



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.07.2022 Bulletin 2022/29

(51) International Patent Classification (IPC):
G08B 13/08 (2006.01) **E05B 39/00** (2006.01)
E05B 45/06 (2006.01)

(21) Application number: **22151692.5**

(52) Cooperative Patent Classification (CPC):
G08B 13/08; E05B 39/00; E05B 45/06

(22) Date of filing: **14.01.2022**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **15.01.2021 GB 202100506**
21.05.2021 GB 202107336

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(54) **A MODULE AND SECURING MEMBER ON A DOOR OR WINDOW**

(57) A door or window including: a frame member and a moveable panel, the moveable panel being moveable between open and closed conditions with respect to the frame member; and a system configured to determine a condition of the door or window, the system including: a module including a sensor; an engagement member and a sensed element, the sensed element being configured to be sensed by the sensor to determine the condition of the door or window, and the sensed element and engagement member being mounted to one of the frame member or the moveable panel; and a se-

curing member to which the module is mounted in one of a plurality of fixed positions, the securing member being mounted to the other of the frame member and moveable panel, wherein the module includes at least one abutment surface configured to be engaged by the engagement member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.

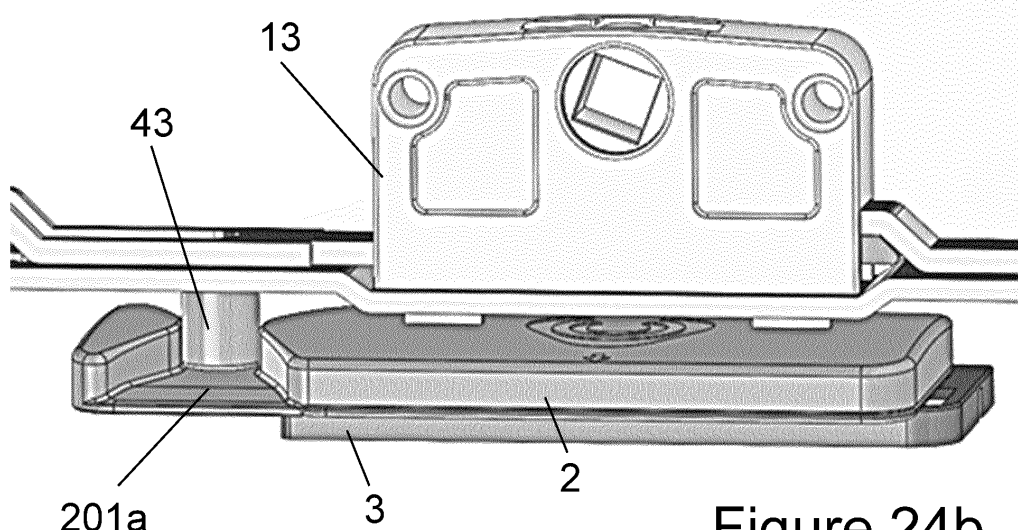


Figure 24b

Description

[0001] Embodiments of the present invention relate to a module and securing member for use in determining the condition of a door or window, along with associated systems and methods.

[0002] A door or window may be in at least one of four conditions - open, closed, unlocked and locked. In some instances, a door or window may be closed and partially locked (meaning that the lock or latch is not fully engaged in a locked condition but is only partially engaged in the locked condition). A partially locked condition may occur, for example, when a handle or other part of a lock or latch mechanism is not fully moved to its locked position.

[0003] A homeowner or another person may want to check the status of the door or window without having to test the door or window manually - for example, they may wish to check the status while away from home.

[0004] Sensors are available which sense the condition of a door or window, and which communicate this to another device (via which the user can determine the condition of the door or window).

[0005] There may be a need to attach such a sensor or another element to the door or window frame, for example. In some instances, there is a need to attach a sensed element to one of a frame or moveable panel and a sensor to the other of the frame or moveable panel (the frame and moveable panel being part of a door or window, for example). The sensor may be configured to sense the sensed element and may be configured to sense movement of the sensed element with respect to the sensor. For this purpose the alignment of the sensor and sensed element must be within relatively small (i.e. tight) tolerances to ensure that the sensor can, indeed, sense the sensed element.

[0006] As will be appreciated, the moveable panels in doors or windows can sag with respect to their associated frames over time. Moreover, parts of the mechanism (e.g. a hinge) which enable the moveable panels to move with respect to the frames will wear through use. In addition, doors and windows are often subject to significant extremes of environmental conditions (e.g. very cold temperatures and very hot temperatures). All of these factors make it difficult for alignment between a sensor and sensed element to be maintained.

[0007] In some instances, it may be that a window or door may be fitted without a sensed element and/or sensor installed. The user may later look to retrofit a sensor and sensed element to the window or door. It can be difficult, or at least onerous, for a user to retrofit a sensor and sensed element with the required alignment. This is particularly true if the user is a member of the public and not a window or door fitter.

[0008] Even if the sensor and/or sensed element are fitted at the time of installation, parts of the frame and door or window may be provided from a factory, for example, with the required dimensions but installation in a building is dependent on local conditions. As a result tol-

erances for the relative position of the moveable panel and the frame are relatively large compared to the tolerance required for the position of the sensor with respect to the sensed element.

[0009] As such, even initial alignment of a sensor and sensed element is problematic.

[0010] The present invention seeks to provide an improved attachment system for a door or window frame and aspects of the described technology build on the advances described in WO2020234588 as well as being applicable to other systems.

[0011] Accordingly, an aspect provides door or window including: a frame member and a moveable panel, the moveable panel being moveable between open and closed conditions with respect to the frame member; and a system configured to determine a condition of the door or window, the system including: a module including a sensor; an engagement member and a sensed element, the sensed element being configured to be sensed by the sensor to determine the condition of the door or window, and the sensed element and engagement member being mounted to one of the frame member or the moveable panel; and a securing member to which the module is mounted in one of a plurality of fixed positions, the securing member being mounted to the other of the frame member and moveable panel, wherein the module includes at least one abutment surface configured to be engaged by the engagement member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.

[0012] The module may include a holding portion and the securing member includes an engaging portion, the holding portion and engaging portion may be configured to engage or abut to hold the module in any of the plurality of fixed positions with respect to the securing member.

[0013] The holding portion may include at least one protrusion and the engaging portion may include a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

[0014] The engaging portion may include at least one protrusion and the holding portion may include a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

[0015] The holding portion and the engaging portion may each include a plurality of inter-engaging protrusions and recesses defining the plurality of fixed positions.

[0016] The module may include a pin with a shaft and a head, the securing member may include an aperture configured to receive at least the head of the pin, the head may include the holding portion and the engaging portion may be provided within the aperture, such that the holding and engaging portions engage each other when the head is received by the aperture.

[0017] The aperture may have a narrow part along

which the head may pass as the module moves with respect to the securing member during the alignment process, the narrow part preventing movement of the head out of the aperture.

[0018] The plurality of fixed positions may be a plurality of discrete fixed positions.

[0019] The holding portion may include an engagement magnet and the securing member includes a further magnet or magnetic metal member, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.

[0020] The securing member may include a magnet and the holding portion includes an engagement magnet or magnetic metal element, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.

[0021] The at least one abutment surface may include two abutment surfaces which oppose each other to define an alignment slot configured to receive the engagement member in the alignment operation.

[0022] The alignment slot may be tapered such that a width of the alignment slot narrows along a length of the alignment slot.

[0023] Engagement of the engagement member with a first of the two abutment surfaces may be configured to move the module in a first direction with respect to the securing member and engagement of the engagement member with a second of the two abutment surfaces may be configured to move the module in a second direction with respect to the securing member, the first and second directions being opposite directions.

[0024] Movement of the module with respect to the securing member may be restricted to linear movement.

[0025] The module may be configured to determine the condition of the door or window and the condition includes: open, closed, locked, unlocked, and partially locked.

[0026] The at least one abutment surface may be configured to be engaged by the engagement member during the alignment process when the door or window moves from an open condition to a closed condition and/or when the door or window moves from an unlocked to a locked condition.

[0027] The engagement member may be a substantially cylindrical pin.

[0028] Another aspect provides a module and a securing member combination, the module being configured for use in determining a condition of a door or window, wherein: the securing member is mountable to a frame member or moveable panel of a door or window; the module includes a sensor configured to sense a sensed element in order to determine the condition of the door or window and the module is configured to be mounted to the securing member in one of a plurality of fixed positions; and the module includes at least one abutment surface configured to be engaged by an engagement

member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.

[0029] The module may include a holding portion and the securing member includes an engaging portion, the holding portion and engaging portion may be configured to engage or abut to hold the module in any of the plurality of fixed positions with respect to the securing member.

[0030] The holding portion may include at least one protrusion and the engaging portion may include a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

[0031] The engagement portion may include at least one protrusion and the holding portion may include a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

[0032] The holding portion and the engagement portion may each include a plurality of inter-engaging protrusions and recesses defining the plurality of fixed positions.

[0033] The module may include a pin with a shaft and a head, the securing member may include an aperture configured to receive at least the head of the pin, the head may include the holding portion and the engaging portion may be provided within the aperture, such that the holding and engaging portions engage each other when the head is received by the aperture.

[0034] The aperture may have a narrow part along which the head may pass as the module moves with respect to the securing member during the alignment process, the narrow part preventing movement of the head out of the aperture.

[0035] A plurality of fixed positions may be a plurality of discrete fixed positions.

[0036] The holding portion may include an engagement magnet and the securing member includes a further magnet or magnetic metal member, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.

[0037] The securing member may include a magnet and the holding portion includes an engagement magnet or magnetic metal element, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.

[0038] The at least one abutment surface may include two abutment surfaces which oppose each other to define an alignment slot configured to receive the engagement member in the alignment operation.

[0039] The alignment slot may be tapered such that a width of the alignment slot narrows along a length of the alignment slot.

[0040] Engagement of the engagement member with a first of the two abutment surfaces may be configured to move the module in a first direction with respect to the securing member and engagement of the engagement member with a second of the two abutment surfaces may be configured to move the module in a second direction with respect to the securing member, the first and second directions being opposite directions.

[0041] Movement of the module with respect to the securing member may be restricted to linear movement.

[0042] The module may be configured to determine the condition of the door or window and the condition includes: open, closed, locked, unlocked, and partially locked.

[0043] The at least one abutment surface may be configured to be engaged by the engagement member during the alignment process when the door or window moves from an open condition to a closed condition and/or when the door or window moves from an unlocked to a locked condition.

[0044] Another aspect provides a method of aligning a sensor with a magnet, the method including: providing the module and securing member combination as above; providing the engagement member; and changing the condition of the door or window to bring the engagement member into engagement with the at least one abutment surface to move the module with respect to the securing member towards alignment with the magnet.

[0045] Another aspect provides the module.

[0046] Another aspect provides the securing member.

[0047] Embodiments are described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1a shows a door;

Figure 1b shows a window;

Figure 2 shows part of a frame member with an exploded view of a magnet and magnet housing;

Figure 3 shows part of a frame member which would be located adjacent the part of figure 2 in some embodiments;

Figure 4 is a detail view of the part indicated in figure 2;

Figure 5 shows the view of figure 3 with the module removed from the securing member;

Figure 6 is a detail view of the part indicated in figure 5;

Figure 7 is an end view of a module;

Figure 8 is a front view of a module;

Figure 9 is a back view of a module;

Figure 10 is a cross-section of a module and securing member through the line indicated in figure 12;

Figure 11 is a detail view of the part indicated in figure 10

Figure 12 is a back view of a securing member and a module coupled together;

Figure 13 is a schematic view of a magnet position with respect to sensor units;

Figure 14 is a table showing what is sensed by the arrangement in figure 13;

Figure 15 is a schematic view of a magnet position with respect to sensor units;

Figure 16 is a table showing what is sensed by the arrangement in figure 15;

Figure 17 is a table with a tamper indication in different scenarios;

Figure 18 is a schematic view of a hub and module;

Figure 19 shows a module and securing member;

Figure 20 shows a securing member;

Figure 21 shows a module;

Figure 22 shows a module attached to a securing member;

Figure 23 shows a cross-section through a module attached to a securing member; and

Figures 24a and 24b show an alignment process.

[0048] In accordance with embodiments, a door or window 1 may be provided (see figures 1a and 1b, for example).

[0049] The door or window 1 may include a frame 11 and a moveable panel 12 (the moveable panel 12 being moveable with respect to at least part of the frame 11 and sometimes referred to as a sash).

[0050] The frame 11 may include one or more frame members 111. The one or more frame members 111 may define an aperture of the door or window 1. In particular, the one or more frame members 111 may surround a perimeter of the aperture of the door or window 1. In some embodiments, the aperture is generally rectangular, or square, or circular (but may be any suitable shape). Each of the one or more frame members 111 may extend along a portion of the perimeter of the aperture of the door or window 1.

[0051] In the case of a rectangular aperture, the frame 11 may include a first pair of frame members 111a, each frame member 111 of the first pair 111a being arranged generally parallel to the other frame member 111 of the first pair 111a. The frame members 111 of the first pair 111a may be of substantially the same length and may be separated from each other across a width of the aperture. The length of the first pair of frame members 111a may define a height of the aperture. The frame 11 may include a second pair of frame members 111b, each frame member 111 of the second pair 111b being arranged generally parallel to the other frame member 111 of the second pair 111b. The frame members 111 of the second pair 111b may be of substantially the same length and may be separated from each other across a height of the aperture. The length of the second pair of frame members 111b may define a width of the aperture. The first pair of frame members 111a may be substantially perpendicular to the second pair of frame members 111b.

[0052] The panel 12 may be mounted to the frame 11 such that the panel 12 is rotatable with respect to at least one frame member 111 of the frame 11. In some embodiments, the panel 12 is mounted to the frame 11 using a

hinge mechanism. In some embodiments, the panel 12 is mounted for rotation with respect to (and may be about an axis defined by) a one of the first pair of frame members 111a or a one of the second pair of frame members 111b.

[0053] Accordingly, the panel 12 may be moveable between open and closed conditions with respect to the frame 11 (e.g. by rotation with respect to at least one frame member 111). In the open condition, the door or window aperture is at least partially open such that passage through the aperture is permitted. In the closed condition, the door or window aperture is closed or substantially closed (e.g. partially open) such that passage through the aperture is inhibited or substantially prevented. The passage may be of a person or an object, for example. A partially open condition as described herein may be considered to be a form of the closed condition.

[0054] The door or window 1 may include a lock or latch mechanism 13 (which may be a lock *and* latch mechanism). The lock or latch mechanism 13 may be configured to be actuated between a locked condition and an unlocked condition. In the locked condition, with the panel 12 in the closed (or partially open) condition, the panel 12 is restricted or substantially prevented from moving to the open condition. In the unlocked condition, the panel 12 may be permitted to move towards the open condition. The locked and unlocked conditions of the lock or latch mechanism 13, therefore, may correspond to locked and unlocked conditions of the door or window.

[0055] In some embodiments, the lock or latch mechanism 13 is a lock mechanism and a key may be required to actuate the lock mechanism between the locked and unlocked conditions. In some embodiments, the lock or latch mechanism 13 is a latch mechanism and a handle may be provided (as part of the latch mechanism) which may actuate the latch mechanism between the locked (or latched) condition and the unlocked (or unlatched) condition - the latch mechanism may not require a key for such actuation. In some embodiments, the lock or latch mechanism 13 is a lock and latch mechanism such that the mechanism can be actuated between (i) a latched and locked condition, (ii) a latched and unlocked condition, and (ii) an unlocked and unlatched condition. Herein, unless otherwise stated, the reference to a locked condition may include a latched condition and the reference to a unlocked condition may include an unlatched condition (irrespective of whether this is also a reference to a locked and unlocked condition).

[0056] In some embodiments, the lock or latch mechanism 13 may have a partially locked or unlatched condition. In this partially locked or unlatched condition the lock or latch mechanism 13 is neither in the locked/latched condition nor in the unlocked/unlatched condition. With the lock or latch mechanism 13 in the partially locked or unlatched condition, it may or may not be possible to move the moveable panel 12 into the open condition from its closed condition (or partially open condition) - this will depend on the design of the lock or latch

mechanism 13 and the extent to which the lock or latch mechanism 13 is close to the locked/latched condition. For example, moving the lock or latch mechanism 13 from the unlocked/unlatched to the locked/latched condition may require movement of the handle from a first position (an unlocked or unlatched position) to a second position (a locked or latched position). If the handle is moved to a point at which parts of the lock or latch mechanism 13 engage but do not put the lock or latch mechanism 13 in the locked/latched condition, then this may be the partially locked or latched condition.

[0057] In some embodiments, the moveable panel 12 into the open condition may have a partially open (or vent) condition in which the lock or latch mechanism 13 may be put into its locked or latched condition to inhibit or substantially prevent the moveable panel 12 from moving to the open condition (or, in some cases, to the closed condition). Such a partially open condition may be used to allow the passage of air through the door or window 1 without allowing the passage of large objects, and is sometimes referred to as a night vent mode, for example. The ability to lock or latch the moveable panel 12 (using the lock or latch mechanism 13) in the partially open condition allows some security to be maintained when in this condition. Accordingly, as mentioned herein, the partially open condition may be viewed as a category of the locked condition.

[0058] The lock or latch mechanism 13 could take a number of different forms. For example, the lock or latch mechanism 13 may include at least one first member moveable with respect to a second member between the unlocked/unlatched and locked/latched conditions - it is these first and second members which may partially engage in the partially locked or latched condition, for example. The first member may be a bolt and the second member may be a keep. In some embodiments, the first member is mounted on a locking bar (e.g. rail) and may be in the form of a pin, whilst the second member may be a receiver for the pin (to receive and retain the pin). The first member may be mounted to the panel 12 and the second member may be mounted to the frame 11 or vice versa. Other lock or latch mechanisms 13 are envisaged but will generally include a first member which moves with respect to a second member, which then receives the first member in the locked condition and releases the first member in the unlocked condition. In embodiments in which the moveable panel 12 can be locked or latched in the partially open condition, the second member may be configured to receive the first member in more than one location (with one such location being used when the moveable panel 12 is in the closed condition and another being used when the moveable panel 12 is in the partially open condition). The second member may include one or more slots and the first member may include one or more pins, for example.

[0059] In some embodiments, at least part of the frame (such as a frame member 111) is, in fact, part of another moveable panel 12 (e.g. in a multi-door arrangement) -

the aperture of the door or window 1 being defined by another frame 11, for example. In such embodiments, the first member may be mounted to a first panel and the second member to a second panel (the two panels being generally adjacent each other when in the closed (or partially open) conditions).

[0060] In some embodiments, the frame member 111 is part of the moveable panel 12 and moves therewith. In such embodiments a further frame 11 may be provided to define the aperture of the door or window 1.

[0061] In other words, the frame member 111 may be part of the frame 11 defining the aperture or may be part of the panel 12.

[0062] Although panels 12 which rotate with respect to at least part of the frame 11 have been described above and elsewhere herein, some embodiments may include at least one panel 12 which is configured to slide linearly with respect to at least part of the frame 11 (or another panel 12 - so providing two panels 12 slideable with respect to each other, in some embodiments).

[0063] Embodiments include a module 2 - see figures 3, 5, 6, 7, 8, 9, 10, 11, 12, and 18, for example. The module 2 is configured to be coupled to the frame member 111 of the door or window 1, or to the panel 12. The module 2 may house electrical or mechanical components.

[0064] The module 2 may be provided to allow sensing of the condition of the door or window 1. The module 2 may, therefore, be configured to sense a condition of the door or window 1.

[0065] The module 2 includes (and may house) a sensor 21 (see figures 13, 15, and 18, for example). The sensor 21 may be configured to sense the condition of the door or window 1. For example, the sensor 21 may be configured to sense the position of the door or window panel 12 with respect to the frame 11 (for example, with respect to a frame member 111 or of the frame member 111 with respect to the frame 11 in embodiments in which the frame member 111 is part of the panel 12). The sensor 21 may also or alternatively be configured to sense the condition of the latch or lock mechanism 13.

[0066] For example, the sensor 21 may be in the form of or include a reed switch or a Hall Effect sensor (or a plurality of Hall Effect sensors H1,H2,H3). A magnet 40 may be provided.

[0067] As will be appreciated a magnet 40 is an example of a sensed element and other sensed elements may be used in some embodiments - wherein the sensor 21 is configured to sense the presence and/or the proximity of the sensed element.

[0068] The magnet 40 may be provided in a magnet housing 41 (see figure 2). The magnet housing 41 may include two parts which are configured to be secured to each other and within which the magnet 40 may be provided. A first part of the magnet housing 41 may be secured to a second part of the magnet housing 41 by one or more securing members which may be in the form of a screw or clip, for example. In some embodiments, the

first and second parts of the magnet housing 41 are additionally or alternatively adhered together. In some embodiments, each of the first and second parts of the magnet housing 41 may include at least one pin member which is configured to be received by a corresponding aperture defined in the other of the first and second parts, in order to secure the two parts together. The two parts may each define at least part of a magnet receiving recess such that, with the two parts secured to each other, the magnet 40 may be received within the magnet recess to retain the magnet in the magnet housing 41.

[0069] The magnet housing 41 may have an external cross-sectional shape which is keyed or at least partially keyed to a magnet attachment point 42 - which may be in the form of an aperture or recess. The keyed or partially keyed arrangement may be such that the magnet 40 has a predefined orientation with respect to the magnet attachment point 42, or may have one of two predefined orientations with respect to the magnet attachment point 42.

[0070] As will be appreciated, the magnet 40 has two opposing poles, a north pole and a south pole - and an orientation of the magnet 40 may be understood to be defined by virtue of the north and south pole of the magnet 40.

