(19) DANMARK

(10) **DK/EP 3445929 T3**

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***E 05 B 53/00 (2006.01)*** ***E 05 B 13/00 (2006.01)*** ***E 05 B 45/06 (2006.01)*** ***E 05 B 63/00 (2006.01)*** ***E 05 B 63/24 (2006.01)*** ***E 05 B 65/10 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2022-09-19**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2022-07-13**

(86) Europæisk ansøgning nr.: **17719738.1**

(86) Europæisk indleveringsdag: **2017-04-18**

(87) Den europæiske ansøgnings publiceringsdag: **2019-02-27**

(86) International ansøgning nr.: **NL2017050241**

(87) Internationalt publikationsnr.: **WO2017183966**

(30) Prioritet: **2016-04-19 NL 2016633**

(84) Designerede stater: **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**

(73) Patenthaver: **Remko Mark B.V., Onderstalstraat 3, 6674 ME Herveld, Holland**

(72) Opfinder: **FREYE, Bastian, c/o Onderstalstraat 3, 6674 ME Herveld, Holland**

(74) Fuldmægtig i Danmark: **NORDIC PATENT SERVICE A/S, Bredgade 30, 1260 København K, Danmark**

(54) Benævnelse: **DØR FORSYNET MED MINDST EN LÅS**

(56) Fremdragne publikationer:
EP-A1- 0 388 379
WO-A1-2004/063503
NL-C- 2 006 122

DESCRIPTION

[0001] The invention relates to a door, provided with at least one latch, wherein said latch is provided with means for moving the latch automatically from a door-releasing position to a door-locking position, for instance when an ambient temperature reaches a particular threshold value or in case of detection of smoke, the door being provided with unlocking means for unlocking the door, wherein the unlocking means can be brought from a passive condition, in which the door can not be unlocked via the unlocking means to an active, operating condition for unlocking the door, wherein the door is provided with at least one actuator.

[0002] Such a door is known from, for instance, European patent application EP 0 156 044. This known door comprises a fire door, provided with a latch which is retained by a fusible material in a door-releasing position. With the latch in this position, the door is released by the latch for normal use. When the fusible material is melted under the influence of, for instance, a relatively high temperature of a fire, the latch is automatically moved back by a spring to the locking position, for interlocking the door to a door post.

[0003] With the known door, the latch is coupled to the unlocking means for unlocking the door after the automatic door locking has come into action. An advantage of such a door is that it can be fixed automatically during a fire to prevent the fire from spreading rapidly and to prevent persons from entering the space closed off by the door when the fire prevails therein. In addition, such a door can still be easily unlocked so that persons present in a space closed off by that door can still escape from that space to save themselves.

[0004] A drawback of the known door is that the position of the unlocking means is not well defined during normal use of the door, which can lead to a user of the door becoming confused. For instance, it will not be clear to him whether he should use the unlocking means for opening and closing the door. Furthermore, a user can bring the unlocking means into a position such that these means counteract or block an automatic movement of the latch, as a result of which the desired action of the latch is undone. Further, the unlocking means have no useful function when the latch is still retained in the releasing position by the fusible material.

[0005] In order to solve such problems, WO2004/063503 has proposed a door wherein under the influence of fire detecting means, the unlocking means can be brought from a passive condition to an active, operating condition for unlocking the door.

[0006] In this manner, a lockable door is provided which is safe in use while misunderstandings relative to the operation and function of the unlocking means can be well prevented. During normal use of the door, the unlocking means are in the passive condition mentioned. As a result, during normal use, the unlocking means experience no or hardly any wear. The door can then be used as, for instance, a normal door, a walk-through door, a door that can be opened via an electronic lock or the like. In the passive condition, the unlocking means can for instance be unmovable, be located behind a screen and/or be substantially

inaccessible, unreachable and/or invisible from a surroundings. In this passive condition, the door cannot be unlocked via the unlocking means. A further advantage is that in the passive condition, the unlocking means can be well usable as a door pusher, door handle, door knob or the like for opening and closing the door. To this end, the unlocking means can comprise, for instance, a push- and/or pull rod, a door knob or the like.

[0007] According to WO2004/063503, during a fire, the door is automatically locked by this latch, so that the door, as a fire door, can form a good fire retardant. This automatic locking can for instance also take place under the influence of the above-mentioned fire detecting means. During the movement of the latch, the unlocking means are preferably entirely or partly in the passive condition. As a result, the door can be automatically fixed in case of fire.

[0008] Upon detection of fire, under the influence of the fire detecting means, the unlocking means are automatically brought in the active, operational condition. As a result, the door can be unlocked by means of the unlocking means, for instance by persons seeking refuge.

[0009] In one embodiment, shown in Figure 5 of WO'503, the door includes an actuator, particularly an actuator having a first actuator state for keeping the latch in its door-releasing position and a second actuator state for moving the latch to the door-locking position. Also, the embodiment comprises an additional actuator for pulling a pin from a passageway of a handle coupling arm, to release the unlocking means.

[0010] The present invention contemplates a further improvement of the innovative door. Particularly, the invention aims at providing a more user friendly door, being easy and safe to handle both before, during and after a fire detection.

[0011] According to an aspect of the present invention, to this aim, there is provided a door that is characterized by the features of claim 1.

[0012] The configuration is such that the unlocking means can be brought from said active condition back into said passive condition.

[0013] In this way, the change of operating condition of the unlocking means (from passive to active) is reversible. In this way, the unlocking means can return to their passive condition, for example under the influence of door controlling means (e.g. fire detection means), after a detected fire has been distinguished and/or a fire alarm has been stopped. More particularly, in this way, the door can be used in combination with e.g. an electronic fire detection system or similar (particularly remote) fire detection or door controlling means, that can provide a temporary test alarm to set the door in a fire detected mode in which the respective at least one latch is automatically brought to the door-locking position and in which the respective unlocking means are brought from their passive condition to the active, operating condition for unlocking the door. The door controlling means (e.g. fire detection system) and the door can be configured such, that after termination of the test alarm, the door returns to its initial state in which each respective latch returns to its door-releasing position, and the respective unlocking

means return to their passive condition. Thus, the door is again operable in the same way as before the test alarm, providing significant user convenience. For example, the door does not have to be replaced or serviced by service personnel after a false fire alarm (the false alarm leading to latch activation as well as activation of the respective unlocking means).

[0014] The door is provided with (i.e. is associated with) at least an actuator for bringing the unlocking means from said active condition back into said passive condition. The same actuator can also be configured to initially bring the unlocking means from the passive condition to the active condition. The skilled person will appreciate that the actuator can be configured in various ways. It is preferred that the actuator has to be electrically powered to hold the unlocking means in their passive condition, wherein it is more preferred that the actuator automatically brings the unlocking means to their active condition in case actuator power fails or significantly reduced from operation power (for example, in case of a local power outage).

[0015] In an embodiment, the door may include a single actuator for operating the latch and respective unlocking means, the door further including for example one or more linkages and connections for connecting the actuator to the latch and respective unlocking means to provide proper operation thereof. Alternatively, the door may include at least an actuator for operating a latch, as well as an additional actuator for operating the respective unlocking means (associated with that latch).

[0016] It will be appreciated that the door can be delivered in a preassembled way, or in parts. The door can be sold as, for instance, an assembly kit. In addition, for instance the unlocking means, controlling means and/or fire detecting means can be sold separately for converting a door provided with at least one latch into a door according to the present invention.

[0017] Further elaborations of the invention are described in the dependent claims. Presently, the invention will be elucidated with reference to exemplary embodiments and the drawing. In the drawing:

Fig. 1 shows a cross-sectional view of an exemplary embodiment of the invention, wherein the handle 2 is in a passive condition;

Fig. 2 shows a similar view to Fig. 1, while the door latch is moved to the locking position and the handle is in an active, operating condition;

Fig. 3 shows a similar view to Fig. 2, while the unlocking handle has been pulled in a direction away from the door;

Fig. 4 shows a schematic cross-sectional view of a second exemplary embodiment of the invention;

Fig. 5 depicts part of a third embodiment; with the unlocking means in an active condition;

Fig. 6 depicts part of a fourth embodiment, with the unlocking means in a passive condition;

and

Fig. 7 depicts the fourth embodiment, the unlocking means being in an active condition.

