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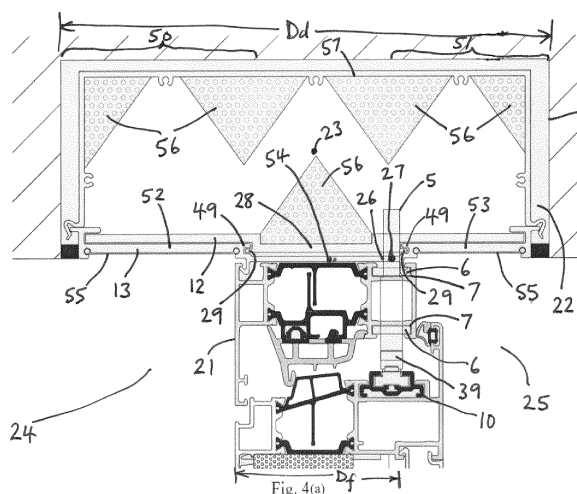
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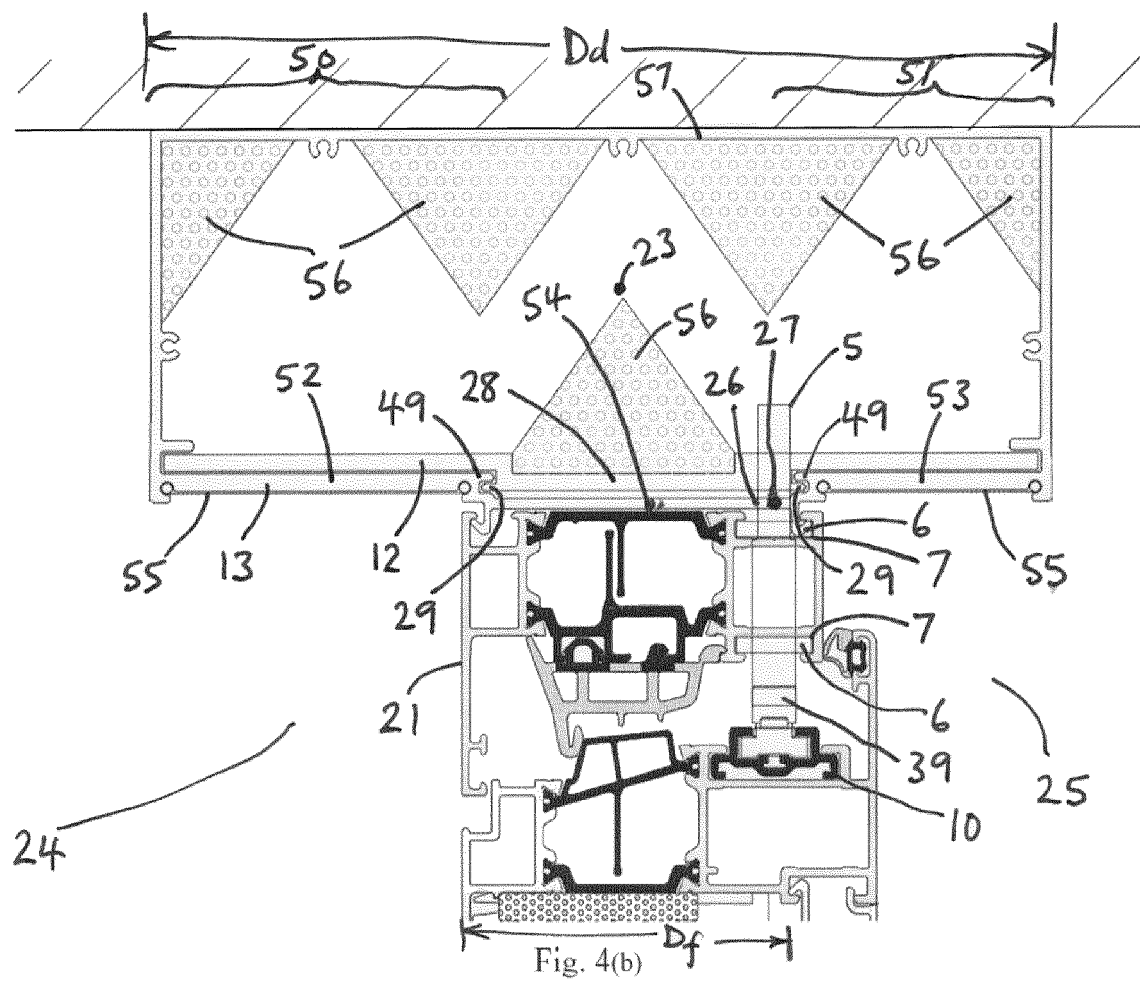
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(54) **VENTILATION DEVICE AND WINDOW OR DOOR INCORPORATING SAME**

(57) In one aspect, a ventilation device is configured to be installed at a peripheral mounting surface of a frame, at a mounting surface in said frame or at a mounting surface in a sash of the window or door from which an actuation member projects, the actuation member being connected via a linkage mechanism to a locking mechanism and then the manually-operable handle of the window or door. The ventilation device comprises a hollow body portion having an engagement surface configured to abut, in use, the mounting surface and a first ventilation member (e.g. grill-type) fixed to or integral with the hollow body portion. A second ventilation member (e.g. sliding grill-type, or rotatable flaps) is disposed adjacent the first ventilation member, the second ventilation member being movable relative to the first ventilation member and being coupled to, and/or configured to be acted upon by, in use, the actuation member, and an actuation aperture is provided in the body portion relative to which, the actuation member is movable, in use. In operation, the second ventilation member is configured to be movable, under the action of the actuation member, between a first position, in which airflow between an exterior side of the window or door and an interior side thereof via the body portion is blocked, and a second position in which said airflow is enabled and maximised, wherein the first ventilation member and the second ventilation member are substantially planar.. The device may be in the form of, e.g., a wall-integrated device or an add-on profile of the frame. The actuation member may be moved, via the locking mechanism and linkage mechanism, to open and close the ventilation by the same manually-operable handle used to secure and release the window or door. In another aspect, a window or door is provided, comprising: a frame; one or more sashes installed within the frame, at least one sash having a manually-operable handle, the handle being cooperatively coupled to the locking mechanism for locking and releasing at least that sash; and a ventilation device as aforesaid.





Description**Technical field**

5 **[0001]** The present invention generally relates to the construction of windows and doors. The invention more particularly relates to a ventilation device and window or door incorporating same, employing techniques for providing ventilation associated with the window or door.

Background Art

10 **[0002]** There have been made available various products enabling the provision of ventilation associated with windows and doors. As shown in Fig. 1(a), Fig. 1(b) and Fig. 1(c) (PRIOR ART), such products include trickle vents integrated into the window profile or into the wall adjacent to the window so as to allow ventilation for air renovation with a window closed; and these are usually flaps operated directly by hands (Figs 1(a)), rods (Fig. 1(b)) or wires (Fig. 1(c)) or elec-
 15 tronically. However, the operating element is not integrated with the window locking mechanism, and two separate types of operation are required.

[0003] Further, EP2824265A2 discloses a window comprising at least one (rotatably opening) sash and a tiltable top window / skylight above the sash(es). A mechanism controlled by a manually operable handle on a sash is configured, through certain movements of the handle, to also open and close the skylight.

Technical problem

20 **[0004]** A problem is that, with known (trickle) ventilation arrangements for windows and doors, there is a need to open and close the ventilation devices with a dedicated closing mechanism separate from that of the window or door, requiring an additional operation to the opening and closing the ventilation device. Moreover, sometimes the ventilation device is not easy to reach as it is installed in an inconvenient place (i.e. on the top of the window), i.e. such that it is difficult to operate and requires long wires or rods in order to do so, thereby often providing limited aesthetics. Moreover, when the ventilation is provided by the window sash in tilt position, the acoustic and thermal insulations are very poor compared with a trickle vent, the entrance of insects is not avoided and moreover the window itself is not safely closed thereby
 25 allowing the opening by burglars.

[0005] It is an object of the present invention to provide ventilation device and window or door incorporating same, in which the same manually-operable handle used to secure and release the window or door may be used to open and close the ventilation. This object is achieved by a ventilation device as claimed in claim 1, and the window or door as claimed in claim 25.

General Description of the Invention

30 **[0006]** In order to overcome the above-mentioned issue, the present invention provides a ventilation device for a window or door, the ventilation device being configured to be installed at a peripheral mounting surface of a frame, at a mounting surface in said frame or at a mounting surface in a sash of the window or door from which an actuation member projects, the actuation member being connected via a linkage mechanism to a locking mechanism of the window or door. The ventilation device comprises a hollow body portion having an engagement surface configured to abut, in use, the mounting surface, and a first ventilation member fixed to or integral with the hollow body portion. The ventilation device further comprises a second ventilation member disposed adjacent the first ventilation member, the second ventilation member being movable relative to the first ventilation member and being coupled to, and/or configured to be acted upon by, in use, the actuation member. An actuation aperture is provided in the body portion relative to which the actuation member is movable, in use. The second ventilation member is configured to be movable, under the action of the actuation member, between a first position, in which airflow between an exterior side of the window or door and an interior side thereof via the body portion is blocked, and a second position in which said airflow is enabled and maximized.

35 **[0007]** Preferably, the first ventilation member and the second ventilation member are substantially planar.

[0008] Preferably, the body portion is elongate, a first axis being defined by an axis of elongation of the body portion.

[0009] Preferably, the actuation aperture is an elongate slot, a direction of elongation of the slot defining a second axis. Preferably, the second axis is aligned with or parallel to the first axis. Preferably, the actuation member is an elongate member extending through the slot in a direction substantially perpendicular to the second axis, and the actuation member is movable, in use, in a direction aligned with or parallel to the second axis.

40 **[0010]** In one embodiment, the second ventilation member is configured to be linearly movable between the first position and the second position. Preferably: the first ventilation member has one or more first ventilation apertures therein, the or each first ventilation aperture having an adjacent first cover member; the second ventilation member has
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one or more second ventilation apertures therein, the or each second ventilation aperture having an adjacent second cover member; wherein, in the first position, the or each second cover member covers and seals an adjacent respective first ventilation aperture, and in the second position the or each first ventilation aperture is substantially aligned with a respective second ventilation aperture, whereby maximum airflow through the body portion is enabled.

[0011] Preferably, the second ventilation member is configured to be linearly (translationally) movable in a direction aligned with or parallel to the first axis.

[0012] In one embodiment, the ventilation device further includes a gear mechanism configured to be coupled to and/or acted upon by the actuation member, wherein: the second ventilation member comprises a plurality of flaps, each flap being coupled to the gear mechanism and being configured for rotation about a respective third axis; the first ventilation member includes a plurality of third ventilation apertures, each third ventilation aperture having a shape corresponding to that of a respective flap; and wherein the second ventilation member moving between the first position and the second position corresponds to the flaps rotating about a respective third axis from a position in which they are angularly most displaced from a respective third ventilation aperture to a position in which they cover the respective third ventilation aperture.

[0013] Preferably, the ventilation device further comprises a resilient gasket at the periphery of the or each third ventilation aperture, each gasket being configured to be engaged and compressed by a respective flap when that flap is in the position in which it covers the respective third ventilation aperture, thereby sealing the respective third ventilation aperture. Preferably, each third axis extends parallel to the first axis.

[0014] Preferably, the ventilation device further comprises a screen disposed on one side of the first ventilation member and/or on one side of the second ventilation member.

[0015] Preferably, the ventilation device further comprises one or more sound insulation elements disposed within the body portion. Preferably, a plurality of sound insulation elements are mounted to at least one internal surface of the body portion. Preferably, the one or more sound insulation elements (i) each comprise, extending parallel to the first axis, elongate ribs of polygonal cross-section or a plurality of projections of pyramid shape, and/or (ii) are made of a sound absorbing resilient material. These sound insulation elements can also slide one to each other in order to guarantee an additional opening/closing mechanism to guarantee better performance of air permeability and sound insulation when the ventilation device is in closed position.

