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(54) Retention device for swing-leaves

(57) A retention device for swing-leaves, which comprises at least one hinge constituted by at least one bracket that is integral with the leaf, at least one tab that is integral with a fixed frame, and at least one pivot, which is accommodated at least partially within the at least one hinge. At least one between the at least one bracket and at least one tab comprises an internal cavity whose shape and dimensions are complementary to those of a first end of the pivot. The pivot is able to translate parallel to its own axis, by way of the action of a respective actuator, between a first free configuration, in which it is spaced from the internal cavity, and a second blocking configuration, in which it is inserted within the cavity, with resting of at least one portion of its outer surface on at least one corresponding portion of the inner surface of the cavity and consequent mutual retention.

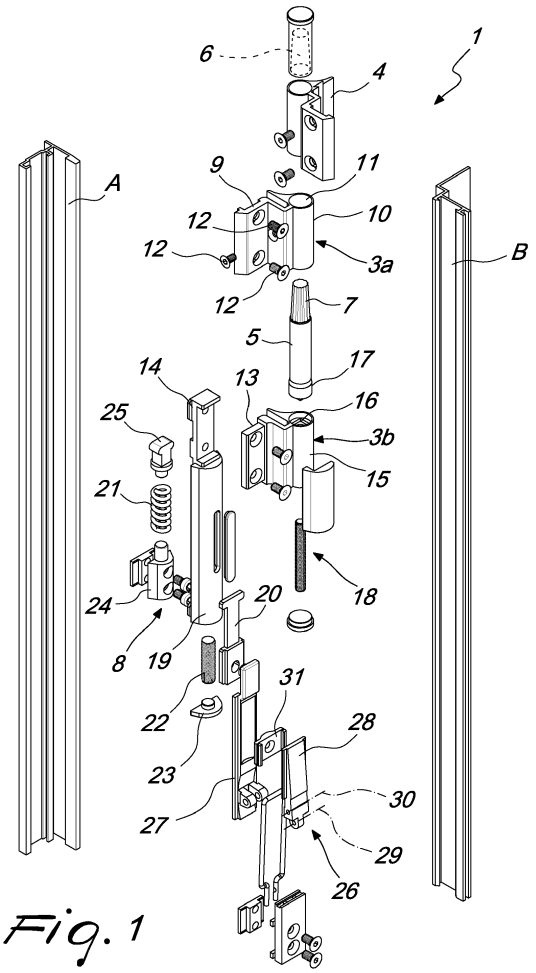

Fig. 1

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Description

[0001] The present invention relates to a retention device for swing-leaves.

[0002] Swing-leaves are normally used for providing doors, windows, shutters, blinds and the like.

[0003] The leaf, in these cases, is pivoted to a frame that is rigidly coupled to the compartment of the installation wall.

[0004] This type of installation is particularly widespread and adopted universally in construction and furnishing.

[0005] Swing-leaves, by way of their free hinging to the fixed frame, can be oriented easily and thus can be moved (to the point of even striking the frame or the wall) by air currents, wind and the like.

[0006] For shutters and blinds, types of swing-leaves installed outside a building to protect the windows and suitable to prevent the passage of light, the problem of free orientation due to wind is particularly felt.

[0007] In fact, when the shutter or blind are open, a gust of wind may make them slam against the edge of the installation compartment and/or against the external wall of the building.

[0008] In a short time the leaf would become damaged as a consequence of the succession of these impacts caused by the wind.

[0009] It is known to resort to so-called "shutter stoppers" for retention in an open position: these are elements fixed to the outside of the face of the building, usually at the lower edge of the leaves.

[0010] This type of accessories is particularly unsightly and suffers numerous drawbacks in relation to the complexity of its maintenance and/or repair, because of the inconvenient placement.

[0011] In some cases, blocking means have been thus adopted which are integral with the casement and which, by engaging the leaf when it is in the open configuration, prevent any movement thereof.

[0012] Such blocking means are usually associated with the pintles of the leaf itself.

