing device for all kinds of doors, gates, lids, drums, and so on, which includes a protection system for keeping users' limbs from being pinched, as well as preventing any of the mechanisms that make up the system itself from breaking. In addition, it offers the possibility of performing the opening by hand, by means of a lever and/or pedal, and so on.

[0002] For example, it is applicable in the field of waste management applied to solid urban waste containers. The invention is exemplified in the present document, in a non-limiting manner, applied to containers of this kind. It has to be considered to be applicable to doors of buildings, vehicles, and machines and, in general, in any field where the automatic closing and opening of a cover, door or gate occurs.

[0003] The word "gate" will be used herein to refer to any kind of cover, door, drum, gate, etc with one or more leaves, hinged or sliding.

STATE OF THE ART

[0004] Numerous systems for opening doors, gates, and all sorts of single- and double-leaf closures are known in the state of the art. Some are manually operated, as is common in, for instance, building or vehicle doors, but others are provided with mechanisms that move the leaf in rotation or translation. This automatic movement may run into a safety issue when a user's limb is pinched or squeezed. It may likewise have a breakage problem if opening or closing is not possible due to the presence of objects or weights that hinder or prevent it.

[0005] For instance, a safety mechanism applied to doors, comprising a clutch to uncouple the door from its actuator, is known from US5040331. If the resistance is high, the clutch comes off and uncouples the mechanisms.

[0006] The mechanism disclosed in EP3299261, applied to a vehicle, is also interesting. In this case, the mechanism monitors the power used to turn off the motor.

[0007] In the case of containers, the most common systems are manual, lever-operated, and automatic. All these systems comprise a gate, often approximately horizontal, that closes automatically by gravity or is closed automatically by a spring. Therefore, when the user is putting elements inside or removing elements from the container, they must keep the gate open to prevent pinching.

[0008] Some solutions have been defined to prevent accidents. In one case, the gate remains locked in its open position until the user closes it. In others, there is a certain play in the closure that ensures pinching will not be severe.

[0009] An example of safety system in containers is

disclosed in EP2390451. The opening device comprises a vertical gate and a series of levers connected by means of an elongated orifice so that play is enabled in the opening direction. Thus, the presence of an object in the path of the gate (such as the hand of a user) is absorbed by the orifice and no pinching occurs.

[0010] However, this system is somewhat lacking as the elongated orifice does not allow the force exerted on the system to be adjusted, nor does it facilitate the return to the ideal position of the actuator when the external opening or closing force disappears.

[0011] The applicant does not know of any other device with the advantages of the invention.

BRIEF DESCRIPTION OF THE INVENTION

[0012] The invention consists in a device for automatic opening and closing a gate or the like having a safety system against pinching and other similar problems.

[0013] The invention provides a complete solution to the different needs and problems that may arise, such as, among others:

- It prevents pinching, entrapment, etc., providing a safe solution for the user.
- It permits the forced closing or locking of the gate, intentional or accidental, during its automatic opening without damaging the mechanism itself.
- It offers the possibility of automatic and manual opening (directly or by means of a lever, pedal, etc) in the same system.
- It works either automatically or manually, always returning to a rest state suitable for operating again automatically or manually and without any maladjustment of the system.

[0014] The opening device is of the type that carries out the automatic opening of a gate hinged to a base, fixed or movable, by means of a linear, rotary or other actuator connected directly to one element and indirectly to the other. The indirect connection of the actuator is realised through a system configured to absorb the movement of the actuator in a first direction of movement (like opening) if a resistance higher than a predefined resistance is offered. This predefined resistance will be higher than that defined by the gate and any other additional element provided for in the design. In other words, if the movement is more limited than intended when the device was designed, the movement in that first direction will be absorbed. The indirect connection is also configured to decouple the movement of the actuator with regard to the gate and the base in a second, opposite direction of movement. This decoupling is temporary or reversible.

[0015] This system can be obtained by combining different elements, both shock absorbing elements and elements that facilitate the decoupling, as can be seen, in a non-limiting manner, in the "Embodiments" section.

[0016] It is preferred that the gate and the base are also connected to each other by means of a separate tensioner. This tensioner helps to define the predefined resistance, in addition to acting as a shock absorber or aid for moving the gate in certain cases.

