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(54) **Window securing means and method**

Vorrichtung und Verfahren zur Sicherung eines Fensters

Dispositif et procédé de verrouillage d'une fenêtre

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Description

[0001] The present invention relates to an assembly comprising an openable window, a main frame defining an aperture, a compressible gasket disposed between the window and the main frame, and a mechanical locking means for locking the window to the main frame in a closed position relative to the aperture.

BACKGROUND ART

[0002] Pivoting windows, doors or other aperture closure members are well known and are widely used in walls or ceilings or roofs of buildings, inter alia. A locking mechanism arranged at one or both edge of the sash of a window or other aperture closure member is often used to prevent the sash from being opened unintentionally.

[0003] In various previous instances, as is described for example in EP1445403 and WO196699, locking systems for windows, doors, vehicle doors or the like, often included a movable locking member such as a pawl, a ratchet or the like, for cooperating with a striker plate, said striker plate having a recess, slot or the like for cooperating with the locking member in a locking position. To prevent break-ins etc., the locking member may often feature means for locking the locking member in relation to the striker plate, and said means, which may be a boss or an indentation, may have been designed to engage with a part of the striker plate. Other locking assemblies have also been described, as for example in WO03048487 or WO02053863 where a rotatable or swivellable handle has a locking member designed to pivotally engage a respective projection on a window frame or sash to lock the window in closed position.

[0004] Still further locking assemblies have included such as in WO04063498 which involves a lock assembly, especially for locking a window, a door or the like, comprising a base member, an operating member pivotally connected to the base member, a link member pivotally connected to the base member, a latch pivotally connected to both the link member and the operating member, said operating member being provided with a pivotable elongated handle bar having a first side facing the operating member. DK patent no. 168406 also discloses a lock assembly of the above type. A still further pivotable elongated handle bar lock actuating device is disclosed in EP0792991.

[0005] However, the designs of these or like prior lock mechanisms could be improved, particularly when it comes to ergonomics, and/or other effects on or undesirable results of manual manipulations in operation. Often, prior art designs have required the application of substantial manual forces to engage and secure or even to release the respective locking mechanisms thereof, particularly in those window constructions which include a resiliently compressible, hermetically sealing gasket provided between the frame and the sash or door. Such gaskets can require large forces for manipulation and/or can create a jarring, thus often disagreeable release effect to the operator. It is hence an object of the invention to provide an assembly having improved functionality with respect to ergonomics and simplicity in use.

[0006] DE 10303814 discloses a magnetic locking device for a hinged or longitudinal moving frame part of door or window has first and second magnet locking units arranged at frames with receptacle for damping element. The free end of the damping element protrudes from the locking plane of the magnetic locking unit. At least one of the locking units but preferably both locking units are band or strip shaped. The first magnet locking unit is arranged at the frame part of an attachment door or window and the second magnet locking unit is arranged at the door or window frame. This locking mechanism requires that the doer is slammed shut and thereby provided with a substantial amount of kinetic energy to ensure that the resistance of the damping element (a brush element) is overcome during the final part of the closing procedure.

DISCLOSURE OF THE INVENTION

[0007] On this background, it is an object of the present invention to provide an assembly as referred to in the introductory part with improved ergonomic characteristics, particularly in alternately opening and then securing the window in a closed position. This object is achieved in accordance with the assembly of claim 1 and the method of claim 16. The invention eases the closing and securing process and/or contrarily simplifies the opening process.

[0008] The window is provided with a compressible gasket. The magnetic attracting force is larger than the gasket repulsion force, so that an positive effective closing force is created, and a user does not need to apply any substantial force to compress the gasket.

[0009] In addition to the magnetic securing means for securing the window to the frame structure, a locking means for locking the window to the frame structure is also included.

[0010] A leverage mechanism may be provided to overcome the effective closing force.

[0011] Further objects, features, advantages and properties of the assembly according to the invention will become apparent from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] In the following detailed portion of the present description, the invention will be explained in more detail with reference to the preferred embodiments shown in the drawings, in which:

Fig. 1 is a schematic isometric view of an embodiment of a pivotal window hereof in a closed position,

Fig. 2, which includes sub-part Figs. 2A and 2B, provides further schematic isometric views of embodi-

ments of one or more pivotal windows hereof in respective open positions,

Fig. 3 is a side elevational view of a sash and a frame along the longitudinal dimension of an embodiment hereof,

Fig. 4 is a side elevational view of a sash and a frame along the longitudinal dimension of an embodiment hereof,

Fig. 5 is a partially cut open isometric view of a locking and/or securing assembly hereof in a window structure,

Fig. 6 is an isometric few of the essential components of a securing and/or locking assembly hereof,

Fig. 7 is an elevational view of a securing and locking assembly according hereto in a closed position,

Fig. 8 is an elevational view of a securing and locking assembly according hereto in a position in which the mechanical locking mechanism is disengaged, whilst the magnetic securing system is not,

Fig. 9 is an elevational view of a securing and locking assembly according hereto in a position in which both the mechanical locking mechanism and the magnetic securing means are disengaged, and

Fig. 10 is a graphical representation of force versus distance according hereto.

DETAILED DESCRIPTION

[0013] The assembly of the invention includes a magnetic securing device that may generally include a fixed magnetic field element, such as a permanent magnet or an anchor, and a movable magnetic field element, such as a permanent magnet or an anchor, which cooperate to alternately, first, engage and hold or secure an aperture closure member in closing position of the aperture, and second release and allow for opening of the closure member relative to the aperture. The assembly has an aperture window, the aperture being defined by a substantially fixed frame and the window being a movable means such as a movable sash, the combination further including the magnetic securing device or system for alternately securing and releasing the window relative to the aperture, e.g. for opening and closing said aperture.

[0014] In the general embodiments shown in Figs. 1 - 4, the combination or assembly including an aperture and a window therefore is generally identified with the reference numeral 10, the aperture being defined by a frame 12 and the window identified generally by the reference numeral 11. The combination 10 may be, as shown in the drawings according to a preferred embodiment of the invention, an openable window assembly 11 with a main, substantially stationary, or fixed frame structure 12 which includes a top member 5, a bottom member 6, and side members 7 and 8, and an openable sash structure 13 with a top member 1, a bottom member 2, and side members 3 and 4. The sash structure 13 carries a window pane 15 which together form the openable window 11 in the embodiments shown in the drawings.

[0015] By means of swing fittings or hinges 9, between the respective sash and frame side members 3, 4 and 7, 8; the sash structure 13 is pivotally journalled in the frame structure 12 with an axis of rotation which as shown, may be parallel with the top and bottom members and may be top or bottom hung or established substantially halfway (or at any other disposition) between them by means of the pivotal fittings 9. Moreover, as is known, the rotatable sash 13 may be alternatively (or even alternately; see Fig. 4 described below) journalled about alternate fittings 9 at or about the top or bottom members, or alternatively (or alternately) at a position at or about and/or parallel to the side members.

[0016] In a closed position, the sash 13 and window 11 are oriented substantially parallel with and are disposed within the window frame 12. In the closed position a securing and/or locking mechanism (alternatives of which being described further below) engages the sash 13 with the frame 12 to hold the sash 13 secure and/or locked closed relative to the frame 12. Note, in many preferred embodiments of window frames and corresponding sashes, a resilient and preferably circumferential gasket (not shown) is often provided between the frame 12 and the sash 13. The gasket is compressed when the sash is in the closed position in order to provide a substantially hermetic seal between the frame 12 and the sash 13.

[0017] In Figs. 3 and 4, schematic side views of the window assembly 10 as a combined turn/pivot window are shown, in which the sash structure 13 and the window 11 under normal use may be either top-hung or substantially centrally pivotal relative to the frame structure 12, or alternately both. Thus, both pivotal positions are shown in dashed lines in Fig. 4, with the central alternative shown in a solid line in Fig. 3. In either case, it may be that the window 11 may function as a pivot window which is manually operable and closable through use of a handle member here shown, Fig. 4, represented by handle 35 on the interior side of the sash bottom member. Note, the handle 35 may be top or bottom or otherwise situated.

[0018] To make it possible to swing the window sash through a large angle (e.g., as much as approximately 90 or even 180 degrees) to a convenient open position, the sash structure 13 may be pivotally connected with intermediate hinge members 9 often positioned substantially centrally between the upper and lower parts of the sash and frame side members 3, 4 and 7, 8, respectively. Note, during normal use of the window, either the top-hung or centrally-disposed hinges may be used (as al-

ternatively could bottom disposed hinges or hinges disposed in the respective top and bottom members 1, 2 and 5, 6). The axis of rotation of the substantially central swingable connection lies approximately halfway between the top and bottom members in the same manner as shown in Figs. 3 and 4, and operation of the window to this pivot or swing movement is carried out in a manner frequently used in connection with roof windows, inter alia.

