(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 187 678 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.07.2017 Bulletin 2017/27

(21) Application number: **16207415.7**

(22) Date of filing: **29.12.2016**

(51) Int Cl.:
E06B 3/46 *(2006.01)* ***E04B 2/82*** *(2006.01)*
E06B 3/02 *(2006.01)* ***E06B 3/663*** *(2006.01)*
E05D 15/10 *(2006.01)*

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

(30) Priority: **29.12.2015 IT UB20159234**
09.08.2016 IT 201600083836

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(54) GLASS DOOR/WINDOW COMPRISING LEAVES ALIGNED ALONG A SINGLE AND CONTINUOUS PLANE

(57) Door/window comprising a plurality of openable leaves (Va) and possibly one or more fixed leaves (Vf) formed by a plurality of glass sheets (Vi, Vc, Vel associated to a support peripheral metal section (M) of the, said metal section (M) being positioned completely inside the pair of peripheral glass sheets (Vi, Ve) of said plurality of glass sheets and housing the seals and the mechanical support elements of the door/window. All the leaves of the door/window are mutually aligned along a single plane in the closing position of the door/window and slidingly supported on lower and upper support elements (L, Ls) and guide elements (Rm, Sm; Sb, St). Said support and guide elements are movable, transversely to the plane of the door/window, between a closing position and an opening position of the openable leaves (Va) of the door/window.

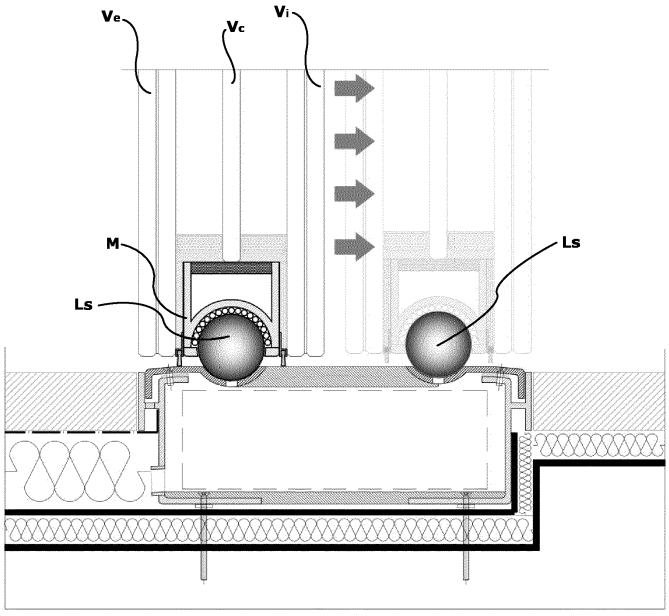

Fig. 8

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Description

[0001] The present invention refers to an openable glass door/window, in particular a door/window for external use provided, on both sides, with a single modular continuous even glass surface.

FIELD OF THE INVENTION

[0002] The invention belongs to the field of openable door/windows, i.e. doors, windows, French windows and glass walls for residential and commercial buildings.

BACKGROUND OF THE PRIOR ART

[0003] Different types of glass door/windows are known in the field, which exhibit different features in relation to the frame shape and arrangement, the way how glass panes are joined to the frames, the way how the leaves of the door/window can be moved in order to achieve its opening and, finally, the material of which the frame is made: wood, plastic materials and metallic materials. All of the known door/windows, however, generally consists of a frame element which comprises both an outer frame portion and one or more inner frame portions, inside of which arc fixedly joined the glass transparent panes. The frame thus is a discontinuous element with respect to the glass surface contained in the same, both as regards obviously the material and as regards the positional plane; due to this construction requirements, in fact, the glass surface is encased in the frame and then positioned at a more inner plane with respect to the outer plane of the frame.

[0004] In modern buildings it is however strongly felt the need for door/windows which show a minimal impact to the eye, which door/windows thus enable to make the best use of the light and the view coming into from the opening closed by the same. The technological answers to this need have produced up to now modified door/windows substantially as far as regards, on the one hand the reduction of the height difference between the outer frame and the glass pane and, on the other hand, the overall reduction of thickness of the frame.

[0005] While giving a first answer to the above mentioned needs, these known solutions are still far from completely satisfy the same and, above all, they do not exhibit such mechanical characteristics as to offer at the same time full width glass panes and a wide and comfortable opening of the door/window leaves. Since in fact the thickness reduction of the frame part with respect to the glass part structurally weakens the glass/window, technical solutions that allow a balanced support of any door/window leaf during its opening, i.e. on two opposite sides of the same, are always preferred. Among these solutions, so-called "transom" windows having an horizontal rotation axis and sliding door/windows are comprised. Transom openings have the drawback of limiting or rendering less comfortable outside accessibility, while sliding door/windows, which on the contrary allow optimum outside accessibility, have the drawback that adjacent elements of the door/window are necessarily positioned on staggered planes, so as to allow their overlapping in the opening step, thus making less aesthetic the door/window in its closed position and significantly worsening the sealing conditions to atmospheric agents, in particular to the wind.

SUMMARY OF THE INVENTION

[0006] In this picture of the prior art, the present invention proposes to overcome all the above mentioned drawbacks, by providing a glass door/window which, in its closed position, show all its component leaves aligned in a single and perfectly even plane, and also does not suffer from the above mentioned drawbacks in relation to the support and driving elements of the openable leaves.

[0007] A specific object of the present invention is therefore to provide a door/window which, in its closed position, show all its component leaves arranged in a single continuous plane, and this both in correspondence of the inner side and of the outer side of the door/window.

[0008] Another object of the present invention is then to provide a door/window which does not exhibit any discontinuous material, to the touch or to the view, for the whole width of the opening closed by the door/window.

[0009] A further object of the present invention is also to provide an openable door/window wherein the opening and closing operations thereof can be performed without applying on the door/window handles or other fittings which impair or interrupt the perfect evenness of the door/window.

[0010] A last object of the present invention is finally to provide a door/window that offers high performances as far as regards both thermal insulation and protection from atmospheric agents.

[0011] These objects are achieved, according to the present invention, through a door/window comprising a plurality of openable leaves and possibly one or more fixed leaves, characterised in that all the leaves of the door/window, in their closed position, are mutually aligned along a single plane and in that said openable leaves are slidingly supported on respective lower and upper support and/or guide elements (Rm, Ls; Sm, Sb, St), said elements being movable, transversely to the plane in which lie the leaves of the door/window, between a closing position and an opening position of the openable leaves (Va) of the door/window.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Further features and advantages of the door/window according to the present invention will anyhow be more evident from the following detailed description of some preferred embodiments thereof, given as a mere and non-restrictive example and illustrated in

the attached drawings, in which:

FIG. 1 is a cross-sectional view of the base portion of a leaf of an openable door/window according to a first embodiment of the present invention. The door/window leaf is represented both in the closed position (darker lines) and in the open position (lighter lines);

FIG. 2 is a cross-sectional view of the top portion of the openable door/window leaf illustrated in FIG. 1, in correspondence of the relative lateral opening control device, the containment box of which is also represented in a perspective view. The door/window leaf is represented both in the closed position (darker lines) and in the open position (lighter lines);

FIG. 3 is a cross-sectional view of the top portion of the openable door/window leaf of FIG. 1, in correspondence of a respective guide pin;

FIG. 4 illustrates a diagram of operation of the opening mode of an openable leaf;

FIG. 4A is a schematic front view of a motorized control device for the lateral opening;

FIG. 5A is a plan view of a door/window of the present invention, with openable leaf in a closed position;

FIG. 5B is a plan view of the door/window of FIG. 5A, with openable leaf in an open position;

FIG. 6A is a schematic front view of an exemplary transverse movement system of an openable leaf of the door/window of FIG. 1, to bring said leaf from the closed position to the lateral sliding position;

FIG. 6B is a schematic plan view of the transverse movement system of FIG. 6A.

