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- (71) Applicant (for all designated States except US): **3M INNOVATIVE PROPERTIES COMPANY** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **ANDERS, Herbert** [DE/DE]; Carl-Schurz-Strasse 1, 41453 Neuss (DE). **SCHNEIDER, Bernhard** [DE/DE]; Carl-Schurz-Strasse 1, 41453 Neuss (DE). **GAERTNER, Norbert** [DE/DE];

Carl-Schurz-Strasse 1, 41453 Neuss (DE). **HA-JOK, Johann, G.** [DE/DE]; Carl-Schurz-Strasse 1, 41453 Neuss (DE). **MÜLLER, Robert, F.** [DE/DE]; Carl-Schurz-Strasse 1, 41453 Neuss (DE).

- (74) Agents: **BURTIS, John, A.** et al.; 3M Center, Office of Intellectual Property Counsel, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).
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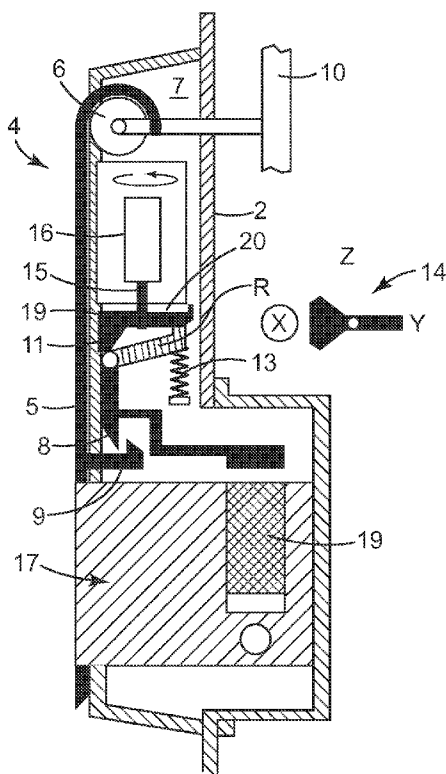


FIG. 2a

(57) Abstract: The invention provides a locking unit (4) for a door (2) or the like comprising an operating device (5) that can be moved from a closed position into an open position, a locking means (10) that can be moved by the operating device (5) from a first position where the door (2) is locked and cannot be opened into a second position where the door (2) can be opened, a blocking means (8) that can be moved from a first position where the operating device (5) is blocked in its closed position into a second position where the operating device (5) is not blocked and can be moved from its closed position into its open position, at least two actuating devices (16, 17) interacting with the blocking means (8), and a control element (14) for overriding at least one actuating device (16, 17).

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LOCKING UNIT

The invention relates to a locking unit for a door or the like. The invention also relates to a telecommunication cabinet with a door and a locking unit.

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The EP 0 261 266 discloses a locking unit for a door or the like with a lever. The lever can be moved from a swivelled-in position into a swivelled-out position. The known locking unit comprises a mechanical locking device, a cylinder lock, for locking the lever in its swivelled-in position with a sash fastener. The lever can be
10 moved into the swivelled-out position after activating the cylinder lock.

The DE 298 06 974 U1 discloses a locking unit for a door or the like with a lever. The lever can be moved from a swivelled-in position into a swivelled-out position. The known locking unit comprises an electro mechanical locking device, a
15 solenoid, for locking the lever in its swivelled-in position with a pin. When the solenoid is activated the pin is moved in a position where the lever is not locked any more and therefore can be moved into its swivelled-out position.

The WO 02/38894 A1 discloses a locking unit for a door or the like with a lever.
20 The lever can be moved from a swivelled-in position into a swivelled-out position. The known locking unit comprises a first mechanical locking device, a cylinder lock, for locking the lever in its swivelled-in position with a blocking means. The known locking unit further comprises a second mechanical locking device, a combination block lock, for locking the lever in its swivelled-in position with a
25 second blocking means. The lever can be moved into the swivelled-out position after either opening the cylinder lock or after opening the combination block lock.

The EP 0 526 522 B1 discloses a similar locking unit as the one described in the WO 02/38894 A1. The only difference between the two known locks is that the
30 locking unit described in the EP 0 526 522 B1 uses two cylinder locks instead of a cylinder lock and a combination block lock.

The EP 1 327 043 B1 also discloses a locking unit for a door or the like with a lever. The lever can be moved from a swivelled-in position into a swivelled-out position. The known locking unit comprises an electro mechanical locking device for locking the lever in its swivelled-in position with a bolt. The electro mechanical locking device can be activated by an integrated keyboard, a finger print scanning device, a transponder device, a reading device for a magnetic strip or the like. Upon activating the electro mechanical device with a signal generated by one of the mentioned means the bolt is moved into a position where the lever is not blocked any more and therefore can be moved into its swivelled-out position.

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The DE 197 08 251 A1 as well as the GB 2 206 638 A and the GB 2 255 368 A disclose a locking unit with a locking bolt and a blocking lever interacting with the bolt. The blocking lever can be moved from a first position where it blocks the bolt into a second position where it does not block the bolt. In the second position of the blocking lever the bolt can be moved. For actuating the blocking lever the known locking unit comprises a spring, a mechanical module and an electro mechanical module. Both modules act in an equal way on the blocking lever. For moving the blocking lever from its first position into its second position either the mechanical module or the electro mechanical module can be used.

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There is a need on the market for a locking unit for a door or the like with improved security features that can be cost-effective manufactured. It is also desirable to have a locking unit with different kind of access authorizations. There is also a need of such a locking unit that at the same time can easily be retrofitted and is space saving in its arrangement. It would also be an advantage to provide a locking unit that may easily be adapted to individual needs or solutions for different customers. Such a locking unit should possibly be ready for use in all occasions even in the occasion of an electrical power outage and/or communication line interruption. And finally there is a need for a locking unit with a modular structure that can easily be adapted to all different kind of applications.

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The present invention provides a locking unit for a door or the like comprising

- an operating device that can be moved from a closed position into an open position,
- a locking means that can be moved by the operating device from a first position where the door is locked and cannot be opened into a second position where the door can be opened,
- a blocking means that can be moved from a first position where the operating device is blocked in its closed position into a second position where the operating device is not blocked and can be moved from its closed position into its open position,
- at least two actuating devices interacting with the blocking means, and
- a control element for overriding at least one actuating device.

The locking unit according to the invention has at least two actuating devices interacting with a blocking means. Hence there are two actuating devices that can move the blocking means from its first position into its second position and vice versa. The control element can override at least one of the actuating devices. If so the according actuating device does not interact with the blocking means anymore and cannot move the blocking means from one position into another and thus, the operating device is blocked and cannot be moved from its closed position into its open position. The control element can also reinstate the actuation device again.

With the inventive arrangement it is possible to run the following operation modes:

- a) The control element does not override any of the actuating devices. The blocking means can be moved from one position into the other position by using either one of the actuating devices.
- b) The control element does override one actuating device. The blocking means can be moved from one position into the other position only by using the according other actuating device.

The locking unit according to the invention may be used for a door or for any kind of closing means such as for example a manhole cover or a window. The locking unit according to the invention may be used for doors, windows or manhole

covers in the area of telecommunication business for example for doors for telecommunication cabinets or telecommunication rooms and the like. It may also be used for lids of any kind of boxes.

- 5 The locking means may be moved by the operating device from a first position where the door is locked and cannot be opened into a second position where the door can be opened. The operating device may move the locking means when it is in its open position and/or while it is moved into its open position. The operating device may be a handle. Any kind of handles can be used as an operating device
10 such as for example turning handles, turning handles with a disc or swinging lever handles. Those kind of handles are standard components for a locking unit and therefore not expensive.

According to one embodiment of the invention the blocking means, the actuating
15 devices and the control element may be integrated in the handle. The integration of several components of a locking unit according to the invention in the handle may help to provide a space saving arrangement. It also may help to provide an arrangement that can easily be retrofitted to an existing door by only exchanging the handle itself without making any or only little changes to the door.

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According to another embodiment of the invention at least one actuating device may be a mechanical device. The use of mechanical devices may have the advantage that the arrangement is independent from electrical power and can be activated even if there is no electrical power available, for example in case of an
25 electrical power outage or if the locking unit is not connected to an electric circuit. The mechanical device may be activated by a key for example a special key such as a wrench or any other known device for activating a mechanical device inside a locking unit, such as a turning handle or a door handle.

- 30 In a further embodiment of the invention the mechanical device comprises a cylinder lock with a sash fastener interacting with the blocking means for moving it from its first position into its second position. A cylinder lock with a sash fastener

is a commonly used mechanical device for locking units. It is therefore a cost-effective solution for a mechanical device in a locking unit. It may also have the advantage of being a small device and therefore may help to provide a space saving arrangement that can be integrated in other components such as for example into a handle. Any kind of cylinder lock can be used such as for example a Euro cylinder, an oval cylinder or a half cylinder.

In a particular embodiment of the invention at least one actuating device may be an electro mechanical device. Using an electro mechanical actuating device may have the advantage of being easy adaptable to different needs or requirements. The energy for driving the electro mechanical device may be provided by the local power supply system, which would then require a connection between the locking unit according to the invention and the according power supply system. The energy may also be provided by a battery located in or near by the locking unit. The electro mechanical device may be activated by a signal. The signal may be any kind of signal, such as an electric signal coming through a line or any kind of radio frequency signal sent from outside and received from means located in or near by the locking unit. It may also have the advantage of being easily integrable into any kind of network such as for example a communication network.

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An electric motor may be used as an electro mechanical actuating device. An electric motor is a standard component for activating or moving components within mechanical arrangements. It is therefore a cost-effective solution for an actuating device. Electric motors are available in very small formats so that they can easily be integrated into other components such as for example a handle. Any kind of other actuators can be used such as for example a solenoid such as a linear or a rotary solenoid.

The electro mechanical actuating device may cooperate with the control element. Since the electro mechanical actuating device can easily be adapted to different needs or requirements it is possible to use it inside the locking unit according to the invention not only for interacting with the blocking means but also to cooperate

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with the control element. That would have the advantage that one device is used for at least two different kinds of functionalities. That may have the advantage of providing a cost-effective solution since there is no need for a further actuating device cooperating with the control element besides the actuating device that
5 cooperates with the blocking means. That may also have the advantage of providing a space saving arrangement since there are no more components necessary to run the locking unit with the control element in the locking unit.

In a particular embodiment the control element may be moved by the electro
10 mechanical device into at least three different positions. In at least one position the control element may override the mechanical device. The other two positions may for example be used for the interaction with the blocking means. It is also possible that in one position two functions of the control element are activated for example overriding the mechanical device and interacting with the blocking
15 means. It is possible to use one position of the control element for moving the blocking means into its first position where the operating device is blocked in its closed position. Furthermore it is possible to use another position of the control element for moving the blocking means into its second position where the operating device is not blocked and can thus be moved from its closed position
20 into its open position. The control element also has more than one functionality. It activates the blocking means and it controls the second actuating device. This helps to get a space saving arrangement and a cost-effective device.

