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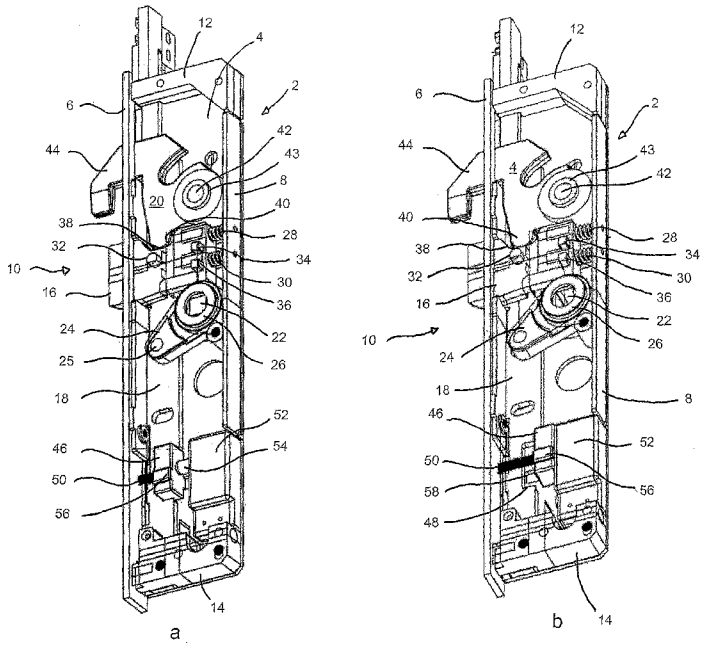

(57) Abstract: A locking system for a closure, comprising a primary locking member moveable between engaging and disengaged positions in respective first and reverse directions. Primary actuation means is provided for selective actuation of the primary locking member in the first and reverse directions. A secondary locking member is arranged to be selectively engagable in the force path between the primary actuation means and the primary locking member so as to prevent movement of the primary locking member in the reverse direction. Electrical actuation means are provided for selectively engaging the secondary locking member in the force path.

WO 2007/054728 A2

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Improved Locking System

The present invention relates to an improved locking system for use in conjunction with a closure, such as, for example, a door or a window.

Standard cylinder locks have a row of, for example, five pins followed by a plug that turns a cam which, in turn, releases a lock. Each pin is an individual shaft that binds the shaft from turning. When a key is inserted, the pins are raised above the line of the shaft such that the shaft is able to turn and release the lock.

It is a known disadvantage of conventional cylinder locks that such locks can be forced by an intruder wishing to gain unauthorised access to the premises secured by the lock. This is primarily due to the need for a free end of the cylinder lock, into which a key is inserted during use, to protrude a short distance from the surface of the door so as to allow insertion of a key therein. This protruding portion provides a point to which an intruder can apply a force to break the lock. Attempts have been made to reinforce the lock, such that the lock can withstand a greater applied force. This has had the effect of making it more difficult for a potential intruder to force a lock, but has not prevented the problem entirely.

One known variation of the conventional lock makes use of electrically powered actuation means for driving a locking bolt. Such systems therefore avoid the need for manual operation of the lock. However, electrically powered locks have not been widely accepted and are typically only used for specific application such as safe locks and the like. This is due in part to the cost of such high end locks and the potential for failure of more cost effective, mass-produced locks. One particular problem is that such locks require a power source and are typically powered by batteries or mains supply. Thus the lock becomes inoperative when the batteries run down or else when there is an interruption to the mains supply. If the actuation means fails to operate correctly, the mechanism can be permanently jammed in a locked or else unlocked condition, either of which is clearly unfavorable.

In view of the foregoing problems, the present invention aims to provide an improved locking system, which offers increased security and improved operation.

According to the present invention, there is provided a locking system for a closure, the system comprising: primary locking means moveable between secured and retracted positions in respective first and second directions; primary actuation means for selective movement of the primary locking means in the first and second directions; secondary locking means selectively operable to prevent movement of the primary locking means in the second direction; and, electrical actuation means for selective operation of the secondary locking means.

The present invention is particularly advantageous, since the primary locking operation need not be electrically operated. Instead, only a secondary locking member need be electrically operated to prevent unlocking of the primary locking means. The power required to operate the locking mechanism is therefore greatly reduced. In addition, the primary locking means can be actuated manually, typically by way of a handle, irrespective of the power supply to the system and so the mechanism to be operated by electrical actuation can be greatly simplified. This increases the reliability of the electrically operated parts.

According to a preferred embodiment, the system comprises control means arranged for communication with a remote device. Typically control means comprises a transceiver arranged to transmit and/or receive security control signals. Accordingly, each of the primary and secondary locking members and the associated actuation means are arranged to be mounted within a closure, whilst the remote device can be installed in a more convenient location or else may be portable. In one embodiment the control means has a receiver arranged for wireless communication with a transmitter within the remote device.

It will be appreciated that the system may allow one-way communication between the remote device and the control means or vice versa, or else may allow two-way

communication. In one embodiment, the control means is associated with the electric actuation means such that the remote device allows selective operation of the lock. Additionally, or else alternatively, the remote device may take the form of one or more speakers, which are operable under a control signal from the control means so as to provide an intruder alarm system.

The present invention is particularly advantageous in that the alarm control means can be provided with the control means for the lock, such that a single printed circuit board can be provided within a unitary housing. Thus, a single transceiver can be provided on the closure for communication with both the portable device and also a remote speaker. Thus, the power supply for the alarm speakers and/or lights can be separate from the power supply for the control means.

In one embodiment the secondary locking member takes the form of a locking block mounted for selective linear movement on a shaft. Preferably, an actuating force from the electric actuation means is transmitted to the secondary locking member via a pivoting arm. Thus, a rotational output of an electric motor is converted to a linear movement of the locking block. The locking block typically abuts against the primary locking member or else the primary actuation means or else in a mechanical link age between the primary locking member and primary actuation means so as to prevent movement thereof.

Preferably, the system further comprises a cylinder lock arranged for selective actuation of the secondary locking member. Typically, the cylinder lock comprises a cam, which selectively abuts a correspondingly shaped portion of the secondary locking means.

The cylinder lock is provided as a manually operated backup in the event that the remote device is unavailable or else if the electric actuation means fails to correctly operate the secondary locking member into or out of engagement in the force path. In this regard, the cam may have an at rest position in which the cam does not contact the secondary locking member. Alternatively, the cam may be received by the secondary locking member, such

that the cam moves passively when the secondary locking member is operated by the electrical actuation means.

