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(54) **THRUST MEANS FOR OPENING WEATHERTIGHT WINDOWS OR DOORS**

(57) The present invention relates to thrust means (8, 8', 8'') adapted to be mounted on a door wing (3) movable between a closed position and an open position with respect to a fixed frame (2) associated with a through opening (A), said door wing (3) being equipped with a control member (99) to drive the opening/closing movement of said door wing (3), said thrust means (8, 8', 8'') being operatively connectable to said control member (99) and comprising a first sliding element (83) movable along a first sliding direction (V1), vertical in use, for integrally displacing a thrust member (84, 84') between a first position, when said door wing (3) is in said closed position, and a second position, wherein said thrust member (84, 84') cooperates with abutment means (24, 24') disposed on said fixed frame (2) to provide said door (3) with an opening thrust (S) for spacing said door wing (3) from said fixed frame (2).

The present invention also relates to a weathertight window or door (1, 10, 100) comprising said thrust means (8, 8', 8'').

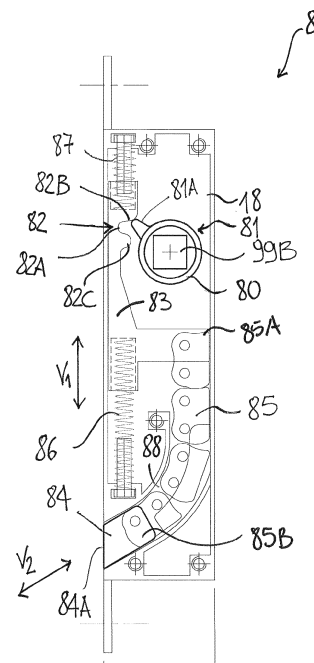


Fig. 2

Description

TECHNICAL FIELD OF INVENTION

[0001] The present invention refers to thrust means for opening weathertight doors or windows, in particular door or windows having wings with abutting or sliding opening, used for example in the building industry, in particular in domestic and commercial premises, or in the naval industry, designed to facilitate the opening of the door or window by providing a thrust that makes it possible to overcome the moment of inertia of the door or window and to break the suction.

PRIOR ART

[0002] The term "weathertight wing" refers to a door or window wing that allows the selective closing of an aperture or opening in an essentially airtight manner, guaranteeing thermal and acoustic sealing, as well as tightness against moisture and air drafts.

[0003] Weathertight windows and doors are known, which comprise a fixed frame, formed with a plurality of elements defining at least one upper crosspiece substantially horizontal and a pair of vertical side elements adapted to be associated to an opening made on a wall, for example separating an internal space from an external space, and at least one wing that allows the selective and airtight closing of the opening to which said door frame is associated.

[0004] For this purpose, said window or door is provided with appropriate gaskets or sealing strips of conventional construction, made with elastic polymeric material or rubber and/or of magnetic type, placed on the frame and/or on the door or window wing so that, in the closed position, the wing is pressed against them and activates them so that they provide the desired sealing effect.

[0005] The wing can then be moved by the user, by means of a control member, for example a handle mounted integrally to the wing, between a closed position, wherein it lies in abutment against the sealing strips, closing the opening completely, and an opening position, wherein at least one portion of the opening remains free, by means of different operative modes; there are in fact wings with "abutting" opening, that is hinged on a vertical member of the window or door frame so as to be rotatable around a vertical axis defined by hinge means, or with a sliding opening, that is, movable by means of a lateral sliding movement on appropriate guides arranged on a threshold plane and/or on the upper cross member of the door frame.

[0006] If necessary, wings with abutment opening can also be provided with a "vasistas-type" opening, that is, one obtained with a controlled rotation around a horizontal hinge axis.

[0007] The wing closed position is maintained stably by temporary locking means that are deactivated by the user by means of the control member to obtain the open-

ing of the wing.

[0008] The main technical problem found in the use of such weathertight door or window is essentially due to the fact that, in the initial phase of opening the wing, users find some difficulty in separating the wing from the sealing strips which, in the closed condition, guarantee its airtightness.

[0009] In fact, the contact between the wing and the sealing strips generates essentially a clinging action engendered by variations in pressure or temperature or by tolerances, creating a situation known as "vacuum effect".

[0010] On top of this, there is also the inertia of the wing itself, whose weight can make its movement particularly arduous, especially for persons with limited physical ability.

[0011] This problem can also be aggravated in the case in which the weathertight door or window includes a sliding wing since, during the wing opening and closing operations, the sliding that occurs between the latter and the sealing strips generates a friction that engenders a high resistance to the movement, making its operation rather difficult. Moreover, this interference can eventually harm the sealing strips and cause a decline in the sealing performance of the wing.

[0012] Lastly, a weathertight door is known according to Patent EP3042017 issued to Sossai Ermenegildo, comprising a fixed frame and at least a wing associated to sliding and tilting means comprising at least a pair of trolleys equipped with wheels running on a guiding rail placed at the upper cross member of the fixed frame and pivoting on it to move said wing between a closed position, in which it lies on a first plane abutting against first sealing strips arranged on the fixed frame of the wing, in which it lies on a second plane, parallel to said first plane, and is separated from said first sealing strips.

[0013] Moreover, second sealing strips are associated to the lower edge of the wing and are adapted to be pressed by the weight of the wing itself on the threshold plane of the opening when said wing is in the closed position.

[0014] Said door includes a mechanism for moving the wing, operated by means of the wing control handle and comprises lifting means for lifting said wing in the passage between said closed position and said open position, disconnecting the second sealing strips from the threshold plane.

[0015] These lifting means comprise an actuating pin axially movable between an idle position, in which it is substantially retracted in a housing seat provided on the wing when said wing is in the closed position, and a thrust position in which it is extracted from the housing and bears against abutment means associated with the fixed frame of the door to force the wheels of the trolleys out of recessed seats provided on the guide and thus obtain the lifting of the wing from the threshold plane.

[0016] In practice, the coordinated action of said sliding and tilting means and of said lifting means provided on

said door wing, caused by the user when opening the door using the control member, makes it possible to lift the wing, detaching the second sealing strips from the threshold plane, and at the same time to move it to a plane parallel to the plane occupied in the closed position, moving it also away from the first sealing strips provided on the frame, thereby overcoming the problems found when opening it, such as the friction generated by the sealing strips and the "vacuum effect".

[0017] Although such lifting means perform satisfactorily, they have significant size: in fact, to allow the lifting movement of the door wing, the actuating pin moves axially along an inclined axis, and therefore the housing seat provided on the framework of the wing must be of sufficient dimensions to contain it when it is in the retracted position, and consequently requires the framework to have a considerable thickness, at the expense therefore of the extension of the glazed surface of the wing.

SUMMARY OF THE INVENTION

[0018] The main objective of the subject matter of the present invention is to overcome the problems of the prior art by devising thrust means for an abutting or sliding weathertight wing, in particular but not exclusively of a door or a window, capable of facilitating the user when opening the wing, making it possible to easily overcome the inertia of the wing and break the suction.

[0019] In the scope of the above objective, one purpose of the present invention is to realize a weathertight door or window provided with practical and functional thrust means that help the user in the wing opening operations, making them absolutely easy and manageable without any effort, even when the wing is particularly large and heavy.

[0020] A further task of the present invention is to provide compact thrust means for a weathertight door or window, having small dimensions that allows them to be integrated in wing frameworks of reduced thickness, to the advantage of the glazed surface and consequently of the appearance, lightness and economy in the quantity of materials used to make the door or window.

[0021] A further purpose of the present invention is to provide strong and durable thrust means for a weathertight door or window without requiring any particular maintenance.

[0022] The above objective, purpose and advantages, as well as others that will become more evident in the description which follows, are achieved with thrust means according to claim 1 and with a weathertight door or window provided with thrust means as defined in claim 2.

BRIEF DESCRIPTION OF THE FIGURES

[0023] The successive claims define additional characteristics of the weathertight window and door according to the present invention, which will be better illustrated in the description of a particular but not exclusive em-

bodiment illustrated by way of example without limitations in the enclosed drawings, wherein:

- figures 1A and 1B illustrate, in a schematic front view a weathertight abutting frame, and in particular a window with a wing with abutment opening, respectively in the closed condition and in the open condition;
- figure 2 illustrates, in a cross-section view, thrust means according to the present invention, adapted to be integrated in the window of figures 1A and 1B;
- figures 3A and 3B illustrate the window of figure 1 with a view in cross section along the plane A-A, respectively with the wing in a closed position and with the thrust element according to a first embodiment in a first position, and with the wing in the opening condition and with the thrust member in a second position, or thrust position;
- figures 4A and 4B illustrate, in cross-sectional views, the thrust members respectively in the non-operative condition and in the operative condition of maximum thrust;
- figures 5A and 5B illustrate the window of figure 1 with a cross-sectional view along plane A-A, respectively with the wing in the closed position and with the thrust member according to a second embodiment in a first position, and with the wing during the opening condition and with the thrust member in a second position, or thrust position;
- figures 6A - 6B illustrate in schematic views various steps of the passage from the non-operative condition to the condition of maximum thrust, achieved with the opening of the door by the thrust means according to the invention;
- figures 7A and 7B illustrate, in a front view, a weathertight frame according to the present invention, in particular a door with a sliding opening wing of the type "lift and slide", respectively with the wing in closed position and with the wing in open position;
- figure 8 illustrates, in an exploded view, thrust means according to the present invention adapted to be integrated in the weathertight window and or door of figures 7A and 7B;
- figures 9A and 9B illustrate, in an exploded view and in partial assembly, the thrust means according to the present invention, the safety locking means, and the temporary locking means;
- figure 10A - 10G schematically illustrate various steps in the passage from the non-operative condition to the condition of maximum thrust of the thrust means according to the invention and the relative and coordinated movement of the safety locking means and the temporary locking means;
- figures 11A and 11B illustrate, in vertical cross-sectional views, one portion of the weathertight door or window wing of figures 7A and 7B respectively with the wing in a closed condition and in an open condition;
- figures 12A and 12B illustrate in a perspective view,

some components of the temporary locking means of a door or window wing according to the present invention, respectively in the locking position and in the unlocking position;

- figures 13A and 13B illustrate, respectively in an exploded view and an assembled view, an energy storage device applicable to a weathertight door or window with wing with sliding-type opening according to the present invention;
- figures 14A and 14B illustrate, with a front view, a weathertight window according to an embodiment of the present invention, in particular a door with a sliding opening wing, respectively with the wing in the closed position and with the wing in the open position;
- figures 15A and 15B are views in vertical cross-section along the planes A-A and B-B of the weathertight door or window frame of figure 14A in the closed position;
- figure 15C is a view in horizontal cross-section of the weathertight window or door of figure 14A in the closed position;
- figures 16A and 16B are views in vertical cross-section along planes A-A and B-B of the weathertight door or window wing which, in figure 14B, is in the open position;
- figures 17A and 17B illustrate, respectively with a front view and a side view, a thrust member according to a variant embodiment of the present invention;
- figures 18A and 18B illustrate, respectively with a front view and a side view abutment means adapted to cooperate with the thrust member of figures 17A and 17B;
- figures 19A and 19B illustrate with a front view and a side view, the thrust member of figures 17A and 17B in the first position; and
- figures 20A and 20B illustrate with a front view and a side view, the thrust member of figures 17A and 17B in the second position.

DETAILED DESCRIPTION OF THE EMBODIMENTS OF THE INVENTION

[0024] With reference to figures 1A and 1B is illustrated a weathertight door or window 1 according to a first embodiment of the invention, in particular a window provided with a wing having "abutting" opening, integrating thrust means 8 according to the present invention.

[0025] Said window 1 comprises essentially a fixed frame 2 associable to an aperture A made on a wall of a building and essentially formed by a plurality of rigid elements interlinked to form at least an upper cross member 2A, and a first and a second member 2B, 2C, arranged substantially vertical and parallel to a lower cross member 2D.

[0026] Said window 1 also includes at least one wing 3, movable between a closed position, in which it closes completely the opening A on the wall, and an open po-

sition in which at least one portion of said opening A remains free.

[0027] Said wing 3 preferably comprises at least one flat plate 3A, advantageously made of transparent material, such as glass, and provided with an interfacing framework 4 on which is mounted a control member, such as a rotating handle, thanks to which the user can obtain the opening or closing of the wing 3.

[0028] Specifically, the wing 3 shown in figures 1A and 1B is of the "side hung" or "abutting" type, that is, it is rotatably connected to one of said pair of vertical members of said fixed frame 2, for example, said second vertical member 2C, around an essentially vertical hinge axis X-X, defined by appropriate and known hinge members, and the passage between the closed position (figure 1A) and the open position (figure 1B) is performed by a rotation around said hinge axis X-X.

[0029] Said weathertight window 1 also comprises sealing means 5 arranged and configured so that, when said wing 3 is in a closed position, said opening A is closed to weather agents, i.e., water and air, in an essentially hermetic manner, also preferably providing a certain level of acoustic insulation.

[0030] In particular, preferably, said sealing means 5 include sealing strips, for example made conventionally of polymeric material or rubber, or of magnetic type, associated to at least one portion of the fixed frame 2 and/or to the wing 3 and arranged so as to be activated when the wing 3 is in the closed position.

[0031] Advantageously, the weathertight closed position is maintained thanks to temporary locking means 9 that substantially include an operating rod (not shown in the figures) extending vertically, inserted in the framework 4 of the wing 3 and axially movable through the rotation of said handle 99, and provided with a plurality of locking hooks adapted to removably cooperate with corresponding holding elements provided at least on the fixed frame 2 to hold said wing 3 in the closed position, so that said wing presses the sealing strips 5 and activates them.

[0032] To obtain the opening of the wing 3 it is thus necessary to break the suction generated by the action of the sealing strips and to overcome the inertia of the wing itself; for this purpose, advantageously, said weathertight window 1 includes thrust means 8 mounted on said wing 3 and actuated by means of said handle 99 to move, comprising a thrust member 84 movable between a first position, occupied when said wing 3 is in the closed position, and a second position, or thrust position, in which it cooperates with abutment means 24 provided on said fixed frame 2 to give the wing 3 an opening push S adapted to space it, that is move it away from said fixed frame 2 and deactivate the sealing means 5, helping the user in the initial step of opening the wing.

[0033] In particular, as shown in figure 2, said thrust members 8 include essentially first driving means 80, operatively associated with said handle 99 and adapted to drivingly slide a first sliding element 83, such as a slide,

along a first sliding direction V1, advantageously vertical, to move integrally said thrust member 84, preferably formed by a rigid pin, along a second sliding direction V2 inclined with respect to the first sliding direction V1.

[0034] Preferably, said thrust means 8 are contained inside a housing 18 obtained in the interface framework 4 of said wing 3, so that, in the first position, the thrust pin 84 is essentially retracted inside the housing 18, and in the second position, or thrust position, it projects from said housing 18, bearing upon said abutment means 24.

[0035] The fact that said first slide 83 moves along a vertical direction V1 to urge the movement of the thrust pin 84 along an inclined sliding direction V2 is advantageous because it makes it possible to reduce the width of the housing 18 and thus of the interface framework 4 of the wing 3, minimizing its encumbrance in favour of the extension of the transparent surface of the plate 3A of the wing 3.

[0036] Advantageously, as shown in figures 3A and 3B, said abutment means 24 include an abutment surface 24A positioned on the fixed frame 2 of the window 1 and properly arranged to provide, cooperating with the thrust member 84, an opening thrust S on the wing itself 3; in particular, in the case of a door or window 1 with a swing opening, said thrust means 8 and said abutment means 24 are arranged and configured so as to apply on the wing 3 a thrust S having a prevalent component along a direction of translation T1 essentially horizontal and transversal with respect to the plane of the wing 3 in the closed position, so as to facilitate the opening rotation of the wing around said hinge axis X-X.

[0037] Referring again to figure 2, said first driving means 80 are preferably formed from a gear wheel, rotatable integrally with the handle 99 thanks for example to a coupling with a polygonal pin 99B inscribed in it, provided with a first toothing 81 comprising at least one tooth 81A adapted to cooperate with a corresponding linear engaging tooth 82 obtained on said first sliding element 83 to activate its movement.

[0038] Advantageously, said first linear toothing 82 comprises at least one groove 82A defined between a first and a second abutting tooth 82B, 82C, said groove 82A having a width larger than the width of the engaging tooth 81A.

[0039] According to a second advantageous characteristic of the present invention, the sliding movement of the first slide 83 is transmitted to the thrust pin 84 thanks to transmission means 85 advantageously formed by a flexible but substantially axially rigid body, that is preferably essentially inextensible and incompressible, therefore adapted to transmit traction and thrust stresses, connected with a first end 85A to the first slide 83 and with the opposite end 85B to the thrust pin 84.

[0040] In particular, advantageously, said transmission means 85 are adapted to slide inside a shaped guide 88 arranged in the housing 18 and configured to deviate the sliding direction V2 of said thrust pin 84 with respect to the sliding direction V1 of the first slide 83.