[0018] In the present application, the same or corresponding features are denoted by the same or similar reference signs.

[0019] Fig. 1 shows a cross-sectional view of an exemplary embodiment of the invention. The drawing schematically depicts part of a door 3, provided with at least one latch 1, wherein the door includes or is associated with means 50, 8 for moving the latch 1 automatically from a door-releasing position to a door-locking position under the influence of fire and/or smoke, for instance when an ambient temperature reaches a particular threshold value or in case of detection of smoke.

[0020] The door includes unlocking means 2 for unlocking the door. Under the influence of door controlling means 101, particularly and alarm system and/or fire detecting means 101, the unlocking means 2 can be brought from a passive condition (see Fig. 1), in which the door can not be unlocked via the unlocking means 2 to an active, operating condition (shown in Figures 2-3) for unlocking the door 3.

[0021] Advantageously, the configuration of the door is such that the unlocking means 2 can be brought from said active condition back into said passive condition. This can be achieved in various ways, as will be appreciated by the skilled person. Non-limiting examples are depicted in the present drawings.

[0022] In particular, as will follow from the drawings and as is explained here-below, the actuator(s) and unlocking means 2 may be configured to cooperate such that the unlocking means are held in their passive condition when the actuator(s) is/are in its respective first actuator state, and such that the unlocking means are in their active condition when the actuator/actuators is/are in a second actuator state. In some examples, the actuator may include a movable actuator part 51 that is linked to the latch via a coupling means, particularly for holding the latch in its door-releasing position against a spring force when the movable actuator part 51 is in a first position. In that case it is preferred (but not required) that the movable actuator part 51 is also linked to the unlocking means for the controlling the condition of the unlocking means, so that a single actuator can perform various functions. Particularly, a highly advantageous embodiment of the door includes or is associated with a single electrically controllable actuator 50 for operating both the latch 1 as well as the blocking and release of the unlocking means 2.

[0023] The exemplary embodiment shown in Figures 1-3 comprises a door 3 disposed along a door post (or door frame or frame part) 11, which is provided in an upper part with said latch 1. In Fig. 1, the latch is in a releasing position, the latch 1 being substantially in the door 3 so that the door 3 can move along the post 11 for the purpose of a normal use of the door 3.

[0024] The door includes a single actuator 50, particularly actuator having a first actuator state (shown in Fig. 1) for keeping the latch 1 in its door-releasing position and a second actuator state for moving the latch to the door-locking position.

[0025] As follows from the drawing, the actuator 50 may include a movable actuator part 51 that is linked to the latch 1 via a coupling means 31, 7, 23, particularly for holding the latch 1 in its door-releasing position against a spring force (of spring means 8) when the movable actuator part is in a first position. In the example, said coupling means include a linkage system, particularly having elongated flexible non-elastic connection means 23, 31 (e.g. cords, chains) and an intermediate securing element 7.

[0026] For example (as in this embodiment), the actuator 50 may be a linear solenoid actuator, having a linearly translatable actuator element (plunger) 51 and one or more electrically powered coils 52 (power can be delivered via a suitable power supply 53) for controlling the position of the actuator element, aided by spring force of optional respective spring means 54. In the example, when the actuator 50 is powered by the power source 53, the actuator element 51 is held in the depicted retracted state, against the spring force of the spring means 54, and against the spring force of the latch spring 8. In case power to the actuator 50 is e.g. cut-off, actuator element 51 is moved by the spring means 54, 8 so that the latch 1 moves to a locking position, extending partly outside the door (as in Fig. 2).

[0027] It should be noted that the particular actuator spring 54 is optional. In the present embodiment, the spring means 8 of the latch 1 can be configured for moving both the actuator element 51 and latch 1, without assistance of a dedicated actuator spring.

[0028] Actuator power supply can be configured in various ways. For example, it can include an electrical power source that is integrated in the door, or it can be a remote power source for feeding power to the actuator via a power line/cable 53, or differently. In the example, the power supply is part of or provided by the door control-system 101, for example an electronic alarm system and/or fire detection system.

[0029] The door controlling means 101 can be (part of) an alarm system, for example a fire detection system (know per se), having e.g. one or more automatic alarm generating means (e.g. one or more fire detectors) and/or one or more alarm generating means controllable via a user interface (e.g. an emergency button), and/or test alarm activation means (e.g. a user terminal or test alarm switch).

[0030] The door controlling means 101 can be configured to operate in a non-alarm (idle) mode, for example powering the actuator 50 to keep the latch 1 in the door-releasing position. The door controlling means 101 can be configured to enter an alarm mode in which an alarm signal has been received or detected by the system 101 (e.g. a test alarm signal, an actual fire detection signal or the like), wherein the door controlling means 101 brings the actuator 50 in its second actuator state (e.g. by cutting-of power to the actuator 50) so that the latch moves to

its door-locking position.

[0031] In the locking position mentioned, the door 3 is locked to the post by the latch 1, at least with the door in closed position represented in Fig. 2. As shown in Figs. 1 - 3, the part of the latch 1 projecting outside the door 3 in the locking position is provided with a beveled edge, so that the door 3 can be moved with the latch 1 along the post 11 when the door 3 is brought from an opened position (not shown) to the closed position. In that case, the latch 1 can lock the door 3 to the post 11.

[0032] In this example, one side of the door 3 is provided with an unlocking handle 2, which is located at a distance from the latch 1. Preferably, the unlocking handle 2 is at an average users' height, for instance on or near half the height of the door, depending on the dimensions of the door. In a particular advantageous embodiment, the unlocking means (handle) 2 can be located for example at least at a level between about 0.5 to 1.5 meter above a floor level. In a further example, the unlocking means can include a handle or pusher bar that extends vertically along substantially the entire door's height.

[0033] In this example by the one end, the unlocking handle 2 is pivotally coupled about a horizontal pivot 12. The other end of the handle 2 extends in a slidable manner in a somewhat flexible support profile 14 fitted on the door 3. Furthermore, this other end of the handle 2 is provided with a coupling arm 13 extending into the door 3.

[0034] In the present examples, the unlocking means 2 comprise spring means 41 configured to counteract unlocking operation using a spring force. Such spring means 41 can be configured in various ways (optionally, they may be integrated in of provided by the flexible support profile 14) as will be appreciated by the person skilled in the art. In Figures 1, 2, the unlocking means 2 are in their initial (exit) position, and the respective spring means 41 are in an initially unloaded spring condition. Manual operation of the unlocking means 2 for retracting the respective latch 1 (as in Figure 3) is counteracted by these spring means 41, allowing the unlocking means 2 to return to their initial position (as in Figure 2) after an operator has released the unlocking means 2. In the present example, the spring means 41 of the unlocking means 2 are configured to allow movement of the unlocking means 2 in two substantially opposite directions (i.e. a first direction towards an opposite outer surface of the door 3 and a second direction AR away from that door, the movement in this second direction being shown in Figure 3 by arrow AR).

[0035] As mentioned earlier, in this example, under the influence of the control system 101, the handle 2 can be brought from a passive condition represented in Fig. 1 to an active, operating condition represented in Figs. 2 - 3. The handle 2 can be manually operated for unlocking the door only in the active, operating condition, and not in the passive condition.

[0036] In Fig. 1, the handle coupling arm 13 has been secured to a cross beam 19 provided in the door 3 so that the handle 2 cannot be operated for moving the latch 1 to the releasing position.

[0037] As follows from the drawings,- in said passive condition - said unlocking means are coupled in a substantially unmovable manner to the door 3 by means of a disconnectable connection, said disconnectable connection 7 being disconnectable under the influence of the door controlling (e.g. fire detecting) means 101 for bringing the unlocking means 2 to the active condition.