FIG. 7 schematically illustrates the opening mode of an openable leaf of a second preferred embodiment of the door/window of the invention;

FIG. 8 is a cross-sectional view of the base portion of a leaf of an openable door/window according to said second embodiment of the present invention, in correspondence of the support elements (according to line A-A of FIG. 7A). The door/window leaf is represented both in the closed position (darker lines) and in the open position (lighter lines);

FIG. 9 is a cross-sectional view of the base portion of the door/window leaf of FIG. 8, in correspondence of the guide elements (according to line B-B of FIG. 7A). The door/window leaf is represented both in the closed position (darker lines) and in the open position (lighter lines);

FIG. 10 is a schematic plan view of the control device for the transverse opening of the openable leaves; and

FIG. 11 is a cross-sectional view of the top portion of the openable door/window leaf illustrated in FIG. 8, in correspondence of the guide elements (according to line C-C of FIG. 7A). The door/window leaf is represented both in the closed position (darker lines) and in the open position (lighter lines).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] As clearly shown in the drawings, the door/window of the present invention is formed by a plurality of leaves placed side by side, that include openable leaves Va and possibly also fixed leaves Vf. The arrangement of openable leaves Va and fixed leaves Vf along the door/window can vary as desired depending on the opening mode and on the possible presence of volumes or compartments in the masonry, laterally to the door/window, for receiving the openable leaves Va in the opening step.

[0014] Each door/window leaf is formed by a pack of parallel sheets of glass glued on a support metal section M to which the door/window seals and mechanical support elements are associated. According to a first important feature of the invention, however, the metal section M is completely internal to the pair of boundary glass sheets which delimit the pack, so that all the door/window leaves, both Va openable leaves and Vf fixed leaves, appear as a continuous all-glass surfaces, i.e. without a door/window support frame being in sight.

[0015] According to another important feature of the invention, the various leaves which form the door/window are then mutually arranged in a perfectly linear way, i.e. aligned along a single plane, so that the final appearance of the closed door/window is that of a continuous glass wall formed by a single plane and exclusively made of glass only. In the embodiments of the invention illustrated in the drawings the door/window leaves are also completely free from any type of fittings, handles or the like, so that the glazed surface in sight is also uninterrupted by any other element.

[0016] In the illustrated embodiments, the pack of sheets which forms the leaves Va and Vf includes two, respectively outer and inner, boundary sheets Vi and Ve, and a middle sheet Vc, so that to form on the whole a two-chamber glass, which is able to offer a thermal transmittance in compliance with current energy waste standards. A possible composition of the sheet pack provides that the two boundary sheets Vi and Ve are each made of a 6+6 mm laminated glass with polished edges, while the middle sheet is made by a 6 mm simple glass. The chambers formed between said sheets are dehydrated and/or filled with argon in a per se known manner and have a thickness of about 15 mm. The entire pack of sheets has thus a transverse bulk of about 60 mm.

[0017] The door/window is preferably modular and includes openable leaves Va and, if required, fixed leaves Vf, in such an arrangement to allow the opening cf the openable leaves overlapping other openable leaves Va or fixed leaves Vf, as will be better clarified in the following; by way of example each module has a width of 1200 mm, but obviously it is possible to adopt, in an absolutely flexible manner, larger or shorter measures and lights or even mutually different ones, according to the requirements of each single plan and the handiness of the single

components, in terms of weight and bulk on the site. The openable doors Va should be able to have, in overall, also a greater extension in width of fixed leaves Vf, depending on architectural and access needs through the door/window that must be met. The fixed leaves Vf could also be completely absent; in this case the openable leaves in the opening step will overlap other openable leaves Va, or any side walls to the door/window or insert in special compartments formed within the wall structure.

[0018] The edges of the outer sheets Vi and Ve preferably are enamelled or silk-screened inside, to cover the view of both the internal metal section M and the bonding and filling seals interposed between said metal section M and the glass sheets V, thus making the appearance of the product particularly pleasant. The above said bonding of the plates Ve, Vi and Vc on the metal section M is obtained, in known manner, by means of silicone adhesives suitable for outdoor applications and designed to ensure a perfect and safe coupling between the different elements that make up the door/window, and moreover by positioning the central sheet Vc through inner spacers. Said enamelled or silk-screened edges have a limited overall bulk in a frontal view, for example of 40 - 50 mm; the finish and then the final appearance of the same can of course be customized according to requirements of the end customer.

[0019] The inner support metal section M of the pack of glass sheets is of the type with a thermal break, as an extruded aluminium section or as a folded and shaped metal sheet. The sizing and shape of said metal section M are designed so as to allow a good insertion and bonding of the glass sheets, and also to create a reserve of useful space, at the free side of the glass sheets facing the outside, for the insertion of the door/window mechanisms apt to move or possibly lift and lower the same. On this metal section M are also formed the seats for the insertion of sealing gaskets G.

[0020] In the herewith illustrated preferred embodiments of the invention, that is, those in which there is no provision of inview fittings for operating the openable leaves Va, their opening movement is obtained, as clearly illustrated in FIGS. 4 and 7 by means of a first motorized movement - wherein the leaf is moved in a direction perpendicular to the plane of the door/window - and a second manual or motorized movement - wherein the openable leaf Va is slid sideways - until it completely overlap another openable or fixed leaf. In view to obtain this result the openable leaves Va are supported and/or guided, at their top and bottom horizontal sides, from support and/or guide elements which can be transversely moved between a closing position - in which the openable leaf Va is aligned to the other leaves of the door/window, and an opening position in which said novable support and/or guide elements have been moved transversely to the door/window, so as to bring the openable leaf in the position shown in view B of FIGS. 4 and 7.

[0021] According to another feature of the invention, when the movable support and/or guide elements of the openable leaf have been moved to the position of open leaf, these elements are able to cooperate with corresponding fixed support and/or guide elements, to enable the lateral sliding of the leaf itself. The shape and the structure of these support and/or guide elements, both mobile and fixed, however, are not limitative and may be changed depending on the specific technical and aesthetic requirements of each plan. Below it will be described exemplifying embodiments thereof, which are schematically illustrated in the drawings.

[0022] In the first embodiment cf the door/window of the present invention, illustrated in FIGs. 1 - 6, the openable leaf Va is provided on the bottom side of idler bogies L which rest on respective lengths of a support rail Rm, which act therefore as a leaf Va support elements and are transversely movable. Said rail lengths Rm, in fact, are the operational terminal elements of the actuating mechanisms which drives the transverse shift of the openable leaf Va and are then made to translate - together with the bogies L bearing on the same and with the openable leaf Va to which said bogies L are fixed - in said transverse movement of the openable leaf Va, up to fit into a fixed support rail Rf (FIG. 4) which is parallel to the door/window and positioned at a set distance from the same. The fixed rail Rf is provided with interruptions wherein the Rm rail lengths are apt to insert, with a perfect alignment of the parts, together whit the openable leaf Va carried on the same. At the end of the transverse movement of the openable leaf Va, the rail lengths Rm are therefore aligned to the fixed rail Rf. therefore allowing the sideways sliding of the leaf Va along said rail Rf in a traditional way.

[0023] With the purpose to house the movable rail lengths Rm of the openable leaves Va, the fixed rails Rf and mechanisms which drive the transverse movement of said rail lengths Rm, and then the openable leaves Va, the door/window of the present invention is provided with opposed boxes C, respectively housed in suitable cavities formed in the support wall structures, said boxes C extending throughout the length of the door/window, in correspondence of the bottom side and the top side of the same. Preferably, boxes C are not inserted directly into the wall structure, but rather in a metal tray T which contains the door/window; the position of boxes C can be finely adjusted by known means, for example screw means, within said metal trays T. Trays T are advantageously provided with side edges forming an abutment and delimitation line of the floorings laterally adjacent to the door/window.

[0024] Cases C have a width such as to allow said first movement of transverse translation of the openable leaves Va, and thus for example of 130 mm, and a depth of 70-80 mm, sufficient to house the support systems of the rails Rm and Rf and the related control mechanisms and electric driving motors. The lower box C can be flush with the internal flooring or partially recessed with respect to the same, while the upper box C can be partially incorporated in the eventual ceiling. Cases C are finally

hidden from view by respective lids which are provided with transverse slits for the passage of thin support steel blades which connect the movable rail lengths Rm to the respective control mechanism. Once the door/window is assembled the entire support and control mechanism of the door/window is completely hidden from view, except for the above-mentioned slits and the fixed rail Rf.