According to one embodiment of the invention the control element may be a cam
25 disc or an eccentric disc interacting with a rocking bar. A cam disc is a component that can easily be integrated in such a way that it cooperates with an electro mechanical device such as an electric motor.

The rocking bar may be connected with the blocking means. This is an easy way
30 to transfer a rotation of the cam disc into a translation of the blocking means. The other end of the rocking bar may be connected with a spring element. The spring element may help to move the rocking bar back into an original position without

further impact of any other actuating device. It is also possible to have a direct interaction between the cam disc and the blocking means without a rocking bar. Instead of an electric motor with a cam disc, it is also possible to use two solenoids acting on both sides of the rocking bar. Another alternative is to use at least one linear magnet acting as the cam disc or a rotary magnet acting as the cam disc. One or two bistable lifting magnets may also be used.

According to a further embodiment of the invention the control element may comprise a bolt with a lifting disc. The bolt may be mounted on a threaded axis driven by an electric motor. The lifting disc may interact with the blocking means. It is also possible to have a threaded axis as a separate component that is connected to an axis of an electric motor. It is also possible to have flanks on both sides of the threaded axis functioning as lifting discs.

According to another embodiment of the invention the control element may comprises a lever with a pivot-mounted wheel and at least one control and/or transmitting element. The blocking means may comprise a lever interacting with the sash fastener of the first actuator.

The blocking means may comprise a lever interacting with the sash fastener of the first actuator. This arrangement has the advantage that the lever transmits a movement of the blocking means and therefore the blocking means in connection with the control element can be used for more than one functionalities such as for example for blocking the hook of the handle and/or for overriding the mechanical actuating device.

According to a further embodiment of the invention the locking unit may comprise at least two movably arranged bolts. The bolts may interact with the control element. To use two separate bolts instead of one blocking means with a lever has the advantage that the two bolts can be moved independently.

One of the two bolts may be moved from a first position where it blocks one actuating device into a second position where it does not block the actuating device. This solution is an easy way to override one actuating device by another. Another bolt may be moved from a first position where the operating device is
5 blocked in its closed position into a second position where the operating device is not blocked and can be moved from its closed position into an open position.

The bolt may interact with at least two actuating devices. This has the advantage that one bolt can be used to transmit the movement of two actuating devices e.g.
10 to the hook of the handle. This helps to achieve a space saving arrangement. An easy solution for an interaction between one actuating device for example the mechanic actuating device and the bolt may be an opening in the bolt for receiving the sash fastener of the cylinder lock.

15 The invention also comprises a method for locking a door or the like with a locking unit comprising two actuating devices each interacting with a blocking means wherein one actuating device overrides the other.

The invention also comprises a telecommunication cabinet with a door and a
20 locking unit.

The locking unit according to the invention has the advantage that it has improved security features since it comprises at least two actuating devices and a control element that is able to override at least one actuating device. It is also cost-
25 effective to manufacture since it uses a lot of common components for locking units that do not have to be designed separately. With more than one actuating device the possibility is given to grant different access authorizations. The locking unit according to the invention can easily be retrofitted and has a space saving arrangement. It also can easily be adapted to individual needs and solutions for
30 different kind of costumers and/or users since it has a modular structure.

The invention will now be described in more detail with reference to the following Figures exemplifying particular embodiments of the invention:

- Fig. 1 is a schematically drawing of a telecommunication cabinet with a door
5 and a locking unit;
- Fig. 2a is a schematically drawing of a locking unit according to the invention with a handle in a closed position, with a blocking means in a closed position and with a cam disc in a first position;
- Fig. 2b is a schematically cross section of a cylinder lock of the locking unit
10 shown in Fig. 2a in a closed position;
- Fig. 3 is a schematically drawing of the locking unit shown in Fig. 2a with the handle in a closed position, with the blocking means in an open position and with the cam disc in a second position;
- Fig. 4 is a schematically drawing of the locking unit shown in Fig. 2a and 3 with
15 the handle in an open position, with the blocking means in an open position and with the cam disc in a third position;
- Fig. 5 is a schematically drawing of the locking unit shown in Fig. 2a to 4 with the handle in a closed position, with the blocking means in a closed position and with the cam disc in the third position;
- 20 Fig. 6 is a schematically drawing of the locking unit shown in Fig. 2a to 5 with the handle in closed position, with the blocking means in a closed position and with the cam disc in the first position;
- Fig. 7a is a schematically drawing of the locking unit shown in Fig. 2a to 6 with the handle in a closed position, with the blocking means in a closed position and with the cam disc in the third;
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- Fig. 7b is a schematically cross section of a cylinder lock of the locking unit shown in Fig. 7a in a closed position;
- Fig. 8a is a schematically drawing of the locking unit shown in Fig. 2a to 7b with the handle in a closed position, with the blocking means in an open position and with the cam disc in a third position;
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- Fig. 8b is a schematically cross section of a cylinder lock of the locking unit shown in Fig. 8a in an open position;

- Fig. 9 is a schematically drawing of the locking unit shown in Fig. 2a to 8b with the handle in an open position, with the blocking means in an closed position and with the cam disc in the third position;
- Fig. 10 is a schematically drawing of another embodiment of a locking unit
5 according to the invention with the blocking means in a closed position and with a control lever in a first position;
- Fig. 11 is a schematically drawing of the locking unit shown in Fig. 10 with the blocking means in an open position and with the control lever in a second position;
- 10 Fig. 12 is a schematically drawing of the locking unit shown in Fig. 10 and 11 with the blocking means in a closed position and with the control lever in a third position;
- Fig. 13 is a schematically drawing of the locking unit shown in Fig. 10 to 12 with the blocking means in an open position and with the control lever in a
15 third position;
- Fig. 14 is a schematically drawing of another embodiment of a locking unit according to the invention with the blocking means in a closed position and with a control bolt in a first position;
- Fig. 15 is a schematically drawing of the locking unit shown in Fig. 14 with the
20 blocking means in an open position and with the control bolt in a second position;
- Fig. 16 is a schematically drawing of the locking unit shown in Fig. 14 and 15 with the blocking means in a closed position and with the control bolt in a third position and
- 25 Fig. 17 is a schematically drawing of the locking unit shown in Fig. 14 to 16 with the blocking means in an open position and with the control bolt in a third position.

Herein below various embodiments of the present invention are described and
30 shown in the drawings wherein like elements are provided with the same reference numbers.

In Fig. 1 is shown a telecommunication cabinet 1 with two doors 2. The doors 2 are fixed over hinges 3 at the cabinet and can be opened after a locking unit 4 has been opened. The locking unit 4 shown in Fig. 1 is integrated in a swinging lever handle 5 and will be described in more detail with reference to the following
5 Figures.

In Fig. 2a is schematically shown a locking unit 4 according to the invention. The locking unit 4 is integrated in a swinging lever handle 5. After the locking unit 4 has been opened the handle 5 can be swivelled in an open position around the
10 axis 6. The axis 6 is connected with a locking means 10 in a manner known by a person skilled in the art. When the handle 5 is swivelled in its open position it can move the locking means 10 for unlocking and locking the door 2 of the cabinet 1. It is also possible to move the locking means 10 while swivelling out the handle 5. The handle 5 is mounted at a door 2. The handle 5 and the door 2 define a space
15 7. Within this space 7 is located the locking unit 4 according to the invention which will now be described in detail.

The locking unit 4 comprises a blocking means 8 interacting with a hook 9 attached at the handle 5. When the blocking means 8 is in its first position –
20 shown in Fig. 2a – it engages behind the hook 9 and the handle 5 can not be swivelled around the axis 6 because the blocking means 8 is blocking a movement of the hook 9 together with the handle 5. When the blocking means 8 is in its second position – shown in Fig. 3 – it does not engage behind the hook 9 and the handle 5 can be opened and swivelled around the axis 6. When the
25 handle 5 is opened the locking means can be moved.

The blocking means 8 is attached at one end of a rocking bar 11 which is pivot-mounted at a bearing 12. A spring element 13 is attached at the other end of the rocking bar 11. The spring element 13 can be any kind of spring such as a helical
30 spring, a flat spring, a disc spring, a torsion spring or a spiral spring. The spring element 13 forces the one end of the rocking bar 11 in the direction of the arrow A

so that the blocking means 8 is forced over the rocking bar 11 in its first position, where it engages behind the hook 9.

The rocking bar 11 interacts with a cam disc 14 that is mounted at an axis 15. The
5 axis 15 is connected with an electric motor 16. The electric motor 16 rotates the
axis 15 with the cam disc 14 when it is activated. The cam disc 14 is arranged
next to a bearing 20 releasing the axis 15 from induced forces of the cam disc 14.
Instead of a cam disc 14 it would also be possible to use a lever with a pivot-
mounted wheel. The wheel acts in the same way the cam of the cam disc 14
10 does. By activating the electric motor 16 by a signal the cam disc 14 rotates
around the axis 15. In the described embodiment the cam disc 14 can be moved
by the electric motor 15 into three different positions. In Fig. 2a is shown the first
position x of the cam disc 14. In this position the cam of the cam disc 14 forces
the blocking means 8 via the rocking bar 11 in its first position engaging behind
15 the hook 9 of the handle 5. In the position x of the cam disc 14 the handle 5 can
not be swivelled into its opened position, the door 2 of the telecommunication
cabinet 1 is locked and cannot be opened.

The locking unit 4 according to the invention also comprises a cylinder lock 17
20 integrated into the space 7 as well. In Fig. 2b is shown a cross section of the
cylinder lock 17. The cylinder lock 17 comprises a key receiving portion 18 and a
sash fastener 19. The function of the cylinder lock 17 will be described in detail
with reference to Fig. 7a to 9.

25 To open the door 2 the electric motor 16 has to be activated. The motor 16 can be
activated by any kind of signal such as an electrical signal coming through a
telecommunication line into the telecommunication cabinet 1. The signal may be
sent by a telecommunication company giving someone the authorization to open
the door 2. The signal can also be a radio frequency signal sent from a person
30 standing in front of the cabinet 1. The radio frequency signal has to be transferred
into an electrical signal readable for the electric motor 16. The electric motor 16
rotates the cam disc 14 into its second position y shown in Fig. 3. In this position

the cam of the cam disc 14 contacts the rocking bar 11 at the other end than in its position x against the force of the spring element 13. The rocking bar 11 rotates around the axis 12 thereby moving the blocking means into its second position not engaging behind the hook 9 any more. The handle 5 can now be swivelled around
5 the axis 6 (see Fig. 4), the locking means 10 can now be moved and the door 5 can now be unlocked or locked. The cylinder lock 17 is fixed at the handle 5 and is swivelled-out together with the handle 5.

As can be seen in Fig. 4 the cam disc 14 is moved into its third position z after
10 swivelling out the handle 5. In this position the cam disc 14 does not contact the rocking bar 11 any more. The position z is a neutral position regarding the rocking bar 11 and the blocking means 8. That means that the rocking bar 11 and blocking means 8 interacts without any influence of the cam disc 14 and the electric motor 16. When the cam disc 14 is in the position z the spring element 13
15 forces the blocking means 8 over the rocking bar 11 back into its first position. Since the handle 5 is swivelled-out the blocking means 8 does not engage behind the hook 9 of the handle 5. But the blocking means 8 is in the position where it would engage behind the hook 9 when the handle 5 would be in its closed position.