In one preferred embodiment, an external housing is provided on the exposed side of the closure in which the locking system is mounted. The cylinder lock is typically mounted in the closure such that each end of the lock protrudes from the opposing sides of the closure. Preferably, the cylinder lock extends part way into the housing such that the free end of the cylinder lock is retracted with respect to an outer surface of the housing. Thus, the free end of the cylinder lock is substantially enclosed or covered by the housing and is not exposed. Therefore, access to the cylinder lock from outside of the closure is restricted and the free end of the cylinder is less susceptible to attack, for example, by way of impact..

Preferably, the housing comprises a moveable cover portion, which covers the end of the cylinder lock during normal operation. The cover portion can be moved to provide selected access to the cylinder lock, as required for insertion of a key. In one embodiment, the housing comprising indication means to provide audio and/or visual indication of a status of the system to a user.

Typically, the system comprises a sensor for detecting an open or closed condition of the closure. Preferably the system comprises a lock sensor for determining an engaged or disengaged condition of either the primary and/or secondary locking means.

In accordance with a further aspect of the present invention, there is provided an alarm system for a closure, the system comprising: one or more locking means moveable between secured and retracted positions; first sensor means for detecting an open or closed condition of the closure; second sensor means for sensing and engaged or disengaged condition of the or each locking means; electric control means mounted on the closure; and, remote indication means for providing an audible or visual alarm indication, wherein the control means transmits a wireless control signal for operation of

the remote indication means upon detection of a predetermined combination of conditions by the first and second sensors.

The remotely mounted indication means can thus be operated by a wireless control signal from the control means on the closure, allowing the indication means to be located in an appropriate position away from the closure itself. The indication means, such as for example a speaker, a buzzer or the like need not share the same power source as the control means.

Preferred embodiments of the invention are described in further detail below, with reference to the accompany figures of which:

figures 1a and b show perspective views of a locking system according to a first embodiment of the present invention;

figures 2a-c show a locking system according to a second embodiment of the present invention; and,

figures 3a to c show perspective views of a housing for use in conjunction with the locking system of the present invention;

figure 4 shows a schematic of the electronic lock components;

figure 5 shows a schematic of the remote control device components; and,

figure 6 shows a schematic of the remote indication means components.

Turning firstly to figure 1, there is shown a locking system 10 arranged for remote operation by a portable device, such as a key fob. The system comprises a casing 2, formed by an elongate substantially rectangular back plate 4, surrounded by a front wall 6 and a rear wall 8, which extend along the longer sides of the back plate 4 and side walls

12, 14 which extend along the shorter sides of the back plate 4. The casing is completed by a front plate (not shown), so as to provide an internal cavity in which the locking mechanism is located. The casing 2 is adapted to be mounted in, for example, a recess within a door (not shown). When the casing 2 is mounted within a door, the front wall 6 of the lock 10 is aligned with a peripheral edge surface of the door, opposite to the hinged edge.

The casing 2 houses a latch bolt 16 and a mechanism for extending and retracting at least one drive bar 18, to operate a primary locking member 20.

The drive bar 18 comprises a longitudinally extending plate which can move within the casing 2 in a plane parallel to the front 6 and rear 8 walls of the casing 2. The drive bar 18 is provided with a number of apertures for engagement with associated drive pegs on the components of the locking mechanism.

The at least one locking member 20 is able to be operated by rotation of one or other of two handles (shown in figure 2) provided on respective sides of the casing. Each handle has an associated separate square section drive rod (figure 2) that engages in an associated boss 22.

On the face of the boss 22 adjacent to the back plate 4 of the casing 2, the boss 22 has an associated annular hub portion for mounting in an associated aperture in the back plate for rotation about an axis normal to the planes of the front and back plates. The boss 22 further comprises a pin (not visible) for engagement with the latch bolt 16, as will be described below.

A return arm 24 having an associated annular hub portion 26 for mounting in an associated aperture in the front plate is mounted on the boss 22. The arm 24 is connected to the drive bar 18 by peg 25 which engages with an aperture provided in the drive bar 18 so a to allow relative rotation between the arm 24 and bar 18. A rotational motion of the return arm 24 is thus converted to a linear motion of the drive bar 18.

The latch bolt 16 is mounted for displacement in the plane parallel to the planes of the front and back plates between an extended position as shown in Figure 1 in which the latch bolt 16 extends beyond the casing 2 and a retracted position in which the latch bolt 16 is wholly within the casing 2. The latch bolt 16 is biased towards the extended position by means of springs 28,30. Guide pins 32, 34, 36 project from the front face of the latch bolt 16 and are received in associated guide slots provided in the front plate of the casing 2. Similar guide means are provided on the back face of the latch bolt 16 and are received in associated guide slots provided in the back plate of the casing 2. Such guide slots correctly locate the moving parts between the front and back plates whilst contraining the freedom of movement thereof.

A recess 38 is provided in the latch bolt 16 for receiving a cam drive member 40 of the locking member 20. A lug (not visible) is provided on the rear face of the latch member 16 for engagement with the pin of the boss 22.

The primary locking member 20 comprises a substantially planar component having a through aperture 42 surrounded on each face by an annular outer portion 43 for mounting in an associated aperture in the front or back plate respectively, for rotation about an axis normal to the planes of the front and back plates. Thus the primary locking member 20 rotates about an axis which is parallel to the axis of rotation of the return arm 24.

The locking member 20 has a cam drive member 40 for engagement in the recess 38 provided in the latch member 16.

The locking member 20 further comprises a hook portion 44 and is rotatable between a locking position as shown in Figure 1, in which the hook portion 44 projects from the casing 2 and a retracted position in which the hook portion 44 is wholly within the casing 2.

The locking member 20 further comprises a peg (not visible) located on its back face for engagement in an associated aperture in the drive bar 18.

The casing 2 further comprises a secondary locking member in the form of locking block 46 which is constrained for displacement between a locked position as shown in Figure 1, in which the block 46 engages in a recess 48 provided in the drive bar 18 and an unlocked position as shown in Figure 2 in which the locking block 46 is withdrawn from the recess 48. The locking block 46 is biased by means of a spring 50 towards the unlocked position as shown in Figure 1. A motor 52 with drive spindle 54 is provided to drive the locking block 46 into the locking position shown in Figure 1, against the biasing of the spring 50. Guide pegs 56 are provided on the front and rear faces of the locking block 46 for engagement in associated guide grooves 58 provided in the front and rear plates of the casing 2.