[0041] Said transmission means 85 can for example include a chain formed from a plurality of modular elements articulated to each other, as shown in figure 2; alternatively, said transmission means 85 can be formed of a flexible shaft or cable of "push-pull type" made of polymeric or metallic material, or of any other means or device capable of performing the same function.

[0042] In practice, the rotation of said first gear wheel 80, in which the engaging tooth 81A meshes with the corresponding first linear toothing 82 provided on said first slide 83, determines the movement of the first slide 83 along the vertical sliding direction V1, which in turn moves integrally, thanks to the transmission means 85, the thrust pin 84 along the inclined sliding direction V2, from the retracted position to the extracted thrust position.

[0043] The first slide 83 is also advantageously associated with a first elastic biasing means 86, such as for example a first compression spring, adapted to return the thrust pin 84 to the retracted position after having performed the thrust function, and with a second elastic biasing means 87, such as for example a second compression spring, adapted to allow the reloading of said thrust means 8.

[0044] Advantageously, said handle 99 is also adapted to move the temporary locking means 9, not shown in the figures relative to the first embodiment of the invention, comprising second drive means, such as a second gear wheel, arranged coaxially with respect to said first gear wheel 80, which is also driven in rotation by the movement of the handle 99.

[0045] Said second gear wheel is provided with a third circumferential toothing adapted to engage with a fourth toothing formed on a second sliding member, such as a second slide, connected operatively to at least one temporary locking rod provided with at least one locking hook, and preferably at least one pair, adapted to removably cooperate with corresponding holding elements provided at least one jamb 2B of the fixed frame 2 to hold said wing 3 in the closed position, so that the same presses against the sealing strips 5 and activates them.

[0046] Preferably, said second drive wheel and said second slide are also arranged inside the same housing 18 in which are inserted said thrust means 8, for example in a space properly separated by a plate that divides it longitudinally.

[0047] The operation of said thrust means 8 when they are applied to a wing 3 of a weathertight window 1 with abutting opening is the following: when the wing 3 is in the closed position (figure 3A), the handle 99 is in a first position, in which it is preferably arranged vertically, with the free operating end 99A for example turned downward, and said thrust means 8 are in an initial condition, with the thrust pin 84 in the first position, that is substantially retracted inside said housing 18 (figures 4A and 6A); the locking hooks of the temporary locking means 9 are engaged with the corresponding holding members and maintain the wing 3 firmly abutting against said seal-

ing strips 5, enhancing their sealing effect.

[0048] Moreover, in the initial condition, the engaging tooth 81A is received in the groove 82A of the first linear toothing 83 and arranged to rest against said first abutment tooth 82B, maintaining the first slide 83 in a position in which it presses said second elastic biasing means 87 (figure 6A).

[0049] To obtain the opening of the wing 3, the user turns the handle 99, gripping advantageously one end portion 99A; this movement involves the coordinated activation of said thrust means 8 of the wing and of the temporary locking means of the wing.

[0050] In fact, as shown in figure 6B, applying to the handle 99 a rotation of a first angle α , of for example 30° with respect to the initial position, the latter brings into rotation in a concordant direction said first driving wheel 80 and consequently said engaging tooth 81A and said second driving wheel of the temporary locking means; thanks to the increased width of said groove 82A, such rotation is not initially useful to the actuation of the thrust pin 84, but the contextual rotation of the second driving wheel makes it possible to impose a vertical translation to the second slide and therefore to the rod of the temporary locking means 9 and, consequently, of the locking hooks integral to the same, setting off the uncoupling of the latter from the corresponding holding elements.

[0051] With a further rotation of the handle 99, for example by an angle α of about 60° with respect to the initial position (figure 6C), said engaging tooth 81A reaches said second abutment tooth 82C and, from that moment, it meshes with the first linear toothing 82; therefore, further opening rotations of the handle 99 impose a sliding movement to the first slide 83 along a vertical sliding direction V1, and therefore, through said transmission means 85, the movement of said thrust pin 84 toward the extracted thrust position, countering the action of said first elastic biasing means 86.

[0052] As the thrust pin 84 comes out of the housing 18 (figure 4B), its head end 84A bears against the surface 24A of the abutment element 24 provided on the fixed frame 2 (figure 3B), providing a thrust S on the wing 3 in the direction of translation T1 that makes it possible to move the wing itself away from the fixed frame 2, in the opening direction, deactivating the sealing strips 5 and thus allowing the user to start and complete without effort the opening movement of the wing 3 itself.

[0053] For this purpose, as is shown in figures 3A and 3B, said thrust pin 84 is advantageously arranged so that the passage between the first position and the second position comes about in a direction parallel to the plane of the wing 3, and is configured in such a way that its head surface 84A and the abutment surface 24A of said abutment means 24 are essentially counter inclined.

[0054] Alternatively, as shown in figures 5A and 5B, said thrust pin 84 can be arranged so that the passage between the first position and the second position comes about in a direction essentially orthogonal to the plane of the wing 3, bearing against an abutment surface 24A

parallel to the plane of the wing 3.

[0055] When the handle 99 has completed a rotation angle α of about 75° with respect to the initial position (figure 6D), the engaging tooth 81A reaches rotationally said second abutment tooth 82C of the first linear toothing 82, which substantially corresponds to the operating condition of maximum thrust, with the thrust pin 84 in the second position.

[0056] As soon as the engaging tooth 81A passes rotationally the second abutment tooth 82C, the first elastic biasing means 86 returns the first slide 83 to the initial position, bringing the thrust pin 84 to the first position (figure 6E), retracted inside the housing 18, and the handle 99 is free to complete its own rotation until it reaches the final opening position, in which it is preferably arranged horizontally.

[0057] The moment in which the user desires to close again the weathertight wing 3 he brings it to the closed position, and starts the rotation of the handle 99 in the direction of rotation opposite to the opening direction, so as to return the end 99A downward.

[0058] When the handle 99 reaches a rotation angle α of about 75° with respect to the closed position, the radial engaging tooth 81A of the of the toothed wheel 81 integral to it passes the second abutment tooth 82C of the first linear toothing 82 obtained on the slide 83 and inserts itself into the groove 82A (figures 6D and 6C); at this point the rotation of the handle 99 corresponds to the movement of the tooth in the groove 82A (figure 6B) which enables the activation of the temporary locking means 9, or the vertical translation in reverse of the second slide integral to the rod, and, consequently, the engagement of the locking hooks integral to it with the corresponding holding elements arranged on the framework 2.

[0059] The further rotation of the handle 99, until the initial closing position is reached, causes the engaging tooth 81A to collide with the first tooth 82B of the first linear toothing 82, causing a sliding of the first slide 83 upward, in opposition to the action of the second elastic biasing means 87, making it possible to return the thrust means 8 to the initial non-operative condition and to reload the thrust rod 84 (figure 6A).

[0060] Figures 7A and 7B illustrate a weatherproof door 10 according to a second embodiment of the present invention, specifically a door with sliding opening wing, integrating thrust means 8 according to the present invention, respectively in a closed position and in an open position.

[0061] As shown in the figures, when opened, the wing 3 is superimposed on a fixed wing; alternatively, the wing 3 can be of hide-away type, that is, it enters into a cavity in the wall.

[0062] As with the previous embodiment, said door 10 includes a fixed frame 2, formed essentially by an upper cross member 2A, a pair of parallel vertical members 2B, 2C, and at least one wing 3 provided with an interface frame 4, and slidably movable between a closed position

and an open position thanks to sliding means (not shown) comprising a pair of trolleys associated with the lower edge of the wing and resting in a tilting or non-tilting manner on a horizontal track arranged at the threshold plane P, that allow the sliding of the wing between a closed position and an operating and open position.

[0063] Inversely, if said weatherproof door 10 is made as provided for in the patent EP3042017 to Sossai Ermenegildo, said wing 3 is supported and movable with sliding and tilting means formed by a pair of trolleys, running on a guide rail arranged at the upper cross member 2A and tilting on it, without guides or tracks on the ground, since the wing 3 can rest directly on the threshold plane P in the closed position.

[0064] In any case, sealing means 5, like appropriate sealing strips, are associated with at least one portion of the fixed frame 2 and/or the wing 3 and can be activated when the wing is in the closed position so as to hermetically close the opening A with which the weatherproof door 10 is associated.

[0065] According to an advantageous characteristic of the present invention, the weathertight door 10 also comprises thrust means 8' according to the invention, mounted on said wing 3 and adapted to assist the user when opening the wing so as to break the suction generated by the sealing means 5 and the inertia of the same wing.

[0066] As with the preceding embodiment, said thrust means 8' comprise first driving means 80', such as a first gear wheel, operatively connected to the handle 99 and adapted to activate in sliding a first sliding element 83 along a first sliding direction V1 in vertical use (figure 8).

[0067] Said first sliding element 83 is connected through flexible transmission means 85 to a thrust element 84, such as a rigid pin, movable along a second sliding direction V2 inclined with respect to the first sliding direction V1 between a first position, in which it is substantially retracted in a housing 18 provided on said wing 3 when said wing 3 is in the closed position, and a second position, or thrust position, in which it is extracted with respect to the housing 18 and bears down on abutment means 24 associated with said fixed frame 2 to give to the wing 3 an opening thrust S useful to move the wing away from the frame 2, deactivating the effect of the sealing means 5.

[0068] In this embodiment, advantageously, said thrust means 8' apply to the wing 3 a thrust S comprising, in addition to a component along a translation direction T1 essentially horizontal and transversal with respect to the lying plane of the wing 3 when in the closed position, a component along a vertical direction T2, to enable the wing 3 to rise with respect to the closed position and allow the movement of the wing through the sliding means. Therefore, in this case, said abutment means 24 are provided with an appropriately inclined abutment surface 24A.

[0069] According to an advantageous characteristic of the invention, as shown with greater detail in figures 9A and 9B, said weathertight window 10 also comprises

safety locking means 6 and temporary locking means 9, the latter actuated by the user by means of a control device 99 provided on the wing 3, in a manner coordinated with the thrust means 8, to selectively hold the wing in a closed position and actuate the sealing strips 5.

[0070] Said safety locking means 6 preferably include a cylinder lock 61, provided with actuating means operated by inserting a key inside a keyhole 61A provided in the same cylinder to transmit the rotational movement of the key to a lock member, so that the lock member can move conventionally between a retracted position and an extracted position.

[0071] Said temporary locking means 9 include second driving means 90, such as a second gear wheel, arranged coaxially with respect to said first gear wheel 80', which is also driven to rotate through the movement of the handle 99.

[0072] Said second gear wheel 90 is provided with a second circumferential toothing 91 adapted to engage with a second linear toothing 92 formed on a second slidable element 93, such as a slide, operatively connected to at least one temporary locking rod 94 provided with at least one locking hook 95, and preferably at least a pair, as shown in figures 12A and 12B, adapted to removably cooperate with a corresponding retaining element 96 provided on at least one vertical member 2B of the fixed frame 2 to retain said wing 3 in the closed position, in a way that enables it to compress the sealing elements 5, activating them.

[0073] Preferably, as shown in figure 9B, a dividing plate 98 divides said housing 18 longitudinally in two compartments, in which in the first compartment are housed said thrust means 8' and in the second are housed said temporary locking means 9.

[0074] The first gear wheel 80' includes a first circumferential toothing 81, adapted to engage with a first linear toothing 82,' provided on the first slide 83. Unlike the first embodiment of the present invention, said first circumferential toothing 81 has a plurality of teeth, among which there is at least a first engaging tooth 81A having a larger radial extension with respect to the other teeth, and one last engaging tooth 81B.

[0075] Advantageously, said first linear toothing 82' includes a plurality of grooves, among which there is at least one first groove 82A defined between a first and a second abutment tooth 82B, 82C, said groove 82A having an increased width with respect to the width of one of the teeth of said first circumferential toothing 81, and a last groove 82D.

[0076] The operation of said thrust means 8' when they are applied to a wing 3 of a weathertight window 10 with sliding opening is the following: when the wing 3 is in said closed position (figures 7A and 11A), the handle 99 is in a first position, in which it is preferably arranged vertically, for example with the free operating end 99A preferably facing upward, and said thrust means 8' are in the initial non-operative condition, with the thrust pin 84 in the first position, substantially retracted inside said housing 18

(figure 10A); the locking hooks 95 of the temporary locking means 9 are engaged with the corresponding retaining elements 96 and maintain the wing 3 firmly abutting against said sealing strips 5, actuating their sealing effect.

[0077] The safety locking means 6 are in the locking configuration, in which the lock member 62 is in an extracted position, inserted inside engaging means of the lock member 63 provided on the fixed frame 2 of the weathertight window 1'.

[0078] Moreover, in the initial condition, the thrust means 8' are arranged so that the first engaging tooth 81A is received in the groove 82A of the first liner toothing 82' and arranged in support against said first abutment tooth 82B, maintaining the first slide 83 in a position in which it exerts a compression on said second spring 87.

[0079] To obtain the opening of the wing 3, the user moves conventionally the key inside the keyhole of the cylinder 61, returning back the lock member 62 to the retracted position with respect to the engagement seat 63, thus deactivating the safety locking means 6 (figure 10B).

[0080] Gripping the operating end 99A of the handle 99, the user sets it into rotation to obtain the opening of the wing 3; this movement involves the coordinated activation of said wing thrust means 8' and of said temporary locking means 9 (figures 10C - 10D).

[0081] In fact, if a rotation of a first angle α with respect to the initial position is applied to the handle 99, the handle also sets said first driving wheel 80' and said second driving wheel 90 into rotation in a concordant direction; thanks to the increased width of said groove 82A, the rotation of said first driving wheel 80' is not initially useful for the movement of said thrust pin 84 but at the same time the second circumferential toothing 91 of said second driving wheel 90 meshes with the second linear toothing 92 of the second slide 93, making it possible to impose a translation in a direction V1 in vertical use to the locking rod 94 and, consequently, to said locking hooks 95 integral to the same, starting the detachment of the latter from the corresponding retaining elements 96.

[0082] With a further rotation of the handle 99 with respect to the initial position, said first engaging tooth 81A reaches said second abutment tooth 82C and, from that moment, further opening rotations of the handle 99 impose a sliding to the first slide 83 along a vertical sliding direction V1 and thus, through said transmission means 85, the movement of said thrust pin 84 along a direction V2 toward the extracted position, in contrast with the action of said first spring 86.

[0083] As the thrust pin 84 comes out of the housing 18, its head end 84A impinge on the surface 24A of an abutment element 24 provided on the fixed frame 2, providing an opening thrust S to the wing 3 that makes it possible to move the wing away from the frame 2, deactivating the sealing strips 5 and thus allowing the user to easily complete the opening movement of the wing 3.

[0084] Advantageously, said thrust pin 84 is arranged so that the passage between the first position and the second extracted position takes place along a direction parallel to the lying plane of the wing 3, and is configured so that its head surface 84A and the abutment surface 24A of said abutment surface 24 are essentially counter-inclined, so that the thrust S applied also has, in addition to a translation component along a translation direction T1 useful to break the suction of the sealing means 5, a component along a vertical direction T2, such as to allow the lifting of the wing 3 and thus the operation of the sliding means that allow its movement.

[0085] When the handle 99 has completed a rotation of an angle α of about 170° with respect to the initial position, the last tooth 81B of the first circumferential toothing 81 of the thrust means 8' is rotatably received in the last groove 82D of the first linear toothing 82, which substantially corresponds to the operative condition of maximum thrust, with the thrust pin 84 in the extracted position (figure 10C).

[0086] As soon as the last engaging tooth 81B rotatably leaves the last groove 82D of the first linear toothing 82 after the further rotation of the handle 99, the first circumferential toothing 81 and the first linear toothing 82 become uncoupled and the first elastic biasing means 86 returns the first slide 83 to the initial position, thus returning back the thrust pin 84 to the retracted position (figure 10D).

[0087] The handle 99 then freely continues its rotation until it reaches the final open position, where it is preferably arranged vertically, with the free end 99A facing downward (figures 7B and 11B).

[0088] When the user wishes to close the wing 3, he rotatably moves it back to the closed position, and starts the rotation of the handle 99 in the direction of rotation opposite to the opening direction, so as to return the end 99A upward.

[0089] During the rotation of the handle 99, the second operating wheel 90 imposes the sliding of the second slide 93 in the direction opposite to the opening direction (figure 10E), retrieving back the locking rod 94 so that the locking hooks 95 integral to it engage the corresponding retaining elements 96 provided on the frame 2.

[0090] At the same time, the rotation of the first driving wheel 80' enables the first circumferential toothing 81 to engage with the first linear toothing 82 provided on the first slide 83, causing it to slide along a direction V1 but in the opposite sense, that is, upward, in contrast with the action of the second spring 87.