[0016] In one embodiment, the ventilation device is configured to be integrated into a wall at or near the periphery of the frame of the window or door. In another embodiment, the ventilation device is installed into the openable sash of the window, using the same concept of operability through the window handle. Preferably: the body portion has a depth, transverse to the first axis, greater than that of the mounting surface, whereby a first protruding section of the body portion protrudes on the exterior side of the window or door and a second protruding section of the body portion protrudes on the interior side thereof; and at least a portion of the first ventilation member and at least a portion of the second ventilation member is provided in or on each of (i) a first side of the first protruding section and (ii) a second side of the second protruding section. Preferably, the first side and/or the second side are substantially parallel to the engagement surface.

[0017] Preferably, as an option, the ventilation device further comprises an electric fan disposed within the body portion. Preferably, the electric fan is disposed within the first protruding section or within the second protruding section.

[0018] In one embodiment, the ventilation device comprises an add-on frame profile configured to be secured on one peripheral side of the frame of the window or door. Preferably, the body portion has a depth, transverse to the first axis, substantially equal to that of the mounting surface and/or to the depth, transverse to the first axis, of the frame of the window or door. In an advantageous alternative, the ventilation device can be installed directly on the outer frame (without an add-on frame) if there is enough space.

[0019] Preferably, the actuation member comprises a pin or a gear extending transverse to the second axis. The pin is generally guided into the hardware groove e.g. by two flat components.

[0020] In another aspect, there is provided a window or door comprising: a frame; one or more sashes installed within the frame, at least one sash having a manually-operable handle, the handle being cooperatively coupled to the locking mechanism for locking and releasing at least that sash; and a ventilation device according to any one of the appended claims mounted at the periphery of the frame (e.g. in the wall surrounding the frame), into the frame or into the sash(es) such that the actuation member of the window or door engages the second ventilation member for movement thereof.

[0021] In a preferred embodiment: the linkage mechanism includes at least one axially translatable sliding rod, the sliding rod being configured for axial movement in a direction parallel to the second axis; at least a first pusher projection and second pusher projection are disposed on or integral with the sliding rod and extend transversely thereto; the first pusher projection abuts and pushes upon the actuation member, in use, while the second ventilation member moves between the first position and the second position; and the second pusher projection abuts and pushes upon the actuation member, in use, while the second ventilation member moves between the second position and the first position.

[0022] Preferably, the first pusher projection and/or the second pusher projection comprise(s) a bolt fixedly attached to the sliding rod and extending transversely thereto.

[0023] An advantage of the invention is that the ventilation device (trickle vent) is integrated together with the window opening mechanism and does not need other means of being operated (e.g. rod or wire).

[0024] Advantageously, the ventilation device can work with open IN windows, open OUT windows, and sliding windows and doors.

[0025] More particularly, at least in embodiments, the ventilation device can be installed either outside the window/door frame and concealed within the wall or integrated into an add-on frame profile of the window/door or into the sash profile

[0026] A further advantage is that opening and closing of the ventilation device with the same handle of the window is afforded, making operation much easier and faster. Moreover it guarantees safety while the ventilation is open, as the window is closed and safe (e.g. regarding burglary risk), guarantees a better acoustic and thermal insulation and protection against insects

[0027] At least in embodiments, a further advantage is that the ventilation device can include a motor/fan for forced ventilation, an acoustic insulator, a system for heat exchange, and/or a fly screen, all discreetly housed and tamper-proof, while affording access/replacement without replacing the entire window.

Brief Description of the Drawings

[0028] Further details and advantages of the present invention will be apparent from the following detailed description of a non-limiting embodiment with reference to the attached drawings, wherein:

Figure 1(a) (PRIOR ART) is a perspective view of a known trickle vent comprising a directly manually operated flap integrated into the window or frame; Figure 1(b) (PRIOR ART) is a perspective view of a known trickle vent comprising a rod-operated flap installed above the window frame; and Figure 1(c) (PRIOR ART) is a perspective view of a known trickle vent comprising a cord-operated flap installed above the window frame;

Figure 2(a) is a perspective view from above of a window having mounted thereto a ventilation device according to an embodiment; and Fig. 2(b) is a perspective view from below of the window of Fig. 2(a); Figure 2(c) is a perspective view from below of another window having mounted thereto a ventilation device according to a further embodiment; and Fig. 2(d) is a perspective side view of the window of Fig. 2(c);

Figure 3 is an axial cross-sectional view of an embodiment of the ventilation device of Fig 2(a), integrated into a wall;

Figure 4(a) is an enlarged version of the view of Fig 3; and Figure 4(b) is a cross-section similar to Figure 4(a), but represents the ventilation device of Fig 2(c) arranged between a wall and the frame;

Figure 5(a) is a perspective view from above of an embodiment of ventilation members used in the ventilation device of Fig. 4; and Fig. 5(b) is perspective view from below of an embodiment of ventilation members of Fig. 5(a);

Figure 6 is a front view the window of Fig. 2(b), showing an embodiment of positions of the handle, locking mechanism, linkage mechanism and actuation member;

Figures 7(a) and 7(b) schematically show examples of a sequence of positions of elements of the window and ventilation device of Fig. 2(a) or Fig. 2(c) at various stages during closing and unclosing of the window and an embodiment of ventilation device;

Figures 8 to 12 show in more detail positions of elements of the window and the embodiment of ventilation device of Fig. 2(a) at the various stages denoted in Fig 7(a);

Figure 13(a) is an enlarged axial cross-sectional view of a ventilation device, according to another embodiment, in which the ventilation members include rotatable flaps operated by a gear mechanism, with the flaps in a closed position; and Fig. 13(b) is an enlarged axial cross-sectional view of a ventilation device of Fig. 13(a), with the flaps in an open position;

Figure 14(a) is a perspective view of a ventilation device, according to another embodiment, in which the body portion comprises an add-on frame profile mounted on the frame of the window; Fig. 14(b) is an axial cross-sectional view of the add-on frame profile flush and upper part of the frame; and Fig. 14(c) is an enlarged version of the view of Fig. 14(b); and

Fig. 15(a) is an enlarged axial cross-sectional view of a ventilation device, according to another embodiment, similar

to that of Fig. 2(a), in which a fan is installed in one section of the body portion thereof; and Fig. 15(b) illustrates and exemplary fan usable in the ventilation device of Fig. 15(a).

Fig. 16 shows a ventilation device according to still another embodiment which is mounted into the sash of a window or door.

Description of Preferred Embodiments

[0029] In the following, like reference numerals denote like parts, and any element, design feature or method step of any embodiment may be used in combination with an element, design feature or method step of any other embodiment unless stated otherwise herein.

[0030] Unless indicated otherwise, the metal components described/illustrated herein may be made of, for example, aluminium or steel, and/or may be fabricated using turning, pressing and/or machining. Non-metallic components may be made of wood, rigid plastic or rigid synthetic materials, e.g. PVC.

[0031] Figure 2(a) is a perspective view from above of a window 3 having mounted thereto a ventilation device 1 according to an embodiment; and Fig. 2(b) is a perspective view from below of the window 3 of Fig. 2(a) having the ventilation 1 device mounted thereto. Figure 2(c) is a perspective view from below of a window 3 having mounted thereto a ventilation device 1 according to a further embodiment; and Fig. 2(d) is a perspective side view from below of the window 3 of Fig. 2(c) having the ventilation 1 device mounted thereto. While the arrangement is described hereinafter in relation to a window 3, the techniques are equally applicable to doors and similar items.

[0032] The ventilation device 1 is configured to be installed at a peripheral mounting surface 20 (see Fig. 2(a), (c), (d)) of a frame 21 of the window 3 from which an actuation member (not shown) projects, the actuation member being connected via a linkage mechanism (not shown) to a locking mechanism (not shown) of the window, as will be described in detail hereinafter.

[0033] The ventilation device 1 comprises a hollow body portion 22 having an engagement surface 63 (see Fig. 2(b)) configured to abut, in use, the mounting surface 20. Further, a first ventilation member 13 is fixed to or integral with the hollow body portion 22. In an embodiment, the first ventilation member 13 comprises a fixed grid having apertures, as best seen in Fig. 2(b), (c) and (d), and as will be described hereinafter. Preferably, the body portion 22 is elongate, a first axis 23 being defined by an axis of elongation of the body portion 22. In Fig. 2(c) and (d), body portion 22 is has the same length as the width of the frame (and it can also be made of extruded aluminium) and is preferably an add-on profile to be placed between the wall and the frame (as opposed to integrated into the wall).

[0034] Figure 3 is an axial cross-sectional view of the ventilation device 1 of Fig 2(a), integrated into a wall 17. That is, in this embodiment, the ventilation device 1 is configured to be integrated into the wall at or near the periphery of the frame 21 of the window 3.

[0035] In this embodiment, the apertures in the ventilation member(s) facilitate movement of air (i.e. indicated by arrow A) between an exterior side 24 of the window 3 and an interior side 25 of the window 3, thereby providing trickle ventilation.

[0036] Figure 4(a) is an enlarged version of the view of Fig 3. As mentioned, the first ventilation member 13 is fixed to or integral with the hollow body portion 22. In addition, a second ventilation member 12 is disposed adjacent the first ventilation member 13, the second ventilation member 12 being movable relative to the first ventilation member and being coupled to, and/or configured to be acted upon by, in use, the actuation member (not shown). In this embodiment, the first ventilation member 13 and the second ventilation member 12 are substantially planar and/or comprise grid-like members. In an embodiment, the second ventilation member 12 includes a central section 28 of π -shaped cross-section, so as to have two projections 29 retained within and guided by U-shaped portions 49 on the of the first ventilation member 13 or the body portion 22.

[0037] An actuation aperture 26 is provided in the body portion 22 and/or the first ventilation member 13 relative to which, the actuation member 5 is movable, in use. In an embodiment, the actuation aperture 26 is an elongate slot, a direction of elongation of the slot (into the paper in Fig. 4(a)) defining a second axis 27. In an embodiment, the second axis 27 is aligned with or parallel to the first axis 23. The slot is preferably (also) machined into the frame 21.

[0038] In an embodiment, the actuation member 5 is an elongate member extending through the slot 26 in a direction substantially perpendicular to the second axis 27, and the actuation member 5 is movable, in use, in a direction (into the paper in Fig. 4(a)) aligned with or parallel to the second axis 27. In an embodiment, the actuation member 5 comprises a pin extending transverse to the second axis 27. In an embodiment, the actuation member (pin) 5 is guided with two attached/integral plates 6 along grooves 7 of the frame 21.

[0039] In accordance with the invention, the second ventilation member 12 is configured to be movable, under the action of the actuation member 5, between a first position, in which airflow between an exterior side 24 (see Fig. 3) of the window or door and an interior side 25 thereof via the body portion 22 is blocked, and a second position in which said airflow is enabled and maximised. In an embodiment, the second ventilation member 12 is configured to be linearly movable between the first position and the second position.

[0040] Figure 4(b) is essentially similar to Fig. 4(a), the same numerals referring to the same features, except that in this embodiment of Fig. 2(c) and (d), the ventilation device 1 is not integrated into the wall, but rather mounted between the wall and the frame 21

[0041] Figure 5(a) is a perspective view from above of ventilation members 12, 13 used in the ventilation device 1 of Fig. 4; and Fig. 5(b) is perspective view from below of ventilation members 12, 13 of Fig. 5(a). In an embodiment, the first ventilation member 13 has one or more first ventilation apertures 30 therein, the or each first ventilation aperture 30 having an adjacent first cover member 31 (as best seen in Fig. 5(b)), and/or the second ventilation member 12 has one or more second ventilation apertures 32 therein, the or each second ventilation aperture 32 having an adjacent second cover member 33. In this embodiment, in the first position, the or each second cover member 33 covers and seals an adjacent respective first ventilation aperture 30, and in the second position the or each first ventilation aperture 30 is substantially aligned with a respective second ventilation aperture 32, whereby maximum airflow through the body portion 22 (not shown) is enabled.

[0042] In an embodiment, the second ventilation member 12 is configured to be linearly movable in direction 34 (see Fig. 5(a)) aligned with or parallel to the first axis 23.

