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(54) **AN EMERGENCY RELEASE DEVICE FOR A DOOR ACTUATION SYSTEM WITH TWO DECOUPLERS**

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(56) References cited:
EP-A1- 2 803 801
EP-A2- 1 365 095
WO-A1-2015/188210
WO-A1-2017/091323
WO-A1-2018/049002
US-B2- 7 185 459

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Description

[0001] The present invention relates to an emergency release device for a door actuation system with two decouplers, for a double-leaf door, for example, which is orientable or roto-translatable, in particular for means of public transport, such as buses or trains.

[0002] The single orientable or roto-translatable leaf of the double-leaf door of a vehicle, for example of a bus, is connected by means of interposing arms, which are orientable, or directly to a rotating column and it is movable, by means of a rotary movement of the rotating column, from an open position to a closed position and vice versa.

[0003] In a first known configuration, the movement of the rotating column occurs by means of a rotary drive having an external housing constrained to the structure of the vehicle and an outlet shaft supported in the external housing and connected integrally to the rotating column on rotation. Thus, the movement of the leaf occurs in response to a rotation of the outlet shaft, while the external housing of the drive is stationary. The use of a rotary drive is known in this first configuration with a pneumatic linear actuator and a screw-type drive, which converts the linear movement of the linear actuator into a rotary movement of the outlet shaft.

[0004] In a second known configuration, the movement of the rotating column occurs by means of a rotary drive having an external housing, which forms the rotating column, or which is integrally constrained on rotation to the rotating column, as well as a stationary shaft supported in the external housing and stationarily constrained to the structure of the vehicle. Unlike the first configuration, here, the movement of the leaf occurs in response to a rotation of the external housing, while the shaft is stationary.

[0005] The use of a compact electric rotary drive is favored in this second configuration as the diameters of known fluid dynamic drives are too elevated to be able to act as a rotating column.

[0006] Known electric rotary drives are usually provided with an automatic locking brake, which is permanently elastically pushed into a locking position to keep the door closed with electric drive off, and electrically releasable during operation of the rotary drive.

[0007] In addition to the automatic locking brake, the rotary electric drives must also be provided with a mechanical emergency opening (or release) device, allowing the opening of the door despite being unable to release the locking brake in the event of an electricity failure.

[0008] As an emergency opening (or release) device, the inclusion is known of a manually operable mechanical decoupler between two reduction stages of the rotary drive, for example, by means of a Bowden cable. When actuating the decoupler, the latter detaches the two reduction stages of the rotary drive from each other and consequently decouples the rotating column (and thus the leaf of the door) from the side of the rotary drive, which is engaged/engageable by the automatic locking brake. In this way, the leaf of the door can be pushed manually into an open position despite being unable to release the locking brake.

[0009] Publication EP2803801 A1 by the applicant describes a rotary drive for a door or a ramp, which is orientable and/or translatable on public transport vehicles, comprising an electric motor, a reduction gear arranged on a front side of the motor and connected to a front portion of a motor shaft, an outlet shaft connected to the reduction gear, an automatic locking brake arranged on a rear side of the motor opposed to the front side, which acts on a rear portion of the motor shaft, as well as a decoupler additionally comprised with the automatic locking brake and operable to decouple the rear portion of the motor shaft (preferably on the rear side of the motor) from the automatic locking brake, also in the event of being unable to release the locking brake.

[0010] In the case of double-leaf doors, each leaf is operated by means of a rotary drive thereof, comprising an automatic locking brake thereof.

[0011] In the event of an emergency, it is thus necessary to comprise two mechanical emergency opening (or release) devices to allow the manual opening of each of the two leaves of the door in the event of an electricity failure, despite being unable to release the two locking brakes.

[0012] In an emergency, the inclusion of two different mechanical release devices with two manually operable levers or handles can confuse the user and the actuation of only one of the two release devices might not be sufficient to allow a manual thrust opening of the door because the movement of the single released leaf could be prevented by the second leaf, which is still locked.

[0013] On the other hand, the manual actuation of both mechanical release devices may require elevated force by the user and result in unsuccessful release attempts, further increasing panic and delaying the release of passengers from dangerous situations.

US7185459B2 describes a locking and unlocking device for vehicle doors and WO2018049002A1 describes a wirelessly-controlled vehicle hood latch lock system which can be operated by a control device.

[0014] Thus, it is the object of the present invention to provide an emergency release device for a door actuation system with two decouplers, described in the introduction, having such features as to ensure a reliable and repeatable operation thereof, with a rapid release effect on both leaves, which is easily operable, without excessive effort by the user.

[0015] These and other objects are achieved by means of an emergency release device for a door actuation system with two decouplers, according to claim 1. The dependent claims relate to advantageous and preferred embodiments.

[0016] According to one aspect of the invention, an emergency release device for a door actuation system

with two decouplers, comprises:

- a support structure,
- a sliding body connected to the support structure by means of a guide device, movable between a locking position and a release position,
- a first Bowden connection interface arranged on the sliding body for the connection of a first Bowden cable to the sliding body, for activating and deactivating a first decoupler of the door actuation system,
- a second Bowden connection interface arranged on the sliding body for the connection of a second Bowden cable to the sliding body, to activate and deactivate a second decoupler of the door actuation system,
- a spring device connected between the support structure and the sliding body, which strains the sliding body permanently towards the release position,
- a locking mechanism connected between the support structure and the sliding body and movable in:
    - a locking configuration, wherein the locking mechanism engages and locks the sliding body in the locking position, and
    - a release configuration, wherein the locking mechanism disengages the sliding body so that the spring device moves the sliding body from the locking position to the release position,
- a third Bowden connection interface arranged on the locking mechanism for the connection of a third Bowden cable to the locking mechanism, for the displacement of the locking mechanism from the locking configuration to the release configuration,
- optionally, a release detector associated with the locking mechanism, configured to detect the attainment of the release configuration and generate a corresponding electric release signal intended for an electric control system of the door actuation system,
- an electric restore actuator connected to the support structure and operable to displace the sliding body, against the force of the spring device, from the release position to the locking position and to displace the locking mechanism from the release configuration to the locking configuration.

[0017] Due to the displacement of the sliding block by means of a preloaded spring device, and not (or not only) by means of the force exerted by the user by the third Bowden cable, the door can easily be released in an emergency without excessive effort.

[0018] Due to the displacement of a single sliding body, the release of both decouplers, or door leaves, is carried out in a synchronized manner, or in a predetermined sequence, in response to a single manual door release operation.

[0019] Due to the interposition of a locking mechanism between the third Bowden cable, operated manually by the user, and the sliding block, the locking force, the release force and the locking and release positions of the sliding body, as well as the thrust force needed to push the sliding block into the release position, can be selected and set according to design parameters of the door with a double decoupler, independently of parameters of force and geometry of the emergency handle or lever by means of which the third Bowden cable will be operated.

[0020] The release detector allows the recognition and signaling of a door release state by means of an electric control system of the emergency release device, or of the door, or of the whole vehicle and the electric restore operation allows a restore, for example, automatic, of the emergency release device by means of the electric control system, without the need for further manual intervention.

[0021] The set of these partial technical effects synergically result in a reliable and repeatable operation of the emergency release device, with a consequent rapid and synchronized release on both decouplers or leaves, with easy operation and without excessive effort by the user.

[0022] The door actuation system with two decouplers can be associated, for example, with a double-leaf door of the type comprising:

- a first leaf, movable between an open position and a closed position by means of a first rotary drive thereof,
- a second leaf, movable between an open position and a closed position by means of a second rotary drive thereof,

wherein the first rotary drive and the second rotary drive each comprise:

- an outlet portion for transmitting the movement of the rotary drive to the leaf and a brakeable portion coupled to the outlet portion,
- an automatic locking brake, which acts on the brakeable portion, to lock the leaf in the closed position,
- a decoupler, operable to decouple the brakeable portion from the outlet portion in order to allow a manual displacement of the leaf towards the opening position, also in the event of being unable to release the automatic locking brake.

[0023] In order to better understand the invention and appreciate the advantages thereof, embodiments will be described below by way of non-limiting examples, with reference to the drawings, wherein:

- figure 1 is a schematic illustration of functional groups of an inlet and outlet system for a vehicle with a double-leaf door, as well as of an actuation subsystem with an emergency release device for the double-leaf door, according to embodiments,
- figure 2 is a schematic illustration of functional groups of an inlet and outlet system for a vehicle with

a single- or double-leaf door, as well as of an actuation sub-system with an emergency release device for a leaf of the door, according to embodiments,

- figure 3 is a perspective view of the emergency release device in a locking configuration, according to one embodiment,
- figure 4 is a perspective view of the emergency release device in figure 1 in a release configuration,
- figure 5 is a view from above of the emergency release device in figure 3, in the locking configuration, with parts removed so that some of the otherwise covered details are visible,
- figure 6 is a view from above of the emergency release device in figure 4, in the release configuration, with parts removed so that some of the otherwise covered details are visible,
- figure 7 is a further view of the emergency release device in the locking configuration, with parts removed so that some of the otherwise covered details are visible,
- figure 8 is a schematized view of a rotary drive for a door leaf according to one embodiment,
- figure 9 is a schematized view of a rotary drive for a door leaf according to a further embodiment,
- figures 10, 11, 12 illustrate a non-desired interaction sequence of a locking-mechanism configuration.

Detailed description of the invention

[0024] Figures from 4 to 7 illustrate an emergency release device 1 for a door actuation system 2 with two decouplers 3, 3', for example, for a double-leaf door 4, 4' or with a single leaf 4, in particular, for a vehicle for transporting people, for example, a bus or a railway carriage.

[0025] The double-leaf door 4, 4' can be, for example, of the type comprising a first leaf 4, movable between an open position and a closed position by means of a first rotary drive thereof 5, a second leaf 4', movable between an open position and a closed position by means of a second rotary drive thereof 5', wherein the first rotary drive 5 and the second rotary drive 5' each comprise an outlet portion 6 for transmitting the movement of the rotary drive to the leaf 4, 4', and a brakeable portion 7 coupled to the outlet portion 6, an automatic locking brake 8, which acts on the brakeable portion 7 to lock the leaf 4, 4' in the closed position, as well as a decoupler 3, 3' operable to decouple the brakeable portion 7 from the outlet portion 6 to allow a manual displacement of the leaf 4, 4' towards the open position, also in the event of being unable to release the automatic locking brake 8 (figures 1, 8, 9).

[0026] Alternatively, the double- 4, 4' or single-leaf door 4 can be of the type comprising at least one leaf 4, movable between an open position and a closed position by means of a rotary drive 5 thereof, wherein the rotary drive 5 comprises an outlet portion 6 for transmitting the movement of the rotary drive 5 to the leaf 4, and a brakeable portion 7 coupled to the outlet portion 6, an automatic locking brake 8, which acts on the brakeable portion 7 to lock the leaf 4 in the closed position, as well as a first and a second decoupler 3, 3', operable (for example, in sequence) to decouple the brakeable portion 7 from the outlet portion 6 to allow a manual displacement of the leaf 4 towards the open position, also in the event of being unable to release the automatic locking brake 8 (figures 2, 8, 9).