[0091] When the first engaging tooth 81A rotatably overcomes the second abutment tooth 82C of the first linear toothing 82, the second spring 87 pushes the slide 83 to the starting position, returning the thrust means 8' to the starting non-operative condition and consequently reloading the thrust pin 84 (figure 10F).

[0092] At this point, the closing procedure can be completed by activating the safety locking means 6 to move the lock member 62 of the safety lock in the extracted

position, so that the lock member is received in the engaging seat 63 provided in the frame 2 (figure 10G).

[0093] Advantageously, on the wing 3 can also be provided a force storage device 30, adapted to store energy resulting from the inertia of the wing during the closing movement, and to provide a thrust in the wing sliding direction T3, contributing in this manner to reducing the force required for the user to open the wing.

[0094] As shown in figures 13A and 13B, said force storage device 30 preferably comprises a mounting plate 31, adapted to be connected to the lateral head edge of the wing, on which is mounted an internally threaded bush 32 adapted to be received in the thickness of the same wing.

[0095] Inside the bush 32 is advantageously threaded in an adjustable way a sleeve 33 wherein are coaxially inserted a first elastic element 34, such as a helical spring advantageously operated by compression, a second elastic element 35, such as a helical spring advantageously operating by traction, and finally a pin 36, provided with a hollow cylindrical body 36A and a flat head 36B, adapted to bear against an abutment element 37 provided on a vertical member 2B of the frame 2 of the watertight window or door 10.

[0096] Said second spring 35 is received within the hollow body 36A of said pin 36 and is connected, with a first end 35A to the bottom of said bush 31, and with the opposite end 36B to the pin 36, near the flattened head 36B of said pin.

[0097] The first spring 34 is instead arranged externally to the body 36A of the pin 36 in such a way as to impinge in abutment with the first end 34A, against the bottom of the bush 32, and with the opposite end 36B to be pressed by the head of the pin 36.

[0098] The second spring 35 pulls constantly the pin 36 in the retracted position, while the first spring 34 is adapted to store elastic energy during the closure, to then release it during the opening of the wing 3.

[0099] When appropriately selecting the springs 34, 35 and the axial position of the sleeve 33 it is advantageously possible to adjust the force developed by the device 30, making it also possible to easily adapt it for use on wings of different weights and dimensions.

[0100] Finally, in figures 14A and 14B is shown a weathertight door or window 100 according to a third embodiment of the invention, equipped with a wing 3 with slidable opening provided with sliding and tilting means 7 comprising slidable trolleys 71 pivoting on upper rails 72 and lower accompanying means comprising advantageously a roller 77 running on a guide member 78 and accompanying cams to guide the opening movement of the wing (figures 15A, 15B, 15C, 16A, 16B and 16C).

[0101] The figures indicate, with the letter E, the external side and with the letter I the internal side.

[0102] Said weathertight window or door 100 includes thrust means 8" (not shown in the figures) mounted on said wing 3, operatively connected to said control member 99 and adapted to drivingly slide a first sliding element

83 along a first sliding direction V1 in vertical use, to integrally move a thrust member 84' between a first position, occupied when said wing 3 is in the closed position, and a second position, in which it interacts with abutment means 24' connected to said fixed frame to give the wing 3 an opening thrust S useful to move it away, that is to separate it, from said frame 2.

[0103] Said thrust means 8" include first driving means 80' formed essentially by a wheel driven in rotation by said control member 99 and provided with a first circumferential toothing 81 comprising at least a first engaging tooth 81A adapted to cooperate with a corresponding first linear toothing 82' formed on said slidable element 83.

[0104] However, in this embodiment the thrust element 84' is formed by an inclined hook (figures 17A and 17B), movable integrally with said first slide 83 along a vertical direction V1 and adapted to cooperate with abutment means 24' to provide an opening thrust S to the wing 3 comprising a component along the sliding direction of movement T3 of the wing, and a component along a translation direction T1 essentially horizontal and transversal with respect to the lying plane of the wing 3 in the closed position.

[0105] For this purpose, said abutment means 24' comprise advantageously an engagement pocket 25 equipped with a frontal guiding slot 25A provided with lateral edges inclined outwardly E to accompany the movement of the wing in the translation direction T1 and with a bottom wall 25B inclined to accompany the movement in the wing 3 in the sliding direction T3 of the wing (figures 18A and 18B).

[0106] When the wing 3 of the weathertight window or door 100 is in the closed position, said thrust member 84' is inserted inside the engagement pocket 25 (figures 19A, 19B). To move the wing 3 to the open position, the user rotates the handle 99, which activates said thrust means 8", causing said first slide 83 to move along said direction V1.

[0107] The thrust hook 84', mounted integrally to said first slide 83, is thus moved along the same sliding direction V1, leaving progressively the engagement pocket 25 with a movement advantageously guided by the inclined lateral edges of the guiding slot 25A and also cooperating at the same time with the bottom wall 25B (figures 20A and 20B) of the pocket 25 so as to apply a thrust S to the wing 3 in the transversal translation direction T1, and also in the direction of sliding movement of the wing T3, thus allowing the user to start without effort the opening movement of the wing 3 away from the frame 2, overcoming the inertia of the wing 3 and breaking the suction created by the action of the sealing means 5.

[0108] Unlike the previous embodiments, said thrust means 8" are not provided with elastic means nor transmission means.

[0109] From the foregoing description, it is thus evident how the present invention achieves the previously foreseen purposes and advantages: in fact, thrust means

have been devised for a weathertight wing, adapted to be incorporated in a door or window, that facilitate the user in the action of opening the wing, making it possible to overcome the moment of inertia of the wing and the so-called "vacuum effect".

[0110] Advantageously, the thrust means according to the present invention are practical and functional, helping the user in the operation of opening the wing to make it absolutely easy and effortless, even if the wing is of appreciable size and weight.

[0111] Moreover, the thrust means according to the present invention are rather compact, with limited dimensions, and thus can be incorporated in the frameworks of wings having reduced thicknesses, to the advantage of the glazed surfaces and consequently of the appearance, light transmittance and economy in the quantity of material used in making the wing.

[0112] It is specified that in the foregoing description, the positional or directional terms such as "above, below, vertical, horizontal, lower and upper", as well as any other similar term should be interpreted with reference to a weathertight door or window, and to thrust means incorporated therein, in their normal operative condition, as shown in the enclosed figures.

[0113] Clearly, characteristics shown with reference to an inventive embodiment can also be included in other compatible embodiments, even if not illustrated in the figures or explicitly described herein.

[0114] Naturally, the present invention is susceptible to numerous applications, modifications or variants without thereby departing from the scope of patent protection, as defined by the accompanying claims.

[0115] Moreover, the materials and equipment used for realizing the present invention, as well as the shapes and dimensions of the individual components, can be the most suitable according to the specific requirements.

Claims

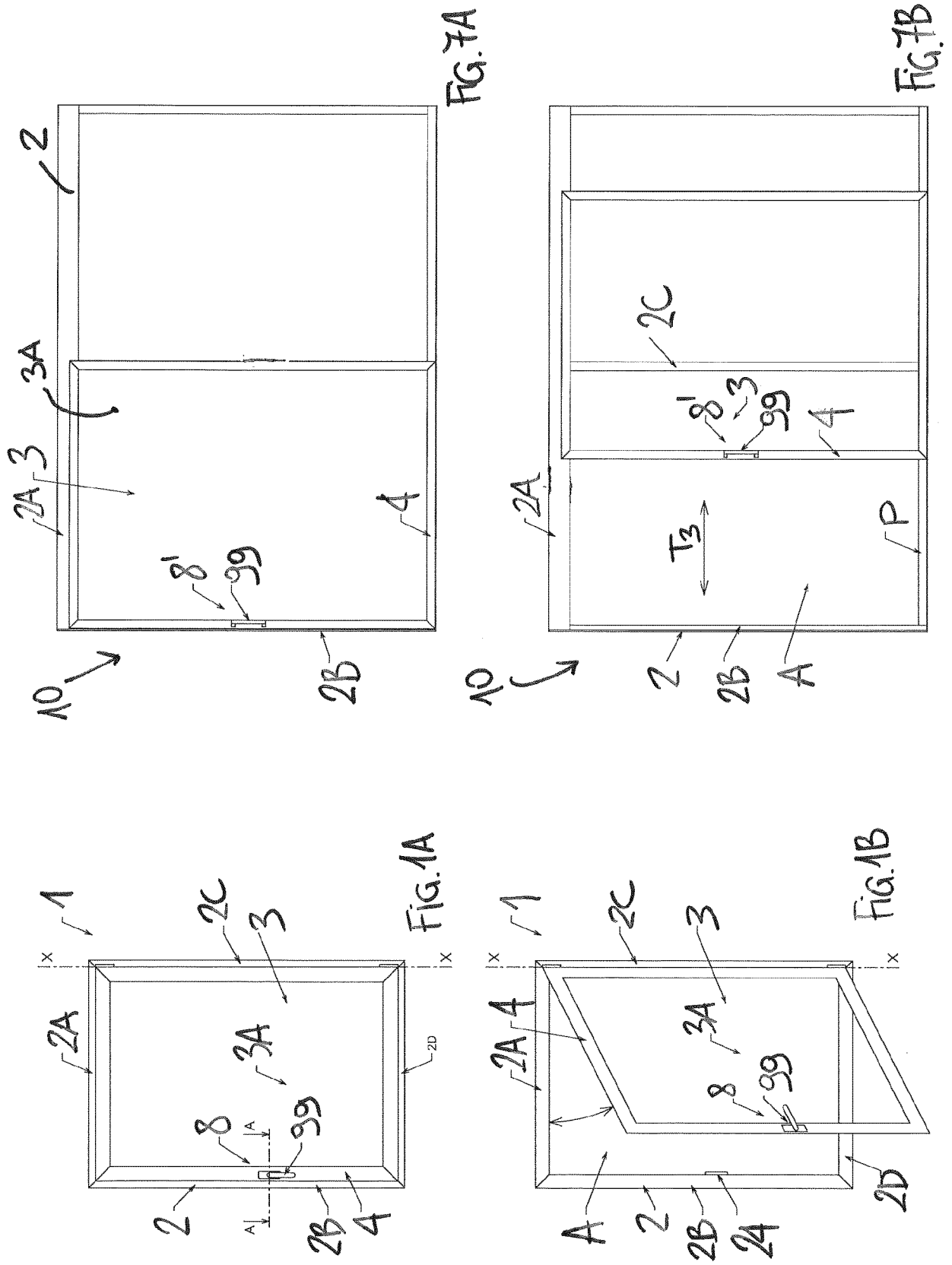
1. Thrust means (8, 8', 8'') adapted to be mounted on a door wing (3) movable between a closed position and an open position with respect to a fixed frame (2) associated with a through opening (A), said door wing (3) being equipped with a control member (99) to drive the opening/closing movement of said door wing (3), said thrust means (8, 8', 8'') being operatively connectable to said control member (99) and comprising a first sliding element (83) movable along a first sliding direction (V1), vertical in use, for integrally displacing a thrust member (84, 84') between a first position, when said door wing (3) is in said closed position, and a second position, wherein said thrust member (84, 84') cooperates with abutment means (24, 24') disposed on said fixed frame (2) to provide said door (3) with an opening thrust (S) for spacing said door wing (3) from said fixed frame (2).
2. Weathertight window or door (1, 10, 100) comprising a fixed frame (2) which can be associated with a through opening (A) obtained in a wall, at least a wing (3) movable between a closed position and an open position for selectively closing said opening (A), and sealing means (5) associated with at least a portion of said fixed frame (2) and/or of said wing (3) and arranged such that, when said wing (3) is in said closed position, said through opening (A) is essentially sealed, a control member (99) being provided integral with said wing (3) to drive the opening/closing of the wing (3) and to selectively operate temporary locking means (9) for holding said wing (3) in said closed position, **characterized in that** it also comprises thrust means (8, 8', 8'') mounted on said wing (3) and operatively connected to said control member (99), said thrust means (8, 8', 8'') comprising a first sliding element (83) movable along a first sliding direction (V1), vertical in use, for integrally displacing a thrust member (84, 84') between a first position, when said wing (3) is in the closed position, and a second position, wherein cooperates with abutment means (24, 24') disposed on said fixed frame (2) to provide the wing (3) with an opening thrust (S) for spacing said wing (3) from said fixed frame (2).
3. Weathertight window or door (1, 10, 100) according to claim 2, wherein said thrust means (8, 8', 8'') comprise first driving means (80, 80') comprising a gear wheel which can be rotated with said control member (99) and equipped with a first circumferential toothing (81) comprising at least a first engaging tooth (81A) adapted to engage with a first linear toothing (82, 82') obtained on said first sliding element (83).
4. Weathertight window or door (1, 10) according to claim 2 or 3, wherein said thrust member (84) of said thrust means (8, 8') is formed of a rigid pin operatively connected to said first sliding element (83) by means of transmission means (85) to be movable along a second sliding direction (V2) inclined with respect to said first sliding direction (V1) between said first position, wherein said thrust pin (84) is essentially retracted in a housing (18) provided on said wing (3), and said second position, wherein said thrust pin (84) extracted from said housing (18) and abuts against said abutment means (24).
5. Weathertight window or door (1, 10) according to any one of claims 2 to 4, wherein said thrust means (8, 8') comprise first elastic biasing means (86) operatively associated with said first sliding element (83) and arranged to bias said thrust member (84) towards said first position.
6. Weathertight window or door (1, 10) according to any one of claims 2 to 5, wherein said thrust means

(8, 8') comprise second elastic biasing means (87) operatively associated with said first sliding element (83) to allow the reload of said thrust member (84).

7. Weathertight window or door (1, 10) according to any one of claims 4 to 6, wherein said transmission means (85) comprise a flexible but substantially axially rigid body, associated with a first end portion (85A) to said sliding element (83) and with an opposite end portion (85B) to said thrust pin (84), said transmission means (85) being adapted to slide in a shaped guide (88) arranged in said housing (18) and configured to deviate the sliding direction (V2) of said thrust pin (84) with respect to the sliding direction (V1) of said sliding element (83).
8. Weathertight window or door (1, 10) according to claim 7, wherein said flexible transmission means (85) comprise a chain formed of a plurality of rigid elements articulated to each other.
9. Weathertight window or door (1, 10) according to claim 7, wherein said flexible transmission means (85) are formed of a flexible shaft.
10. Weathertight window or door (10) according to any one of claims 2 to 9, wherein said wing (3) is slidably connected to said fixed frame (2), said thrust means (8') being arranged and configured so as to provide an opening thrust (S) comprising a force component along a translation direction (T1) which is essentially horizontal and transverse with respect to a lying plane of said wing (3) when in the closed position, and a force component along a vertical direction (T2), to raise said wing (3) with respect to the closed position.
11. Weathertight window or door (10) according to any one of claims 2 to 10, wherein said wing (3) is slidably connected to said fixed frame (2), said window or door (10) further comprising a force storage device (30) fixable to said wing (3) and adapted to store the inertia energy of said wing (3) during the closing movement and to release it progressively and in an adjustable way during the opening movement along the sliding direction (T3) of the wing (3), said device (30) comprising an internally threaded bush (32) wherein a sleeve (33) is screwed, a first elastic element (34) for storing the inertia energy of the wing (3), a pin (36) having a flat head (36B) and a second elastic element (35) for biasing said pin (36) to a retracted position, said first elastic element (34), said pin (36) and said second elastic element (35) being coaxially inserted in said sleeve (33).
12. Weathertight window or door (10) according to any one of claims 2 to 9, wherein said wing (3) is rotatably connected to said fixed frame (2), said thrust means

(8) being arranged so as to provide an opening thrust (S) in a translation direction (T1) essentially horizontal and transversal with respect to the lying plane of said wing (3) when in said closed position.

13. Weathertight window or door (100) according to claim 2 or 3, wherein said wing (3) is slidably connected to said fixed frame (2), said thrust means (8") comprising a thrust member (84') formed by an inclined hook, mounted on said first sliding element (83) and adapted to cooperate with abutment means (24') disposed on said fixed frame (2) and defining an engagement pocket (25) provided with a front guiding slot (25A) equipped with inclined lateral edges and with an inclined bottom wall (25B) to provide an opening thrust (S) comprising a force component along a translation direction (T1) essentially horizontal and transversal with respect to the lying plane of the wing (3) and a force component along the sliding direction (T3) of the wing (3).
14. Weathertight window or door (1, 10, 100) according to any one of claims 2 to 13, further comprising safety locking means (6) essentially formed by a cylinder lock (61) operable by inserting a key for transmitting the movement of said key to a lock member (62) movable between a retracted position and an extracted position.
15. Weathertight window or door (1, 10, 100) according to any one of claims 3 to 14, wherein said temporary locking means (9) comprise second driving means (90) formed by a second gear wheel arranged coaxial with respect to said first gear wheel (80, 80') and provided with a second circumferential toothing (91) adapted to engage with a second linear toothing (92) obtained on a second sliding element (93) operatively connected to at least one temporary locking rod (94) whereon at least one locking hook (95) is mounted, said locking hook being adapted to removably engage with a corresponding retaining element (96) provided on said fixed frame (2) to hold said wing (3) in said closed position.