[0043] Referring briefly to Fig. 6, this is a front view the window 3 of Fig. 2(b), showing the disposition of the handle 2, the locking mechanism 35, the linkage mechanism 36 and actuation member 5. As noted, the actuation member 5 is connected via the linkage mechanism 36 to the locking mechanism 35 of the window 3. More particularly, the window 3 comprises the frame 21 and one or more sashes 37 installed within the frame 21, at least one sash having the manually-operable handle 2, the handle 2 being cooperatively coupled to the locking mechanism 35 for locking and releasing at least that sash 37. A ventilation device 1 may be mounted to the frame 21 such that the actuation member 5 of the window or door engages the second ventilation member 12 for movement thereof.

[0044] In an embodiment, the linkage mechanism 36 includes at least one axially translatable sliding rod 10 which is operated by the window handle 2, where necessary via a corner drive 11, as is known in the art.

[0045] Returning to Fig. 5(a), the sliding rod 10 is preferably configured for axial movement in a direction parallel to the second axis 27. In an embodiment, at least a first pusher projection 38 and second pusher projection 39 are disposed on or integral with the sliding rod 10 and extend transversely thereto. In an embodiment, the first pusher projection 38 abuts and pushes upon the actuation member 5, in use, while the second ventilation member 12 moves between the first position and the second position, and/or the second pusher projection 39 abuts and pushes upon the actuation member 5, in use, while the second ventilation member 12 moves between the second position and the first position. Generally, the actuation member passes through the frame (profiles) thanks to a slot 58 machined into the profile.

[0046] In an embodiment, the first pusher projection 38 and/or the second pusher projection 39 comprises a bolt fixedly attached to the sliding rod 10 and extending transversely thereto.

[0047] Returning to Fig. 4(a) or 4(b), in these embodiments, the body portion 22 has a depth D_d , transverse to the first axis 23, greater than that (D_f) of the mounting surface 20, whereby a first protruding section 50 of the body portion protrudes on the exterior side 24 of the window 3 and a second protruding section 51 of the body portion protrudes on the interior side 25 thereof. In this embodiment, at least a portion of the first ventilation member 13 and at least a portion of the second ventilation member 12 are provided in or on each of (i) a first side 52 of the first protruding section 50 and (ii) a second side 53 of the second protruding section 51. It is to be noted that this is not the case when the ventilation device is integrated into the frame or sash.

[0048] In an embodiment, the first side 52 and/or the second side 53 are aligned with or substantially parallel to the engagement surface 54 of the ventilation device 1.

[0049] In an embodiment, the ventilation device 1 further comprises a screen 55 (e.g. a flyscreen) disposed on one side of the first ventilation member 13 and/or on one side of the second ventilation member 12.

[0050] In an embodiment, the ventilation device 1 further comprises one or more sound insulation elements 56 disposed within the body portion 22. In an embodiment, a plurality of sound insulation elements 56 are mounted to at least one internal surface 57 of the body portion 22. In an embodiment, the one or more sound insulation elements 56 (i) each comprise, extending parallel to the first axis 23, elongate ribs of polygonal cross-section or a plurality of projections of pyramid shape, and/or (ii) are made of a sound absorbing resilient material.

[0051] Figure 7(a) schematically shows a first embodiment of a sequence of positions of elements of the window 3 and ventilation device 1 of Fig. 2(a) at various stages during closing and unclosing of the window 3 and ventilation device 1. Figure 7(b) schematically shows a second alternative embodiment of a sequence of positions of elements of the window sash 3 and ventilation device 1 of Fig. 2(a) at various stages during closing and unclosing of the window 3 and ventilation device 1. Figures 8 to 12 show in more detail positions of elements of the window 3 and ventilation device 1 of Fig. 2(a) at the various stages denoted in Fig. 7.

[0052] In stage 1 of Fig. 7(a) and (b), the handle 2 is pointing downwards, both the sash 37 and the ventilation device 1 are closed (schematically represented by black rectangle 1), and the sash 37 is locked (schematically represented by a closed padlock), as shown in more detail in Fig. 8.

[0053] In stage 2 of Fig. 7(a) and (b), the handle 2 has been turned a quarter turn anti-clockwise and is pointing to the

right, the sash 37 is released and openable, and the ventilation device 1 is closed, as shown in more detail in Fig. 9.

[0054] In stage 3 of Fig. 7(a) and (b), and starting from the position in Fig. 8, the handle 2 has been turned a half turn anti-clockwise (180 degrees) and is pointing upwards, the sash 37 remains secured and is not openable, and the ventilation device 1 is open (schematically represented by a white rectangle), as shown in more detail in Fig. 10.

[0055] In stage 2a of Fig. 7(a), and starting from the position in Fig. 10, the handle 2 has been turned a quarter turn clockwise (90 degrees) and is pointing to the right, the sash 37 is released and openable, and the ventilation device 1 is open, as shown in more detail in Fig. 11. In a preferred embodiment, a biasing element, such as a (e.g. coil or leaf) spring, may be provided in the ventilation device (e.g. as an option) that closes the ventilation device 1 while the handle 2 is turned clockwise back to 90° to point to the right. In such a case, as illustrated in Fig. 7(b), stage 2b, and contrary to the illustration in Fig. 11, the ventilation device 1 automatically closes again (black rectangle), once the sash 37 is released and openable.

[0056] In a subsequent return to stage 1 of Fig. 7(a), the sash 37 has been closed, and thereafter the handle 2 has been turned a further quarter turn clockwise (180 degrees in total) and is pointing downwards, the sash 37 is closed, the ventilation device 1 is thereby closed (as shown in Fig. 7(a), from stage 2a to stage 1), or remains closed (Fig. 7(b), from stage 2b to stage 1) as it already had been closed in stage 2b by the biasing element of the alternative embodiment mentioned above, and the sash is locked, as shown in more detail in Fig. 12.

[0057] Accordingly, the sash 37 may be opened with or without opening of the ventilation device 1, and the ventilation device 1 may be opened with or without opening of the sash 37.

[0058] Figure 13(a) is an enlarged axial cross-sectional view of a ventilation device 1', according to another embodiment, in which the ventilation members include rotatable flaps 40, with the flaps 40 in a closed position; and Fig. 13(b) is an enlarged axial cross-sectional view of a ventilation device of Fig. 13(a), with the flaps 40 in an open position.

[0059] In this embodiment, the ventilation device 1' includes a gear mechanism 41 configured to be coupled to and/or acted upon by the actuation member 5. In this embodiment, the second ventilation member comprises a plurality of flaps 40 (in this case only 2), each flap 40 being coupled to the gear mechanism 41 linked to the handle of the window through the locking device, and being configured for rotation about a respective third axis 42. In this embodiment, the first ventilation member 13 includes a plurality of third ventilation apertures 43. In this embodiment, the second ventilation member 12 moving between the first position and the second position corresponds to the flaps 40 rotating about a respective third axis 42 from a position (Fig. 13(b)) in which they are angularly most displaced from a respective third ventilation aperture 43 to a position (Fig. 13(a)) in which they cover the respective third ventilation aperture 43.

[0060] In an embodiment, the ventilation device 1' further comprises a resilient gasket 44 at the periphery of the or each third ventilation aperture 43, each gasket 44 being configured to be engaged and compressed by a respective flap 40 when that flap 40 is in the position of Fig. 13(a) in which it covers the respective third ventilation aperture 43, thereby sealing the respective third ventilation aperture 43.

[0061] In an embodiment, the or each third axis 42 extends parallel to the first axis 23.

[0062] Figure 14(a) is a perspective view of a ventilation device 1'', according to another embodiment, in which the body portion 22'' comprises an add-on frame profile 18, e.g. flush with the frame 21 of the window 3'', configured to be secured on one peripheral side of the frame 21. This is the same as the embodiment of Figs 2 to 13, except as described otherwise hereinafter.

[0063] In this embodiment, the add-on frame profile 18 is installed at the top of the frame 21; however, it may be installed at other locations (e.g. on other sides) of the frame 21. As shown, the add-on frame profile 18 includes a number of apertures 45 providing trickle ventilation.

[0064] Fig. 14(b) is an axial cross-sectional view of the add-on frame profile 18 and upper part of the frame and Fig. 14(c) is an enlarged version of the view of Fig. 14(b). In an embodiment, the body portion has a depth D2, transverse to the first axis 23, substantially equal to that of the mounting surface 20 and/or to the depth Df, transverse to the first axis 23, of the frame 21 of the window 3. In this embodiment, the apertures 45 are provided on sides 46 and 47 substantially parallel to the plane of the sash 37. The apertures 45 are open and closed through a moveable (sliding) grid in U shape 59 including apertures 60 and operated by the handle 2 though the pin 5 in same way as explained in the context of Figure 4.

[0065] Figure 15(a) is an enlarged axial cross-sectional view of a ventilation device 1''', according to another embodiment, similar to that of Fig. 2(a), in which a fan 48 is installed in one section of the body portion 22''' thereof. In this embodiment, the fan 48 is disposed within the first protruding section 50; however, the fan 48 may be disposed within the second protruding section 51, or one fan 48 may be disposed within each of the first protruding section 50 and the second protruding section 51. The or each fan 48 provides forced ventilation, which is advantageous in certain usage scenarios.

[0066] Figure 15(b) illustrates and exemplary fan 48 usable in the ventilation device of Fig. 15(a). The fan 48 suitably comprises an electric fan, and may be switched on and off through actuation of a button or control activated by (additional) movement of the actuation member 5.

[0067] Figure 16 shows an embodiment of a window or door with a frame 21 and a sash 37, wherein the ventilation device 1'''' of the invention is mounted inside said sash 37.

[0068] While embodiments have been described by reference to embodiments of survey devices having various components in their respective implementations, it will be appreciated that other embodiments make use of other combinations and permutations of these and other components.

Legend

1, 1', 1'', 1''', 1''''	ventilation device
2	handle
3, 3''	window (or door)
5	actuation member or pin
6	attached/integral plates
7	grooves
10	sliding rod
11	corner drive
12	second ventilation member
13	first ventilation member
17	wall
18	add-on frame profile
20	(peripheral) mounting surface
21	frame
22, 22''	(hollow) body portion
23	first axis
24	exterior side
25	interior side
26	actuation aperture or slot
27	second axis
28	central section
29	projection(s)
30	first ventilation apertures
31	first cover member
32	second ventilation apertures
33	second cover member
34	direction
35	locking mechanism
36	linkage mechanism
37	sash
38	first pusher projection
39	second pusher projection
40	rotatable flaps
41	gear mechanism
42	third axis
43	third ventilation aperture

(continued)

44	resilient gasket
45	apertures
46, 47	sides substantially parallel to the plane of the sash 37
48	fan
49	U-shaped portions
50	first protruding section
51	second protruding section
52	first side of the first protruding section
53	second side of the second protruding section
54	engagement surface
55	screen
56	sound insulation elements
57	internal surface
58	slot for actuation member 5
59	U-shaped grid
60	apertures in U-shaped grid 59
63	engagement surface
Dd	depth of body portion
Df	depth of the mounting surface

Claims

1. A ventilation device (1) for a window or door (3, 3"), the ventilation device (1) being configured to be installed at a peripheral mounting surface (20) of a frame (21), at a mounting surface in said frame (21) or at a mounting surface in a sash (37) of the window or door (3, 3") from which an actuation member (5) projects, the actuation member (5) being connected via a linkage mechanism (36) to a locking mechanism (35) of the window or door (3, 3") arranged to be operated by a manually-operable handle (2) of the window or door (3, 3"), the ventilation device (1) comprising:
 - a hollow body portion (22, 22") having an engagement surface (63) configured to abut, in use, the mounting surface; and
 - a first ventilation member (13) fixed to or integral with the hollow body portion (22, 22"); and
 - a second ventilation member (12) disposed adjacent the first ventilation member (13), the second ventilation member (12) being movable relative to the first ventilation member (13) and being coupled to, and/or configured to be acted upon by, in use, the actuation member (5);
 - wherein an actuation aperture (26) is provided in the body portion (22, 22") relative to which, the actuation member (5) is movable, in use;
 - wherein the second ventilation member (12) is configured to be movable, under the action of the actuation member (5), between a first position, in which airflow between an exterior side of the window or door (3, 3") and an interior side thereof via the body portion (22, 22") is blocked, and a second position in which said airflow is enabled and maximised; and
 - wherein the first ventilation member (13) and the second ventilation member (12) are substantially planar.
2. The ventilation device (1) according to claim 1, wherein the body portion (22, 22") is elongate, a first axis (23) being defined by an axis of elongation of the body portion (22, 22").
3. The ventilation device (1) according to claim 1 or 2, wherein the actuation aperture (26) is an elongate slot, a direction of elongation of the slot defining a second axis (27); the actuation member (5) preferably comprising a pin extending

transverse to the second axis (27).