[0027] According to one aspect of the invention, the emergency release device 1 comprises:

a support structure 9, for example, a metal plate, for example, made of aluminum or steel,

a sliding body 10, for example, a metal block, for example, made of aluminum or steel, connected to the support structure 9 by means of a guide device 11, movable between a locking position (figures 3, 5) and a release position (figures 4, 6),

a first Bowden connection interface 12 arranged on the sliding body 10 for the connection of a first Bowden cable 13 to the sliding body 10, to activate and deactivate a first decoupler 3 of the door actuation system 2,

a second Bowden connection interface 12' arranged on the sliding body 10 for the connection of a second Bowden cable 13' to the sliding body 10, to activate and deactivate a second decoupler 3' of the door actuation system 2,

a spring device 14 connected between the support structure 9 and the sliding body 10, which strains the sliding body 10 permanently towards the release position,

a locking mechanism 15 connected between the support structure 9 and the sliding body 10 and movable in:

- a locking configuration (figure 5), wherein the locking mechanism 15 engages and locks the sliding body 10 in the locking position, and
- a release configuration (figure 6), wherein the locking mechanism 15 releases the sliding body 10 so that the spring device 14 moves the sliding body 10 from the locking position to the release position,

a third Bowden connection interface 16 arranged on the locking mechanism 15 for the connection of a third Bowden cable 17 to the locking mechanism 15, for the displacement of the locking mechanism 15 from the locking configuration to the release configuration (sequence of figures 5, 6),

optionally, a release detector 18 associated, for example, with the locking mechanism 15, with the sliding body 10, or with the spring device 14, and configured to detect the attainment of the release configuration and generate a corresponding electric release signal intended for an electric control system

19 of the door actuation system 2,
an electric restore actuator 20 connected to the support structure 9 and operable to displace the sliding body 10, against the force of the spring device 14, from the release position to the locking position, and to displace the locking mechanism 15 from the release configuration to the locking configuration.

[0028] According to one embodiment, the guide device 11 comprises two parallel guide bars 21 extending through two guide holes 23 of the sliding block 10, whose opposite ends can be connected to two opposite support walls 22, which can be screwed, in turn, to the metal plate of the support structure 9. In this way, the guide device 11 determines a translation travel direction of the sliding body 10, which corresponds to an actuation (traction) and return translational travel direction of the first Bowden cable 13 and the second Bowden cable 13'.

[0029] According to one embodiment, the Bowden coupling interfaces 12, 12' are formed by a rocker arm 26 oscillatingly connected to the sliding body 10 about a rocker arm axis 27 transverse (preferably orthogonal) to the translational travel direction of the sliding body 10, and positioned on two opposite sides with respect to the rocker arm axis 27. In this way, a difference in resistance between the first 13 and the second Bowden cable 13' increases the actuation travel of the Bowden cable, offering less resistance to the Bowden cable, which offers more resistance and/or allows an actuation of the two decouplers 3, 3' in a predetermined sequence by means of the difference in the mechanical actuation resistance of the two decouplers 3, 3'.

[0030] Besides the first and the second Bowden coupling interfaces 12, 12' arranged on the sliding body 10 and configured for the connection of the Bowden cables 13, 13', a first Bowden abutment seat 24 and a second Bowden abutment seat 24' are comprised for positioning and stopping external casings 25, 25' of the first Bowden cable 13 and the second Bowden cable 13'.

[0031] The first 24 and the second 24' Bowden abutment seats can be formed in one same wall, for example, a metal angular profile, formed or screwed to a first wall 22 of the opposite walls 22, 22'.

[0032] According to one embodiment, the spring device 14 can comprise a gas spring or a helical spring preferably arranged in an intermediate region between the two guide bars 21, and possibly with an orientation and thrust effect parallel to the direction of extension of the guide bars 21. The spring device can be connected or positioned between the aforesaid first wall 22' of the opposite walls 22 and the sliding body 19.

[0033] Advantageously, the spring device 14 comprises two springs (e.g. gas or helical) placed parallel (figure 4) to ensure a thrust operation of the sliding body 10 with safety redundancy.

[0034] The elastic force of the gas or helical spring is adjustable, for example, by means of selecting the preloaded compression length, or by means of adjusting the pressure of the gas in the gas spring, and it is consequently adaptable to the decoupling resistance of the decouplers 3, 3'.

[0035] According to one embodiment, the locking mechanism 15 comprises:

a hooking lever 28 connected rotatably to the support structure 9 about a hooking axis 36 between a hooking position (figure 5) and a release position (figure 6) and forming a hooking seat 34 and a stop seat 35 arranged on two opposite sides to the hooking axis 36,
a projection 33, for example, a pin, integral with the sliding body 10, and
a trigger 37 connected rotatably to the support structure 9 about a trigger axis 38 between a stop position (figure 5) and a trigging position (figure 6), forming the third Bowden coupling interface 16 and a stop portion 40, and
a stop spring 39, which strains the trigger 37 permanently towards the stop position (figure 5).

[0036] The hooking lever 28, the projection 33 and the trigger 37 are configured and shaped so that:

when the trigger 37 is in the stop position, the stop portion 40 engages the stop seat 35 and stops the hooking lever 28 in the hooking position,
when the trigger 37 is rotated (by means of the third Bowden cable 17 and against the force of the stop spring 39) from the stop position to the trigging position, the stop portion 40 disengages the stop seat 35 and allows the hooking lever 28 to rotate from the hooking position to the release position,
when the hooking lever 28 rotates from the hooking position to the release position, the hooking seat 34 releases the projection 33 and allows the sliding body 10 to slide (pushed by the spring device 14) from the locking position to the release position, thus actuating the first and the second Bowden cable 13, 13',
when the sliding body 10 slides (pushed by the electric restore actuator 20) from the release position to the locking position, the projection 33 engages the hooking seat 34 and rotates the hooking lever 28 from the release position to the hooking position,
when the hooking lever 28 rotates from the release position to the hooking position (and in the absence of actuation of the third Bowden cable 17), the stop spring 39 triggers the stop portion 40 of the trigger 37 into the stop seat 35 of the hooking lever 28 and stops the hooking lever 28 again in the hooking position, thus completing the device 1 restore.

[0037] According to one embodiment, the hooking seat 34 of the hooking lever 28 comprises a first projection (or surface) 30 and an opposite, second projection (or surface) 31, longer than the first projection (or surface) 30,

which mutually delimit a groove 32 so that the first projection (or surface) 30 locks and releases the projection 33 of the sliding body 10, while the second projection (or surface) 31, of a greater length, intercepts the projection 33 when the sliding body 10 returns from the release position to the locking position.

[0038] According to one embodiment, the hooking lever 28 is permanently elastically (spring 29) strained towards the release position, in order to ensure the necessary position synchrony for the restore. In the absence of positioning of the hooking lever 28 in the release position, by means of the spring 29, the situation shown in the sequence in figures 10, 11, 12 could occur, wherein the pin 33 might not enter the hooking seat 34 in the restore step.

[0039] According to a further embodiment, the device comprises a further stop spring 41, which strains the trigger 37 permanently towards the stop position (figure 7), ensuring an operation redundancy of the device 1 restore.

[0040] According to a further embodiment, the trigger 37 forms a sensing projection or portion 42, which interacts with the release detector 18, for example, switching an electric microswitch between two different switching states, to detect a device state 1 set and not actuated (figure 5) and a device state 1 actuated and not yet restore (figure 6).

[0041] Advantageously, the stop seat 35 of the hooking lever 28 and the stop portion 40 of the trigger 37 are positioned and shaped so that, when the trigger 37 stops in the stop position and the hooking lever 28 stops in the hooking position (figure 5), a resulting support force 46 between the stop seat 35 and the stop portion 40 (generated by the spring device 14) intersects the trigger axis 38 of the trigger 37.

[0042] This creates a stable locking position of the sliding body 10, independent of the relation of elastic forces between the stop spring 39, 41 and the spring device 14, and allows, for example, the spring device 14 to exert a highly elevated thrust force on the sliding body 10, and the stop spring 39, 41 to exert an elastic resistance to the manual actuation of the third Bowden cable 17, which is less elevated and can easily be overcome by the user by operating the release handle, or lever 47, in an emergency.

[0043] Advantageously, the device 1 is configured so that the first, second and third Bowden cable 13, 13', 17 can all three be coupled to only one same side of the device 1. This favors the installation of the device 1 and the Bowden cables 13, 13', 17.

[0044] According to one embodiment, a telescopic transmission rod 42 is arranged between the sliding body 10 and the electric restore actuator 20, slidingly compactable in a shortened configuration (figure 4), wherein the transmission rod 42 can transmit an axial compression force from the restore actuator 20 to the sliding body 10 to reposition the sliding body 10 from the release position to the locking position, and slidingly extendable in an elongated configuration (figures 3, 7) starting from which the transmission rod 42 can house the movement of the sliding body 10 from the locking position to the release position, shortening slidingly, without transmitting movements to the restore actuator 20.

[0045] This ensures a reliable operation of the device 1 and eliminates the risk of jamming and resistance due to the internal mechanical resistance of the restore actuator 20.

[0046] According to one embodiment, the electric restore actuator 20 can be controlled, for example, by means of the control system 19 and it can comprise an electric motor 43, with or without a reducer 44, coupled to the telescopic transmission rod 42, for example, by means of an eccentric 45 (making a modified crankshaft and rod mechanism, of thrust only and without traction phase) or by means of a screw-type drive (not shown, also thrust only and without traction phase).

[0047] In the embodiment shown in the figures, in the restore step of the emergency release device 1, the eccentric 45 performs:

- a first rotation of 180° in a direction towards the sliding body 10, by means of which it positions the sliding body 10 from the release position to the locking position by means of the compacted telescopic transmission rod 42,
- a further rotation of 180° in a direction away from the sliding body 10 and by means of which it re-extends the telescopic transmission rod 42.

Description of embodiments of the door actuation system 2

[0048] With reference to figures 8 and 9, the door actuation system 2 for an inlet/outlet device, in particular a door or a ramp, which is orientable and/or translatable and similar on public transport vehicles, comprises a rotary drive 5, 5' with an electric motor 48, a first reduction gear 49 arranged on a front side of the motor 48 and connected to a front portion of a motor 48 shaft 50, a second reduction gear 51 connected to the first reduction gear 49, an outlet shaft 52 (forming the aforesaid outlet portion 6) connected to the second reduction gear 51, an automatic locking brake 8 arranged on a rear side of the motor 48 opposed to the front side and which acts on a brakeable portion 7 coupled to a rear portion 53 of the motor shaft 50, as well as a decoupler 3 connected between the brakeable portion 7 and the rear portion 53 of the motor shaft 50 and operable to decouple the brakeable portion 7 from the rear portion 53 of the motor shaft 50 to decouple the motor shaft 50 from the locking brake 8 also in the event of being unable to release the locking brake 8.