[0025] A support and/or guide system completely analogous to that described above is provided at the top side of the openable leaf Va. In the here described embodiment it has been adopted a guide system consisting of slide pins Sm which are the terminals elements of the top control mechanism which controls the transverse displacement of the openable leaf Va. Pins Sm cooperate with a U-shaped internal groove formed in the metal section M of the openable leaf Va top side (FIG. 3) and, when the leaf is open, are carried in alignment with a fixed rib (not shown) positioned in front of the door/window and provided with interruptions into which said Sm movable pins insert.

[0026] The transverse movement of the movable rail lengths Rm and of movable pins Sm can be achieved by any mechanism suitable to this purpose. A possible embodiment of such mechanism is illustrated in FIGS. 6A and 6B where an electric actuator E controls the translation of two sliders A, each of said sliders being provided with an inclined slit cam B in which engage pins P which are made integral to the above described support and/or guide elements of the door/window, namely to the movable rail lengths Rm or to the movable pins Sm. Pins P are then also driven by respective transverse guides D which therefore cause a transverse displacement path of said pins P, upon operation of the cams B.

[0027] When the transverse movement has taken place, and then when the openable leaf Va is brought into the position shown in lighter lines in the drawings, the step of opening said openable door Va is then easily performed manually, by pushing it laterally sliding on the fixed rail system Rf described above. Obviously, also this type of sliding movement can be automated and motorized where required. A possible and preferred slide control device Z for the accomplishment of this movement is illustrated in FIG. 4 and, in greater detail, in FIG. 4A. It consists in an electric motor (not shown in the drawing) that controls the rotation of a central pinion X which in turn sets in concurrent rotation two suitably spaced toothed wheels W. The toothed wheels W cooperate with a rack Y which is placed on the bottom of the U-shaped groove provided in the metal section M of the top side of the openable leaf Va.

[0028] The slide control Z thus described is placed at one end of said top side of the openable leaf Va, on the side towards which the leaf is to be opened, and is made integral to the upper guide elements Sm, in such a position that one of the two toothed wheels W is entirely external to the openable leaf Va profile. When the openable leaf Va is cause to transversally move with the first movement described above, the slide control Z is therefore moved parallel to the same and is able to laterally move the leaf by acting on the rack Y, firstly with only one of the toothed wheels W and then with both. In vicinity of the stroke end, the side sliding of the openable leaf Va can be further continued thanks to the initially inactive toothed wheel W, until the openable leaf should perfectly overlap the adjacent leaf, both a openable or a fixed leaf, as it is clearly shown in the view D of FIG. 4.

[0029] The presence of the aforesaid movable rail lengths Rm causes however possible complications in the transverse movement mechanism of the openable leaf Va or even possible difficulties of a regular insertion of the rail lengths Rm in their respective locations within the rail Rf, when dirt is present or due to wear or deterioration of parts.

[0030] Moreover, when the door/window is closed, the rail Rf necessarily shows a series of interruptions in correspondence of each openable leaf, i.e. the housing seats of said movable rail lengths Rm. These discontinuities are not optimal from an aesthetic point of view and can also serve as a receptacle for dirt, so hindering the smooth operation of the leaves opening, especially when this is not done on a regular basis.

[0031] In order to eliminate these drawbacks, in a second and preferred embodiment of the invention illustrated here, the transverse movement of the openable leaf Va is obtained, as clearly illustrated in FIG. 8, by means of at least two spherical wheels Ls to each leaf, housed inside a suitable seat formed in the bottom metal section M of each openable leaf Va. The spherical wheels Ls, as known, are movable in any direction on the respective ball bearings and can thus act as appropriate support elements of the openable leaf Va both during the first opening step of said leaf, in a direction transverse to the plane of the door/window, and during the second opening step, in which the openable leaf Va is moved in a direction parallel to the plane of the door/window, so obtaining the opening thereof.

[0032] In order to provide an appropriate guide to the above spherical wheels Ls, fixed concave rails are also provided which offer a permanent seat for the rolling of the wheels. In particular, said concave rails comprise short transverse lengths Rt, one for each of the spherical wheels Ls, suitably smoothly connected to a single longitudinal length Rg (FIG. 7) parallel to the door/window and positioned at a set distance therefrom. Thanks to this arrangement, the spherical Ls wheels can roll in a continuous way, firstly on the transverse lengths Rt, to cause the transverse movement of the openable leaf Va, and then on the rail length Rg, to cause the lateral sliding of said door/window, and then the door/window opening.

[0033] In addition to the support elements consisting of the spherical wheels Ls, each opening leaf Va of the door/window according to the present invention is also provided with movable lower and upper guide elements, which elements are used to maintain in the correct alignment and guide the leaf, both during the first step of the leaf Va opening movement, in a direction transverse to

the plane of the door/window, and in the second step of the leaf Va side sliding. In a preferred embodiment, said guide elements consist in at least two lower pins Sb and two upper pins St, respectively, which are supported and slide on respective fixed transverse F guides which then determine their transverse movement path. The heads of pins Sb and pins St engage and cooperate with an internal U-shaped groove provided in the metal section M of the bottom side and upper side of the openable leaf Va, so as to maintain said leaf in correct and stable alignment during the transverse opening movement of the same.

[0034] The lower pins Sb (FIG. 3) are of the retractable type, so that at the end of the transverse displacement path of the leaf Va into open position, where they fit into a suitable aperture formed in the rail Rg, they are retracted to the extent sufficient to allow the passage of the spherical wheels Ls on said rail, going to close with their head the aperture formed in the rail Rg. The upper pins St (FIG. 5) instead remain permanently engaged in the U-shaped groove of the section M with their head, said head being preferably of the rotary type, acting as a upper guide for the openable leaf Va also during the lateral sliding movement of the same, in combination with a rib or fixed pins (not shown) which engage the U-shaped groove of the metal section M when the openable leaf Va superimposes another leaf or the wall, as already described in relation to the first embodiment of the door/window.

[0035] The transverse movement of the movable pins Sb and St can be obtained either manually or using any motorized mechanism suitable to the purpose. In the first case, the openable leaf Va must obviously be equipped with gripping handles to enable the user to extract the same in the open position. In the second case, one of the many possible embodiments of such a motorized mechanism is illustrated in FIG. 10, where it is shown an electrical actuator E which controls the movement of a slide A along the guides F by means of a chain H. On the same side A is then mounted one of the pins Sb or St. Preferably, the position of the quides F of the upper pins St is adjustable in height, as illustrated schematically by the vertical double arrows in FIG. 11, to allow both an easy assembly of the openable leaves Va and an accurate positioning of pins St within the U-shaped groove of the top metal section M.

[0036] Of course, also the pins Sb and St and the mechanisms which allow the transverse movement thereof are housed in the opposed boxes C, said boxes C being advantageously provided with projecting lateral edges which form abutment and delimitation lines of the lateral floorings of the door/window and a containment for a closing lid.

[0037] Naturally, the above described embodiment of the movable guide elements Sb/St of the openable leaves should be construed only as a not limiting example of a mechanical device suitable to this purpose and the invention is in no way limited to the same, but includes any mechanical, electrical, magnetic or electromagnetic device allowing to control the first transversal movement of the openable leaves. Another type of movable guide elements according to the present invention, particularly preferred when a perfect aesthetic appearance of the door/window is decisive, consist in pairs of electromagnetic plates, respectively housed within the box C and inside the metal section M of the openable leaves Va of the door/window. When electrically activated, these plates attract each other strongly and thus behave as if they were mechanically linked. By moving the electromagnetic plates inside the boxes C with a motorised device similar to that described above, it is possible to get the first transverse opening movement of the door/window without being no longer necessary providing through slits across the lids of the boxes C, which can therefore remain closed and continuous.

[0038] It will be finally noted that boxes C preferably comprise a non-metallic central portion formed by a low thermal conductivity material, so as to achieve also in this position, as already seen for the metal section M, a thermal break which can greatly decrease the overall heat transfer coefficient through the door/window.