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Fig. 5 does show the locking unit 4 according to the invention when the handle 5 is in its closed position again. The cam disc 14 remains in its third, neutral position z. The blocking means 8 therefore stays in its first position. The hook 9 of the handle 5 comprises a gliding surface 21 engaging with a gliding surface 22 at the
25 blocking means 8. When the handle 5 is being closed, the gliding surface 21 of the hook 9 contacts the gliding surface 22 of the blocking means 8 thereby pushing the blocking means 8 in the direction of its second position against the force of the spring element 13. When the hook 9 has passed the blocking means 8 the force of the spring element 13 forces the blocking means 8 over the rocking
30 bar 11 into its first position where it engages behind the hook 9 again and prevents a swivelling out of the handle 5. The mechanism works as a latch.

After the handle 5 has been moved into its closed position the electric motor 16 moves the cam disc 14 back into its position x contacting the rocking bar 11 at the end of the blocking means 8 thereby forcing the blocking means 8 to stay in its first position (see Fig. 6). In that position the blocking means 8 cannot move into
5 its second position. The handle 8 is blocked in its closed position by the blocking means 8 and the electric motor 16. For detecting different stages of the locking unit 4 there may be integrated several detectors. There may be for example five detectors integrated in the locking unit 4. One detector may detect the three positions (x, y and z) of the cam disc 14, one detector may detect the position of
10 the hook 9 (opened or closed) and one detector might detect the position of the handle (opened or closed). An electronic system integrated in the telecommunication cabinet 1 may detect the position of the door 2 as well.

With reference to Fig. 7a to Fig. 9 will be described the function of the cylinder
15 lock 17. The cylinder lock 17 may be activated for example in the case of an emergency opening of the cabinet or any mechanically operated opening attempt. Such an emergency case may occur when no electricity is available for example in case of an electrical power outage. The cylinder lock 17 may also be activated when the cabinet is built up and opened for the first time and is not yet connected
20 to the electricity.

In the case described above the cam disc 14 has to be moved for example from the situation shown in Fig. 6 by the electric motor 16 into its third, neutral position z. For that movement a certain amount of energy is needed. The energy may be
25 provided by a storage element (not shown) within the locking unit 4 or it may be provided by a storage element (not shown) outside the locking unit 4 and transferred into the locking unit 4. As described above in the position z the cam disc 14 does not influence the rocking bar 11 and the blocking means 8. A lever 23 is mounted at the blocking means 8. The lever 23 may transfer a movement to
30 the blocking means 8.

When the cylinder lock 17 is activated by a key (not shown) and the sash fastener 19 is moved from a closed position as (Fig. 7a and b) in an open position (Fig. 8a and b) the sash fastener 19 contacts the lever 23 and pushes it in the direction of arrow B in Fig. 8a. Since the lever 23 is mounted at the blocking means 8 the blocking means 8 will be moved into this direction from its first position (Fig. 7a) into its second position (Fig. 8a). In this situation the blocking means 8 does not engage behind the hook 9 of the handle 5. Therefore the handle 5 can be swivelled around the axis 6 (see Fig. 9), the locking means 10 can now be moved, the door can be opened.

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As soon as the handle 5 together with the cylinder lock 17 is swivelled-out around the axis 6 the spring element 13 thereby pushes back the rocking bar 11 into the direction of the arrow A and the blocking means 8 into its first position again. Since the handle 5 is swivelled-out the blocking means 8 does not engage behind the hook 9 of the handle 5. But the blocking means 8 is in the position where it would engage behind the hook 9 when the handle 5 would be in its closed position. The blocking means 8 is therefore prepared for blocking the handle 5 as soon as it will be swivelled-in. For swivelling-in the handle 5 the sash fastener 19 cylinder lock 17 should be in its closed position.

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As described with reference to Figures 1 to 9 the inventive arrangement may be run in the following operation modes: the control element does not override any of the actuating devices. The blocking means 9 can be moved from one position into the other position by using the cylinder lock 17 or the electric motor 16 for unlocking the door. The control element does override the cylinder lock 17 by blocking it with the lever 23. The blocking means 9 can be moved from one position into the other position only by using the electric motor 16.

The following process can be driven with a locking unit 4 according to the invention. For opening the door 2 of the telecommunication cabinet 1 the control element in the shape of a cam disc 14 moves into the position y, what is detected by a detector. As a result of that the blocking means 8 moves in an open position,

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what is also detected by a detector. Now the handle 5 may be swivelled out. The open position of the handle 5 may also be detected. After the handle has been swivelled-out the cam disc 14 moves into the position z. This movement may be initiated after a certain time passed by. In this position the blocking means 8 are
5 forced in their closed position by the spring element 13. If the handle 5 has been swivelled-in the cam disc 14 moves into the position x again.

With reference to Fig. 10 to 13 a further embodiment of the invention is described. Fig. 10 does only show parts of the locking unit 4 according to the invention. The
10 locking unit 4 is designed to fit into a handle 5 of a door 2. The handle 5 is not shown in Fig. 10. The hook 9 of the handle 5 is shown schematically only.

The locking unit 4 comprises an electric motor 16 with an axis. At the end of the axis a lever 24 is mounted having a pivot-mounted wheel 25 attached at its end
15 (see also Fig. 11). The lever 24 can be moved by the electric motor 16 at least into three different positions as will be described in the following. The locking unit 4 shown in Fig. 4 also comprises a cylinder lock 17 with a key receiving portion 18 and a sash fastener 19. The wheel 25 interacts in at least two positions with two separate bolts 26, 28. On the left hand side of Fig. 10 can be seen a movable
20 attached bolt 26. In the position shown in Fig. 10 the bolt 26 is in a position where it prevents an entire rotation of the sash fastener 19 of the cylinder lock 17. The bolt 26 is forced by a spring element 27 into this position. On the right hand side of Fig. 10 can be seen another movably attached bolt 28. The bolt 28 functions as the blocking means 8 in the embodiment described with reference to Fig. 2a to 9.
25 In the position shown in Fig. 10 the bolt 28 is in a position where it prevents an opening of the handle 5 since it engages behind the hook 9. The bolt 28 is forced into this position by another spring element 29. The bolt 28 comprises an opening 31 for receiving the sash fastener 19. The lever 24 in Fig. 10 is shown in a neutral position. It does not engage any of the bolts 26 or 28.

30

In Fig. 10 the door 2 is locked and cannot be opened since the handle 5 (not shown) with the hook 9 is hold by the tip 32 of the bolt 28 in a swivelled-in

position. For opening the door 2 the electric motor 16 has to be activated by a signal. The electric motor 16 moves the lever 24 into a position interacting with the bolt 28 (Fig. 11). The wheel 25 of the lever 24 contacts the bolt 28 and forces it against the force (arrow C) of the spring element 29. By the movement of the bolt 28 the hook 9 of the handle 5 is disengaged from the tip 32 of the bolt 28. Hence the handle 5 can be swivelled-out. After the handle 5 has been swivelled-out the electric motor 16 moves the lever back into the neutral position shown in Fig. 10. The force of the spring 29 pushes the bolt 28 back into its position shown in Fig. 10. As soon as the handle 5 will be swivelled-in the tip 32 of the bolt 28 engages behind the hook 9 again and the handle 5 will be blocked. There may be for example five detectors integrated in the locking unit 4. One detector may detect the three positions (x, y and z) of the cam disc 14, one detector may detect the position of the hook 9 (opened or closed) and one detector might detect the position of the handle (opened or closed). An electronic system integrated in the telecommunication cabinet 1 may detect the position of the door 2 as well.

In the situation shown in Fig. 12 the electric motor 16 has moved the lever 24 in a third, "neutral" position interacting with the bolt 26 and the wheel 25 mounted to the lever 24 pushing it against the force of the spring element 27 (arrow D) thereby opening the way for a rotation of the sash fastener 19 of the cylinder lock 17. In this position the sash fastener 19 can be moved by a key (not shown) until it engages with the opening 31 of the bolt 28 and forces the bolt 28 to move against the force of the spring element 29 (see Fig. 13). By the movement of the bolt 28 the hook 9 of the handle 5 is disengaged from the tip 32 of the bolt 28. Hence the handle 5 can be swivelled-out. After the handle 5 has been swivelled-out the electric motor 16 moves the lever back into the first position shown in Fig. 10. The force of the spring element 29 (arrow C) pushes the bolt 28 back into its position shown in Fig. 10. As soon as the handle 5 will be swivelled-in the tip 32 of the bolt 28 engages behind the hook 9 again and the handle 5 will be blocked. For swivelling-in the handle 5 the sash fastener 19 of the cylinder lock 17 should be in its closed position.

In Fig. 14 is schematically shown a further embodiment of a locking unit 4 according to the invention. The locking unit 4 is integrated in a swinging lever handle 5. After the locking unit 4 has been opened the handle 5 can be swivelled into an open position around the axis 6. The axis 6 is connected with a locking means 10 in a manner known by a person skilled in the art. When the handle 5 is swivelled in its open position it can move the locking means 10 for unlocking and locking the door 2 of the cabinet. It is also possible to move the locking means 10 while swivelling out the handle 5. The handle 5 is mounted at a door 2. The handle 5 and the door 2 define a space 7. Within this space 7 is located the locking unit 4 according to the invention which will now be described in detail.

The locking unit 4 comprises a blocking means 8 interacting with a hook 9 attached at the handle 5. When the blocking means 8 is in its first position – shown in Fig. 14 – it engages behind the hook 9 and the handle 5 can not be swivelled around the axis 6 because the blocking means 8 is blocking a movement of the hook 9 together with the handle 5. When the blocking means 8 is in its second position – shown in Fig. 15 – it does not engage behind the hook and the handle 5 can be opened and swivelled around the axis 6. When the handle 5 is opened the locking means 10 can be moved.

20

The blocking means 8 is mounted on a bolt 33 with a lifting disc 34. The bolt 33 itself is mounted on a threaded axis 35 driven by an electric motor 16. When the electric motor 16 is activated the axis 35 is turned thereby lifting or lowering (arrow E) the bolt 33 in a guiding device 36. The bolt 33 has an upper thicker part and a lower thinner part. The blocking means 8 comprises an opening for receiving the bolt 33. It is held between the thicker part of the bolt 33 and the lifting disc 34. Therefore the diameter of the opening is smaller than the diameter of the thicker part of the bolt 33 and the diameter of the lifting disc 34. A spring element 37 is arranged around the bolt 33 pushing the blocking means 8 into the direction of the arrow F in its first closed position.

30

In the described embodiment the bolt 33 can be moved by the electric motor 15 into three different positions. In Fig. 14 is shown the first position of the bolt 33. In this position the thicker part of the bolt 33 forces the blocking means 8 in its first position engaging behind the hook 9 of the handle 5. In the first position of the bolt 5 33 the handle 5 can not be swivelled into its open position, the door 2 of the telecommunication cabinet 1 is locked and cannot be opened.