[0049] The actuation of the decoupler 3, 3' occurs by a Bowden cable 13, 13' by means of the manually operable emergency release device 1.

[0050] Actuation 1 can comprise a second decoupler

3' connected between the second reduction gear 51 and the outlet shaft 52 (forming the aforesaid outlet portion 6) and operable to decouple the outlet shaft 52 from the second reduction gear 51.

[0051] Actuation of the second decoupler 3' occurs, for example, by the same Bowden cable 13, or by means of a further Bowden cable 13', using the same manually operable emergency release device 1.

[0052] In this way, in the event of an electricity failure to open the door 4, 4' by means of the door actuation system 2 and to release the automatic locking brake 8 from the brakeable portion 7, the outlet shaft 52 can be manually decoupled from the whole motor unit 48 - first reduction gear 49 - second reduction gear 51, allowing the opening of the door 4, 4' by manual thrust.

[0053] In one embodiment, the manual emergency release device 1 is configured first to operate the first decoupler 3 and then the second decoupler 3'.

[0054] According to one aspect of the invention, a rotating column 54 is rotatably constrained to a frame 55 of the door and one or more orientable arms 56 are integrally connected on rotation to the rotating column 54 to move (open and close) a leaf 4, 4' of the door in response to a rotation of the rotating column 54. The rotary drive 5, 5' is at least partially inserted in the rotating column 54, integrally constrained on rotation to the frame 55, while the outlet shaft 52 is connected to transmit the rotary movement thereof to the rotating column 54, for example, by means of a direct anti-rotation connection 58, or by means of a transmission gear (not shown).

[0055] In the embodiment in figure 9, the locking brake 8 is arranged externally to the rotating column 54 (and preferably above an upper support thereof) and connected to the motor shaft 50 by means of a transmission portion extending from inside the rotating column 54 to the outside thereof. Such transmission portion can be formed, for example, by the aforesaid brakeable portion 11'.

[0056] An upper arm of the orientable arms 56, which commands the movement of the leaf 4, 4' of the door, can be mounted integrally on rotation and on translation to the rotating column 54 or, alternatively, the orientable arm 56 can be engaged with the rotating column 54 integrally on rotation, but translatable or adjustable in height, for example, by means of an axial guide welded to the rotating column 54 (not shown).

Claims

1. An emergency release device (1) for a door actuation system (2) with two decouplers (3, 3'), for a double-leaf door (4, 4') of the type comprising:

   - a first leaf (4), movable between an open position and a closed position by means of a first rotary drive thereof (5),
   - a second leaf (4'), movable between an open position and a closed position by means of a second rotary drive thereof (5'),

   wherein the first rotary drive (5) and the second rotary drive (5') each comprise:

   - an outlet portion (6) for transmitting the movement of the rotary drive to the leaf (4, 4'), and
   - a brakeable portion (7) coupled to the outlet portion (6),
   - an automatic locking brake (8), which acts on the brakeable portion (7) to lock the leaf (4, 4') in the closed position,
   - a decoupler (3, 3') operable to decouple the brakeable portion (7) from the outlet portion (6) to allow a manual displacement of the leaf (4, 4') towards the open position,

   OR for a single leaf door (4) of the type comprising:

   - at least one leaf (4), movable between an open position and a closed position by means of a rotary drive (5) thereof,

   wherein the rotary drive (5) comprises:

   - an outlet portion (6) for transmitting the movement of the rotary drive (5) to the leaf (4), and
   - a brakeable portion (7) coupled to the outlet portion (6),
   - an automatic locking brake (8), which acts on the brakeable portion (7) to lock the leaf (4) in the closed position,
   - a first and a second decoupler (3, 3'), operable to decouple the brakeable portion (7) from the outlet portion (6) to allow a manual displacement of the leaf (4) towards the open position,

   wherein the emergency release device (1) comprises:

   - a support structure (9),
   - a sliding body (10) connected to the support structure (9) by means of a guide device (11) in a movable manner between a locking position and a release position,
   - a first Bowden connection interface (12) arranged on the sliding body (10) for the connection of a first Bowden cable (13) for activating and deactivating a first decoupler (3) of the door actuation system (2),
   - a second Bowden connection interface (12') arranged on the sliding body (10) for the connection of a second Bowden cable (13') for activating and deactivating a second decoupler (3') of the door actuation system (2),
   - a spring device (14), which strains the sliding body (10) permanently towards the release po-

sition,
- a locking mechanism (15) connected between the support structure (9) and the sliding body (10) and movable in:

  - a locking configuration, wherein the locking mechanism (15) engages and locks the sliding body (10) in the locking position, and
  - a release configuration, wherein the locking mechanism (15) releases the sliding body (10) so that the spring device (14) moves the sliding body (10) from the locking position to the release position,

- a third Bowden connection interface (16) arranged on the locking mechanism (15) for the connection of a third Bowden cable (17) for the displacement of the locking mechanism (15) from the locking configuration to the release configuration,
- an electric restore actuator (20) connected to the support structure (9) and operable for displacing the sliding body (10), against the force of the spring device (14), from the release position to the locking position and for displacing the locking mechanism (15) from the release configuration to the locking configuration, wherein the emergency release device (1) comprises:
- said first Bowden cable (13) for activating and deactivating said first decoupler (3) of said two decouplers (3, 3'),
- said second Bowden cable (13') for activating and deactivating said second decoupler (3') of said two decouplers (3, 3'),
- said third Bowden cable (17) which, in use, is operated manually by a user by means of an emergency handle or lever.

2. An emergency release device (1) according to claim 1, wherein the guide device (11) comprises two parallel guide bars (21) extending through two guide holes (23) of the sliding block (10), and opposite ends of the two guide bars (11) are connected to two support walls (22, 22') connected to the support structure (9).

3. An emergency release device (1) according to any one of the preceding claims, wherein the first and the second Bowden coupling interfaces (12, 12') are formed by a rocker arm (26) oscillatingly connected to the sliding body (10) about a rocker arm axis (27), transverse to a translational travel direction of the sliding body (10), wherein the first and the second Bowden coupling interfaces (12, 12') are positioned on two opposite sides to the rocker arm axis (27).

4. An emergency release device (1) according to any one of the preceding claims, wherein the spring device (14) comprises two springs or two gas springs placed to exert a thrust on the sliding body (10) with safety redundancy with respect to each other.

5. An emergency release device (1) according to any one of the preceding claims, wherein the locking mechanism (15) comprises:

- a hooking lever (28) connected rotatably to the support structure (9) about a hooking axis (36), between a hooking position and a release position, forming a hooking seat (34) and a stop seat (35) arranged on two opposite sides to the hooking axis (36),
- a projection or a pin (33), integral with the sliding body (10),
- a trigger (37) connected rotatably to the support structure (9) about a trigger axis (38) between a stop position and a trigging position, forming the third Bowden coupling interface (16) and a stop portion (40),
- a stop spring (39), which strains the trigger (37) permanently towards the stop position,

wherein the hooking lever (28), the projection (33) and the trigger (37) are configured and shaped so that:

- when the trigger (37) is in the stop position, the stop portion (40) engages the stop seat (35) and stops the hooking lever (28) in the hooking position,
- when the trigger (37) is rotated against the force of the stop spring (39) from the stop position to the trigging position, the stop portion (40) disengages the stop seat (35) and allows the hooking lever (28) to rotate from the hooking position to the release position ,
- when the hooking lever (28) rotates from the hooking position to the release position, the hooking seat (34) releases the projection (33) and allows the sliding body (10) to slide from the locking position to the release position, actuating the first and the second Bowden cable (13, 13'),
- when the sliding body (10) is displaced by the restore actuator (20) from the release position to the locking position, the projection (33) engages the hooking seat (34) and rotates the hooking lever (28) from the release position to the hooking position,
- when the hooking lever (28) rotates from the release position to the hooking position, the stop spring (39) triggers the stop portion (40) of the trigger (37) in the stop seat (35) of the hooking lever (28) and stops the hooking lever (28) again in the hooking position.

6. An emergency release device (1) according to claim 5, wherein the hooking seat (34) of the hooking lever (28) comprises a first surface (30) and a second opposite surface (31), longer than the first surface (30), which mutually delimit a groove (32), wherein the first surface (30) locks and releases the projection (33) of the sliding body (10), while the second surface (31) intercepts the projection (33) during the return of the sliding body (10) from the release position to the locking position.

7. An emergency release device (1) according to claim 5 or 6, comprising a spring (29), which strains the hooking lever (28) permanently elastically towards the release position.

8. An emergency release device (1) according to claim 5, 6 or 7, comprising a further stop spring (41), which strains the trigger (37), with redundancy with respect to the stop spring (39), permanently towards the stop position.

9. An emergency release device (1) according to claim 5, 6, 7 or 8, wherein the trigger (37) forms a sensing projection (42), which switches an electric microswitch of a release detector (18) between two different switching states, depending on the position of the trigger (37).

10. An emergency release device (1) according to claim 5, 6, 7, 8 or 9, wherein the stop seat (35) of the hooking lever (28) and the stop portion (40) of the trigger (37) are positioned and shaped so that, when the trigger (37) stops in the stop position and the hooking lever (28) stops in the hooking position, a resulting support force (46) between the stop seat (35) and the stop portion (40), generated by the spring device (14), intersects the trigger axis (38) of the trigger (37).

11. An emergency release device (1) according to any one of the preceding claims, wherein the first, second and third Bowden cable (13, 13', 17) can all three be coupled to one same side of the device (1).

12. An emergency release device (1) according to any one of the preceding claims, wherein a telescopic transmission rod (42) is arranged between the sliding body (10) and the electric restore actuator (20), slidingly configurable:

- in a shortened configuration, wherein the transmission rod (42) can transmit an axial compression force from the restore actuator (20) to the sliding body (10) for repositioning the sliding body (10) from the release position to the locking position, and
- in an elongated configuration, starting from which the transmission rod (42) can house the movement of the sliding body (10) from the locking position to the release position, shortening slidingly without transmitting movements to the restore actuator (20).

13. An emergency release device (1) according to claim 12, wherein the electric restore actuator (20) comprises an electric motor (43) coupled to the telescopic transmission rod (42) by means of an eccentric (45) to make a crankshaft and rod mechanism, of thrust only and without traction phase.

14. An emergency release device (1) according to any one of the preceding claims, comprising a release detector (18) configured to detect the attainment of the release configuration and generate a corresponding electric release signal.

15. Door actuation system (2) with two decouplers (3, 3'), comprising:

- the emergency release device (1) according to any one of the preceding claims.