[0017] The device may comprise limit sensors for the actuator and/or gate. This allows the position of the actuator to be recalibrated if it is in an improper position.

[0018] The actuator can be commanded by a user identification system that recognises authorised users. An electronic lock may also be provided.

[0019] Other embodiments of the invention are described below.

DESCRIPTION OF THE DRAWINGS

[0020] A series of figures are provided to facilitate the understanding of the invention:

Figure 1: Several schematic views of a first embodiment of the invention are depicted, showing: A: in the closed position; B: after automatic opening; C: with forced opening; and D: with forced closing.

Figure 2: Several schematic views of a second embodiment of the invention are depicted, showing: A: in the closed position; B: after automatic opening; C: with forced opening; and D: with forced opening.

Figure 3: Schematic views (A-D) of one way of implementing the embodiment of figure 1 are shown.

Figure 4: Schematic views (A-D) of one way of implementing the embodiment of figure 2 are shown.

Figure 5: Several schematic views of a third embodiment of the invention are depicted, showing: A: after automatic opening; B: in the closed position; C: with forced closing; and D: with forced opening.

EMBODIMENTS OF THE INVENTION

[0021] This section briefly describes one embodiment of the invention as an illustrative, non-limiting example thereof.

[0022] The device depicted in the figures is intended to permit the safe opening of a cover or gate (1) hinged to a base (2) by one or more hinges or the like (not referenced). This embodiment comprises a main element, which is an actuator (3), in charge of transmitting the movement necessary for opening and closing the gate (1). The actuator (3) depicted in Figure 1 is an electric actuator (3), but may be of another type. This actuator (3) is fixed directly at one end to the base (2) or to the gate (1) and indirectly at the other end to the gate (1) or to the base (2). In the case depicted, the direct union is with the base (2).

[0023] The indirect connection of the actuator (3) to

the gate (1) should allow the absorption of the movement in a first direction if the resistance offered by the gate (1) is higher than expected, defined by a predefined physical resistance. The way to predefine this resistance is by controlling the power of the actuator, the weight of the gate (1), and the allowable margin. That is, the resistance can be defined so that the actuator (3) can, for example, lift a weight of 1-2kg on the gate (1) but not lift a 10kg weight.

[0024] In the figures, the absorption of the movement in the first direction is carried out by means of a main shock absorber (4) disposed between the actuator (3) and the gate (1). This main shock absorber (4) may be of the spring, ratchet, clutch, pneumatic cylinder or other type. The main shock absorber (4) also has to be considered when estimating the predefined resistance. A joining part (8) connects the main shock absorber (4) to the actuator (3).

[0025] The indirect connection should also allow the disconnection of the movement of the gate (1) with regard to the actuator (3) in a second direction of movement, opposite to the first direction. For example, it may correspond to the opening of the gate (1) by manual means, either directly or by means of a lever and/or a foot pedal, among others. This disconnection for the second direction can be done in several ways.

[0026] In the embodiment of Figures 1 and 3, the disconnection is carried out between the joining part (8) and the main shock absorber (4). The joining part (8) has a longitudinal sleeve inside which the main shock absorber (4) can slide. Thus, the movement in the second direction causes the main shock absorber (4) to slide inside the joining part (8) and the latter does not move, such that the actuator (3) is not affected by said movement.

[0027] The most practical, non limiting way of realising the joining part (8) is to dispose the main shock absorber (4) and the actuator (3) parallel to each other in order to reduce the effective length.

[0028] In Figures 2 and 4, the function of the joining part (8) is achieved by means of an elongated hole in the end of the main shock absorber (4), such that movement in a second direction, opposite to the first, permits the movement of the main shock absorber (4) without the actuator (3) being affected by this movement.

[0029] This way of connecting the actuator (3) to the gate (1) and the base (2) makes it easier to carry out the forced closing of the gate (1) and reduces the finger pinching risk. It also allows the gate (1) to be opened or closed manually or to be locked in the closed position.