[0038] The disconnectable connection 7 is reconnectable. Particularly, the disconnectable connection is provided with a securing element (pin) 7 which, under the influence of the controlling means 101 is movable from an unlocking means-securing position (see Fig. 1) to an unlocking means-releasing position (see Fig. 2), for example in case of an alarm or fire detection.

[0039] The securing element 7 also is movable back (reversible), from the unlocking means-releasing position to its unlocking means-securing position, under the influence of the door controlling means, for example in case of cancelling a fire alarm or ending of fire detection. Thus, operation/controlling of the door is preferably reversible. Particularly, the door controlling means 101 and actuator 50 are configured to control each latch 1 and respective unlocking means (e.g. handle) 2 of the door 3 to enter and maintain each respective operating state/condition (i.e. for the latch to be in its release or locking position, and for the handle 2 to be in its passive or active state).

[0040] In the present example, particularly, the unlocking means 2 include a blocking section (see Fig. 1), to be engaged by the securing element 7 that is driven by said actuator 50 (and respective spring means 54, 8) such that the unlocking means are held in their passive condition when the actuator 50 is in its first actuator state (Fig. 1), and such that the unlocking means are brought to their active condition when the actuator 50 is a second actuator state (as in Figures 2-3). In the first embodiment, the securing element 7 is simply part of the connection (connection structure/mechanism) between the actuator 50 and the latch 1.

[0041] As follows from Fig. 1, initially, the movable securing element 7 extends through aligned first passageways 15, 17, respectively, of the coupling arm 13 and the cross beam 19. Via a flexible (particularly non-elastic) connection link (e.g. a cord or chain) 23, the securing pin is connected to a lower end of the latch 1. The securing element 7 is also connected to the actuator element 51, via a flexible (particularly non-elastic) connection link 31.

[0042] In the non-limiting example, the cross beam 19 is further provided with a second passageway 18. With a flexible (particularly non-elastic) connection link (e.g. a cord 22), extending through the second passageway 18 of the cross beam, the handle 2 is also connected to the latch 1. As follows from Figures 1-2, this connection is such that it allows the latch 1 to move to its door-locking position, to be subsequently operated via the handle 2. For example, the flexible connection link 22 may have a length that is slightly larger than a distance between the latch 1 and cross beam 19 in case of the initial door state (Fig. 1), the overlength be sufficient for allowing the outward latch movement. After the outward latch movement (see

Fig. 1), the respective flexible connection link may have flexed or deformed to the condition shown in Fig. 2, for transmitting handle movement to the latch in order to retract the latch (see Fig. 3).

[0043] In Fig. 1, the handle 2 is in the passive condition, with the handle immovably coupled to the door 3. As a result, it is immediately clear to a user that he cannot use the handle 2 for operating the door locking. However, the handle 2 in this position can very well be used for opening and closing the door, in particular in that the connection between the handle 2 and the door is relatively strong and free of clearance.

[0044] Under the control of the door control means 101, e.g. in case of an alarm mode of those means (e.g. fire detection), the electrically driven actuator 50 can be brought from a first electrically powered state (shown in Fig. 1) to the second state wherein it is electrically unpowered, thereby releasing the actuator element 51. This leads to the latch 1 moving to its door locking position, by the latch spring means 8 (and optionally assisted by an actuator spring means 54 if available, for moving a respective actuator element 51), as is represented in Fig. 2, for locking the door 3.

[0045] During the locking movement of the latch 1, the securing pin 7 is pulled from the coupling arm 13 of the unlocking handle 2 via the respective flexible connection link 23. The unlocking handle is thus brought in the active, operating condition, while the handle 2 is no longer secured to the door 3. Moreover, by the movement of the latch 1, the other flexible connection link 22 is brought to a state in which it provides a force transmission link between handle 2 and latch 1. Thereupon, the latch 1 can simply be unlocked by a user by operating the unlocking handle 2, which is represented in Fig. 3, the user moving the handle 2 towards the door or away from the door against the spring force of the spring means 41.

[0046] It should be observed that in the embodiment of Figures 1-4, the door 1 is provided with an unlocking handle on one door side. In a further embodiment, both sides (i.e. the door main surfaces faced away from each other) of the door can include a respective unlocking handle of the unlocking means (see also Figures 5-7).

[0047] In Fig. 3, the unlocking handle 2 is pivoted about the pivot 12 of the door 3 , such that the handle 2 has been pulled back to a releasing position. The unlocking handle can also be pivoted towards the door 3, also such that the handle 2 is back in a releasing position. Thus, the door 3 can easily be unlocked, for instance in case of panic, by pushing against or pulling the handle 2 in order that the door 3 can then be opened, for instance for escaping from a space threatened by a fire. In the first exemplary embodiment, the unlocking mechanism 2, 22 can only be operated after the latch 1 has carried out a locking movement, which renders the automatic locking of the door safe and reliable.

[0048] As follows from Figure 3, optionally the connection link 31 between the securing element 7 and the actuator 50 may be configured to bend or deform or otherwise reposition itself during movement of the handle 2. As an example, such a repositioning of the connection

link 31 may optionally involve a slight repositioning of the actuator section 51 to which it connects. Alternatively, and also optionally, as is shown in Figure 2, the configuration can be such that the respective connection link 31 provides overlength (slack) when the actuator is in its unpowered state (e.g. upon spring induced movement of the actuator element 51), to avoid the connection link 31 blocking operation of the handle 2. In another embodiment, the connection link 31 between the securing element 7 and the actuator 50 may be partly or entirely rigid (e.g. unbendable during normal operation).

[0049] After manual operation, the handle 2 can return to its exit position shown in Figure 2, particularly forced by respective spring means 41. As a result, the passages 15, 17 are aligned. In that case, when the actuator 50 is powered again (under the control of the door controlling means 101), the handle is automatically locked (passive condition) by the securing element 7 entering the blocking passage 15, and the latch 1 is automatically retracted to its door-releasing state, leading to the situation as presented in Figure 1. Thus, both the latch activation and handle enabling operation have been entirely undone, and the above-described steps can be carried out again (e.g. in case of a new/second alarm condition of the controlling means 101).

[0050] Figure 4 shows a second exemplary embodiment. In this example, the door includes two actuators 103, 106 for changing the condition of both the latch 1 and the unlocking means 2.

[0051] For example, the latch 1 can be part of a electrically powered latch actuator 103 (as is schematically drawn in Fig. 4), the latch for example be driven or attracted by a magnetic actuator force. Alternatively, the latch can be connected to a dedicated latch actuator 103. Via a connection 102, the door control system 101 is coupled to the latch actuator 103, for driving that actuator 103.

[0052] In the second exemplary embodiment, the movable handle-securing pin 7 is provided with a dedicated second actuator 106 for moving this pin out of the passageway 15 of the handle coupling arm 13 (preferably when that actuator becomes unpowered), as well as for moving the pin back into the passageway 15 (preferably when that actuator is powered). Movement of the pin 7 out of the passageway 15 may for example be induced by a spring means which may be part of the actuator 106 (similar to the configuration of the actuator 50 shown in Figure 1). Via a connection 102, 105, the latter actuator 106 has also been coupled to the control system 101 for the purpose of operating it.

[0053] During normal use of the second exemplary embodiment, the securing pin 7 is held by the second actuator 106 in the position represented in Fig. 4, and the latch 1 is kept in the releasing position by the first actuator 103, while the handle 2 is fixed in a passive condition by the securing pin 7. Preferably, both the actuators 103, 106 are electrically powered for maintaining the latch 1 and securing pin 7 in these initial positions.

[0054] During an alarm mode of the door control system, e.g. when a respective fire detector

detects fire or in case of a test alarm, the system 101 controls the actuators 103, 106 to pull the respective securing pin 7 from the coupling arm 13 and to move the latch to its door blocking position (e.g. by spring action of a latch spring 8). The controlling of the actuators 103, 106 preferably involves cutting-off power to those actuators. As a result, the latch 1 is released, so that the latch 1 is automatically moved by the spring 8 to the locking position. Moreover, in this manner, the handle 2 is brought in the active, operating condition for allowing the door to be unlocked.