Patentansprüche

1. Notentriegelungsvorrichtung (1) für ein Türbetätigungssystem (2) mit zwei Entkopplungseinrichtungen (3, 3') für eine zweiflügelige Tür (4, 4') des Typs, welcher umfasst:

- einen ersten Flügel (4), welcher mittels eines ersten Drehantriebs (5) davon zwischen einer offenen Position und einer geschlossenen Position beweglich ist,
- einen zweiten Flügel (4'), welcher mittels eines zweiten Drehantriebs (5') davon zwischen einer offenen Position und einer geschlossenen Position beweglich ist,

wobei der erste Drehantrieb (5) und der zweite Drehantrieb (5') jeweils umfassen:

- einen Ausgangsabschnitt (6) zum Übertragen der Bewegung des Drehantriebs auf den Flügel (4, 4'), und
- einen zerbrechlichen Abschnitt (7), welcher mit dem Ausgangsabschnitt (6) gekoppelt ist,
- eine automatische Verriegelungsbremse (8), welche auf den zerbrechlichen Abschnitt (7) wirkt, um den Flügel (4, 4') in der geschlossenen Position zu verriegeln,
- eine Entkopplungseinrichtung (3, 3'), welche betriebsfähig ist, den zerbrechlichen Abschnitt (7) von dem Ausgangsabschnitt (6) zu entkoppeln, um eine manuelle Verlagerung des Flügels (4, 4') in Richtung der offenen Position zu erlau-

ben,

oder für eine einflügelige Tür (4) des Typs, welcher umfasst:

- wenigstens einen Flügel (4), welcher mittels eines Drehantriebs (5) davon zwischen einer offenen Position und einer geschlossenen Position beweglich ist,

wobei der Drehantrieb (5) umfasst:

- einen Ausgangsabschnitt (6) zum Übertragen der Bewegung des Drehantriebs (5) auf den Flügel (4), und
- einen zerbrechlichen Abschnitt (7), welcher mit dem Ausgangsabschnitt (6) gekoppelt ist,
- eine automatische Verriegelungsbremse (8), welche auf den zerbrechlichen Abschnitt (7) wirkt, um den Flügel (4) in der geschlossenen Position zu verriegeln,
- eine erste und eine zweite Entkopplungseinrichtung (3, 3'), welche betriebsfähig sind, den zerbrechlichen Abschnitt (7) von dem Ausgangsabschnitt (6) zu entkoppeln, um eine manuelle Verlagerung des Flügels (4) in Richtung der offenen Position zu erlauben,

wobei die Notentriegelungsvorrichtung (1) umfasst:

- eine Halterungsstruktur (9),
- einen Gleitkörper (10), welcher mittels einer Führungsvorrichtung (11) mit der Halterungsstruktur (9) in einer beweglichen Weise zwischen einer Verriegelungsposition und einer Freigabeposition gekoppelt ist,
- eine erste Bowdenzug-Verbindungsschnittstelle (12), welche an dem Gleitkörper (10) angeordnet ist, für die Verbindung eines ersten Bowdenzugs (13) zum Aktivieren und Deaktivieren einer ersten Entkopplungseinrichtung (3) des Türbetätigungssystems (2),
- eine zweite Bowdenzug-Verbindungsschnittstelle (12'), welche an dem Gleitkörper (10) angeordnet ist, für die Verbindung eines zweiten Bowdenzugs (13') zum Aktivieren und Deaktivieren einer zweiten Entkopplungseinrichtung (3') des Türbetätigungssystems (2),
- eine Federvorrichtung (14), welche den Gleitkörper (10) permanent in Richtung der Freigabeposition hin spannt,
- einen Verriegelungsmechanismus (15), welcher zwischen der Halterungsstruktur (9) und dem Gleitkörper (10) verbunden ist und beweglich ist in:

  - eine Verriegelungskonfiguration, wobei der Verriegelungsmechanismus (15) mit dem Gleitkörper (10) in Eingriff tritt und ihn in der Verriegelungsposition verriegelt, und
  - eine Freigabekonfiguration, wobei der Verriegelungsmechanismus (15) den Gleitkörper (10) freigibt, so dass die Federvorrichtung (14) den Gleitkörper (10) von der Verriegelungsposition zu der Freigabeposition bewegt,

- eine dritte Bowdenzug-Verbindungsschnittstelle (16), welche an dem Verriegelungsmechanismus (15) angeordnet ist, für die Verbindung eines dritten Bowdenzugs (17) für die Verlagerung des Verriegelungsmechanismus (15) von der Verriegelungskonfiguration zu der Freigabekonfiguration,
- einen elektrischen Rückstellaktuator (20), welcher mit der Halterungsstruktur (9) verbunden ist und betriebsfähig ist, den Gleitkörper (10) gegen die Kraft der Federvorrichtung (14) von der Freigabeposition zu der Verriegelungsposition zu verlagern und den Verriegelungsmechanismus (15) von der Freigabekonfiguration zu der Verriegelungskonfiguration zu verlagern, wobei die Notentriegelungsvorrichtung (1) umfasst:
- den ersten Bowdenzug (13) zum Aktivieren und Deaktivieren der ersten Entkopplungseinrichtung (3) der beiden Entkopplungseinrichtungen (3, 3'),
- den zweiten Bowdenzug (13') zum Aktivieren und Deaktivieren der zweiten Entkopplungseinrichtung (3') der beiden Entkopplungseinrichtungen (3, 3'),
- den dritten Bowdenzug (17), welcher in Verwendung mittels eines Notgriffs oder -hebels manuell durch einen Benutzer betätigt wird.

2. Notentriegelungsvorrichtung (1) nach Anspruch 1, wobei die Führungsvorrichtung (11) zwei parallele Führungsschienen (21) umfasst, welche sich durch zwei Führungslöcher (23) des Gleitblocks (10) erstrecken, und wobei entgegengesetzte Enden der beiden Führungsschienen (11) mit zwei Halterungswänden (22, 22') verbunden sind, welche mit der Halterungsstruktur (9) verbunden sind.

3. Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei die erste und die zweite Bowdenzug-Kopplungsschnittstelle (12, 12') durch einen Kipphebel (26) gebildet sind, welcher schwingend um eine Kipphebelachse (27), welche transversal zu einer translatorischen Fortbewegungsrichtung des Gleitkörpers (10) ist, mit dem Gleitkörper (10) verbunden ist, wobei die erste und die zweite Bowdenzug-Kopplungsschnittstelle (12, 12') an zwei entgegengesetzten Seiten der Kipphebelachse (27) positioniert sind.

4. Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei die Federvorrichtung (14) zwei Federn oder zwei Gasfedern umfasst, welche derart platziert sind, dass sie eine Schubkraft auf den Gleitkörper (10) ausüben, mit einer Sicherheitsredundanz in Bezug aufeinander.

5. Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der Verriegelungsmechanismus (15) umfasst:

- einen Einhakhebel (28), welcher drehbar mit der Halterungsstruktur (9) verbunden ist, um eine Einhakachse (36) herum, zwischen einer Einhakposition und einer Freigabeposition, wobei eine Einhakaufnahme (34) und eine Anschlagaufnahme (35) gebildet werden, welche an zwei entgegengesetzten Seiten der Einhakachse (36) angeordnet sind,
- einen Vorsprung oder einen Stift (33), welcher integral mit dem Gleitkörper (10) ist,
- eine Auslöseeinrichtung (37), welche drehbar mit der Halterungsstruktur (9) verbunden ist, um eine Auslöseeinrichtungsachse (38) herum, zwischen einer Anschlagposition und einer Auslöseposition, wobei die dritte Bowdenzug-Kopplungsschnittstelle (16) und ein Anschlagabschnitt (16) gebildet werden,
- eine Anschlagfeder (39), welche die Auslöseeinrichtung (37) permanent in Richtung der Anschlagposition hin spannt,

wobei der Einhakhebel (28), der Vorsprung (33) und die Auslöseeinrichtung (37) derart eingerichtet und geformt sind, dass:

- wenn die Auslöseeinrichtung (37) in der Anschlagposition ist, der Anschlagabschnitt (40) mit der Anschlagaufnahme (35) in Eingriff tritt und den Einhakhebel (28) in der Einhakposition stoppt,
- wenn die Auslöseeinrichtung (37) gegen die Kraft der Anschlagfeder (39) von der Anschlagposition zu der Auslöseposition gedreht wird, der Anschlagabschnitt (40) die Anschlagaufnahme (35) außer Eingriff nimmt und erlaubt, dass sich der Einhakhebel (28) von der Einhakposition zu der Freigabeposition dreht,
- wenn sich der Einhakhebel (28) von der der Einhakposition zu der Freigabeposition dreht, die Einhakaufnahme (34) den Vorsprung (33) freigibt und erlaubt, dass der Gleitkörper (10) von der Verriegelungsposition zu der Freigabeposition gleitet, wobei der erste und der zweite Bowdenzug (13, 13') betätigt werden,
- wenn der Gleitkörper (10) durch den Rückstellaktuator (20) von der Freigabeposition zu der Verriegelungsposition verlagert wird, der Vorsprung (33) mit der Einhakaufnahme (34) in Eingriff tritt und den Einhakhebel (28) von der Freigabeposition zu der Einhakposition dreht,
- wenn sich der Einhakhebel (28) von der Freigabeposition zu der Einhakposition dreht, die Anschlagfeder (39) den Anschlagabschnitt (40) der Auslöseeinrichtung (37) in der Anschlagaufnahme (35) des Einhakhebels (28) auslöst und den Einhakhebel (28) wieder in der Einhakposition stoppt.

6. Notentriegelungsvorrichtung (1) nach Anspruch 5, wobei die Einhakaufnahme (34) des Einhakhebels (28) eine erste Fläche (30) und eine zweite gegenüberliegende Fläche (31), die länger als die erste Fläche (30) ist, umfasst, welche gegenseitig eine Nut (32) begrenzen, wobei die erste Fläche (30) den Vorsprung (33) des Gleitkörpers (10) verriegelt und freigibt, während die zweite Fläche (31) den Vorsprung (33) während der Rückkehr des Gleitkörpers (10) von der Freigabeposition zu der Verriegelungsposition abfängt.

7. Notentriegelungsvorrichtung (1) nach Anspruch 5 oder 6, umfassend eine Feder (29), welche den Einhakhebel (28) permanent elastisch in Richtung der Freigabeposition hin spannt.

8. Notentriegelungsvorrichtung (1) nach Anspruch 5, 6 oder 7, umfassend eine weitere Anschlagfeder (41), welche die Auslöseeinrichtung (37) mit einer Redundanz in Bezug auf die Anschlagfeder (39) permanent in Richtung der Anschlagposition hin spannt.

9. Notentriegelungsvorrichtung (1) nach Anspruch 5, 6, 7 oder 8, wobei die Auslöseeinrichtung (37) einen Erfassungsvorsprung (42) bildet, welcher einen elektrischen Mikroschalter einer Freigabedetektionseinrichtung (18) in Abhängigkeit der Position der Auslöseeinrichtung (37) zwischen verschiedenen Schaltzuständen schaltet.