[0039] When the openable leaf Va has so completed its transverse movement, i.e. when the openable leaf Va has been brought into the position shown in lighter lines in the drawings, the opening step of said openable leaf Va is then easily performed manually, by pushing sideways said leaf Va on the fixed concave rail system Rg described above. Of course, also this type of sliding movement can be automated and motorized, where required. A possible and preferred slide control device consists in the device Z shown in FIG. 4A and described in relation to the first embodiment of the door/window of the invention. In other embodiments of the door/window of the invention, in which one could renounce to the aesthetic appearance of the door/window having a surface completely free of control elements in view, handles or other door/window opening fittings as disclosed above can be used, in place of the above illustrated motorization, to cause the first transverse movement of the openable leaf.

[0040] It is of course possible to use the door/window of the present invention also to make up more traditional opening solutions, of the type having vertical lateral rotation axis, by inserting the necessary hinges in the vertical metal sections of two adjacent leaves and equipping the openable leaf of suitable control handles. Also in this solution it is then maintained - notwithstanding the presence of said control handle - the appearance of a continuous and all-glass wall arranged on a single plane, according to one of the main innovative features of the present invention.

[0041] The door/window described above is suitable to be used with all methods of opening and closing of the known door/windows, and then both those that involve a preliminary step of lifting the leaf from a lowered gasket-sealing position, and those in which the seal is instead

obtained in a more traditional way by using only the leaf translation movement and the formation of abutment areas in the vertical plane, as illustrated for example in FIGS. 5A and 5B. On the other end it is obviously also possible to adopt more sophisticated closing and sealing systems, for example by safety bolts cr magnetic and mechanical closures, always depending on the specific plan requirements.

[0042] From the above description it is apparent therefore how the door/window of the present invention lends itself, in a extremely versatile manner, to be integrated with multiple and different types of opening solutions and seals, while still offering a peculiar and innovative features of perfect planarity of the glass surfaces in a single plane and extension of the glass area to the entire free light of the wall aperture, i.e. without any frames in view.

[0043] It is anyhow understood that the invention is not considered limited to the particular arrangements illustrated above, which represent only exemplary embodiments of the same, but that different variants are possible, all within the reach of a skilled man in the art, without departing from the scope of the invention itself, which is solely defined by the attached claims.

Claims

1. Door/window comprising a plurality of openable leaves and possibly one or more fixed leaves, **characterized in that** all the leaves of the door/window, in their closed position, are mutually aligned along a single plane and **in that** said openable leaves are slidingly supported on respective lower and upper support and/or guide elements (Rm, Sm; Sb, St), said elements being movable, transversely to the plane in which lie the leaves of the door/window, between a closing position and an opening position of the openable leaves (Va) of the frame.

2. Door/window as in claim 1, wherein said support elements and said guide elements are mutually independent and said support elements are formed by spherical wheels (Ls) fixed to the openable leaves (Va) and sliding on concave rails (Rt, Rg).

3. Door/window as in claim 2, wherein said concave rails comprise a plurality of lengths of transverse rail (Rt) perpendicular to the plane of the door/window, in correspondence of each of the spherical wheels (Ls) of said openable leaves (Va) and a single length of longitudinal rail (Rg) arranged at a set distance from said door/window and parallel thereto, said transverse rail lengths (Rt) being smoothly connected to said longitudinal rail length (Rg) to enable the openable leaves (Va) to move both along a first transverse opening direction and along a second sliding opening direction so overlapping the adjacent leaves, while said spherical wheels (Ls) roll on said transversal rail lengths (Rt) and on said longitudinal rail length (Rg).

4. Door/window as in claim 3, wherein said movable lower and upper guide elements consist of slide pins (Sb, St) which cooperate with a U-haped groove formed in the bottom and top side of the openable leaves (Va).

5. Door/window as in claim 4, wherein said slide lower pins (Sb) are of retractable type and, in said opening position of the openable leaves (Va), are retracted in such a position that their end surface is flush with the concave bottom of said longitudinal rail length (Rg).

6. Door/window as in claim 3, wherein said movable lower and upper guide elements consist in electromagnetic elements apt to exert a coupling magnetic attraction with corresponding electromagnetic elements housed inside the openable leaves (Va) of the door/window.

7. Door/window as in claim 1, wherein said movable lower support and/or guide elements /are formed by rail lengths (Rm) on which bear sliding bogies (L) of the openable leaves (Va).

8. Door/window as in claim 7, wherein, in said opening position of the openable leaves (Va), said rail lengths (Rm) are coupled and aligned to a corresponding fixed rail (Rf) provided at a set distance from said door/window and parallel thereto, so as to allow the sliding opening of the openable leaves (Va) to overlap the adjacent leaves.

9. Door/window as in claim 7, wherein said movable upper support and/or guide elements consist of slide pins (Sm) which cooperate with a U-shaped groove formed in the top side of said openable leaves (Va).

10. Door/window as in any one of the preceding claims, wherein, in said opening position of the openable leaves (Va), said upper slide pins (Sm, St) are aligned to a corresponding fixed rib or to corresponding fixed pins provided at a set distance from said frame and parallel thereto, so as to allow the engagement of said rib or said fixed pins in said U-shaped groove of the top side of the openable leaf (Va), during the sliding opening of the openable leaves (Va).

11. Door/window as in any one of the preceding claims, wherein said movable support and guide elements (Rm, Sm; Sb, St) are controlled in said transverse opening movement by a cam mechanism (A, B, D) or by a chain (H) driven by an electric motor (E).

12. Door/window as in any one of the preceding claims,

wherein said movable support and guide elements (Rm, Sm; Sb, St) and the relative control device are housed in boxes (C), registered in position with respect to the wall structures, said boxes (C) being closed by respective lids provided with transverse slits for the passage of the movable elements.

13. Door/window as in any one of the preceding claims, wherein said openable leaves are provided with handles and said movable support and guide elements (Rm, Sm; Sb, St) are controlled in said transverse opening movement by means of a slide mechanism manually operated by means of said handles.

14. Door/window as in any one of the preceding claims, which further comprises a slide control to move laterally one of said openable leaves (Va) in its opening position, said slide control comprising an electric motor which drives the concurrent rotation of two toothed wheels (W) apt to cooperate with a rack (Y) arranged on the bottom of the U-shaped groove formed in the top side of said openable door (Va), said gear wheels (W) being transversely movable integrally with said upper support and/or guide elements and arranged at one end of said top side, when said openable leaf (Va) is in the closing position, in such a position that one of the two toothed wheels (W) is entirely external to the openable leaf profile (Va).

15. Door/window as in any one of the preceding claims, wherein each one of said openable leaves (Va) and said fixed leaves (Vf) comprises a plurality of glass sheets (Vi, Vc, Ve) associated to a support peripheral metal section (M), said metal section (M) being positioned completely inside the pair of outer glass sheets (Vi, Ve) of said plurality of glass sheets and housing the seals and the mechanical support elements of the door/window.