The locking unit 4 also comprises a cylinder lock 17 integrated in the space 7 as well. The cylinder lock 17 comprises a key receiving portion 18 and a sash 10 fastener 19. The function of the cylinder lock 17 will be described in detail with reference to Fig. 17.

To open the door 2 the electric motor 16 has to be activated. The motor 16 can be activated by any kind of signal such as an electrical signal coming through a 15 telecommunication line into the telecommunication cabinet 1. The signal may be sent by a telecommunication company giving someone the authorization to open the door 2. The signal can also be a radio frequency signal sent from a person standing in front of the cabinet 1. The radio frequency signal has to be transferred into an electrical signal readable for the electric motor 16. The electric motor 16 20 rotates the axis 35 into its second position thereby lifting the blocking means 8 against the force of the spring element 37 into its second, open position shown in Fig. 15. In this position the blocking means 8 is not engaging behind the hook 9 of the handle 5. The handle 5 can now be swivelled around the axis 6, the locking means 10 can now be moved and the door 5 can be unlocked or locked. The 25 cylinder lock 17 is fixed at the handle 5 and is swivelled-out together with the handle 5.

The bolt 33 is moved into a third position after swivelling out the handle 5. In this position the thicker part of bolt 33 does not contact the blocking means 8 any 30 more but the blocking means 8 are forced by the spring element 37 into its first closed position (see Fig. 16). The third position of the bolt 33 lies between the first and the second position. When the handle 5 is swivelled-out the blocking means 8

does not engage behind the hook 9 of the handle 5. But the blocking means 8 is in the position where it would engage behind the hook 9 when the handle 5 would be in its closed position. This mechanism works as a latch.

5 With reference to Fig. 16 and 17 will be described the function of the cylinder lock 17. The cylinder lock 17 may be activated for example in the case of an emergency opening of the cabinet 1 or any mechanically operated opening attempt. Such emergency case may occur when no electricity is available for example in case of an electrical power outage. The cylinder lock 17 may also be
10 activated when the cabinet is built up and opened for the first time and is not yet connected to the electricity.

In this case the bolt 33 has to be moved by the electric motor 16 into its third position (shown in Fig. 16). For that movement a certain amount of energy is
15 needed. The energy may be provided by a storage element (not shown) within the locking unit 4 or it may be provided by a storage element (not shown) outside the locking unit 4 and transferred into the locking unit 4. As described above in the third position the bolt 33 does not contact the blocking means 8 but the spring element 37 forces the blocking means 8 into its first position. A lever 23 is
20 mounted at the blocking means 8. The lever 23 does make the same movement as the blocking means 8.

When the cylinder lock 17 is activated by a key (not shown) and the sash fastener 19 is moved from a closed position as (Fig. 16) in an open position (Fig. 17) the
25 sash fastener 19 contacts the lever 23 and pushes it in the direction of arrow G in Fig. 17. Since the lever 23 is mounted at the blocking means 8 the blocking means 8 will be moved into this direction from its first position (Fig. 16) into its second position (Fig. 17). In this situation the blocking means 8 does not engage behind the hook 9 of the handle 5. Therefore the handle 5 can be swivelled
30 around the axis 6, the locking means 10 can now be moved, the door can be opened.

As soon as the handle 5 together with the cylinder lock 17 is swivelled-out around the axis 6 the spring element 13 thereby pushes back the rocking bar 11 into the direction of the arrow F in Fig. 14 and the blocking means 8 into its first position again. Since the handle 5 is swivelled-out the blocking means 8 does not engage
5 behind the hook 9 of the handle 5. But the blocking means 8 is in the position where it would engage behind the hook 9 when the handle 5 would be in its closed position. The blocking means 8 is therefore prepared for blocking the handle 5 as soon as it will be swivelled-in. For swivelling-in the handle 5 the sash fastener 19 cylinder lock 17 should be in its closed position again.

REFERENCE NUMBERS

5	1	telecommunication cabinet
	2	door
	3	hinge
	4	locking unit
	5	swinging lever handle
10	6	axis of handle
	7	space
	8	blocking means
	9	hook
	10	locking means
15	11	rocking bar
	12	bearing
	13	spring element
	14	cam disc
	15	axis of cam disc
20	16	electric motor
	17	cylinder lock
	18	key receiving portion
	19	sash fastener
	20	bearing
25	21	gliding surface of hook 9
	22	gliding surface of blocking means 8
	23	lever
	24	lever
	25	pivot-mounted wheel
30	26	bolt
	27	spring element
	28	bolt

	29	spring element
	30	
	31	opening
	32	tip
5	33	bolt
	34	lifting disc
	35	treaded axis
	36	guiding device
	37	spring element
10		
	A	direction of force of spring element 13 in Fig. 2a, 4 and 9
	B	direction of movement of the lever 23 in Fig. 8a
	C	direction of force of spring element 29 in Fig. 10 to 13
15	D	direction of force of spring element 27 in Fig. 10 to 13
	E	direction of movement of bolt 33 in Fig. 14
	F	direction of force of spring element 37 in Fig. 14
	G	direction of lever 23 in Fig. 17
20		
	x	first position of the cam disc 14 – blocking means 8 in its first position
	y	second position of the cam disc 14 – blocking means 8 in its second position
	z	third position of the cam disc 14 – blocking means 8 in its first position
25		due to force of spring element 13

PATENT CLAIMS

1. Locking unit (4) for a door (2) or the like comprising
5 an operating device (5) that can be moved from a closed position into an open position,
a locking means (10) that can be moved by the operating device (5) from a first position where the door (2) is locked and cannot be opened into a second position where the door (2) can be opened,
10 a blocking means (8) that can be moved from a first position where the operating device (5) is blocked in its closed position into a second position where the operating device (5) is not blocked and can be moved from its closed position into its open position,
at least two actuating devices (16, 17) interacting with the blocking means
15 (8), and
a control element (14) for overriding at least one actuating device (17).
2. Locking unit according to claim 1, wherein the blocking means (8), the actuating devices (16, 17) and the control element (14) are integrated in
20 the handle (5).
3. Locking unit according to claims 1 or 2, wherein the control element (14) can be moved by the electro mechanical device (16) into at least three different positions (x, y, z).
25
4. Locking unit according to any of claims 1-3, wherein the control element comprises a cam disc (14) and a rocking bar (11).
5. Locking unit according to any of the preceding claims, wherein the control
30 element comprises a lever (24) with a pivot-mounted wheel (29).

6. Locking unit according to any one of the preceding claims, wherein the blocking means (8) comprises a lever (23) interacting with the sash fastener (19) of the first actuator.
- 5 7. Locking unit according to any of the preceding claims, wherein the locking unit comprises at least two movably arranged bolts (26, 28).
8. Telecommunication cabinet with a door and a locking unit as defined in any of claims 1 to 7.