[0013] The adoption of such blocking means, however, can produce serious damage to the leaf and/or the frame if the wind is very strong, because such wind might apply such a force to the leaf as to break the engagement portions and/or their seats, thus compromising also the entire functionality of the leaf.

[0014] Blocking means of the known type, as well as "shutter stoppers", allow moreover to block the leaf only at one of its extreme configurations (generally the maximum opening configuration).

[0015] The aim of the present invention is to solve the problems described above, by proposing a retention device for swing-leaves which, even in the event of strong gusts of wind capable of moving the leaf in retention conditions, does not cause any damage to the leaf, the frame and/or the corresponding hinges.

[0016] Within this aim, an object of the invention is to propose a retention device for swing-leaves that allows safe blocking of the leaf.

[0017] Another object of the invention is to propose a retention device for swing-leaves that allows to retain the leaf substantially in any configuration defined between the maximum opening configuration and the closed configuration.

[0018] A further object of the present invention is to provide a retention device for swing-leaves that has low costs, is relatively easy to provide and is safe in use.

[0019] Another object of the present invention is to solve the problems shown above, proposing a friction-controlled retention device for swing-leaves which, even in the event of strong gusts of wind capable of moving the leaf in retention conditions, does not cause any damage to the leaf, the frame and/or the respective pintles.

[0020] Within this aim, an object of the invention is to propose a friction-controlled retention device for swing-leaves that allows safe blocking of the leaf.

[0021] Another object of the invention is to propose a friction-controlled retention device for swing-leaves that allows to retain the leaf substantially in any configuration defined between the maximum opening configuration and the closed configuration.

[0022] A further object of the present invention is to provide a friction-controlled retention device for swing-leaves that has low costs, is relatively easy to provide in practice and is safe in use.

[0023] This aim and these objects are achieved by a retention device for swing-leaves, characterized in that it comprises at least one hinge constituted by at least one bracket that is integral with the a fixed frame, at least one tab that is integral with the leaf, and at least one pivot, which is accommodated at least partially within said at least one hinge, at least one between said at least one bracket and at least one tab comprising an internal cavity whose shape and dimensions are complementary to those of a first end of said pivot, said pivot being able to translate parallel to its own axis, by way of the action of a respective actuator, between a first free configuration, in which it is spaced from said internal cavity, and a second blocking configuration, in which it is inserted within said cavity, with resting of at least one portion of its outer surface on at least one corresponding portion of the internal surface of said cavity and consequent mutual retention.

[0024] This aim and these objects are achieved, moreover, by a friction-controlled retention device for swing-leaves, characterized in that it comprises at least one hinge constituted by at least one bracket that is integral with the leaf, at least one tab that is integral with a fixed frame, and at least one pivot, which is accommodated at least partially within said at least one hinge, at least one between said at least one bracket and at least one tab comprising an internal cavity for the accommodation of at least one bushing made of polymeric material that has a seat for at least one rigid shell provided with an internal cavity whose shape and dimensions are complementary

to those of a first end of said pivot, said pivot being able to translate parallel to its own axis, by way of the action of a respective actuator, between a first free configuration, in which it is spaced from the internal compartment of said shell, and a second blocking configuration, in which it is inserted within said compartment, with resting of at least one portion of its outer surface on at least one corresponding portion of the internal surface of said compartment and consequent mutual retention.