4. The ventilation device (1) according to claim 3, when dependent on claim 2, wherein the second axis (27) is aligned with or parallel to the first axis (23).

5. The ventilation device (1) according to claim 3 or 4, wherein: the actuation member (5) is an elongate member extending through the slot in a direction substantially perpendicular to the second axis (27); and the actuation member (5) is movable, in use, in a direction aligned with or parallel to the second axis (27).

6. The ventilation device (1) according to any one of the preceding claims, wherein the second ventilation member (12) is configured to be linearly movable between the first position and the second position.

7. The ventilation device (1) according to claim 6, wherein:

the first ventilation member (13) has one or more first ventilation apertures (30) therein, the or each first ventilation aperture (30) having an adjacent first cover member (31); and the second ventilation member (12) has one or more second ventilation apertures (32) therein, the or each second ventilation aperture (32) having an adjacent second cover member (33); and wherein, in the first position, the or each second cover member (33) covers and seals an adjacent respective first ventilation aperture (30), and in the second position the or each first ventilation aperture (30) is substantially aligned with a respective second ventilation aperture (32), whereby maximum airflow through the body portion (22, 22") is enabled; the second ventilation member (12) preferably being configured to be linearly movable in a direction aligned with or parallel to the first axis (23).

8. The ventilation device (1) according to any one of claims 1 to 5, further including a gear mechanism (41) configured to be coupled to and/or acted upon by the actuation member (5), wherein:

the second ventilation member (12) comprises a plurality of flaps (40), each flap (40) being coupled to the gear mechanism (41) and being configured for rotation about a respective third axis (42); the first ventilation member (13) includes a plurality of third ventilation apertures (43), each third ventilation aperture (43) having a shape corresponding to that of a respective flap (40); and wherein the second ventilation (12) member moving between the first position and the second position corresponds to the flaps (40) rotating about a respective third axis (42) from a position in which they are angularly most displaced from a respective third ventilation aperture (43) to a position in which they cover the respective third ventilation aperture (43); the ventilation device (1) preferably further comprising a resilient gasket (44) at the periphery of the or each third ventilation aperture (43), each gasket (44) being configured to be engaged and compressed by a respective flap (40) when that flap (40) is in the position in which it covers the respective third ventilation aperture (43), thereby sealing the respective third ventilation aperture (43); more preferably each third axis (42) extending parallel to the first axis (23).

9. The ventilation device (1) according to any one of the preceding claims, further comprising a screen (55) disposed on one side of the first ventilation member (13) and/or on one side of the second ventilation member (12).

10. The ventilation device (1) according to any one of the preceding claims, further comprising one or more sound insulation elements (56) disposed within the body portion (22, 22"); preferably a plurality of sound insulation elements (56) are mounted to at least one internal surface (57) of the body portion (22, 22"); and/or preferably the one or more sound insulation elements (56) (i) each comprise, extending parallel to the first axis (23), elongate ribs of polygonal cross-section or a plurality of projections of pyramid shape, and/or (ii) are made of a sound absorbing resilient material.

11. The ventilation device (1) according to any one of the preceding claims, configured to be integrated into a wall (17) at or near the periphery of the frame (21) of the window or door (3, 3").

12. The ventilation device (1) according to claim 11, wherein:

the body portion (22, 22") has a depth, transverse to the first axis (23), greater than that of the mounting surface

(20), whereby a first protruding section (50) of the body portion (22, 22") protrudes on the exterior side of the window or door (3, 3") and a second protruding section (51) of the body portion (22, 22") protrudes on the interior side thereof; and

at least a portion of the first ventilation member (13) and at least a portion of the second ventilation member (12) is provided in or on each of (i) a first side of the first protruding section (50) and (ii) a second side of the second protruding section (51);

the first side and/or the second side preferably being substantially parallel to the engagement surface (63).

13. The ventilation device (1) according to any one of claims 11 or 12, further comprising an electric fan (48) disposed within the body portion (22, 22"); the electric fan (48) preferably being disposed within the first protruding section (50) or within the second protruding section (51).

14. The ventilation device (1) according to any one of claims 1 to 10, comprising an add-on frame profile configured to be secured on one peripheral side of the frame of the window or door (3, 3"); the body portion (22, 22") preferably having a depth (Dd), transverse to the first axis (23), substantially equal to that (Df) of the mounting surface and/or to the depth, transverse to the first axis (23), of the frame (21) of the window or door (3, 3").

15. The ventilation device (1) according to any one of claims 1 to 10, configured to be secured inside the frame (21) of the window or door (3, 3"); the body portion (22, 22") preferably having a depth, transverse to the first axis (23), substantially equal to that of the frame (21) of the window or door (3, 3").

16. The ventilation device (1) according to any one of claims 1 to 10, configured to be secured inside the sash of the window or door (3, 3"); the body portion (22, 22") preferably having a depth, transverse to the first axis (23), substantially equal to that of the sash of the window or door (3, 3").

17. A window or door (3, 3") comprising:

a frame (21);

one or more sashes (37) installed within the frame (21), at least one sash (37) having a manually-operable handle (2), the handle (2) being cooperatively coupled to the locking mechanism (35) for locking and releasing at least that sash (37); and

a ventilation device (1) according to any one of the preceding claims mounted to the frame (21) or the one or more sashes (37) such that the actuation member (5) of the window or door (3, 3") engages the second ventilation member (13) for movement thereof.

18. The window or door (3, 3") according to claim 18, wherein:

the linkage mechanism (36) includes at least one axially translatable sliding rod (10), the sliding rod (10) being configured for axial movement in a direction parallel to the second axis (27);

at least a first pusher projection (38) and second pusher projection (39) are disposed on or integral with the sliding rod (10) and extend transversely thereto;

the first pusher projection (38) abuts and pushes upon the actuation member (5), in use, while the second ventilation member (12) moves between the first position and the second position; and

the second pusher projection (39) abuts and pushes upon the actuation member (5), in use, while the second ventilation member (12) moves between the second position and the first position; the first pusher projection (38) and/or the second pusher projection (39) preferably comprising a bolt fixedly attached to the sliding rod (10) and extending transversely thereto.

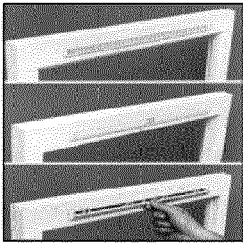


Fig. 1(a) (PRIOR ART)

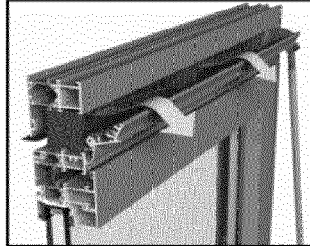


Fig. 1(b) (PRIOR ART)

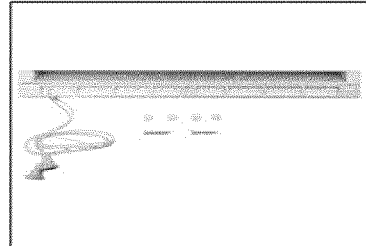


Fig. 1(c) (PRIOR ART)

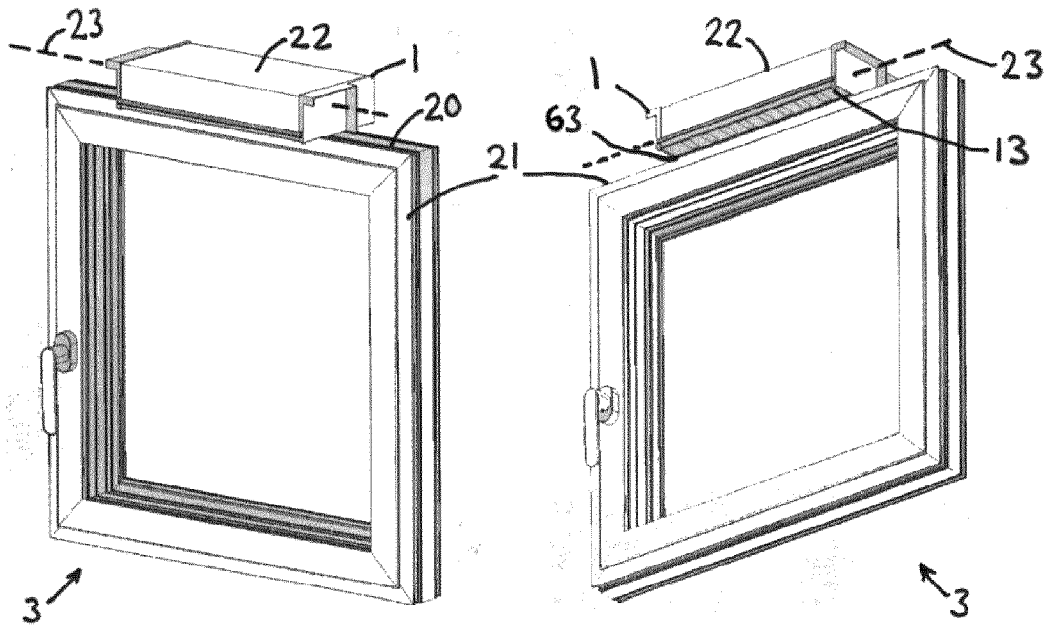


Fig. 2(a)

Fig. 2(b)