[0030] The preferred device comprises several types of sensors (7), eg opening and closing sensors which tell an electronic system (6) the position of the actuator (3), in particular the limit switches. It will likewise include a sensor of the position of the gate (1) or cover for comparing the position of the actuator (3) with the position of the gate (1).

[0031] The electronic system (6) orders the opening of the gate (1) by means of the actuator (3) when an external

condition is met: the pressing of a button or a lever, the identification of the user at a card or mobile phone NFC reader, and so on. The opening may also require the unlocking of an electronic lock.

[0032] The device may have an independent tensioner (5) corresponding to a spring, eg of the pneumatic cylinder type, joined to both parts, base (2) and gate (1). It acts as a supplementary closing force if the gate does not close on its own, eg by gravity or a by means of a counterweight. In some cases it also acts as a shock absorber in manual opening operations. This independent tensioner (5) also has to be considered when estimating the predefined resistance.

[0033] In use, several situations can be encountered in the case of the preferred embodiment:

Automatic opening: In this case, the electronic system (6) gives the actuator (3) an order to move, which moves the gate (1) via the main shock absorber (4) until it opens all the way. If there is a weight on top of the gate (1) or if the gate is locked for any reason, the main shock absorber (4) absorbs all the movement of the actuator (3) in the first direction and the opening does not take place. Since the actuator (3) has carried out its function correctly, it is not damaged. The independent tensioner (5) moves synchronously with the other elements.

[0034] Automatic closing: It is also the electronic system (6) which orders the actuator (3) to close. If the gate (1) is locked and cannot be closed, the main shock absorber (4) slides by means of the joining part (8), without communicating the movement of the actuator (3) to the gate (1), and thus absorbs the movement of the actuator (3) in a second direction. Likewise, it also releases the movement of the gate (1) from the actuator (3) if an object is encountered in the path of the gate (1). It thus prevents a user limb from being pinched. The independent tensioner (5) moves synchronously with the other elements.

[0035] Manual or forced opening: When the user opens the gate (1) directly by hand or by means of a pedal and/or a lever, the actuator (3) remains unchanged, it being the sliding of the main shock absorber (4) inside the joining part (8) that allows this movement. Once the gate (1) is released, the independent tensioner (5) carries out or helps to control the closing.

[0036] Manual or forced closing: If closing is done manually, by gravity or by another kind of force, the actuator (3) also remains unchanged, the main shock absorber (4) being the one that allows the motion.

[0037] When the opening or closing has been carried out in a non-automatic manner, the electronic system (6) will recognise that the actuator (3) is not in the same position as the gate (1) thanks to the sensors (7). Therefore, it will be able to make the corresponding movement to adjust them. The movement may not be immediate but take place after a programmed time has elapsed if the opposite movement is carried out manually or by means of the independent tensioner (5) within a short period of time. For example, once the elements or the rubbish have been put inside the base (2).

[0038] Figures 2A-2D and 4A-4D show other similar solutions, where like reference numbers have been used in the case of like elements, although their disposition is different. The independent tensioner (5) has not been depicted in these figures, but may supplement the system.

[0039] In this case, the actuator (3) is rotary, whereby the connection to the gate (1) is made by means of a connecting rod-crank system in which the joining part (8) is replaced by an elongated hole.

[0040] Finally, Figures 5A-D show a detail of another embodiment, with a gate (1) that rotates about a central axis. In this case, the gate (1) can close on its own, or otherwise it may require an additional mechanism such as the independent tensioner (5) (not shown).

[0041] As can be seen in the figures, the absorption of the movement in the first direction is carried out by means of a ratchet (4). Said ratchet permits the direct transmission of the movement of the actuator (3) to the gate (1), unless there is a resistance to this movement higher than the predefined. In such case, the ratchet would absorb the movement of the actuator. On the other hand, the decoupling of the movement in a second direction, opposite to the first, is carried out by means of a radial elongated hole disposed in the joining part (8) between the actuator (3) and the gate (1).

[0042] The system will comprise a power supply for all electrical or electronic equipment, such as a mains socket, a solar panel and a battery, or any similar system.