[0071] With the module 2 mounted to the frame 11, the magnet 40 may be mounted to the panel 12, or vice versa. The mounting may be via the magnet attachment point 42. The magnet attachment point 42 may include an aperture or other recess formed in the panel 12, or frame 11. The mounting of the magnet 40 to the panel 12 or frame 11 (e.g. by use of the magnet attachment point 42 and/or the magnet housing 41) may be such that an axis of movement of first member with respect to the second member may be generally aligned with a magnetic axis of the magnet 40 (i.e. the magnetic axis is directionally aligned with the magnet path, which may mean that it is parallel thereto, for example). For example, there may be a locking bar (or rail) provided and the magnet 40 may be mounted thereto such that movement of the locking bar is along an axis which is parallel to the magnet axis of the magnet 40. This may be a vertical axis, for example. The magnet attachment point 42 may be an elongate slot and the magnet housing 42 may also, therefore, be elongate. The magnet 40 may be held in place by virtue of magnetic attraction, a mechanical clip, a screw, a rivet, and/or an adhesive, for example.

[0072] There may be an engagement pin 43 (see figures 2 and 4) provided which is mounted in a fixed position with respect to the magnet attachment point 42 (if provided) and, in any event, with respect to the location of the magnet 40 when fitted (in either case at least when the magnet 40 or magnet attachment point 42 are in their position corresponding with the lock or latch mechanism 13 being in one of its locked and unlocked conditions). The engagement pin 43 may be mounted to the locking bar (or rail) or may be attached to a member under which the locking bar (or rail) moves (so that the locking bar (or

rail) moves with respect to the engagement pin 43). The engagement pin 43 may have a generally circular cross-sectional shape and may be generally cylindrical in shape, for example. The engagement pin 43 may extend generally perpendicular to the locking bar (or rail), in such embodiments.

[0073] The engagement pin 43 could take a different form and may be a non-pin-like member. As such, the engagement pin 43 as described could be an engagement member providing an engagement member surface.

[0074] The magnet 40 may be located such that, with the door or window 1 in the closed (or, in some cases, the partially open) condition, the sensor 21 (e.g. the reed switch) is actuated to an "on" state but with the door or window 1 in the open condition, the reed switch is in an "off state. The magnet 40 may be mounted for movement with the first member (of the lock or latch mechanism 13) such that, with the door or window 1 in the locked condition, the sensor 21 (e.g. reed switch) is actuated to an "on" state but with the door or window 1 in the unlocked condition, the sensor 21 (e.g. the reed switch) is in an "off state. The engagement pin 43 may, likewise, be mounted for movement with the magnet 40 or not (as described).

[0075] As described, in some embodiments, the sensor 21 may include at least one Hall Effect sensor H1,H2,H3 and, in some embodiments, may include at least three Hall Effect sensors H1,H2,H3.

[0076] The sensor 21 may be a motion or proximity sensor which does not require physical contact for actuation - a reed switch or a Hall Effect sensor being one example of such a sensor 21 another example being an induction coil, for example.

[0077] For the correct operation of the sensor 21, the module 2 may therefore need to be located on the frame 11 or panel 12 in close proximity to the other of the frame 11 or panel 12 when the window or door 1 is in the closed (or partially open) condition and/or in close proximity to the lock or latch mechanism 13 (e.g. when in the locked condition). The module 2 must not, however, foul the operation of the door or window 1, or the lock or latch mechanism 13. The spacing of the module 2 with respect to the frame member 111 may, therefore, be important and/or the alignment of the sensor 21 and magnet 40 may be important.

[0078] The module 2 (see figure 18) may include (and may house) a power source 22, for powering powered elements of the module 2, or may include a connection (for example, a port or other socket to allow connection of a cable) for connecting the module 2 to a power source 22. For example, the module 2 may be connectable to a mains electrical power supply. In some embodiments, the power source 22 is in the form of a battery. The battery may be a rechargeable battery and the power source may include a connection (such as a port or other socket) to enable recharging of the battery. In some embodiments, the battery is not rechargeable. In some embod-

iments, the battery is replaceable such that the battery is removable from the module 2 and can be replaced without substantive damage to the module 2. In some embodiments, the battery is not replaceable - such that the module 2 may be a so-called sealed unit - and removal of the battery from the module 2 may, therefore, cause damage to the module 2 or may require specialist tools.

[0079] The module may include a battery cover 28 (see figures 9 and 12). The battery cover 28 may be configured to be at least partially removed from the rest of the module 2 to allow access to a battery for replacement. Access may also be provided, via the movement of the battery cover 28 for maintenance, for example. In some embodiments, the battery cover 28 is held in place (i.e. in a closed condition) with respect to the rest of the module 2 by one or more cam members 281 of a cover securing mechanism. The or each cam member 281 may be rotatably coupled to the module 2 (for rotation with respect to the battery cover 28). The or each cam member 281 may be configured to rotate to rotate a respective unlatch and latched position. With the or each cam member 281 in its unlatched position, the or each cam member 281 may be configured to pass through a respective aperture 282 defined through the battery cover 28. This enables the battery cover 28 to be placed into the closed condition. The or each cam member 281 may then be rotated such that at least part of the or each cam member 281 engages a part of the battery cover 28 to inhibit its removal (i.e. to inhibit its movement out of the closed condition into an open condition). The or each cam member 281 may include a slot for use in rotating that cam member 281 (e.g. through engagement with a screw driver or coin).

[0080] In some embodiments, see figure 21 for example, the battery cover 28 may be secured by a battery cover clip 283, which may be a resilient clip 283 mounted to the battery cover 28 and configured to engage (selectively) another part of the module 2. Of course, the embodiment of figure 21 may use the cam member(s) 281 in addition or alternatively. Likewise, the embodiments of figures 9 and 12 may use a battery cover clip 283.

[0081] The module 2 may include (and may house) a controller 23 (see figure 18), for example to control operation of the sensor 21 and/or to receive information from the sensor 21. The module 2 may include a processor 25, configured to process sensed information from the sensor 21. In some embodiments, the controller 23 is provided as part of the processor 25 and/or is the processor 25.

[0082] The module 2 may include (and may house) a communications subsystem 24. The communications subsystem 24 may be configured to communicate with another device and that communication may be wireless communication or may be over a wired communication channel or both. The communications subsystem 24 may include a transmitter and/or a receiver, or only a transceiver (i.e. without a receiver). The communication subsystem 24 may be configured to communicate with an-

other device using radio frequency waves - for example, using WiFi[®] or Zigbee[®] or Bluetooth[®], or a similar radio frequency protocol.

[0083] The communication subsystem 24 may be operated by the controller/processor 23/25 and may be powered by the power source 22.

[0084] The communications subsystem 24 may be configured to deliver information about the condition of the door or window 1 (as sensed by the sensor 21) to a hub 24a. The hub 24a may be configured to collect and/or forward the received information to yet another device (such as a server, for example). The hub 24a may, therefore, provide an interface between the communication channel used to communicate with the module 2 (which may be relatively short range communication and may be a local area network) and the communication channel used to communicate with the yet another device (which may be relatively long range communication and may be a wide area network such as the Internet).

[0085] In some embodiments, a user may use a computing device (such as a mobile telephone, laptop, desktop, tablet, or the like) to interrogate the hub 24a and/or the yet another device to obtain information about the condition of the door or window 1. The computing device may be configured to receive this information and to present an indication to the user about the current condition of the door or window 1 (e.g. a visual indication about the state of the door or window 1 in substantially real-time and/or a historic record of changes in that state).

[0086] The communications subsystem 24 may be configured to deliver information about the condition of the door or window 1 to the hub 24a or another device periodically or on request from the hub 24a or other device.

[0087] Likewise, the hub 24a may be configured to deliver information about the condition of the door or window 1 to another device periodically or on request.

[0088] The module 2 may include (and may house) a computer readable medium 26 storing instructions which, when executed by the processor/controller 25/23 cause the performance of the operations of the module 2 - such as the sensing of the condition of the door or window 1 and the transmission of that condition.

[0089] The module 2 may include a housing 200 in which the various components thereof are located. The module 2 may include a front portion 201 which, when fitted as described herein, is generally visible to the user (when the door or window 1 is in the open condition) and may include a back portion 202 which may couple the module 2 to the frame 11 or panel 12.

[0090] The front portion 201 may be in the form of a fascia and/or may include one or more decorative elements.

[0091] The front portion 201 of the housing 200 may include a first part and a second part which form different sections of the front portion 201, with the two parts being separated from each other along the length of the housing 200. The first part of the front portion 201 of the housing

200 may cover (e.g. and at least partially contain) components of the module 2 (such as the sensor 21, power source 22, controller 23, and/or communications subsystem 24, for example). The second part of the front portion 201 may at least partially provide an alignment slot 201a (see figure 8, for example).

[0092] The alignment slot 201a may be a slot defined by the housing 200 across at least part of a width thereof. In some embodiments, the alignment slot 201a has at least one open end and in some embodiments the alignment slot 201a as two open ends (which ends may oppose each other across the slot (which may be across a width of the housing 200)). The alignment slot 201a may extend across substantially an entire width of the housing 200. A length of the alignment slot 201a may, therefore, be a distance across the width of the housing 200 (and so of the module 2).

[0093] The alignment slot 201a is defined by first and second abutment surfaces 201b,c which may extend across at least part of the width of the housing 200. The first abutment surface 201b may be a surface of the first part and the second abutment surface 201c may be a surface of the second part - wherein the first and second abutment surfaces 201b,c may oppose each other across the alignment slot 201a. A distance between the first and second abutment surfaces 201b,c may be a width of the alignment slot 201a.

[0094] The first and second parts of the front portion 201 may be coupled to each other by a back plate 201d which may be part of the front portion 201 or which may be part of the back portion 202 for example. The back plate 201d may define a depth of the alignment slot 201a. In some embodiments, the back plate 201d is present across the entire alignment slot 201a but this need not be the case in some versions.

[0095] Accordingly, the module 2 may include, as part of the housing 200, the alignment slot 201a. The alignment slot 201a may be defined between two parts of the front portion 201 (and so between two parts of the housing 200). The alignment slot 201a may have at least one open end (towards one side of the module 2) and may have two open ends (towards opposing sides of the module 2). The alignment slot 201a may extend across substantially an entire width of the module 2. A depth of the alignment slot 201a may be defined by the back plate 201d (which may couple the first and second parts of the front portion 201/module 2) and an outermost surface of the housing 200 adjacent the alignment slot 201a.

[0096] The alignment slot 201a may have a width which is not uniform across the length of the alignment slot 201a. In particular, the alignment slot 201a may taper from an edge of the module 2 (i.e. the front portion 201) towards the middle of the module 2 (i.e. the front portion 201). In some embodiments, the tapering is provided by the angle of the first and second abutment surfaces 201b,c with respect to each other. In some embodiments, the first and second abutment surfaces 201b,c are not, therefore, parallel with each other. In some embodi-

ments, at least one of the first and second abutment surfaces 201b,c is angled with respect to a width of the module 2 (and front portion 201). In some embodiments, both of the first and second abutment surfaces 201b,c are angled with respect to a width of the module 2 (and front portion 201), such that the width of the slot decreases from an edge of the module 2 inwards.

[0097] In some embodiments, the alignment slot 201a narrows towards a middle of the module 2 (i.e. the front portion 201) and may be wider either side of the middle of the module 2 (i.e. the front portion 201). In some embodiments, the alignment slot 201a has two open ends and the alignment slot 201a may taper (i.e. narrow) from each edge of the module 2 (i.e. the front portion 201) towards the middle of the module 2 (i.e. the front portion 201). The alignment slot 201a may, therefore, have an hourglass shape with its widest parts towards opposing edges of the module 2 (i.e. the front portion 201) and its narrowest part may be towards a middle of the module 2 (i.e. the front portion 201). If there is only one open end of the alignment slot 201a, then the alignment slot 201a may still have this shape. In some embodiments, the narrowest part is provided at a different location across the width of the module 2 (i.e. the front portion 201).

[0098] In some versions, the depth of the alignment slot 201a may be greater at the end or ends of the alignment slot 201a (this may be achieved by a declined back plate 201d surface at or towards each end, for example).

[0099] In the depicted and some other embodiments, the alignment slot 201a is located towards a lower section of the module 2. However, this need not be the case. In some embodiments, the alignment slot 201a may be generally centrally located or located in an upper section of the module 2.

[0100] In some embodiments, the second part of the front portion 201 (and so the module 2) may not house any components of the module 2 but this need not be the case. In some embodiments, the second part may additionally or alternatively house one or more of the module 2 components.

[0101] In some embodiments, only one abutment surface 201b,c is provided and this may be a surface of the first part of the front portion 201 (and so the module 2) but may be a surface of the second part of the front portion 201 (and so the module 2). In such embodiments, the second part may not be provided and the alignment slot 201a may not be provided as such - there being no opposing side to the slot.

[0102] As described herein the or each abutment surface 201b,c acts as a guide surface which a pin (such as the engagement pin 43) may abut and which then causes movement of the module 2 with respect to the securing member 3 if the module 2 is out of alignment.

[0103] In embodiments in which the engagement pin 43 moves with the magnet 40 (or the a magnet attachment point 42), then the distance between the two abutment surfaces 201b,c at the point at which the engagement pin 43 would be located with the door or window 1

in its closed condition (which may be the narrowest part of the alignment slot 201a) is greater than (or substantially equal to) the distance which the engagement pin 43 moves when the lock or latch mechanism 13 is operated between its locked/latched and unlocked/unlatched conditions.

[0104] In some embodiments, at least part of the sensor 21 may be positioned relatively closer to the front portion 201 than the back portion 202, and may, indeed, extend from the front portion 201 (in a direction away from both the front and back portions 201,202).

[0105] The housing 200 may be generally rectangular (e.g. a rounded rectangle) - although other shapes are envisaged. One or more corners of the housing 200 may be rounded at a different radius than one or more other corners of the housing 200.

[0106] The module 2 may include a coupling arrangement 27 and this may be at least partially located on or as part of the back portion 202 of the housing 200 of the module 2.

[0107] In the depicted and some other embodiments, the coupling arrangement 27 (see figure 9, for example) includes one or more pins 271 which may extend from a main surface of the back portion 202 of the housing 200.

The or each pin 271 may extend generally perpendicular to a plane of the back portion 202 of the housing 200. The or each pin 271 may be generally mushroom shaped - such that a proximal end nearest the main surface of the back portion 202 has a first cross-section and a distal end remote from the proximal end has a second cross-section which is larger (in at least one dimension) than the first cross-section. In some embodiments (see figure 21, for example), however, the or each pin 271 may have such first and second cross-sections which are substantially the same in size (and/or shape). The or each pin 271 may be a respective protrusion extending from the main surface of the back portion 202 of the housing 200. The or each pin 271 may have a generally uniform width and/or length and/or height.

[0108] The or each pin 271 may have a circular cross-section (and the first and/or second cross-sections may be circular or rectangular) - although other shapes are envisaged (such as a stadium-shaped or oval cross-section).

[0109] In some embodiments, the or each pin 271 may, therefore, include a shaft (with the first cross-section) and a head (with the second cross-section). Whilst the shaft may have a smaller cross-section than the head (see above), this need not be the case (also see above).

[0110] In some embodiments, the head of the or each pin 271 may be generally D-shaped and/or may extend with respect to the shaft of that pin 271 (perpendicular to a longitudinal axis thereof) in a first direction but not in an opposing second direction (e.g. to form an overhang over at least part of the shaft but not an overhang in all directions). In some versions, the head of the or each pin 271 may have a shape corresponding to that of the rest of that pin 271 - such as circular, or stadium-shaped, or

oval, or rectangular. The head and the shaft of the or each pin 271 may be the same shape (and/or size).

[0111] Side surfaces of the or each pin 271 may be parallel with each other. Indeed, if there is more than one such pin 271, then the side surfaces of all such pins 271 may be parallel with each other.

[0112] A top or end of the or each pin 271 (e.g. of the head) may be substantially flat. The tops or ends of the pins 271 in embodiments with a plurality of pins 271 may be parallel with each other and may define a plane (see figures 21 and 23 for example).

[0113] In some embodiments, at least one of the or each pins 271 may extend laterally from the housing 200 as well as away from the main surface of the back portion 202 of the housing 200 - see figures 19, and 21-23. Indeed, in some embodiments, the housing 200 may include one or more extensions such that any such pin(s) 271 extend from a respective one of the or each extensions (at least in part). In this manner, the housing 200 may be kept smaller whilst still allowing for, for example, adequate spacing of a plurality of pins 271 (or the appropriate placement of a single pin 271, for example).

[0114] In the depicted and some other embodiments, there may be two pins 271 provided. In some embodiments which include a battery cover 28, at least one pin 271 may be provided on the battery cover 28 (and another pin 271, if provided, may be provided on another part of the back portion 202 of the module 2 (the battery cover 28 being part of the back portion 202)).

[0115] Embodiments include a securing member 3 (see figures 5, 6, 10, 11, and 12, for example). The securing member 3 may be configured to be fixed to the frame 11 or to the panel 12 (e.g. the frame member 111). The module 2 may be configured to be fixed to the securing member 3. Accordingly, the module 2 may be attached to the frame 11 or panel 12 using (i.e. via) the securing member 3. The securing member 3 may be sandwiched between the module 2 and the frame member 111 when so secured in place.

[0116] In some embodiments, the module 2 is secured to the frame member 111 solely by the securing member 3 and, in some such embodiments, no part of the module 2 touches or is otherwise in direct contact with the frame member 111.

[0117] The securing member 3 may include a body 31. The body 31 may include a fixing arrangement 32 for use in securing the securing member 3 to the frame member 111. The fixing arrangement 32 could take a number of different forms and may include more than one element.

[0118] In the depicted and some other embodiments, the fixing arrangement 32 may include a fixing element 32a which is configured to be received by or otherwise mate with a fixing receiver 32b provided as part of the body 31. The fixing receiver 32b may be a through-hole defined by the body 31 or a slot defined by the body 31, for example. The fixing element 32a may be a screw (which may be a self-tapping screw), a rivet, a nut and bolt arrangement, a nail, or the like.

[0119] In some embodiments, the fixing arrangement 32 may be or include an adhesive (such as an adhesive covered pad which may be sandwiched between the body 31 and the frame member 111).

[0120] The body 31 of the securing member 3 may have an outer face (i.e. a face which is opposite an inner face which is secured to face the frame member 111) which is generally rectangular in shape, for example but other shapes are envisaged. The inner face may be of generally the same shape as the outer face and a depth of the securing member 3 (and body 31) may be defined between the inner and outer faces thereof. As will be appreciated, the shapes of the inner and outer faces may define at least part of a shape of the body 31 and, therefore, the securing member 3.

[0121] In some embodiments, the fixing arrangement 32 may be located generally centrally with respect to the securing member 3. In some embodiments, this may be generally through or adjacent part of the rectangular part of the outer and/or inner faces.

[0122] Each fixing arrangement 32 may be spaced apart across the body 31 - e.g. there may be a plurality of fixing receivers 32b each configured to receive a fixing element 32a.

[0123] The fixing element 32a (or each fixing element 32a in some embodiments) may be configured to be countersunk with respect to the body 11 and outer face - such that, for example, no part of the fixing element 32a extends substantially above the outer face. The fixing receiver 32b (or fixing receivers 32b in some embodiments) may be correspondingly formed, therefore, to allow for this countersunk configuration.

[0124] Accordingly, the securing mechanism 3 may be secured to the frame 11 (e.g. to the frame member 111 - which may be a frame member 111 of the first pair 111a or the second pair 111b - or the panel 12 (as discussed herein the frame member 111 may be parts of the panel 12 rather than the frame 11)).

[0125] The securing member 3 and, in some embodiments, the body 31 may define one or more grooves 33. The or each groove 33 may be defined in the inner face of the body 31. The or each groove 33 may be a linear groove 32. The or each groove 33 may be configured to receive a part of the frame member 111.

[0126] In particular, the frame member 111 may include one or more elongate projections along a length thereof. Such elongate projections may be configured for use in the fitting of a seal member to the frame member 111, or may be part of the structure of the frame member 111 to improve rigidity thereof, for example.

[0127] The or each groove 33 may extend through an entire length of a part of the securing member 3 (e.g. the body 31). The or each groove 33 may be open ended. The or each groove 33 may help in the locating of the securing member 3 with respect to the frame member 111. Accordingly, the or each groove 33 may be positioned in the body 31 at a position determined by the configuration of the frame member 111.

[0128] The securing member 3 may include a coupling configuration 34 (see figure 10, for example). The coupling configuration 34 of the securing member 3 may be configured to mate with or otherwise receive (or engage) at least part of the coupling arrangement 27 of the module 2 - herein referred to as the fitting of the module 2 to the securing member 3. The fitting of the module 2 to the securing member 3, using the coupling configuration 34 and the coupling arrangement 27, may secure the module 2 to the securing member 3.

[0129] In some embodiments, the coupling configuration 34 includes a receiving configuration to engage the coupling arrangement 27 or a part thereof.

[0130] In the depicted and some other embodiments, the receiving configuration includes at least one aperture 341a (defined in the body 31, for example). There may be a corresponding number of apertures 341a to the number of pins 271, for example - with each aperture 341a configured to receive a pin 271. Accordingly, the location of the or each aperture 341a may correspond with the location of the or each pin 271 to allow the fixing as described herein of the module 2 to the securing member 3.

[0131] The or each aperture 341a may be a through-hole (or slot) in the body 31 or may be a blind-hole (or slot) in the outer face of the body 31.