[0055] In the second embodiment, both the latch and handle can be returned to their initial states, upon proper control by the door controlling system 101 (e.g. by powering the actuators 103, 106 again).

[0056] Figure 5 shows a third embodiment of a door latching mechanism (the respective door not being depicted), which differs from the configuration depicted in Figure 4 in that the door is provided with a single actuator 103 for actuating the latch 1, the actuator 103 e.g. being a solenoid or solenoid type actuator located at or near the latch 1. In this example, the actuator 103 is also connected to the locking pin 7' via a link 22', for blocking operation of the operating means (in this case including two translatable door knobs or elements 2', located on opposite sides of the door) when the actuator is in its first actuator state. In Fig. 5, the actuator 103 is in the second state, having moved the latch 1 to the door locking state, and having moved the locking pin 7' out of a respective blocking passage to release the operating means 2'. Translation of the operating means 2' (e.g. in the direction of the arrow AR', against the spring means 41) leads to retraction of the latch 1 via a link 23'. The configuration is such that the locking pin 7' can be moved back into the respective blocking passage when the actuator 103 returns to its initial first state.

[0057] Figures 6-7 show a fourth embodiment, which differs from the embodiments of Figures 1-5 in that the door latch 1' and respective latch actuator 203 are mounted in the respective door frame 11' of the door. It follows that the latch 1' is not part of the door itself (it is not integrated in the door). In this embodiment, the actuator 203 can move the latch 1' out of the frame 11', from the door-releasing position shown in Fig. 6, to the door-locking position shown in Fig. 7, under the influence of the door controlling means (not shown in Figures 6-7). The latch 1' reaches into the door via a latching opening 260 of the door when the latch 1' is in the locking position, thereby locking the door to the frame 11'. The door of the fourth embodiment includes unlocking means 2' for unlocking the door, and a disconnectable connection 7', being disconnectable under the influence of said door controlling means 101 for bringing the unlocking means 2'to the active condition. Preferably, the disconnectable connection 7' is reconnectable, as in the above embodiments.

[0058] In the fourth embodiment, the latch 1' and unlocking means 2' are configured to cooperate, such that the latch 1' can bring the unlocking means 2' to their active condition when the latch 1' moves into the door blocking state. To that aim, the door includes e.g. a mechanical latch receiving mechanism 261, configured to be actuated by the latch 1' when the latch enters the latching opening 260. The mechanism 261 is constructed such that entry of

the latch 1' into the door leads to retraction of the locking pin 7' (i.e. disconnection of the disconnectable connection), thereby leading to undoing the blocking of the unlocking means 2'. As an example, the latch receiving mechanism 260 may include a translatable latch receiving element 262, which is linked to the link 22' to the locking pin 7' via a transmission (e.g. gears, swivable arms or the like) for moving that link 22' when the latch receiving element 262 is translated by the incoming latch 1'.The latch receiving mechanism 260 can be configured to automatically return to an initial state (shown in Figure 6) after the latch 1' has been retracted into the frame 11', for example under influence of gravity, a spring force and/or other means. The advantage of such an embodiment is that the door does not require an integrated (e.g. electrically powered) actuator for controlling latching of the door and controlling the state of the unlocking means 2'.

[0059] In the exemplary embodiments described, the unlocking means (e.g. unlocking handle 2 or knobs/elements 2') is located on an accessible position outside the door 3. According to an alternative embodiment of the invention, in the passive condition, the unlocking means are substantially inaccessible from a surroundings of the door 3, while in the active, operating condition, the unlocking means are accessible from a surroundings 3. What can thus be achieved in a simple manner is that the unlocking means can only be operated when these means have been brought into the active, operating condition. In the passive condition, these unlocking means can for instance be screened off from the surroundings by a screen for rendering the unlocking means inaccessible, while, under the influence of the fire detecting means, the screen can be made undone for rendering the unlocking means accessible. Such a screen can for instance comprise a movable cap, displaceable grid or the like.

[0060] In addition, it is advantageous when, in the passive condition, the unlocking means, are at least partially, preferably substantially entirely recessed in the door. As a result, the unlocking means are inaccessible in a simple manner and/or unreachable in that passive condition. The unlocking means are then for instance at least partially movable out of the door under the influence of the fire detecting means, in order that the unlocking means can be operated after detection of fire. Further, in the passive condition, the unlocking means can for instance be located entirely in the door 3 and/or be partly withdrawn from view, so that it is clearly visible that the door cannot be unlocked with these means.

[0061] It is self-evident that the invention is not limited to the exemplary embodiments described. Various modifications are possible within the framework of the invention as set forth in the following claims.

[0062] For instance, the door can comprise a sliding door, push door, revolving door, pivot door or the like.

[0063] Also, the term 'door' is to be interpreted broadly, since it can be a panel, window unit or the like.

[0064] Further, the unlocking means can be of different design and comprise, for instance, a

pull and/or push rod, a door knob, a turning handle, a turning knob and or a different unlocking means. In the active, operating condition, such unlocking means can furthermore be pivotable, rotatable and/or translatable or different relative to the door 3.

[0065] The unlocking means can for instance be designed for moving each latch 1 from the locking position to the releasing position, at least when the unlocking means are brought in the active, operating condition. Each latch 1 can then, for instance, be coupled to the unlocking means.

[0066] A coupling/connection (22; 22') between the at least one latch 1 and the unlocking means 2 can be designed in various manners, for instance via one or more cords, rods, chains, a sprocket transmission, mutually pivotal elements or the like. Further, the at least one latch can for instance be integrally provided with such unlocking means, for instance as an unlocking bracket fixedly provided on the latch or the like.

[0067] Similarly, a coupling/connection (31, 22; 22') between the at least one latch 1 and a respective actuator (50) can be designed in various manners, for instance via one or more cords, rods, chains, a sprocket transmission, mutually pivotal elements or the like.

[0068] Also, in certain embodiments, a coupling/connection (22; 22') between a said securing element 7 and a respective actuator can be designed in various manners, for instance via one or more cords, rods, chains, a sprocket transmission, mutually pivotal elements or the like. Further, the at least one latch can for instance be integrally provided with such unlocking means, for instance as an unlocking bracket fixedly provided on the latch or the like.

[0069] In addition, each latch 1 can for instance be automatically blocked in the locking position by a blocking device, after the latch 1 has been brought to the locking position in case of fire. The unlocking means can then be designed for undoing the blocking action of the blocking device for the purpose of unlocking the door. In that case, the unlocking means are indirectly coupled or can be indirectly coupled to the latch 1, via the blocking device. After the blocking of this latch 1 has been undone, the latch 1 can for instance simply be brought to the releasing position under the influence of particular force, for instance a spring force, gravity or via a force applied via the door and/or the post to the latch or the like.

[0070] The fire detecting means can be designed in various manners and comprise, for instance, fusible material, bimetal, memory metal, a temperature sensor, smoke detecting means, carbon monoxide detection means, and/or other means.

[0071] Automatically moving the latch and/or bringing the unlocking means into the active condition can further be effected under the influence of electromagnetic means, an electromagnet, an actuator, spring means, gravity and a combination of these possibilities and/or other options.

[0072] In an alternative embodiment, automatically bringing the unlocking means into the

passive condition can further be effected under the influence of electromagnetic means, an electromagnet, an actuator, spring means, gravity and a combination of these possibilities and/or other options.

[0073] Also, in a further embodiment, gravity can be used to assist or set actuator action. To that aim, for example, a movable actuator element 51 can be provided with or include a relatively large mass, so that a resulting gravitational force can assist a magnetic force induced by the powering of the actuator, to hold the element 51 in its initial state (e.g. against spring force of spring means 8, 54).

[0074] For the purpose of the movement of the latch and/or use of electric means, for instance an electromagnet, an actuator, sensor or the like, the door can moreover be provided with a voltage source, for instance with one or more batteries and/or accumulators.