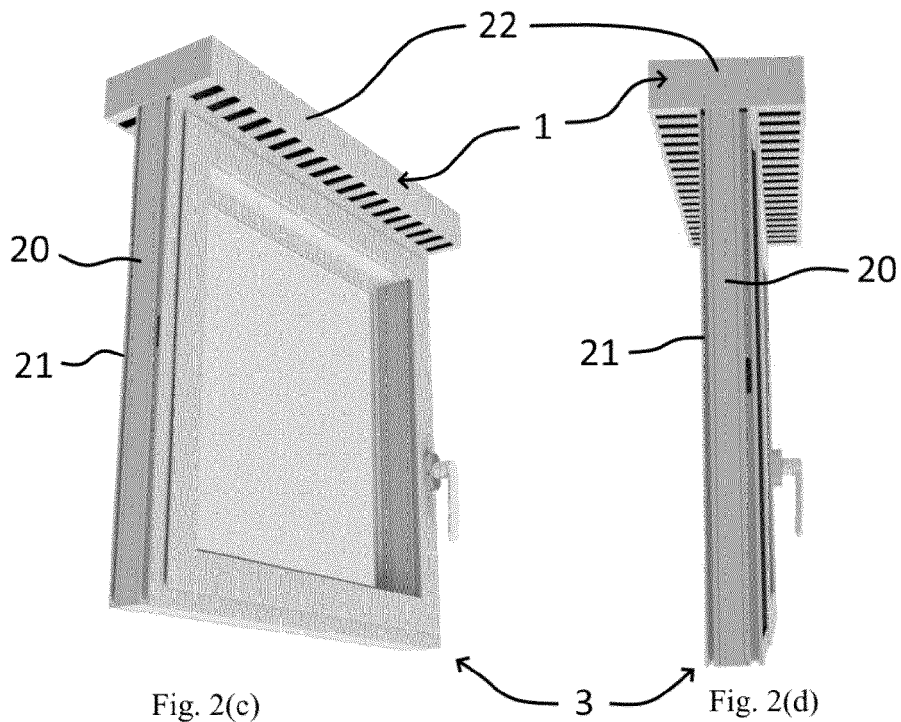
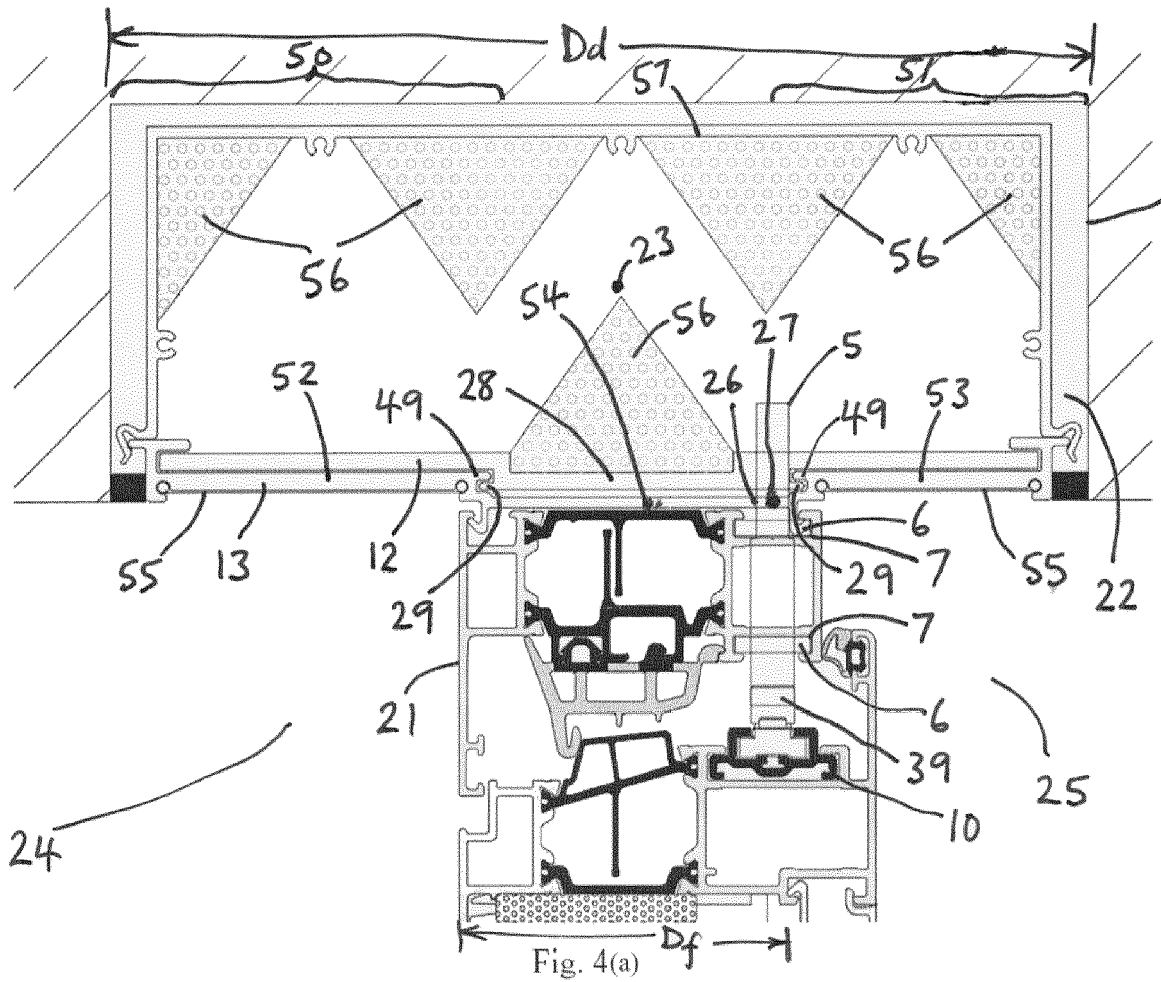
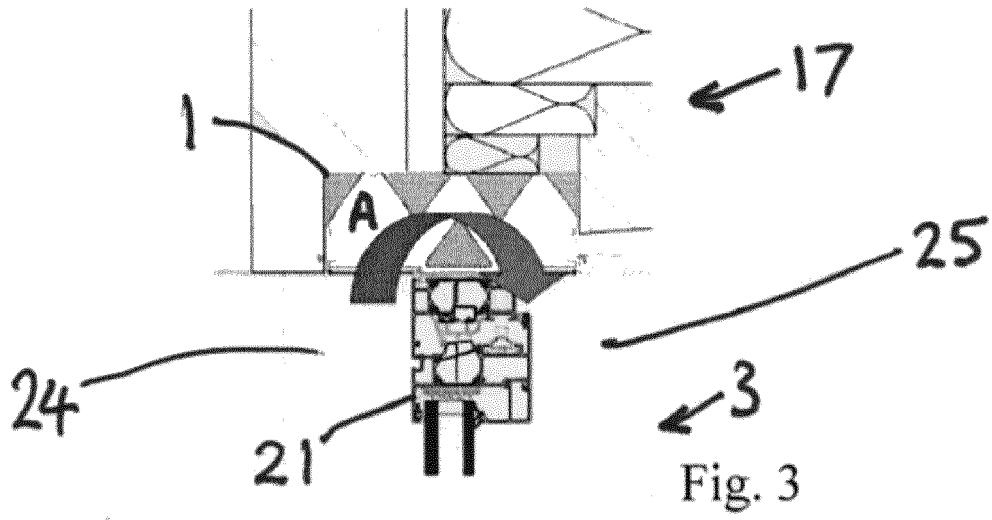


Fig. 2(c)

Fig. 2(d)



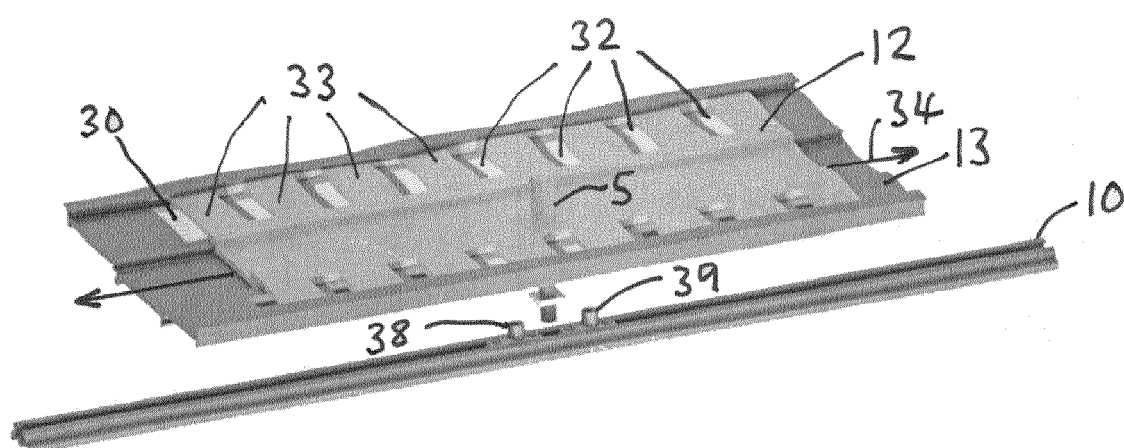
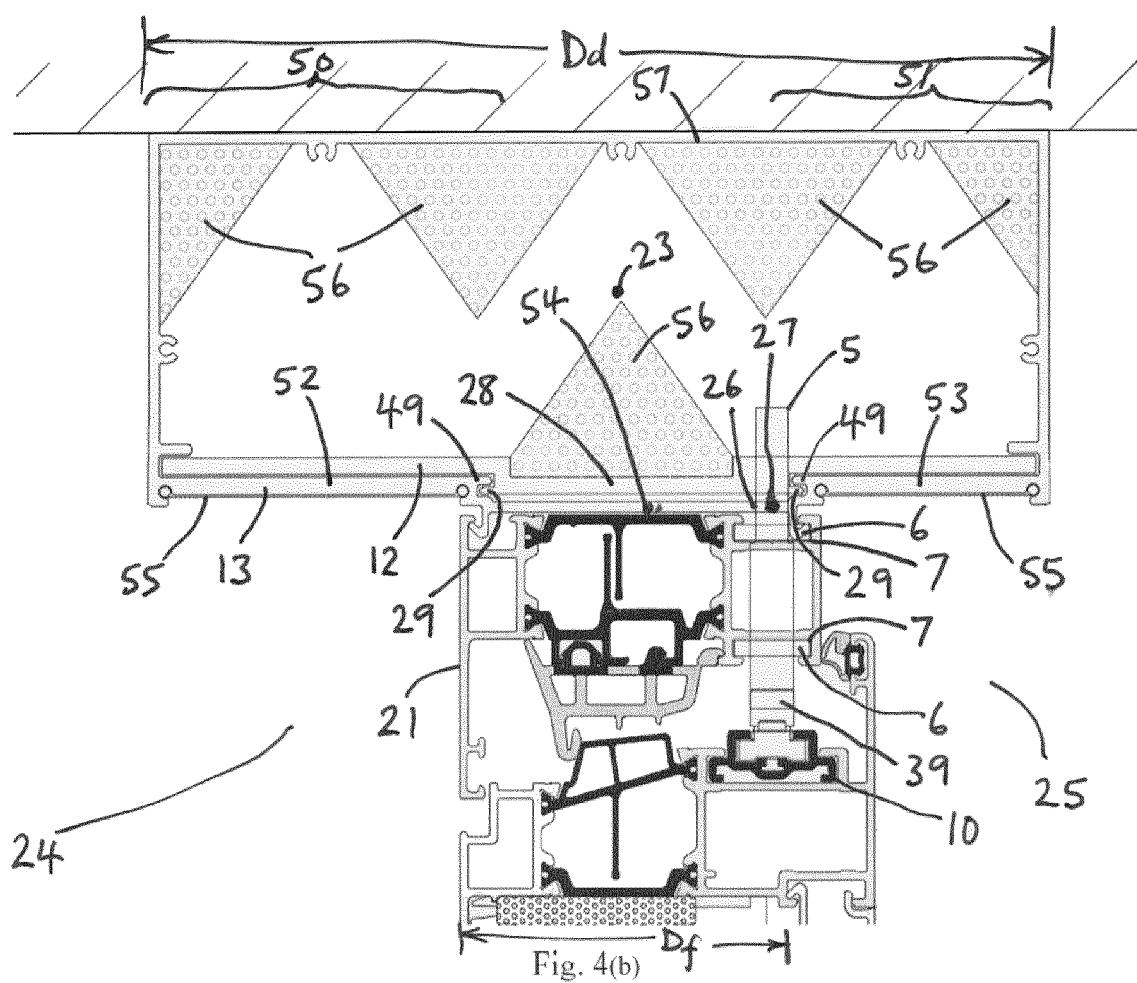


Fig. 5 (a)

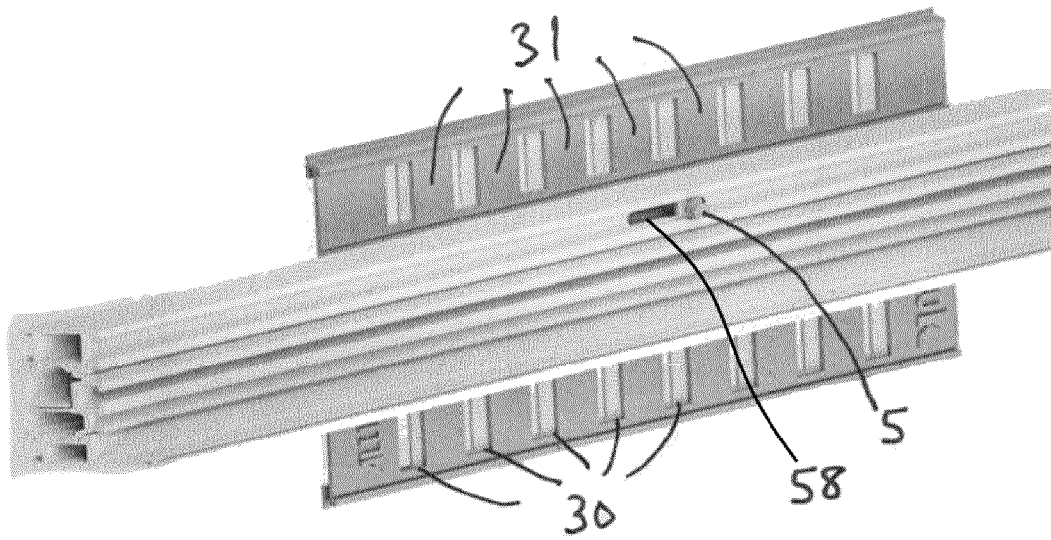


Fig. 5(b)

