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(72) Inventors:
• **Flinkman, Pekka**
FI-28610 Pori (FI)
• **Kivistö, Rami**
29570 Söörmarkku (FI)

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(74) Representative: **Nieminen, Taisto Tapani**
Patenttitoimisto T. Nieminen Oy
P.O. Box 65
33201 Tampere (FI)

(71) Applicant: **Suojax Oy**
28600 Pori (FI)

(54) **Locking device mounted to a door**

(57) Locking device either including a lock body (10) which can be embedded inside a door or can be installed on the surface of a door or that the locking device can be adjusted in a door equipped with the mentioned lock body (10) wherein the mentioned lock body (10) comprises two shaft lines (L1), (L2) of which shaft lines for one a turning knob (2) is adjusted and for the other operating handles (1) are adjusted and that the lock body (10) comprises a mechanism which locks the door and unlocks the door wherein the functions of the locking element (3) protruding out of the lock body (10) are adjusted to occur with the help of the mentioned locking device and that the mentioned locking device comprises at least a touch element, such as a fingerprint detector (7), as a controlling function. The locking device comprises an inner unit (8, 9) and an outer unit (4) which can be attached to the door wherein a mechanism is adjusted in the inner unit (8, 9) on the shaft line (L1) of the turning knob (2) with the help of which mechanism the shaft (17) of the turning knob (2) can be adjusted both to have a rotation connection with operating handles (1) which are located on the other shaft line (L2) and can be adjusted to be disengaged from the mentioned rotation connection wherein the element which conveys the rotation connection and opens it is a switching element (13) which is adjusted on the shaft line (L1) of the turning knob (2) and moves in the direction of the mentioned shaft (17).

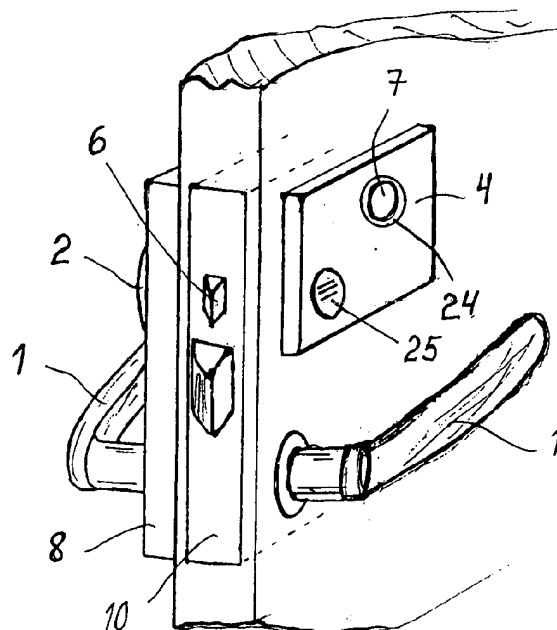


Fig. 2

Description

[0001] Invention relates to a locking device for attaching it to a door including either a lock body which can be embedded into the door or can be installed on the surface of the door or that the locking device can be adjusted in a door which is equipped with the mentioned lock body in which case the mentioned lock body comprises two shaft lines of which shaft lines for the one a turning knob is adjusted and for the other operating handles are adjusted and that the lock body comprises a mechanism which locks the door and unlocks it in which case the functions of the locking element protruding out of the lock body are adjusted to occur with the help of the mentioned locking device and that the mentioned locking device comprises at least a touch element, such as a fingerprint detector as a controlling function.

[0002] A locking device from a Chinese published application CN 2630399 is previously known in which publication the control of the lock can additionally be performed with a fingerprint identification. The structure according to the invention is located in the lock body which can be embedded inside the door which is not a conventional standard lock body, but especially built for this invention. The invention comprises a combined key usage and electronical control. The electronical control can be a coded control or a fingerprint control.

[0003] The disadvantage of the above described known solution is the unsuitability regarding the installation to the existing lock body. In the publication there is no clarification on how the lock is controlled from inside and from outside and there is no clarification on how the lock could be connected to the doorhandles. No such usage possibility of the lock is described in the publication that it could be adjusted to be constantly either in an open state, constantly in a locked state or in a secure state in which case it cannot be unlocked before the secure state has been cancelled. With this lock solution conventional locks, which are being used in the outer doors in Finland and Europe, cannot be replaced.