[0075] A said actuator can have various configurations. It can be a solenoid actuator (as in the depicted embodiments), or a servo-type actuator, a motor, electromotor, a linear actuator, rotary type actuator, magnetic actuator, and/or different type of actuator.

[0076] Further, the spring means mentioned for bringing a latch to the locking position can be designed in different manners.

[0077] The door can further comprise one or more door locks and/or door operating means for the normal use of the door.

[0078] In addition, each latch can be designed in various forms and be made of various materials.

[0079] Further, the latch can be fitted, for instance, on the door or on the post for locking the door.

[0080] Further, the latch can, for instance, be movable to the locking position under the influence of fire or not under the influence of fire.

[0081] In addition, a said fire detecting means can for instance be designed to form part of a central fire detecting system or the like.

[0082] Moreover, the door controlling (e.g. fire detecting) means 101 and the actuator(s) of the door can be operatively coupled to each other in various manners, for instance via an electric, electronic, wireless and/or optical connection 102, 105 and/or remote control, and/or a computer network, intranet and/or Internet. The door controlling means 101 may be configured to provide operating power to the actuator(s) of the door. Alternatively, the door controlling means 101 can be configured to transmit a control signal to the actuator(s), wherein the actuator (or door) has its own dedicated power source to operate based on a received control signal.

[0083] The disconnectable connection mentioned of the unlocking means can for instance comprise an element which is or is not manually operable, for instance a securing pin or the like. The disconnectable connection can further comprise, for instance, a tear or break connection or the like.

[0084] The door controlling means 101 can for instance be arranged for detecting fire at or near an upper side of a space/room, on or near a ceiling, at or near an upper side of the door and/or at a different location. The at least one latch 1 can for instance be designed for automatically moving to the locking position under the influence of fire. This latch 1 can be arranged at various positions, for instance near or at an upper side of the door 3.

[0085] Also, the door controlling means 101 can for instance be arranged relatively far away from the door to be controlled, for example in a building that includes the door 1, or in another building or elsewhere. Remote door controlling means 101 can be operatively connectable to a door actuator to be controlled in various ways, as will be clear to the skilled person, for example via a radio link, computer communication means, Internet or an intranet, a wired or wireless controlling link and/or differently.

[0086] Detection of a fire may be one trigger for the door controlling means 101 to control the system, to bring the unlocking means 2 from the passive condition into the active condition. However, triggering the door controlling means 101 can also be achieved differently, for example upon a user/operator initiated signal, an alarm signal or the-like.

[0087] Also, as follows from the fourth embodiment, the term "door provided with at least one latch" is to be interpreted broadly, since the latch may be integrated in the respective door 3, or located near the door 3, such as in/on a respective door frame 11.

[0088] Similarly, as follows from the fourth embodiment, a said actuator that is associated with the door may be included in a respective door, or it may be located near a respective door.

[0089] Further, the door configuration that includes a remote latch 1' (such as or corresponding to the embodiment depicted in Figures 6-7) preferably includes unlocking means 2' that can be brought from the active condition back into the passive condition. That is however not required. For example, according to another aspect of the invention, the door and respective remote latch 1' (the door e.g. including the mechanical latch receiving mechanism 261, configured to be actuated by the latch 1' when the latch enters to latching opening 260, the mechanism 261 being constructed such that entry of the latch 1' into the door leads to undoing the blocking of the unlocking means 2'), may not have the option of restoring the blocking of the unlocking means 2'.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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

- EP0156044A [0002]
- WO2004063503A [0005] [0007]

Patentkrav

1. Dør, forsynet med mindst én lås (1), hvor låsen (1) er forsynet med midler (8, 50; 8, 103, 106) til automatisk at bevæge låsen (1) fra en dørfrigørelsesposition til en dørlåsningsposition under påvirkning af dørstyringsmidler (101), for eksempel når en stuetemperatur når en specifik tærskelværdi eller i tilfælde af røgdetektering, hvilken dør (3) er forsynet med oplåsningsmidler (2) til oplåsning af døren, hvor under påvirkning af dørstyringsmidler (101) oplåsningsmidlerne (2) kan bringes fra en passiv tilstand, hvori døren ikke kan låses op ved hjælp af oplåsningsmidlerne (2), til en aktiv driftstilstand til oplåsning af døren, hvor døren er forsynet med mindst én aktuator (50; 103, 106; 203), hvilken aktuator har en første aktuatortilstand til at holde låsen i dens dørfrigørelsesposition og en anden aktuatortilstand til at bevæge låsen til dørlåsningspositionen,

kendetegnet ved, at konfigurationen er således, at oplåsningsmidlerne (2) kan bringes fra den aktive tilstand tilbage til den passive tilstand.

2. Dør ifølge krav 1, hvor aktuatoren (50; 106) og oplåsningsmidlerne (2) er konfigureret til at samvirke, således at oplåsningsmidlerne holdes i deres passive tilstand, når aktuatoren (50; 106) er i en første aktuatortilstand, og således, at oplåsningsmidlerne bringes i deres aktive tilstand, når aktuatoren (50; 106) er i en anden aktuatortilstand.

3. Dør ifølge krav 1 eller 2, hvor aktuatoren indbefatter en bevægelig aktuatordel (51), der er forbundet med låsen via et koblingsmiddel, navnlig til at holde låsen i dens dørfrigørelsesposition mod en fjederkraft, når den bevægelige aktuatordel er i en første position.

4. Dør ifølge kravene 2 og 3, hvor den bevægelige aktuatordel (51) også er forbundet med oplåsningsmidlerne til styring af oplåsningsmidlernes tilstand.

5. Dør ifølge et hvilket som helst af de foregående krav, hvor aktuatoren er en elektrisk drevet aktuator, der fortrinsvis er i en første tilstand, når den tilføres elektrisk strøm, og i dens anden tilstand, når den ikke tilføres elektrisk strøm.

6. Dør ifølge et hvilket som helst af de foregående krav, der er forsynet med en enkelt elektrisk styrbar aktuator (50) til drift af både låsen (1) og blokering og frigørelse af oplåsningsmidlerne (2).

7. Dør ifølge et hvilket som helst af kravene 1-5, der er forsynet med to aktuatorer (103, 106) til ændring af både låsens og oplåsningsmidlernes (2) tilstand.

8. Dør ifølge et hvilket som helst af de foregående krav, hvor en aktuator (50) er integreret i døren i en vertikal position i alt væsentligt under en vertikal position for oplåsningsmidlerne (2).

9. Dør ifølge et hvilket som helst af de foregående krav, hvor oplåsningsmidlerne (2) omfatter fjedermidler, der er konfigureret til at modvirke oplåsning med en fjederkraft.

10. Dør ifølge et hvilket som helst af de foregående krav, hvor - i den passive tilstand - oplåsningsmidlerne på en i alt væsentlig ubevægelig måde kobles til døren (3) ved hjælp af en frakoblelig forbindelse, hvilken frakoblelig forbindelse (7) kan frakobles under påvirkning af dørstyringsmidlerne (101) for at bringe oplåsningsmidlerne (2) i den aktive tilstand, hvor den frakoblelige forbindelse (7) kan genkobles.

11. Dør ifølge krav 10, **kendetegnet ved, at** den frakoblelige forbindelse er forsynet med et sikringselement (7), der, under påvirkning af dørstyremidlerne (101), kan bevæges fra en oplåsningsmiddelsikringsposition til en oplåsningsmiddelfrigørelsesposition, for eksempel i tilfælde af en brandalarm eller branddetektering eller røgdetektering, hvor sikringselementet (7) kan bevæges fra oplåsningsmidlernes frigørelsesposition til oplåsningsmidlernes sikringsposition under påvirkning af dørstyringsmidlerne såvel som for eksempel i tilfælde af annullering af en brandalarm eller afslutning af branddetektering.