[0019] Note, the handle assembly 35, as shown in the drawings, see Figs. 3 and 4, may be disposed in a substantially horizontal disposition, i.e., operably parallel to the top and/or bottom members 1, 2 and 5, 6 of the sash and frame, and may be disposed at or adjacent the top members 1, 5 (not shown), or may be disposed at or about or adjacent the bottom members 2, 6 as shown in Figs. 3 and 4. Note also, though not shown (and perhaps less preferred), the handle bar assembly 35 could be disposed at various dispositions top to bottom horizontally, or the handle bar member 35, or the like could be disposed in a lengthwise position parallel with the side members 3, 4 and 7, 8, and adjacent one or the other sides 3, 7 or 4, 8. Even so, it should be noted that these alternatives may have a variety of functional distinctions or restrictions not required or impacted by the preferred top and/or bottom horizontal dispositions shown and initially described here.

[0020] The handlebar assembly 35 may act not only as a maneuvering device for the movable sash 13, i.e., alternately into open and closed positions but also as an actuator for alternately engaging and disengaging the locking/securing device.

[0021] Unshown alternatives could provide for the handlebar assembly to be connected to the frame 12 for actuating the locking/securing device, but would likely lose functionality for maneuvering the sash and aperture closure 11 open and closed.

[0022] A first feature of a push/pull member 35 is in a first preferred interaction thereof with one or more locking or securing devices or assemblies hereafter referred to generally using the reference numeral 20. Details of such alternative locking or securing devices or assemblies 20 will be addressed below; but first; more description of a preferred push/pull handle bar assembly 35 will be described with particular reference to Figs. 5-10, inter alia.

[0023] A feature of a locking or securing device or assembly hereafter referred to generally using the reference numeral 20 involves magnetism. Details of such will be described with particular reference to Figs. 5, to 9. As shown in Figs. 5-9, a magnetic securing means is depicted. One, two or more of such units may be provided along the sides of the frame 12, depending on the size and rigidity of the frame 12 and movable sash 13. The depicted preferred embodiment includes two such assemblies. Each assembly may be a magnetic securing device/assembly 20 including a magnetic unit 50 and a cooperating magnetic unit 54 to be affixed (as by screws, nails, embedding or other means) to a corresponding fixed frame member, e.g., either top or bottom frame member 5 or 6. The fixture may have, for example, a magnetic unit 50 including a super magnet in the form of a bar magnet 51 made from or at least including Neodymium-Iron-Boron ($Nd_2Fe_{14}B$). The bar magnet 51 is disposed on a substantially L-shaped member 52 of a magnetically permeable material such as iron to effectively form a U-shaped magnetic unit with both poles facing in the same direction. The magnetic device 20 includes similar or magnetic unit 54 with a super magnets in the form of a bar magnet to 55 disposed on a substantially L-shaped member 56 of a magnetically permeable material. The two magnetic units are arranged such that opposite poles face one another. The magnetic units 50,54 are embedded in plastic (not shown), preferably in a layer of plastic or similar suitable material that is a few millimeters thick. Thus, in the closed position the one another facing surfaces of the two magnetic units 50,54 are separated by a layer of plastic, i.e. a medium with a low magnetic permeability. Thereby, it is avoided that the two super magnetic units 50,54 come in direct contact with one another, which is important since it would require excessive forces to separate the two super magnetic units once they are in direct contact with one another. Fastening means such as bores for receiving screws (not shown) are integrated into the plastic embedding. The alternative of using less strong magnets that are allowed to come in contact with one another (and can subsequently be separated without applying excessive force) is not viable. In order to obtain and effective closing force that exceeds the repulsion force of the gasket throughout the compression force of the gasket it is necessary to use very strong super magnets, that have a substantial pulling power in a range that covers the complete compression range of the gasket (cf. Fig. 10).

[0024] An eyelet 43 or other hook receiving portion is disposed connected to the frame fixture 41 (or may otherwise be connected to the window frame) for receiving a securing hook 44, or the like, also described below. The eyelet 43 is provided wit a roller 61 that cooperates with a cam 48 that will be described in greater detail below.

[0025] Thus, the magnetic units or portions 50,54 overcome the repulsion force of the gasket and secure the aperture window 11 in closing position of said aperture.

[0026] The specific operational features of a preferred magnet assembly 20, which may also be known as a magnetic securing device 20, will now be described.

[0027] In operation, starting from an open position, the window is manually moved towards the closing position. When window abuts with the gasket, the attractive force between the magnetic units 50,54 (cf. Fig. 10) is larger that the repulsive force of the gasket under compression and the last part of the closing movement of the window is automatic or at least requires very little effort. In the closed position the window 11 is, in this embodiment, secured, but not locked, e.g. to prevent a burglar from opening the window. In the preferred embodiment the

assembly is configured such that the effective closing force (magnetic attractive force minus the gasket repulsion force) is relatively small, preferably only large enough so as to ensure that variations caused by production tolerances do not lead to a negative effective closing force. Thus, the effort required to move the window 11 from the closed position to an open position is as low as possible.

[0028] The magnetic force of the magnetic device 20 may be such as to strongly resist opening, thus locking the sash against the frame, or may in be of limited strength (depending upon available materials, for example) and thus provide more relative securing of the sash against the frame. An auxiliary or alternative locking device, e.g., a hookpiece 44, is then used as described below. In any case, the mere push and pull activation by manual maneuvering of the handle 35 to put the magnetic units 50,54 in position adjacent one another may provide greater simplicity in operation and actuation of the alternate securing/locking and then unsecuring/unlocking feature, simplifying the overall maneuvering necessary by the human operator to both engage and disengage, and/or improving the overall ergonomics of the opening and/or closing of the window 11 relative to the aperture.

[0029] According to a preferred embodiment, the positive effective securing locking force is quite substantial, if not enough to lock the sash to the frame for burglary prevention. A leverage mechanism actuated by the handle bar 35 and including one or more cams 48 (two cams in the preferred embodiment) assists in overcoming the effective securing force (Fig. 10) when the window is to be moved from the closed position to an open position.

[0030] The preferably elongated handle bar 35, which has one or more, here two, connecting bars 37 which operably connect the bar to the cams 48. Such mechanical parts include generally as shown in Figs. 5-9, one or more, here two, gear assemblies 38, which are mechanically connected to an elongated rotational rod 39. The gear assemblies include a rack 65 attached to the connecting bar 37 and a pinion 66 mounted on the elongated rod 39. These parts, particularly the gears 38 may then be connected (as by nails or screws or other connection means) to the sash, see e.g., elongated horizontal sash member 1a or 2a (which could be a part of or comprise the entirety of the sash upper or lower member 1 or 2, see descriptions thereof above). The connecting bars 37 are disposed to move translationally back and forth within (e.g., telescopically in and out of) the gear assemblies 38 (see the arrowheads in Figs. 5) with alternate pushing and pulling forces applied to the bar 35. The rotational rod 39 may be disposed in rotational capacity within a receiving trough or other channel like feature (not shown) defined in the sash member 1a or 2a.

[0031] The cams 48 are mounted onto of a elongate shaft 39 (at or near the opposite ends thereof) and rotate in unison therewith. In the closed position (Fig. 7) the cam 48 abuts with the roller 61 at the lowest point of the cam profile. This part of the cams 48 is also provided with a latch or hookpiece 44. In the closed position the latch or hookpiece 44 engages the eyelet 43, thereby effectively locking the window to the frame.

[0032] Note, as introduced, an auxiliary locking device is used, e.g., for redundancy or to provide actual locking if the magnetic member 20 is not sufficiently strong to lock (e.g., rather than merely secure) the aperture window in closed position by itself. As shown in Figs. 5, 6, 8 and 9, the magnetic securing device 20 is used with an auxiliary locking device, particularly a latch or hookpiece 44, thereby providing a secure stay device plus a lock device. The auxiliary locking member or mechanism, 44, can thus be an integral part of the cam 48, although it would also be possible to provide attach one or more separate arms or hooks to the elongated shaft (not shown), i.e. latch 44 may be operated by conventional means so long as it is adapted to extend into a recess or eyelet 43 connected to or within the frame 12 as for example in either upper or lower member 5 or 6 (or in the respective side member 7 or 8) to secure the sash against undesired opening.

[0033] Note also that it may be desirable for there to be clearance between the hookpiece 44 and the eyelet 43 such engagement of the hook with the eyelet only occurs when and if the magnetic securing force has overcome, as by an attempted break-in. Thus, so long as there is such clearance, then, the normal operation of the mechanical locking system will not have to overcome contact resistance of the latch. In another version there may not be any clearance between the hookpiece 44 and the eyelet to avoid rattling or noise when the window moves e.g. by wind forces. However the contact pressure between the hookpiece 44 and the eyelet 43 is configured to be very relatively small, so that the operation of the leverage mechanism is still very light. Thus, the system will be more ergonomically attractive, i.e., will require less manually-applied force for opening or closing.