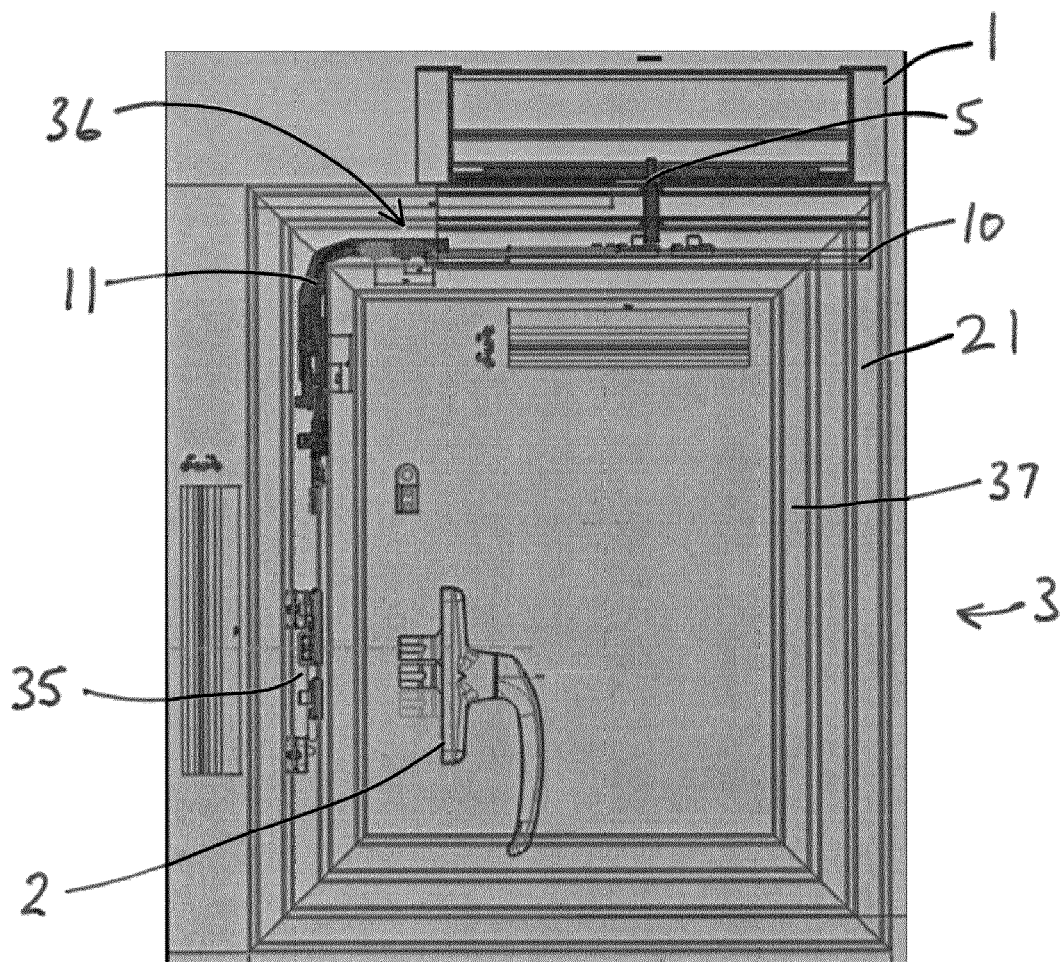


Fig. 6

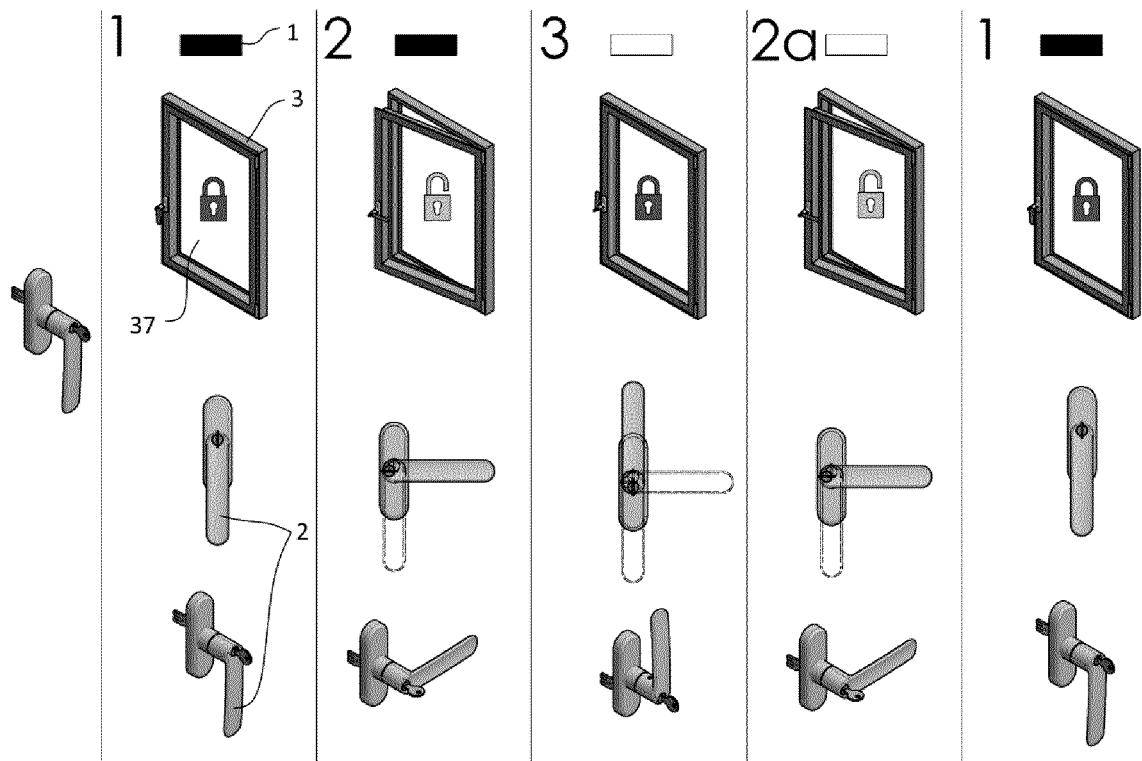


Fig. 7(a)

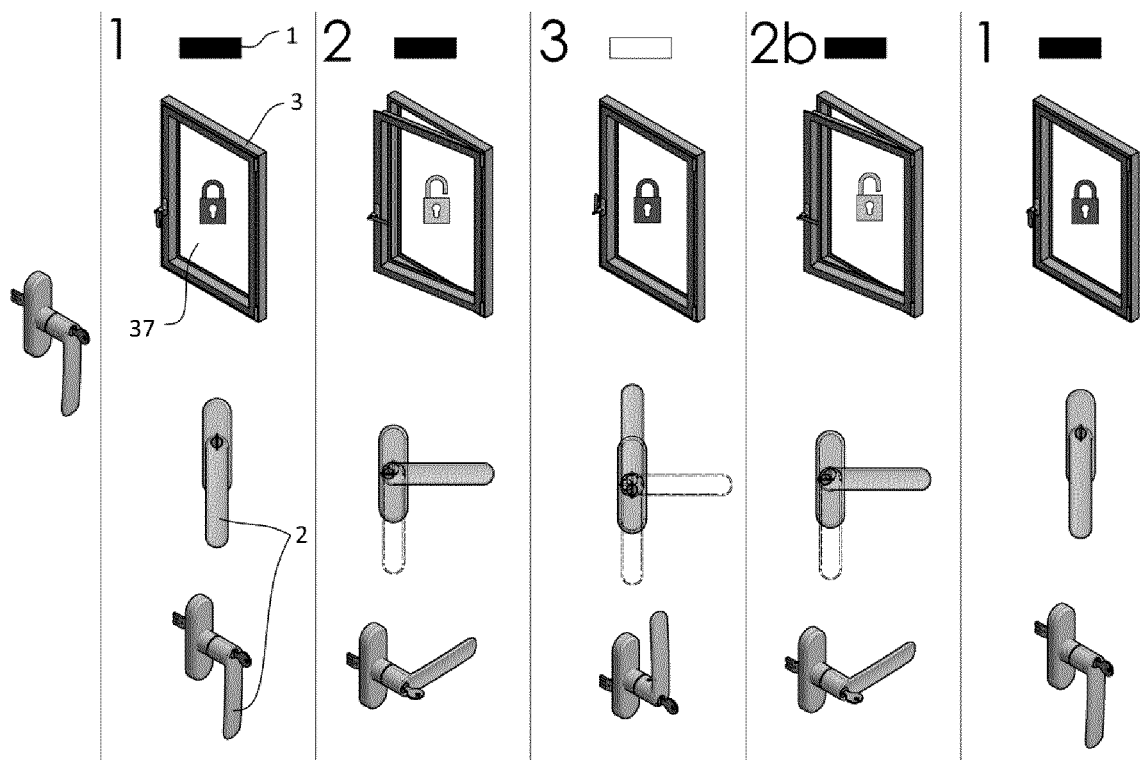


Fig. 7(b)