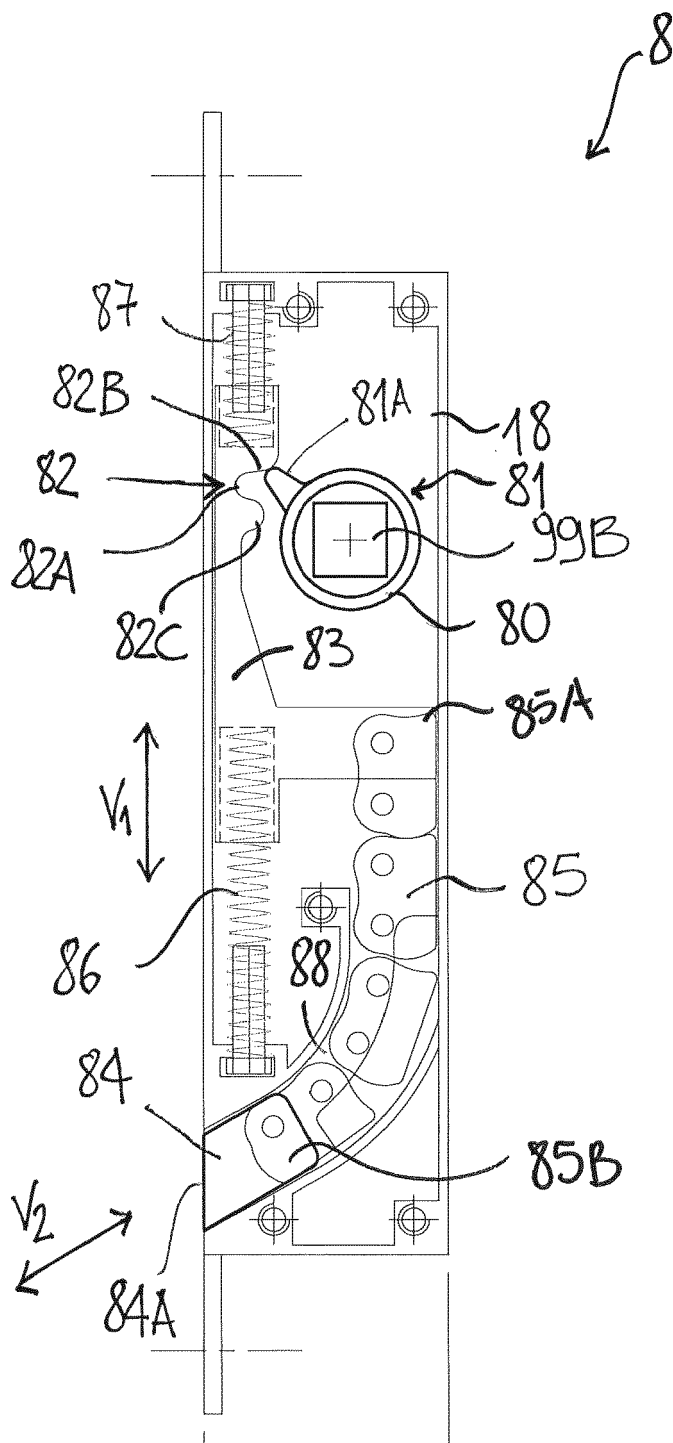


Fig. 2

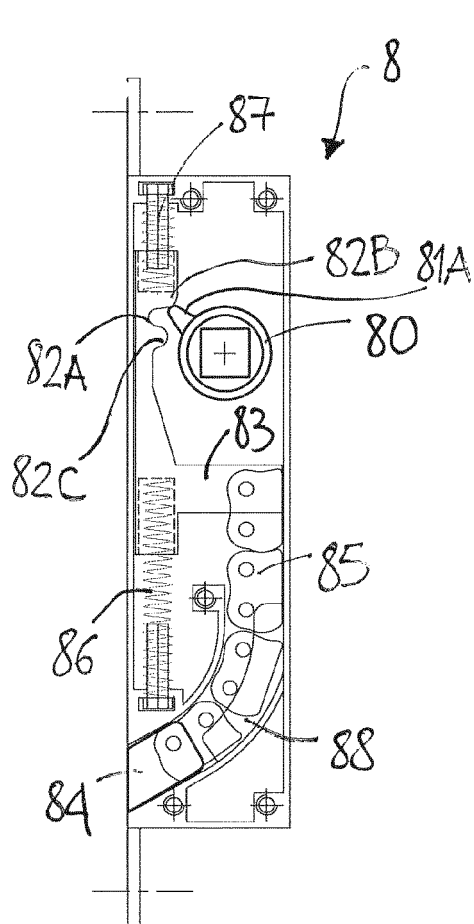


FIG. 4A

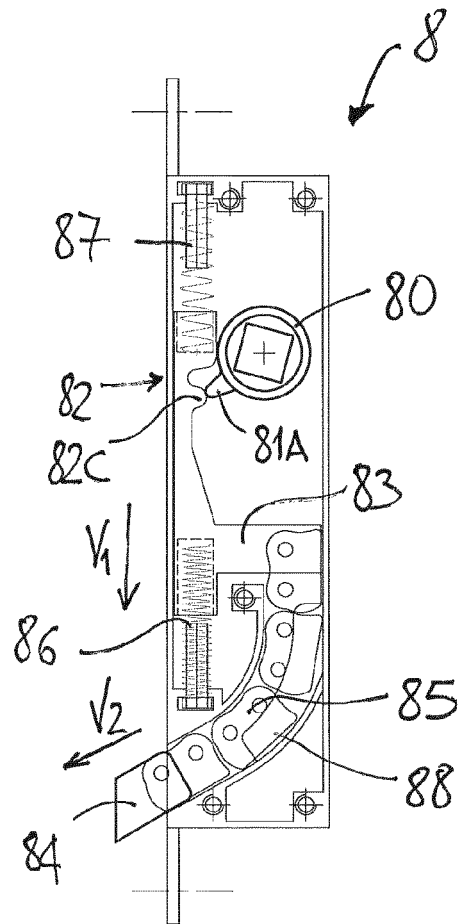


FIG. 4B

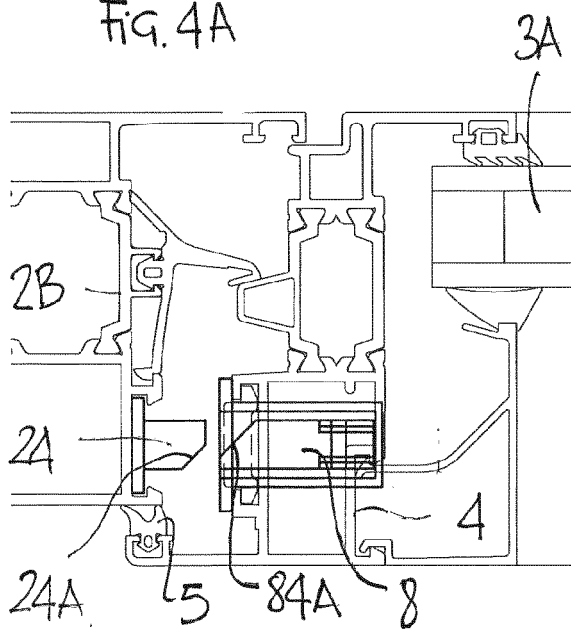


FIG. 3A
SE2.A-A

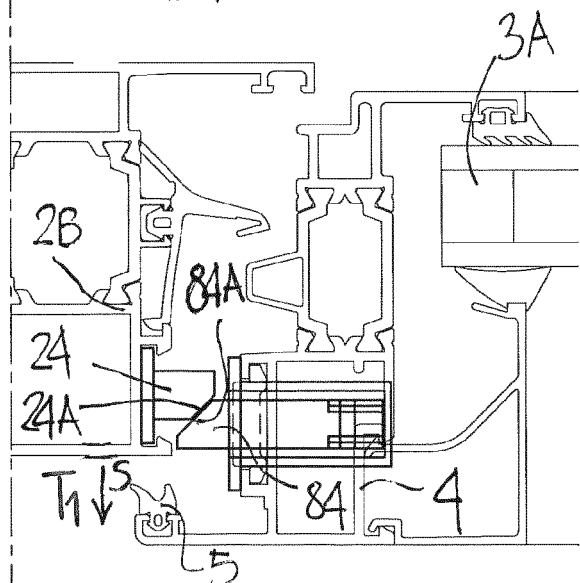


FIG. 3B
SE2.A-A

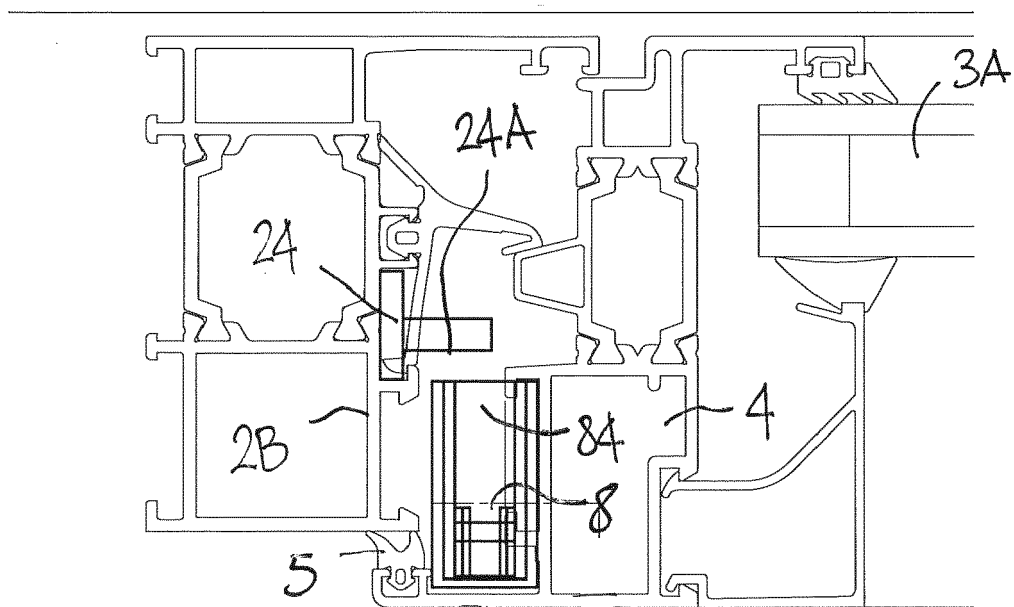


FIG. 5A
SE2.A-A

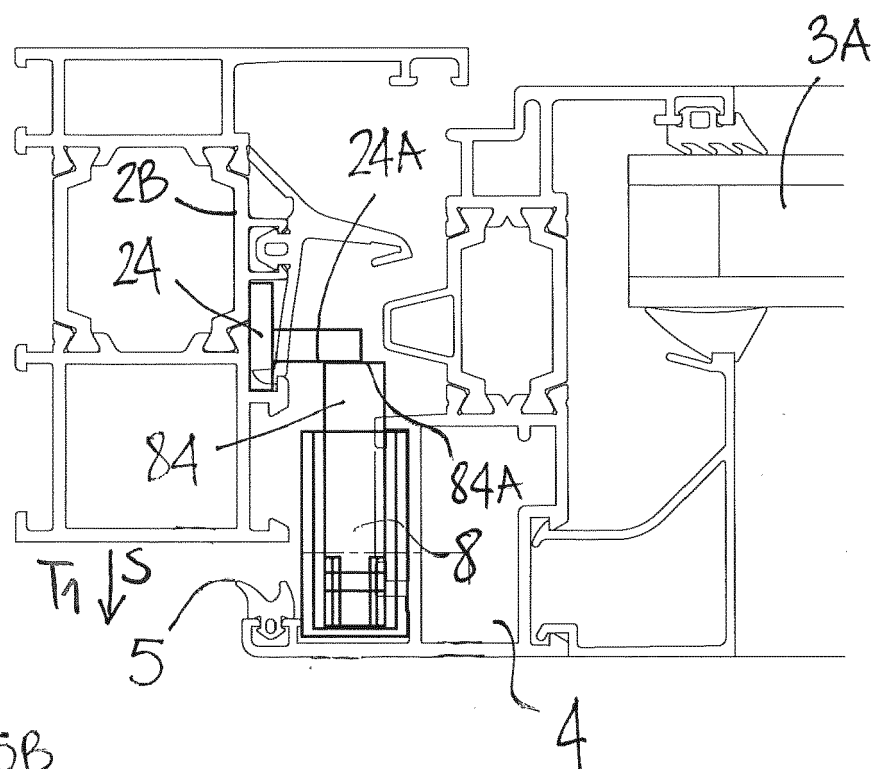


FIG. 5B
SE2.A-A

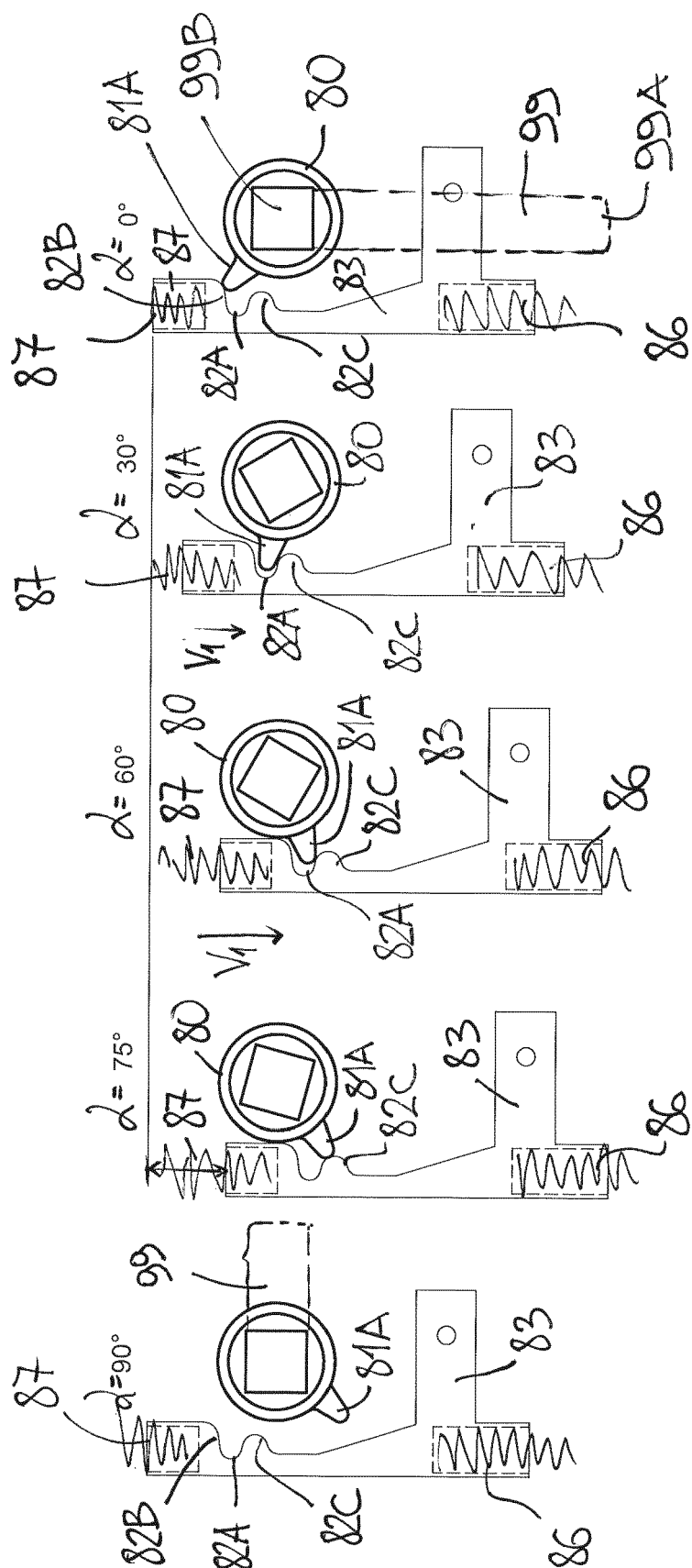


FIG. 6A

FIG. 6B