[0034] Note, that a sealing gasket (not shown) is used as a sealing member between the frame and the sash, and a considerable amount of force can often be necessary to be applied to and/or by a securing mechanism, such as may be necessary for use of a magnetic locking device 20 as shown and described here, to ensure that the gasket is properly and fully compressed for sealing closure. In the closed position, the contrary repelling force of the gasket that resists closure or otherwise urges the sash toward an open position (caused by the resilient pressure of the gasket exerted by the gasket on the sash 13) is fully counteracted by the magnetic attractive force between the magnetic units 50, 54. (i.e. the mechanical lock, including e.g. the latch 44, is not loaded at any time by the force caused by the compressed gasket). In operation, the magnetic lock first overcomes the pressure of the gasket and thereafter, if used, the hookpiece 44 may be used to catch the eyelet 43 when the sash is secured in closed position by the magnet. When the sash is opened, the order is reversed, so that the latch 44 may be disengaged from the eyelet 43 whilst the magnetic

securing means still withstands the opening force exerted by the gasket onto the sash. The effective closing force is then overcome after the latch has disengaged the eyelet. The profile of the cam 48 assures that there is a substantial leverage effect on the (pulling) force that the user applies to the handle bar 35. Consequently, the force that a user needs to apply to the handle bar to alternately engage and disengage and engage the sash is very low, thus adding to user ergonomics and/or comfort. As will be readily understood other leverage mechanisms with or without a cam could be used, such as for example a mechanism with the elongated shaft 39 acting as a synchronous shaft on between two racks, one of the racks being connected to the handle part via the connecting bars and the other rack being connected to a push bar, the extremity thereof acting on the frame.

[0035] Fig. 8 shows the assembly in a semi-open position where the cam is acting on the roll 61 to overcome the last part of the effective closing force, whilst Fig. 9 shows the assembly in an open position in which there is no longer any effective closing force.

[0036] A graphical representation of an embodiment of an operable magnetic force versus a gasket force is set forth in Fig. 10. In this representation, a gasket force line L is shown graphically as a dashed line, while the magnetic force line is shown in solid line form. On the abscissa is the Aperture Opening Distance starting at the left side at A which represents closure of the aperture at zero distance (i.e., substantially zero distance between the sash and the frame) extending to a point B which is where the gasket force drops to zero representing an open aperture condition (i.e., where the gasket is removed from contact with sash. On the ordinate is the measure of force. Point U represents the maximum closure-resistive force of the gasket, which may be empirically determined and point V represents the amount of closure force of the magnet. Preferably, the magnet 20 will be chosen to have a closure force at least equal but preferably slightly greater than the gasket force (otherwise, the gasket will successfully open the aperture against a lesser magnetic force). The resulting effective closing force is represented by the dotted line, and the effective window closing force is represented by point W.

[0037] As to ultimate uses, it may be noted that the window construction of the primary embodiments is a pivot window for installation in an inclined roof, however, the window or other aperture window may be installed in any of various orientations in/on a building, a vehicle or other situs for closing a respective aperture.

[0038] Preferably, the top, bottom and side members of the frame and sash structures may for the major part be built using wood products, although it is also possible to use metal or plastic. These profiles, particularly those which may be exposed to the weather may also be covered with covering members which are constituted of comparatively thin metal sheet profiles, for instance of aluminum, and which together may provide a completely weather-shielding enclosure of the window. Preferably the hinge(s) 9 and the operable securing/looking means 20 and/or 44 may be made from metallic material, such as steel, or strong plastic materials, such as fiber reinforced plastics or combinations thereof, the primary exceptions being the magnetic and/or magnetically activatable members which may be of any magnetic materials. The handlebar assembly 35 may additionally and/or alternatively be made from various combinations of materials including, without limitation, wood, metals and/or plastics.

[0039] Although the present invention has been described in detail for purpose of illustration, it is understood that such detail is solely for that purpose, and variations in combinations can be made therein by those skilled in the art without departing from the scope of the invention as defined by the appended claims.

Claims

1. An assembly comprising an openable window (11), a main frame (12) defining an aperture, a compressible gasket disposed between said window (11) and said main frame (12), a mechanical locking means (43,44) for locking said window (11) to said main frame (12) in a closed position relative to said aperture, wherein each of the window (11) and the main frame (12) includes a respective portion (50,54) of a magnetic means for securing said window (11) to the frame (12), wherein said magnetic means for securing includes a magnetic field in both portions (50,54), one of the portions (50) being disposed on the main frame (12) and one of the portions (54) being disposed on the openable window (11) and thus being adapted to be movable by an operator with the openable window alternately into a magnetically attractive closure position and a magnetically unattractive opening position, the gasket being at least partially compressed when the window (11) is secured to the aperture, and the attractive force between the portions (50, 54) exceeds the repulsion force of the gasket at all stages of compression of the gasket for compressing the gasket under the influence of the magnetic locking (20) means to the closed position so that the mechanical locking means (43, 44) can lock the window (11) to the aperture defined by the frame (12) without the mechanical locking means (43, 44) being loaded by the force caused by the compressed gasket.

2. An assembly according to claim 1, wherein portions (50,54) are in the closed position separated by a medium with a low magnetic permeability.

3. An assembly according to claim 1 or 2, wherein one or both of the portions (50,54) comprises a permanent magnet (51,55), preferably a Neodymium-Iron-Boron super magnet.

4. An assembly according to claim 1 or 2, wherein the permanent magnets (51,55) are bar magnets disposed on a substantially L-shaped member (52,56) of a magnetically permeable material to effectively form a U-shaped magnetic unit with both poles facing in the same direction.

5. An assembly according to claim 3 or 4, wherein the permanent magnet (51,55) as such or the magnetic unit (50,54) as a whole is embedded in a material with a low magnetic permeability.

6. An assembly according to claim 5, wherein a medium with a low magnetic permeability separating the two portions is formed by the material in which the permanent magnet (51,55) or the magnetic unit (50,54) is embedded.

7. An assembly according to any of claims 1 to 6, further comprising a leverage mechanism for overcoming the attractive magnetic force between the portions (50,54) when moving the window (11) away from the closed position.

8. An assembly according to claim 7, wherein the leverage mechanism includes a handle (35) operatively connected to a rotable cam (48) and roller (61).

9. An assembly according to claim 8, wherein the leverage mechanism including the handle (35) and the cam (48) is arranged on and/or in the window (12).

10. An assembly according to claim 8, wherein the leverage mechanism includes a rack (65) and pinion (66) gear (38) to transmit a translative movement of the handle (35) into a rotational movement of the cam (48).

11. An assembly according to any of claims 1 to 10, wherein the assembly is configured to first compress the gasket under the influence of the magnetic locking (20) means and thereafter engage the mechanical locking means (43, 44) to lock the window (11) to the aperture defined by the frame (12) and said assembly being configured to first disengage the mechanical locking (43, 44) means and thereafter disengage the magnetic securing means (20) to release the window (11) relative to the aperture.

12. An assembly according to claim 11, wherein the mechanical locking means (44) for securing said window (11) to the frame (12) comprises a hooking or latching member (44).

13. An assembly according to claim, 12 wherein the hooking or latching member (44) is integrated in the cam (48).

14. An assembly according to any of claims 8 to 13, wherein the roller (61) is disposed on an eyelet (43) that is secured to the frame (12).

15. An assembly according to any of the preceding claims, wherein the window (11) comprises a movable sash structure (13) having horizontal top and bottom members (1, 2) connected by parallel side members (3, 4), said sash structure being accommodated by at least one hinge device (9) in an aperture frame structure (12) with top and bottom members (5, 6) connected by side members (7, 8), wherein the magnetic means (20) is connected to at least one of the top and bottom members (1, 2) or at least one of the parallel side members (3, 4) of the movable sash structure (13).

16. A method for securing and releasing an openable window (11) in closed position relative to an aperture defined by a main frame (12), one of the window (11) and the main frame (12) including a magnetic means (20) for securing said window (11) to the frame (12) and a mechanical locking means (43, 44) for locking said window (11) to the frame (12); a compressible gasket between the window (11) and the aperture, the method being **characterized by**:

substantially translationally moving at least a portion (50) of a magnetic assembly (20) toward another portion (54) of the magnetic assembly (20);
alternately securing and releasing an openable aperture window (11) in closed position relative to an aperture defined by a main frame (12) with the gasket at least partially compressed, wherein the attractive force between the portions of the magnetic assembly is in all positions larger that the gasket repulsion force to obtain a positive effective closing force, said method further comprising first bringing the an openable aperture window (11) in the closed position by compressing the gasket with the assistance of the magnetic locking (20) means and thereafter engaging the mechanical locking means (43, 44) when securing the window (11) to the aperture defined by the frame (12)

17. A method according to claim 16, further comprising first disengaging the mechanical locking (43, 44) means and thereafter the overcoming the magnetic securing means (20) to release the window (11) relative to the aperture when disengaging the window (11) from the aperture defined by the frame (12).

18. A method according to claim 16 or 17, further comprising the step of overcoming the effective closing force for releasing an openable aperture window (11) by the use of a leverage mechanism.