10. Notentriegelungsvorrichtung (1) nach Anspruch 5, 6, 7, 8 oder 9, wobei die Anschlagaufnahme (35) des Einhakhebels (28) und der Anschlagabschnitt (40) der Auslöseeinrichtung (37) derart positioniert und geformt sind, dass, wenn die Auslöseeinrichtung (37) in der Anschlagposition stoppt und der Einhakhebel (28) in der Einhakposition stoppt, eine durch die Federvorrichtung (14) erzeugte, resultierende Stützkraft (46) zwischen der Anschlagaufnahme (35) und dem Anschlagabschnitt (40) die Auslöseachse (38) der Auslöseeinrichtung (37) schneidet.

11. Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der erste, der zweite und der dritte Bowdenzug (13, 13', 17) alle drei mit einer selben Seite der Vorrichtung (1) gekoppelt

sein können.

12. Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei eine teleskopische Übertragungsstange (42) zwischen dem Gleitkörper (10) und dem elektrischen Rückstellaktuator (20) angeordnet ist, welche gleitend konfigurierbar ist:

- in eine verkürzte Konfiguration, wobei die Übertragungsstange (42) eine axiale Druckkraft von dem Rückstellaktuator (20) auf den Gleitkörper (10) übertragen kann, um den Gleitkörper (10) von der Freigabeposition zu der Verriegelungsposition neu zu positionieren, und
- in eine verlängerte Konfiguration, beginnend von welcher die Übertragungsstange (42) die Bewegung des Gleitkörpers (10) von der Verriegelungsposition zu der Freigabeposition aufnehmen kann, wobei sie sich gleitend verkürzt, ohne Bewegungen auf den Rückstellaktuator (20) zu übertragen.

13. Notentriegelungsvorrichtung (1) nach Anspruch 12, wobei der elektrische Rückstellaktuator (20) einen Elektromotor (43) umfasst, welcher mittels eines Exzenters (45) mit der teleskopischen Übertragungsstange (42) gekoppelt ist, um einen Kurbelwelle-Stange-Mechanismus mit nur einer Schubkraft und ohne eine Zugkraftphase zu bilden.

14. Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, umfassend eine Freigabedetektionseinrichtung (18), welche dazu eingerichtet ist, das Erreichen der Freigabekonfiguration zu detektieren und ein entsprechendes elektrisches Freigabesignal zu erzeugen.

15. Türbetätigungssystem (2) mit zwei Entkopplungseinrichtungen (3, 3'), umfassend:

- die Notentriegelungsvorrichtung (1) nach einem der vorhergehenden Ansprüche.

Revendications

1. Dispositif de libération d'urgence (1) pour un système d'actionnement de porte (2) avec deux découpleurs (3, 3'), pour une porte à double battant (4, 4') du type comprenant :

- un premier battant (4), mobile entre une position ouverte et une position fermée au moyen d'un premier entraînement rotatif de celui-ci (5),
- un second battant (4'), mobile entre une position ouverte et une position fermée au moyen d'un second entraînement rotatif de celui-ci (5'),

dans lequel le premier entraînement rotatif (5) et le second entraînement rotatif (5') comprennent chacun :

- une portion de sortie (6) pour la transmission du mouvement de l'entraînement rotatif au battant (4, 4'), et
- une portion pouvant être freinée (7) couplée à la portion de sortie (6),
- un frein de verrouillage automatique (8) qui agit sur la portion pouvant être freinée (7) pour verrouiller le battant (4, 4') dans la position fermée,
- un découpleur (3, 3') actionnable pour découpler la portion pouvant être freinée (7) de la portion de sortie (6) pour permettre un déplacement manuel du battant (4, 4') vers la position ouverte,

OU pour une porte à un seul battant (4) du type comprenant :

- au moins un battant (4), mobile entre une position ouverte et une position fermée au moyen d'un entraînement rotatif (5) de celui-ci,

dans lequel l'entraînement rotatif (5) comprend :

- une portion de sortie (6) pour la transmission du mouvement de l'entraînement rotatif (5) au battant (4), et
- une portion pouvant être freinée (7) couplée à la portion de sortie (6),
- un frein de verrouillage automatique (8) qui agit sur la portion pouvant être freinée (7) pour verrouiller le battant (4) dans la position fermée,
- un premier et un second découpleur (3, 3') actionnables pour découpler la portion pouvant être freinée (7) de la portion de sortie (6) pour permettre un déplacement manuel du battant (4) vers la position ouverte,

dans lequel le dispositif de libération d'urgence (1) comprend :

- une structure de support (9),
- un corps coulissant (10) relié à la structure de support (9) au moyen d'un dispositif de guidage (11) de manière mobile entre une position de verrouillage et une position de libération,
- une première interface de liaison Bowden (12) agencée sur le corps coulissant (10) pour la liaison d'un premier câble Bowden (13) pour l'activation et la désactivation d'un premier découpleur (3) du système d'actionnement de porte (2),

- une deuxième interface de liaison Bowden (12') agencée sur le corps coulissant (10) pour la liaison d'un deuxième câble Bowden (13') pour l'activation et la désactivation d'un second découpleur (3') du système d'actionnement de porte (2),
- un dispositif de ressort (14) qui tend le corps coulissant (10) en permanence vers la position de libération,
- un mécanisme de verrouillage (15) relié entre la structure de support (9) et le corps coulissant (10) et mobile dans :

  - une configuration de verrouillage, dans lequel le mécanisme de verrouillage (15) met en prise et verrouille le corps coulissant (10) dans la position de verrouillage, et
  - une configuration de libération, dans lequel le mécanisme de verrouillage (15) libère le corps coulissant (10) de sorte que le dispositif de ressort (14) déplace le corps coulissant (10) de la position de verrouillage dans la position de libération,

- une troisième interface de liaison Bowden (16) agencée sur le mécanisme de verrouillage (15) pour la liaison d'un troisième câble Bowden (17) pour le déplacement du mécanisme de verrouillage (15) de la configuration de verrouillage dans la configuration de libération,
- un actionneur de restauration électrique (20) relié à la structure de support (9) et actionnable pour le déplacement du corps coulissant (10), contre la force du dispositif de ressort (14), de la position de libération dans la position de verrouillage et pour le déplacement du mécanisme de verrouillage (15) de la configuration de libération dans la configuration de verrouillage,

dans lequel le dispositif de libération d'urgence (1) comprend :

- ledit premier câble Bowden (13) pour l'activation et la désactivation dudit premier découpleur (3) desdits deux découpleurs (3, 3'),
- ledit deuxième câble Bowden (13') pour l'activation et la désactivation dudit second découpleur (3') desdits deux découpleurs (3, 3'),
- ledit troisième câble Bowden (17) qui, en utilisation, est actionné manuellement par un utilisateur au moyen d'un manche ou levier d'urgence.

2. Dispositif de libération d'urgence (1) selon la revendication 1, dans lequel le dispositif de guidage (11) comprend deux barres de guidage parallèles (21) s'étendant à travers deux trous de guidage (23) du bloc coulissant (10), et des extrémités opposées des deux barres de guidage (11) sont reliées aux deux parois de support (22, 22') reliées à la structure de support (9).

3. Dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes, dans lequel les première et deuxième interfaces de couplage Bowden (12, 12') sont formées par un bras oscillant (26) relié de manière oscillante au corps coulissant (10) autour d'un axe de bras oscillant (27), transversalement à une direction de déplacement de translation du corps coulissant (10), dans lequel les première et deuxième interfaces de couplage Bowden (12, 12') sont positionnées sur deux côtés opposés à l'axe de bras oscillant (27).

4. Dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes, dans lequel le dispositif de ressort (14) comprend deux ressorts ou deux ressorts à gaz placés pour exercer une poussée sur le corps coulissant (10) avec une redondance de sécurité l'un par rapport à l'autre.

5. Dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de verrouillage (15) comprend :

- un levier d'accrochage (28) relié de manière rotative à la structure de support (9) autour d'un axe d'accrochage (36), entre une position d'accrochage et une position de libération, formant un siège d'accrochage (34) et un siège d'arrêt (35) agencé sur deux côtés opposés à l'axe d'accrochage (36),
- une projection ou une broche (33) formé(e) d'un seul tenant du corps coulissant (10),
- un déclencheur (37) relié de manière rotative à la structure de support (9) autour d'un axe de déclencheur (38) entre une position d'arrêt et une position de déclenchement, formant la troisième interface de couplage Bowden (16) et une position d'arrêt (40),
- un ressort d'arrêt (39) qui tend le déclencheur (37) en permanence vers la position d'arrêt,

dans lequel le levier d'accrochage (28), la projection (33) et le déclencheur (37) sont configurés et formés de sorte que :

- lorsque le déclencheur (37) est dans la position d'arrêt, la portion d'arrêt (40) met en prise le siège d'arrêt (35) et arrête le levier d'accrochage (28) dans la position d'accrochage,

- lorsque le déclencheur (37) est tourné contre la force du ressort d'arrêt (39) de la position d'arrêt dans la position de déclenchement, la portion d'arrêt (40) met hors prise le siège d'arrêt (35) et permet au levier d'accrochage (28) de tourner de la position d'accrochage dans la position de libération,
- lorsque le levier d'accrochage (28) tourne de la position d'accrochage dans la position de libération, le siège d'accrochage (34) libère la projection (33) et permet au corps coulissant (10) de coulisser de la position de verrouillage dans la position de libération, actionnant les premier et deuxième câbles Bowden (13, 13'),
- lorsque le corps coulissant (10) est déplacé par l'actionneur de restauration (20) de la position de libération dans la position de verrouillage, la projection (33) met en prise le siège d'accrochage (34) et tourne le levier d'accrochage (28) de la position de libération dans la position d'accrochage,
- lorsque le levier d'accrochage (28) tourne de la position de libération dans la position d'accrochage, le ressort d'arrêt (39) déclenche la portion d'arrêt (40) du déclencheur (37) dans le siège d'arrêt (35) du levier d'accrochage (28) et arrête le levier d'accrochage (28) de nouveau dans la position d'accrochage.

6. Dispositif de libération d'urgence (1) selon la revendication 5, dans lequel le siège d'accrochage (34) du levier d'accrochage (28) comprend une première surface (30) et une seconde surface opposée (31), plus longue que la première surface (30), qui délimitent mutuellement une rainure (32), dans lequel la première surface (30) verrouille et libère la projection (33) du corps coulissant (10) alors que la seconde surface (31) intercepte la projection (33) pendant le retour du corps coulissant (10) de la position de libération dans la position de verrouillage.

7. Dispositif de libération d'urgence (1) selon la revendication 5 ou 6, comprenant un ressort (29) qui tend le levier d'accrochage (28) en permanence élastiquement vers la position de libération.

8. Dispositif de libération d'urgence (1) selon la revendication 5, 6 ou 7, comprenant un autre ressort d'arrêt (41) qui tend le déclencheur (37), avec une redondance par rapport au ressort d'arrêt (39), en permanence vers la position d'arrêt.