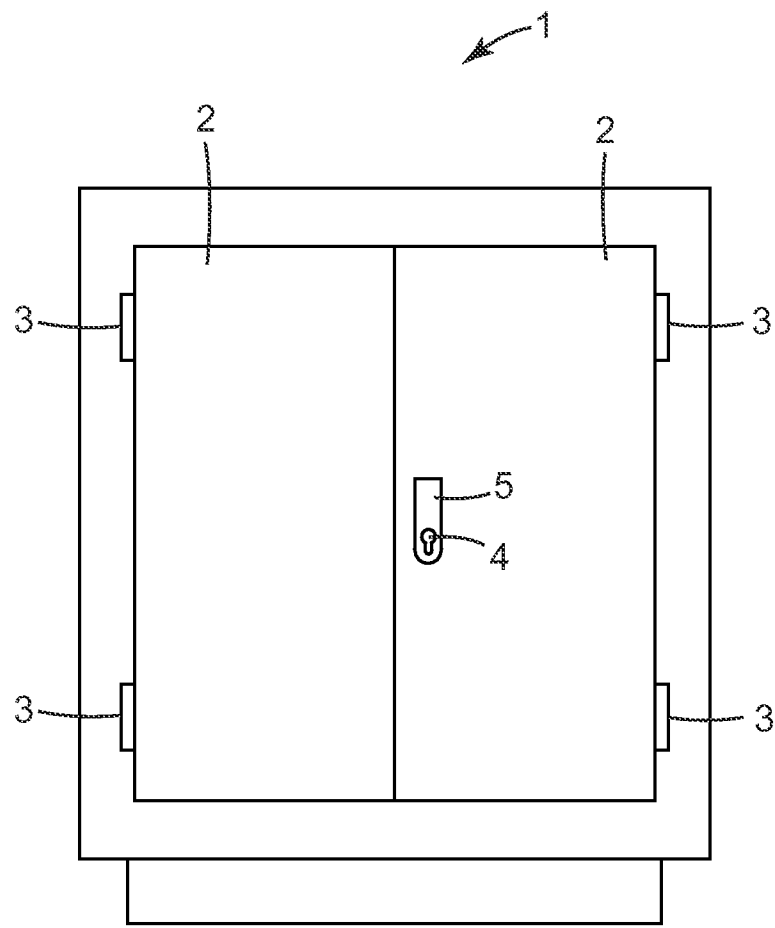


FIG. 1

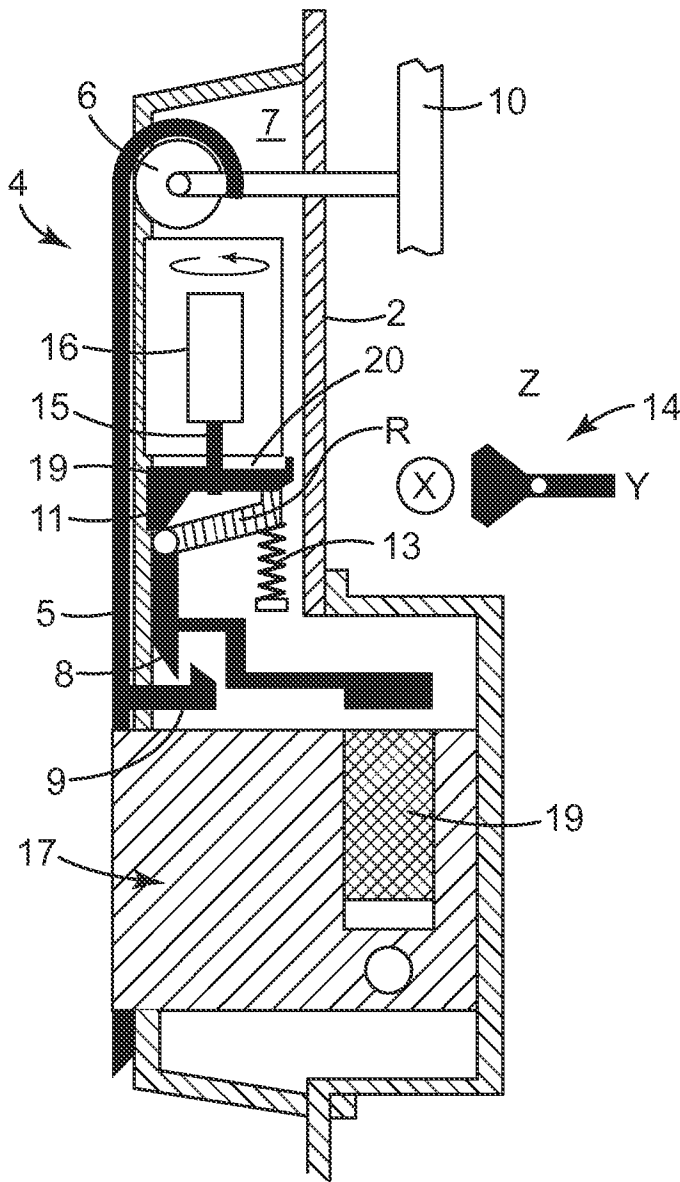


FIG. 2a

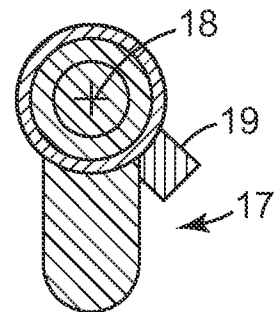


FIG. 2b

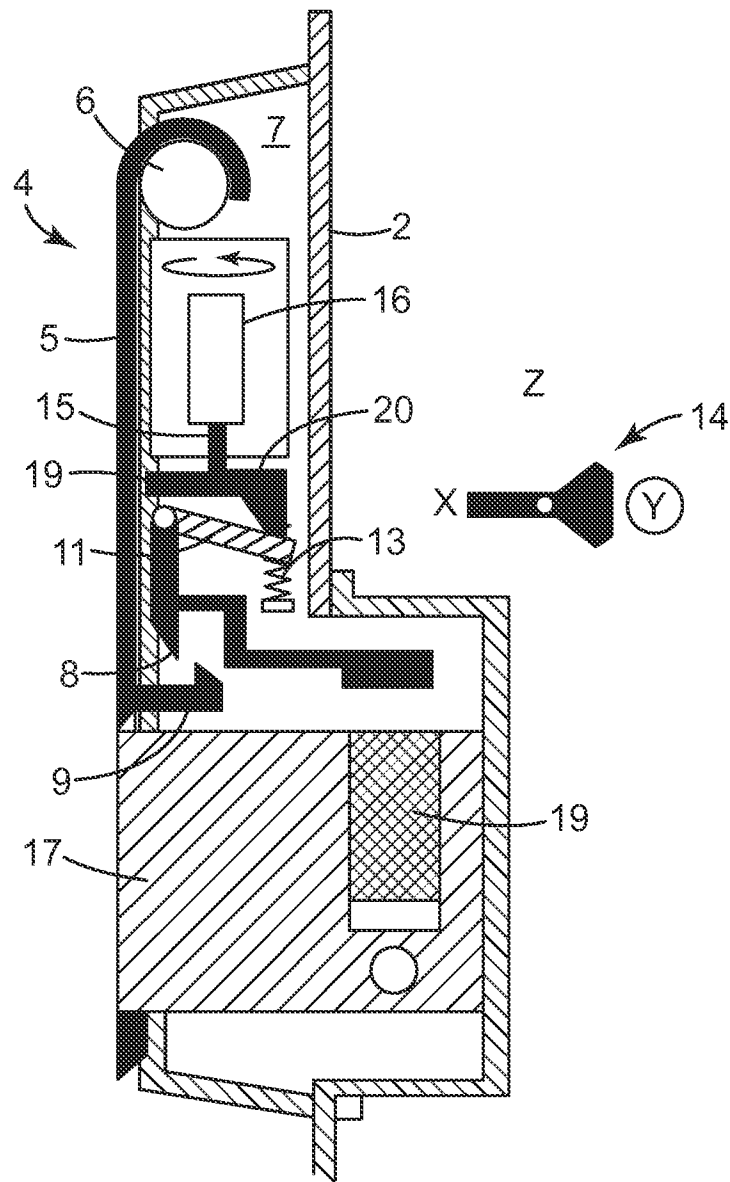


FIG. 3

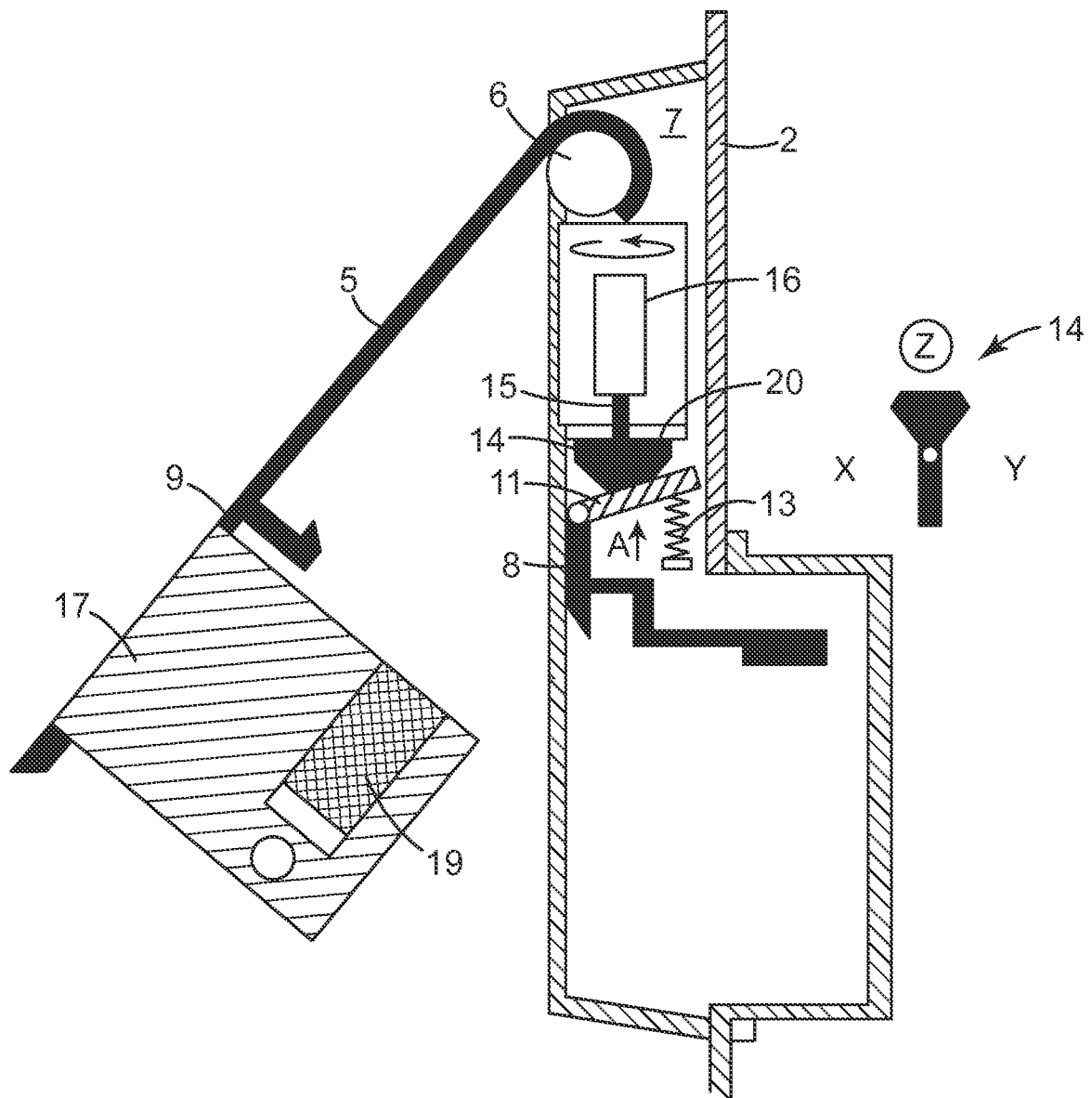


FIG. 4

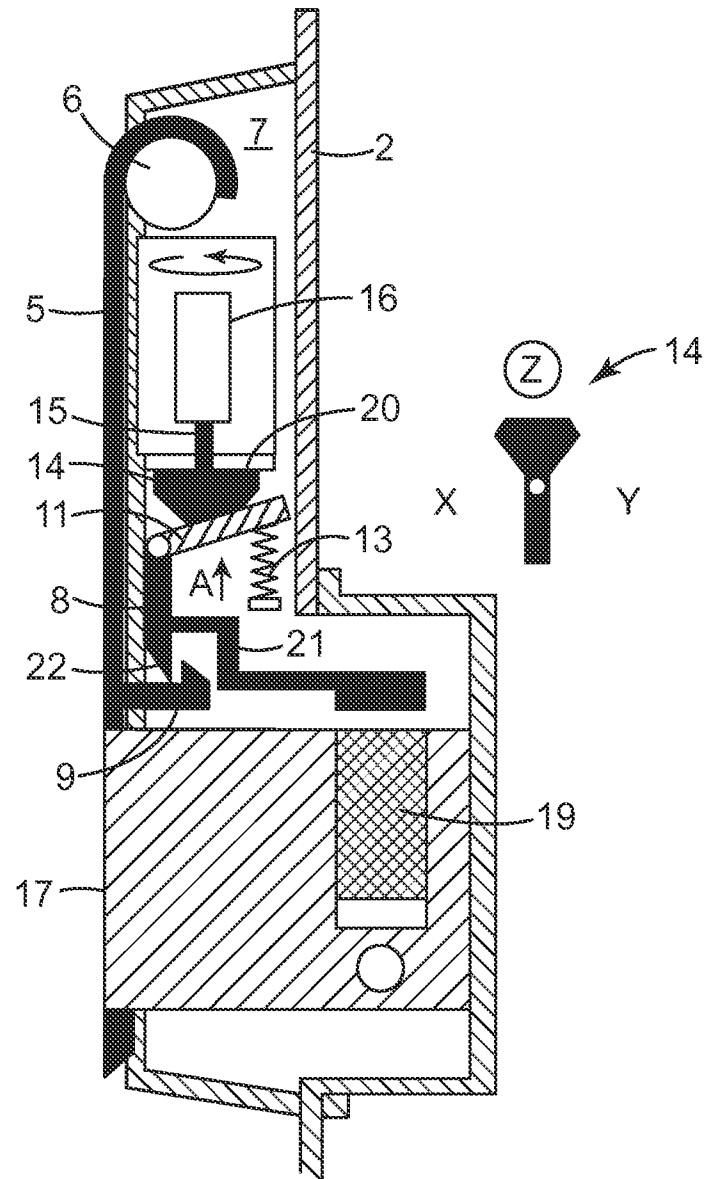