Claims

1. An opening device, of the type that carries out the automatic opening of a gate (1) hinged to a base (2) by means of an actuator (3) connected directly to one of the elements and indirectly to the other element, **characterised in that** the indirect connection of the actuator (3) is carried out via a system (4,8) configured for:

absorbing the movement of the actuator (3) in a first direction of movement against a resistance greater than the predefined; and
decoupling the movement of the actuator (3) with regard to the gate (1) or the base in a second, opposite direction of movement.

2. A device according to claim 1, **characterised in that** the indirect connection is made by means of a main shock absorber (4) which is configured to absorb the movement of the actuator (3) in a first direction of movement, and because the main shock absorber (4) is capable of decoupling its movement from that of the actuator (3) in the opposite direction.
3. A device according to claim 2, **characterised in that** the actuator (3) is linear and the main shock absorber

(4) is sliding, guided by means of the joining part (8).

4. A device according to claim 2, **characterised in that** the actuator (3) is rotary and the main shock absorber (4) is sliding by means of an elongated hole. 5
5. A device according to claim 1, **characterised in that** the actuator (3) is rotary, the indirect connection is made by means of a ratchet (4) which is configured to absorb the movement of the actuator (3) in a first direction of movement, and an elongated hole for decoupling the movement of the actuator (3) in the opposite direction. 10
6. A device according to claim 1, **characterised in that** it comprises limit sensors (7) of the end of travel of the actuator (3) and/or the gate (1). 15
7. A device according to claim 1, **characterised in that** gate (1) and the base (2) are also connected to each other by means of an independent tensioner (5). 20
8. A device according to claim 1, **characterised in that** it comprises an electronic lock. 25
9. A device according to claim 1, **characterised in that** it comprises a user identification system.