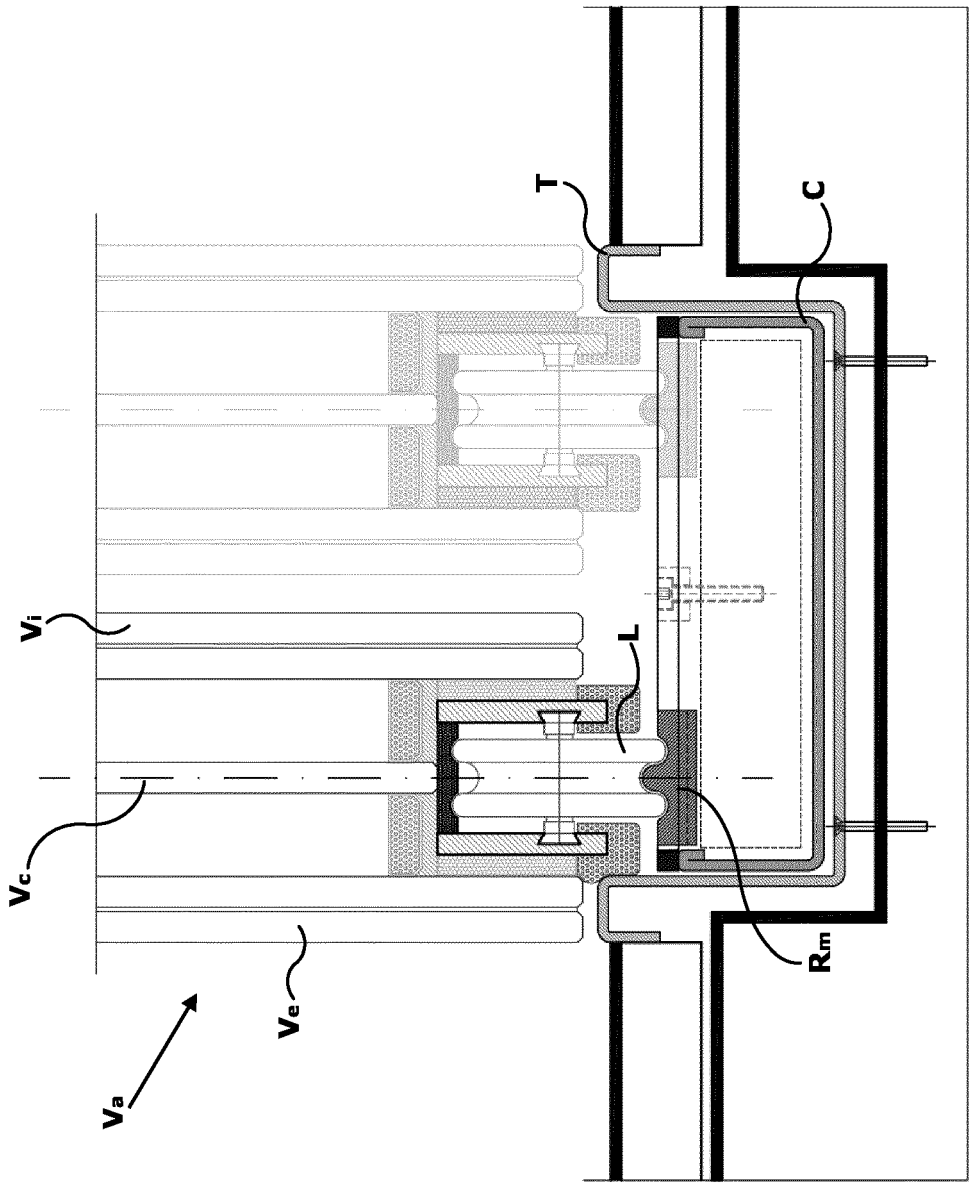


Fig. 1

Fig. 2

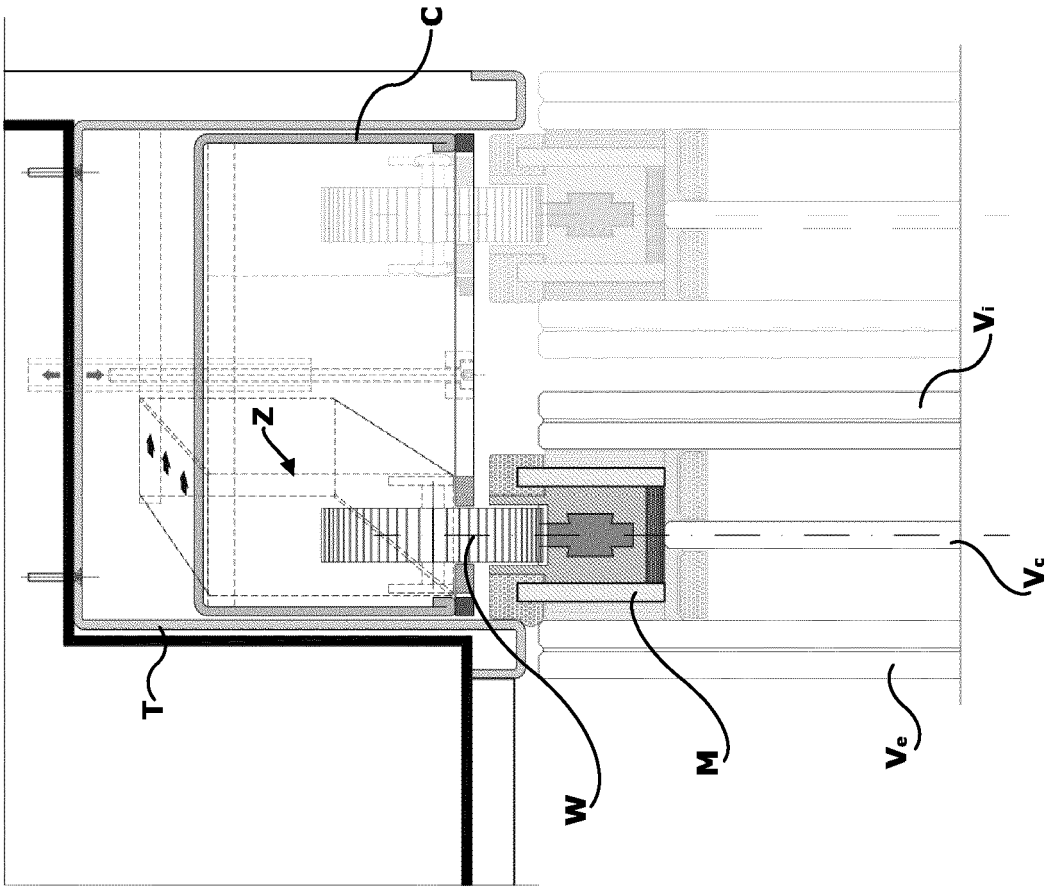
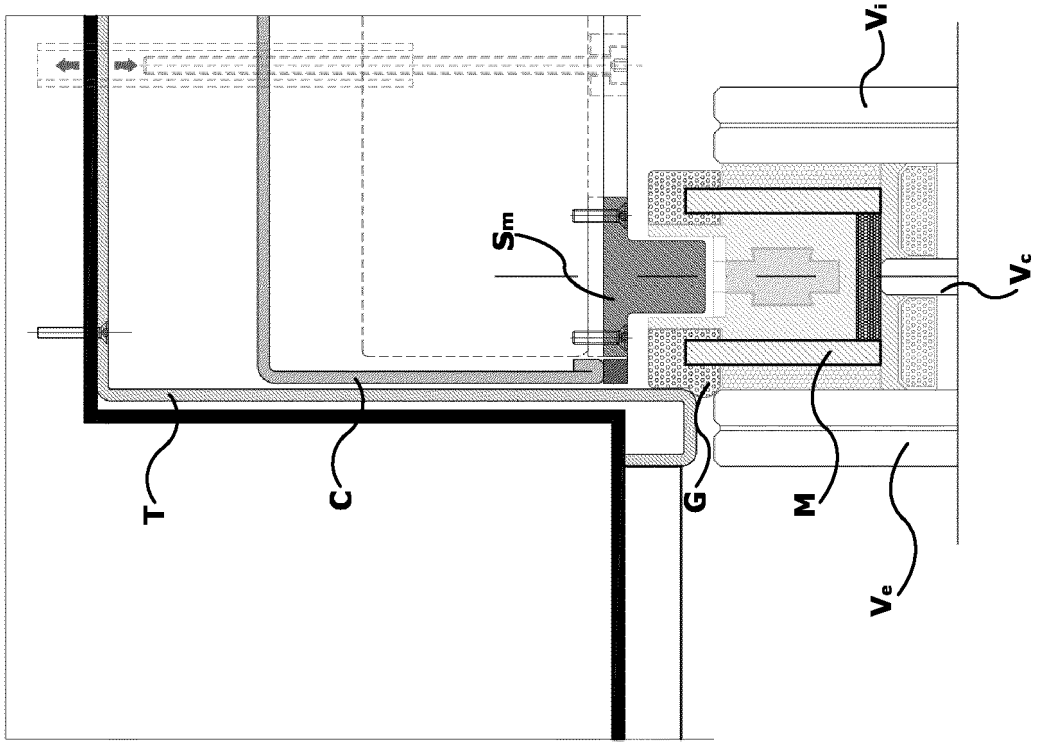