9. Dispositif de libération d'urgence (1) selon la revendication 5, 6, 7 ou 8, dans lequel le déclencheur (37) forme une projection de détection (42) qui commute un micro-commutateur électrique d'un détecteur de libération (18) entre deux états de commutation différents, selon la position du déclencheur (37).

10. Dispositif de libération d'urgence (1) selon la revendication 5, 6, 7, 8 ou 9, dans lequel le siège d'arrêt (35) du levier d'accrochage (28) et la portion d'arrêt (40) du déclencheur (37) sont positionnés et formés de sorte que, lorsque le déclencheur (37) s'arrête dans la position d'arrêt et le levier d'accrochage (28) s'arrête dans la position d'accrochage, une force de support résultante (46) entre le siège d'arrêt (35) et la portion d'arrêt (40), générée par le dispositif de ressort (14), croise l'axe de déclencheur (38) du déclencheur (37).

11. Dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes, dans lequel les premier, deuxième et troisième câbles Bowden (13, 13', 17) peuvent être couplés tous les trois à un même côté du dispositif (1).

12. Dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes, dans lequel une tige de transmission télescopique (42) est agencée entre le corps coulissant (10) et l'actionneur de restauration électrique (20), configurable de manière coulissante :

- dans une configuration raccourcie, dans laquelle la tige de transmission (42) peut transmettre une force de compression axiale de l'actionneur de restauration (20) au corps coulissant (10) pour le repositionnement du corps coulissant (10) de la position de libération dans la position de verrouillage, et
- dans une configuration allongée, à partir de laquelle la tige de transmission (42) peut abriter le mouvement du corps coulissant (10) de la position de verrouillage dans la position de libération, se raccourcissant de manière coulissante sans transmettre de mouvements à l'actionneur de restauration (20).

13. Dispositif de libération d'urgence (1) selon la revendication 12, dans lequel l'actionneur de restauration électrique (20) comprend un moteur électrique (43) couplé à la tige de transmission télescopique (42) au moyen d'une excentrique (45) pour fabriquer un mécanisme de vilebrequin et tige, de poussée seulement et sans phase de traction.

14. Dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes, comprenant un détecteur de libération (18) configuré pour détecter l'atteinte de la configuration de libération et générer un signal de libération électrique correspondant.

15. Système d'actionnement de porte (2) avec deux découpleurs (3, 3') comprenant :

- le dispositif de libération d'urgence (1) selon l'une quelconque des revendications précédentes.

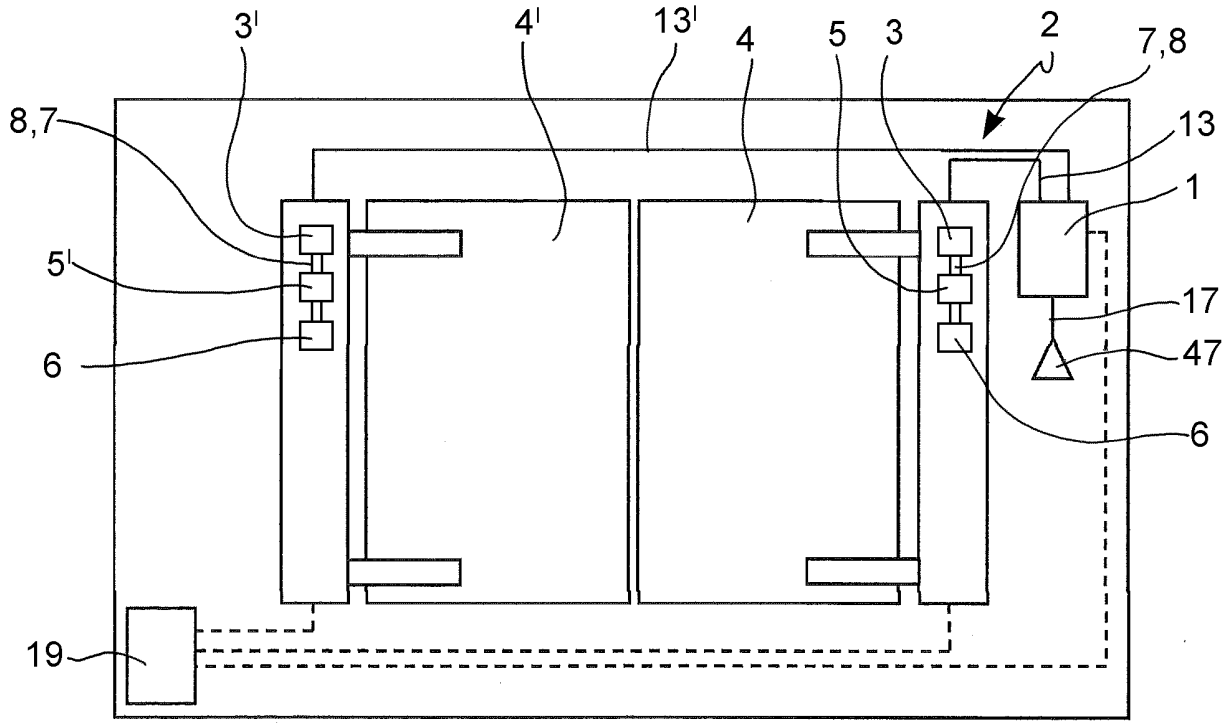
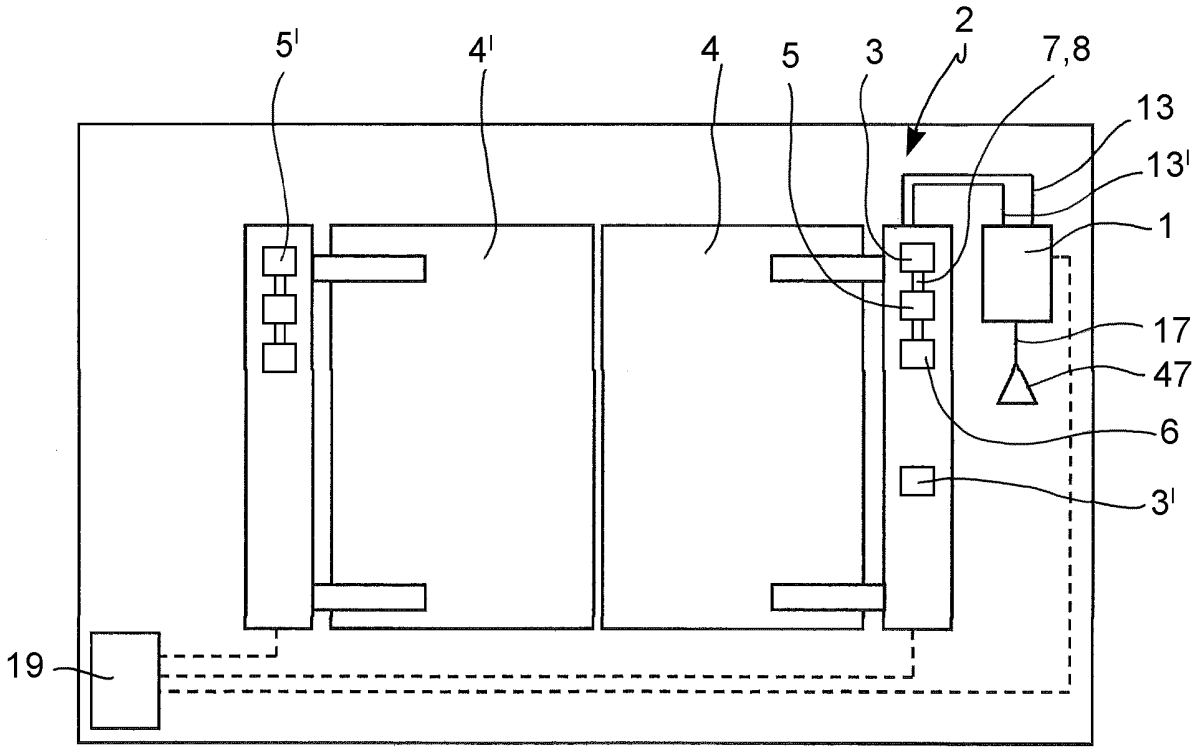

3I
4I
13I
4
5
3
2
7,8
8,7
13
1
5I
17
6
47
6
19

FIG. 1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5
3
2
7,8
13
13I
1
17
47
6
3I
19

FIG. 2

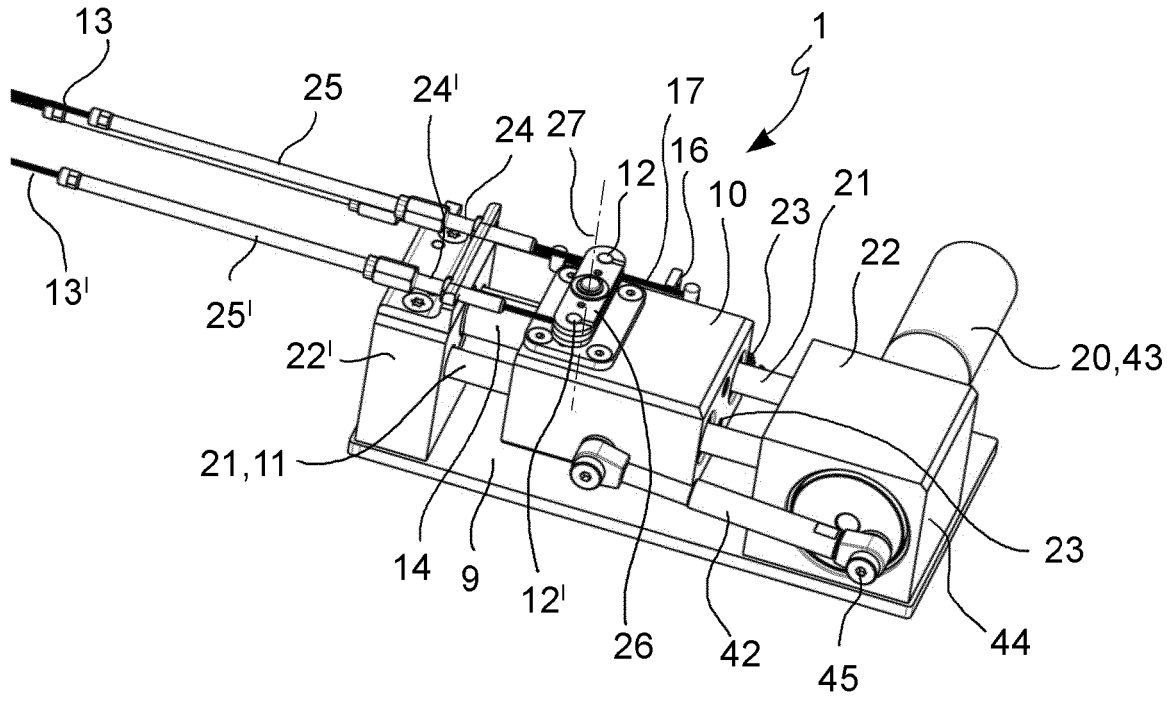

13
25
24'
24
27
17
1
16
12
10
23
21
22
13'
25'
22'
20,43
21,11
23
14
9
12'
26
42
45
44