12. Dør ifølge et hvilket som helst af de foregående krav, hvor oplåsningsmidlerne (2) indbefatter en blokeringssektion til at skulle gå i indgreb med et sikringsmiddel (7), der drives af en aktuator (50; 106), således at oplåsningsmidlerne holdes i deres passive tilstand, når aktuatoren (50; 106) er i en første aktuatortilstand, og således, at oplåsningsmidlerne bringes i deres aktive tilstand, når aktuatoren (50; 106) er i en anden aktuatortilstand.

13. Dør ifølge et hvilket som helst af de foregående krav, hvor - i den aktive driftstilstand - oplåsningsmidlerne (2) kan bevæges for at bevæge låsen (1) til frigørelsespositionen.

14. Dør ifølge et hvilket som helst af de foregående krav, hvor oplåsningsmidlerne (2) kun kan fungere i den aktive driftstilstand til oplåsning af døren (3).

15. Dør ifølge et hvilket som helst af de foregående krav, hvor låsen (1') og tilsvarende aktuator (203) initialt er placeret væk fra den tilsvarende dør (3), for eksempel i en tilsvarende dørkarm (11'), hvor låsen (1') trænger ind i en låseåbning (260), når den er i dørlåsningspositionen, hvor døren (3) indbefatter en låsemodtagelsesstruktur (261), der er konfigureret til at blive aktiveret ved hjælp af låsen (1'), når låsen trænger ind i låseåbningen (260), hvilken låsemodtagelsesstruktur (261) er konfigureret således, at indtrængen af låsen (1') i døren (3) bringer oplåsningsmidlerne (2') i deres aktive tilstand.