FIG. 6C

FIG. 6D

FIG. 6E

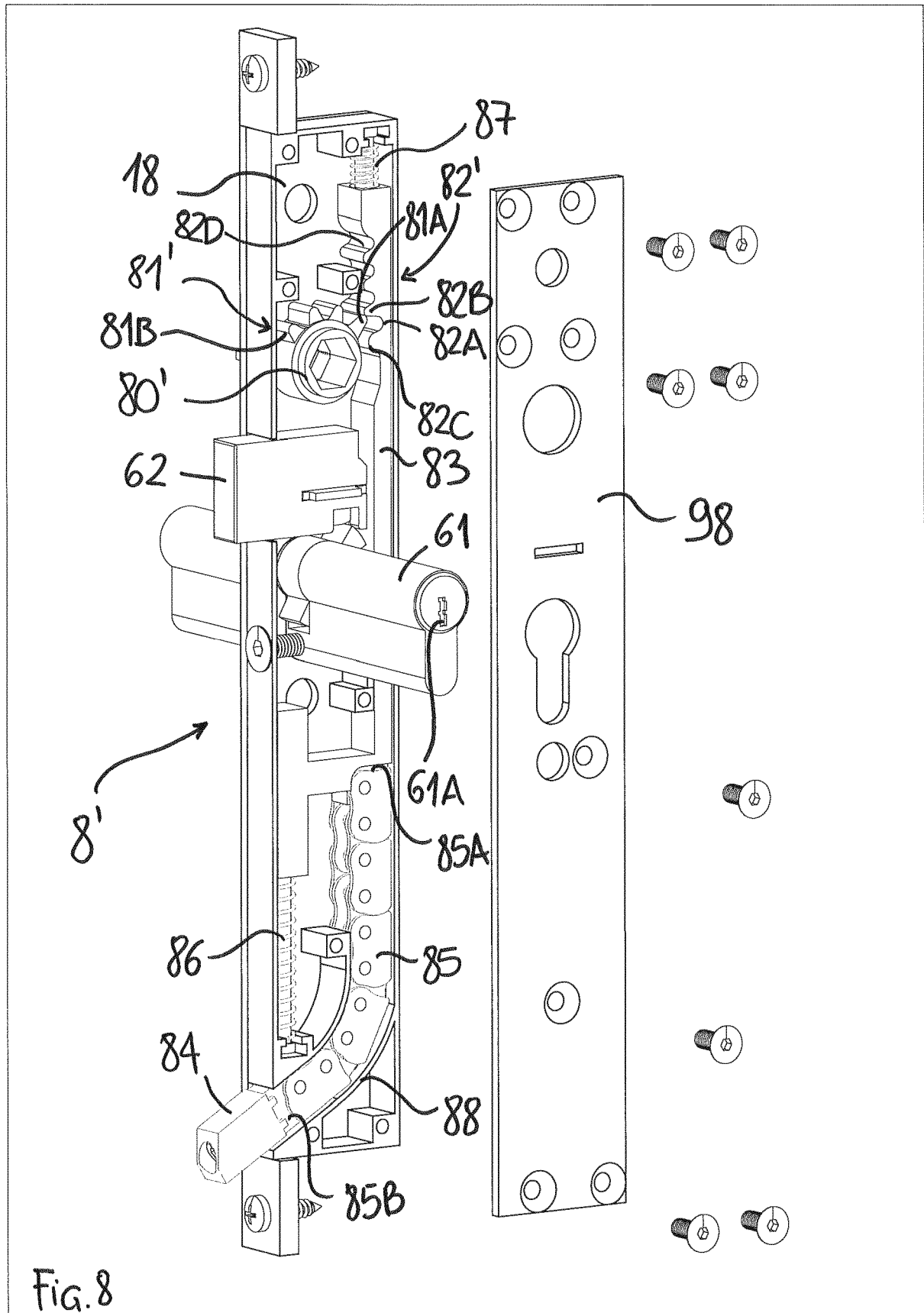


Fig. 8

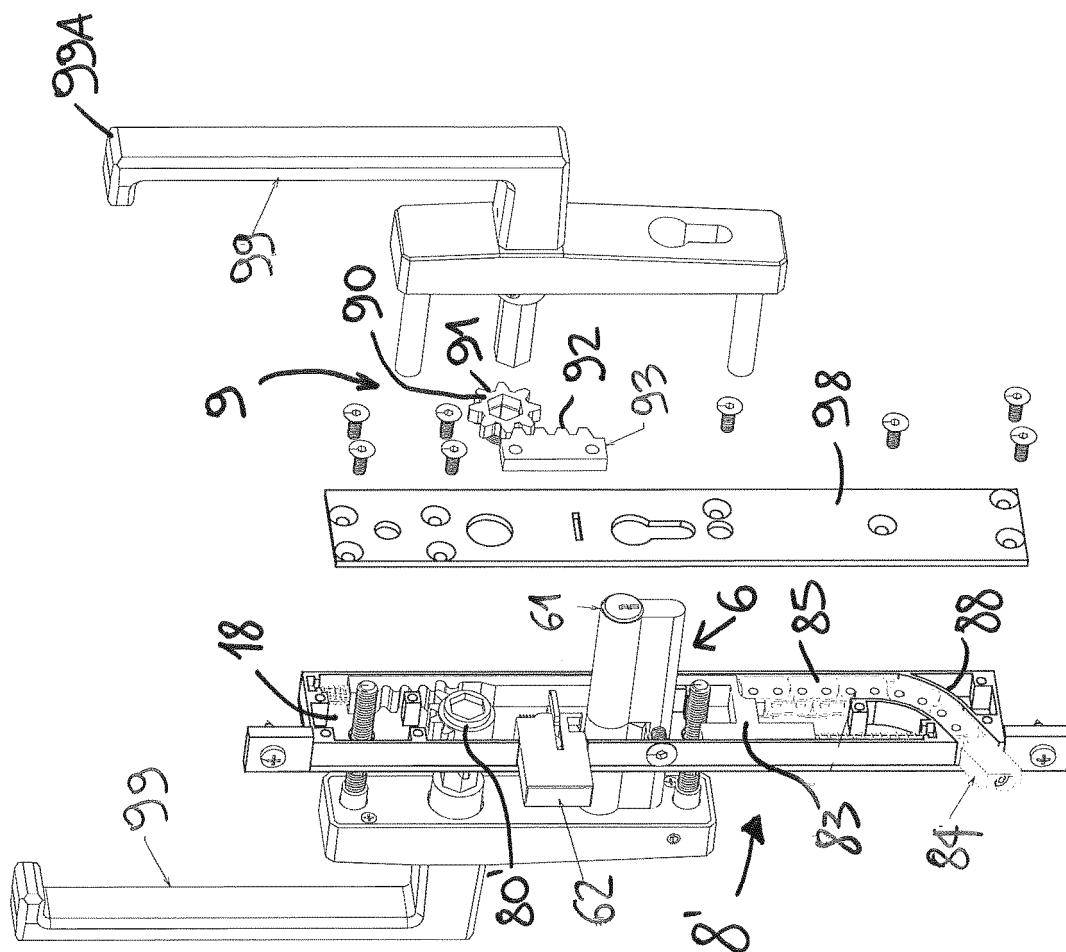


FIG. 9A

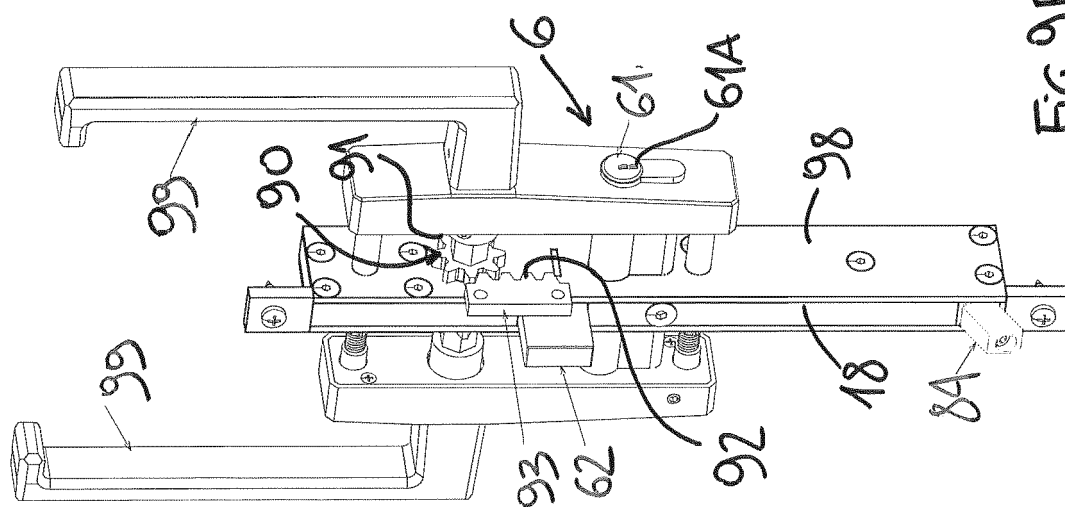
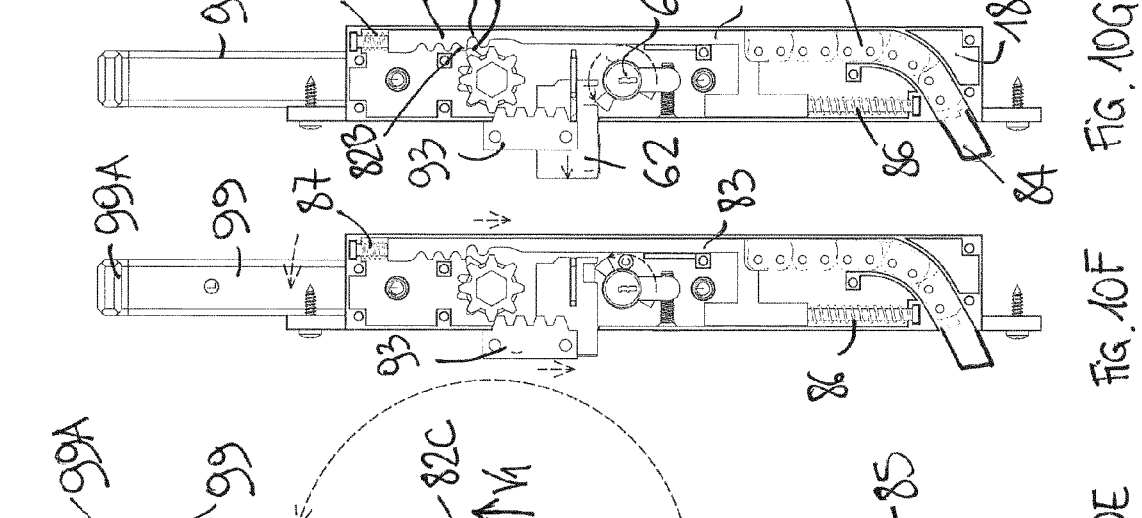
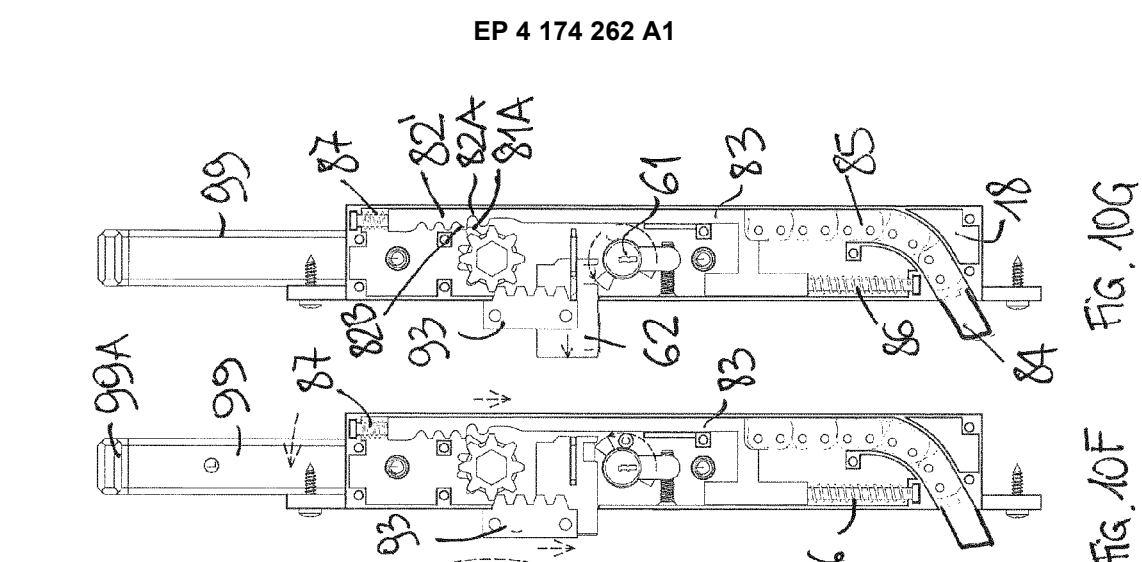
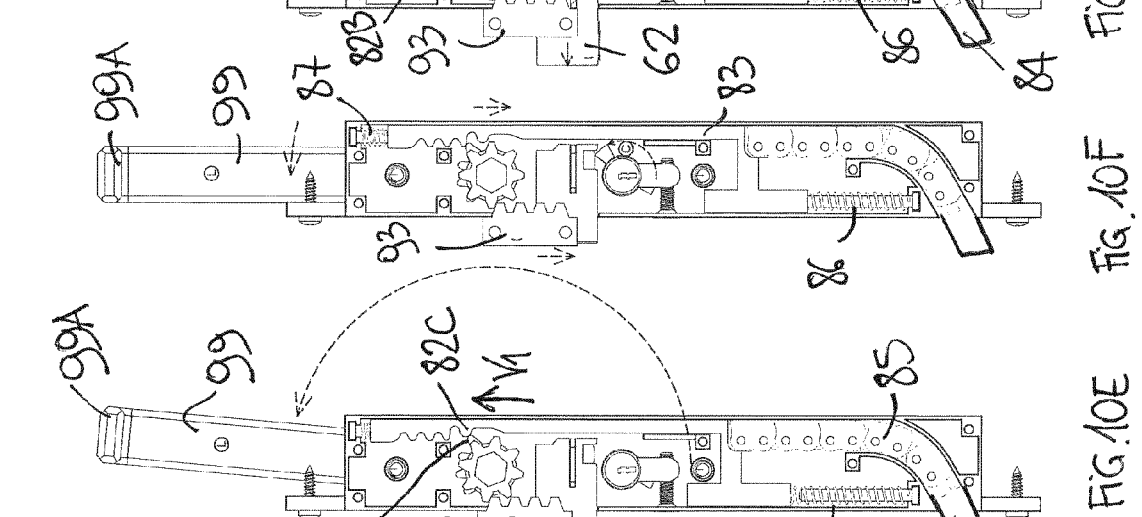
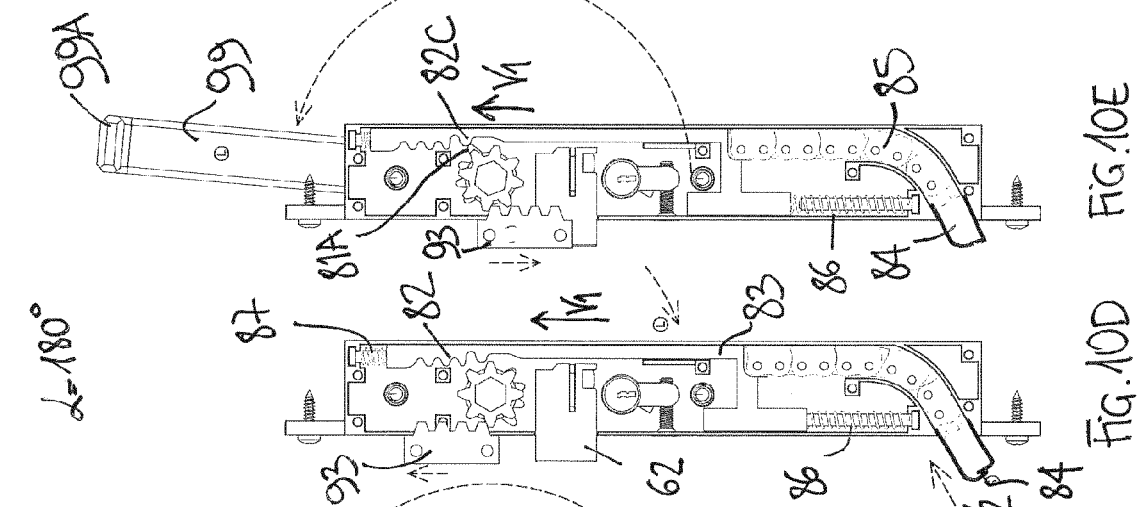
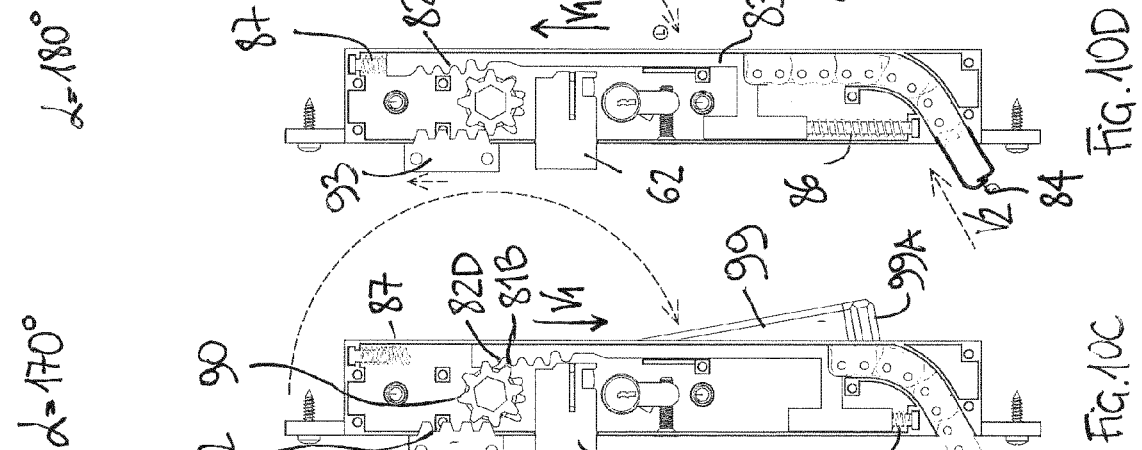
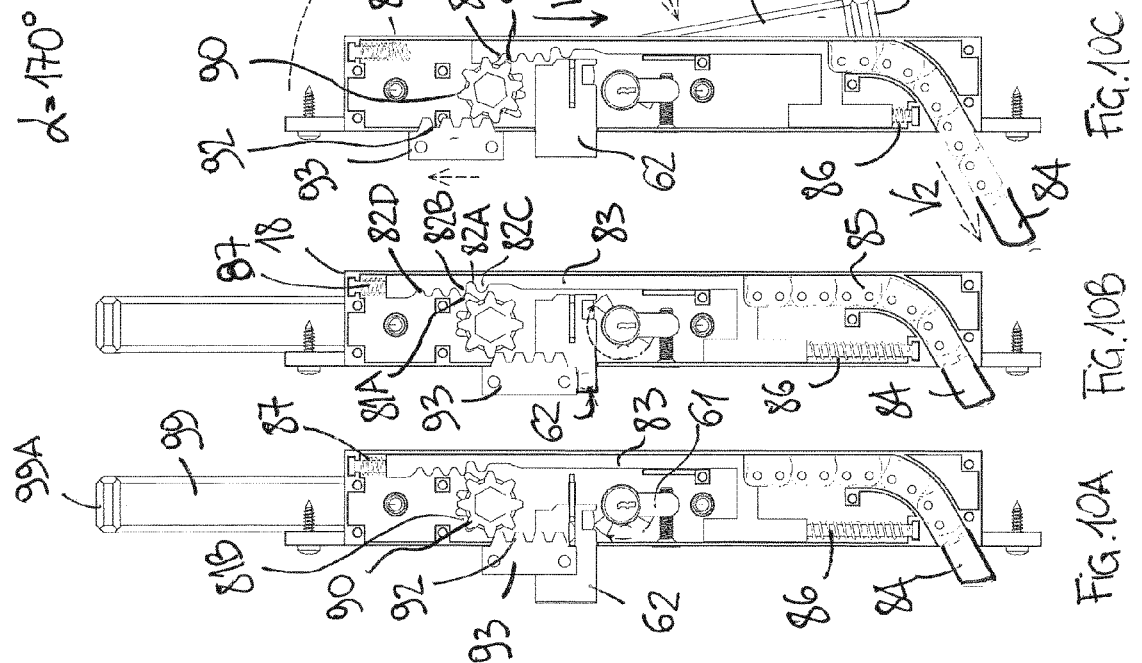
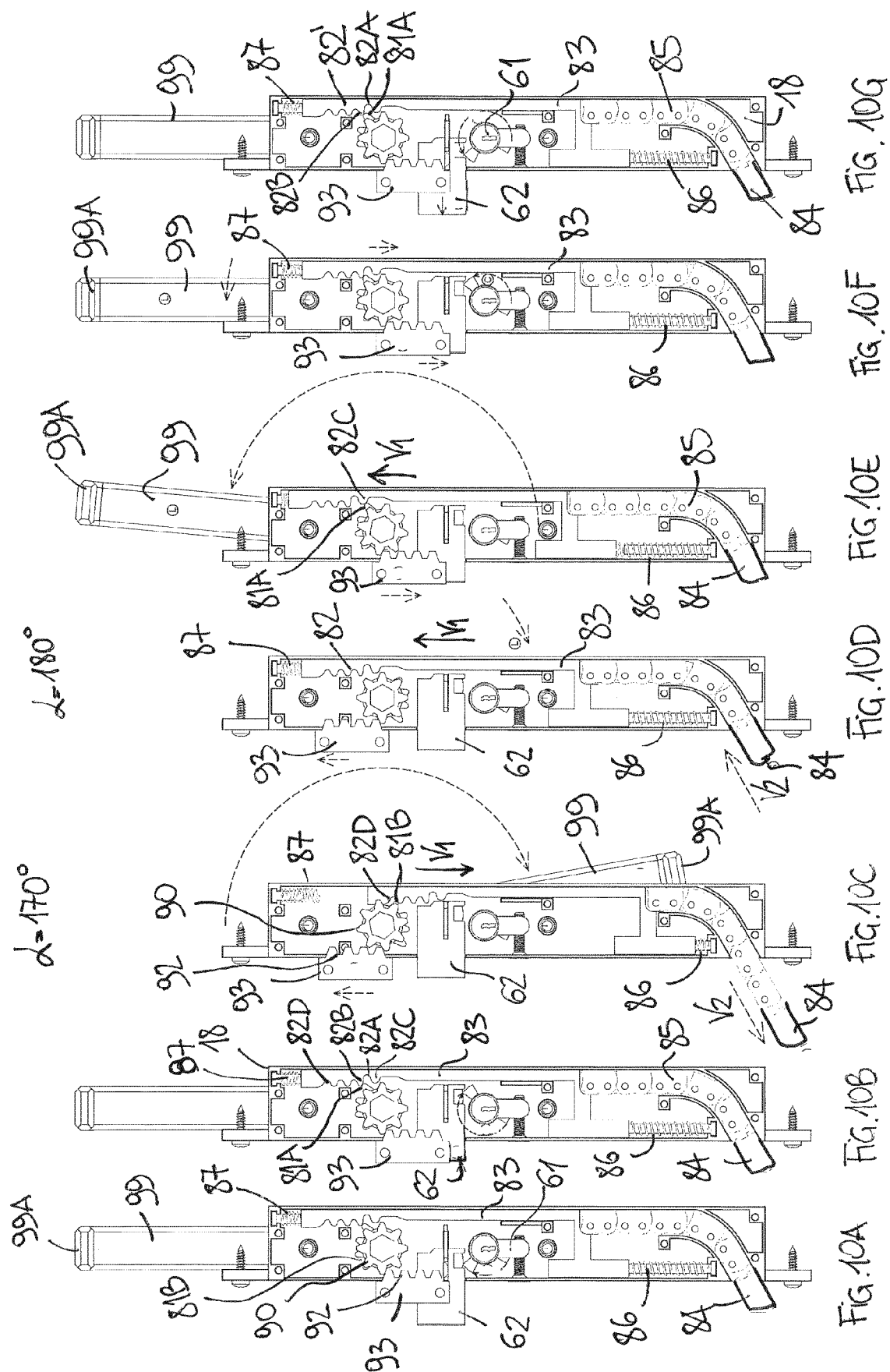