[0132] In some embodiments, a first of the one or more apertures 341a may be joined by a channel to a second of the one or more apertures 341a.

[0133] In some embodiments, the or each aperture 341a may include two respective parts - a wide part and a narrow part, the two parts may be along different lengths of the or each aperture 341a which may be in the form of a slot (which may also, as will be appreciated have a depth through the body 31). The wide part may be sized to allow the head of the corresponding pin 271 therethrough and the narrow part may be sized to prevent the head of the corresponding pin 271 from passing therethrough (but still sufficiently large to receive the neck of the pin 271). The narrow part may be wider below the outer face (to allow passage of the head of the pin 271 along the narrow part but not through the narrow part). Accordingly, a pin 271 may be inserted into the corresponding aperture 341a through the wide part and then moved (linearly) across the aperture 341a until the neck of the pin 271 is passing through the narrow part and the head cannot be removed from the aperture 341a (other than by reversing the linear movement to align the head of the pin 271 with the wide part again). The channel may be an extension of the narrow part, for example. In some embodiments, the or each aperture 341a may not include two parts as described above but may be of a substantially uniform size, with an opening of the aperture 341a being generally the same width along its length (or a length thereof) - see figure 20, for example. The or each such aperture 341a may still be configured to receive a respective pin 271. In some versions, sides of the or each aperture 341a (as defined by the body 31 or other part of the securing member 3) may be parallel with each

other and, indeed, if there are multiple such apertures 341a provided then it may be that the sides of all such apertures 341a are parallel with each other. With one of the or each pins 271 received by a respective one of the or each apertures 341a, the sides of the aperture 341a may abut the sides of the pin 271. In such a configuration, movement of the pin 271 (and so the module 2) with respect to the aperture 341a (and so the securing member 3) may be permitted along the axis of movement but restricted in or around at least one other axis. In some embodiments, such movement is restricted (with the pin(s) 271 so received) to movement along the axis of movement only. The movement may be achieved by the pin(s) 271 sliding along the aperture(s) 341a in which they are respectively received. Accordingly, as will be appreciated, the or each pin 271 (or at least the part received by an aperture of the one or more apertures 341a) may have a smaller length than a length of the aperture 341a. The width of the or each pin 271 may be substantially equal to (or marginally less than) the width of the or each aperture 341a. The pin(s) 271 and aperture(s) 341a may be, as will be understood, elongate.

As depicted, and in some other embodiments, there may be two such apertures 341a and two such pins 271. There may be more than one receiving configuration. The two (or more) apertures 341a may be aligned with each other along a common axis.

[0134] The module 2 may include a holding portion 203 (see figures 10-12, for example) which is configured to mate with an engaging portion 350 provided as part of the securing member 3. Mating of the holding portion 203 and the engaging portion 350 may hold the module 2 in a generally fixed position with respect to the securing member 3. However, the mating may be achieved at a plurality of relative positions between the module 2 and the securing member 3. Accordingly, the holding portion 203 and the engaging portion 350 may be configured to hold the module 2 with respect to the securing member 3 in one of a plurality of fixed positions, wherein (as described herein) the module 2 may be moved to another of the plurality of fixed positions relative to the securing member 3 (again, with the holding portion 203 and the engaging portion 350 holding the module 2 and securing member 3 in that other position).

[0135] The holding portion 203 may be part of the coupling arrangement 27 and the engaging portion 350 may be part of the coupling configuration 34, for example.

[0136] The holding portion 203 and the engaging portion 350 may be configured to engage each other to mate. Movement of the module 2 with respect to the securing member 3 with the holding portion 203 and the engaging portion 350 mated may not require the user to take an additional step to disengage the two portions 203,350. In particular, a force applied to the module 2 above a threshold force may cause the movement of the module 2 with respect to the securing member 3 may cause momentary disengagement and then re-engagement of the two portions 203,350 as the module 2 moves with respect

to the securing member 3. The module 2 may be constrained, however, to move with respect to the securing member only along one axis (i.e. in one direction or in two opposing directions). In the depicted and some other versions the module 2 may move up and down with respect to the securing member 3 (although the module 2 and securing member 3 may be re-oriented so that this is movement from side to side).

[0137] The holding portion 203 and engaging portion 350 could take a number of different forms. In some versions, the holding portion 203 includes at least one protrusion and the engaging portion 350 includes a plurality of corresponding recesses (each recess being configured to receive a respective one of the one or more protrusions, for example). The recesses may be arranged in an array (which may be a linear array), such that movement of the module 2 with respect to the securing member 3 causes the protrusion to move from one recess to another. According, in some embodiments, the holding portion 203 and engaging portion 350 are configured to provide a discrete (rather than continuous) plurality of positions of the module 2 with respect to the securing member 3. In some embodiments, the discrete positions are relatively close to each other such that a positions are substantially continuous positions.

[0138] In some embodiments, it is the holding portion 203 which includes the plurality of recesses and the engaging portion 350 which includes the at least one protrusion.

[0139] In some embodiments, it may be that there are a plurality of protrusions and at least one recess - such that the recess receives different ones of the protrusions as the module 2 is moved with respect to the securing member 3.

[0140] In some embodiments, the or each protrusion may include an elongate rib and the or each recess may be correspondingly shaped. In some embodiments, such as those depicted, for example, there are a plurality of protrusions and a plurality of recesses. Indeed, the recesses may be defined by a plurality of protrusions and the protrusions may be defined between recesses. In other words, the holding portion 203 and the engaging portion 350 may both be provided as respective undulating surfaces, each with a plurality of recesses and protrusions which engage each other and provide for a plurality of fixed positions of the module 2 relative to the securing member 3. The interference between the two portions 203,350 may hold the module 2 in place with respect to the securing member 3 during normal use (e.g. against the effect of gravity) until a force is applied above a threshold force to move the module 2 with respect to the securing member 3 (the threshold force being defined by the engagement of the two portions 203,350).

[0141] In some embodiments, the holding portion 203 and engaging portion 350 use one or more engagement magnets 203a for use in engaging each other (see figures 20-23, for example). In some embodiments, therefore, the or each pin 271 (or other part of the holding portion

203) may include a respective engagement magnet 203a which may be provided in the head of that pin 271, for example. The or each engagement magnet 203a may have a surface which forms part of a surface of the head of the pin 271 in which it is located. The or each engagement magnet 271 may be located within a respective one of the or each pins 271 or may be secured to an end (such as the head) of a respective one of the or each pins 271. In some embodiments, therefore, the or each engagement magnet 203a may be considered to be part of a respective one of the or each pins 271. The engaging portion 350 may include one or more further engagement magnets and/or one or more magnetic metal members configured to be attracted to the or each engagement magnet 203a. For example, the engaging portion 350 may include a further engagement magnet and/or magnetic metal member 341b within the or each engagement portion 350 (such as forming at least part of a base of the or each aperture 341a). The or each further magnet and/or magnetic metal member 341b may be configured to attract a respective one of the or each engagement magnet 203a to hold the module 2 in a substantially fixed location (of a plurality of possible such fixed locations) with respect to the securing member 3. The or each further magnet and/or magnetic metal member 341b may be located in a base of a respective one of the or each aperture 341a and/or a side of a respective one of the or each aperture 341a. The base of the or each aperture 341a may, indeed, be defined by one of the further magnets and/or magnetic metal members 341b and/or may be a substantially flat surface (e.g. to enable the sliding of one of the or each pins 271 within the aperture 341a during the alignment process described herein). In some embodiments, the further magnet(s) and/or magnetic metal member(s) 341b are received within their associated aperture(s) 341a and secured therein by one or more clips or an adhesive, or any other suitable arrangement (which may result in the further magnet(s) and/or magnetic metal member(s) 341b then effectively forming the new base of the aperture(s) 341a). The or each aperture 341a may include one or more grooves through a depth thereof which are configured to receive one or more protrusions of a one of the further magnet(s) and/or magnetic metal member(s) 341b to ensure correct positioning and/or alignment of the or each further magnet and/or magnetic metal member 341b.

[0142] As will be understood, the base of the or each aperture 341a may abut the end (such as the head) of a respective one of the or each pins 271. In some embodiments, the or each engagement magnet 203a will abut a respective one of the or each further magnets and/or magnetic metal members 341b. If there are a plurality of pins 271 and apertures 341a then each aperture 341a may have an associated further magnet and/or magnetic metal member 341b. In some embodiments, the securing member 3 may be formed from a magnetic metal (which may negate the need for further magnets and/or magnetic metal members 341b). In some embodiments, there

are one or more further magnets 341b as described, but the or each pin 271 may include a magnetic metal element instead of an engagement magnet 203a, for example. In some versions, the frame member 111 to which the securing member 3 is secured may include a magnetic metal portion or may be formed from a magnetic metal such that the provision of the further magnet and/or magnetic metal member 341b as part of the securing member 3 is not required as the engagement magnet(s) 203a may be attracted to the frame member 111 (through the securing member 3 or a part thereof). The further magnet(s) and/or magnetic metal member(s) 341b may be elongate and/or may have a shape which corresponds with that of the aperture 341a in which they are each configured to be received (in embodiments in which they are so received).

[0143] Using such embodiments, the magnetic attraction between the engagement magnet(s) 203a (or magnetic metal element(s)) and the further magnet(s) and/or magnetic metal member(s) 341a may be sufficient to hold the module 2 and securing member 3 together (under the force of gravity) in one of a plurality of possible relative linear positions with respect to each other (wherein the module 2 may be moved in the alignment process to another of that plurality of positions and then held in that position with respect to the securing member 3 by the magnetic attraction, as described). The magnetic attraction may permit sliding movement between relative linear positions of the module 2 with respect to the securing member 3 during the alignment process as described herein.

[0144] The further magnet(s) and/or magnetic metal member(s) 341b may, therefore, form part of the engaging portion 350 and may be provided in addition to or instead of the protrusion(s) and recess(es) also described herein in relation thereto. The engagement magnet(s) 203a (and/or the magnetic metal element(s)), likewise, may form part of the holding portion 203.

[0145] The holding portion 203 and the engaging portion 350 may be provided in several different locations on the module 2 and securing member 3 respectively. With the module 2 fitted to the securing member 3, however, the holding configuration 203 and the engaging portion 350 would engage and so should abut each other.

[0146] In some embodiments, the holding portion 203 is provided on the back portion 202 of the module 2 (i.e. so that it faces the securing member 3 when the module 2 is fitted to the securing member 3). Likewise, the engaging portion 350 may be provided on (or in) the outer face of the body 31 of the securing member 3 (i.e. so that it faces the module 2 when the module 2 is fitted to the securing member 3). So arranged, the holding portion 203 and engaging portion 350 may mate as described herein.

[0147] The holding portion 203 may extend along a length of a part of the module 2 (to enable the position of the module 2 and securing member 3 with respect to each other to be altered along that length).

[0148] In some embodiments, the holding portion 203 and engaging portion 350 are provided in different locations to those described above.

[0149] For example, and as depicted, the holding portion 203 may be provided on at least one of the or each pin 271 and may be provided on a head thereof (e.g. on a surface of the head which faces the rest of the module 2). The engaging portion 350 may be provided along one or more inwardly facing surfaces within the narrow part of the aperture 341a such that these one or more surfaces abut the surface of the head of the pin 271 received in the aperture 341a. In this sense, therefore, the inwardly facing surface(s) face towards the inner face of the body 31 and away from the outer face of the body 31. In some embodiments, the holding portion 203 may be provided along both sides of the aperture 341a (and may be provided on corresponding sides of the head of the pin 271). In some embodiments, the engaging portion 350 may be provided within the or each aperture 341a and may form a base of thereof (e.g. in embodiments using magnetic attraction for this purpose).

[0150] The holding portion 203 and the engaging portion 350 may be pressed into engagement by a part (such as a lip) at the edge of the aperture 341a being between the head of the pin 271 and a surface of the module 2 (e.g. a surface of the back portion from which the pin 271 may extend). The space between the head of the pin 271 and this surface, relative to a depth of the lip at the edge of the aperture 341a may be used to determine, at least in part, the threshold force (a tighter fit of the lip in this part meaning the threshold force for movement of the module 2 is higher). In some such embodiments, the engaging portion 350 is provided on the lip. There may be one such lip on either side of the aperture 341a (at least in the narrow part thereof).

[0151] The holding portion 203 and the engaging portion 350, therefore, may engage with the module 2 and securing member 3 in any one of a plurality of different relative positions (the plurality of relative positions being defined by the holding portion 203 and the engaging portion 350). As will be understood from the description herein, at least one of the holding portion 203 and the engaging portion 350 may include an array (which may be a linear array) of either recesses or protrusions (or both), with protrusions of one portion 203,350 inter-engaging recesses of the other portion 203,350. In some embodiments, magnetic attraction is used instead or in addition (see the description in relation to the engagement magnet(s) 203a or magnetic metal element(s), for example).

[0152] In some embodiments, the protrusions of the holding portion 203 and/or the engaging portion 350 have rounded or otherwise profiled ends to aid in the slippage of the holding portion 203 over the engaging portion 350 when the force exceeds the threshold (defined by the engagement of the two portions 203,350). The profile of the protrusions could be different - e.g. triangular.

[0153] Each pin 271 may include its own holding portion 203 or the holding portion 203 may only be provided

in relation to some pins 271 and not others (e.g. in embodiments in which the holding portion 203 is provided as part of the pin 271).

[0154] The module 2 may, therefore, be secured to the securing member 3 but, with the module 2 so secured, the module 2 may move with respect to the securing member 3. This movement may be linear movement - e.g. as defined by the aperture(s) 341a (which may restrict the movement to this linear movement). The module 2 remains secured to the securing member 3 during such movement. The module 2 may be described, therefore, as secured in a floating manner because it can be moved to different relative positions with respect to the securing member 3 and held in that position by the holding portion 203 and engaging portion 350 engaging each other.

[0155] The frame member 111 to which the securing member 3 and module 2 may be fitted could have a number of different profiles (i.e. cross-sectional shapes). As described the frame member 111 may be a part of the frame 11 in relation to which the panel 12 moves or may, indeed, be part of a frame of the panel 12 (which may move with respect to another frame or other panel 12).

[0156] In any event, however, when the door or window 1 is in the closed condition, a channel may be defined between at least part of the panel 12 and the frame 11. This channel may accommodate, for example, parts of the lock or latch mechanism 13 and may provide sufficient space for this to operate freely.

[0157] The channel may be generally inaccessible from the exterior of the window or door 1 when in the closed condition. In some embodiments, the frame member 111 may be such that there is at least one edge lip extending along an outer and/or inner edge of the frame member 111 along its length and at least partially defining the channel.

[0158] In some embodiments, the securing member 3 and module 2 are entirely or substantially entirely contained within the channel. With respect to a frame member 111, a volume may be defined between the outer and inner edge of the frame member 111 along its length and the securing member 3 and module 2 may be entirely or substantially entirely contained within this volume.

[0159] The securing member 3 and module 2 may be sized and shaped such that, when fitted, they do not foul the operation of the door or window 1 - as it changes condition between the open and closed conditions and/or between the locked and unlocked conditions.

[0160] The engagement pin 43 may, however, be positioned relative to the securing member 3 such that, if a module 2 secured to that securing member 3 is not correctly aligned with the magnet 40, the engagement pin 43 will abut one of the abutment surfaces 201b,c as the door or window 1 is moved to its closed condition (or, in some cases, the partially open condition). This abutment will apply a force on the module 2 which, when it exceeds the threshold force, will move the module 2 with respect to the securing member 3.

[0161] In embodiments in which the engagement pin 43 moves with the magnet 40 (and/or the magnet attachment point 42) then the engagement pin 43 may move as the lock or latch mechanism 13 is moved to its locked/latched or unlocked/unlatched condition. This movement may cause the engagement pin 43 (e.g. the engagement member surface) to abut and apply a force to one of the abutment surfaces 201b,c and that force may cause movement of the module with respect to the securing member 3 when the threshold force is exceeded. It should be noted, however, that the arrangement is such that subsequent movements of the engagement pin 43 would not cause movement of the module 2 with respect to the securing member 3 unless the module 2 has since moved out of alignment with the magnet 40 or magnet attachment point 42. This may be achieved by providing, for example, sufficient space between the two abutment surfaces 201b,c (in embodiments which have two such surfaces 201b,c) to allow the movement of the engagement pin 43 through its full expected range of motion (through the locking/latching/unlatching/unlocking process) therebetween (if the module 2 is aligned). Accordingly, operations which do align or realign the module 2 (and so the sensor 21) with the magnet 40 or magnet attachment point 42 may be referred to as an alignment process (to be distinguished from normal operation in which the condition of the door or window 1 is determined using the module 2). The alignment process is shown in figures 24a (with the prior to alignment) and 24b (after alignment).

[0162] The threshold force is large enough such that the module 2 is held in position (by the engaging of the holding portion 202 and the engaging portion 350) but small enough that the threshold is easily exceeded by manual force applied by virtue of the closing of the door or window 1.

[0163] The direction and distance of movement is determined by the engagement of the engagement pin 43 and the abutment surface 201b,c. As the magnet 40 is positioned in a fixed relationship with respect to the engagement pin 43, the movement may be used to align the module 2 with the magnet 40 (i.e. to align the sensor 21 and the magnet 40 to the extent required for the sensor 21 to be used in determining the condition of the door or window 1). If there is only one abutment surface 201b,c provided the module 2 may only be moved in this manner in one direction. Initial fitting of the module 2 to the securing member 3 could, therefore, be such that the module 2 is at (or towards) one extreme of the range of positions at which the module 2 may be secured with respect to the securing member 3. Closing of the door or window 1 may then cause the engagement pin 43 to abut the abutment surface 201b,c to move the module 2 into alignment with the magnet 40. However, in such embodiments, the module 2 is only moveable in this manner in one direction (re-alignment may require the manual grasping and movement of the module 2 back to the aforementioned extreme position and then the closing of

the door or window 1 again). In the depicted and some other embodiments, therefore, there may be provided both the first and second abutment surfaces 201b,c such that the module 2 may be moved in both directions (e.g. up and down) as defined by the aperture(s) 241a. This allows, therefore, for constant re-alignment without additional steps being needed by the user (the user simply opens and closes the door or window 1 as normal, with realignment occurring (if required) with each movement to the closed condition (or, in some cases, the partially open condition). As described, of course, realignment may also or alternatively require the lock or latch mechanism 13 to be operated between the locked/latched and unlocked/unlatched conditions (e.g. in embodiments in which the engagement pin 43 moves with the magnet 40).

[0164] The ability to align the module 2 with respect to the magnet 40 means that changes in the relative position of the securing member 3 with respect to the magnet 40 overtime are automatically dealt with and the module 2 realigned with the magnet 40. Moreover, initial placement of the securing member 3 with respect to the magnet 1 need not be as accurate as previously was the case. The improved alignment, and that this alignment is maintained, means that more accurate sensing can be achieved by the sensor 21 because the relative position of the sensor 21 to the magnet 40 remains substantially constant.

[0165] The body 31 (and/or the entire securing member 3) may have a width equal to, substantially equal to, or less than the width of the channel. The body 31 may have a width equal to, substantially equal to, or less than a depth of the frame member 111.

[0166] As will be understood from the description herein, at least part of the frame member 111 may be received by at least part of the securing member 3. The securing member 3 and frame member 111 may, therefore, interlock.

[0167] The securing member 3 may be a packer, for example. As such, the securing member 3 may provide a spacing function to ensure that the module 3 is correctly located to sense the condition of the door or window 1.

[0168] In some embodiments, the magnet 40 (and, in some embodiments the magnet housing 41) are entirely or substantially entirely contained within the channel. With respect to a frame member 111, a volume may be defined between the outer and inner edge of the frame member 111 along its length and the magnet 40 (and, in some embodiments the magnet housing 41) may be entirely or substantially entirely contained within this volume.

[0169] The magnet 40 (and, in some embodiments the magnet housing 41) may be sized and shaped such that, when fitted, they do not foul the operation of the door or window 1 - as it changes condition between the open and closed conditions and/or between the locked and unlocked conditions.

[0170] When the door or window 1 is in the closed condition, the channel may not be accessible - i.e. the panel

12 may prevent access by blocking off any part of the channel that would be open if the door or window 1 were in the open condition. Therefore, a potential burglar may be prevented or hindered from accessing the module 2.

[0171] In some embodiments, a window or door fitter may fit the securing member 3 to the frame 11 during installation of the window or door 1. This may include selection of the correct securing member 3 from a plurality of securing members 3 for the frame member 111. The fitter may then position the securing member 3 in the correct location to ensure that the module 2 operates correctly. The fitter may secure the securing member 3 using the fixing arrangement 32. In some embodiments, one or more markers (which may be grooves in the body 31 or printed on the body 31, for example) may be used by the fitter for alignment of the securing member 3 at the correct location with respect to the frame member 111 and/or the lock or latch mechanism 13. As will be understood, however, the automatic alignment achieved in some embodiments negates the need for accurate placement of the securing member 3. In this sense, automatic means during normal use of the window or door 1 by the user.

[0172] The window or door 1 may then be used as normal.

[0173] The user may then, at some later time, decide to install the module 2. The user may be aware that the window or door 1 is configured to receive a module 2 by virtue of the presence of the securing member 3.

[0174] The securing member 3 may carry information or indicators to provide the user with information as to the type of module 2 which may be fitted to the securing member 3.