30

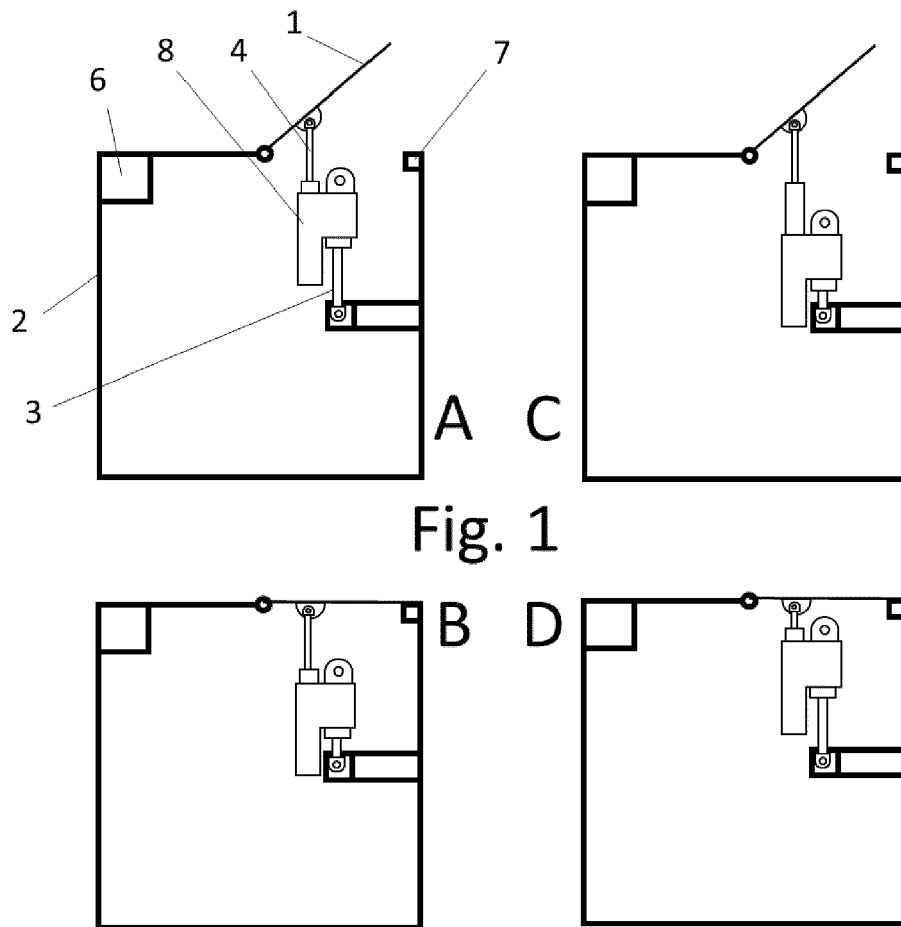
35

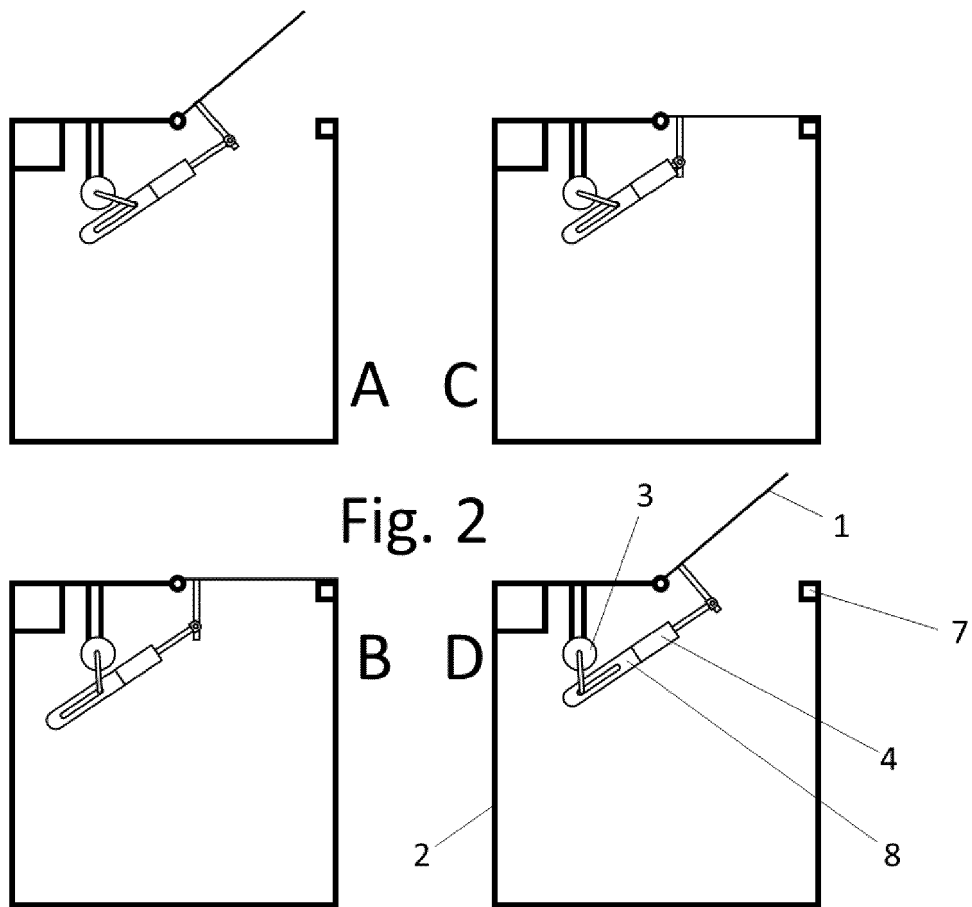