FIG. 9B



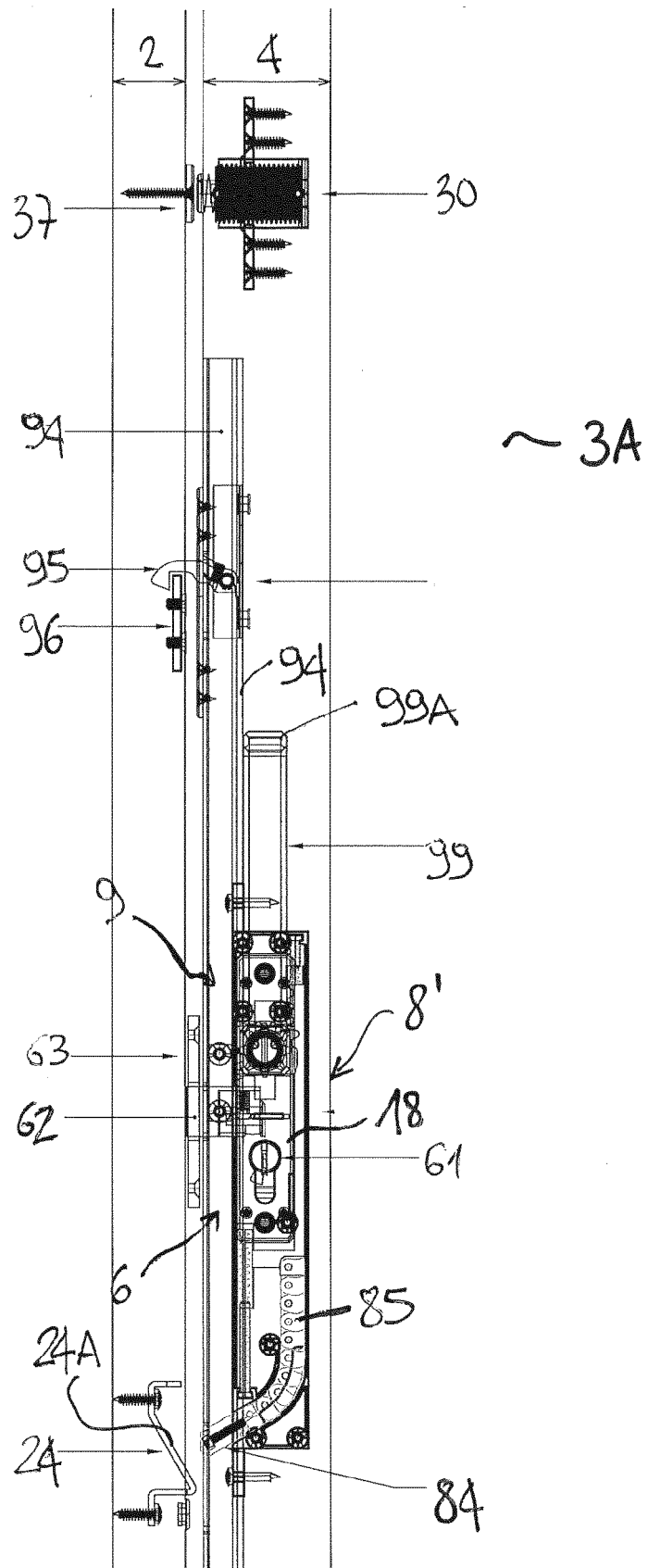
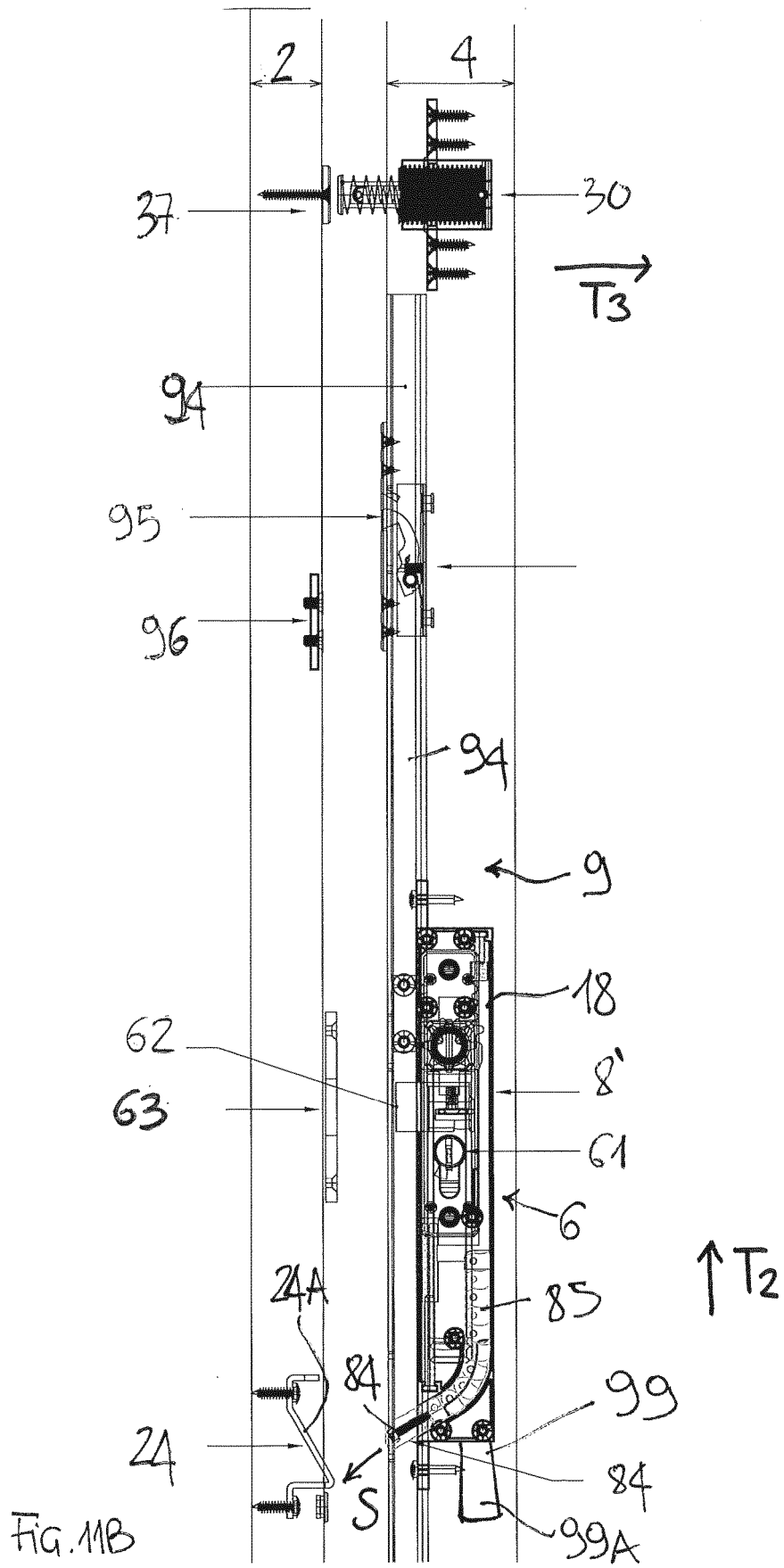