The motor is controlled in a manner known per se by means of an electronic actuator.

In operation, the lock is locked by the electronic actuator in the locked position, and the status is as follows.

The locking member 20 and the latch member 16 are each in their respective locking position.

The locking block 46 is engaged in the recess 48 of the drive bar 18 so that the drive bar is unable to move longitudinally with respect to the casing 2.

The locking member 20 is constrained against rotation by the peg engaged in the associated aperture of the drive bar 18.

The latch bolt 16 is retained in the extended locking position by means of the engagement of the cam drive member 40 in the recess 38 provided in the latch bolt 16.

The return arm 24 is similarly constrained against rotation by means of its peg engaged in the associated aperture of the drive bar 18. Any attempt to operate the handle to rotate the return arm will be prevented.

In order to unlock the door, to which the locking system is fitted, the electronic actuator is actuated and the motor spindle 54 is withdrawn, allowing the locking block to disengage from the drive bar 18 under the effect of the spring 50, to provide the configuration shown in Figure 2.

In this configuration, the drive bar 18 is free to move longitudinally with respect to the casing 2.

The handle is then rotated so that the drive bar 18 is moved in the upward direction by means of the return arm 24. The locking member 20 is rotated by the movement of the drive bar 18 so that the hook portion 44 of the locking member 20 is withdrawn into the casing 2. At the same time, the cam drive member 40 is withdrawn from the recess 38 provided in the latch bolt 16, so that the latch member 16 is held in the extended locking position solely by the action of the springs 28, 30.

However, at the same time, the rotation of the return arm 24 causes the peg on its rear face to engage with the drive lug on the rear face of the latch bolt 16 so that the latch bolt 16 is withdrawn against the force of the springs 28,30.

The door can thus be opened. As the handle is released, the peg on its rear face to disengage with the drive lug on the rear face of the latch bolt 16 so that the latch bolt 16 is free to move into the extended position under the biasing force of the springs 28,30.

Turning now to figure 2, an alternative arrangement of the electrical actuation means is shown, which is in many ways preferred. Those parts which operate substantially as described in relation to figure 1 are referenced using like numerals and the description of those parts is omitted for conciseness. Figure 2 shows casing 2 from the exposed side of

the rear plate 4 assembled ready for installation within a door. In figure 1 the motor 52 is provided within the casing, within which the available space for the motor is limited. However in figure 2, the motor 52A has been moved into an outer housing portion 60.

A pair of handles 62 and 64 are mounted on opposing sides of the casing 2 and are connected by square section drive rod 66 which passes through the square aperture in boss 22 within the casing. Thus actuation of either handle in a first direction acts to retract the latch 16 as described above so as to allow the door to be opened, whilst actuation of the handle in the opposing direction causes movement of the primary locking member 20 into the locking condition shown.

Housing portions 60 and 61 are arranged to be mounted on opposing sides of a door, each having an aperture 63 within which respective handles 62 and 64 are mounted. A spring-loaded biasing block 67 acts on an elliptical formation disposed around the aperture 63 in order to bias the handle to a horizontal position. Housing 61 is to be mounted on the exposed side of the door and has a transparent front panel 65 within its outer surface. The housing portion 60 is to be mounted on the secure side of the door and houses electronics 68 in the form of a printed circuit board (not shown).

The electronics comprise a transceiver for receipt of a control signal from a key fob and a chip for controlling operation of the electric motor and other electrical means associated with the lock. One or more batteries may be located at 68 or else batteries may be provided at a different location, such as, for example, mounted in the groove of the door above or below the casing 2. Alternatively the electronics and motor may be connected to the mains by suitable wiring provided on the secure side of the door or else passing through the door. In such an embodiment, batteries may be provided as a back up power source in the event that the mains power is interrupted.

Housing portion 60 also houses the motor 52A and a mechanism for transmitting an output torque of the motor 52A to the secondary locking mechanism. The mechanism is shown in further detail in figure 2b and has a rod 70 which is mounted for rotation about

an axis substantially perpendicular to the front and rear walls of the casing 2. The rod 70 has an eccentric end portion 72 in the form of an arm which is received within a recess 74 in actuation block 76. The rod is rectangular in section and is received within a correspondingly shaped aperture 78 in secondary locking arm 80. The secondary locking arm 80 has an annular hub portion 82 which is received within opening 84 in the casing 2 such that the arm 80 can pivot.

Turning now to figure 2c, the spindle 54 of the first embodiment is replaced with a plain shaft 54A such that the locking block 46A can slide back and forth along the shaft into and out of engagement with the recess 48 in the drive bar 18. The locking block 46A has a recess or detent 86 into which the free end of the secondary locking arm 80 extends. In an alternative embodiment the locking arm 80 is forked at its free end such that it engages with corresponding grooves on each side of the locking block 46A.

The actuation block 76 is mounted adjacent an output shaft of the motor and is actuated by way of a rack and pinion arrangement such that it can move back and forth dependent on the direction of rotation of the motor. In this regard the rack is mounted within the actuation block. When the motor is operated, the movement of the actuation block 76 causes rotation of the rod 70, which in turn rotatates secondary locking arm 80 to cause the locking block to engage or disengage the drive rod 18. Thus a mechanical linkage is provided between the locking block 46A and the motor allowing the motor to be positioned outside the casing. The positioning of the motor outside the casing allows a conventional cylinder lock 88 to be inserted within the casing as shown in figures 2a and c.

The cylinder lock 88 has a cam 89 which operates in a conventional manner as would be understood by a person skilled in the art. The cam is received within a cam recess 90 in the locking block 46A. The cam recess 90 is provided on the opposing side of the locking block 46A from the recess 86 for the arm 80. Thus either of the cam 88 or the arm 80 can actuate the locking block 46A independently. The cylinder lock thus provides a manual

backup mechanism for locking the door in the event that the motor 52A cannot be correctly operated.

In one embodiment, the cam 88 and cam recess 90 are oriented such that the cam abuts the recess up until a point of engagement or disengagement of the locking block, after which, further rotation of the cam causes the cam to disengage from the recess. Thus the cam can be moved to an idle position away from the recess 90 such that the cylinder lock is not affected by operation of the locking block by the motor 52A. In this manner the cylinder lock is idle until it is operated by insertion of a key. In the alternative, the cam may be permanently located in the recess 90 and may be moved passively by the locking block when the motor is operated.