[0004] With the locking device according to the invention an essential improvement can be achieved in relation to the known technology and it is characteristic of the invention that the locking device comprises an inner unit and an outer unit which can be attached to the door in which case a mechanism is adjusted inside the inner unit on the shaft line of the turning knob with the help of which mechanism the turning knob can be adjusted to have both a rotating connection with the operating handles which are located on the other shaft line through a shaft which is located on its shaft line and can be adjusted to be disengaged from the mentioned rotating connection in which case the element which conveys the rotating connection and disconnects it is a switching element which is located on the shaft line of the turning knob and moves in the direction of the mentioned shaft.

[0005] Advantage of the invention is the fact that it can easily be located to the lock bodies which are located

inside the doors by locating its inner unit over on the inner surface of the door so that rotational motions coming from both the turning knob and the handles of the locking device move along their shaft lines into the lock body. With the help of the locking device various locking stages can be formed for the door and these functions and opening functions are mainly possible only with the help of a fingerprint authentication. The locking device can be built so that it can also be partly embedded into the door. The outer unit belonging to the locking device is located most advantageously on the outer surface of the door at the corresponding location with the inner unit. In addition to the outer unit a conventional cylinder body can be located on the outside being left at its place for the functions occurring with a key in addition to the outer unit according to the invention.

[0006] In the following the invention is described more detailed by referring to the accompanying drawings in which

Figure 1 shows an inner unit which is located to the door diagonally seen.

Figure 2 shows an outer unit which is located to the door diagonally seen.

Figure 2a shows an outer unit equipped with a cylinder body on the outside of the door.

Figure 3 shows parts of the locking device seen from the edge direction of the door.

Figure 4 shows a switching element and the shaft when they are being connected.

Figure 5 shows the moving arrangement of the switching element.

Figure 6 shows the shaft of the turning knob.

Figure 7 shows moving of the switching element with the help of pieces which can be lifted and a peg which switches the lock to be in a secure state inside the switching element.

[0007] In the figure 1 the inside of the door can be seen comprising the inner unit 8 according to the invention on the inner surface which inner unit comprises the turning knob 2 and the handle 1. The lock body 10 is embedded into the door in the conventional way which lock body comprises the protruding latch of the lock as the locking element 3 and the part 6 which adjusts the mentioned locking element 3 into the locked position when the door is being closed. An inner unit 8, 9 which has a high design is shown in the figure 1. The inner unit may also be lower being formed only from the part 8, such as is shown in the figures 2 and 2a. There is a display 30 in the inner unit 8, 9 of the figure 1 which display shows for example the state of the lock and with the help of it one can also control and program the device with the help of the push buttons 31 located underneath the display.

[0008] In the figure 2 the exterior of the door is shown in which case in this case the cylinder body is missing and on the outside there are only the handle 1 and the outer unit 4. There is a detector sensor 7 in the outer unit

4 for the fingerprint authentication. The lock can be set into a secure state by choosing the secure state by pressing the push button 31 which is on the inner unit 8, 9 and after that letting the device read the fingerprint successfully in the fingerprint reader 7 of the outer unit. The secure state can be cancelled only with an acceptable and a successful finger print authentication. When the secure state is activated the door cannot be opened from inside but it can only be opened with the help of the finger print authentication from outside. If the lock is controlled in such a way that it executes the locking, but it is not in a secure state, it can be opened from inside with the help of the turning knob 2 and from outside with the fingerprint authentication. If the lock is neither in a secure state nor in a state which controls the locking, it can be unlocked with the help of the handle 1 from inside and outside and with the help of the turning knob 2 from inside. The fingerprint reading and changing of the states of the lock are indicated with LED lights from which light is directed to a lens 24 which surrounds the reader 7. In addition to that same occurrences are indicated with a small buzzer 25.

[0009] In the figure 2a there is an outer unit 4 which corresponds to the outer unit of the figure 2 but it is located above the cylinder body 26. By using the cylinder body 26 the door can be opened with the help of a key from the secure state and from the locked state.