Patentansprüche

1. Baugruppe, umfassend ein öffnungsfähiges Fenster (11), einen Hauptrahmen (12), der eine Öffnung definiert, eine zusammendrückbare Dichtung zwischen dem Fenster (11) und dem Hauptrahmen (12) einen mechanischen Arretiermechanismus (43, 44) zum Arretieren des Fensters (11) am Hauptrahmen (12) in einer geschlossenen Position bezüglich der Öffnung, wobei das Fenster (11) und der Hauptrahmen (12) jeder einen jeweiligen Abschnitt (50, 54) eines Magnetmittels zum Sichern des Fensters (11) am Rahmen (12) enthält, wobei das Magnetmittel zum Sichern ein Magnetfeld in beiden Abschnitten (50, 54) enthält, wobei einer der Abschnitte (50) am Hauptrahmen (12) angeordnet ist und einer der Abschnitte (54) am öffnungsfähigen Fenster (11) angeordnet ist und daher geeignet ist, durch eine Bedienperson abwechselnd in eine magnetisch anziehende Schließposition und eine magnetisch nicht anziehende Öffnungsposition beweglich zu sein, wobei die Dichtung zumindest teilweise zusammengedrückt wird, wenn das Fenster (11) an der Öffnung gesichert ist, und wobei die Anziehungskraft zwischen den Abschnitten (50, 54) die Abstoßungskraft der Dichtung in allen Kompressionsphasen der Dichtung zum Zusammendrücken der Dichtung unter der Einwirkung des magnetischen Arretiermittels (20) zur geschlossenen Position übersteigt, sodass die mechanischen Arretiermittel (43, 44) das Fenster (11) an der Öffnung, die durch den Rahmen (12) definiert ist, arretieren können, ohne dass die mechanischen Arretiermittel (43, 44) durch die Kraft belastet werden, die durch die zusammengedrückte Dichtung bewirkt ist.

2. Baugruppe nach Anspruch 1, wobei Abschnitte (50, 54) in der geschlossenen Position durch ein Medium mit einer niedrigen magnetischen Permeabilität getrennt sind.

3. Baugruppe nach einem der Abschnitte 1 oder 2, wobei einer oder beide der Abschnitte (50, 54) einen Permanentmagneten (51, 55) umfasst, vorzugsweise einen Neodym-Eisen-Bor-Supermagneten.

4. Baugruppe nach einem der Ansprüche 1 oder 2, wobei die Permanentmagneten (51, 55) Stabmagneten sind, die auf einem im Wesentlichen L-förmigen Glied (52, 56) aus einem magnetisch permeablen Material angeordnet sind, um wirksam eine U-förmige Magneteinheit auszubilden, bei der beide Pole in dieselbe Richtung deuten.

5. Baugruppe nach einem der Ansprüche 3 oder 4, wobei der Permanentmagnet (51, 55) als solcher oder die Magneteinheit (50, 54) als Ganzes in ein Material mit niedriger magnetischer Permeabilität eingelassen ist.

6. Baugruppe nach Anspruch 5, wobei ein Medium mit einer niedrigen magnetischen Permeabilität, das die zwei Abschnitte trennt, durch das Material ausgebildet ist, in das der Permanentmagnet (51, 55) oder die Magneteinheit (50, 54) eingelassen ist.

7. Baugruppe nach einem der Ansprüche 1 bis 6, ferner umfassend einen Hebelmechanismus zum Überwinden der anziehenden Magnetkraft zwischen den Abschnitten (50, 54) beim Bewegen des Fensters (11) aus der geschlossenen Position weg.

8. Baugruppe nach Anspruch 7, wobei der Hebelmechanismus einen Griff (35) enthält, der betriebsfähig mit einem Drehnocken (48) und einer Rolle (61) verbunden ist.

9. Baugruppe nach Anspruch 8, wobei der Hebelmechanismus, der den Griff (35) und den Nocken (48) enthält, am und/oder im Fenster (12) angeordnet ist.

10. Baugruppe nach Anspruch 8, wobei der Hebelmechanismus ein Getriebe (38) aus Zahnstange (65) und Ritzel (66) zum Übertragen einer Translationsbewegung des Griffs (35) in eine Drehbewegung des Nockens (48) enthält.

11. Baugruppe nach einem der Ansprüche 1 bis 10, wobei die Baugruppe dazu konfiguriert ist, zunächst die Dichtung unter der Einwirkung der magnetischen Sperrmittel (20) zusammenzudrücken und danach die mechanischen Arretiermittel (43, 44) zum Arretieren des Fensters (11) an der Öffnung, die durch den Rahmen (12) definiert ist, in Eingriff zu bringen, und wobei die Baugruppe dazu konfiguriert ist, zunächst die mechanischen Arretiermittel (43, 44) außer Eingriff zu bringen und danach die magnetischen Sicherungsmittel (20) zum Freigeben des Fensters (11) bezüglich der Öffnung außer Eingriff zu bringen.

12. Baugruppe nach Anspruch 11, wobei die mechanischen Arretiermittel (44) zum Sichern des Fensters (11) am Rahmen (12) ein Einhak- oder Einklinkglied (44) umfassen.

13. Baugruppe nach Anspruch 12, wobei das Einhak- oder Einklinkglied (44) in den Nocken (48) eingegliedert ist.

14. Baugruppe nach einem der Ansprüche 8 bis 13, wobei die Rolle (61) an einer Öse (43) angeordnet ist, die am Rahmen (12) gesichert ist.

15. Baugruppe nach einem der vorhergehenden Ansprüche, wobei das Fenster (11) eine bewegliche Flügelrahmenstruktur (13) mit horizontalen oberen

und unteren Gliedern (1, 2) umfasst, die durch parallele Seitenglieder (3, 4) verbunden sind, wobei die Flügelrahmenstruktur durch zumindest eine Scharniervorrichtung (9) in einer Öffnungsrahmenstruktur (12) mit oberen und unteren Gliedern (5, 6), welche durch Seitenglieder (7, 8) verbunden sind, untergebracht ist, wobei das Magnetmittel (20) mit zumindest einem der oberen und unteren Glieder (1, 2) oder zumindest einem der parallelen Seitenglieder (3, 4) der beweglichen Flügelrahmenstruktur (13) verbunden ist.

16. Verfahren zum Sichern und Freigeben eines öffnungsfähigen Fensters (11) in geschlossener Position bezüglich einer Öffnung, die durch einen Hauptrahmen (12) definiert ist, wobei eines des Fensters (11) und des Hauptrahmens (12) ein Magnetmittel (20) zum Sichern des Fensters (11) am Rahmen (12) und ein mechanisches Arretiermittel (43, 44) zum Arretieren des Fensters (11) am Rahmen (12) enthält; wobei eine zusammendrückbare Dichtung zwischen dem Fenster (11) und der Öffnung ist, wobei das Verfahren durch folgendes gekennzeichnet ist:

im Wesentlichen Translationsbewegen von zumindest einem Abschnitt (50) einer Magnetbaugruppe (20) zu einem anderen Abschnitt (54) der Magnetbaugruppe (20) hin;
abwechselndes Sichern und Freigeben eines öffnungsfähigen Öffnungsfensters (11) in geschlossener Position bezüglich einer Öffnung, die durch einen Hauptrahmen (12) definiert ist, wobei die Dichtung zumindest teilweise zusammengedrückt wird, wobei die Anziehungskraft zwischen den Abschnitten der Magnetbaugruppe in allen Positionen größer als die Dichtungsabstoßkraft ist, um eine positive wirksame Schließkraft zu erzielen, wobei das Verfahren ferner zunächst das Verbringen des öffnungsfähigen Öffnungsfensters (11) in die geschlossene Position durch Zusammendrücken der Dichtung mithilfe des magnetischen Arretiermittels (20) und danach das Einrasten der mechanischen Arretiermittel (43, 44) beim Sichern des Fensters (11) an der Öffnung, die durch den Rahmen (12) definiert ist, umfasst.

17. Verfahren nach Anspruch 16, ferner umfassend zunächst das Freigeben der mechanischen Arretiermittel (43, 44) und danach das Überwinden des magnetischen Sicherungsmittels (20) zum Freigeben des Fensters (11) bezüglich der Öffnung beim Freigeben des Fensters (11) aus der Öffnung, die durch den Rahmen (12) definiert ist, umfasst.

18. Verfahren nach einem der Ansprüche 16 oder 17, ferner umfassend den Schritt des Überwindens der effektiven Schließkraft zum Freigeben eines öffnungsfähigen Öffnungsfensters (11) durch die Benutzung eines Hebelmechanismus.

Revendications

1. Ensemble comprenant une fenêtre ouvrable (11), un cadre principal (12) définissant une ouverture, un joint compressible disposé entre ladite fenêtre (11) et ledit cadre principal (12), un moyen de verrouillage mécanique (43, 44) pour verrouiller ladite fenêtre (11) sur ledit cadre principal (12), dans une position fermée par rapport à ladite ouverture, dans lequel chacun de la fenêtre (11) et du cadre principal (12) comprend une partie respective (50, 54) d'un moyen magnétique pour fixer ladite fenêtre (11) sur le cadre (12), dans lequel ledit moyen de fixation magnétique comprend un champ magnétique dans les deux parties (50, 54), une des parties (50) étant disposée sur le cadre principal (12) et une des parties (54) étant disposée sur la fenêtre ouvrable (11) et étant ainsi adaptée pour être déplacée par un opérateur avec la fenêtre ouvrable en alternance dans une position de fermeture avec attraction magnétique et une position d'ouverture sans attraction magnétique, le joint étant au moins partiellement comprimé lorsque la fenêtre (11) est fixée sur l'ouverture, et la force d'attraction entre les parties (50, 54) dépasse la force de répulsion du joint à toutes les étapes de compression du joint pour comprimer le joint sous l'influence du moyen de verrouillage magnétique (20) vers la position fermée de façon à ce que le moyen de verrouillage mécanique (43, 44) puisse verrouiller la fenêtre (11) sur l'ouverture définie par le cadre (12) sans que le moyen de verrouillage mécanique (43, 44) ne soit contraint par la force provoquée par le joint comprimé.