40

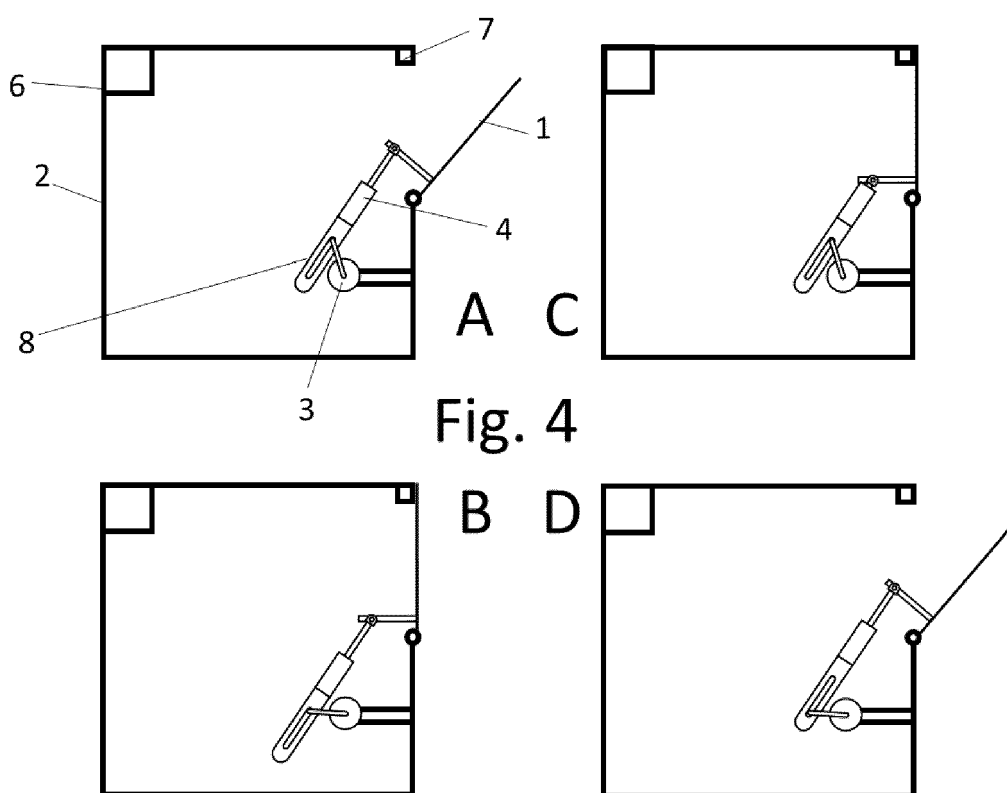
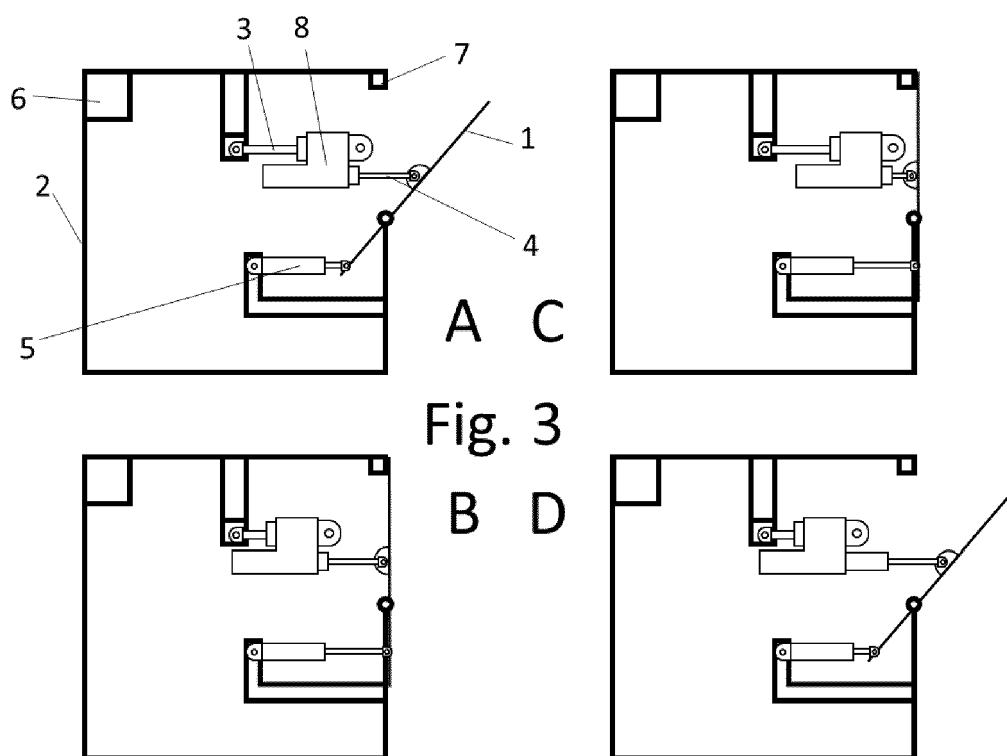
45