The cylinder lock 88 is seated within the casing 2 in a conventional manner such that a first end 92 of the cylinder lock protrudes from the exposed surface of the door and a second end 94 protrudes from the secure side of the door. Unlike conventional locks, the housing portion 61 encloses the first end 92 so as to prevent the cylinder lock being exposed on the outside of the door. Housing 61 is provided with an aperture 96 aligned with the cylinder lock to allow access to the first end of the cylinder lock as will be described with reference to figures 3a-c below. The additional security provided by enclosing the lock end is not required on the secured side of the door and so housing 60 has an opening 98 shaped to correspond to the shape of the cylinder lock such that the second end of the cylinder lock is exposed to allow easy access thereto. However it will be appreciated that the second end 94 of the cylinder lock could be enclosed by housing 60 if additional security is required.

Each of the housing portions 60 and 61 are greater in length than the casing 2 such that the housing portions extend beyond the upper and lower limit of the casing when installed for use. The housing 60 has first 100 and second 102 fixing holes in the vicinity of the upper and lower ends. A bolt or screw is inserted into each of the fixing holes to secure the housing in place. The screws pass through the door and are received in corresponding

apertures 104 and 106 in housing 61 (see figure 3a) such that the casing is located between the screws for use.

Each of housings 60 and 61 can be made of the same or different materials, which may be either metal or plastic subject to cost and security requirements. Either or both of housing portions 60 or 61 may be provided with a backing plate to increase the strength of the housing.

Figures 3a-c show further details of the internal features of housing portion 61. Threaded formations are provided on the internal surface of the housing so as to create apertures 104 and 106 for reception of fixing screws. The apertures 104 and 106 are closed at one end such that the apertures do not pass through the housing 61. Thus the housing 61 is firmly held in place on the exterior surface of the door by tightening the screws from the secured side. The housing is provided with a backing plate (not shown) which sits between the housing 61 and the door so that the housing 61 forms a sealed unit.

A cover plate 108 is provided on the inside of the housing 61 as shown in figure 3b and is seated behind the housing aperture 96. A cover projection 110 is shaped to fit within the aperture 96 so as to block the aperture when the cylinder lock is not in use. The cover plate 108 has an opening 114 adjacent the projection 110 and of dimensions roughly equal to the housing aperture 96. The cover plate also has a longitudinal slot 116 within which a pin 118 is received. The pin is typically located on the inside of the housing 61. A coil spring 120 is located on the pin such that the spring is compressed between the cover plate 108 and the backing plate. A washer is provided adjacent the cover plate for contact with the spring. Thus the spring urges the cover plate against the housing 61.

The cover projection 110 has grooves 112 therein such that when access to the cylinder lock is required, the cover plate pushed backward and can be slid downwards using a nail or a key. The direction of movement of the cover plate is limited by the slot 116 and by grooves 122 either side of the plate on the inside surface of the housing 61. Movement of

the cover plate in this manner causes the opening 114 to become aligned with the housing aperture 96 so that a key can be inserted for manual operation of the lock.

The transparent panel 65 provides a window as shown in figure 3c, behind which one or more lights (not shown) can be mounted in order to provide a user with information on the status of the lock. Additionally a buzzer, speaker or the like can be connected to the control means in order to provide the user with an audible indication of various lock conditions. The speaker may be mounted in the Eurogroove of the door or else in the housing 61. In this regard two or more LED's of different colors and/or a speaker are typically provided in order to indicate:

- Receipt of a signal from the remote device
- Low battery or interruption in mains power
- Door open
- Door unlocked
- Door locked
- Failed locking operation
- Door opened whilst lock engaged
- Lock engaged whilst door open

The indication of each of the above may be provided for a predetermined period only or else intermittently over an extended time period dependent on the condition. In order to detect the above conditions, a number of sensors are provided as follows:

- Voltage/current sensor for power to lock circuit
- Magnetic contact sensor for detecting an open/closed condition of the door
- Position sensor for the primary and/or secondary locking member

The control means can determine the required control conditions for operation of the LED's, the speaker and the motor 52 or 52A as is described in relation to figures 4 to 6 below based on receipt of the control signal from the keyfob in combination with readings from the above sensors which are fed to a chip on the PCB. In addition, the system is

provided with a remote alarm unit with a receiver arranged to receive signals from the lock transmitter such that an alarm can be triggered if predetermined sensor conditions are met.

Turning to figure 4, there is contained within the housing 61 on the secure side of the closure a programmable logic unit or processor 124 connected to wireless transceiver unit 126. The transceiver and processor 124 are typically provided on a single PCB within housing 68 in figure 2A. The transceiver 124 has an antenna 128 for transmission and reception of control signals which are typically radio frequency signals. The processor is electrically connected to motor 52 or 52A, one or more LEDs 130 and speaker or buzzer 132. Upon receipt of a corresponding signal from the remote control device (fig. 5), the processor 124 controls the motor to move the locking block 46 or 46A in a locking or unlocking direction. LED's 130 may be illuminated to indicate success or failure of a locking command based upon signals provided to the controller by sensors 134, 136 and 138.

Sensor 134 detects the position of the locking block; sensor 136 detects the position of the hook 44; and, sensor 138 is typically a magnetic contact sensor for detecting the open or closed condition of the closure, which may be mounted in a peripheral groove of the closure. The sensors 134 and 136 are typically conventional sensors such as pressure sensors, motion sensors, switches, contact sensors or the like.

In figure 5 the remote control device or keyfob has a transmitter 141 and associated antenna 142 connected to a control means 144. The keyfob 140 is operated in a conventional manner using buttons 146 and 148 which cause transmission of a wireless locking or unlocking signal via antenna 142. According to a preferred embodiment, the keyfob includes an LED or vibration means 150 to provide the user with feedback from the lock control means 124. In this regard the transmitter may be substituted with a transceiver such that the keyfob and lock control 124 can undergo two-way communication. Security measures are implemented as would be understood by the

skilled person such that the keyfob and lock control means are synchronised in order to avoid the possibility of third parties recording the radio signals transmitted therebetween.

In figure 6 the remote alarm unit 152 has a receiver 154 and an associated antenna 156 for receiving signals sent by the control means 124. The alarm has audio alarm means 160 in the form of a speaker, bell or buzzer, which is operated to sound an alarm upon receipt of an alarm signal from the lock control means 124. The alarm unit is typically operated passively by the lock control means 124 although in an alternative embodiment the alarm unit may be provided with a processor 158 in order to allow implementation of a more complex control logic between the alarm unit, the closure control means and the keyfob.