2. Ensemble selon la revendication 1, dans lequel les parties (50, 54) sont, dans la position fermée, séparées par un agent à faible perméabilité magnétique.

3. Ensemble selon la revendication 1 ou 2, dans lequel une ou deux des parties (50, 54) comprend un aimant permanent (51, 55), de préférence un super aimant neodymium-fer-boron.

4. Ensemble selon la revendication 1 ou 2, dans lequel les aimants permanents (51, 55) sont des barres aimantées disposées sur un élément essentiellement en L (52, 56) en matériau perméable magnétiquement pour former réellement une unité magnétique en forme de U avec les deux pôles orientés dans la même direction.

5. Ensemble selon la revendication 3 ou 4, dans lequel l'aimant permanent (51, 55) en tant que tel ou l'unité magnétique (50, 54) en tant que tout est enchâssé(e)

dans un matériau à faible perméabilité magnétique.

6. Ensemble selon la revendication 5, dans lequel un agent à faible perméabilité magnétique séparant les deux parties est formé par le matériau dans lequel l'aimant permanent (51, 55) ou l'unité magnétique (50, 54) est enchâssé(e).

7. Ensemble selon l'une quelconque des revendications 1 à 6, comprenant en outre un mécanisme de levier pour vaincre la force magnétique d'attraction entre les parties (50, 54) lorsque la fenêtre (11) est éloignée de la position fermée.

8. Ensemble selon la revendication 7, dans lequel le mécanisme de levier comprend une poignée (35) reliée de façon opérationnelle à une came rotative (48) et à un galet (61).

9. Ensemble selon la revendication 8, dans lequel le mécanisme de levier comprenant la poignée (35) et la came (48) est agencé sur et/ou dans la fenêtre (12).

10. Ensemble selon la revendication 8, dans lequel le mécanisme de levier comprend une transmission (38) à crémaillère (65) et pignons (66) pour transmettre un mouvement de translation de la poignée (35) en un mouvement de rotation de la came (48).

11. Ensemble selon l'une quelconque des revendications 1 à 10, dans lequel l'ensemble est configuré pour comprimer d'abord le joint sous l'influence du moyen de verrouillage magnétique (20) et ensuite engager le moyen de verrouillage mécanique (43, 44) pour verrouiller la fenêtre (11) sur l'ouverture définie par le cadre (12), et ledit ensemble étant configuré pour désengager d'abord le moyen de verrouillage mécanique (43, 44) et désengager ensuite le moyen de fixation magnétique (20) pour libérer la fenêtre (11) par rapport à l'ouverture.

12. Ensemble selon la revendication 11, dans lequel le moyen de verrouillage mécanique (44) pour fixer ladite fenêtre (11) sur le cadre (12) comprend un élément de crochetage ou de verrouillage (44).

13. Ensemble selon la revendication 12, dans lequel l'élément de crochetage ou de verrouillage (44) est intégré dans la came (48).

14. Ensemble selon l'une quelconque des revendications 8 à 13, dans lequel le galet (61) est disposé sur un oeillet (43) qui est fixé sur le cadre (12).

15. Ensemble selon l'une quelconque des revendications précédentes, dans lequel la fenêtre (11) comprend une structure de châssis mobile (13) présentant des éléments supérieur et inférieur horizontaux (1, 2) reliés par des éléments latéraux parallèles (3, 4), ladite structure de châssis étant reçue par au moins un dispositif à charnière (9) dans une structure de cadre d'ouverture (12) avec des éléments supérieur et inférieur (5, 6) reliés par des éléments latéraux (7, 8), dans lequel le moyen magnétique (20) est relié à au moins un des éléments supérieur et inférieur (1, 2) ou à au moins un des éléments latéraux parallèles (3, 4) de la structure de châssis mobile (13).

16. Procédé de fixation et de libération d'une fenêtre ouvrable (11) en position fermée par rapport à une ouverture définie par un cadre principal (12), l'un de la fenêtre (11) et du cadre principal (12) comprenant un moyen magnétique (20) pour fixer ladite fenêtre (11) sur le cadre (12), et un moyen de verrouillage mécanique (43, 44) pour verrouiller ladite fenêtre (11) sur le cadre (12) ; un joint compressible entre la fenêtre (11) et l'ouverture, le procédé étant **caractérisé par** :

le déplacement essentiellement translationnel d'au moins une partie (50) d'un ensemble magnétique (20) en direction d'une autre partie (54) de l'ensemble magnétique (20) ;
la fixation et la libération en alternance d'une fenêtre d'ouverture ouvrable (11) en position fermée par rapport à une ouverture définie par un cadre principal (12) avec le joint au moins partiellement comprimé, dans lequel la force d'attraction entre les parties de l'ensemble magnétique est supérieure, dans toutes les positions, à la force de répulsion du joint pour obtenir une force de fermeture réelle positive, ledit procédé comprenant en outre d'amener d'abord la fenêtre d'ouverture ouvrable (11) dans la position fermée en comprimant le joint à l'aide du moyen de verrouillage magnétique (20) et d'engager ensuite le moyen de verrouillage mécanique (43, 44) lorsque l'on verrouille la fenêtre (11) sur l'ouverture définie par le cadre (12).

17. Procédé selon la revendication 16, comprenant en outre de désengager d'abord le moyen de verrouillage mécanique (43, 44) et de vaincre ensuite le moyen de fixation magnétique (20) pour libérer la fenêtre (11) par rapport à l'ouverture lorsque l'on désengage la fenêtre (11) de l'ouverture définie par le cadre (12).

18. Procédé selon la revendication 16 ou 17, comprenant en outre l'étape de vaincre la force de fermeture efficace pour libérer une fenêtre d'ouverture ouvrable (11) en utilisant un mécanisme de levier.