DRAWINGS

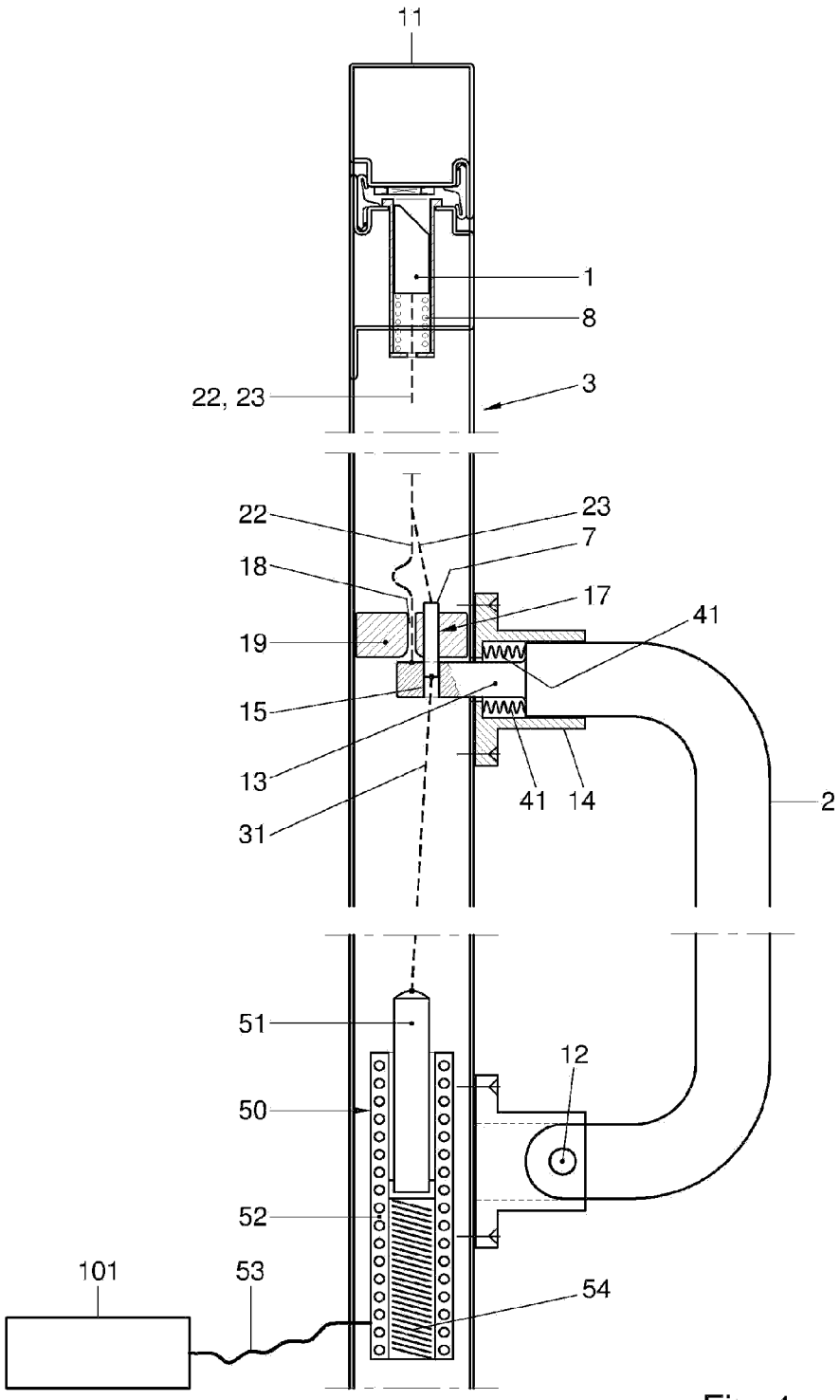

Fig. 1

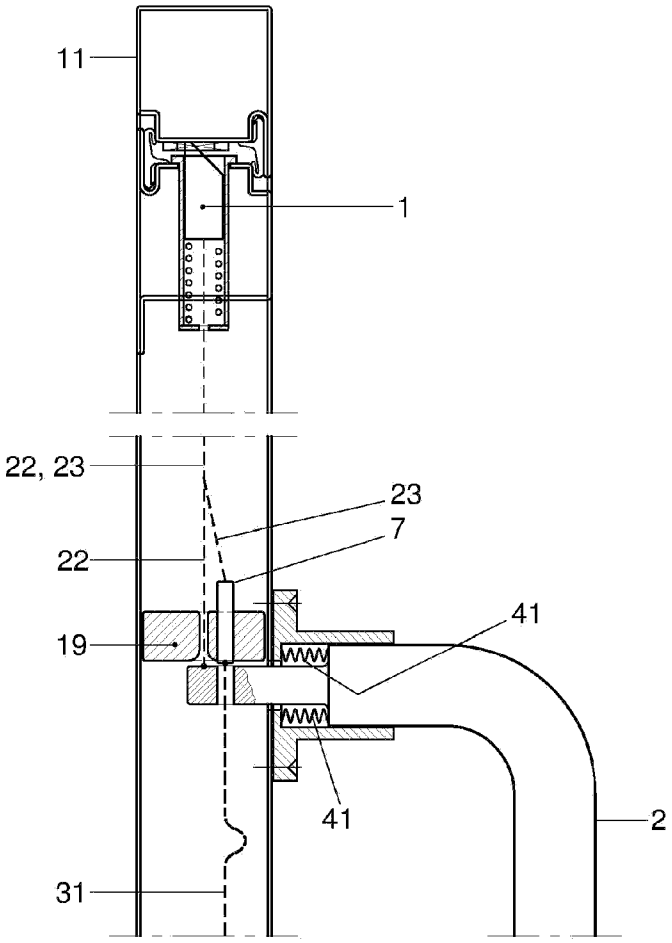

Fig. 2

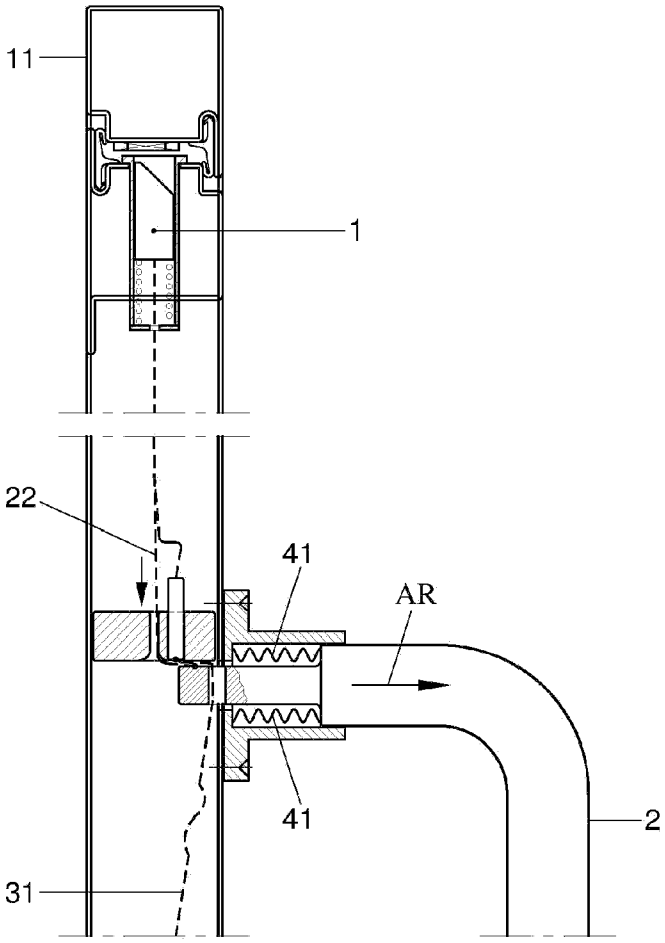

Fig. 3