[0010] In the figure 3 a shaft 19 which is located in the shaft centre of the handles 1, on the line L2 is shown with the help of which shaft the rotations of the handles 1 located inside and outside are connected to each other. Power transmission which is realized with a chain 12 and chain gears 11 comes from the shaft 19 to the shaft line L1 on which shaft line the shaft 17 is located. The chain gear 11 is attached to the part 16 in a non-rotating way which for its part can rotate when being bearing-mounted on top of the shaft 17. The turning knob 2 is connected fixed to the shaft 17. Thus there is no connection between the handles 1 and the turning knob 2 when the part 16 can rotate on top of the shaft 17. The shaft 17 and the part 16 are locked to each other when the switching element 13 is moving in the direction of the shaft line L1 so much that the extension part 27 (figure 6) located in the shaft 17 is located in the transversal groove (figure 4) of the switching element 13.

[0011] The movements of the switching element 13 into positions I, II and III are created for example with the help of the pieces 21, 22 which can be lifted and a back-moving spring 20 shown by the figure 7. One of the pieces which can be lifted, most advantageously the piece 22 rotates with the help of a motor 5 and a toothed wheel 15 and the other piece 21 is non rotating so that the pieces 21 and 22 which can be lifted become disengaged from each other when the motor 5 is rotating in the first direction chosen for it and return close to each other when the motor is rotating in an opposite direction being pressed by a spring 20.

[0012] The switching element 13 moves with the piece

21 which can be lifted and correspondingly returns to its position with the piece 21 between its three positions I - III being controlled by the rotation of the motor 5. When the extension part 27 of the shaft 17 is located in the transversal groove 14 of the switching piece 13, the rotational motion of the handle becomes conveyed through the shaft 17 into the lock body. The part 16 and the switching element 13 always rotate together. The sides of the part 16 are always located in the groove of the switching element 13 and control the movement of the switching element 13 when it moves into a switching position with the shaft 17 and out of it.

[0013] The lock goes into the secure state with the help of the peg 29 shown by the figure 7 when the switching element 13 moves into the third position III which can be reached when the pieces 21, 22 become most disengaged in relation to each other with the help of a reciprocal rotational motion. In this secure state the peg 29 projects inside the turning knob 2 and prevents the turning knob from rotating. Thus when being in the secure state the lock cannot be unlocked from inside even with a cranker, and naturally not even with the help of a handle 1.

Claims

1. Locking device either including a lock body (10) which can be embedded inside a door or can be installed on the surface of a door or that the locking device can be adjusted in a door equipped with the mentioned lock body (10) wherein the mentioned lock body (10) comprises two shaft lines (L1), (L2) of which shaft lines for one a turning knob (2) is adjusted and for the other operating handles (1) are adjusted and that the lock body (10) comprises a mechanism which locks the door and unlocks the door wherein the functions of the locking element (3) protruding out of the lock body (10) are adjusted to occur with the help of the mentioned locking device and that the mentioned locking device comprises at least a touch element, such as a fingerprint detector (7), as a controlling function, **characterized in that** the locking device comprises an inner unit (8, 9) and an outer unit (4) which can be attached to the door wherein a mechanism is adjusted in the inner unit (8, 9) on the shaft line (L1) of the turning knob (2) with the help of which mechanism the shaft (17) of the turning knob (2) can be adjusted both to have a rotation connection with operating handles (1) which are located on the other shaft line (L2) and can be adjusted to be disengaged from the mentioned rotation connection wherein the element which conveys the rotation connection and disconnects it is a switching element (13) which is adjusted on the shaft line (L1) of the turning knob (2) and moves in the direction of the mentioned shaft (17).

2. Locking device according to the claim 1, **character-**

ized in that the switching element (13) which switches said locking device to have a rotation connection and disconnects it from it is adjusted to move on a shaft line (L1) with the help of a piece (22) which can be lifted rotated by the electric motor (5) between the positions (I - III) in which case the mentioned lift, when the mentioned piece (22) is rotating, moves the switching element (13) in the direction of the shaft (L1).

to the switching element (13) is located in a groove located in the turning knob (2).