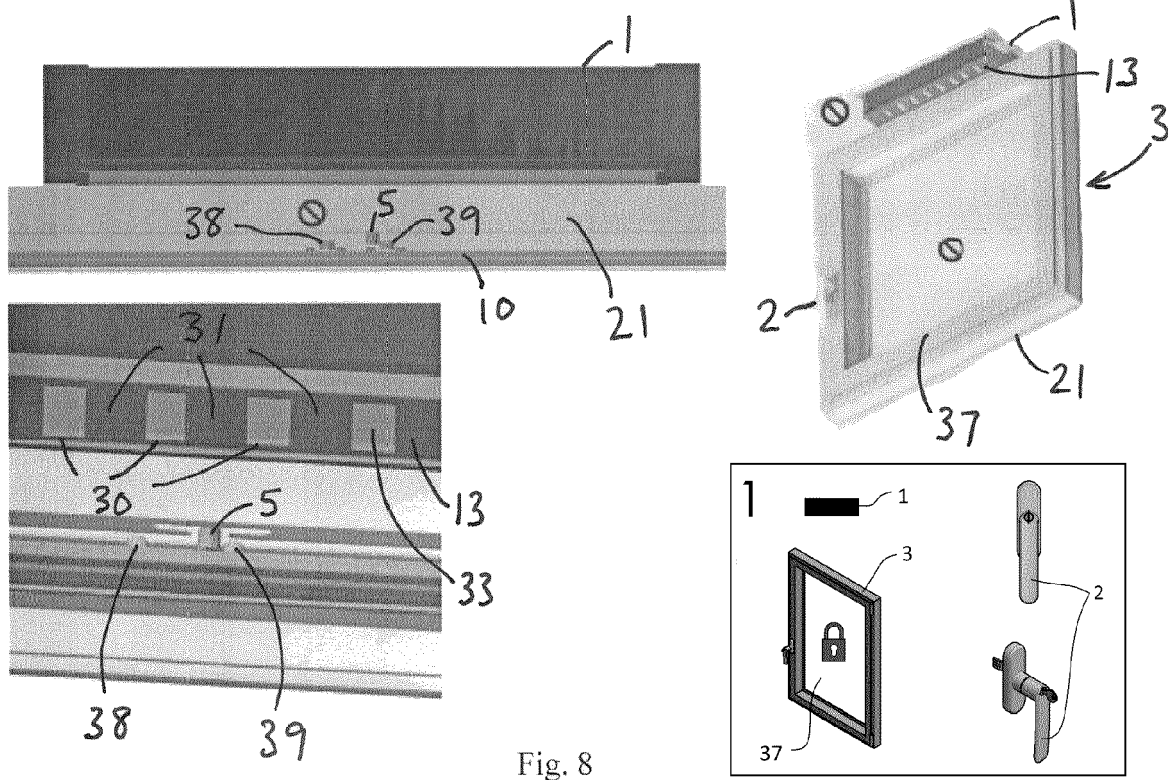


Fig. 8

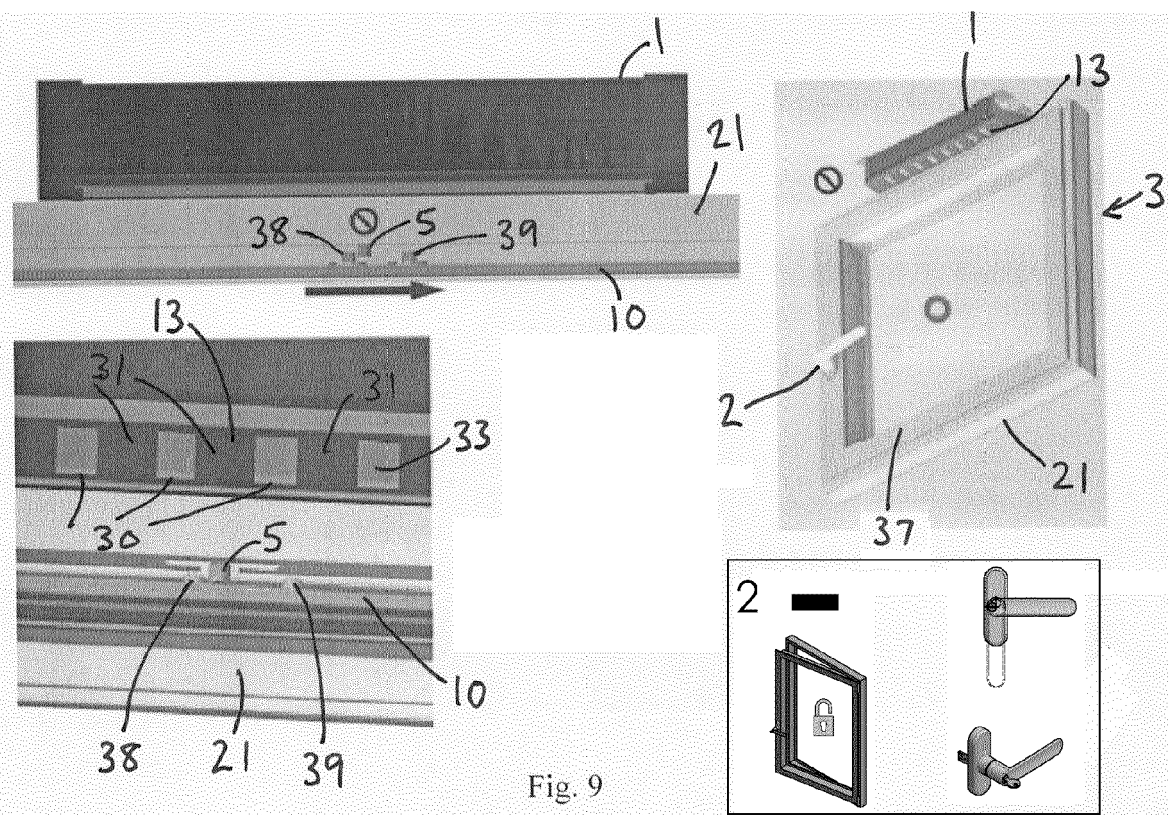
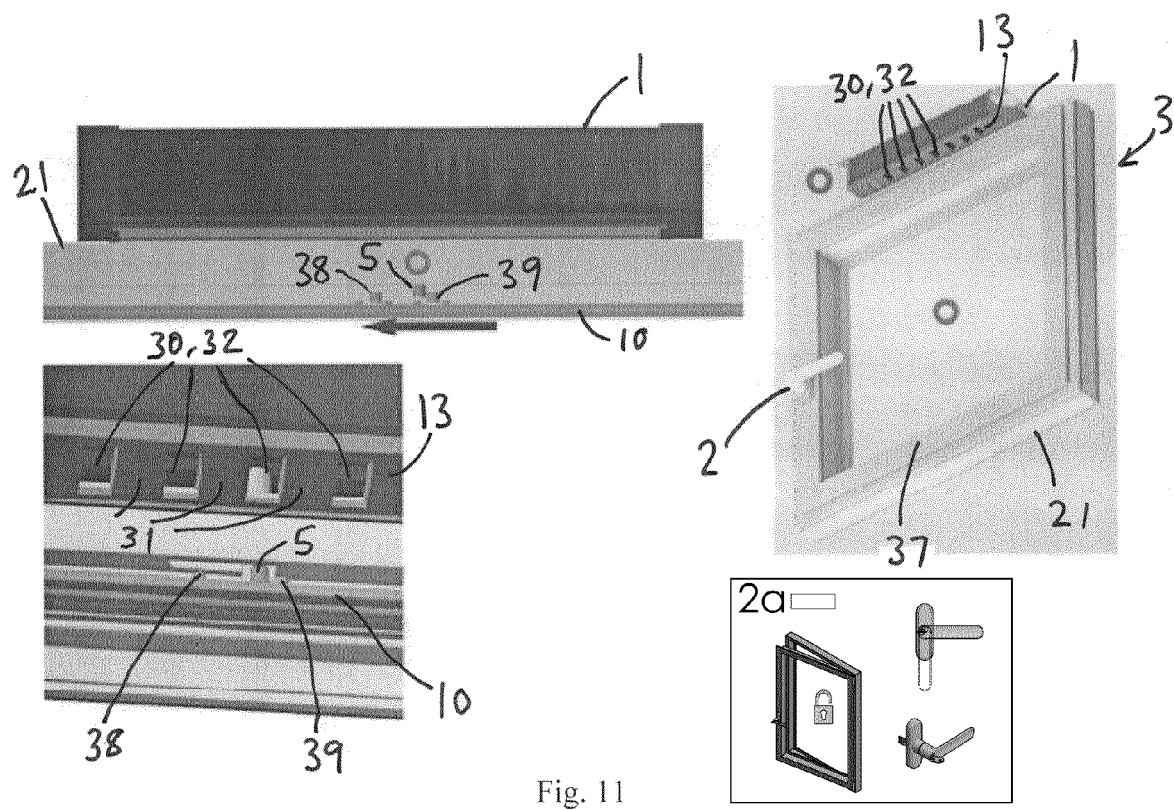
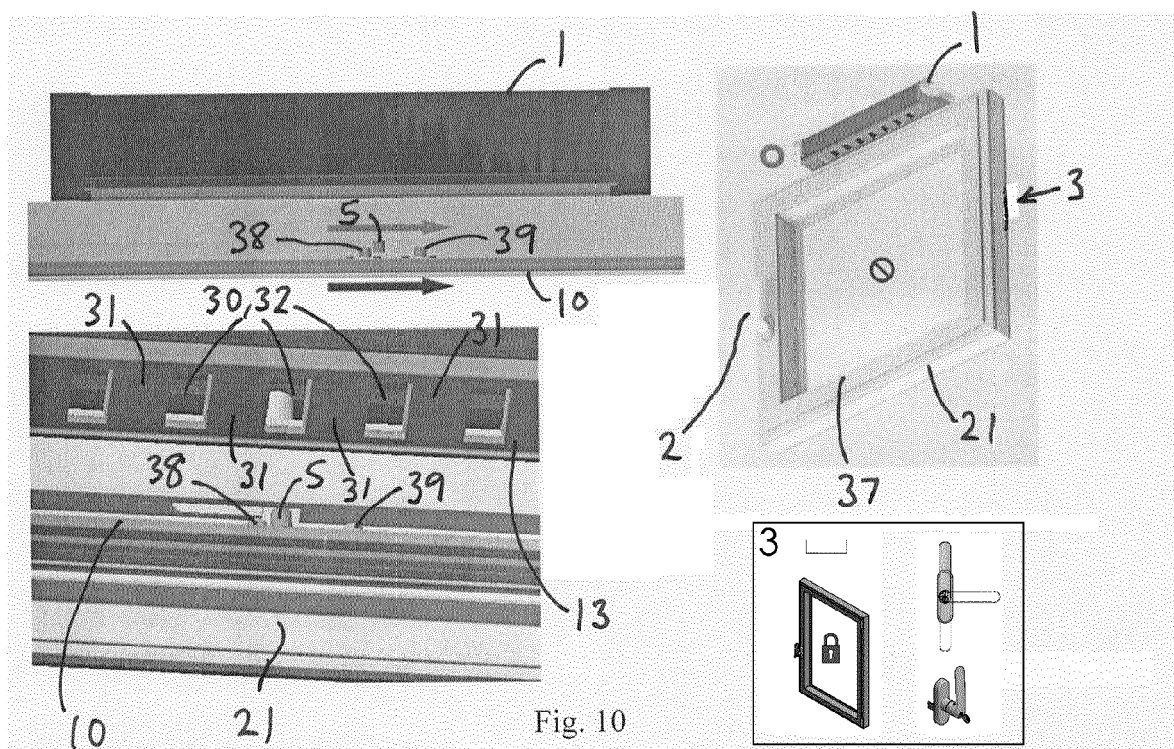
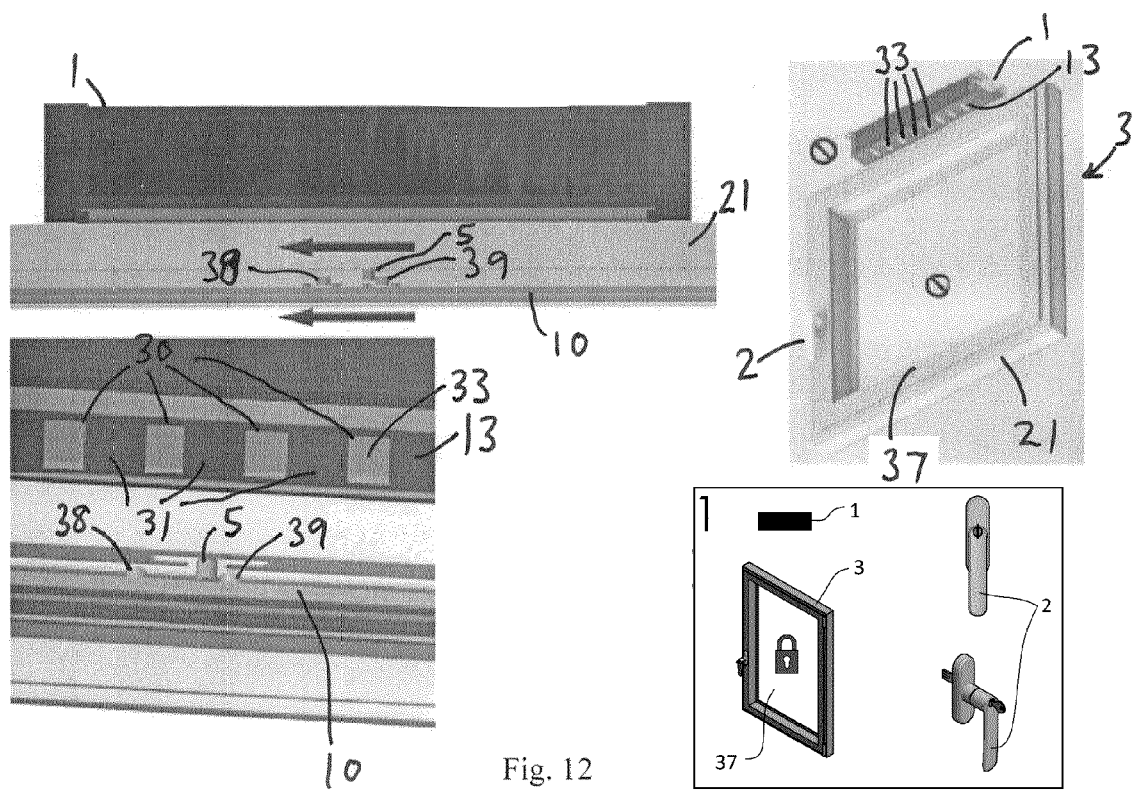