The alarm may be set upon a person leaving the building as with conventional burglar alarm systems. In such an embodiment, the alarm can be automatically primed by activating the lock using the keyfob. In an alternative embodiment the alarm does not need to be primed but instead is only triggered by certain predefined sensor conditions. The logic for the operation of the alarm according to this embodiment can be defined as follows:

If the closure is opened from a closed condition whilst either the primary (hook) or secondary (locking block) locking members are engaged then the alarm is triggered. The alarm can be deactivated subsequently by movement of the hook and/or locking block into the disengaged condition by actuation of the keyfob or else by operation of cylinder lock.

Claims:

1. A locking system for a closure, the system comprising: primary locking means moveable between secured and retracted positions in respective first and second directions; primary actuation means for selective movement of the primary locking means in the first and second directions; secondary locking means selectively operable to prevent movement of the primary locking means in the second direction; and, electrical actuation means for selective operation of the secondary locking means.

2. A locking system according to claim 1, wherein the primary actuation means is arranged for manual operation.

3. A locking system according to claim 1 or claim 2, further comprising control means arranged for communication with a remote device.

4. A locking system according to claim 3, wherein the control means is arranged to control operation of the electrical actuation means upon receipt of a control signal from the remote device.

5. A locking system according to claim 3 or claim 4, comprising a remote speaker unit operable by the control means.

6. A locking system according to any one of claims 1 to 5, wherein a drive bar connects the primary actuation means and primary locking means, the secondary locking means being selectively engageable with the drive bar.

7. A locking system according to claim 6, wherein the secondary locking means has a stop portion and the drive bar has a correspondingly shaped recess, into which the stop portion is selectively insertable.

8. A locking system according to any one of claims 1 to 7, wherein the electrical actuation means is arranged to be mounted externally of the closure and connected to the secondary locking means by way of a mechanical linkage.

9. A locking system according to any one of claims 1 to 8, further comprising a cylinder lock arranged for selective actuation of the secondary locking means.

10. A locking system according to claim 9, wherein the secondary locking means has a recess shaped to receive a cam portion of the cylinder lock.

11. A locking system according to any one of claims 1 to 10, comprising a first housing arranged to be mounted on a side of the closure.

12. A locking system according to claim 11, further comprising a cylinder lock having an end portion located within the housing when mounted in the closure for use.

13. A locking system according to claim 11 or 12, wherein the housing has an aperture and cover portion moveable between a first position in which the cover portion covers the aperture and a second position in which the aperture is open.

14. A locking system according to claim 13, wherein the cover portion has an opening which aligns with the aperture when the cover is in the second position.

15. A locking system according to any one of claims 11 to 14, comprising indication means mounted in the housing for providing a visual or audible indication of a system status.

16. A locking system according to any one of claims 11 to 15, comprising a second housing arranged to be mounted on a second side of the closure.

17. A locking system according to claim 16, wherein the second housing houses the electrical actuation means and control means.

18. A locking system according to claim 16 or 17, wherein fixing means extend between the first and second housing through the closure.

19. A locking system according to any one of claims 1 to 18, further comprising one or more sensors arranged to detect a condition of any or any combination of the closure, the primary locking member and/or the secondary locking member.

20. A locking system according to any one of claims 1 to 19, wherein the secondary locking means is selectively engageable with the primary locking means.

21. A locking system according to any one of claims 1 to 19, wherein the secondary locking means is selectively engageable with the primary actuation means.

22. A locking system according to any one of claims 1 to 19, wherein a force path exists between the primary actuation means and the primary locking means and the secondary locking means is selectively engageable in the force path.

23. An alarm system for a closure, the system comprising: one or more locking means moveable between secured and retracted positions; first sensor means for detecting an open or closed condition of the closure; second sensor means for sensing and engaged or disengaged condition of the or each locking means; electric control means mounted on the closure; and, remote indication means

for providing an audible or visual alarm indication, wherein the control means transmits a wireless control signal for operation of the remote indication means upon detection of a predetermined combination of conditions by the first and second sensors.

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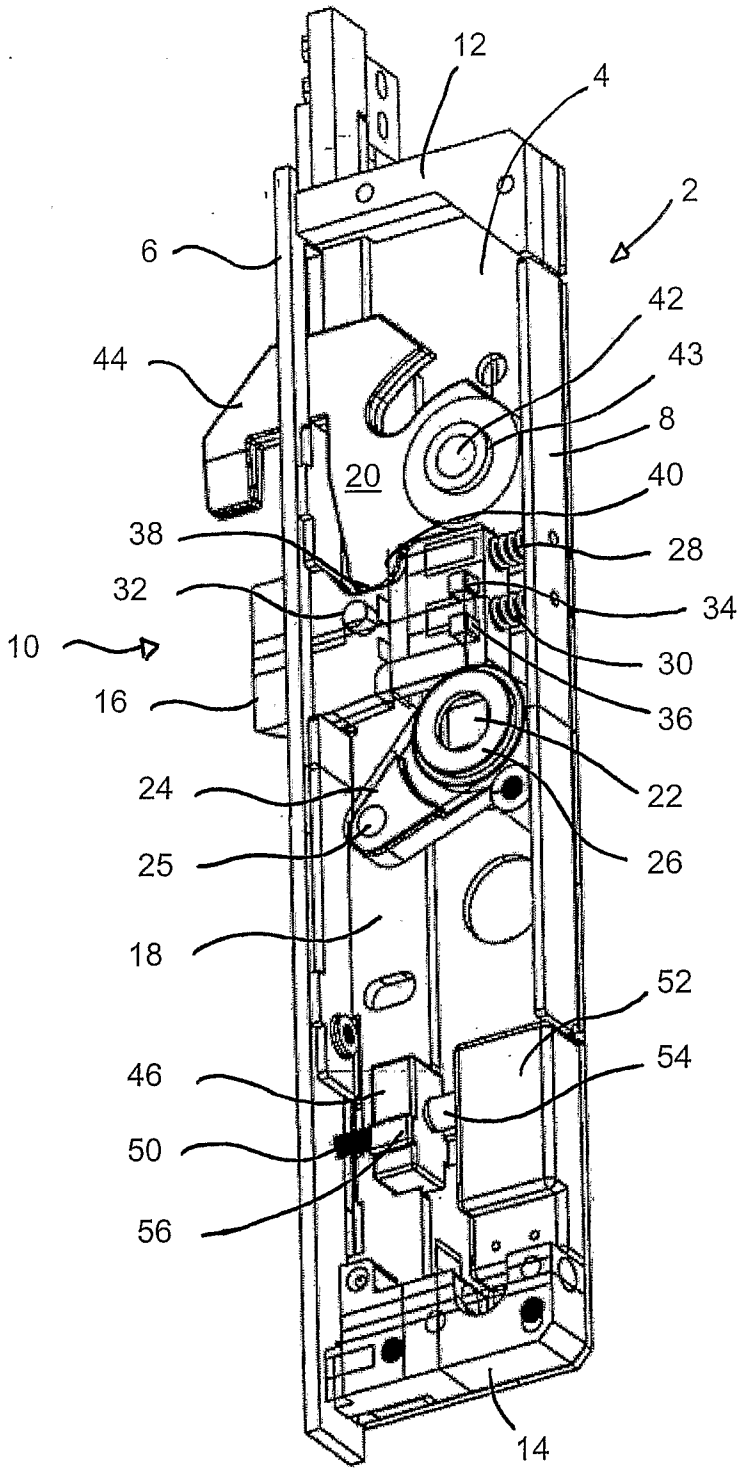
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Figure 1a