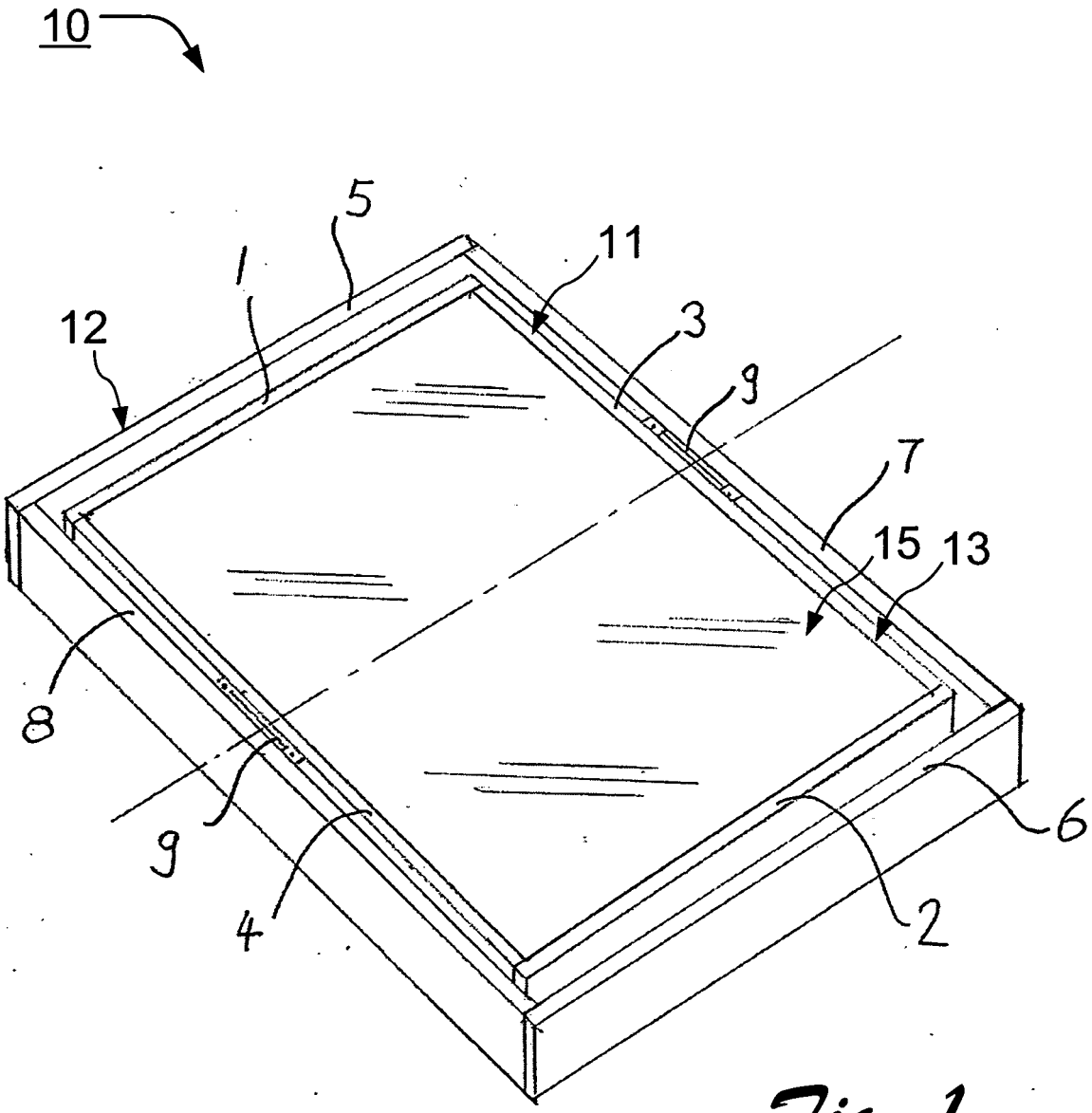

Fig. 1

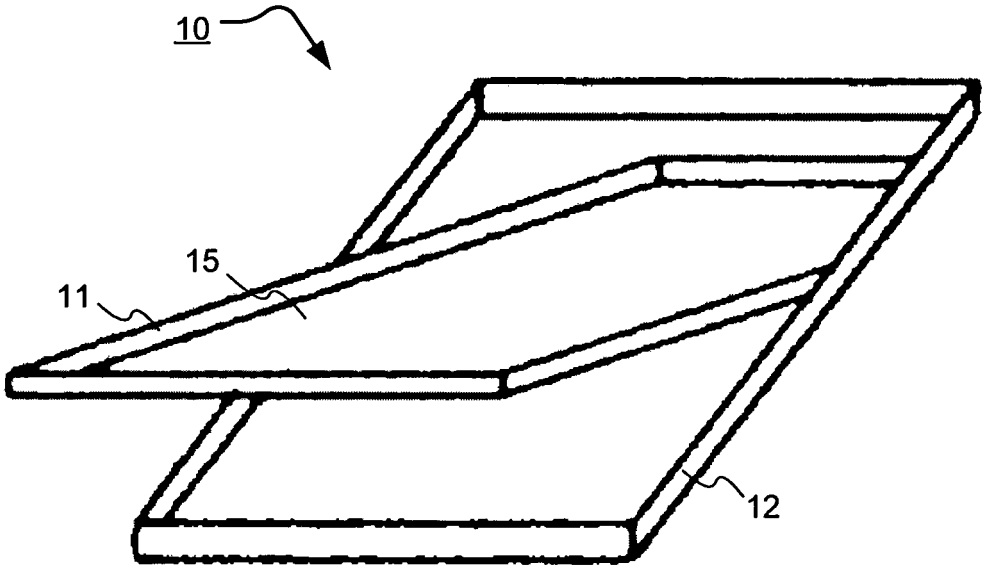

Fig. 2A

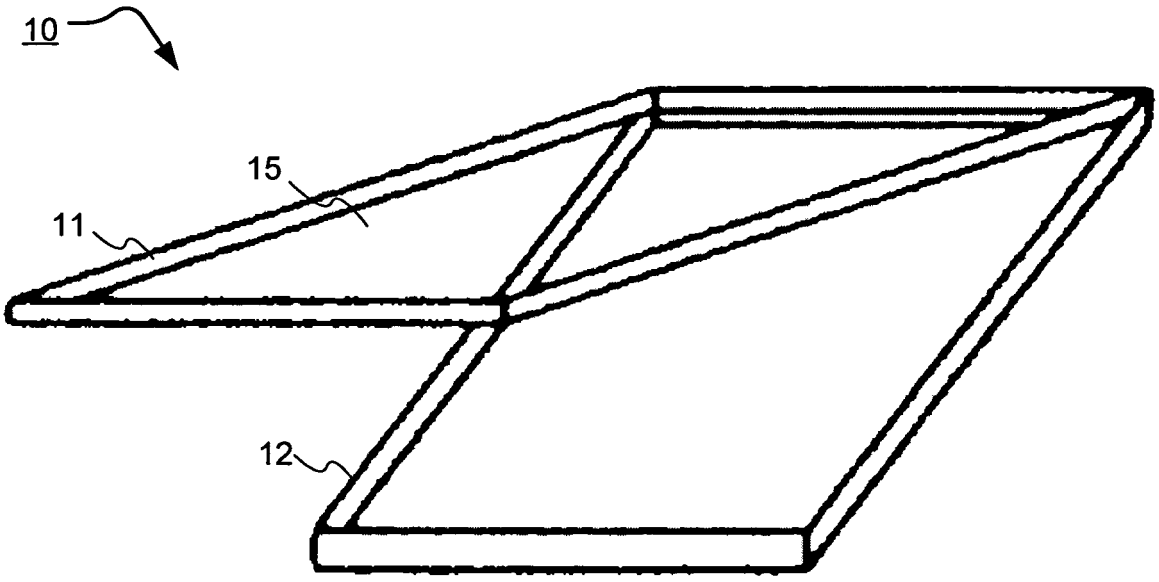

Fig. 2B

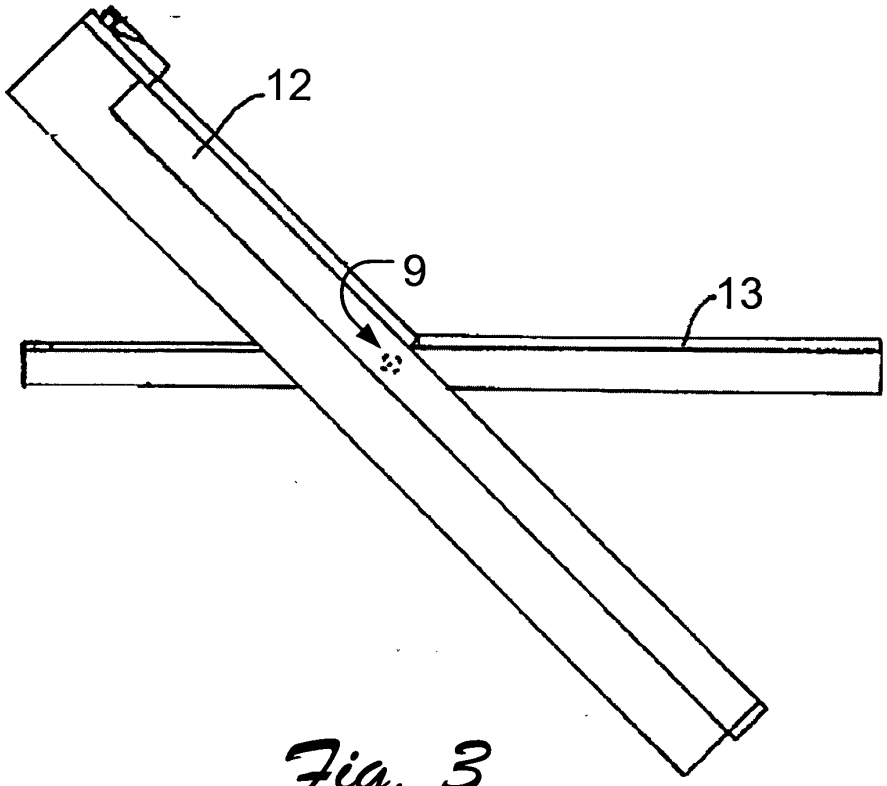

Fig. 3

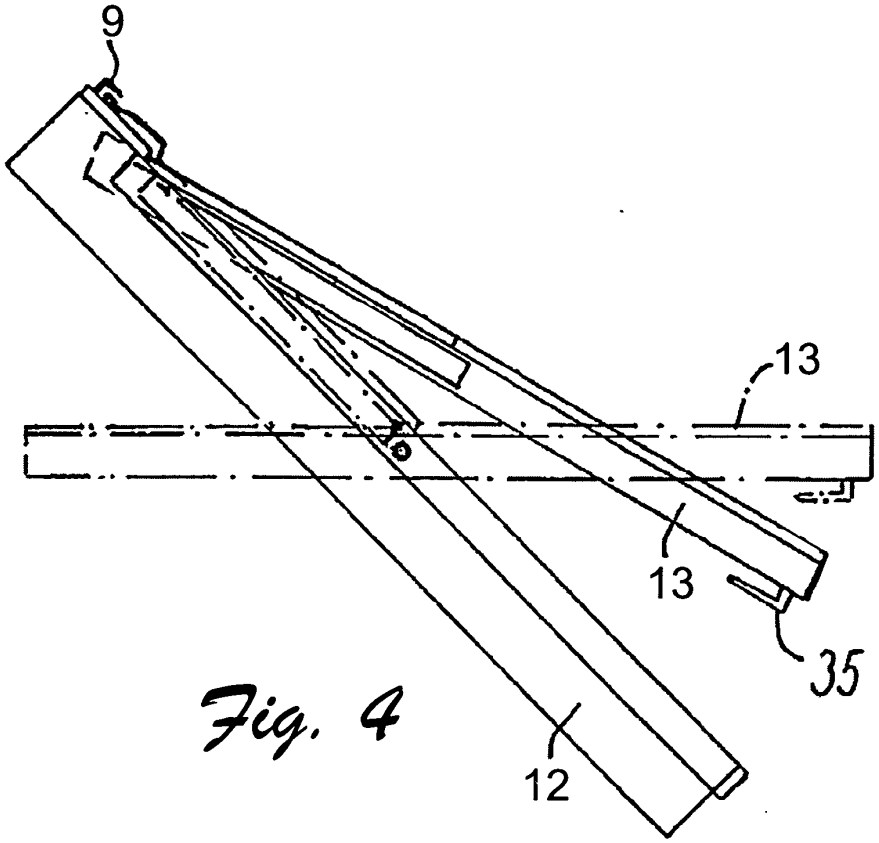

Fig. 4