FIG. 11A



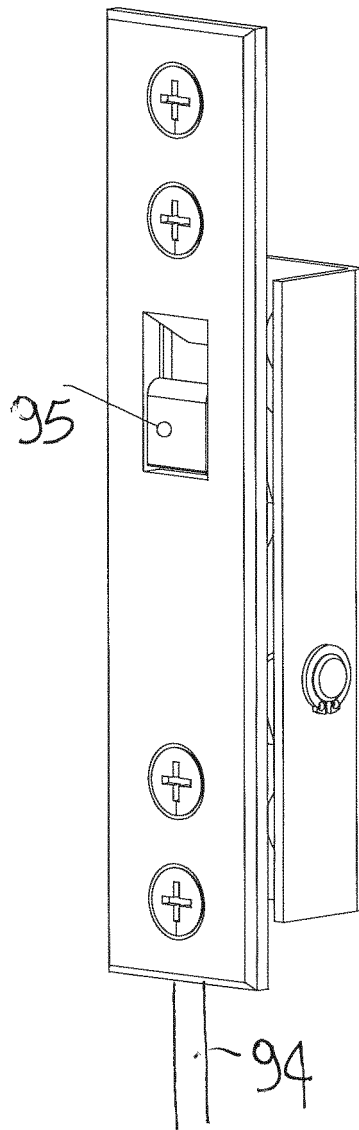


FIG. 12B

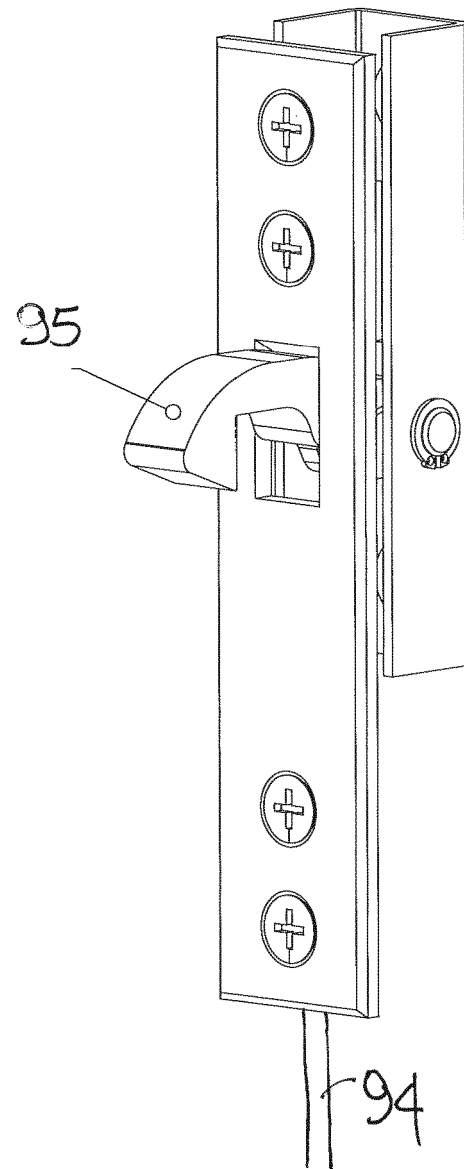
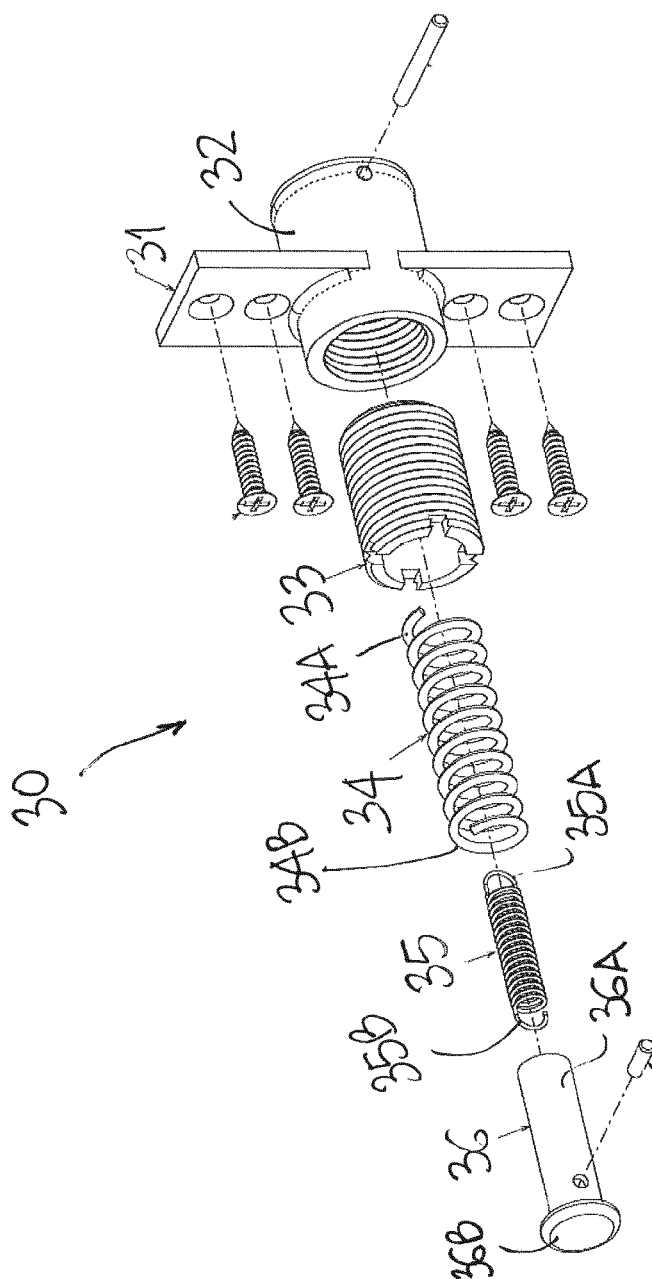
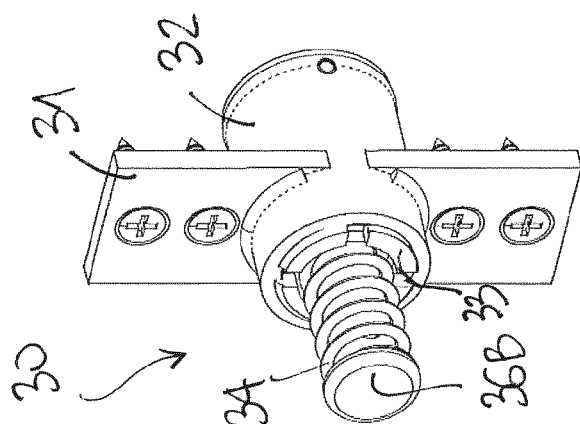
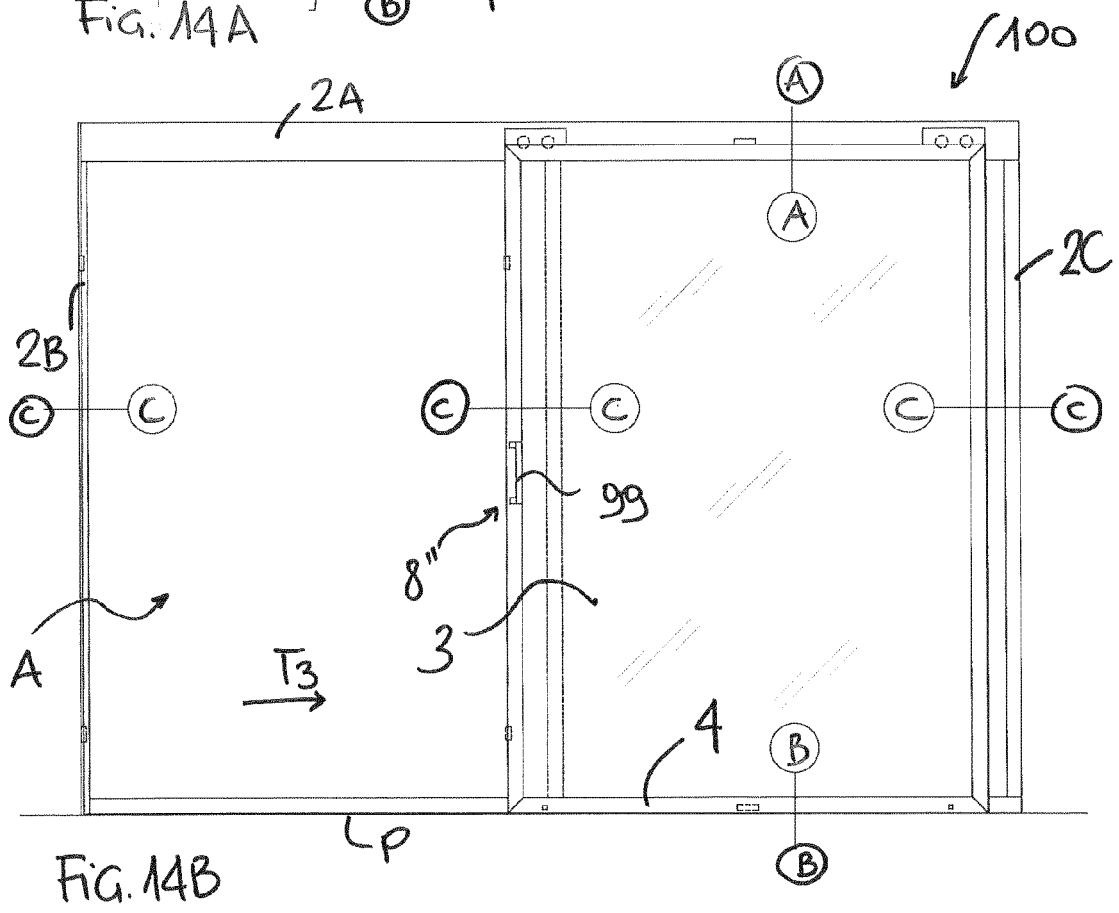
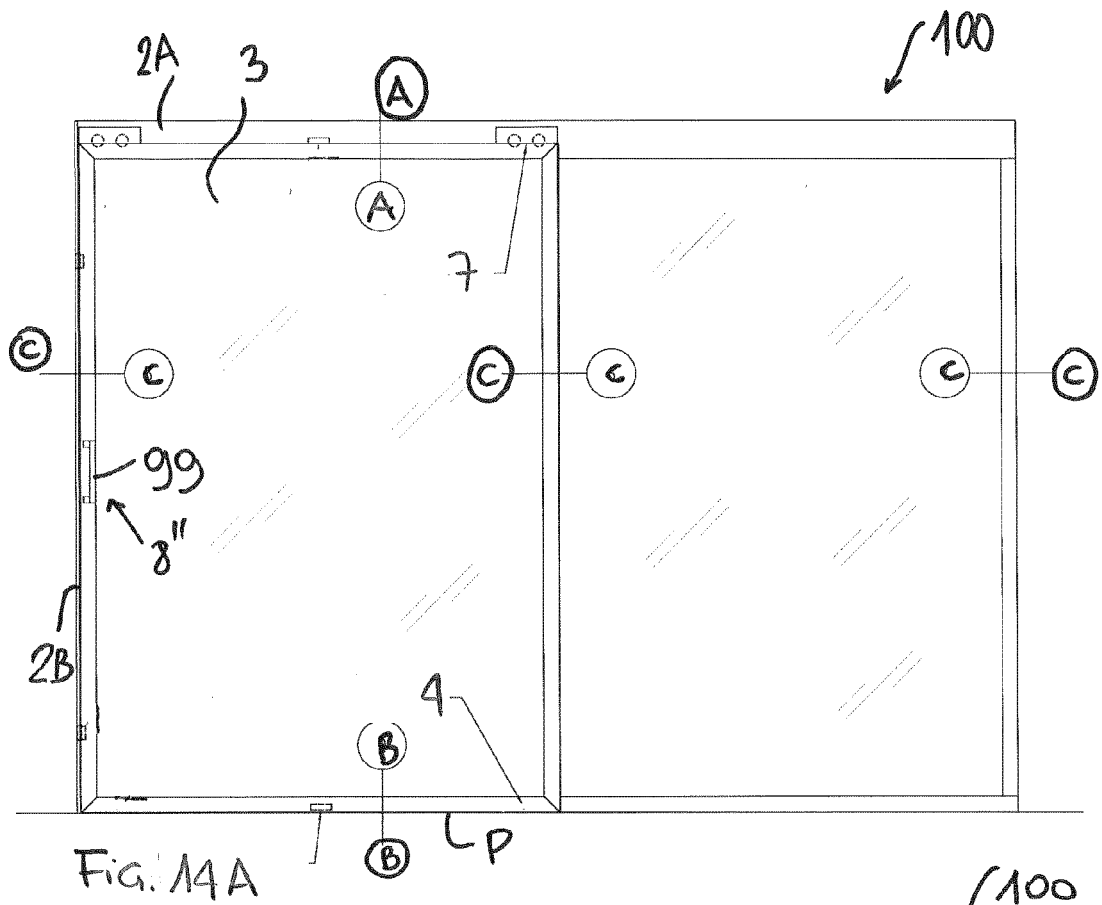
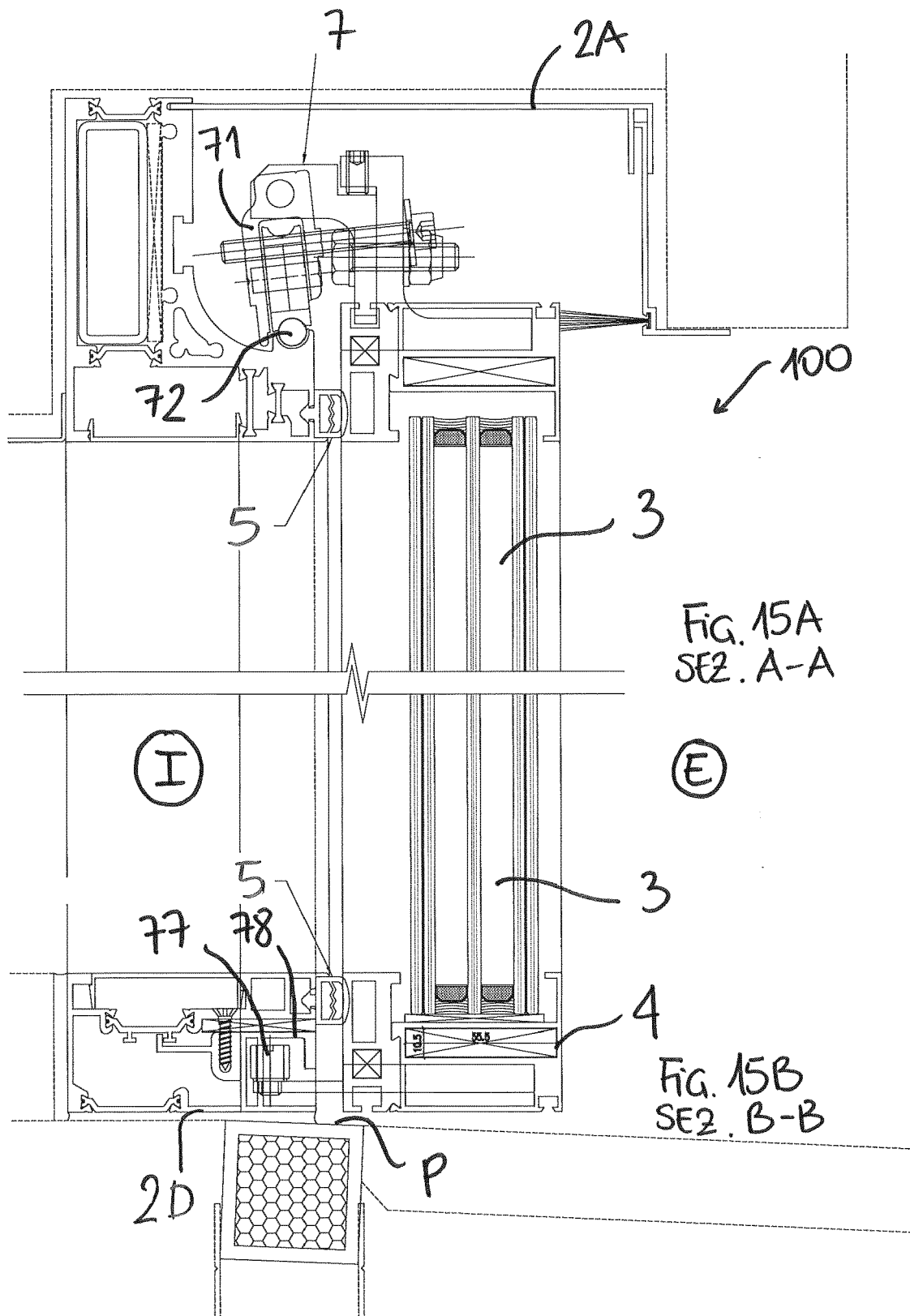