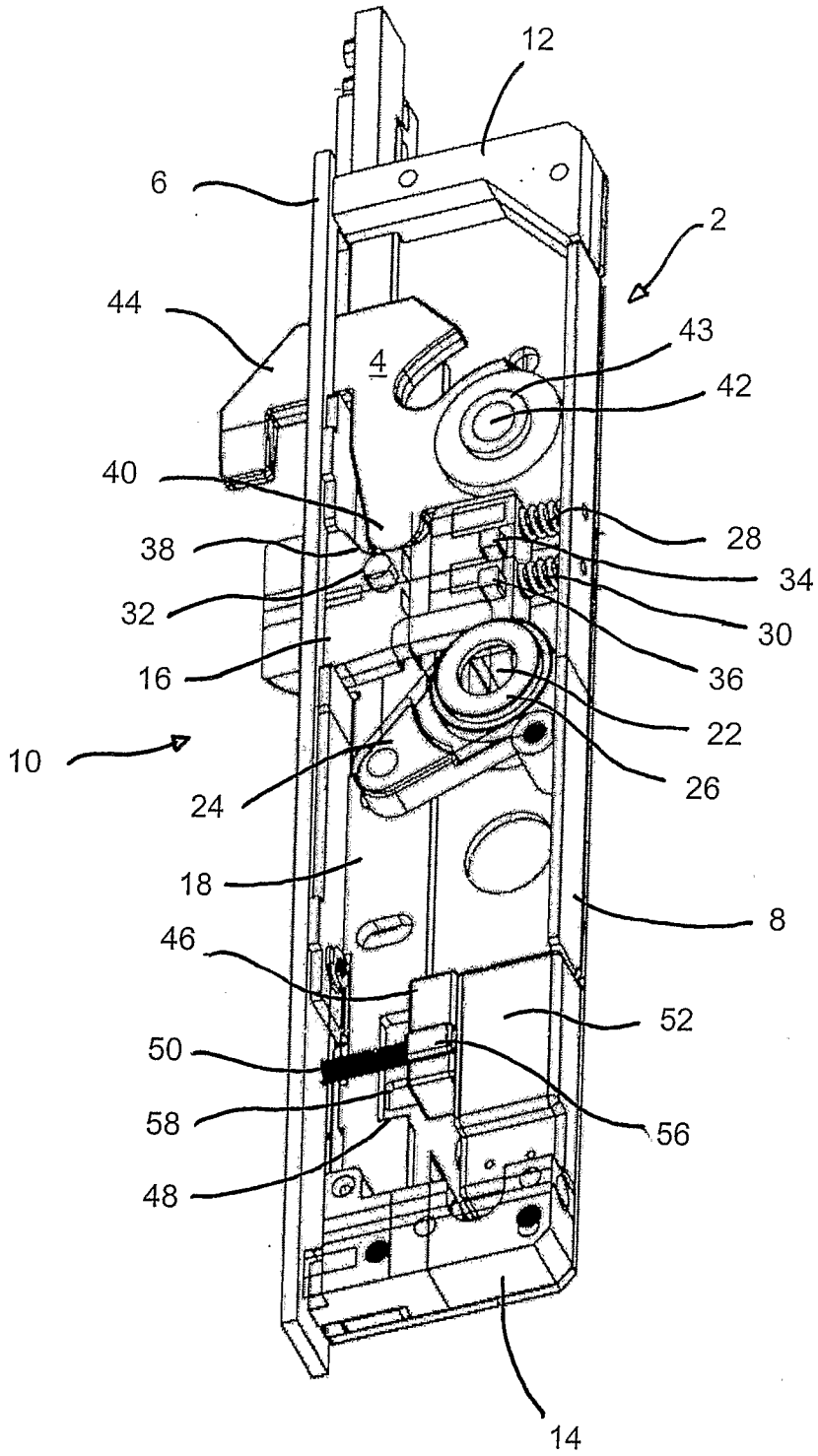
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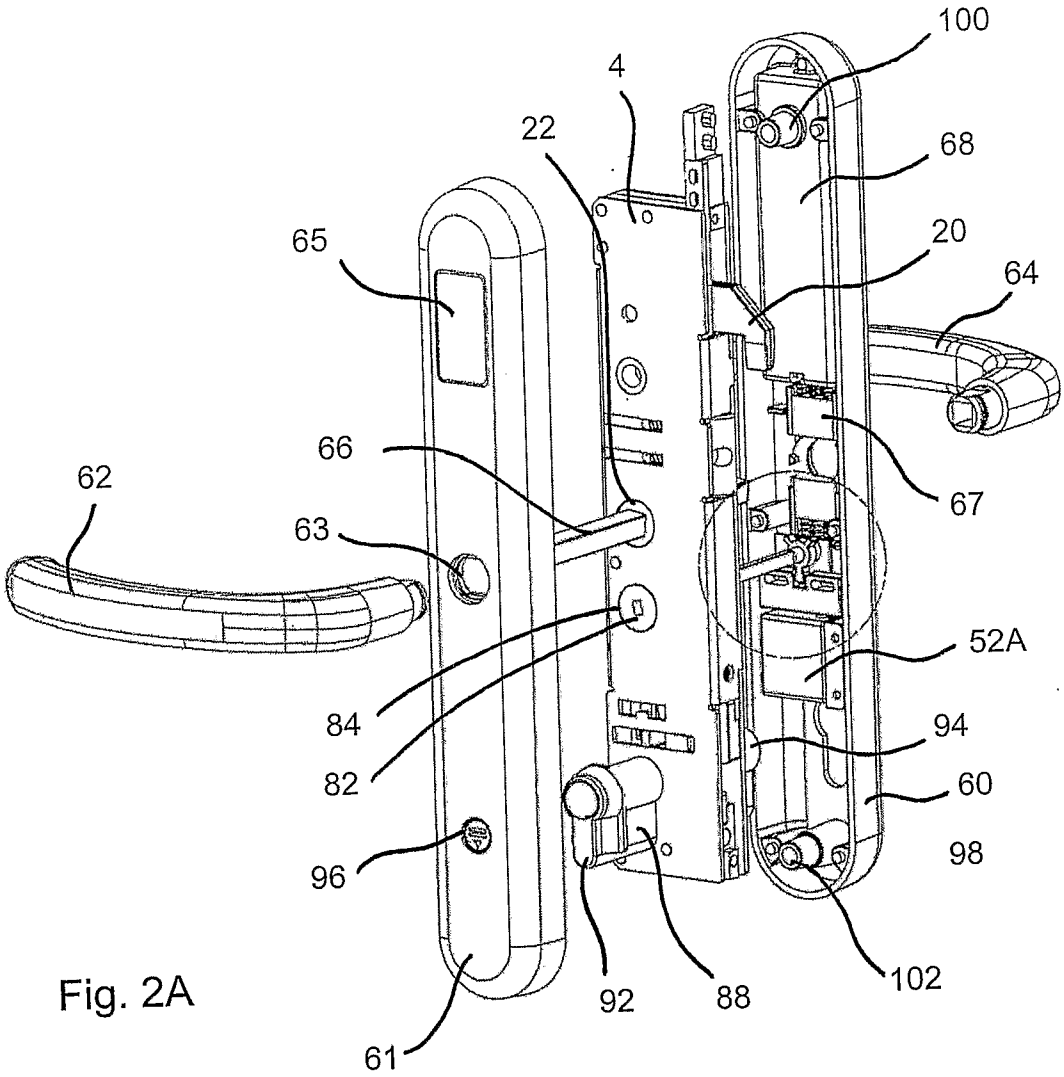
Figure 1b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61