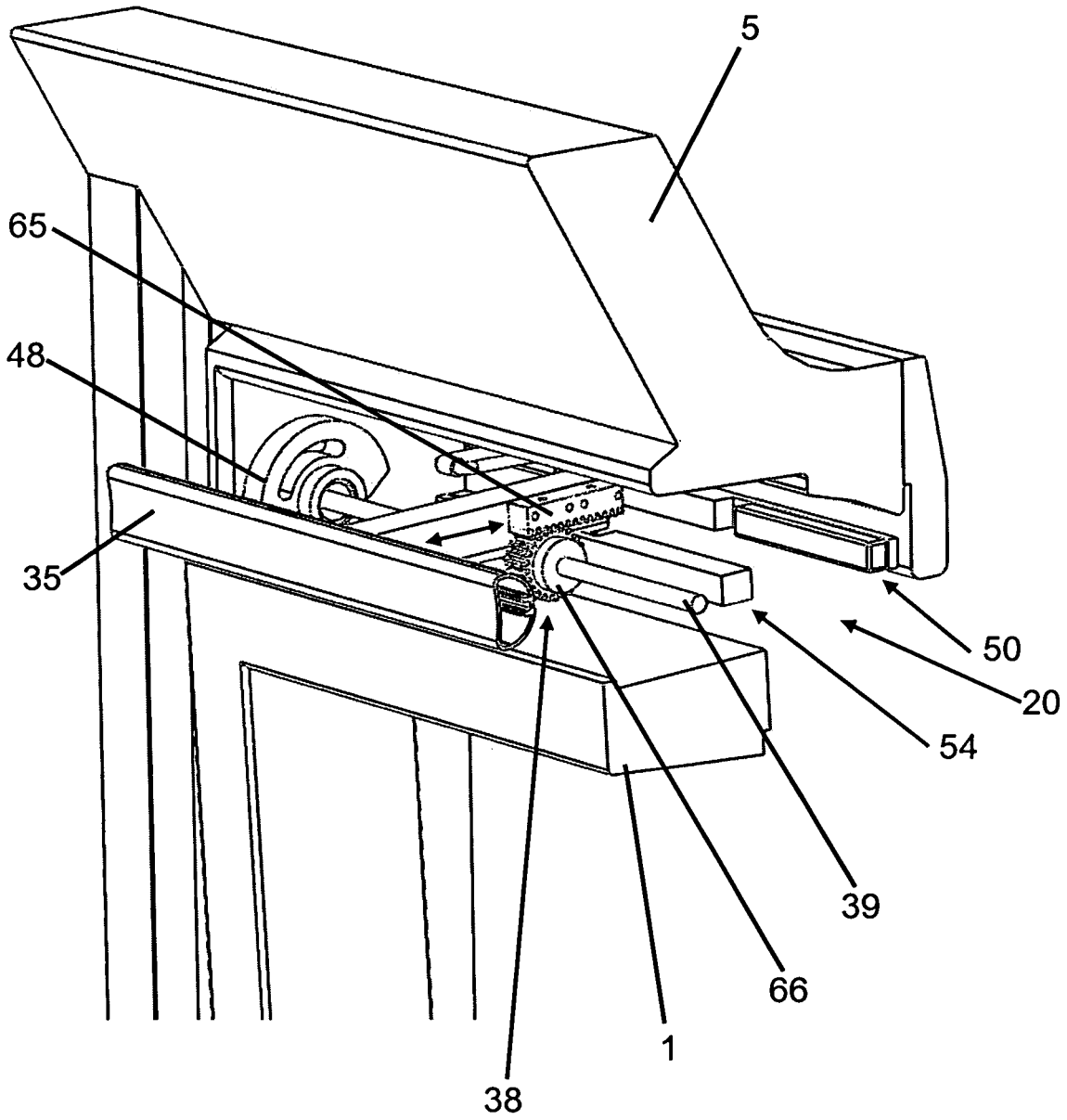

Fig. 5

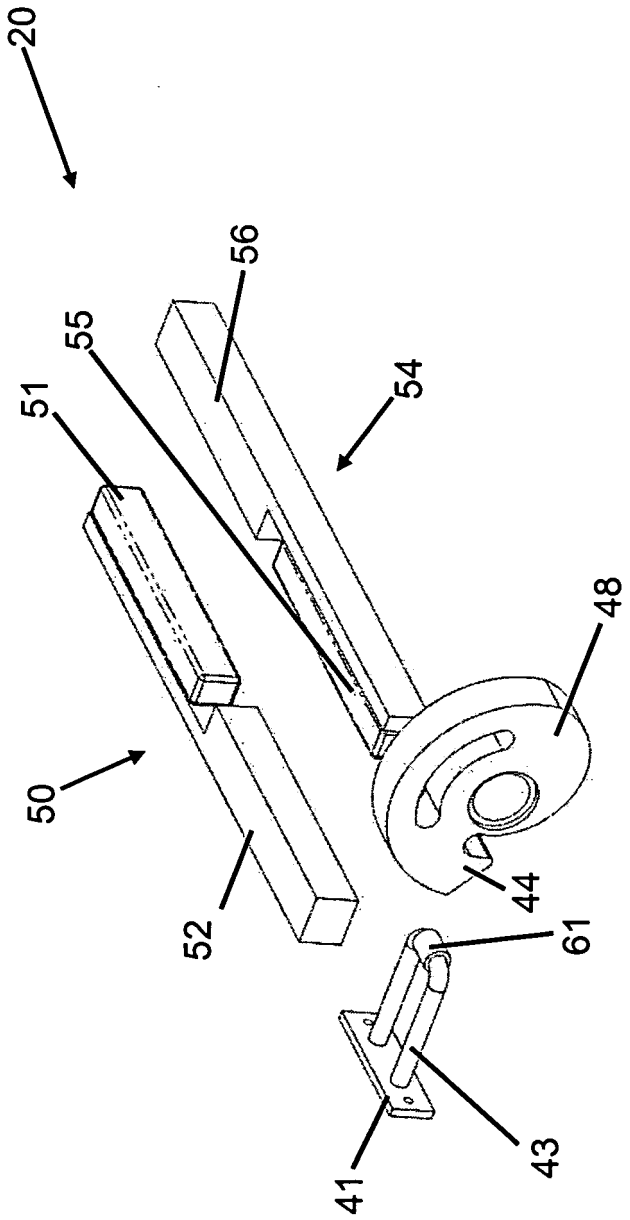

Fig. 6

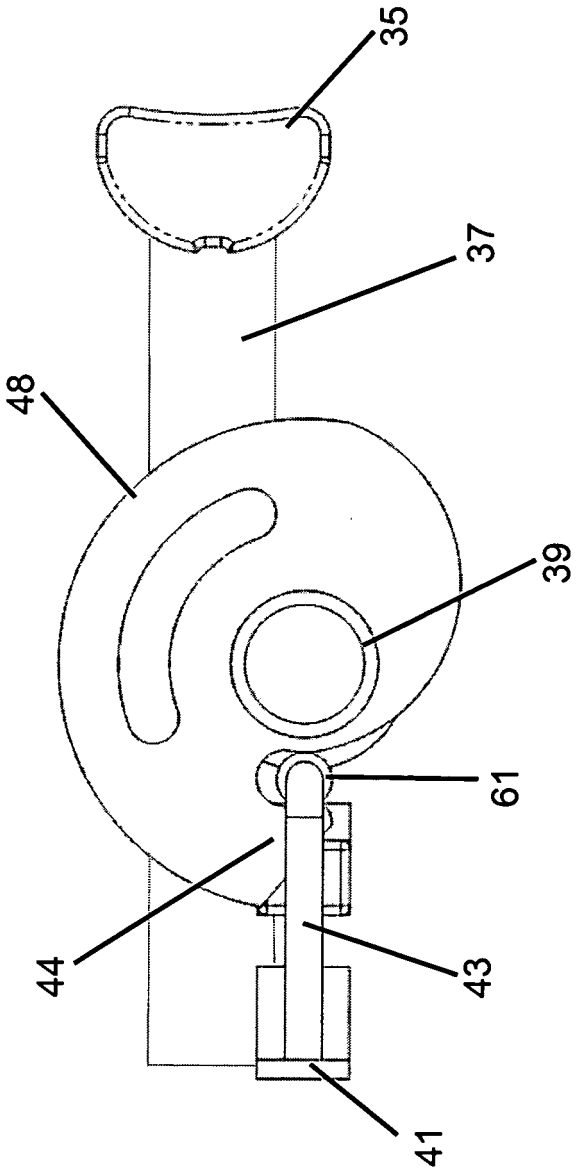

Fig. 7

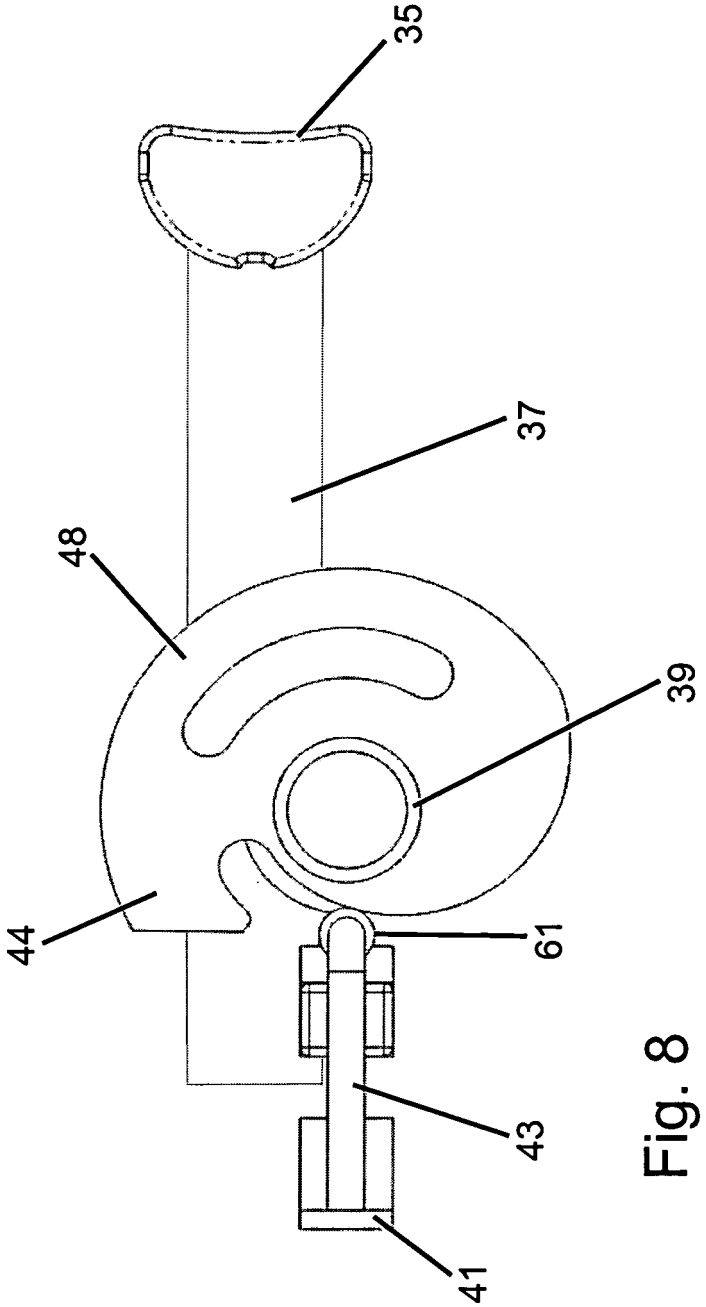

Fig. 8

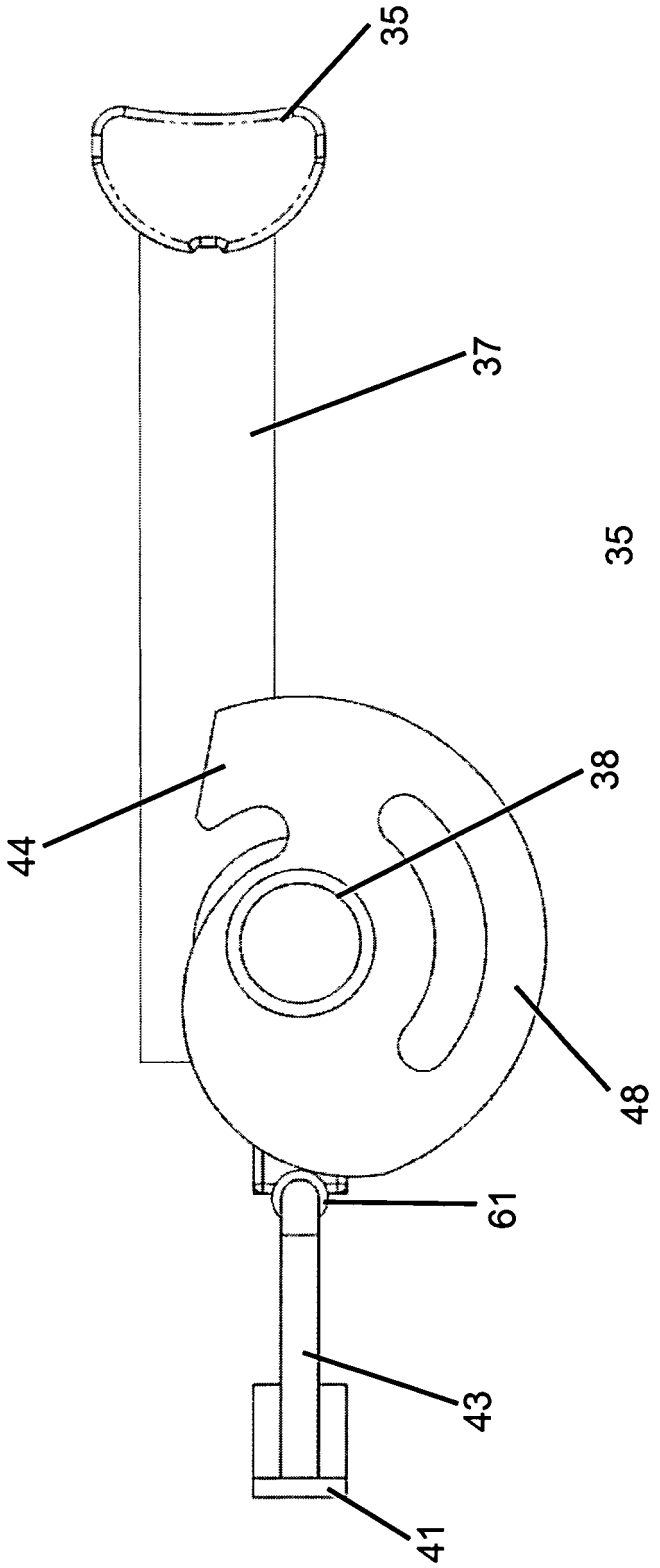

Fig. 9