Fig. 3



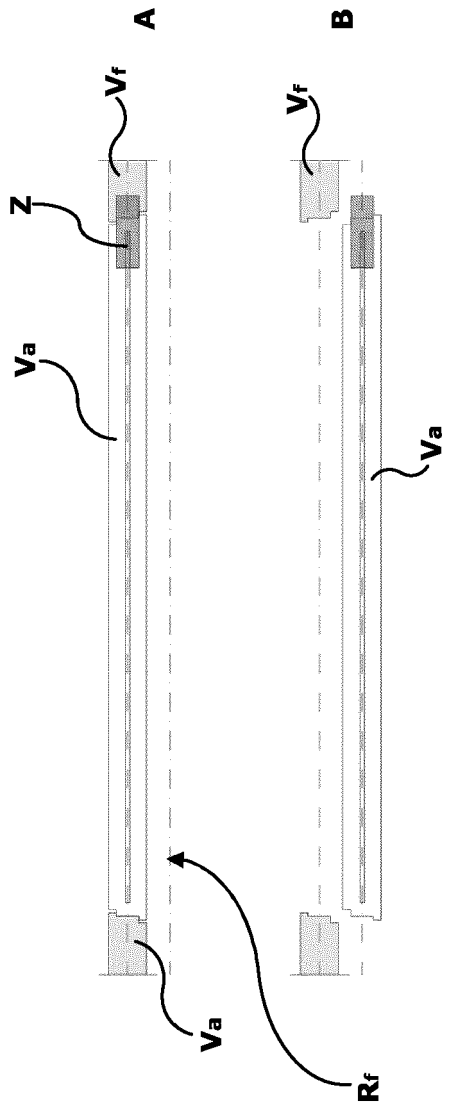


Fig. 4

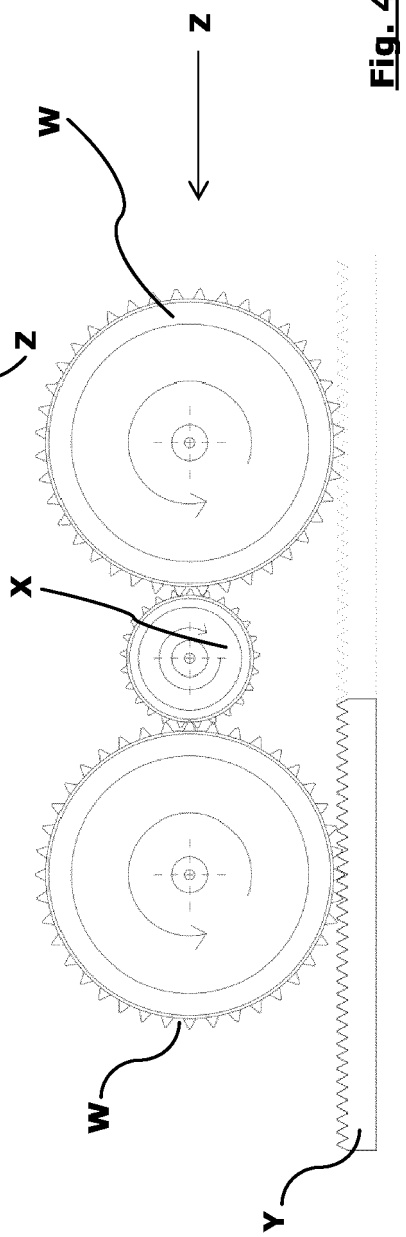
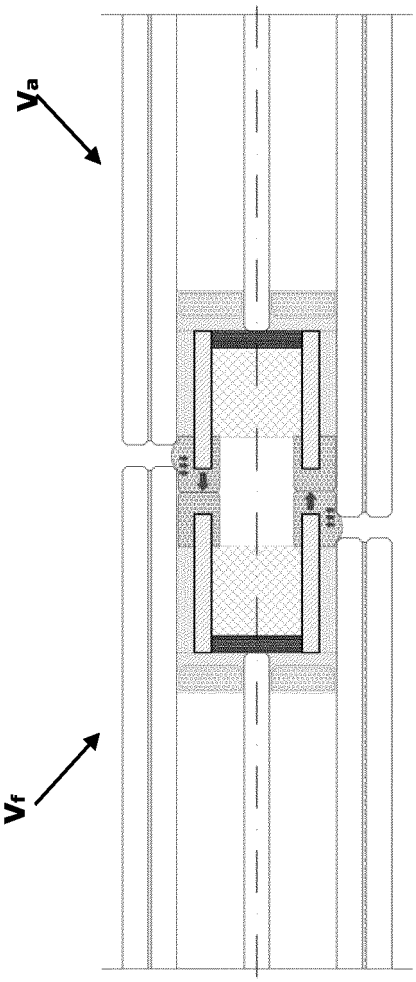