3. Locking device according to the claim 1, **characterized in that** the movement of the switching element (13) in the first direction switches the shafts (19) and (17) located on the shaft lines (L1) and (L2) to rotate together with the help of the power transmission (12) connecting the shafts and the movement in another direction disengages the mentioned shafts from the rotation connection. 5
10
4. Locking device according to the claim 1, **characterized in that** the movement of the switching element (13) in another direction is adjusted to occur with the help of a spring (20) when the piece (22), which can be lifted, rotates. 15
20
5. Locking device according to the claim 1, **characterized in that** the switching element (13) comprises a transversal groove (14) which runs through its rotational centre to which groove the extension part (27), which is arranged to the shaft (17) of the turning knob (2) and differs from a round form, is located in order to create the rotation connection. 25
30
6. Locking device according to the claim 1, **characterized in that** the shaft (17) of the turning knob (2) and the handle shaft (19) can be controlled with the help of a touch element, such as a fingerprint detector (7) to have a rotation connection in order to undo the locking of the door by using the motor (5). 35
40
7. Locking device according to the claim 1, **characterized in that** the shaft (17) of the turning knob (2) and the handle shaft (19) can be controlled with the help of touch element, such as a fingerprint detector (7), off from the rotation connection in order to lock the door by using the motor (5). 45
50
8. Locking device according to the claim 1, **characterized in that** the locking can be undone in the locked state by rotating the turning knob (2). 50
9. Locking device according to the claim 1, **characterized in that** in order to create the secure state, the switching element (13) can be moved into the third position (III) in which position the non rotating switching element (13) which moves in the axial direction (L1) locks the turning knob (2) to be non-rotating when a projecting part, such as a peg (29) belonging 55