FIG. 3

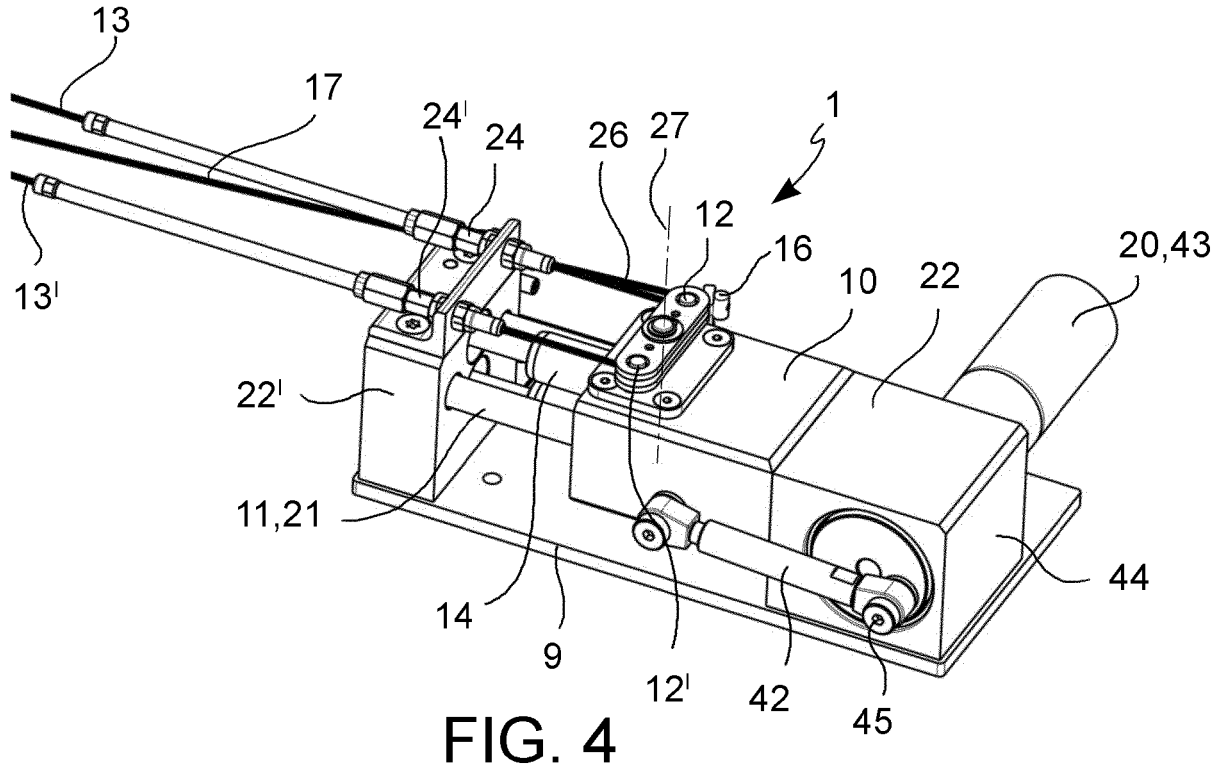
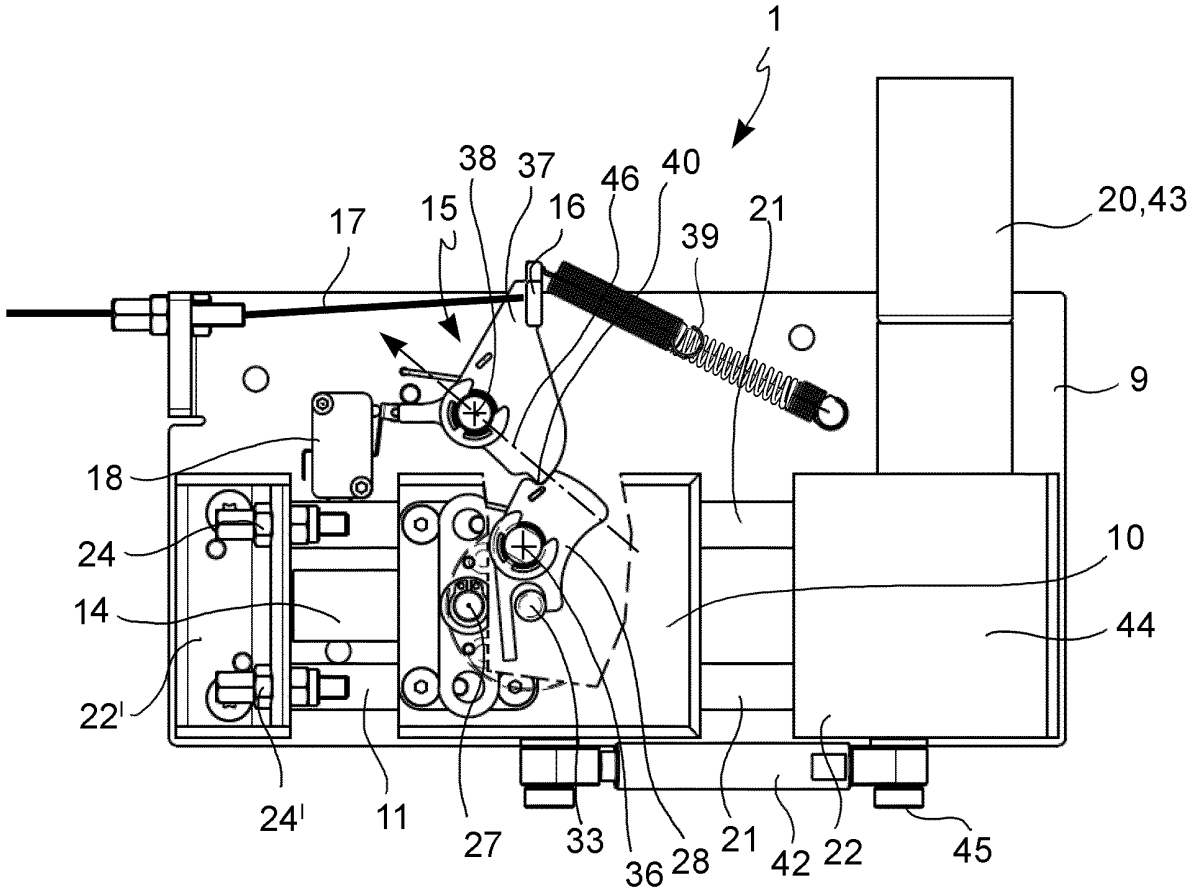

13
17
24'
24
26
27
1
12
16
20,43
10
22
13'
22'
11,21
44
14
9
12'
42
45

FIG. 4


1
38
37
46
40
15
16
17
39
21
20,43
9
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14
22'
10
44
24'
11
27
33
36
28
21
42
22
45

FIG. 5

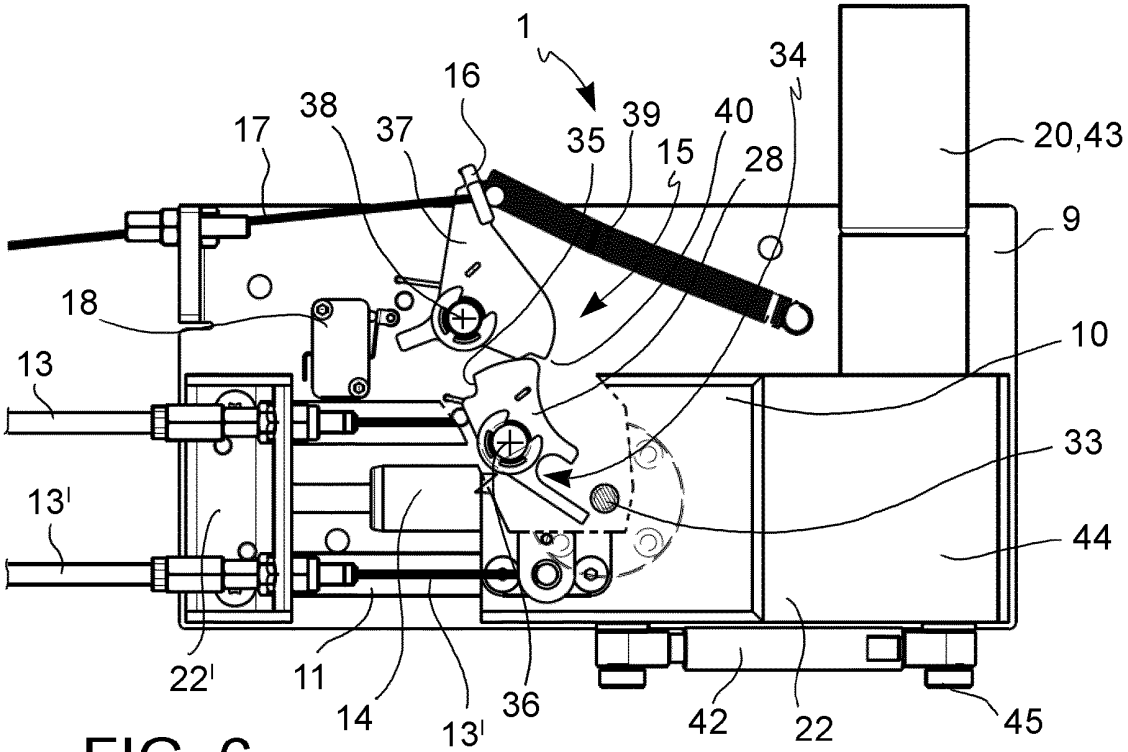

1
34
16
38
17
37
35
39
40
15
28
20,43
9
18
10
13
33
13'
44
22'
11
14
13'
36
42
22
45