Fig. 4 A

Fig. 5A



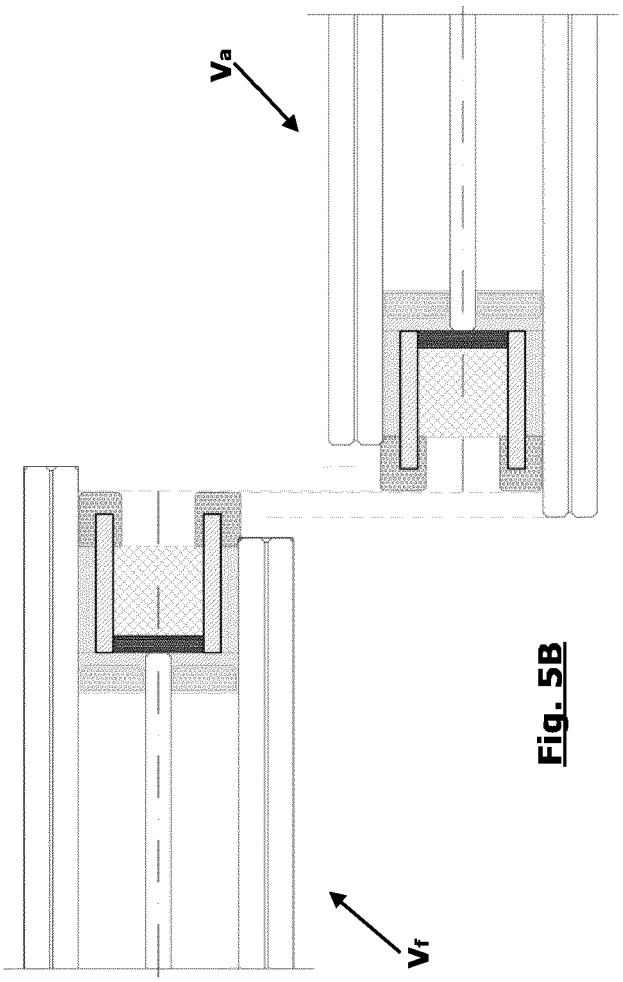


Fig. 5B

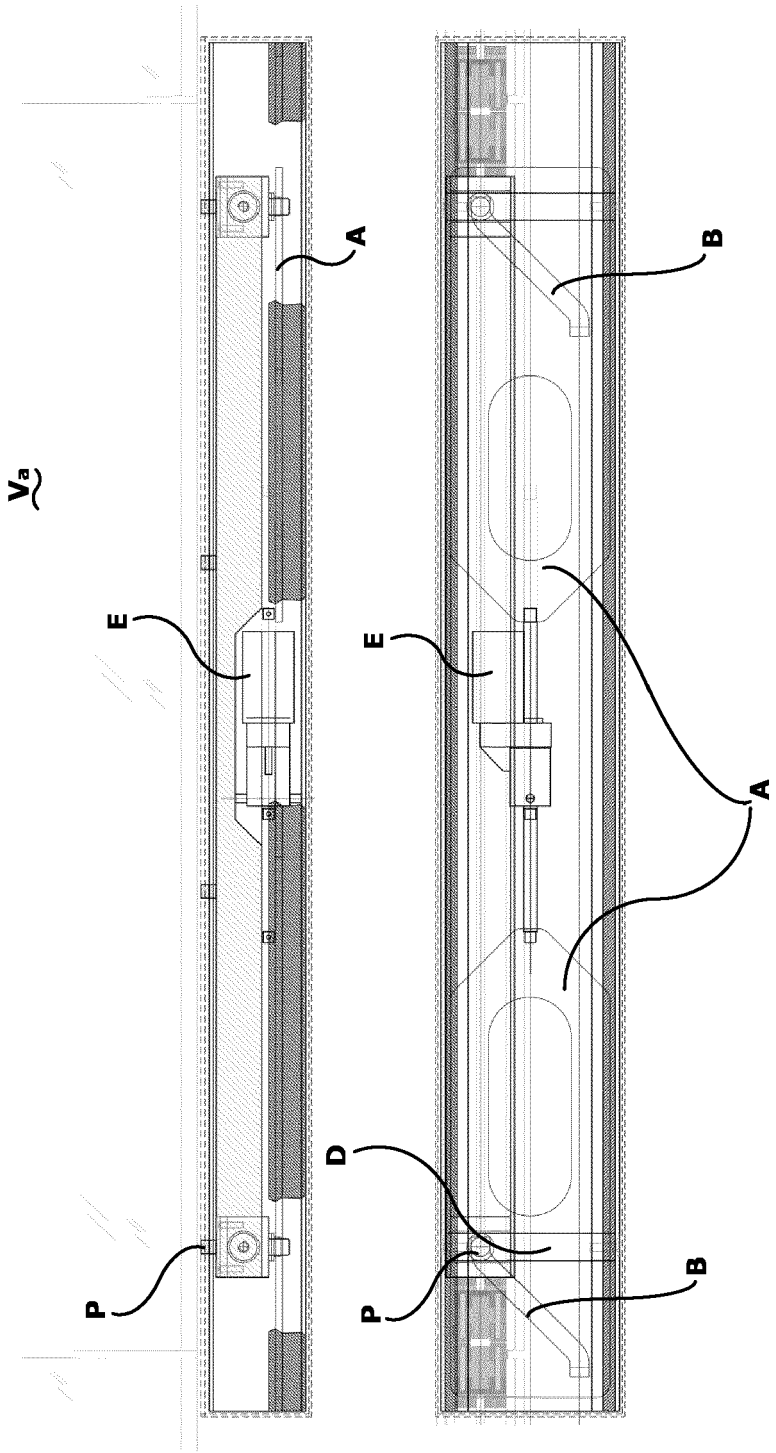


Fig. 6A

Fig. 6B

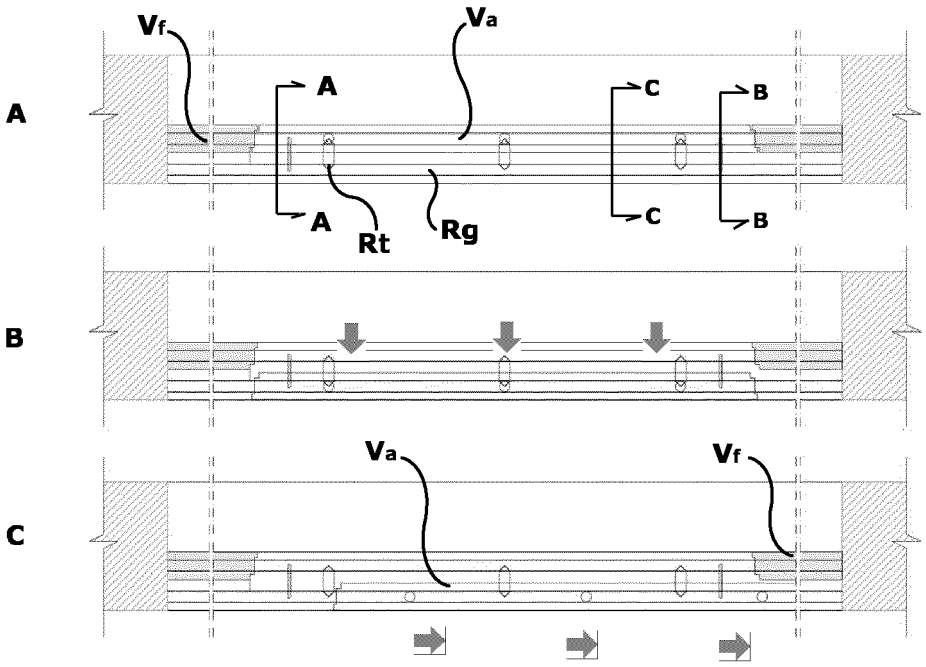


Fig. 7

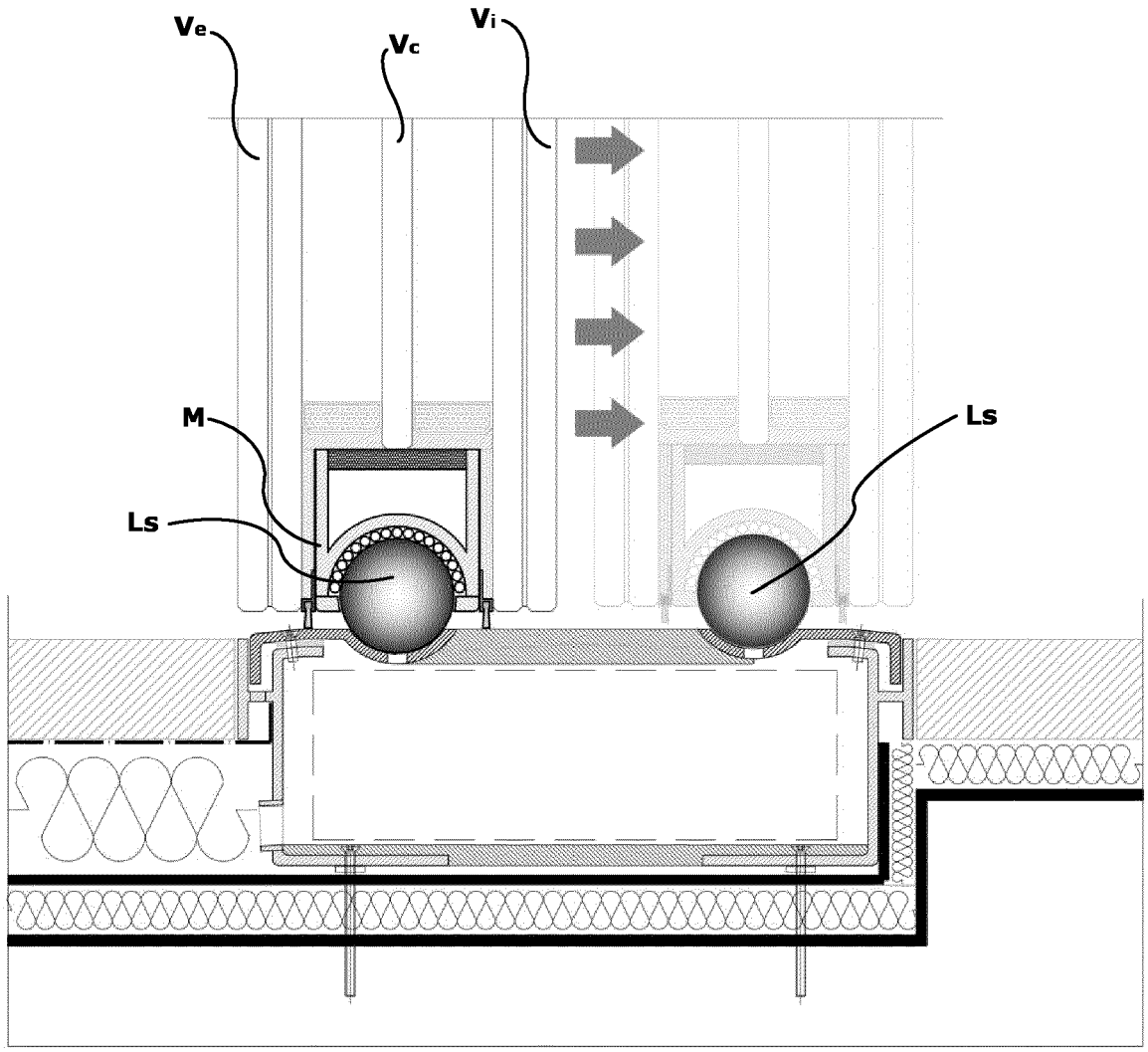


Fig. 8

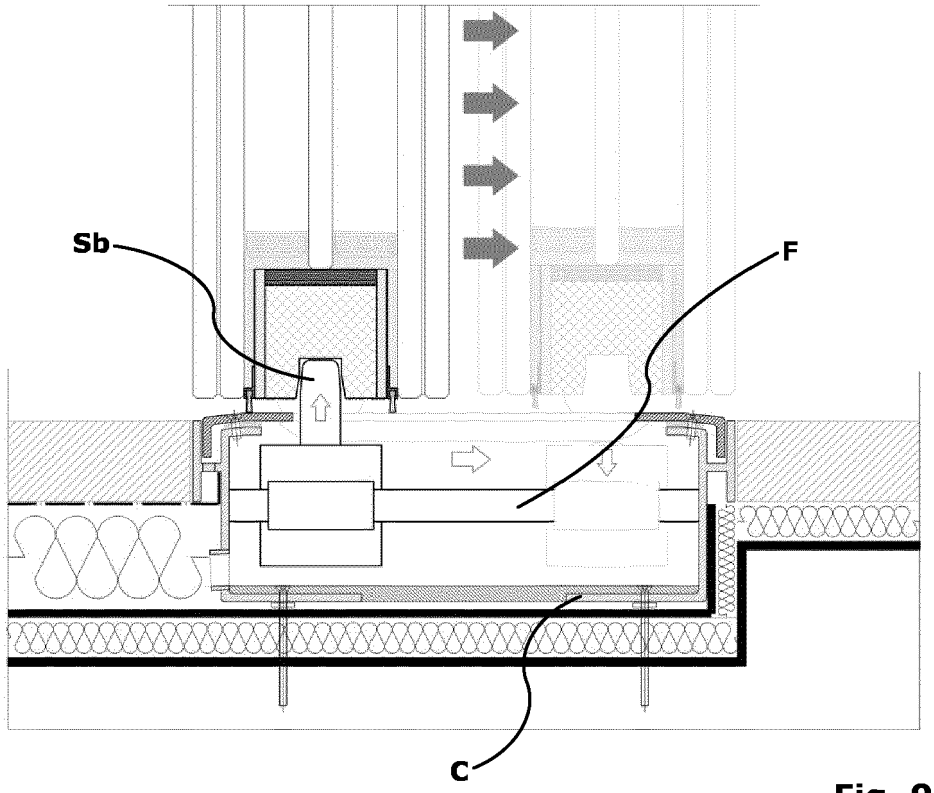


Fig. 9

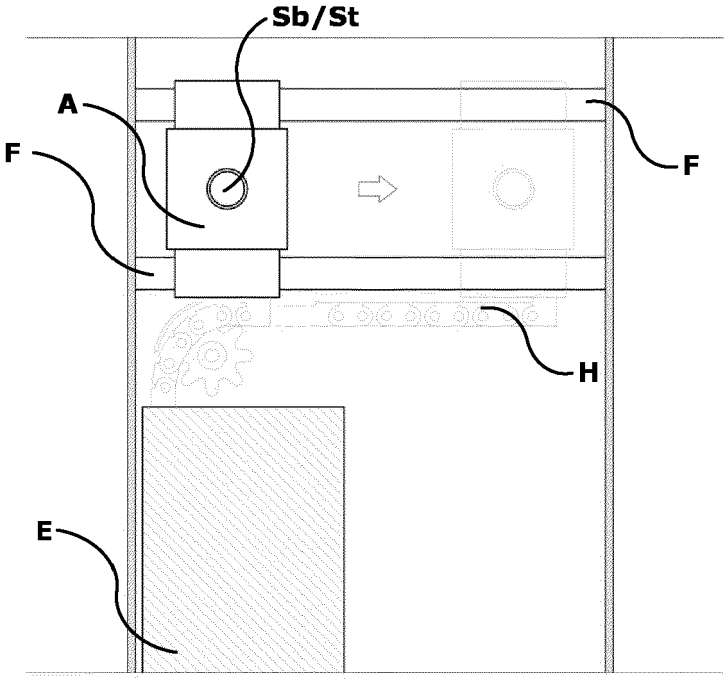


Fig. 10

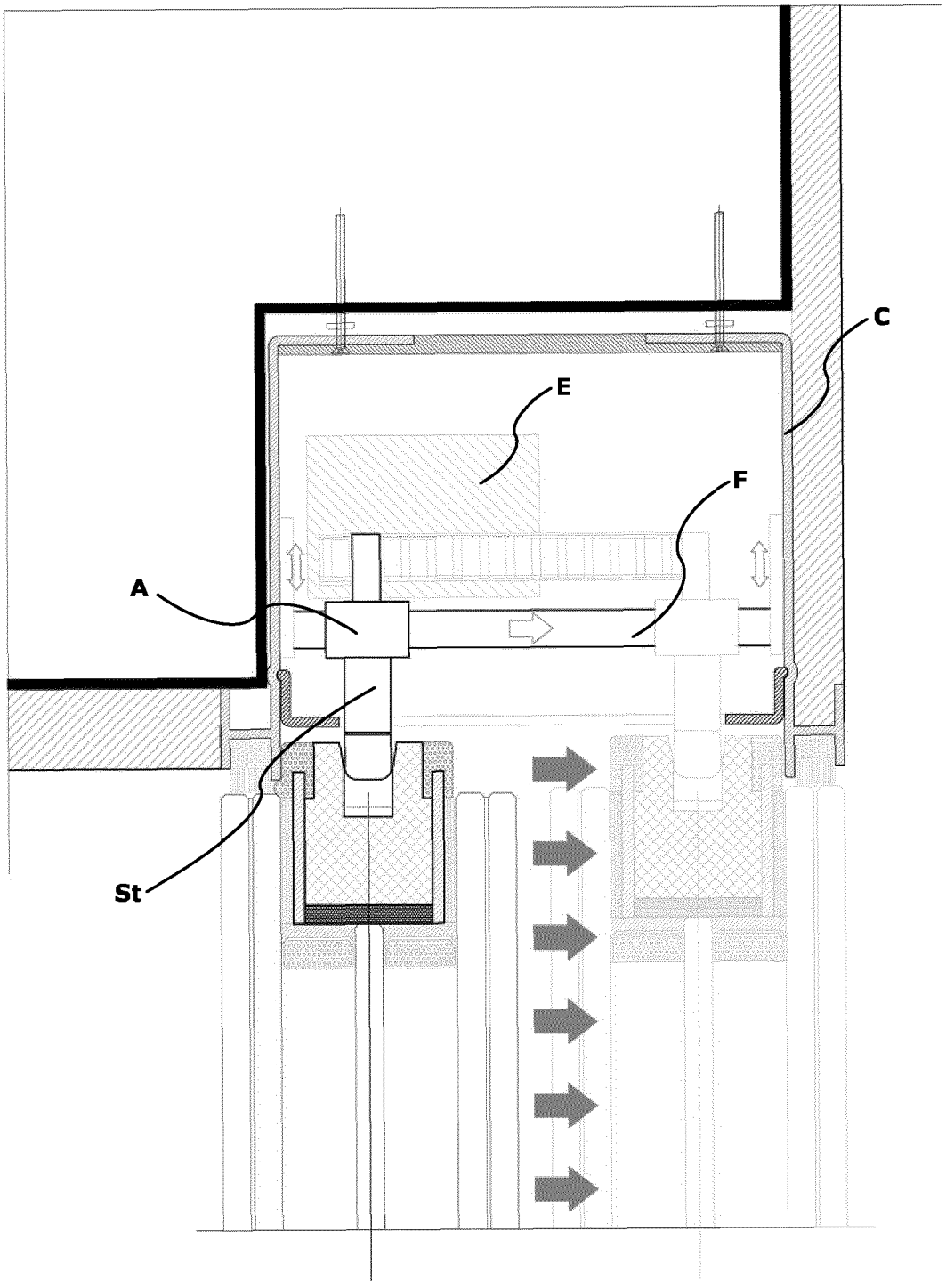


Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 7415

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A	EP 1 249 548 A1 (H & T RAUMDESIGN AG [CH]) 16 October 2002 (2002-10-16) * figures 1, 2, 3a, 3b, 4 *	15	INV. E06B3/46 E04B2/82 E06B3/02
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A	* page 16, line 19 - line 24; figure 5 *	2-6,15	
X	EP 1 164 243 A2 (POLIFORM S P A [IT]) 19 December 2001 (2001-12-19) * figures 4, 5 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E06B
E04B
E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 March 2017	Jülich, Saskia

CATEGORY OF CITED DOCUMENTS

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10-03-2017

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