FIG. 5

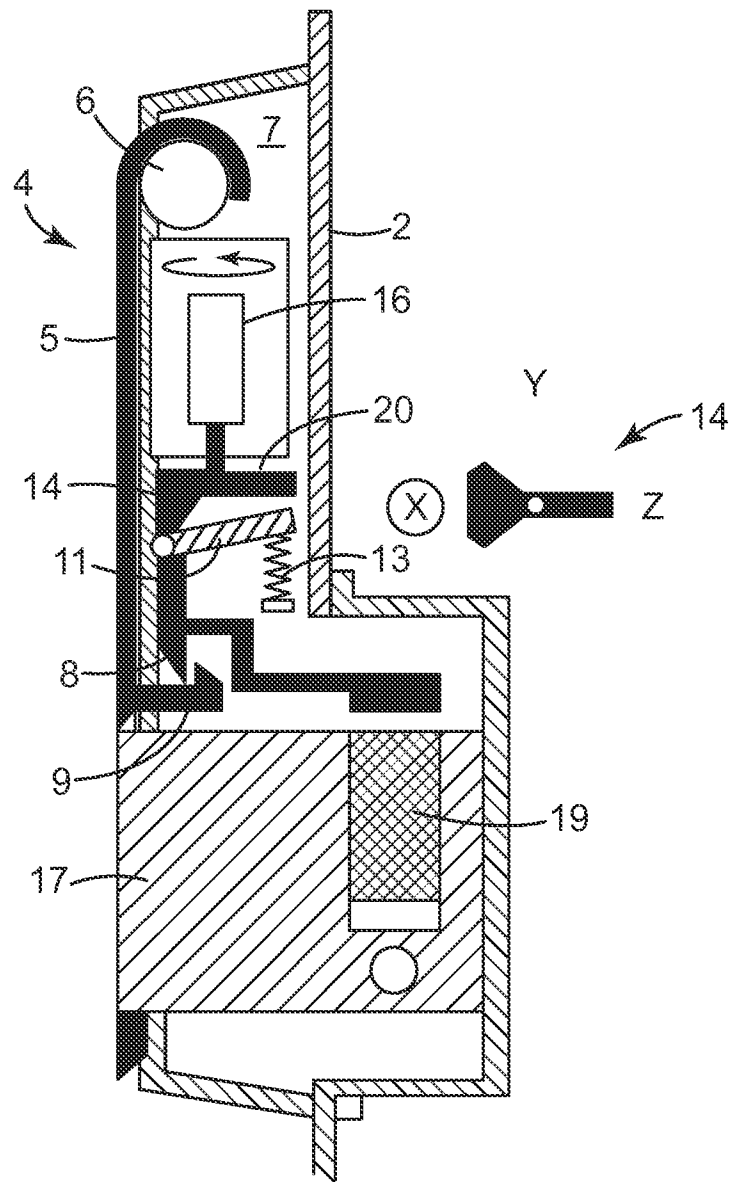


FIG. 6

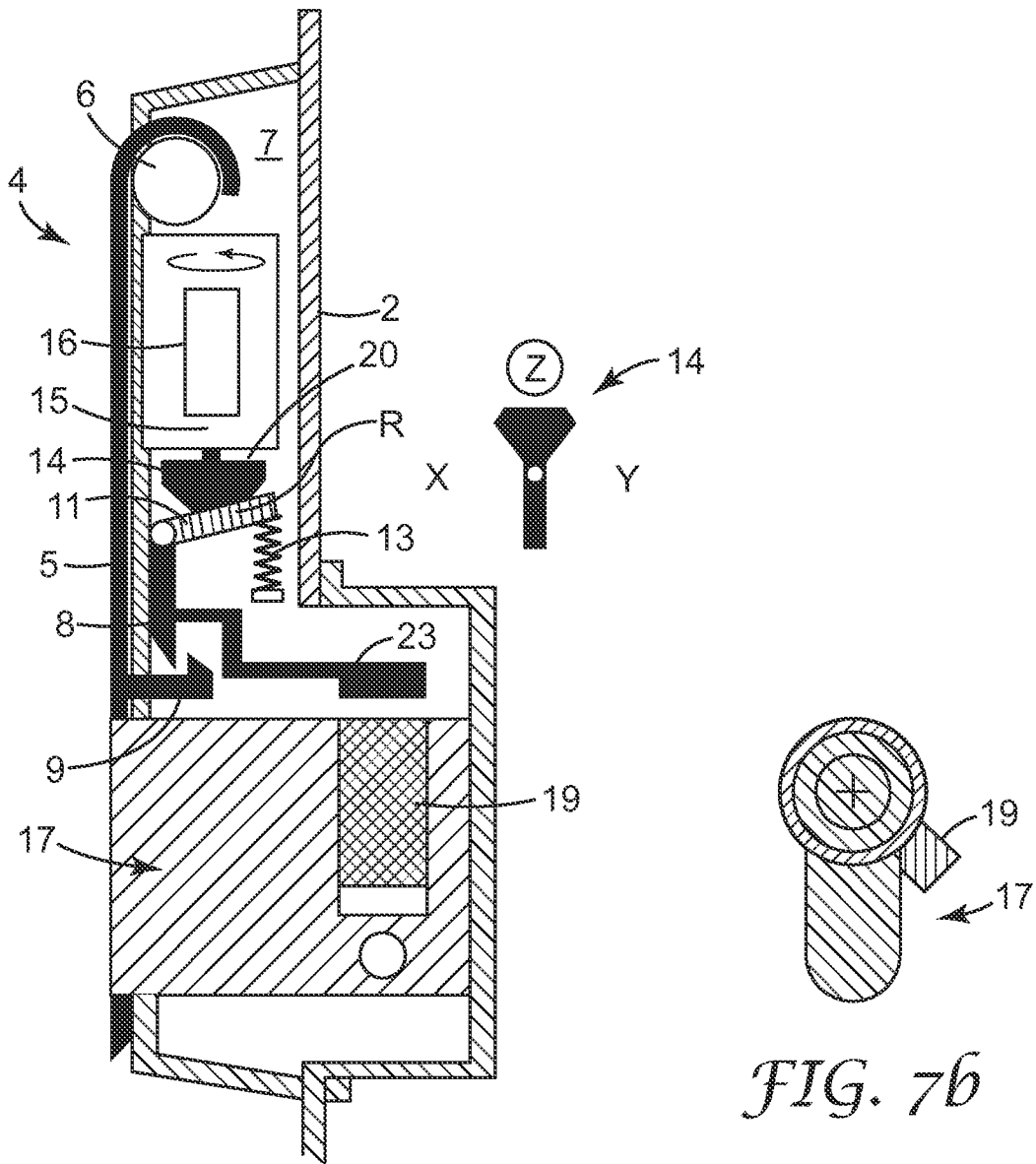


FIG. 7a

FIG. 7b

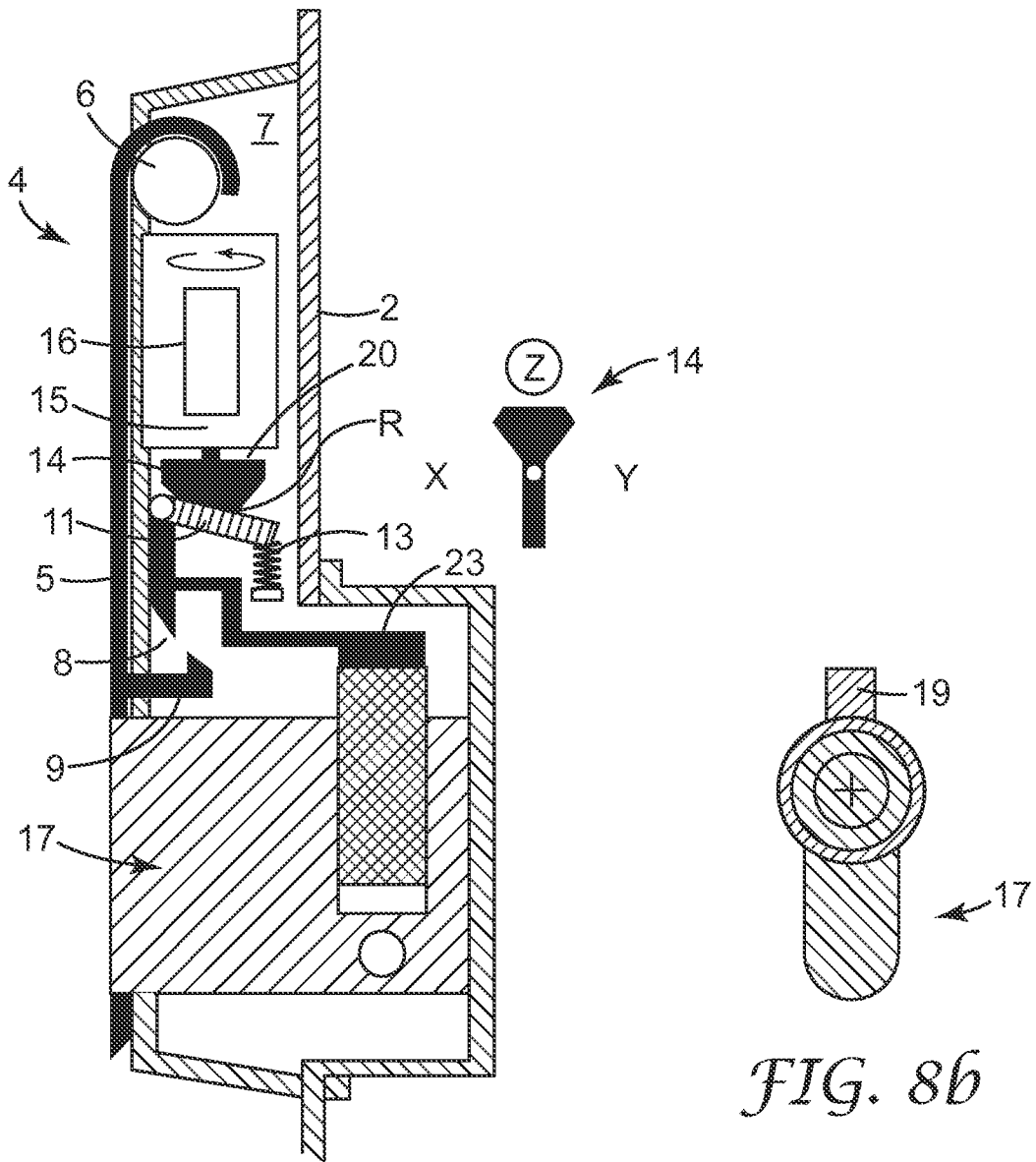


FIG. 8a

FIG. 8b

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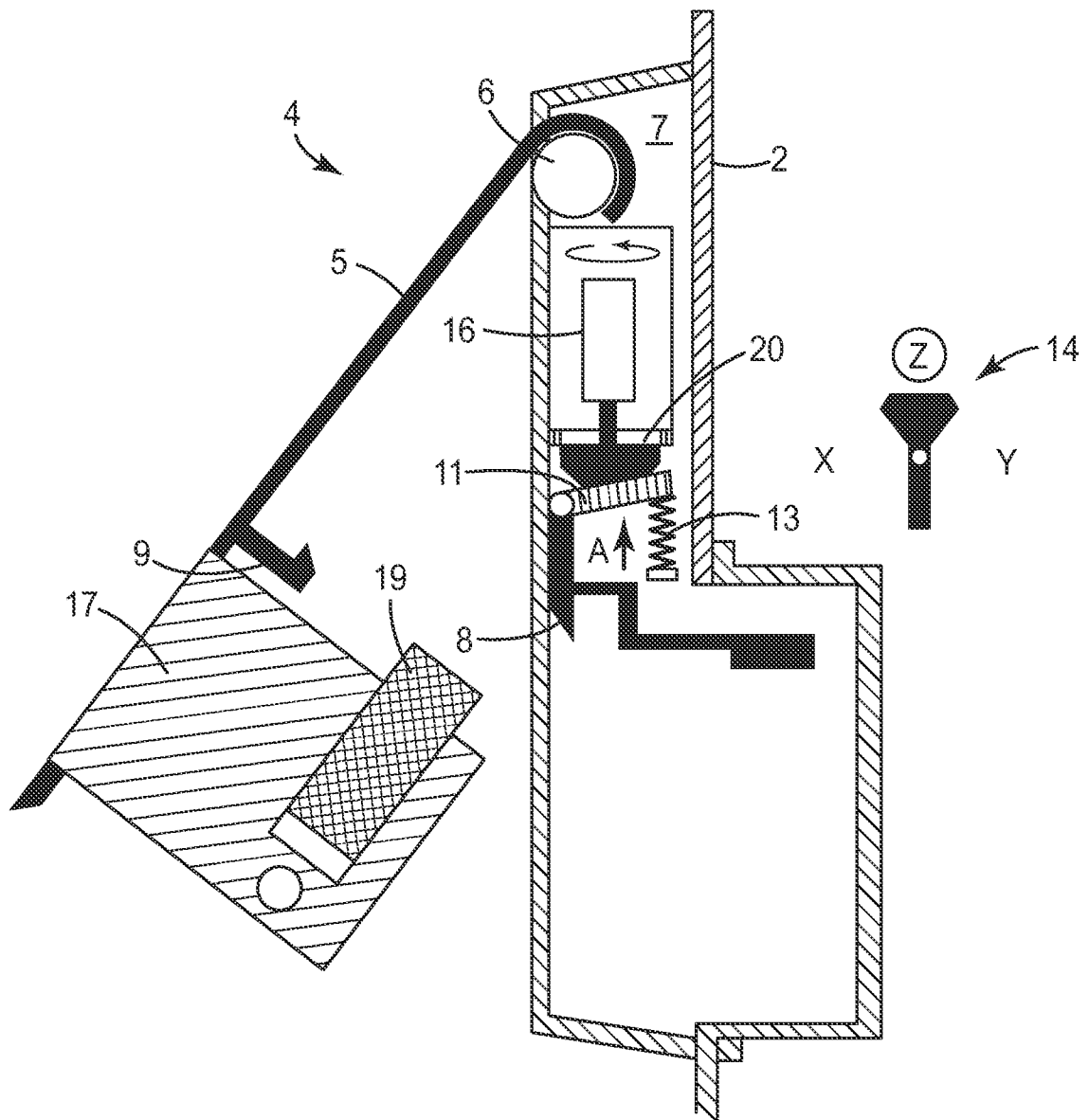


FIG. 9