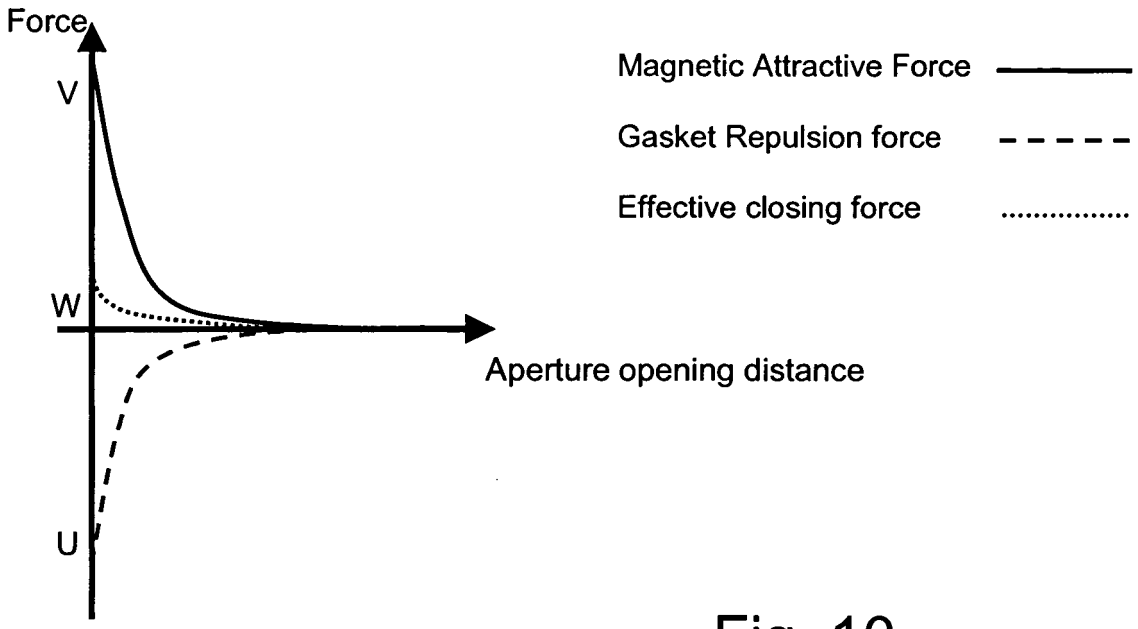
Force
V
W
U
Aperture opening distance
Magnetic Attractive Force
Gasket Repulsion force
Effective closing force

Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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