FIG. 6

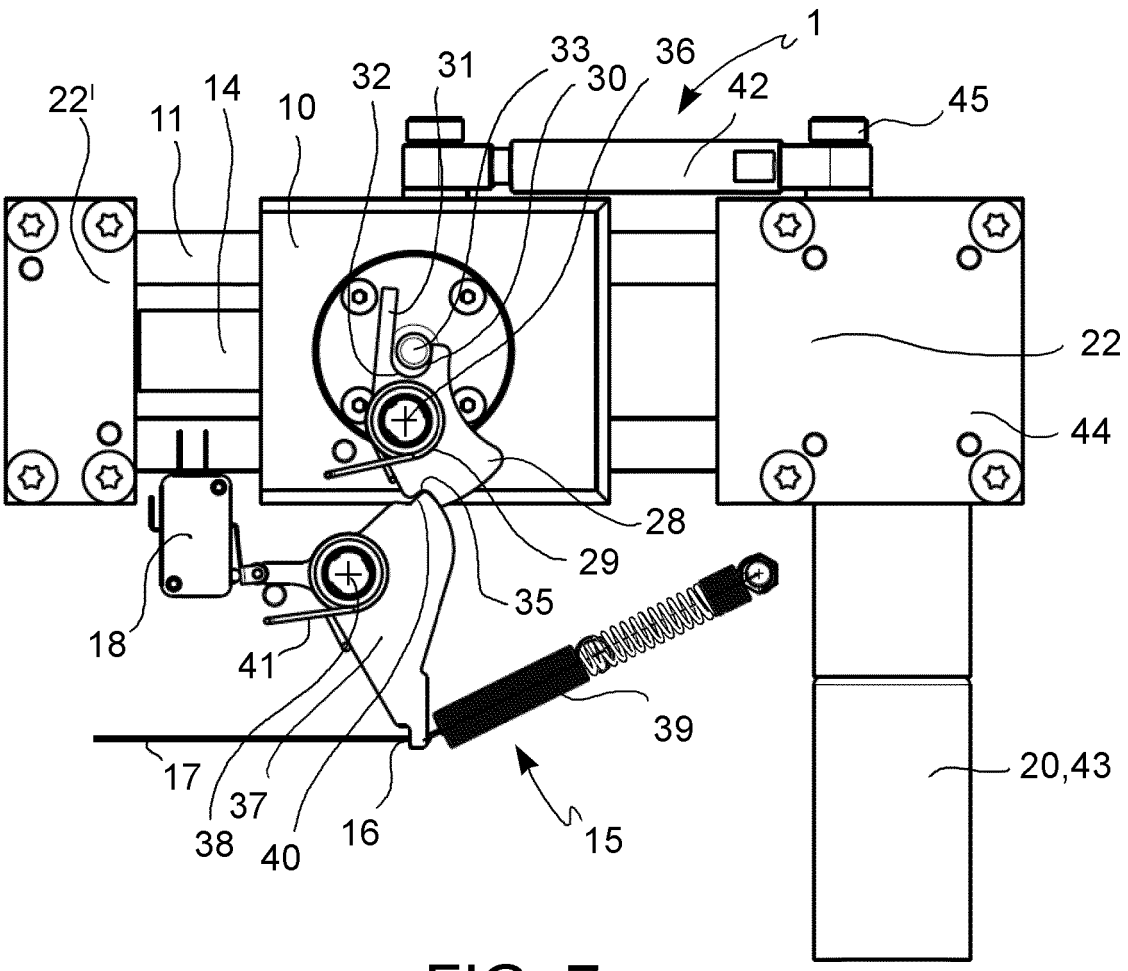


FIG. 7

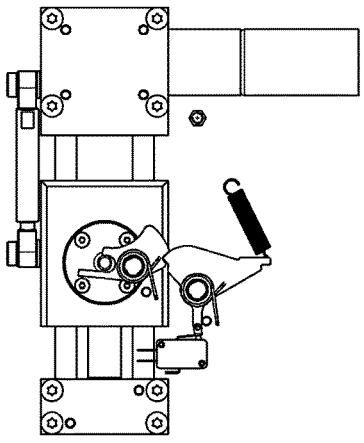


FIG. 10

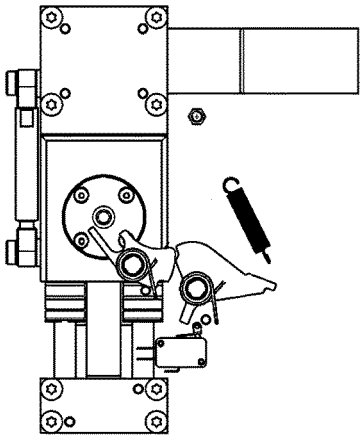


FIG. 11

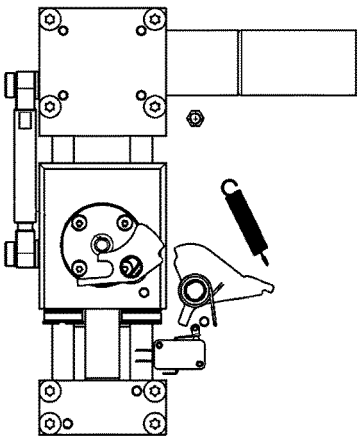


FIG. 12

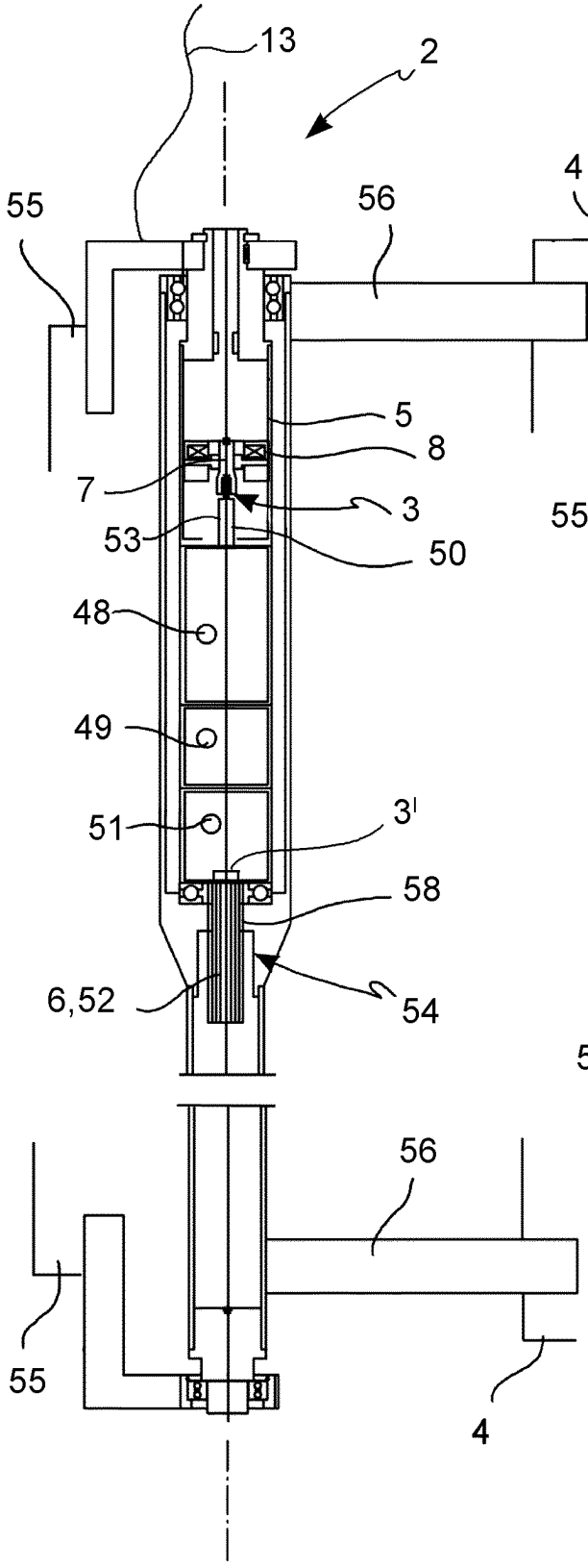
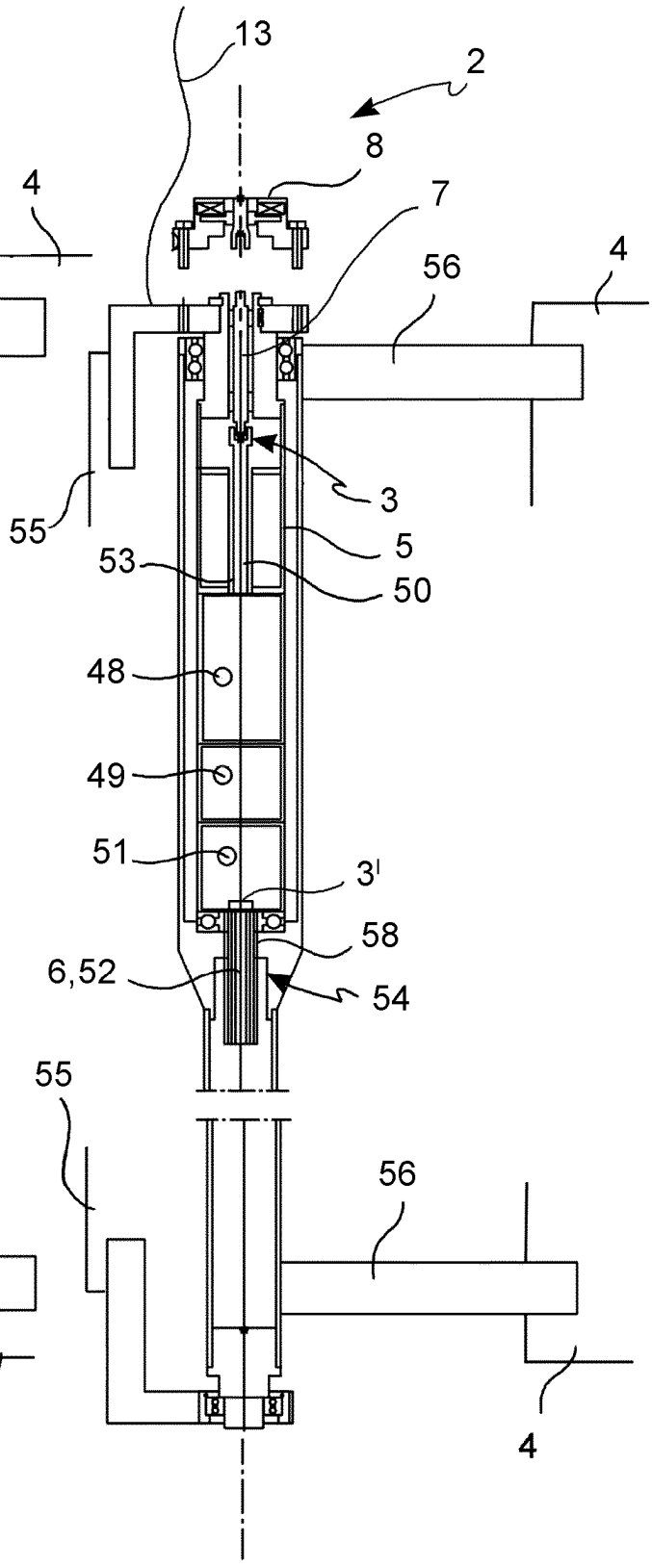

13
2
55
56
4
5
8
7
3
53
50
48
49
51
3'
58
6,52
54
56
55
4

FIG. 8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8
7
4
56
55
3
5
53
50
48
49
51
3'
58
6,52
54
55
56
4

FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2803801 A1 **[0009]**
- US 7185459 B2 **[0013]**
- WO 2018049002 A1 **[0013]**