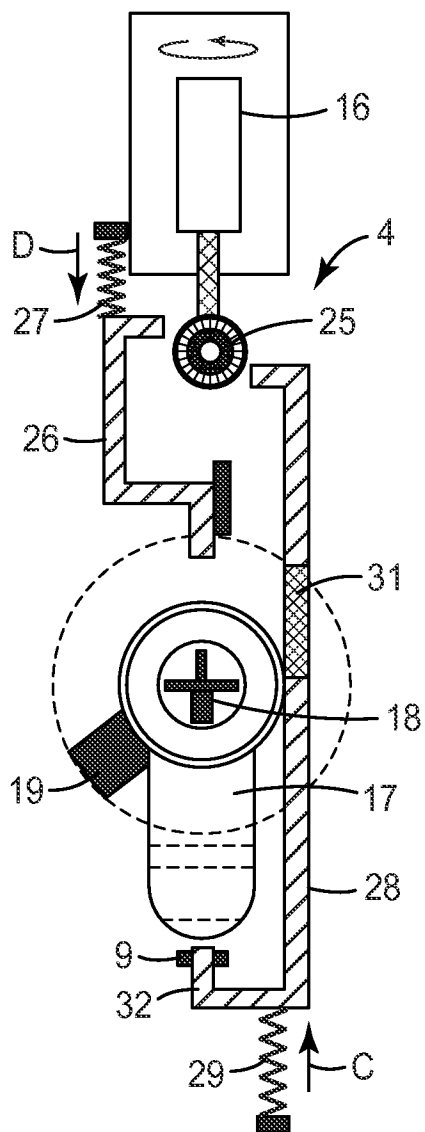


FIG. 10

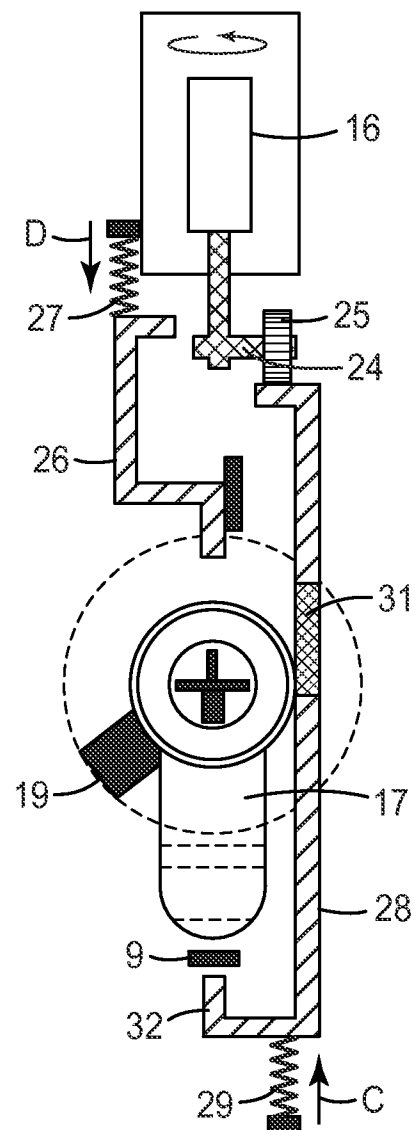


FIG. 11

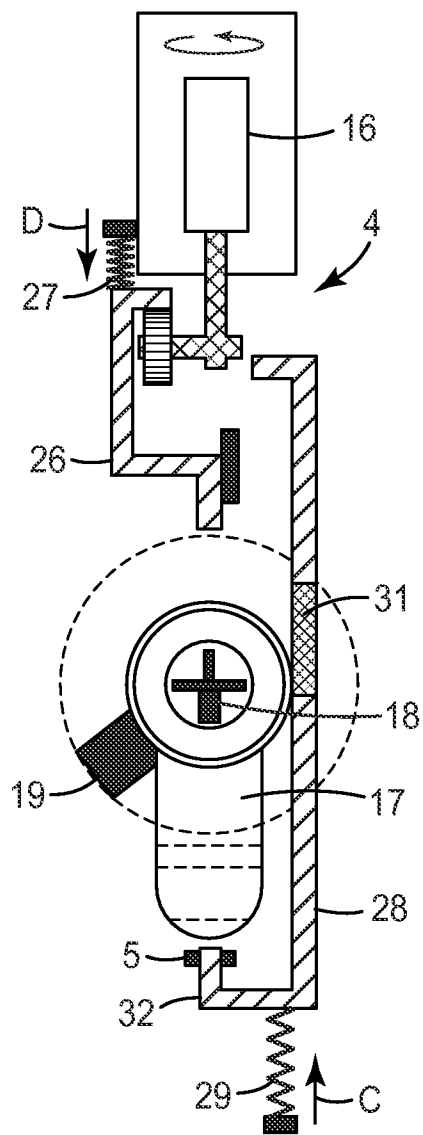


FIG. 12

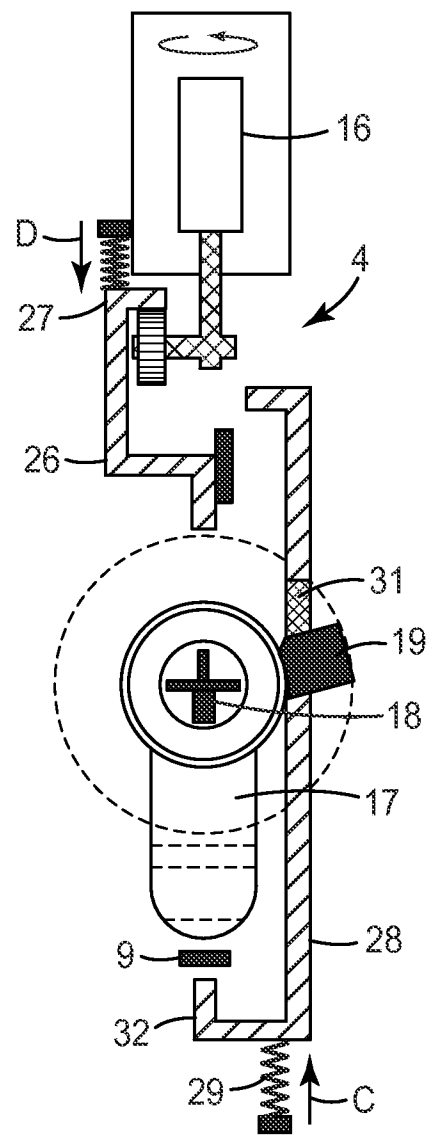


FIG. 13

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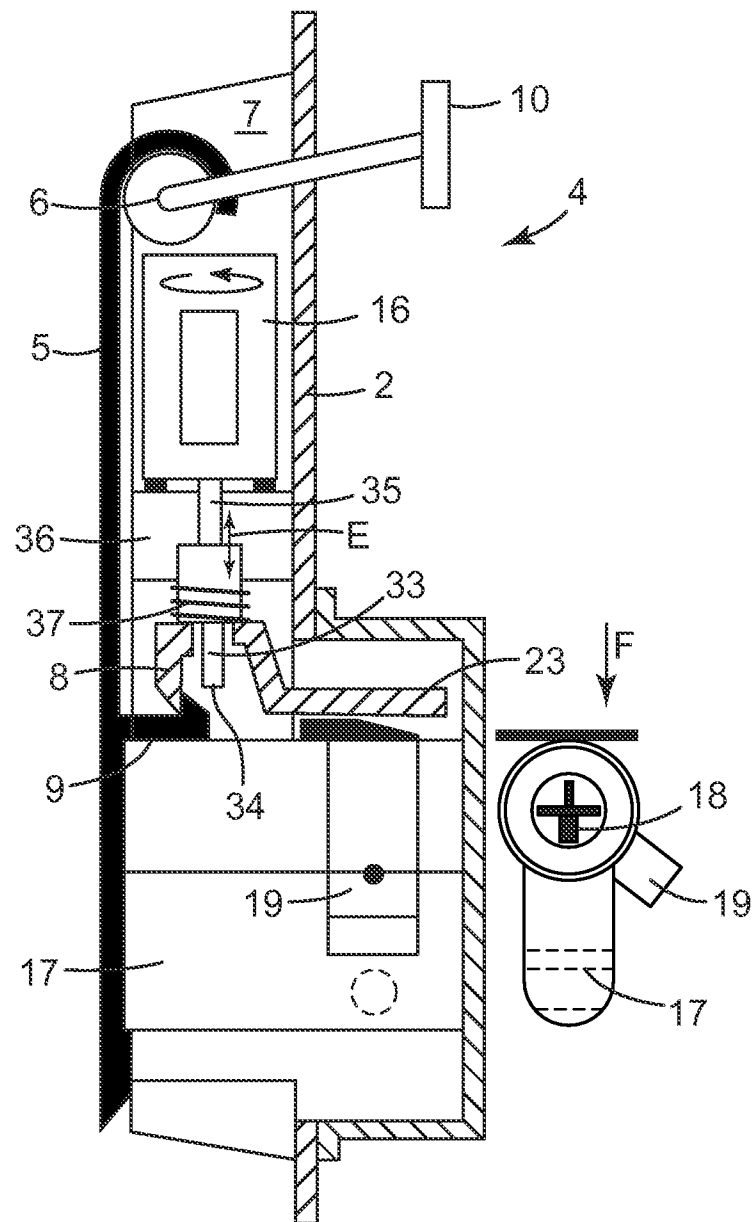