[0175] The user may fit the module 2 to the securing member 3 by positioning the module 2 such that the coupling arrangement 27 engages the coupling configuration 34. For example, such that the or each pin 271 is received by a respective receiving configuration (such as an aperture 341a). As described, the closing of the door or window 1 (and/or operation of the lock or latch mechanism 13) may then cause the automatic linear movement of the module 2 with respect to the securing member 3. In some embodiments, this movement is a vertical movement upwards, against gravity. In some embodiments, this movement is in parallel to a longitudinal axis of the frame member 111. This movement may move the or each pin 271 within the or each receiving configuration (e.g. aperture 341a). The module 2 will then be aligned with the magnet 40 (or at least to the magnet attachment point 42 if the magnet 40 has yet to be fitted) and held in place by engagement of the holing portion 203 and the engaging portion 350.

[0176] The module 2 may then be located correctly for operation (e.g. correctly spaced from the frame member 111 and aligned with the magnet 40 and/or magnet attachment point 42).

[0177] Similarly, the magnet 40 may be fitted to the magnet attachment point 42 (which may also be acces-

sible from the channel and so only when the window or door is open). The magnet 40 may be fitted to the magnet attachment point 42 by insertion, for example, to the magnet 40 (which may be housed in the magnet housing 41) into the magnet attachment point 42. The magnet 40 and/or the magnet housing 41 may be at least partially received by the magnet attachment point 42.

[0178] Accordingly, the module 2 may be fitted and/or replaced without the need for tools and by a relatively unskilled user.

[0179] As described, some embodiments include a sensor 21 with at least two Hall Effect sensors H1,H2,H3. WO2020234588, for example, describes a sensor 21 with at least two Hall Effect sensors and specifically embodiments with two Hall Effect sensors. Such arrangements may be used with embodiments described herein. However, also described herein is a three Hall Effect sensor H1,H2,H3 arrangement (with the third sensor unit H3 located between the first and second sensor units H1,H2).

[0180] These are examples of sensor units H1,H2,H3 which are capable of sensing a magnetic field. These sensor units H1,H2,H3 may be configured to sense a magnetic field in a single (i.e. one and only one) sensing axis, for example (which may be a sensing axis which is common to all of the sensor units H1,H2,H3). The sensor units H1,H2,H3 may be arranged within the module 2 such that the magnet 40 moves with respect to the sensor units H1,H2,H3 from a position to a first side of both of the three sensor units H1,H2,H3 to a position to a second side of the three the sensor units H1,H2,H3 as the lock or latch mechanism 13 is actuated between the locked condition and the unlocked condition (passing the three sensor units H1,H2,H3 during this movement).

[0181] Figures 13 and 15 show the magnet 40 schematically represented and mounted for movement with a part of the lock or latch mechanism 13 - such that the position of the magnet 40 with respect to the sensor units H1,H2,H3 changes as the lock or latch mechanism 13 is actuated between the locked and unlocked conditions.

[0182] The sensor units H1,H2,H3 forming parts of the sensor 21 are schematically depicted as mounted to a circuit board, for example.

[0183] As will be understood, figures 13 and 15 do not show other features of the embodiments - including other features of the module 2 - for the sake of simplicity of explanation.

[0184] With the moveable panel 12 in the closed condition, the sensor units H1,H2,H3 may be located along a path of the magnet 40 but spaced apart therefrom (and in practice other parts of the module 2 may be located between the sensor units H1,H2,H3 and the magnet 40, for example). The magnet 40, with the moveable panel 12 in the closed condition, may travel along the path and that path may have a path axis. The sensor units H1,H2,H3 may be aligned with that path axis, but offset with respect thereto (to provide non-contact sensing, for example). The sensor units H1,H2,H3 may be said to

have a sensing axis which is an axis which passes through all three sensor units H1,H2,H3 and which is parallel to the path axis.

[0185] The magnet 40 has a north pole N and a south pole S as depicted.

[0186] With the moveable panel 12 in the closed condition and the magnet 40 located at a first side of all three sensor units H1,H2,H3, the lock or latch mechanism 13 may be in the unlocked condition.

[0187] If the moveable panel 12 is moved to the open condition, then the magnet 40 will move further away from the sensor units H1,H2,H3. With reference to figures 13 and 15 this may be a movement downwardly and/or into or out of the page, for example (depending on the type of door or window 1).

[0188] As the lock or latch mechanism 13 is actuated to the locked condition, the magnet 40 moves along a magnet path (which may be a linear - i.e. substantially straight - path. The magnet 40 may, therefore, move past a first H1 of the sensor units H1,H2,H3 to a position between the two sensor units H1,H2 at opposing ends of the line of sensor units H1,H2,H3, and to a position under a middle one of the sensor units H3. This position may be referred to as an interim position and may form part of a movement to or from the locked condition of the lock or latch mechanism 13.

[0189] As the lock or latch mechanism 13 reaches the locked condition, the magnet 40 has moved (along the magnet path) to a position at the second side of both of the sensor units H1,H2,H3. The magnet 40 may, therefore, move (i.e. continue) past the second H2 of the sensor units H1,H2,H3 and this is generally shown in the bottom drawings of figures 13 and 15. This may be referred to as a locked position of the magnet 40.

[0190] Therefore, for example, when moving from the unlocked to the locked condition of the lock or latch mechanism 13, the magnet 40 may move along the magnet path as depicted sequentially in figures 13 and 15 from the top drawings thereof to the bottom. When the lock or latch mechanism 13 moves from the locked to the unlocked condition, the movement along the magnet path (of the magnet 40) may be reversed.

[0191] The sensor units H1,H2,H3 may each be configured to detect the presence of a magnetic field generated by the magnet 40. The sensor units H1,H2,H3 may, therefore, be configured to detect the proximity of the magnet 40 with respect thereto. The sensor units H1,H2,H3 may use a magnet field strength threshold such that the magnet field strength sensed by the sensor units H1,H2,H3 must be above the threshold in order for the sensor unit H1,H2,H3 to indicate the proximity of the magnet 40 thereto. In some embodiments, there may also be an upper threshold applied such that if the magnetic field strength is above the upper threshold then it may be determined, by the sensor units H1,H2,H3 (individually or collectively) that the magnetic field is from an external source and this may trigger a tamper alert.

[0192] The sensor units H1,H2,H3 are also configured

to detect a polarity of the magnet field (that is a polarity of the magnetic field which has been sensed or the sensed magnetic field) such that each sensor unit H1,H2,H3 is configured to determine which pole of the magnet 40 is in closest proximity to that sensor unit H1,H2,H3.

[0193] As will be appreciated from figures 13 and 15, the magnetic field polarity sensed at each sensor unit H1,H2,H3 will depend on the position of the magnet 40 along the magnet path (with the moveable panel 12 in the closed condition). Figure 14 shows the changes in the polarities for the arrangement of figure 13 and figure 16 shows the changes in polarity for the arrangement of figure 15.

[0194] Therefore, with reference to figures 15 and 16, with the moveable panel 12 in the open condition none of the sensor units H1,H2,H3 will detect a magnetic field (or any detected magnetic field may be below a required threshold as described). With the moveable panel 12 in the partially open condition, then the magnetic field strength sensed by the sensor 21 (e.g. the sensor units H1,H2,H3) may be between a lower strength threshold and above an upper strength threshold. Reference to the sensor 21 (e.g. the sensor units H1,H2,H3) not detecting a magnetic field may be references to the sensor 21 (e.g. the sensor units H1,H2,H3) not detecting a magnetic field above the lower strength threshold. When the moveable panel 12 is in the closed condition, then the sensed magnetic field strength (by the sensor 21 (e.g. any of the sensors H1,H2,H3)) may be above the upper strength threshold. Accordingly, the magnetic field strength may be used to determine the condition of the moveable panel 12. In some embodiments, the largest magnetic field strength sensed by the sensor 21 (e.g. any one of the sensors H1,H2,H3) is used for comparison with the aforementioned thresholds to determine the condition of the moveable panel 12. Not all embodiments need have the ability to determine the partially open condition of the moveable panel 12.

[0195] With the moveable panel 12 in the closed (or, in some embodiments, partially open) condition and the lock or latch mechanism 13 in the unlocked condition, the magnet 40 is to the first side of all three of the sensor units H1,H2,H3. The first sensor unit H1, in this embodiment, is closest to the magnet 40 and detects the proximity of the magnet 40 and that it is the north pole N of the magnet which is closest to the first sensor unit H1. The magnetic field at the second sensor unit H2 may be too low to be detected and/or may be below the threshold (as described). Likewise, the magnetic field at the third sensor unit H3 may be too low to be detected and/or may be below the threshold (as described). This is shown in the upper drawing of figure 15 and in the table of figure 16.

[0196] As the lock or latch mechanism 13 is actuated towards the locked condition, the magnet 40 travels along the magnet path to the interim position and this is depicted in the middle drawing of figure 15. In this position, both the first H1 and second H2 sensor units may detect

the proximity of the magnet 40, with the first sensor unit H1 detecting the proximity of the south pole S of the magnet 40 and the second sensor unit H2 detecting the proximity of the north pole N of the magnet 40. The third sensor H3 may also sense the proximity of the magnet 40 and the sensed pole will change depending on the precise position of the magnet 40 with respect to the third sensor H3. This is generally shown in the middle drawing of figure 15.

[0197] As the lock or latch mechanism 13 is actuated further towards the locked condition, the magnet 40 travels along the magnet path to the locked position and this is depicted in the bottom drawing of figure 15. In this position, the second H2 sensor unit may detect the proximity of the magnet 40, with the second sensor unit H2 detecting the proximity of the south pole S of the magnet 40. The magnetic field at the first sensor unit H1 may be too low to be detected and/or may be below the threshold (as described). Likewise, the magnetic field at the third sensor unit H3 may be too low to be detected and/or may be below the threshold (as described). This is generally shown in the bottom drawing of figure 15 and in figure 16.

[0198] The provision of an extra sensor unit, the third sensor unit H3, between the first and second sensor units H1,H2 (compared to WO2020234588) allows for greater resolution in the determining of the position of the magnet 40.

[0199] As with the arrangement in WO2020234588, the orientation of the magnet 40 with respect to the sensor 21 may not be known prior to installation. This may be because the orientation of the magnet 40 within the magnet housing 41 was not predefined at the time of securing the magnet 40 within the magnet housing 41 or may be because the magnet housing 41 can have different orientations (in some embodiments) when secured to the magnet attachment point 42 or may be because the magnet attachment point 42 may have been installed in two or more different orientations with respect to the location of the sensor 21, for example.

[0200] Accordingly, figures 13 and 14 consider the same arrangement of three sensor units H1,H2,H3 as discussed in relation to figures 15 and 16 but with the orientation of the magnet 40 reversed relative thereto. As in WO2020234588, from these figures it can be seen that the orientation of the magnet 40 can be determined by the controller 23, for example.

[0201] The controller 23 of the module 2 may be configured to receive information from the sensor 21 and this may be information from the or each sensor unit H1,H2,H3. This information may include an indication that a magnetic field has been detected, the polarity of the detected magnetic field, and/or the strength of the magnetic field. Thresholds are discussed above and these may be applied by the sensor 21 or by the controller 23 or both.

[0202] The controller 23 may be configured, therefore, to receive the information from the sensor 21 and to determine the current condition of the moveable panel 12

(i.e. open or closed or partially open) and the current condition of the lock or latch mechanism 13 (i.e. locked or unlocked or partially locked).

[0203] For a given relative orientation of the module 2 with respect to the magnet attachment point 43, for example, the controller 23 can determine the current condition of the moveable panel 12 and the lock or latch mechanism 13 irrespective of the orientation of the magnet 40. The detection of a magnetic field by the second sensor unit H2 indicates that the lock or latch mechanism 13 is locked (and the moveable panel 12 is closed or, in some embodiments, partially open). Likewise, the detection of a magnetic field by the first sensor unit H1 indicates that the lock or latch mechanism 13 is unlocked (and the moveable panel 12 is closed or, in some embodiments, partially open). If there is no magnetic field detected by either sensor unit H1,H2, then the moveable panel 12 is open.

[0204] If the lock or latch mechanism 13 is partially locked or latched then the sensed polarity at the two end sensor units H1,H2 can be used to determine this condition. With the third sensor unit H3, however, it is possible to determine the position of the sensor 21 (and hence the module 2) with respect to the magnet 40 to a greater accuracy (i.e. at a higher positional resolution) and this includes the partially locked or latched condition. The use of the third sensor unit H3 may also allow a magnet 40 of a lower strength to be used compared to the prior art.

[0205] The controller 23 may be configured to learn the relative orientation of the sensor 21 and the magnet 40 on first installation and may store this information as setup information on the computer readable medium 26, for example.

[0206] In particular, the controller 23, using the information received from the sensor 21, may detect the position of the magnet 40 relative to the sensor units H1,H2,H3 when the moveable panel 12 moves from the closed (or partially open) to the open condition. When this occurs, the lock or latch mechanism 13 is, by definition, in the unlocked condition. This may, therefore, enable the controller 23 to store the expected magnetic field polarity at the first or second sensor unit H1,H2,H3 with the lock or latch mechanism 13 in the unlocked condition. This also allows the controller 23 to determine (and store) the expected magnetic field polarity at the other of the sensor units H1,H2,H3 with the lock or latch mechanism 13 in the locked condition.

[0207] In some embodiments, the controller 23 may use the sensed magnetic field orientation at the sensor units H1,H2,H3 in the interim position to confirm (in part) the likely relative orientation of the sensor 21 and magnet 40 with respect to each other. This may be particularly useful as confirmation or an alternative learning step in embodiments in which the orientation of the either the magnet 40 with respect to the sensor 21 is fixed (but the positions of the sensor units H1,H2,H3 within the sensor 21 is not known) or the positions of the sensor units

H1 ,H2,H3 within the sensor 21 are known), for example.

[0208] If the controller 23 determines an unexpected change in the sensed magnetic fields, then the controller 23 may generate a tamper alert. An expected change may be the changes expected in the magnetic fields sensed when the lock or latch mechanism 13 is moved from the locked to the unlocked condition and/or the moveable panel 12 is opened or closed (or partially open).

[0209] An unexpected change may be a magnetic field detected at any of the sensor units H1,H2,H3 which is not of an expected magnetic polarity and/or magnetic field strength (e.g. too high). So, for example, if an external magnet is brought close to the sensor 21 then the magnetic field may be higher than expected or the polarity of the magnetic field sensed at any one sensor unit H1,H2,H3 may not fit with what is expected for the different conditions of the lock or latch mechanism 13. For example, if all of the sensor units H1,H2,H3 detect a magnetic field of the same polarity, then this is likely the result of an external magnet being used to tamper with the operation of the module 2. If the field strength is higher at any of the sensor units H1,H2,H3 than normally sensed as a result of the magnet 40, then this may also be an indication of the presence of an external magnet. The controller 23 may be configured to require the unexpected magnetic field to be sensed for a predetermined period of time before a tamper alert is generated and this may help to prevent false alarms. In some embodiments, the tamper alert may be triggered when there are more than a predetermined number of trigger events (each being a sensed unexpected magnetic field) within the predetermined time period - which may be the result of someone moving an external magnet relative to the module 2.

[0210] Figure 17 shows various sequences of conditions which may trigger a tamper alert (the "valid" indication is an indication that a tamper alert has not been issued). In this table, "unsecure" means closed but unlocked, "partlysecure" means closed and partially locked, and "secure" means closed and locked. In some embodiments, closed - in relation to this figure - also includes partially open.

[0211] A tamper alert may also or alternatively be generated by the controller 23 if the sensed magnetic fields indicate that the moveable panel 12 has moved to the open condition from the closed condition, with the sensed magnetic fields indicating that the lock or latch mechanism 13 has not changed from the locked to the unlocked condition, for example.

[0212] A tamper alert may also be triggered by a detected vibration of the module 2. This vibration may be a vibration above a predetermined magnitude for a predetermined period of time, and/or may be vibration within a predetermined frequency range, and/or may be vibration which is of a predetermined vibration profile (determined to be indicative of tampering, for example). The module 2 may detect vibration in a number of different manners. For example, the sensor 21 (e.g. the sensors

H1,H2,H3 or any one thereof) may be used to detect changes in the magnetic field strength (which may be changes above the frequency and/or magnitude of changes typically encountered through, for example, the action of weather on the moveable panel 12). In some embodiments, the module 2 may include a vibration sensor 21a which may be a Piezoelectric sensor, for example.

[0213] On the generation of a tamper alert, the controller 23 may cause the communications subsystem 24 to deliver the alert to a hub 24a - from which a user may be notified (via their computing device, for example).

[0214] As will be appreciated, the flexibility provided by the different orientations of the magnet 40 and sensor 21, along with the automatic alignment of the floating module 2 enable the same module 2 to be used in a wide variety of applications and simplifies the installation process - particularly if being installed by a consumer user.

[0215] As will be understood, in some embodiments, there are at least two sensor units H1,H2 provided as part of the sensor 21 and there may be three sensor units H1,H2,H3. With the moveable panel 12 in the closed condition (or partially open), the magnet 40 is located (which may also mean that the magnet housing 41 and magnet attachment point 42 are similarly located) such that it is moveable from a first side of the sensor units H1,H2,H3 to a second side of the sensor units H1,H2,H3 depending on the condition (i.e. locked or unlocked) of the lock or latch mechanism 13. The movement of the magnet 40 is along the magnet path and this may take the magnet 40 past one of the sensor units H1,H2 to an interim position prior to reaching each end of the magnet path during use. In some embodiments, there is a single (i.e. one and only one) magnet 40 which moves along this magnet path and only one magnet 40 (i.e. the same one and only one magnet 40) which is sensed by the sensor units H1,H2,H3 in normal operation (e.g. when there is no tampering or external magnet). The magnet 40 may be oriented such that an axis through its north N and south S poles (e.g. the magnetic axis of the magnet 40) is aligned with the magnet path. For the avoidance of doubt, the magnet path is defined herein with the moveable panel 12 in its closed condition (movement of the moveable panel 12 to the open condition will move the magnet 40 in such embodiments) off the magnet path.

[0216] As will be appreciated, an attachment system according to embodiments may include the securing member 3 and/or the module 2.

[0217] Embodiments may include the window or door 1 to which the securing member 3 has been fitted. Embodiments may include the window or door 1 to which the securing member 3 and module 2 have been fitted. Embodiments may include the window or door 1 with or without the magnet attachment location 43, and/or with or without the magnet 40.

[0218] Embodiments may include the frame 11 to which the securing member 3 has been fitted. Embodiments may include the frame 11 to which the securing

member 3 and module 2 have been fitted. Embodiments may include the frame member 111 to which the securing member 3 has been fitted. Embodiments may include the frame member 111 to which the securing member 3 and module 2 have been fitted.

[0219] Embodiments may include a method of fitting the securing member 3 to the frame member 111 and/or frame 11 and/or door or window 1. Embodiments may include a method of fitting the module 2 to the securing member 3. Embodiments may include a method of replacing the module 2 with a different module 2 on the securing member 3.

[0220] Embodiments may include the learning process discussed herein.

[0221] In some embodiments, the alignment slot 201a may have two open ends and this may permit the entry into the slot 201a of the engagement pin 43 through either open end. This, coupled with the use of the sensor 21 as described may allow the same module 2 to be used for multiple different door and window 1 configurations (e.g. irrespective of whether a door/window hinge is on the left or right, top or bottom - i.e. the module 2 is "non-handed"). The same securing member 3 may be similarly non-handed.

[0222] In some embodiments, the controller 23 is able to determine if the lock or latch mechanism 13 is in the partially locked condition. This may be important as, for some lock or latch mechanisms 13, it may be relatively easy to leave the mechanism 13 in such a partially locked condition and visual inspection may be difficult (or may the locked and partially locked conditions may be easily confused on visual inspection). In some prior art systems, a partially locked condition may be indicated as a locked condition erroneously, for example and so some embodiments seek to avoid this incorrect determining of the condition of the lock or latch mechanism 13.

[0223] The ability to determine a partially locked condition is aided, in some embodiments, by the more accurate alignment of the module 2 with respect to the magnet 40. In some prior art systems the sensitivity of any sensor had to be such that it would take into account poor tolerances and changes in alignment over time. This could make a difficult to determine, with any reliability, the difference between a locked and a partially locked condition. This may be especially true of systems only using two sensor units (noting that some embodiments herein may use only two sensor units even though an example with three sensor units is also described).

[0224] In some embodiments, the partially locked, locked, or unlocked condition (and/or, for the avoidance of doubt, the condition of the moveable panel 12) as determined by the module 2 is transmitted to the hub 24a and may be communicated to the yet another device and/or the computing device used by the user.

[0225] As used herein the condition (or configuration) of the door or window 1 includes the condition (or configuration) of the panel 12 and/or the lock or latch member 13. The condition of the door or window 1 may, therefore,

include: locked, latched, unlocked, unlatched, open, partially open, closed, partially locked, and partially latched. As will be understood, the condition may be open and any of locked, latched, unlocked, unlatched, partially locked, and partially latched. Likewise, the condition may be closed (or partially closed) and any of locked, latched, unlocked, unlatched, open, closed, partially locked, and partially latched.

[0226] When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

[0227] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

[0228] Although certain example embodiments of the invention have been described, the scope of the appended claims is not intended to be limited solely to these embodiments. The claims are to be construed literally, purposively, and/or to encompass equivalents.

ASPECTS

[0229]

1. A door or window including:

a frame member and a moveable panel, the moveable panel being moveable between open and closed conditions with respect to the frame member; and

a system configured to determine a condition of the door or window, the system including:

a module including a sensor;
an engagement member and a sensed element, the sensed element being configured to be sensed by the sensor to determine the condition of the door or window, and the sensed element and engagement member being mounted to one of the frame member or the moveable panel; and

a securing member to which the module is mounted in one of a plurality of fixed positions, the securing member being mounted to the other of the frame member and moveable panel, wherein the module includes at least one abutment surface configured to be engaged by the engagement member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is

changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.