[0025] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the retention device for swing-leaves according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is an exploded perspective view of a retention device for swing-leaves according to the invention;
Figure 2 is a schematic perspective view of the device of Figure 1;
Figure 3 is a sectional view, taken along a longitudinal central plane, of the device of Figure 1;
Figure 4 is an enlarged-scale view of the sectional view of Figure 3 that corresponds to the configuration of interference and blocking of the leaf with respect of the frame;
Figure 4a is an enlarged-scale view of the sectional view of Figure 3 that corresponds to the configuration of noninterference and free rotation of the leaf with respect to the frame;
Figure 5 is a rear perspective view of the device of Figure 1;
Figure 6 is a schematic exploded perspective view of the device of Figure 1;
Figure 7 is a front view of the device of Figure 1;
Figure 8 is a rear view of the device of Figure 1;
Figure 9 is a side view of a device according to the invention in a configuration for free rotation of the leaf;
Figure 10 is a side view of a device according to the invention in a configuration for blocking the leaf;
Figure 11 is a perspective view of a device according to the invention in a configuration for blocking the leaf;
Figure 12 is a perspective view of a device according to the invention in a configuration for free rotation of the leaf;
Figure 13 is a side view of a bracket of a device according to the invention;
Figure 14 is a perspective view of a tab of a device according to the invention;
Figure 15 is a top view of a tab of a device according to the invention;
Figure 16 is a schematic front view of a leaf in which the device according to the invention is installed, controlled by a handle of the type known as "cremone bolt" and/or "olive-shaped window knob";
Figure 17 is an exploded perspective view of a friction-controlled retention device for swing-leaves according to the invention;
Figure 17a is a view of a component 105' that can be used in the device of Figure 17 instead of the component 105;
Figure 18 is a schematic enlarged-scale exploded perspective view of the device of Figure 17;
Figure 19 is a sectional view, taken a the longitudinal central plane, of the device of Figure 17;
Figure 20 is an enlarged-scale view of the sectional view of Figure 19 that corresponds to the configuration for interference and blocking of the leaf with respect to the frame;
Figure 21 is a front view of the device of Figure 17;
Figure 22 is a rear view of the device of Figure 17;
Figure 23 is a perspective view of a device according to the invention in the assembly configuration;
Figure 24 is a schematic view of a leaf provided with an opening mechanism of the type known as turn and tilt leaf, in which at least one hinge is constituted by a device according to the invention.

[0026] With reference to Figures 1-16, a retention device for swing-leaves A is designated generally by the reference numeral 1.

[0027] The retention device 1 for swing-leaves A comprises at least one hinge 2 constituted by at least one bracket 3 that is integral with the leaf, at least one tab 4 that is integral with a frame B (with respect to which the leaf A is pivoted), and at least one pivot 5, which is accommodated at least partially within the hinge 2.

[0028] At least one between the at least one bracket 3 and the at least one tab 4 comprises an internal cavity 6 whose shape and dimensions are complementary to those of a preferably substantially frustum-like first end 7 of the pivot 5.

[0029] The pivot 5, moreover, is capable of translating parallel to its own axis, by way of the action of a respective actuator 8, between a first free configuration, in which it is spaced from the internal cavity 6 (see Figures 9 and 12 by way of example), and a second blocking configuration, in which it is inserted within the cavity 6 (see Figures 10 and 11 by way of example), resting with at least one portion of its outer surface on at least one corresponding portion of the inner surface of the cavity 6, with consequent mutual retention (such mutual retention can be achieved, for example, by friction).

[0030] In such second blocking configuration, in other words, the pivot 5, which is integral with the leaf A, and the cavity, which is integral with the frame B, are mutually interlocked, creating the friction-controlled blocking of the leaf A.

[0031] It is specified that the device 1 can be arranged in the second configuration at substantially any orientation of the leaf A with respect to the frame B, with the advantage, with respect to blocking units of the known type, of not limiting the possibility to fix the leaf A only at

its two extreme configurations.

[0032] According to a constructive solution of undeniable practical and applicative interest, the brackets 3 that are integral with the leaf A are two in number, a first fixed bracket 3a and a second bracket 3b that can slide along a predefined stroke.

[0033] In this case, the pivot 5 is integral with the second sliding bracket 3b.

[0034] The second sliding bracket 3b is interposed between the pivot 5 and the respective actuator 8.

[0035] It is specified, moreover, that the first fixed bracket 3a has a first portion 9 for retention to the leaf A and a second portion 10, which is arranged substantially opposite the first portion 9, that protrudes with respect to the leaf A, in the configuration for use, and is provided with a substantially cylindrical seat 11 for the free accommodation of at least one substantially central part of the pivot 5.

[0036] The first portion 9 can be fixed to the leaf A by interlocking, gluing and/or with any other method of the known type.