FIG. 14

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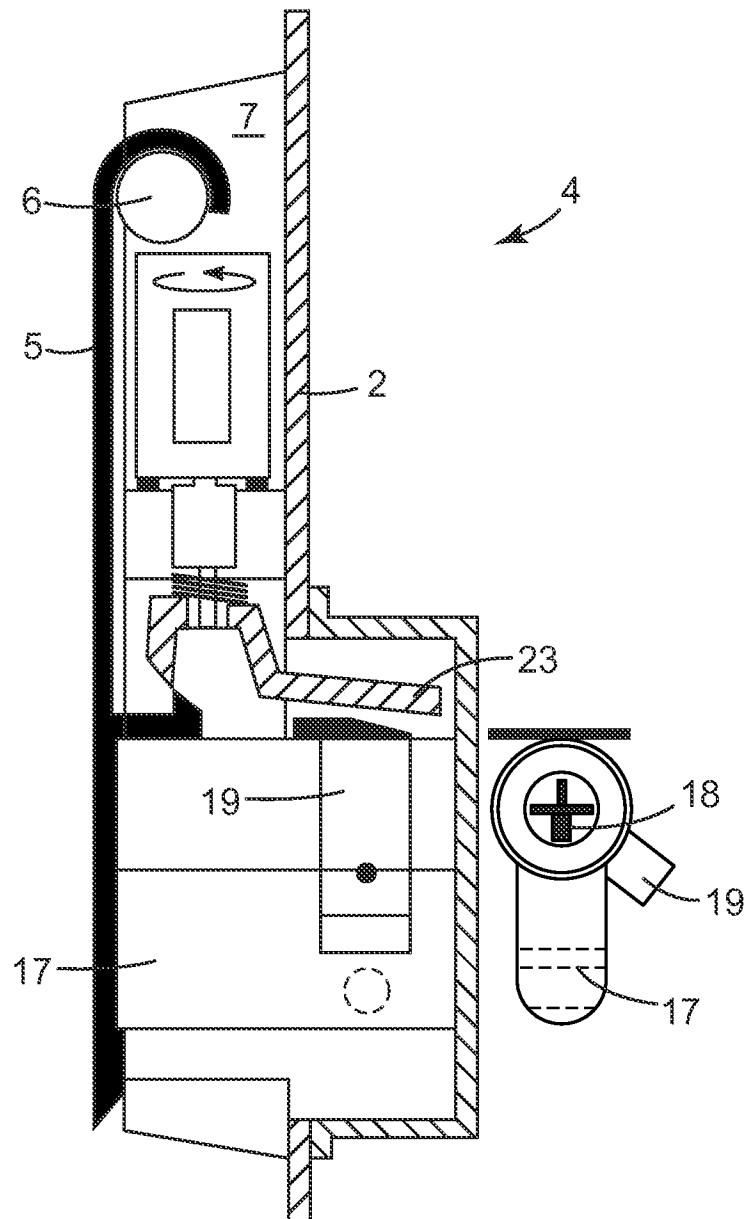


FIG. 15

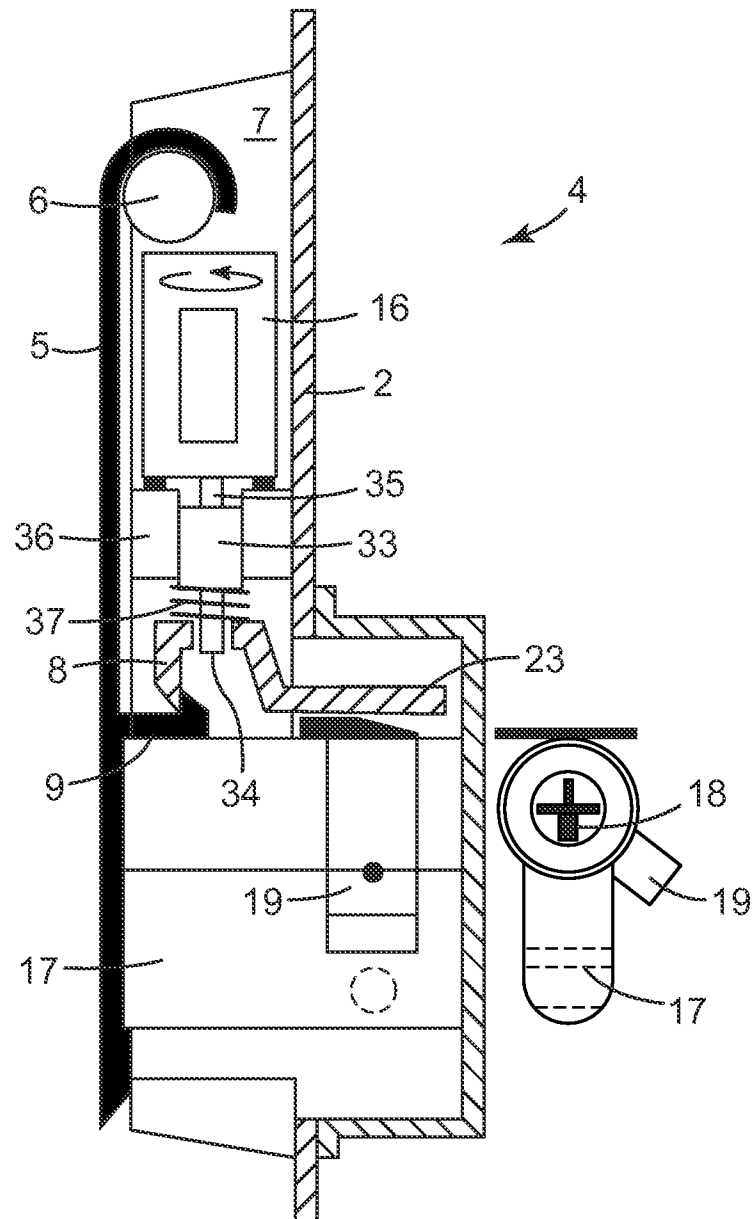


FIG. 16

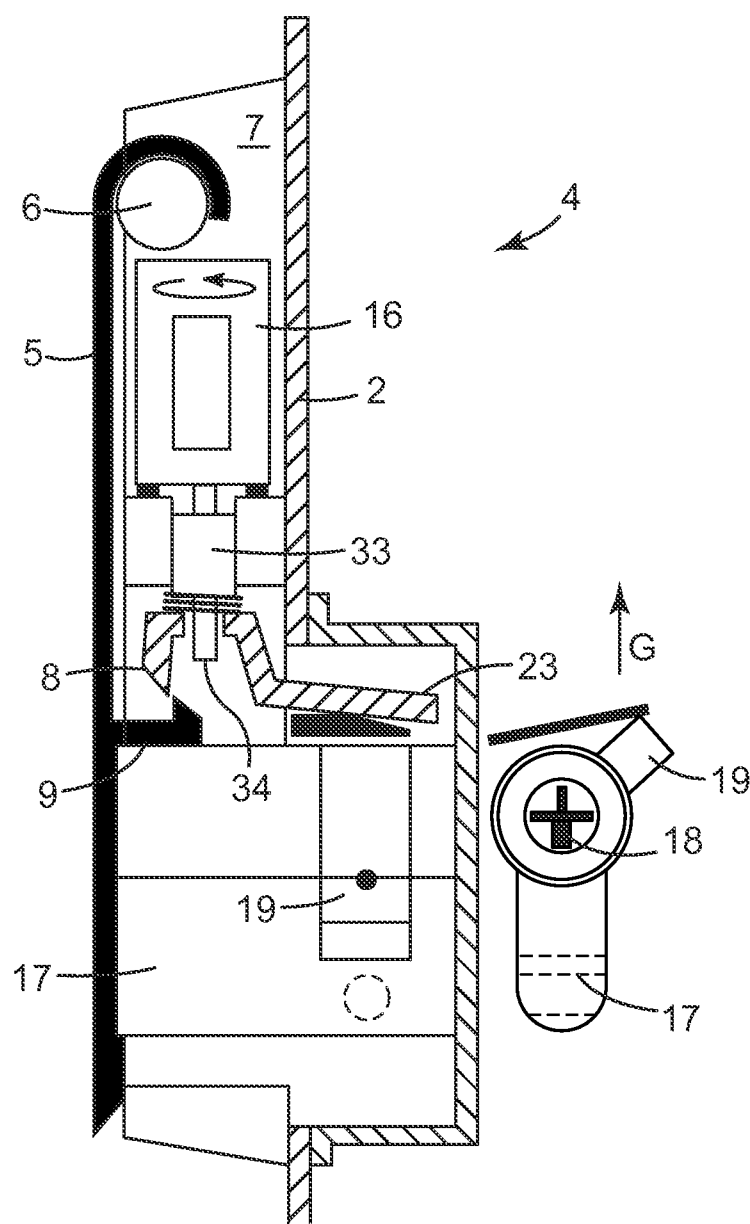


FIG. 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/062127**A. CLASSIFICATION OF SUBJECT MATTER****E05B 13/10(2006.01)i, E05B 47/00(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 E05B 13/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) & keywords: "lock", "handle", and "blocking"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1382780 A2 (TAKIGEN MANUFACTURING CO., LTD.) 21 January 2004 See abstract; figures 1-11; paragraphs 19-55; claims.	1,2
A		3
A	EP 1329575 B1 (TAKIGEN MANUFACTURING CO., LTD.) 22 March 2006 See abstract; figures 1-17; paragraphs 11-38; claims.	1-3
A	WO 02/38894 A1 (RAMSAUER, D.) 16 May 2002 See abstract; figures 1-10; claims.	1-3
A	US 7040125 B2 (CIEZKI, R.; DRESSEL, O.) 09 May 2006 See abstract; figures 1A-1D; column 4 line 26-column 6 line 30; claims.	1-3



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

09 OCTOBER 2008 (09.10.2008)

Date of mailing of the international search report

09 OCTOBER 2008 (09.10.2008)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

OH, KUN KU

Telephone No. 82-42-481-5448



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2008/062127**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 4-8
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2008/062127

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