2. A door or window according to aspect 1, wherein the module includes a holding portion and the securing member includes an engaging portion, the holding portion and engaging portion being configured to engage or abut to hold the module in any of the plurality of fixed positions with respect to the securing member.

3. A door or window according to aspect 2, wherein the holding portion includes at least one protrusion and the engaging portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

4. A door or window according to aspect 2, wherein the engaging portion includes at least one protrusion and the holding portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

5. A door or window according to any of aspects 2 to 4, wherein the holding portion and the engaging portion each include a plurality of inter-engaging protrusions and recesses defining the plurality of fixed positions.

6. A door or window according to any of aspects 2 to 5, wherein the module includes a pin with a shaft and a head, the securing member includes an aperture configured to receive at least the head of the pin, the head includes the holding portion and the engaging portion is provided within the aperture, such that the holding and engaging portions engage each other when the head is received by the aperture.

7. A door or window according to aspect 6, wherein the aperture has a narrow part along which the head may pass as the module moves with respect to the securing member during the alignment process, the narrow part preventing movement of the head out of the aperture.

8. A door or window according to any preceding aspect, wherein a plurality of fixed positions is a plurality of discrete fixed positions.

9. A door or window according to any preceding aspect, wherein the holding portion includes an engagement magnet and the securing member includes a further magnet or magnetic metal member, such that the holding portion and securing member

may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.

10. A door or window according to any preceding aspect, wherein the securing member includes a magnet and the holding portion includes an engagement magnet or magnetic metal element, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.

11. A door or window according to any preceding aspect, wherein the at least one abutment surface includes two abutment surfaces which oppose each other to define an alignment slot configured to receive the engagement member in the alignment operation.

12. A door or window according to aspect 11, wherein the alignment slot is tapered such that a width of the alignment slot narrows along a length of the alignment slot.

13. A door or window according to aspect 11 or 12, wherein engagement of the engagement member with a first of the two abutment surfaces is configured to move the module in a first direction with respect to the securing member and engagement of the engagement member with a second of the two abutment surfaces is configured to move the module in a second direction with respect to the securing member, the first and second directions being opposite directions.

14. A door or window according to any preceding aspect, wherein movement of the module with respect to the securing member is restricted to linear movement.

15. A door or window according to any preceding aspect, wherein the module is configured to determine the condition of the door or window and the condition includes: open, closed, locked, unlocked, and partially locked.

16. A door or window according to any preceding aspect, wherein the at least one abutment surface is configured to be engaged by the engagement member during the alignment process when the door or window moves from an open condition to a closed condition and/or when the door or window moves from an unlocked to a locked condition.

17. A door or window according to any preceding aspect, wherein the engagement member is a substantially cylindrical pin.

18. A module and a securing member combination, the module being configured for use in determining a condition of a door or window, wherein:

the securing member is mountable to a frame member or moveable panel of a door or window; the module includes a sensor configured to sense a sensed element in order to determine the condition of the door or window and the module is configured to be mounted to the securing member in one of a plurality of fixed positions; and the module includes at least one abutment surface configured to be engaged by an engagement member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.

19. A combination according to aspect 18, wherein the module includes a holding portion and the securing member includes an engaging portion, the holding portion and engaging portion being configured to engage or abut to hold the module in any of the plurality of fixed positions with respect to the securing member.

20. A combination according to aspect 19, wherein the holding portion includes at least one protrusion and the engaging portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

21. A combination according to aspect 19, wherein the engagement portion includes at least one protrusion and the holding portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.

22. A combination according to any of aspects 19 to 21, wherein the holding portion and the engagement portion each include a plurality of inter-engaging protrusions and recesses defining the plurality of fixed positions.

23. A combination according to any of aspects 19 to 22, wherein the module includes a pin with a shaft and a head, the securing member includes an aperture configured to receive at least the head of the pin, the head includes the holding portion and the engaging portion is provided within the aperture, such that the holding and engaging portions engage each other when the head is received by the aper-

ture.

24. A combination according to aspect 23, wherein the aperture has a narrow part along which the head may pass as the module moves with respect to the securing member during the alignment process, the narrow part preventing movement of the head out of the aperture. 5

25. A combination according to any of aspects 18 to 24, wherein a plurality of fixed positions is a plurality of discrete fixed positions. 10

26. A combination according to any of aspects 18 to 25, wherein the holding portion includes an engagement magnet and the securing member includes a further magnet or magnetic metal member, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member. 15 20

27. A combination according to any of aspects 18 to 26, wherein the securing member includes a magnet and the holding portion includes an engagement magnet or magnetic metal element, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member. 25 30

28. A combination according to any of aspects 18 to 27, wherein the at least one abutment surface includes two abutment surfaces which oppose each other to define an alignment slot configured to receive the engagement member in the alignment operation. 35

29. A combination according to aspect 28, wherein the alignment slot is tapered such that a width of the alignment slot narrows along a length of the alignment slot. 40

30. A combination according to aspect 28 or 29, wherein engagement of the engagement member with a first of the two abutment surfaces is configured to move the module in a first direction with respect to the securing member and engagement of the engagement member with a second of the two abutment surfaces is configured to move the module in a second direction with respect to the securing member, the first and second directions being opposite directions. 45 50

31. A combination according to any of aspects 18 to 30, wherein movement of the module with respect to the securing member is restricted to linear movement. 55

32. A combination according to any of aspects 18 to 31, wherein the module is configured to determine the condition of the door or window and the condition includes: open, closed, locked, unlocked, and partially locked.

33. A combination according to any of aspects 18 to 32, wherein the at least one abutment surface is configured to be engaged by the engagement member during the alignment process when the door or window moves from an open condition to a closed condition and/or when the door or window moves from an unlocked to a locked condition.

34. A method of aligning a sensor with a magnet, the method including:

providing the module and securing member combination according to any of aspects 18 to 33;

providing the engagement member; and
changing the condition of the door or window to bring the engagement member into engagement with the at least one abutment surface to move the module with respect to the securing member towards alignment with the magnet.

35. A module for use in a module and securing member combination according to any of aspects 18 to 33.

36. A securing member for use in a module and securing member combination according to any of aspects 18 to 33.

Claims

1. A door or window including:

a frame member and a moveable panel, the moveable panel being moveable between open and closed conditions with respect to the frame member; and

a system configured to determine a condition of the door or window, the system including:

a module including a sensor;
an engagement member and a sensed element, the sensed element being configured to be sensed by the sensor to determine the condition of the door or window, and the sensed element and engagement member being mounted to one of the frame member or the moveable panel; and
a securing member to which the module is mounted in one of a plurality of fixed positions, the securing member being mounted to the other of the frame member and move-

- able panel, wherein the module includes at least one abutment surface configured to be engaged by the engagement member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.
2. A door or window according to claim 1, wherein the module includes a holding portion and the securing member includes an engaging portion, the holding portion and engaging portion being configured to engage or abut to hold the module in any of the plurality of fixed positions with respect to the securing member.
 3. A door or window according to claim 2, wherein:
 - the holding portion includes at least one protrusion and the engaging portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion; OR
 - the engaging portion includes at least one protrusion and the holding portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.
 4. A door or window according to claim 2 or 3, wherein the holding portion and the engaging portion each include a plurality of inter-engaging protrusions and recesses defining the plurality of fixed positions.
 5. A door or window according to any of claims 2 to 4, wherein the module includes a pin with a shaft and a head, the securing member includes an aperture configured to receive at least the head of the pin, the head includes the holding portion and the engaging portion is provided within the aperture, such that the holding and engaging portions engage each other when the head is received by the aperture, and optionally wherein the aperture has a narrow part along which the head may pass as the module moves with respect to the securing member during the alignment process, the narrow part preventing movement of the head out of the aperture.
 6. A door or window according to any preceding claim,
 - wherein a plurality of fixed positions is a plurality of discrete fixed positions; and/or
 - wherein the holding portion includes an engagement magnet and the securing member includes a further magnet or magnetic metal member,
- such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member; and/or wherein the securing member includes a magnet and the holding portion includes an engagement magnet or magnetic metal element, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member; and/or wherein the at least one abutment surface includes two abutment surfaces which oppose each other to define an alignment slot configured to receive the engagement member in the alignment operation, and optionally wherein the alignment slot is tapered such that a width of the alignment slot narrows along a length of the alignment slot, and optionally wherein engagement of the engagement member with a first of the two abutment surfaces is configured to move the module in a first direction with respect to the securing member and engagement of the engagement member with a second of the two abutment surfaces is configured to move the module in a second direction with respect to the securing member, the first and second directions being opposite directions.
7. A door or window according to any preceding claim, wherein:
 - movement of the module with respect to the securing member is restricted to linear movement; and/or
 - the module is configured to determine the condition of the door or window and the condition includes: open, closed, locked, unlocked, and partially locked; and/or
 - the at least one abutment surface is configured to be engaged by the engagement member during the alignment process when the door or window moves from an open condition to a closed condition and/or when the door or window moves from an unlocked to a locked condition; and/or
 - the engagement member is a substantially cylindrical pin.
 8. A module and a securing member combination, the module being configured for use in determining a condition of a door or window, wherein:
 - the securing member is mountable to a frame member or moveable panel of a door or window; the module includes a sensor configured to sense a sensed element in order to determine the condition of the door or window and the mod-

- ule is configured to be mounted to the securing member in one of a plurality of fixed positions; and
the module includes at least one abutment surface configured to be engaged by an engagement member to move the module to another of the plurality of fixed positions in an alignment process when the condition of the door or window is changed, so as to bring the sensor and the sensed element towards alignment for subsequent use in determining the condition of the door or window.
9. A combination according to claim 8, wherein the module includes a holding portion and the securing member includes an engaging portion, the holding portion and engaging portion being configured to engage or abut to hold the module in any of the plurality of fixed positions with respect to the securing member.
10. A combination according to claim 9, wherein:
- the holding portion includes at least one protrusion and the engaging portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion; OR
the engagement portion includes at least one protrusion and the holding portion includes a plurality of recesses defining the plurality of fixed positions and each configured to receive the at least one protrusion.
11. A combination according to claim 9 or 10, wherein the holding portion and the engagement portion each include a plurality of inter-engaging protrusions and recesses defining the plurality of fixed positions.
12. A combination according to any of claims 9 to 11, wherein the module includes a pin with a shaft and a head, the securing member includes an aperture configured to receive at least the head of the pin, the head includes the holding portion and the engaging portion is provided within the aperture, such that the holding and engaging portions engage each other when the head is received by the aperture, and optionally wherein the aperture has a narrow part along which the head may pass as the module moves with respect to the securing member during the alignment process, the narrow part preventing movement of the head out of the aperture.
13. A combination according to any of claims 8 to 12, wherein:
- a plurality of fixed positions is a plurality of discrete fixed positions; and/or
- the holding portion includes an engagement magnet and the securing member includes a further magnet or magnetic metal member, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member; and/or
the securing member includes a magnet and the holding portion includes an engagement magnet or magnetic metal element, such that the holding portion and securing member may held in any of the plurality of fixed positions by magnetic attraction between the holding portion and the securing member.
14. A combination according to any of claims 8 to 13, wherein the at least one abutment surface includes two abutment surfaces which oppose each other to define an alignment slot configured to receive the engagement member in the alignment operation, and optionally wherein the alignment slot is tapered such that a width of the alignment slot narrows along a length of the alignment slot, and optionally wherein engagement of the engagement member with a first of the two abutment surfaces is configured to move the module in a first direction with respect to the securing member and engagement of the engagement member with a second of the two abutment surfaces is configured to move the module in a second direction with respect to the securing member, the first and second directions being opposite directions, and optionally wherein:
- movement of the module with respect to the securing member is restricted to linear movement; and/or
the module is configured to determine the condition of the door or window and the condition includes: open, closed, locked, unlocked, and partially locked; and/or
the at least one abutment surface is configured to be engaged by the engagement member during the alignment process when the door or window moves from an open condition to a closed condition and/or when the door or window moves from an unlocked to a locked condition.
15. A method of aligning a sensor with a magnet, the method including:
- providing the module and securing member combination according to any of claims 8 to 14; providing the engagement member; and changing the condition of the door or window to bring the engagement member into engagement with the at least one abutment surface to move the module with respect to the securing member towards alignment with the magnet.