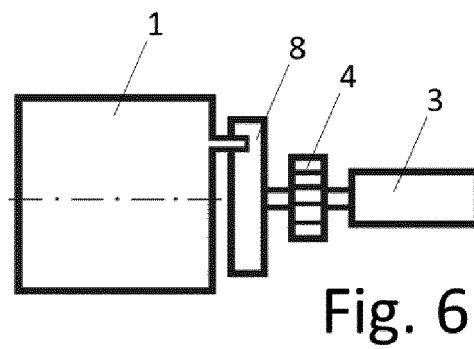
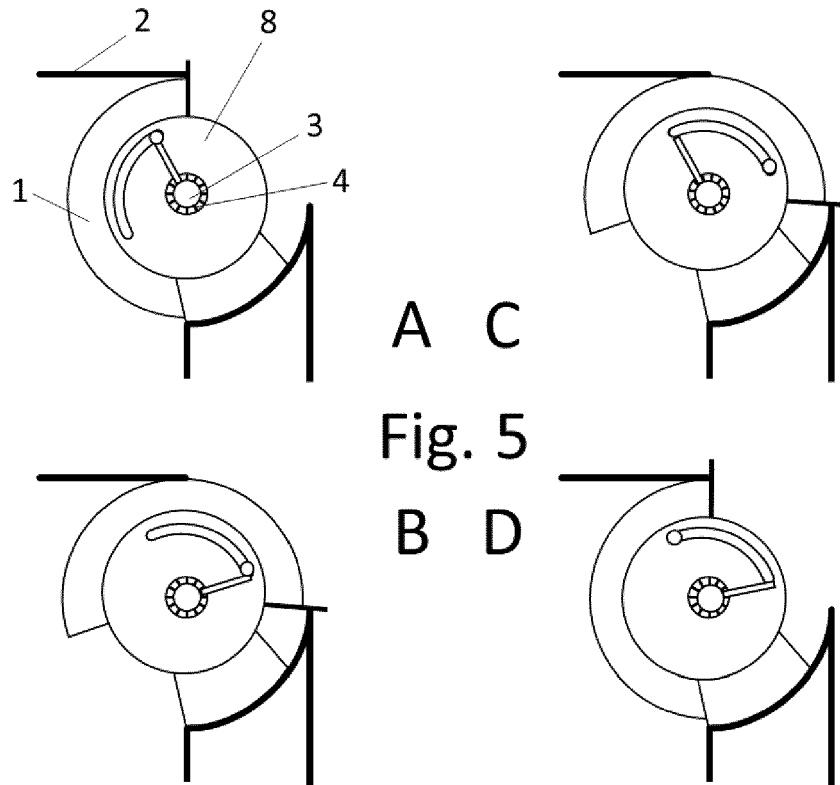
50

55











EUROPEAN SEARCH REPORT

Application Number
EP 21 17 5630

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2013 001402 A1 (APPBAU GMBH [IT]) 31 July 2014 (2014-07-31) * paragraphs [0043] - [0050], [0052], [0054]; figures 2,3,6,7 *	1-7	INV. E05F1/10 B65F1/16 E05F15/60 E05F15/63
X	EP 2 103 554 B1 (EME ELEKTRO METALL EXP GMBH [DE]) 29 August 2012 (2012-08-29) * paragraphs [0020] - [0029]; figures 1-9 *	1,4,6-9	
A	KR 2014 0010847 A (2HAPPY CO LTD [KR]) 27 January 2014 (2014-01-27) * paragraph [0039]; figures 2-8 *	8,9	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F B65F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 October 2021	Examiner Rémondot, Xavier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 4
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 17 5630

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-10-2021

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102013001402 A1	31-07-2014	DE 102013001402 A1	31-07-2014
		EP 2759669 A2	30-07-2014
-----	-----	-----	-----
EP 2103554 B1	29-08-2012	EP 2103554 A1	23-09-2009
		ES 2393137 T3	18-12-2012
-----	-----	-----	-----
KR 20140010847 A	27-01-2014	NONE	
-----	-----	-----	-----

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- US 5040331 A [0005]
- EP 3299261 A [0006]
- EP 2390451 A [0009]