FIG. 12A







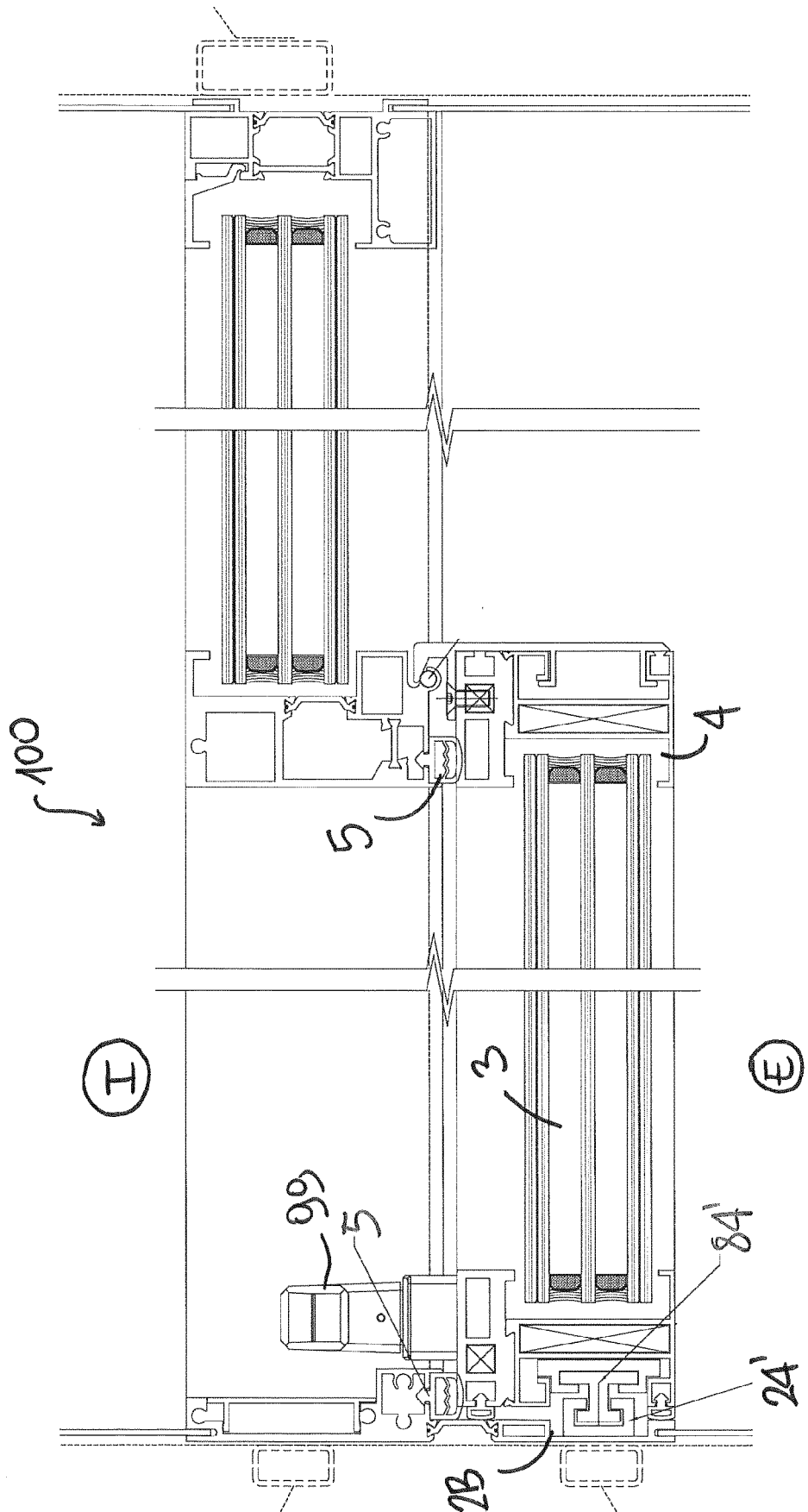
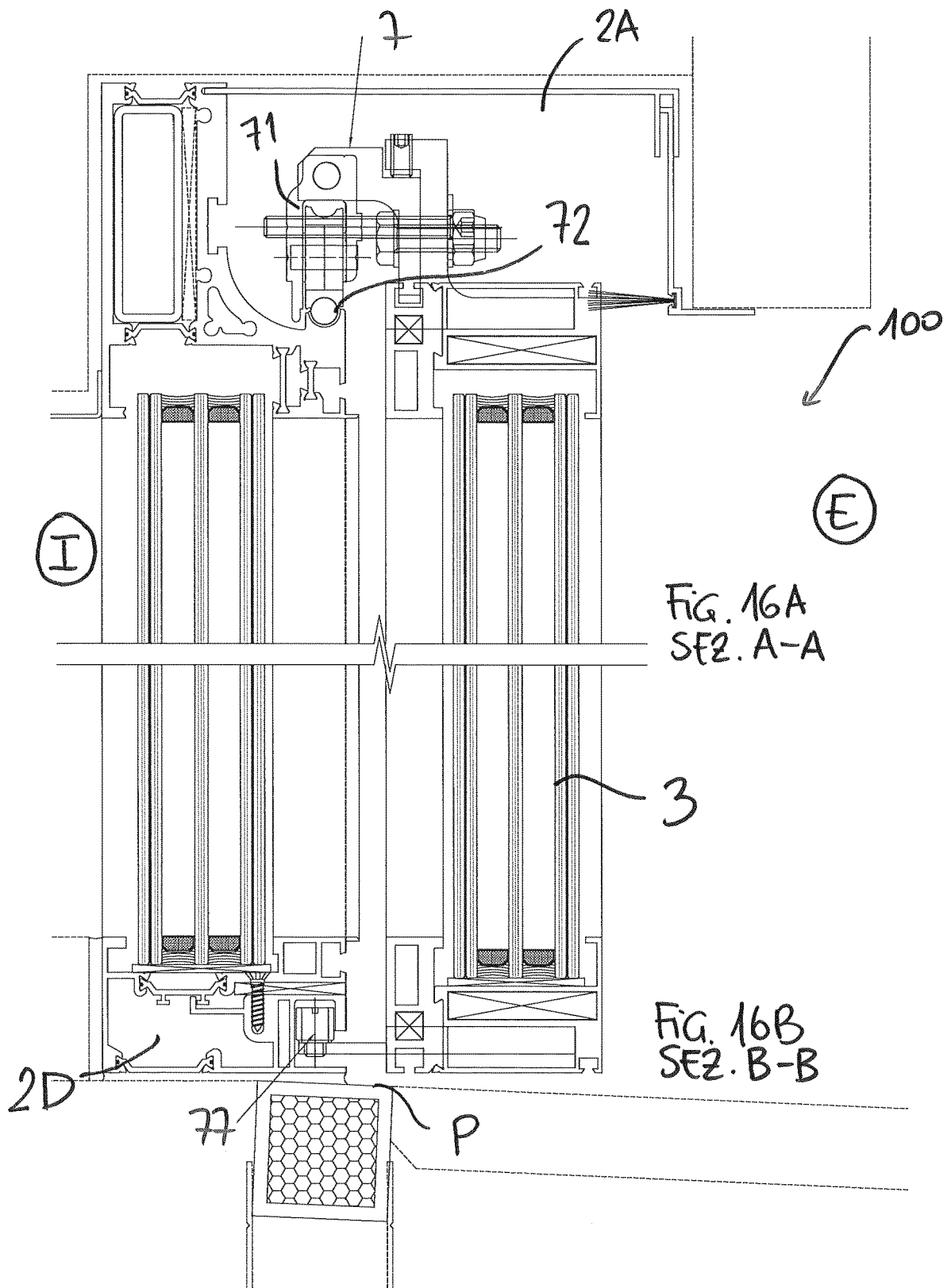
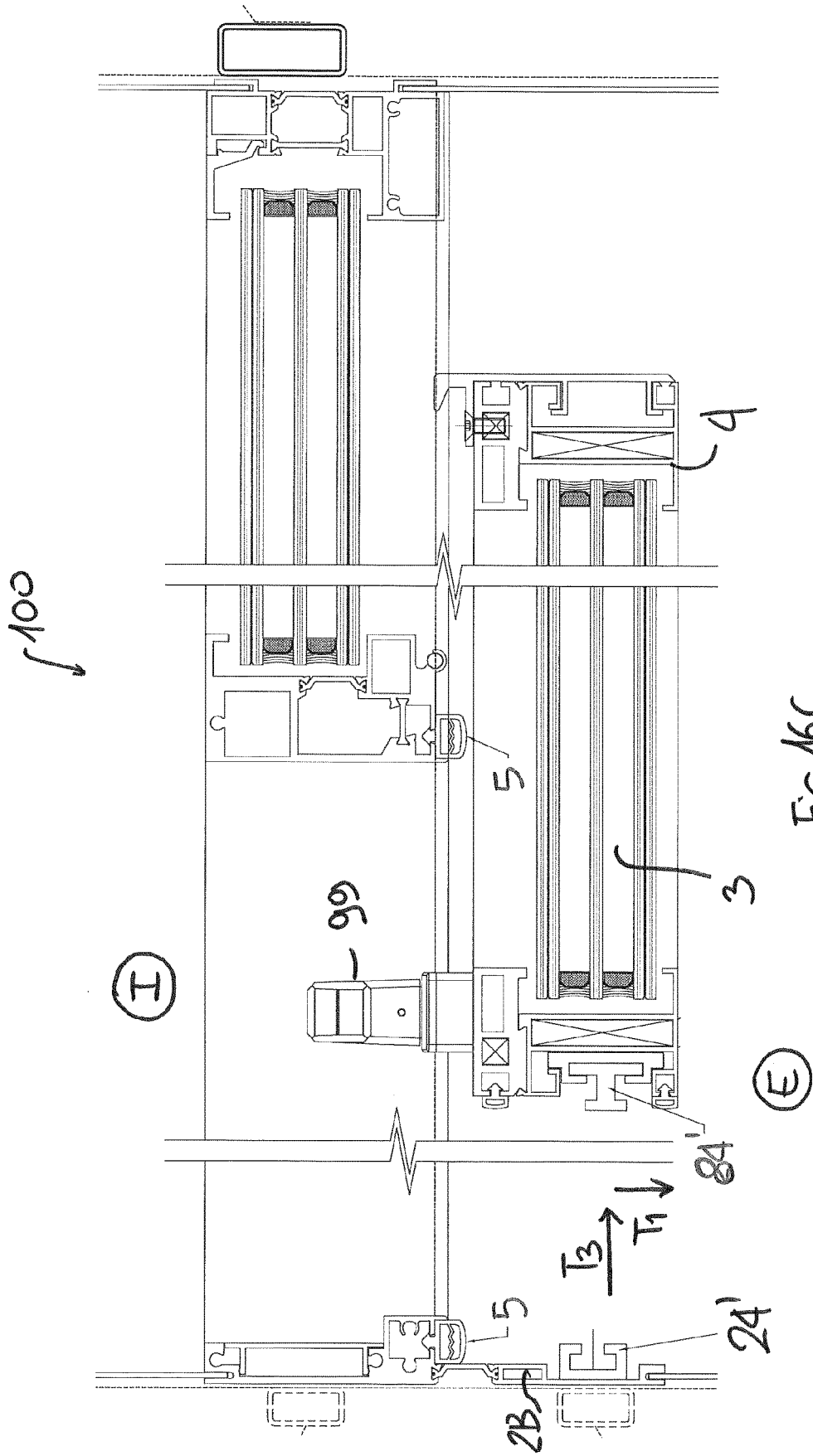


FIG. 15C
SEC. C-C





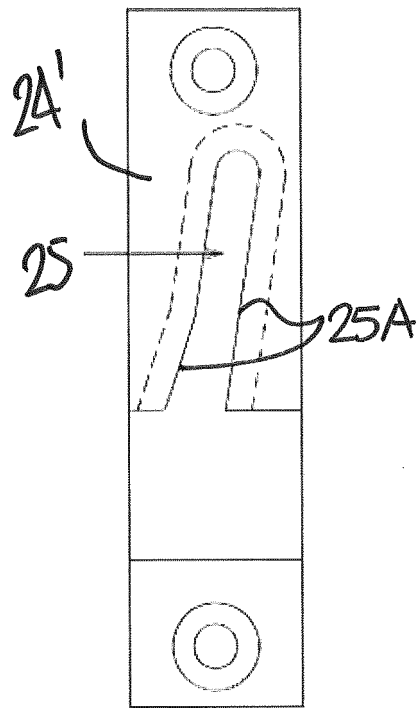


Fig. 18A

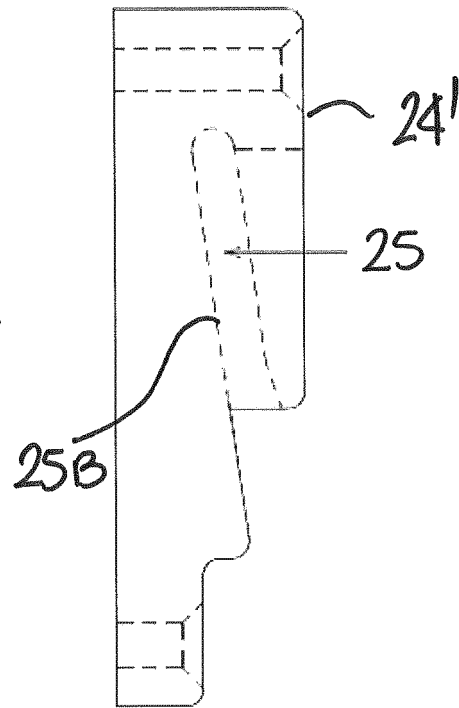


Fig. 18B

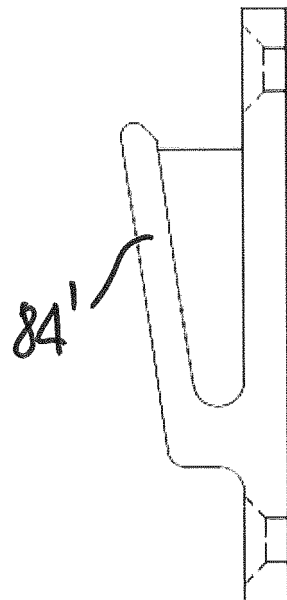


Fig. 17B

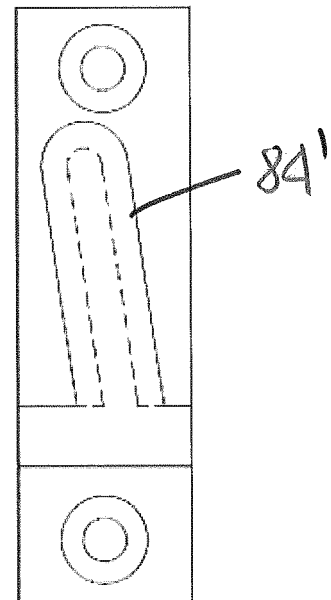


Fig. 17A

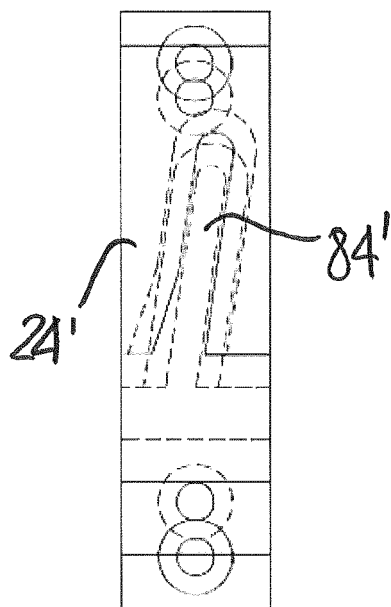


FIG. 19A

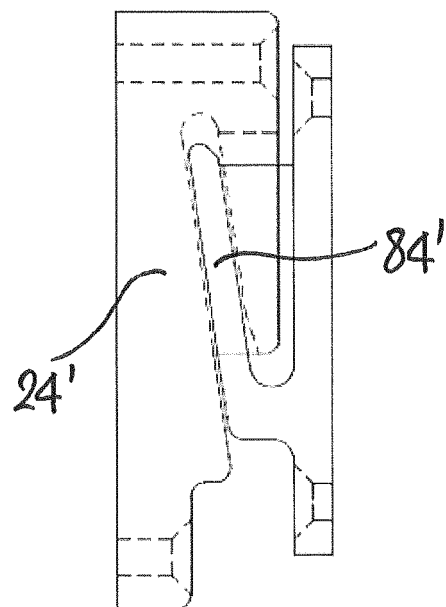


FIG. 19B

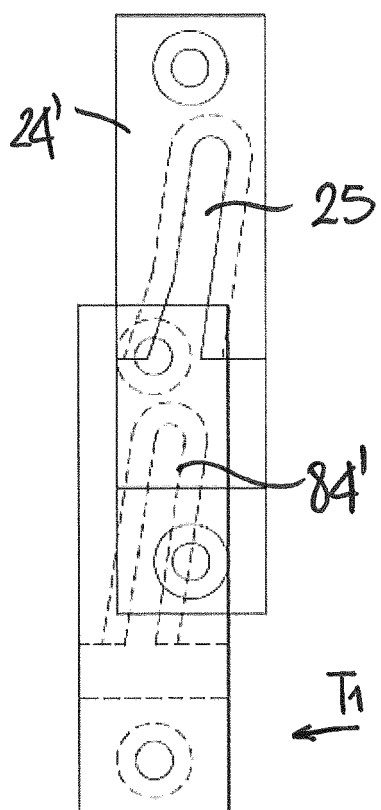


FIG. 20A

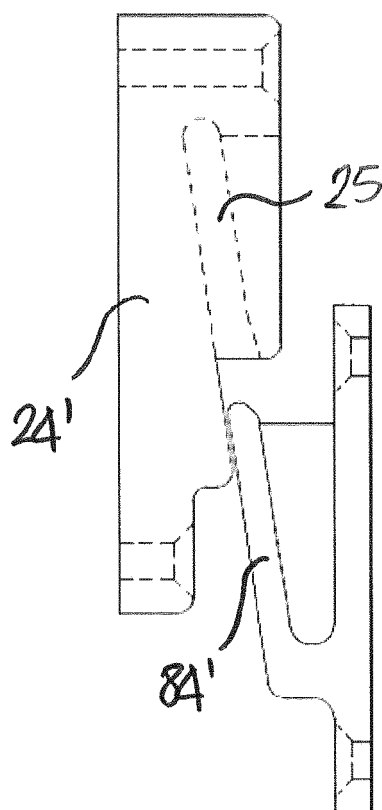


FIG. 20B



EUROPEAN SEARCH REPORT

Application Number

EP 22 20 3500

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X	WO 2017/096290 A2 (CHAFFIN LAWRENCE E [US]; GLOVER JOHN R [US]) 8 June 2017 (2017-06-08) * page 2, line 24 - page 14, line 20; figures 1-13 *	1-6, 10-12, 14, 15	INV. E05B17/00 E05C9/02 E05F1/16 E05F3/22 E05F11/10 E05F11/12
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Place of search The Hague	Date of completion of the search 22 February 2023	Examiner Viethen, Lorenz
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