Fig. 2A

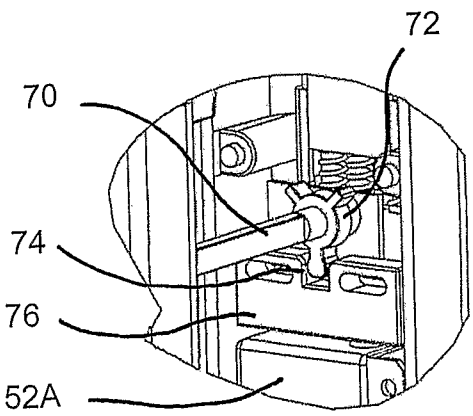
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Fig. 2B

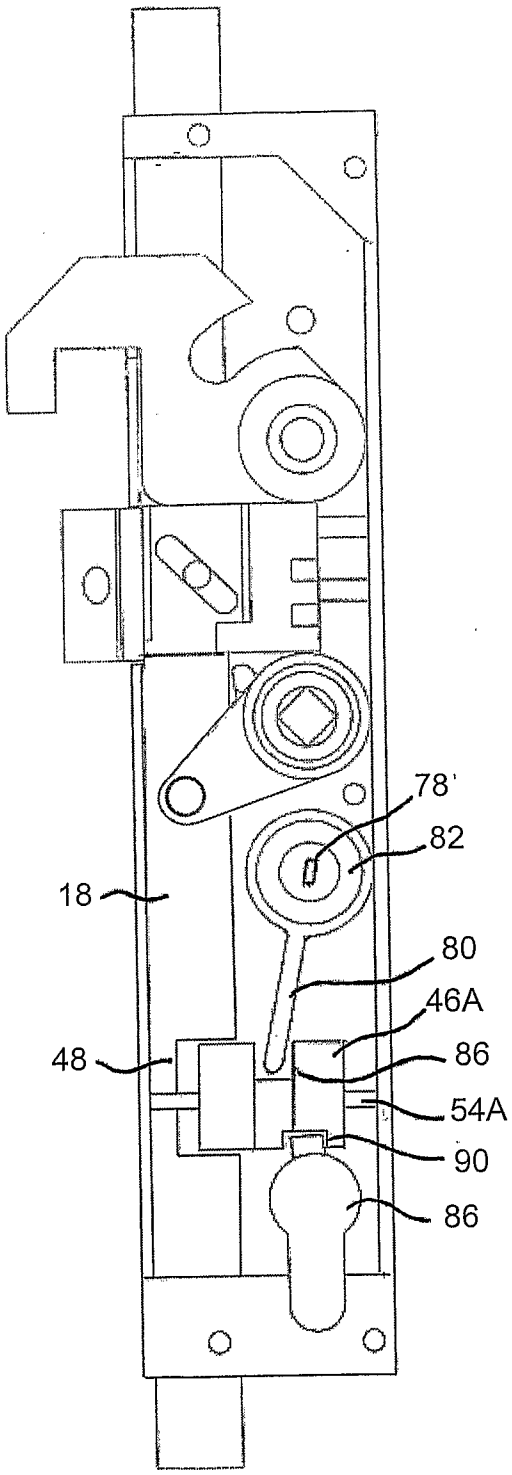

Fig. 2C

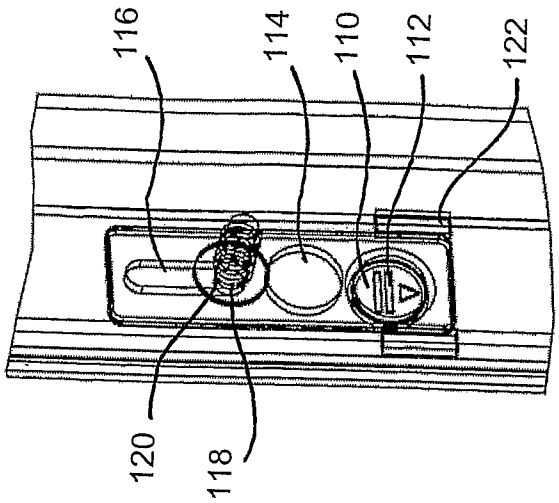

Fig. 3B