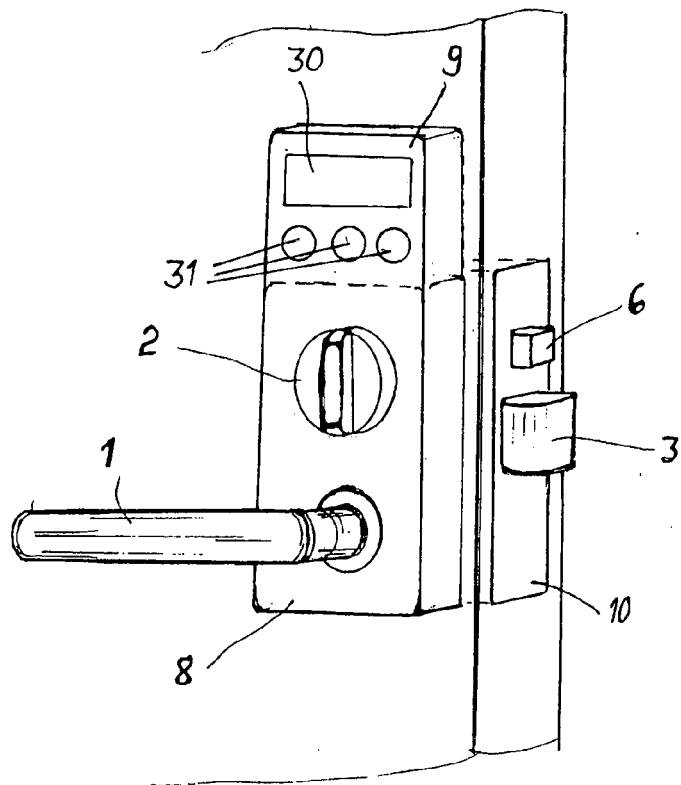


Fig. 1

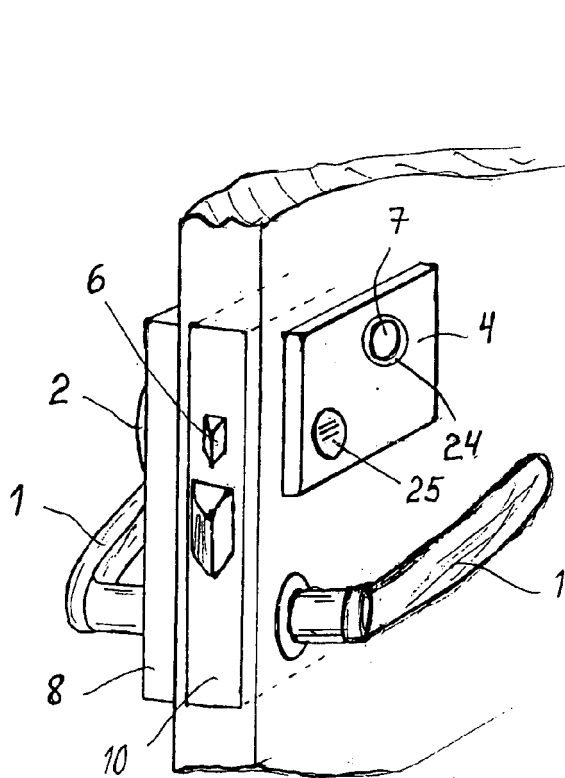


Fig. 2

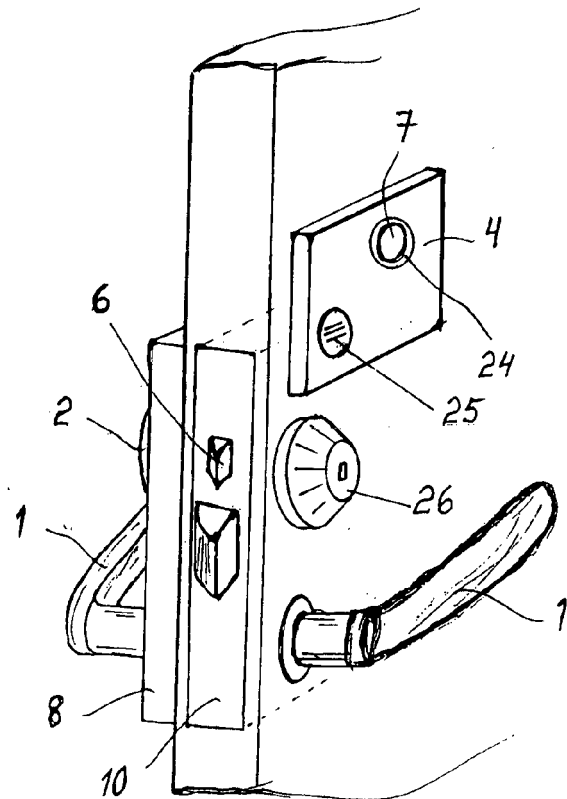


Fig. 2a

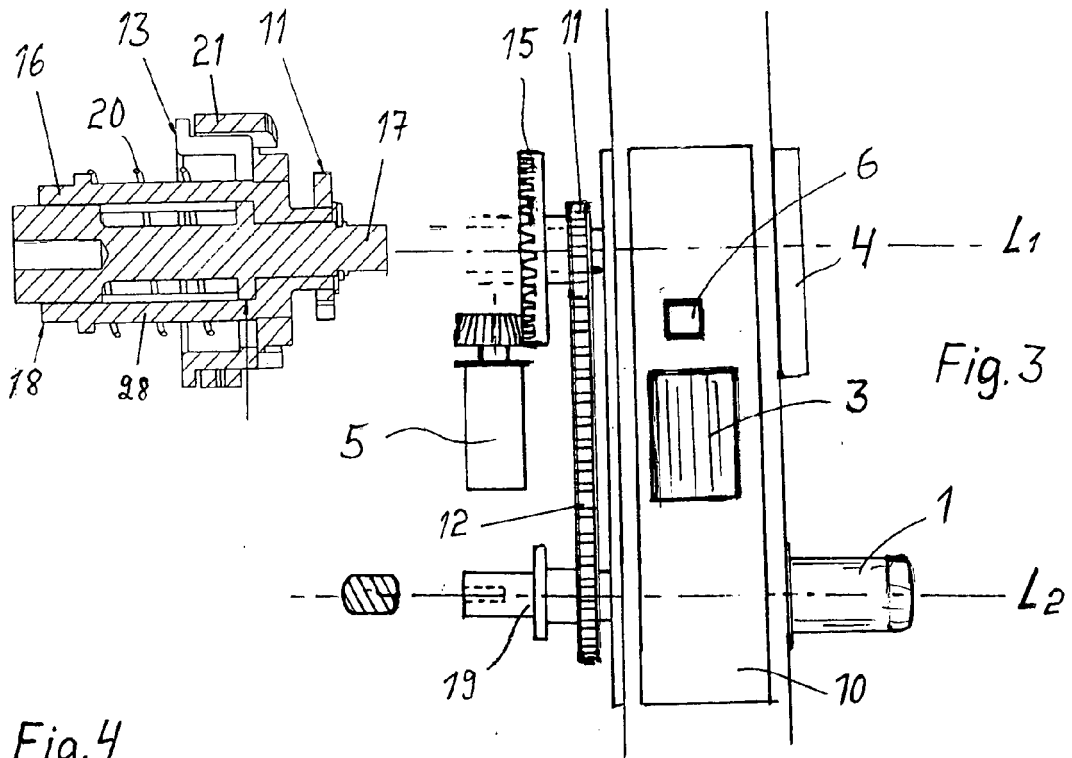


Fig. 4

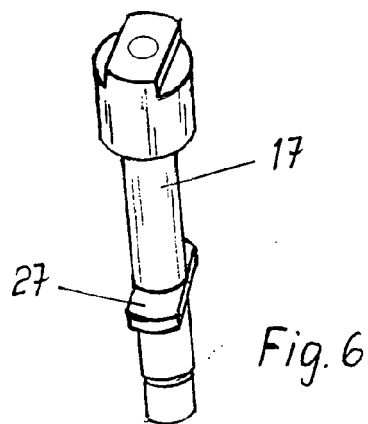