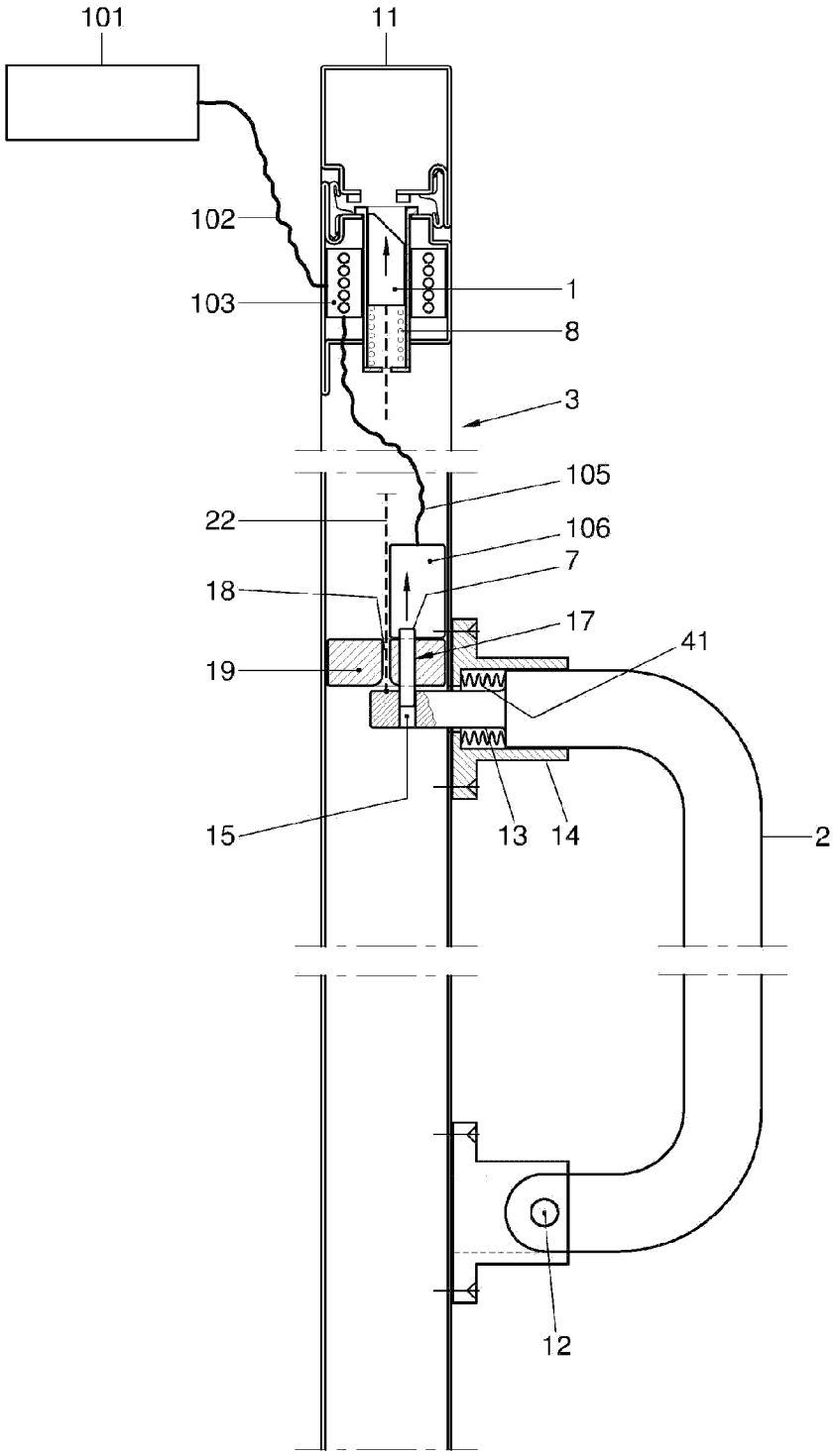

Fig. 4

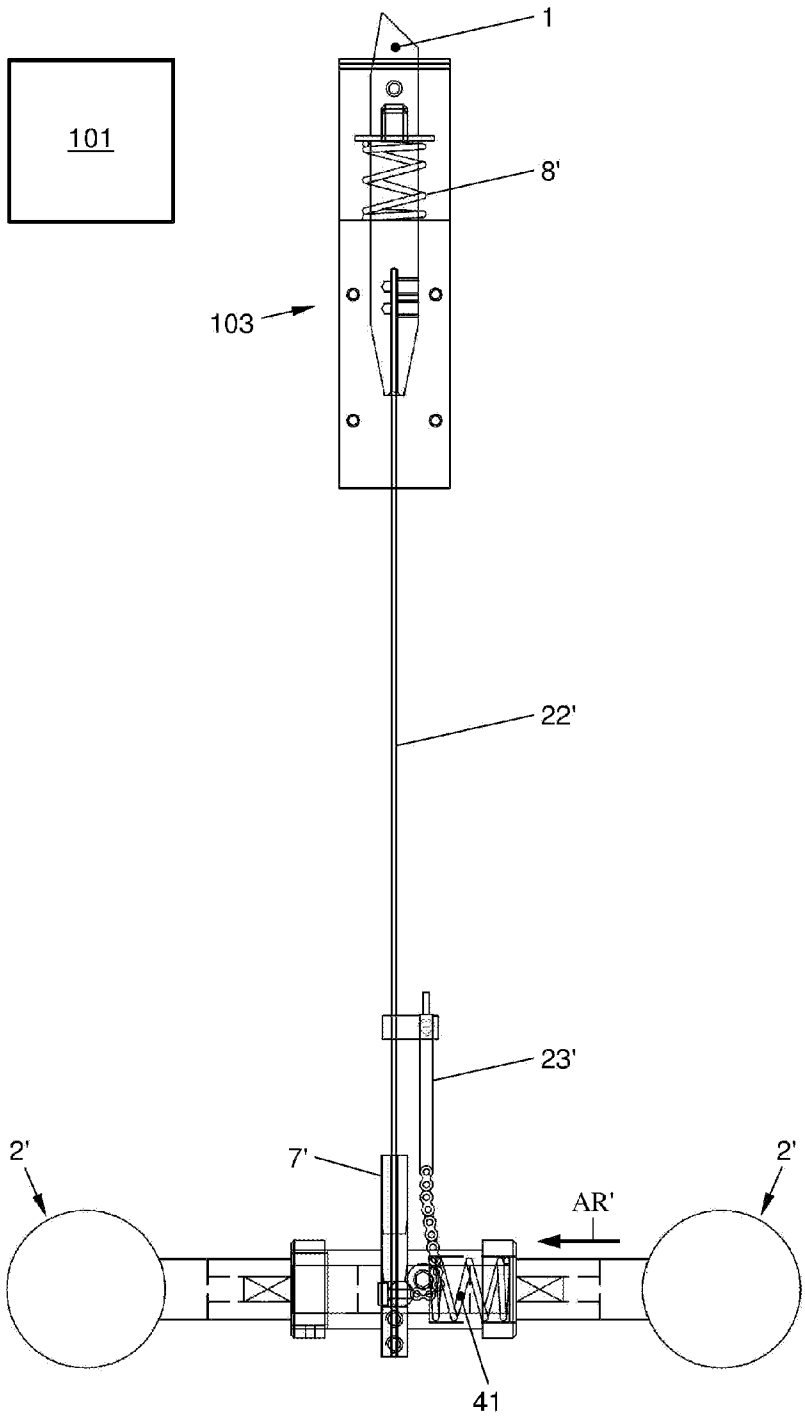

Fig. 5

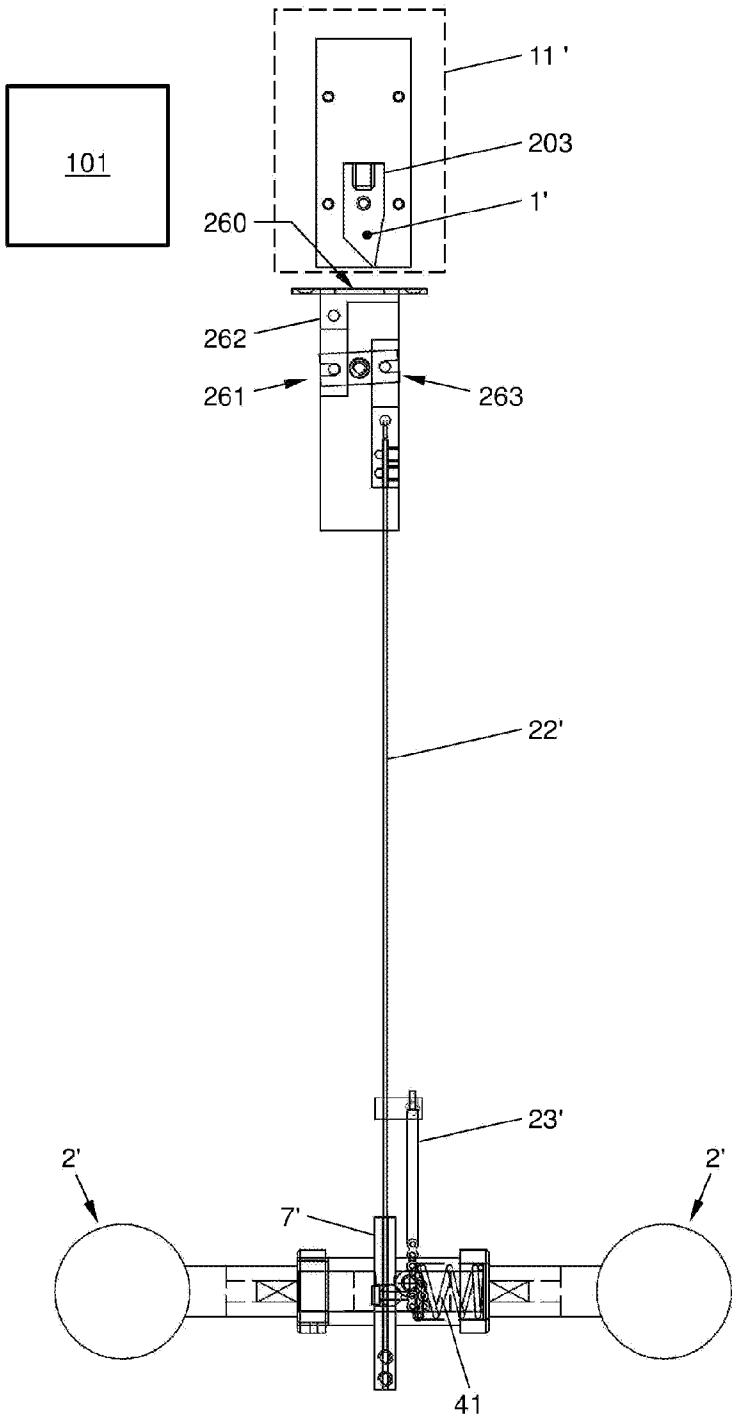

Fig. 6

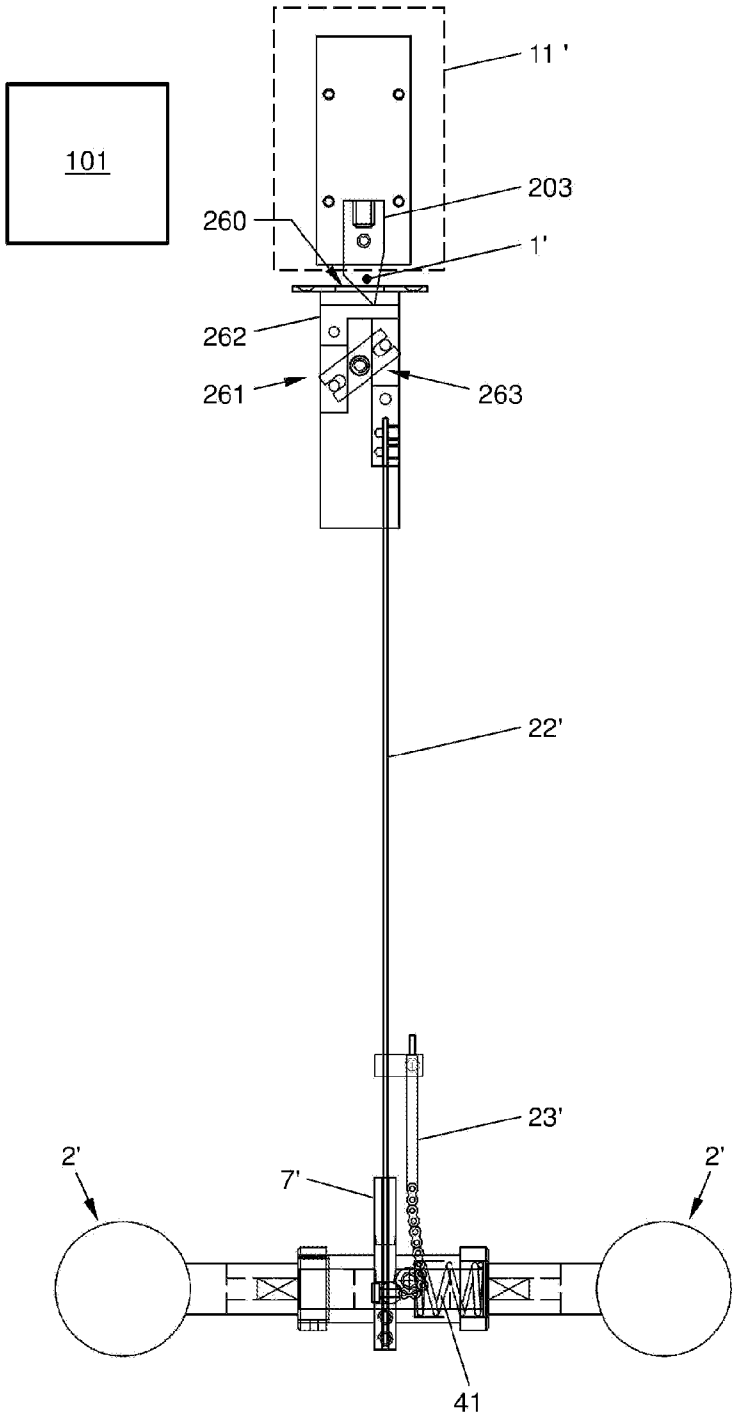

Fig. 7