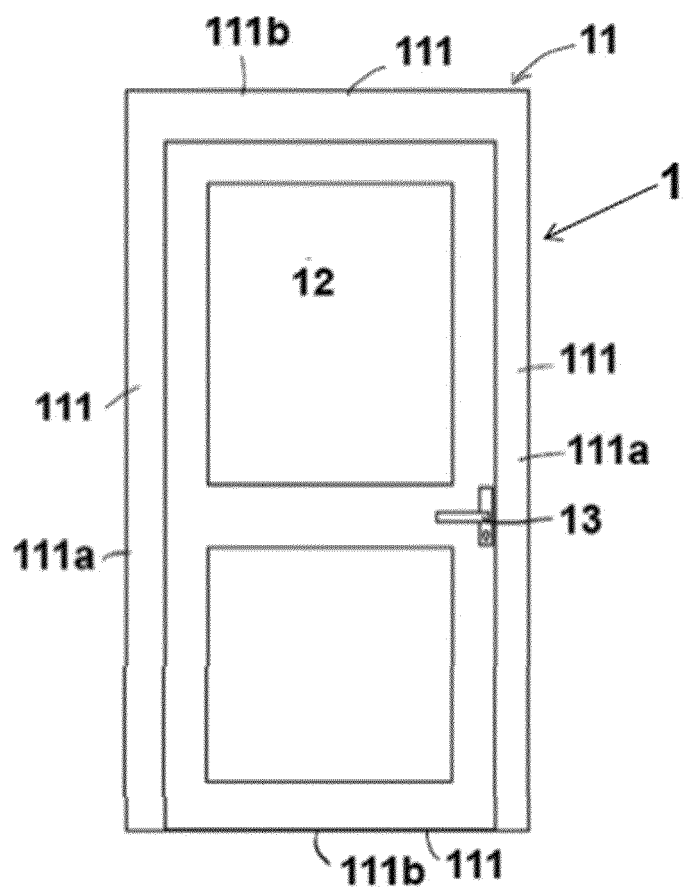


Figure 1a

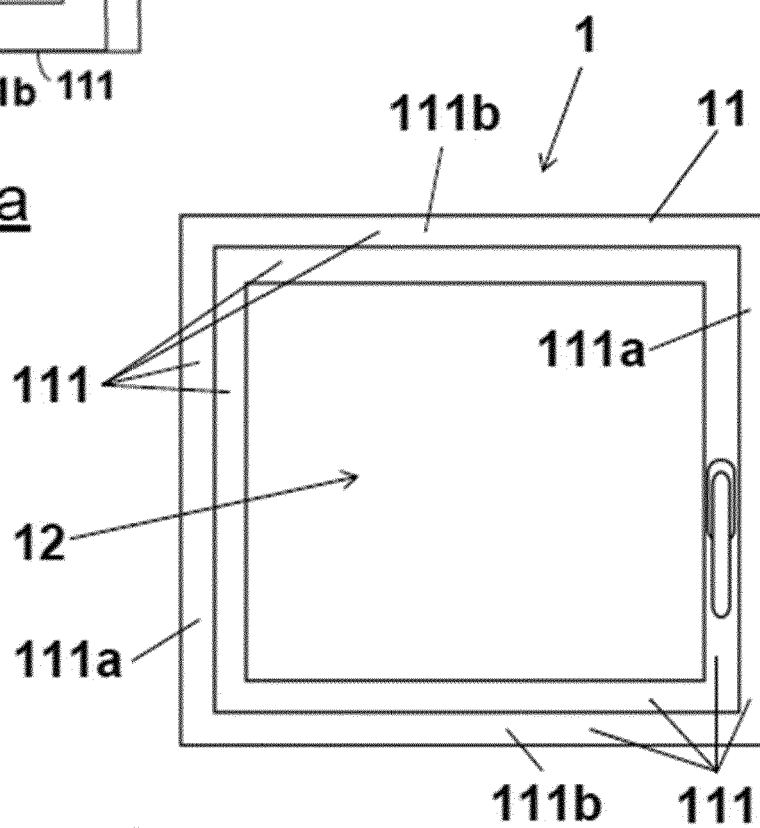


Figure 1b

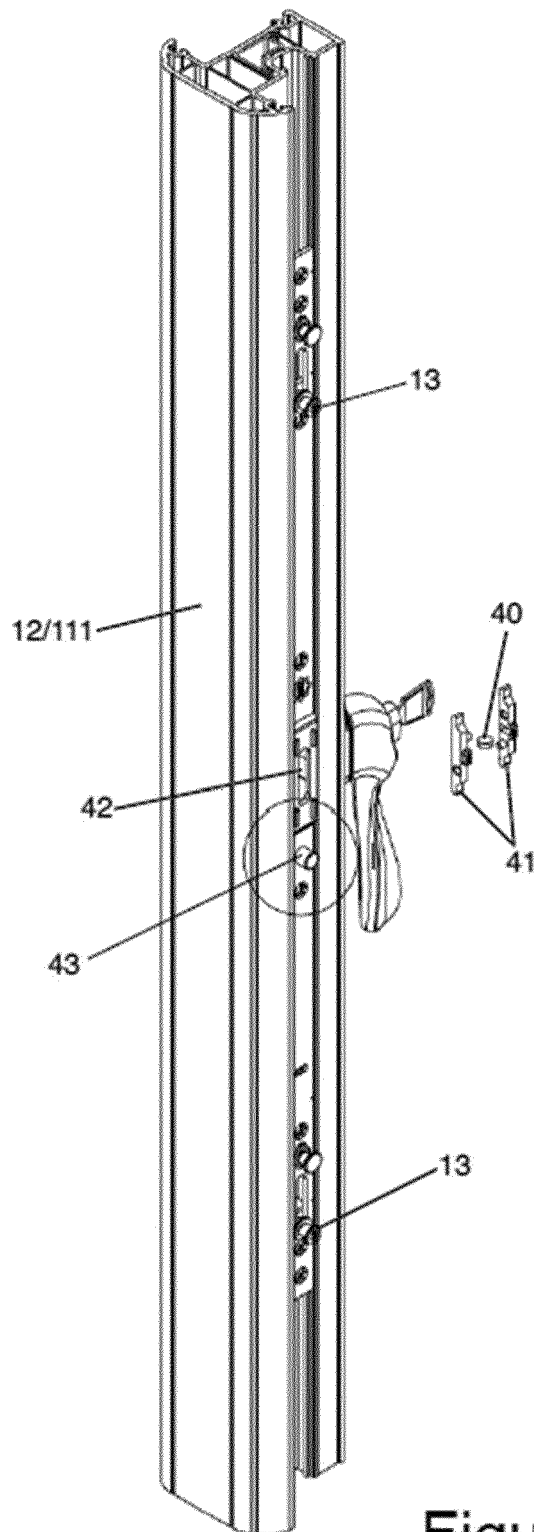


Figure 2

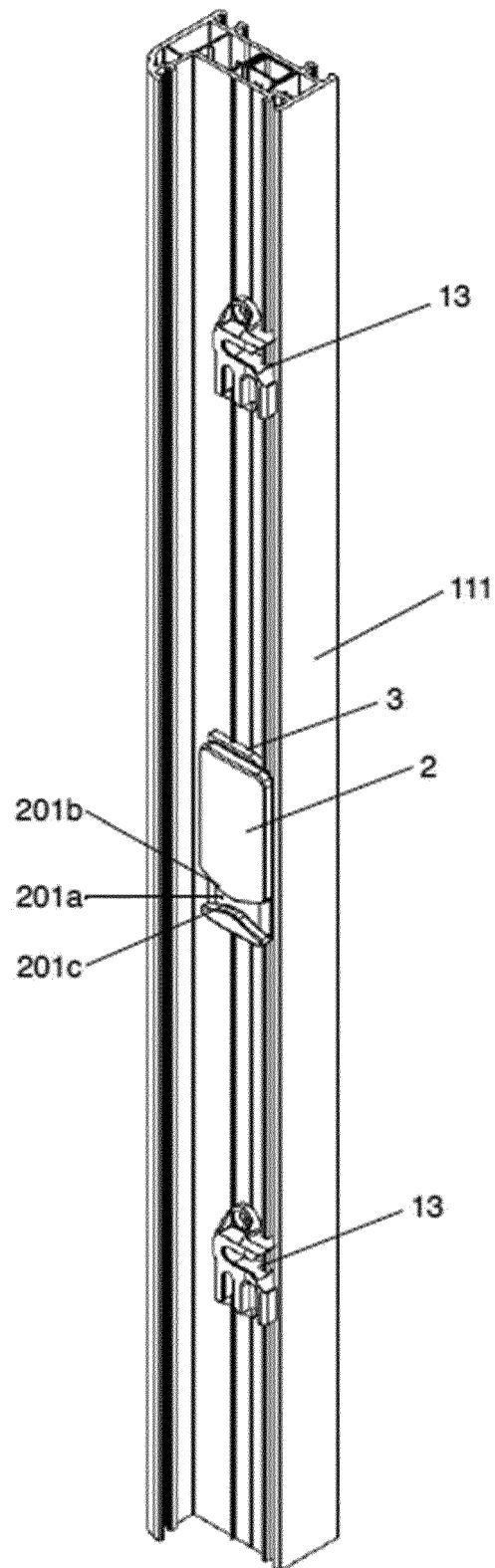


Figure 3

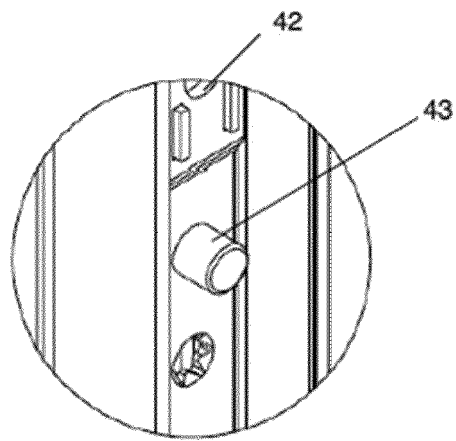


Figure 4

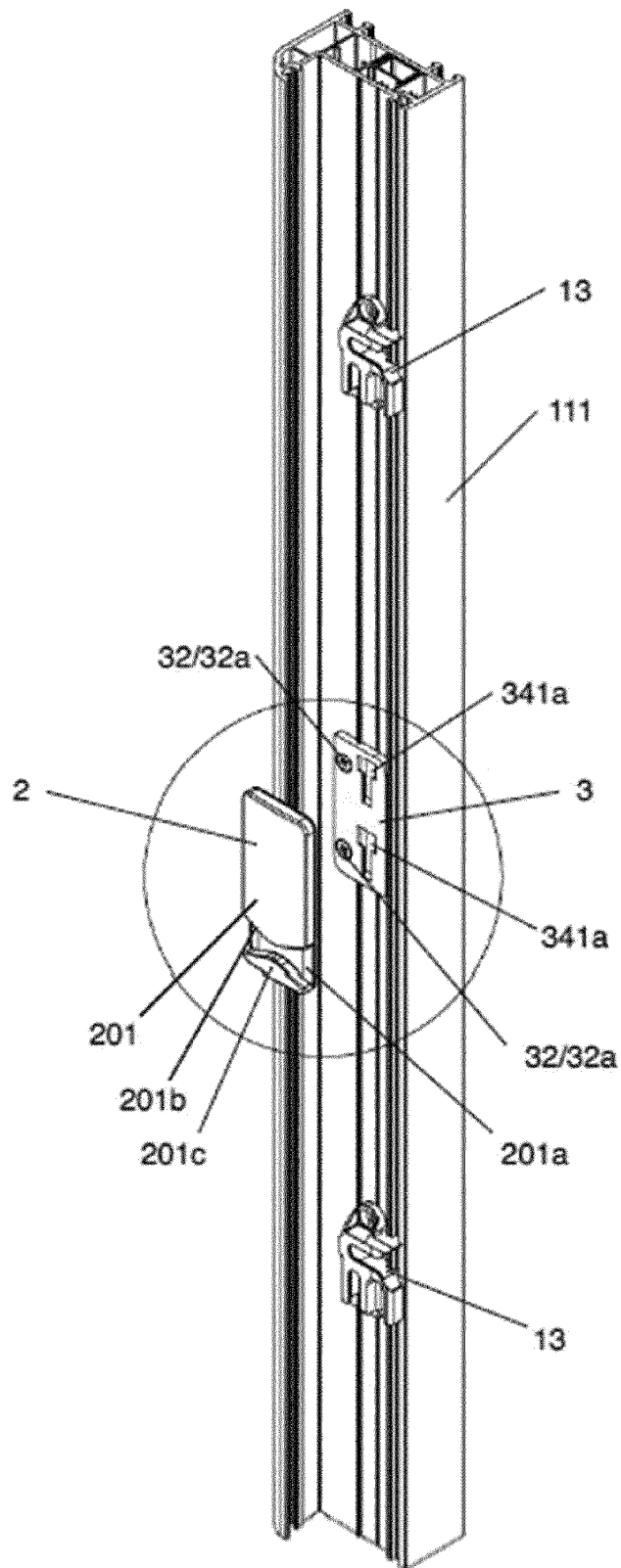


Figure 5

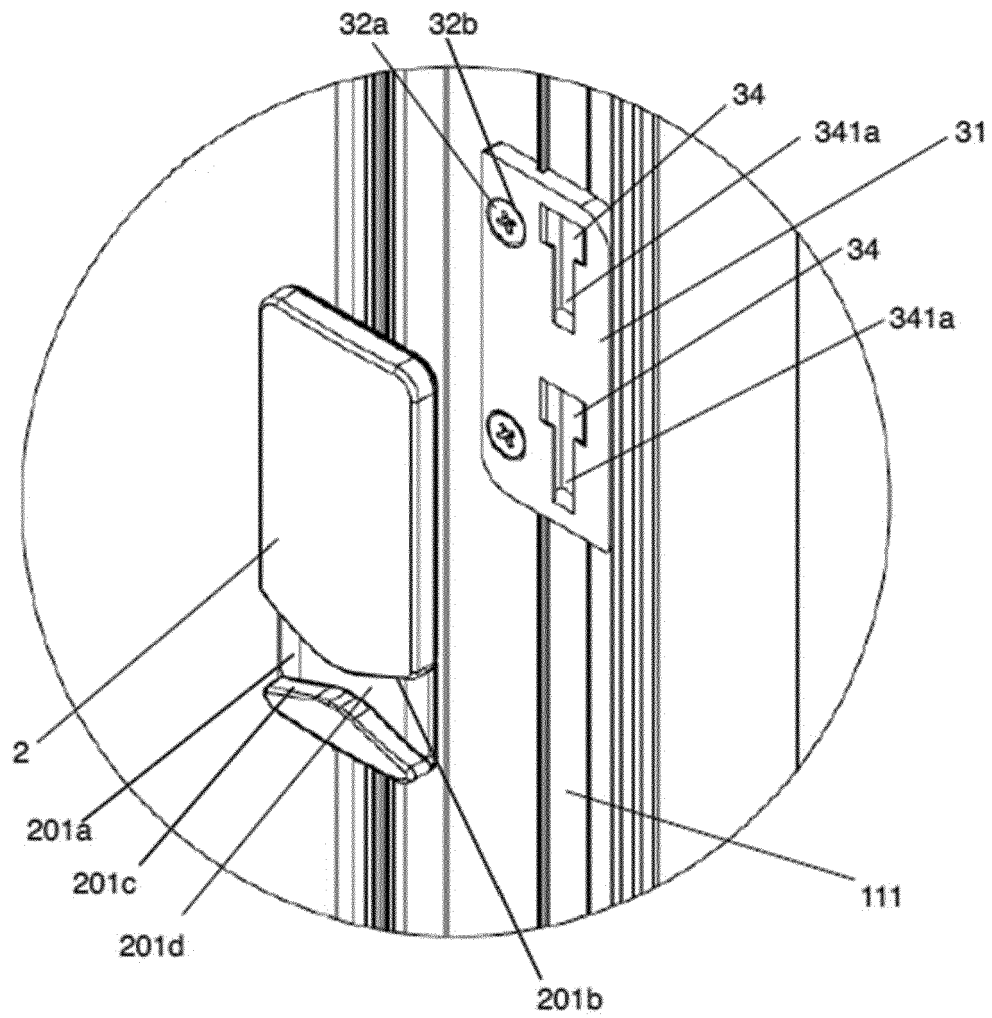
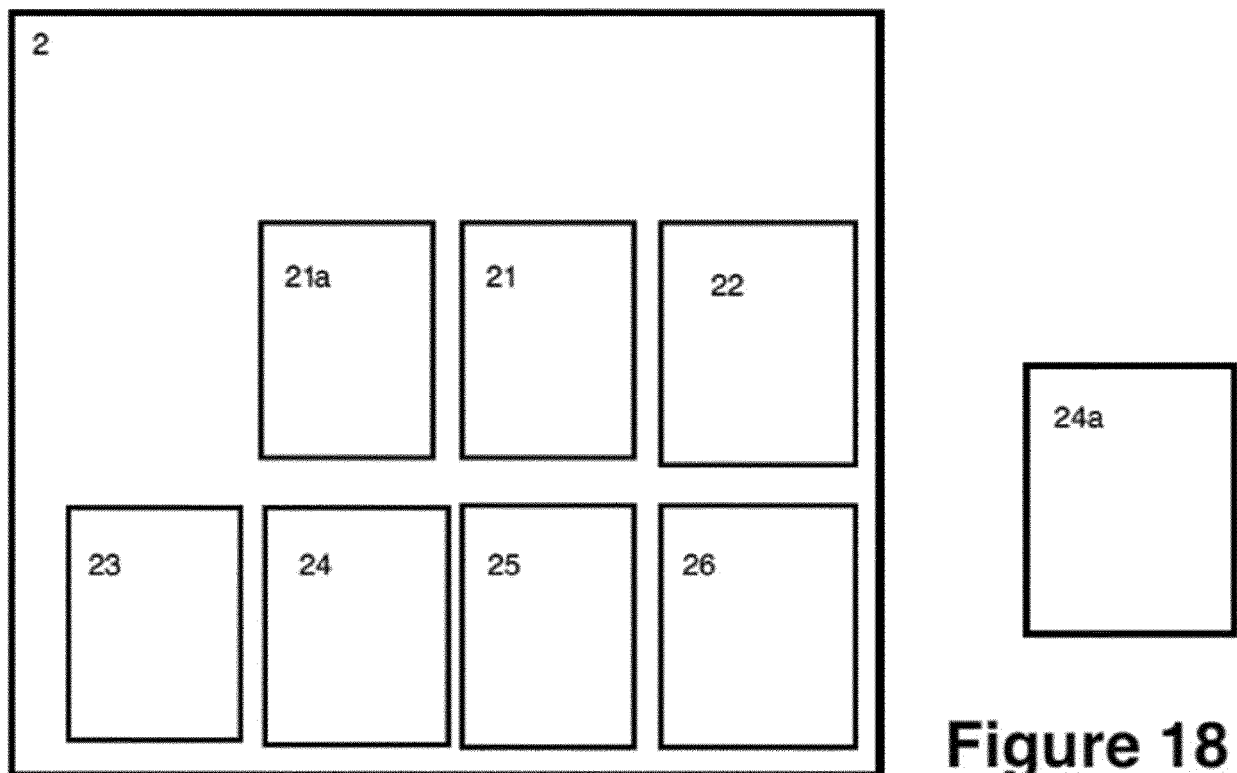
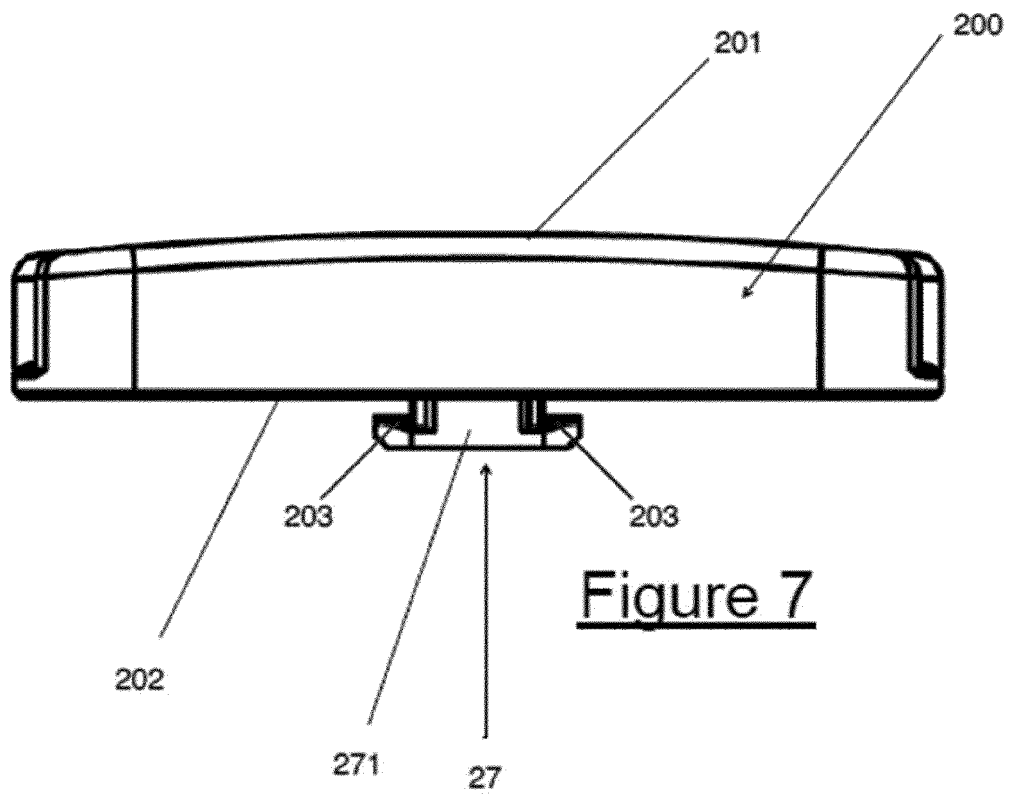