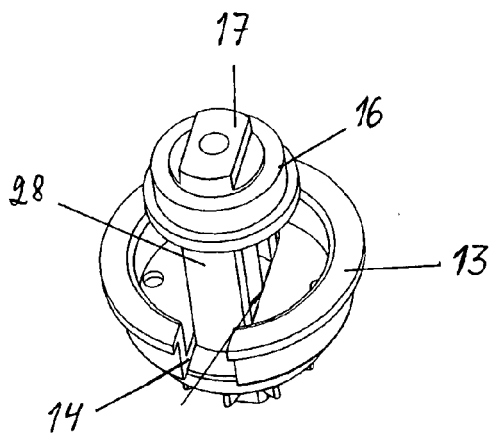


Fig. 6

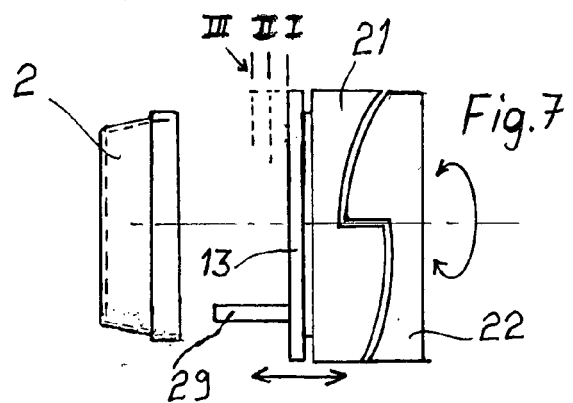


Fig. 7

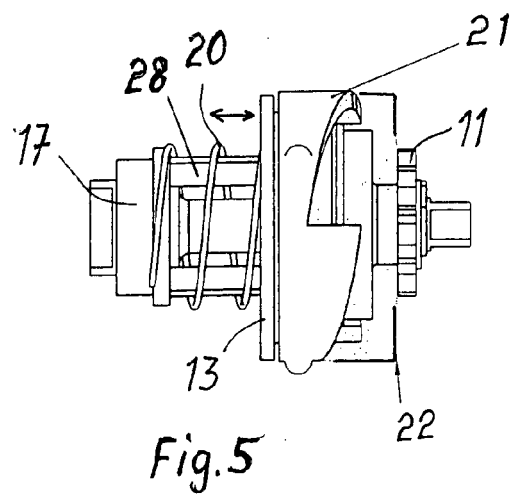


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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