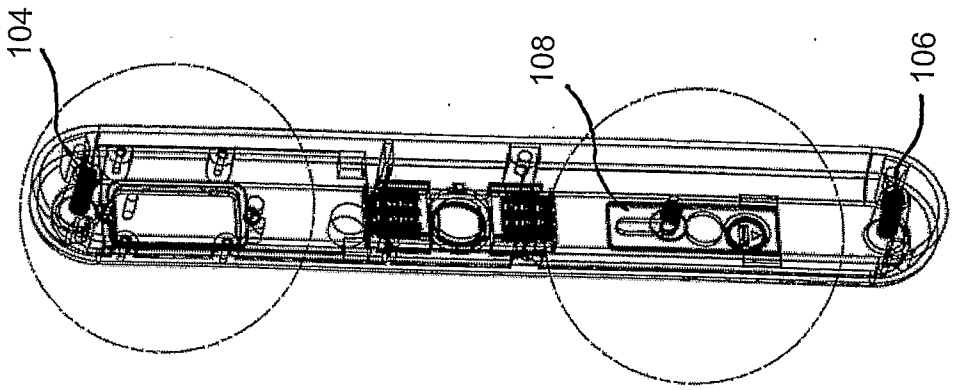

Fig. 3A

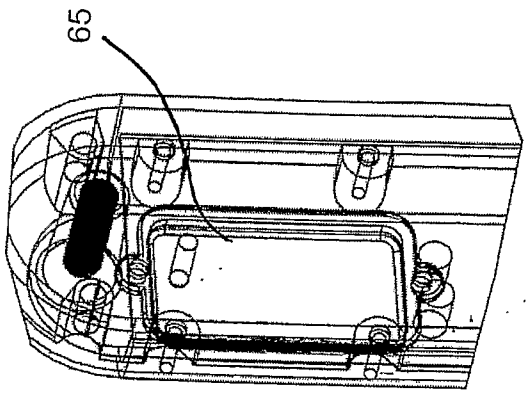

Fig. 3C

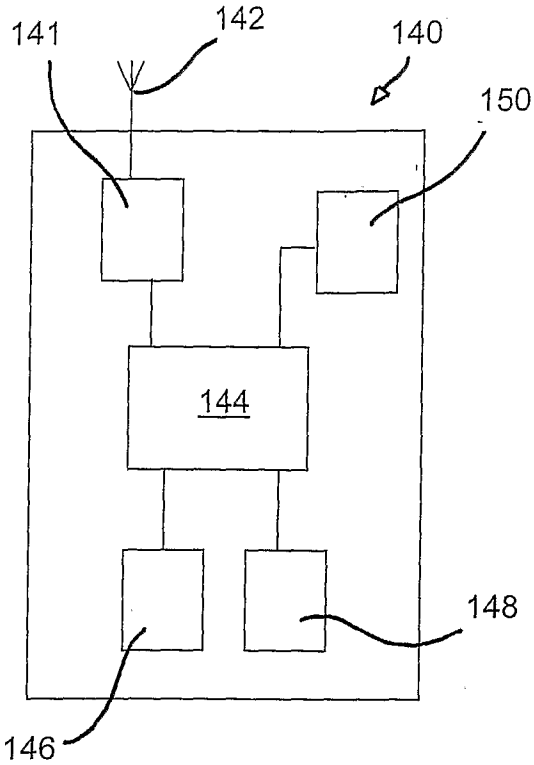

Fig. 5

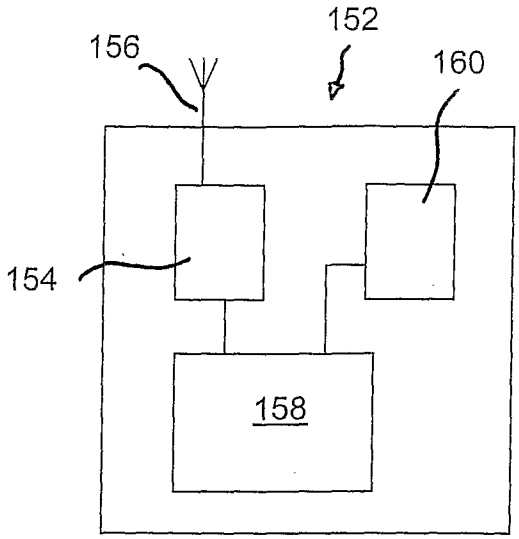

Fig. 6

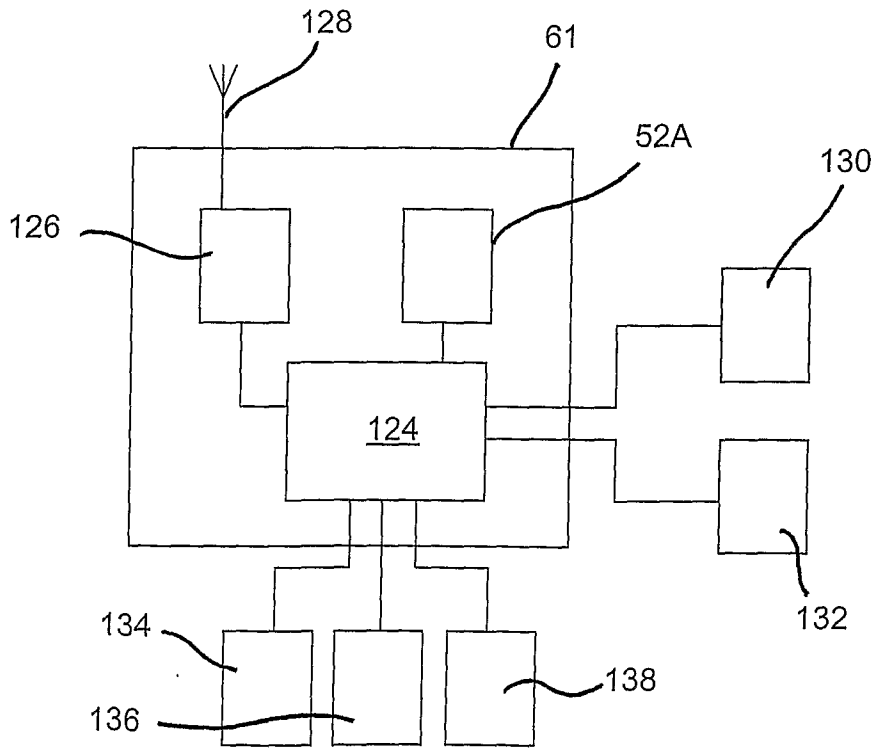

Fig. 4