Figure 6



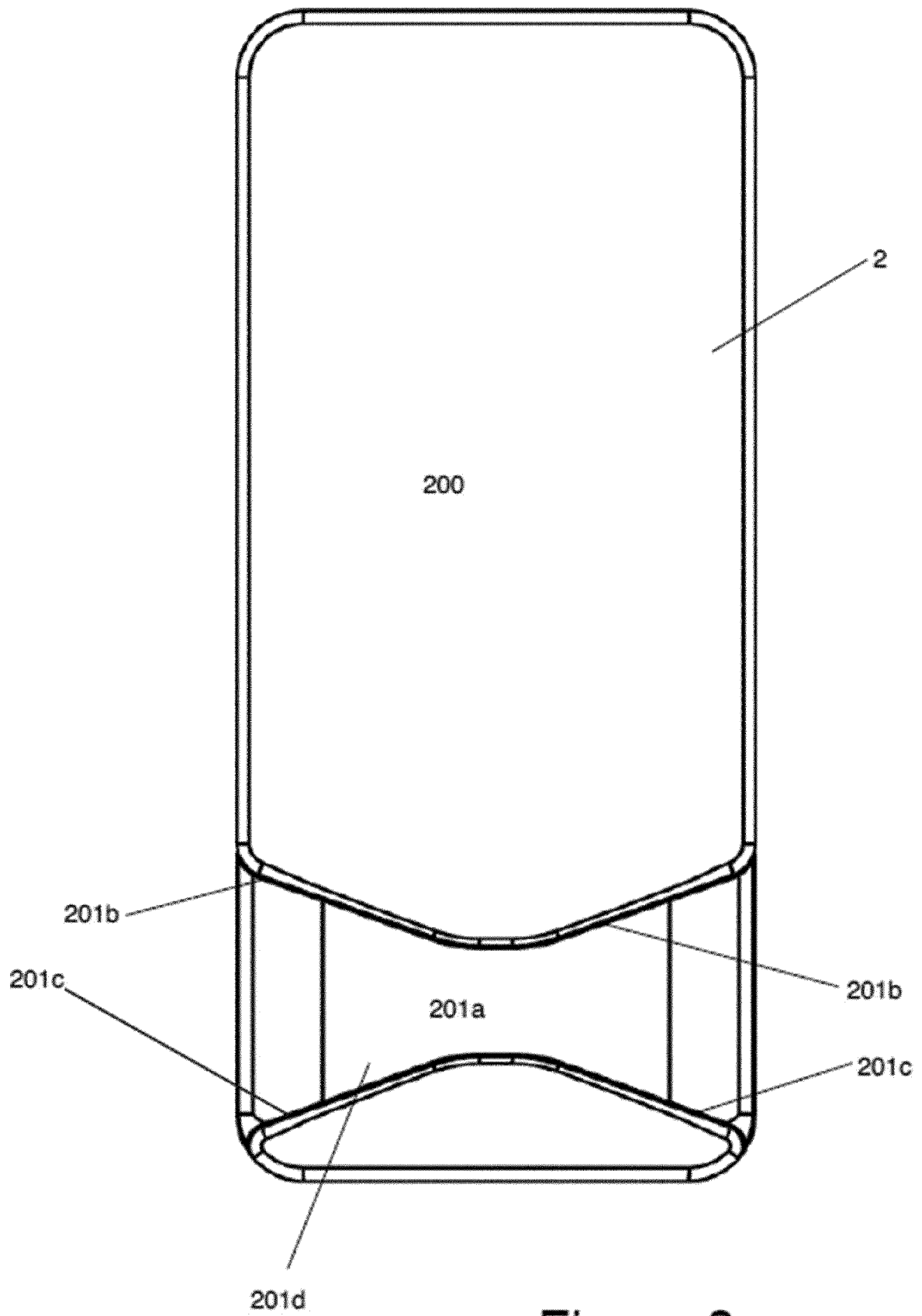


Figure 8

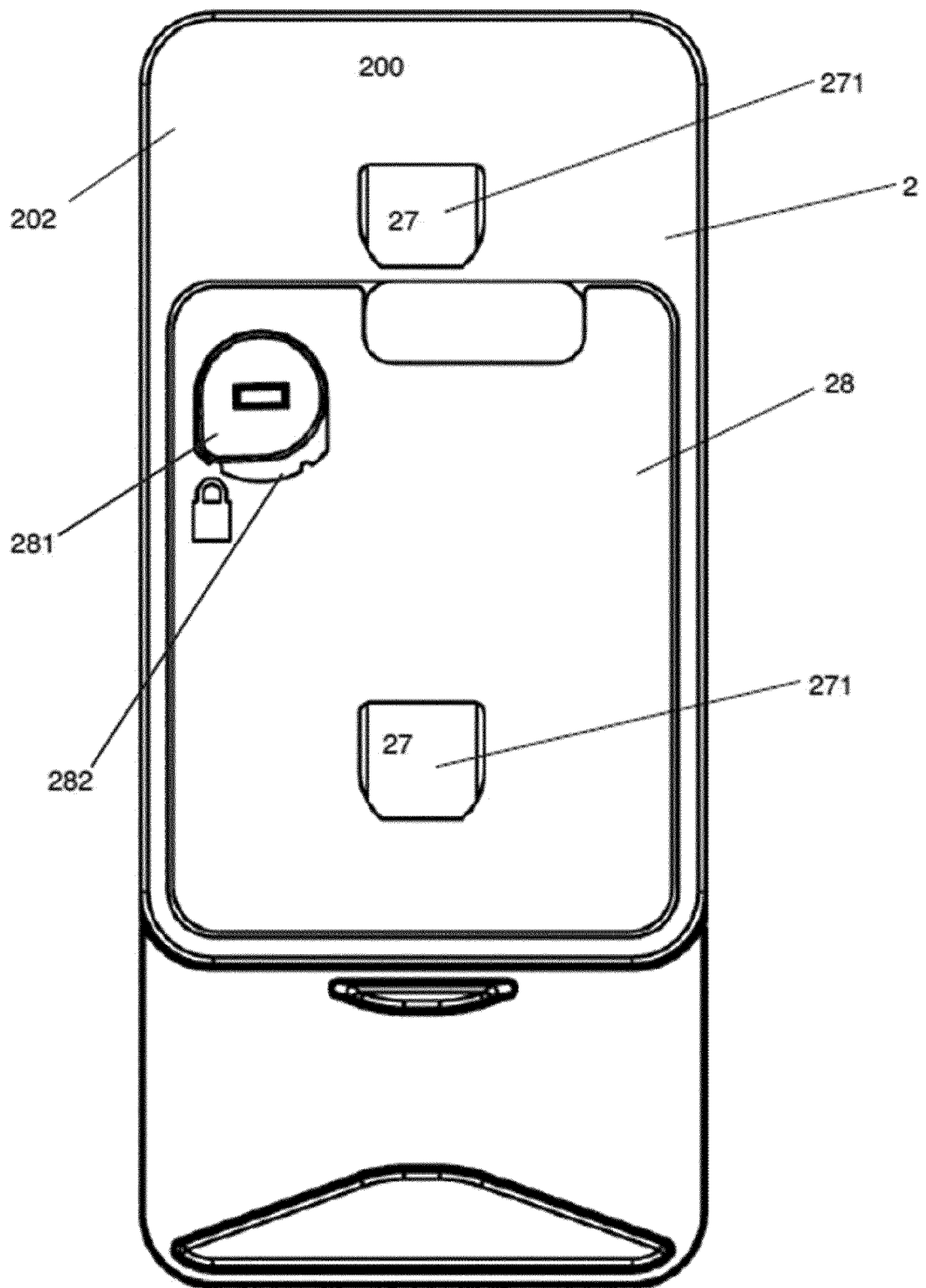


Figure 9

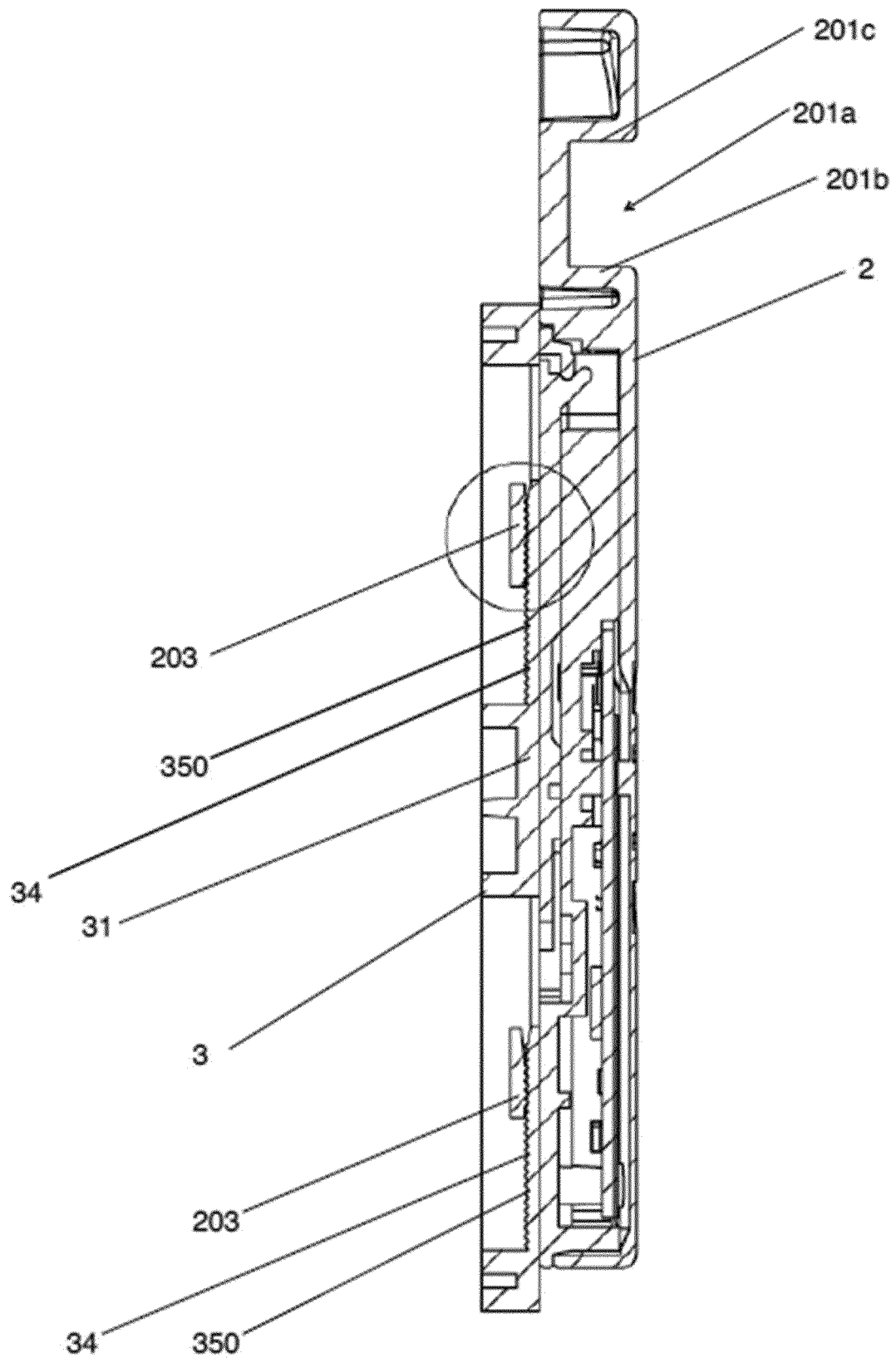
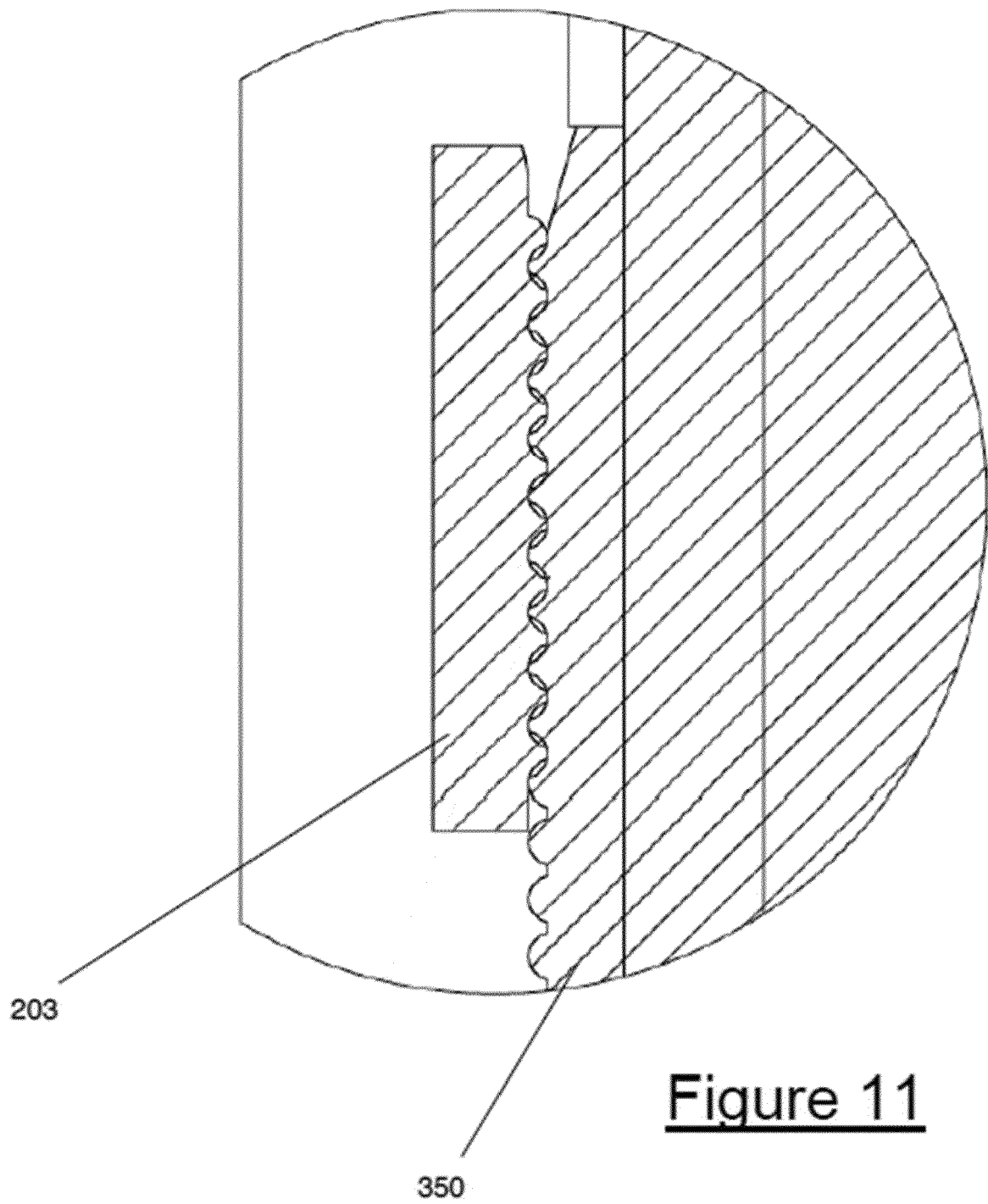


Figure 10



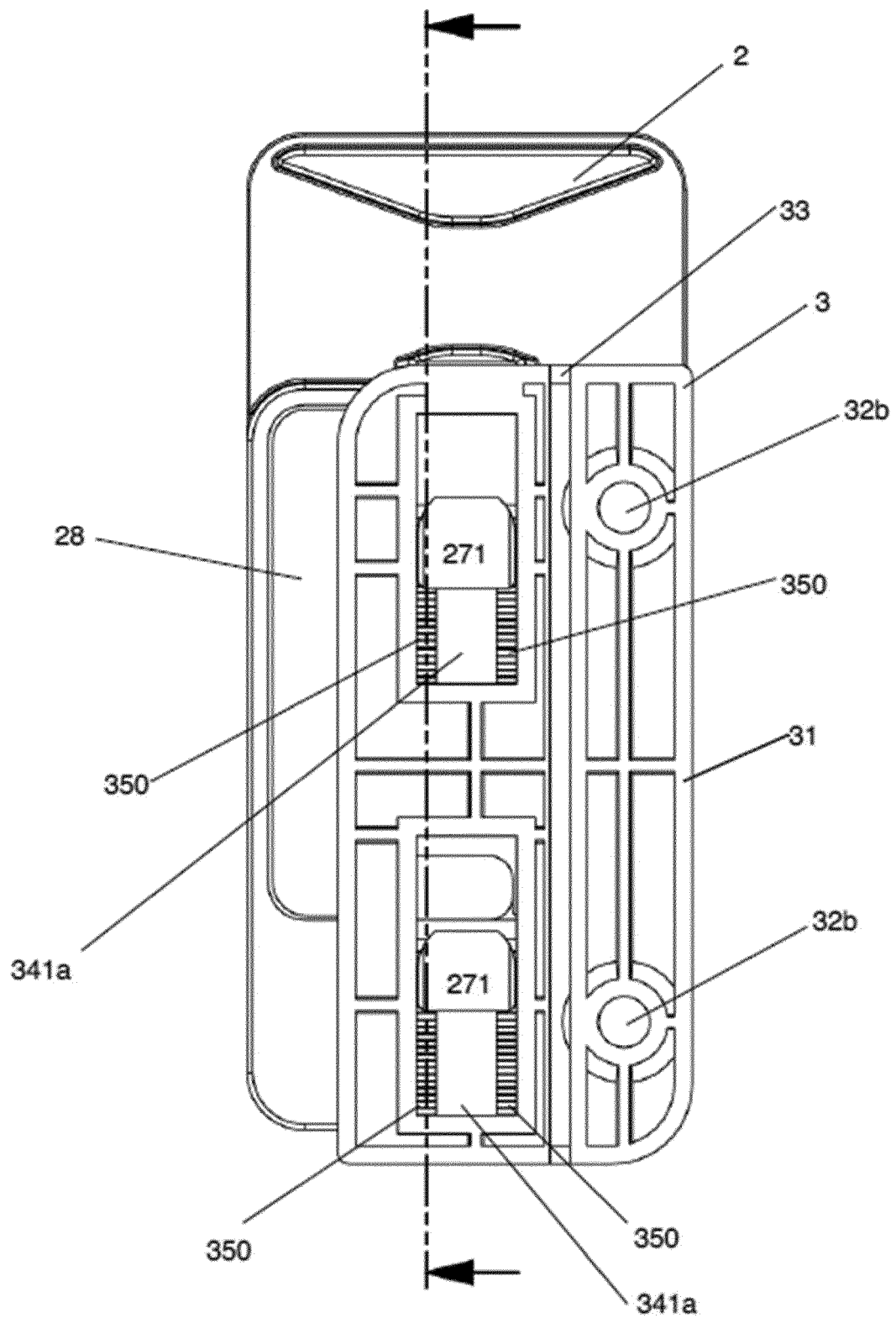


Figure 12

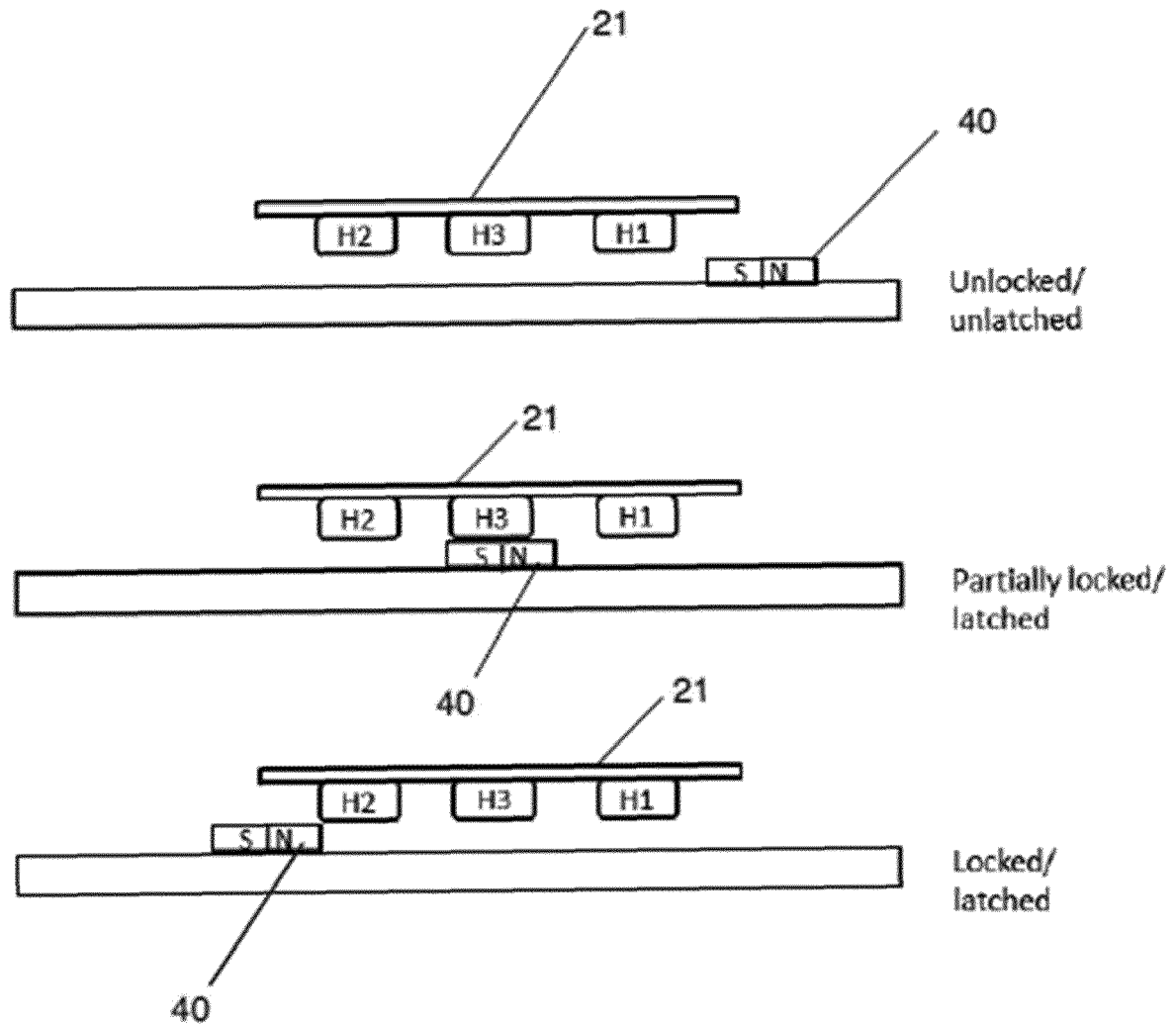


Figure 13

HS2	HS3	HS1	Condition
None	None	None	Open
None	None	S	Unlocked/ unlatched
None	S	S	
None	S	N	Partially locked/ Latched
None	N	N	
S	N	N	
S	N	None	
N	N	None	Locked/ latched
N	None	None	

Figure 14

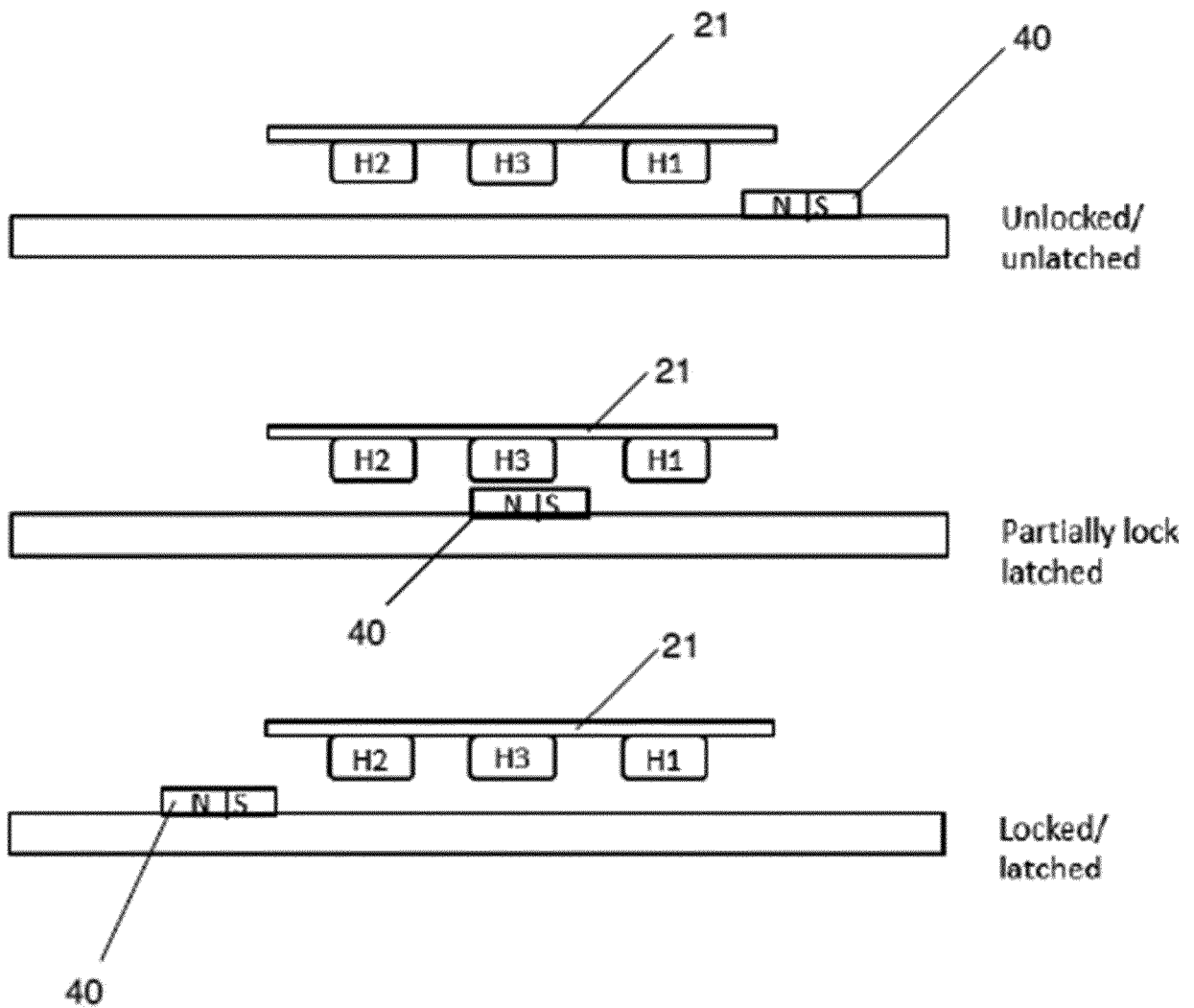


Figure 15

HS2	HS3	HS1	Condition
None	None	None	Open
None	None	N	Unlocked/ unlatched
None	N	N	
None	N	S	Partially locked/ Latched
None	S	S	
N	S	S	
N	S	None	
S	S	None	Locked/ latched
S	None	None	

Figure 16

Current Condition	Next Condition	Result
Open	Unlocked	Valid
	Partially locked	Valid
	Locked	Tamper
Unsecure	Open	Valid
	Partially locked	Valid
	Locked	Valid
PartlySecure	Open	Valid
	Unsecure	Valid
	Locked	Valid
Secure	Open	Tamper
	Partially locked	Valid
	Unlocked	Valid