Fig. 9





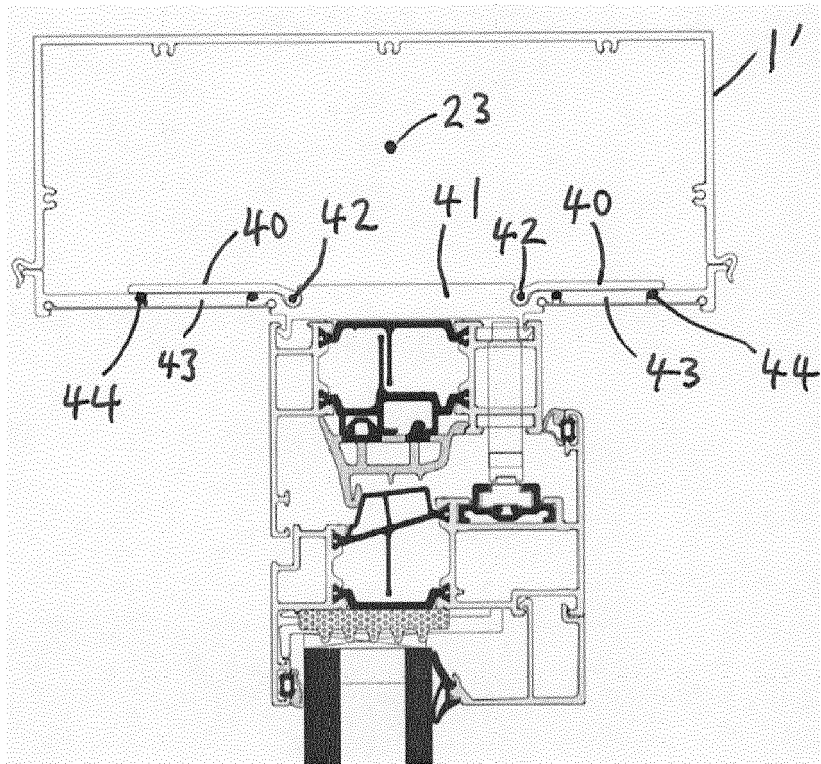


Fig. 13(a)

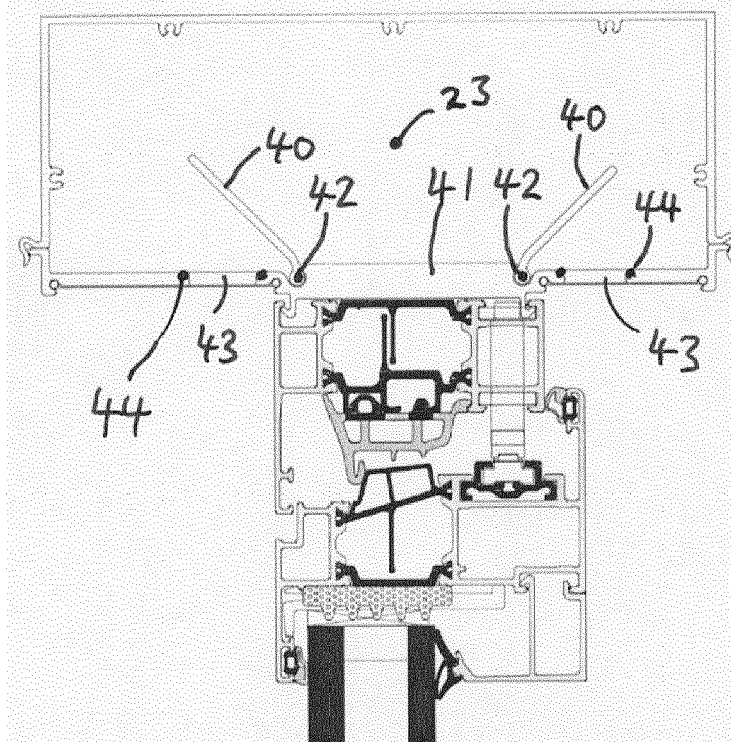


Fig. 13(b)

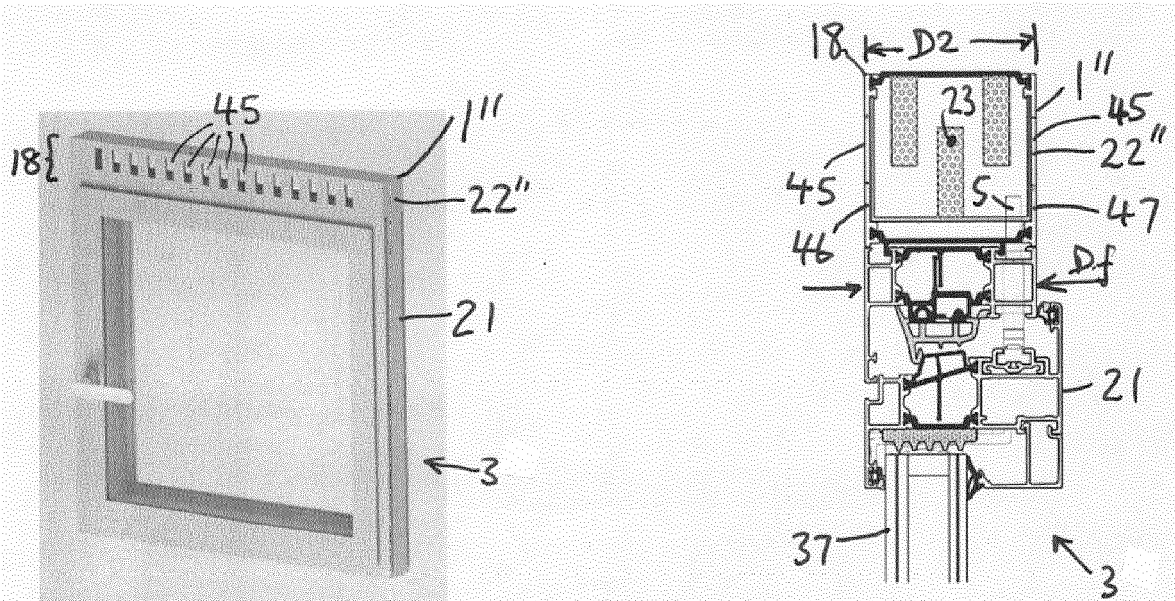


Fig. 14(a)

Fig. 14(b)

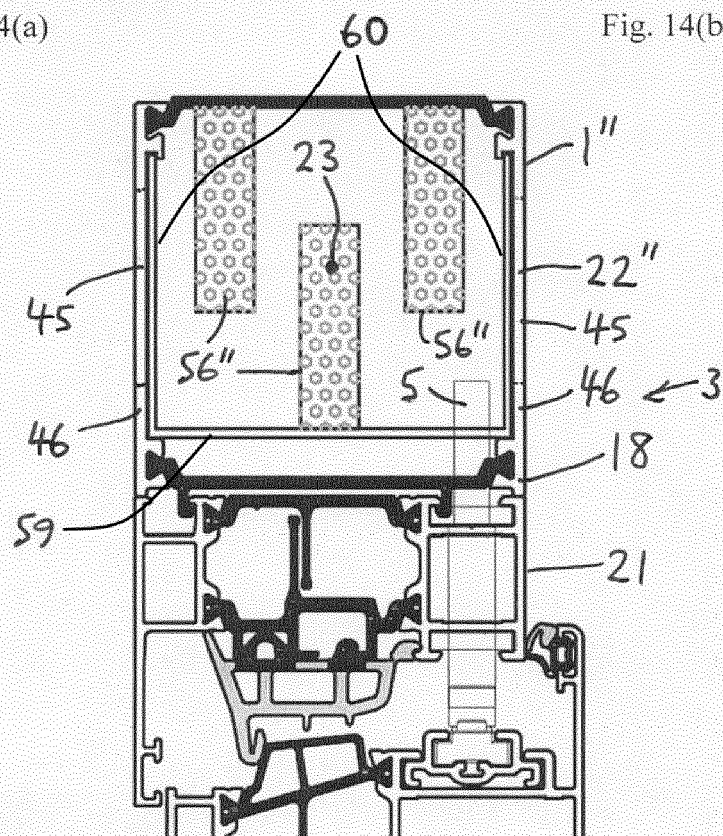


Fig. 14(c)

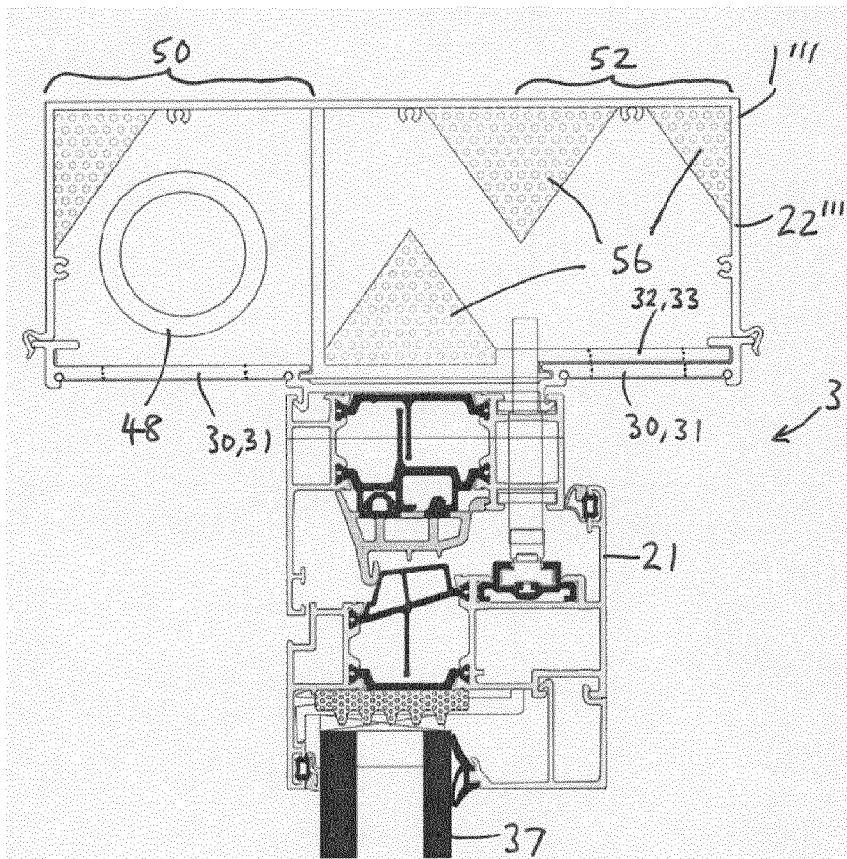


Fig. 15(a)

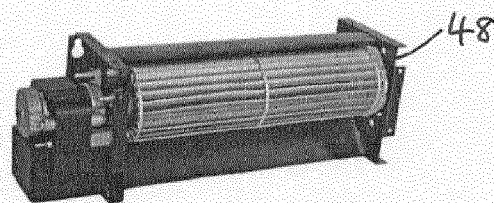


Fig. 15(b)

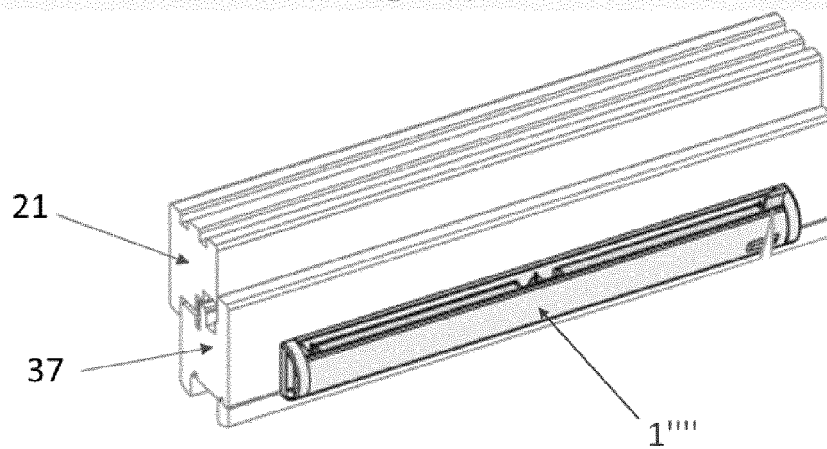


Fig. 16



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 21 3220

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A	JP 2010 156146 A (SUMITOMO FORESTRY) 15 July 2010 (2010-07-15) * paragraph [0014]; figures 1-7 *	1-18	
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A	EP 0 291 540 A1 (MEETH ERNST JOSEF) 23 November 1988 (1988-11-23) * the whole document *	1-18	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 April 2021	Examiner Bourgoin, J
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29-04-2021

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