Figure 17

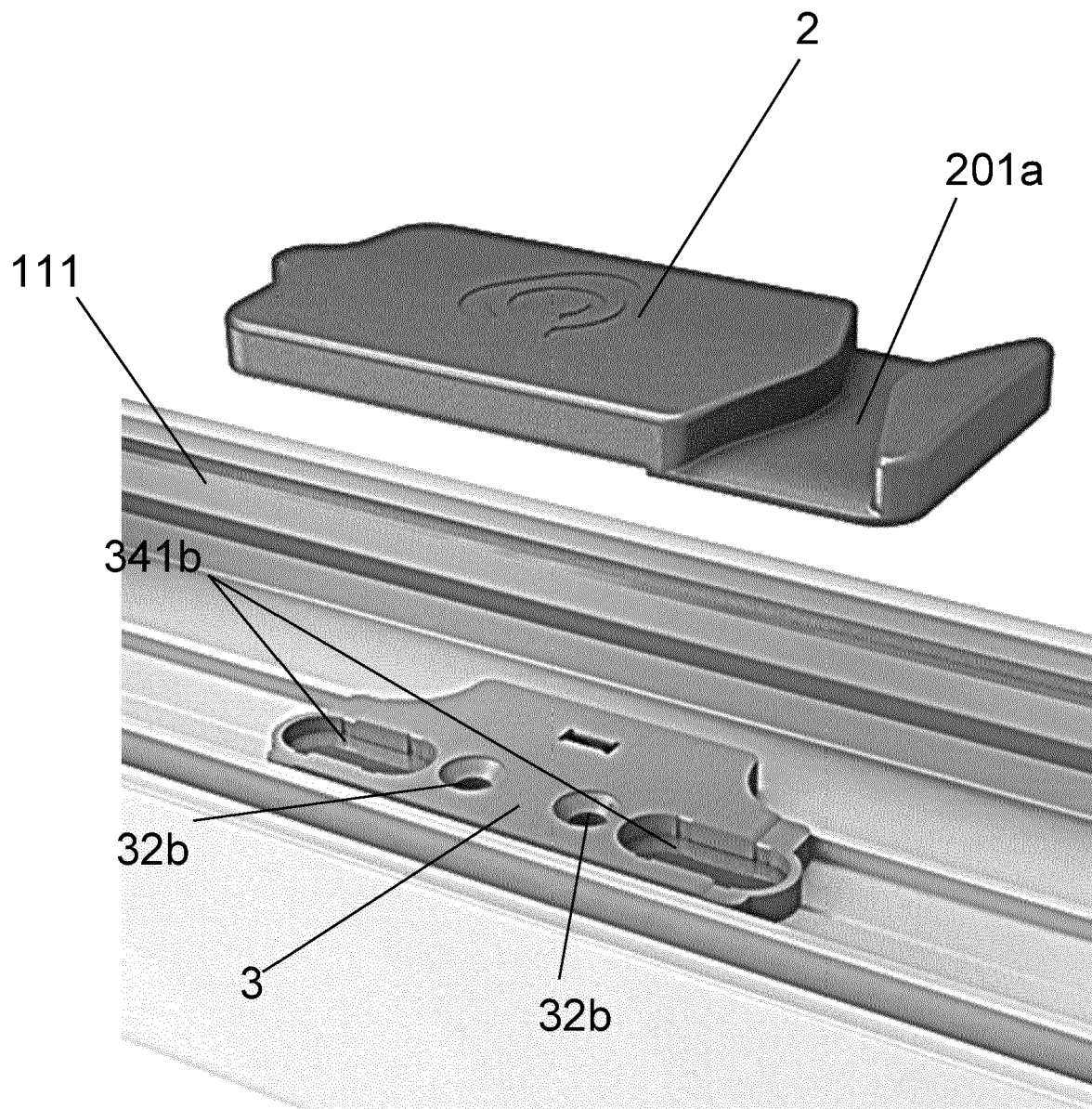


Figure 19

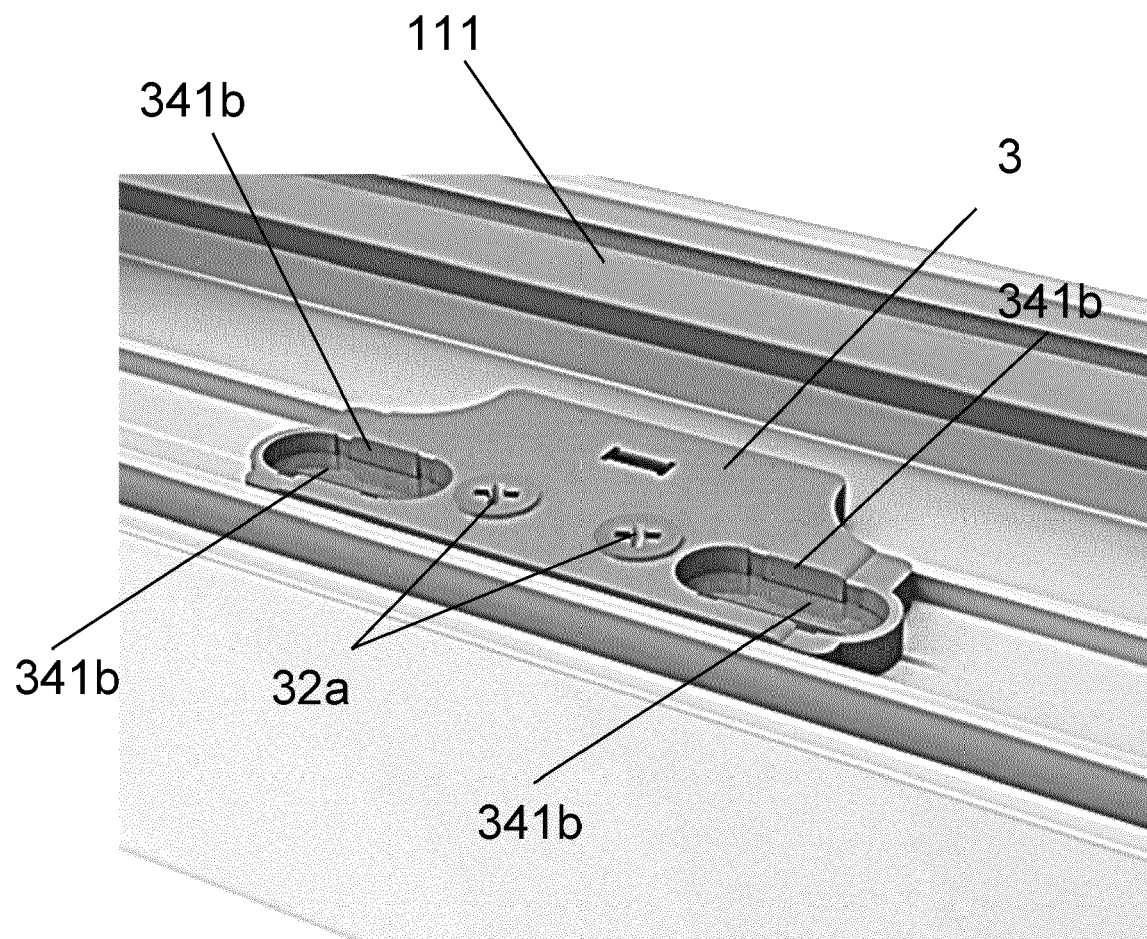


Figure 20

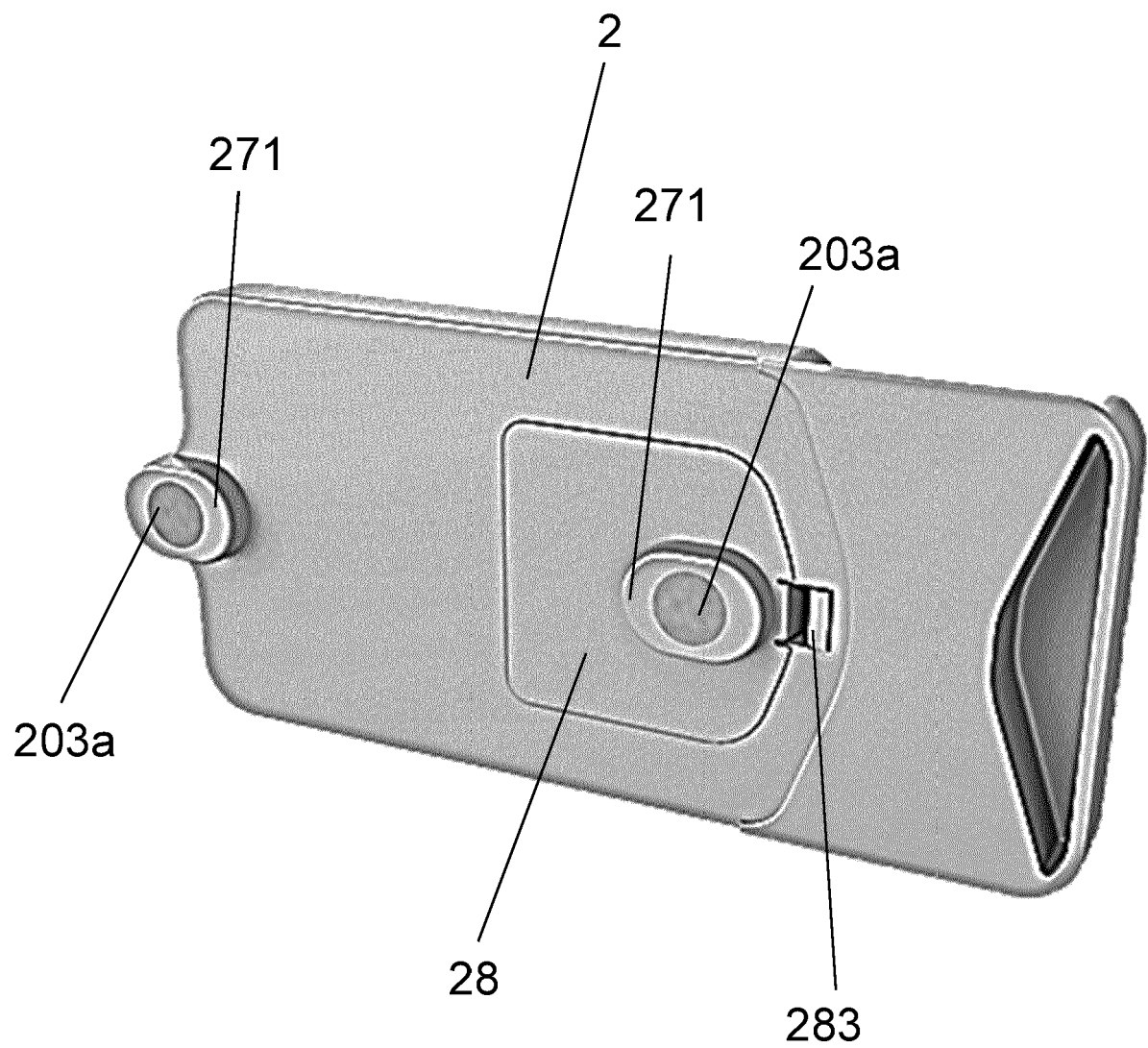


Figure 21

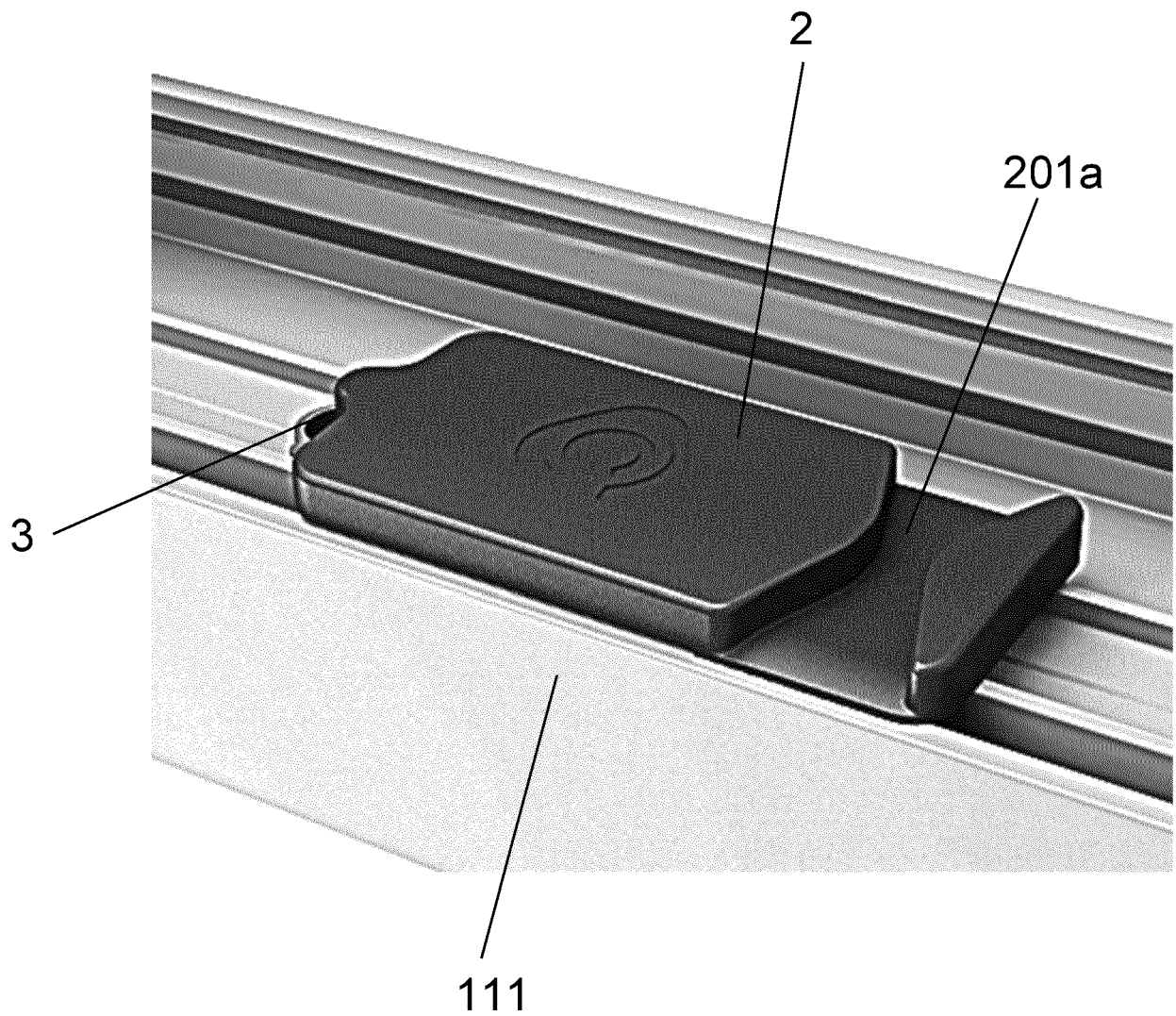


Figure 22

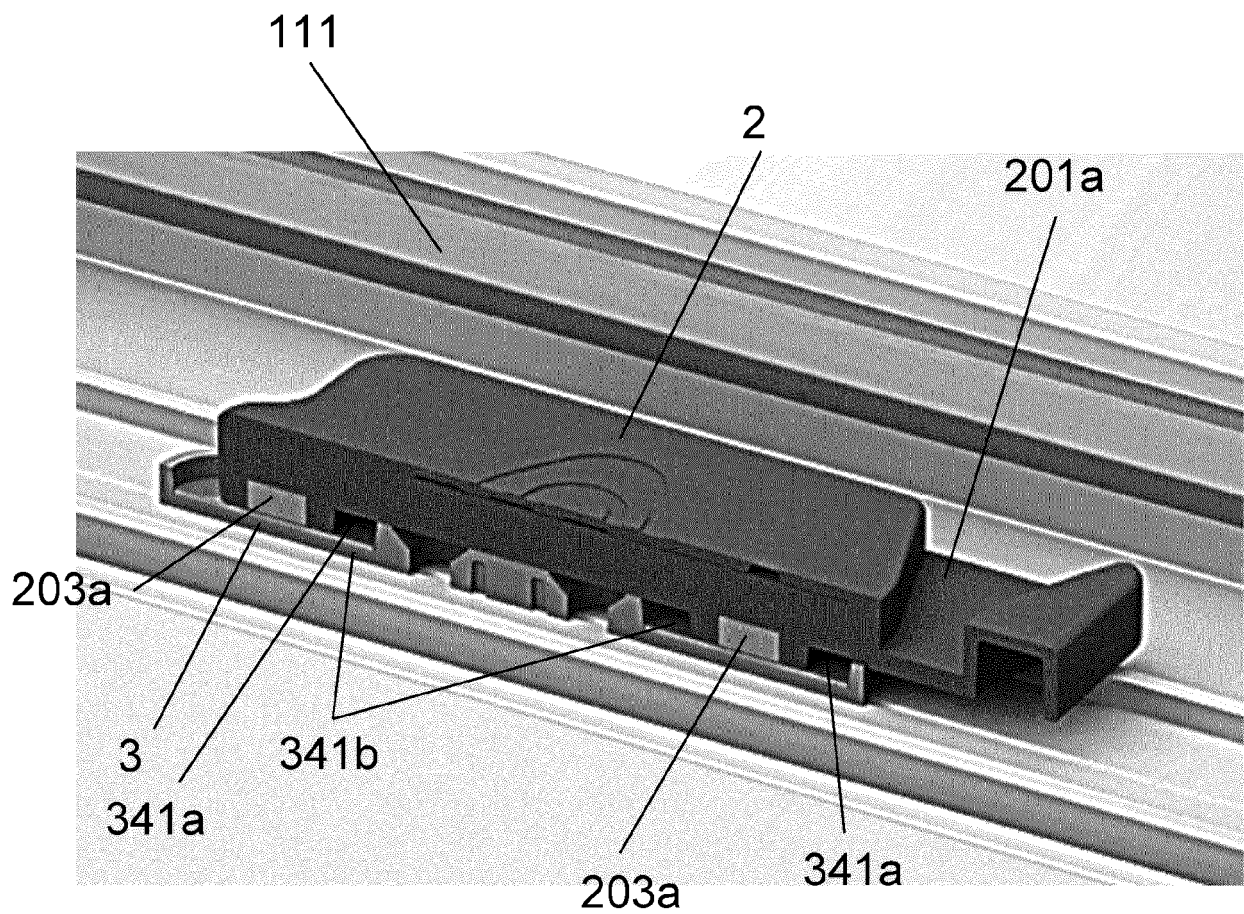


Figure 23

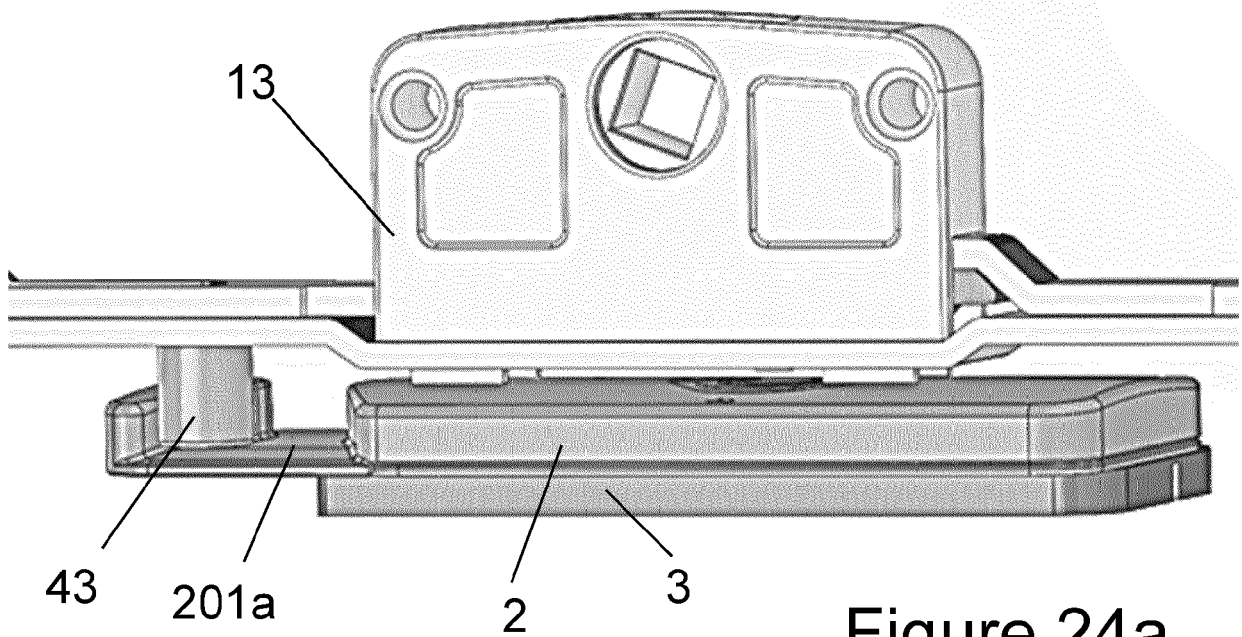


Figure 24a

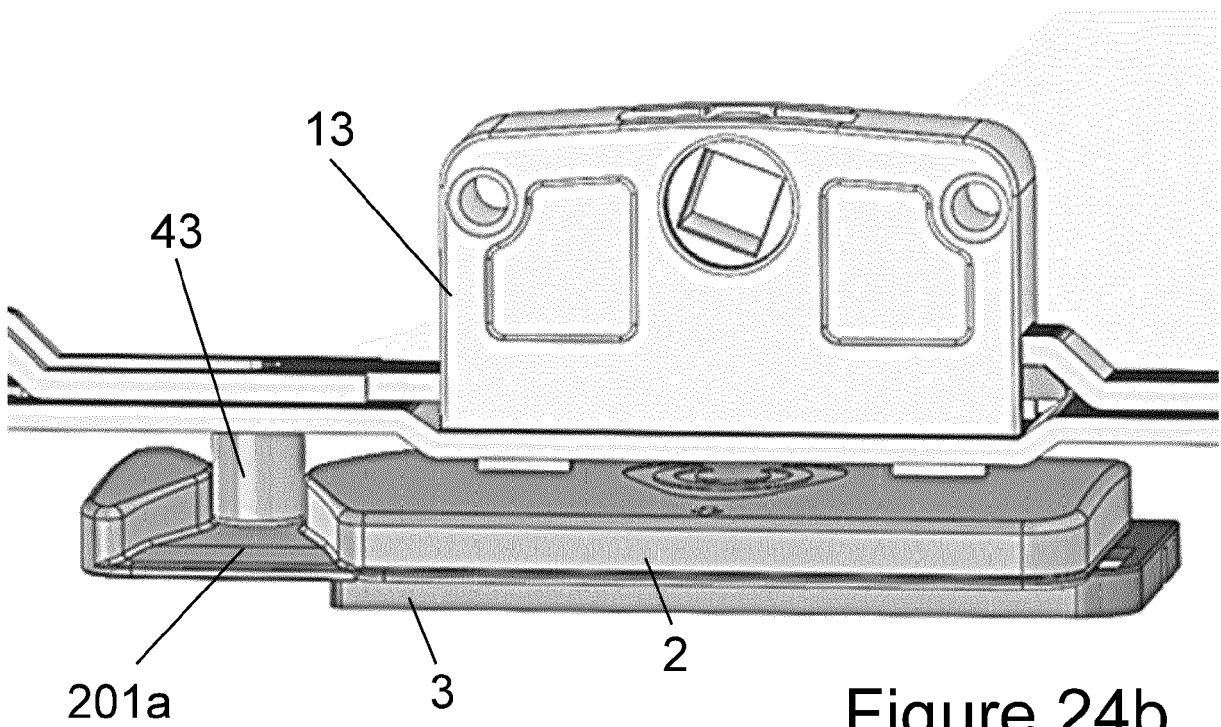


Figure 24b



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 1692

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2019/234110 A1 (LAPORTA GIOVANNI [GB]) 1 August 2019 (2019-08-01) * abstract; figure 27 * * paragraph [0330] - paragraph [0332] * -----	1-15	INV. G08B13/08 E05B39/00 E05B45/06
A,D	WO 2020/234588 A2 (AVANTIS HARDWARE LTD [GB]) 26 November 2020 (2020-11-26) * abstract; claim 1; figures 1-14, 28-30, 39 * * page 8 - page 10 * * page 28, line 33 - page 29, line 2 * * page 31, line 21 - line 29 * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			G08B E05C E05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 June 2022	Examiner Bilard, Stéphane
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 15 1692

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-06-2022

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