[0037] In particular, it is specified that in the accompanying figures (see Figure 13 by way of example) the portion 9 is fixed to the leaf A by means of specific fixing screws 12: in the figures it can be noted that two of these screws 12 are engaged on the front face of the leaf A, while a third screw 12 is instead engaged on the perimetric border of the leaf A at right angles to said front face. This constructive choice allows to have a particularly rigid and efficient blocking of the bracket 3a on the leaf A.

[0038] Moreover, the laminar portion of the bracket 3a interposed between the portion 10 and the portion 11, thanks to the blocking on the two opposite faces, will be not subjected to a bending moment and thus will not be subject to mechanical fatigue failure.

[0039] The screws 12 (and in general the other screws used for fixing the sliding bracket 3b and the tab 4) can have fixing plates accommodated slidingly within the shaped grooves of the profiles that constitute the leaf A and the frame B: the respective screw engages in a hole of the plate, clamping the profile. This constructive solution has the undeniable advantage of adjusting with extreme precision the arrangement of the hinge 2, and optionally of modifying its position during maintenance.

[0040] The use of brackets 3a and 3b and tabs 4 (see Figures 14 and 15 by way of example) in which there are shaped grooves within which the head of a screw, which is screwed on the profile (which constitutes the leaf A and/or the frame B), can be accommodated slidingly is not ruled out: in this case also, the screw constitutes an alignment element that determines the specific arrangement of the bracket 3a or 3b and/or of the tab 4. The arrangement of additional fastening screws allows the installer to decide the exact height to assign to the component, with the assurance that the alignment is ensured in any case by the head of the screw that slides within the shaped groove.

[0041] It is specified, moreover, that the second sliding bracket 3b has a first band 13 for retention to a movable sliding block 14 of the actuator 8 that is accommodated on the leaf A, and a second band 15, which is substantially opposite the first band 13, protruding with respect to the leaf A in the configuration for use, and is provided with a substantially cylindrical compartment 16 for the free accommodation of a second end 17, opposite the first end 7, of the pivot 5.

[0042] Moreover, it should also be noted that the end 7 of the pivot 5 is positively frustum-shaped.

[0043] In accordance with what has been indicated previously, the internal cavity 6 of the at least one tab 4, in this case, is also frustum-shaped and has a shape and dimensions that are complementary to those of the end 7 of the pivot 5 in order to ensure optimum coupling therewith in the cited second blocking configuration.

[0044] However, the possibility is not excluded to provide a cavity 6 that is cylindrical or has a different taper with respect to the end 7 of the pivot 5 in order to ensure a good coupling without the possibility of mutual interlocking of the two components.

[0045] It should be specified, moreover, that the end 7 of the pivot 5 can comprise preferably, on at least one wall thereof that faces outwardly, a plurality of raised portions and contoured regions.

[0046] The contoured regions of the end 7 have the purpose of ensuring a stable coupling that does not entail mutual interference but only friction: the contoured regions and the raised portions prevent the end 7 and the cavity 6 from mutually coupling rigidly as a bevel gear pair; their coupling, by way of these contoured regions and raised portions, is therefore always removable by way of the action of the actuator 8.

[0047] This constructive solution allows therefore to obtain a more stable and safe blocking of the leaf A.

[0048] It is specified that the pivot 5 comprises means 18 for facilitated assembly: the means 18 have the purpose of allowing its upright or inverted installation (depending on whether it has to be installed in a leaf A that opens to the right and/or to the left) and it is in fact possible to disassemble the bracket 3b and assemble it again with the opposite orientation by way of the presence of the means 18.

[0049] It is not ruled out that the means 18 might also allow an adjustment of the protrusion of the pivot 5 from the bracket 3b: in practice, by adopting the means 18 it is possible to move the end 7 closer (when the device is in the free configuration) and/or away with respect to the cavity 6 (if adjustment is necessary due to a less than perfect assembly).

[0050] This adjustment is extremely advantageous, since it allows to adapt during installation (if the brackets 3a and 3b and the tab 4 are not at the ideal design distance due to a mistake of the installation technician) the position of the pivot 5 in order to ensure that when it is moved into the blocking configuration it engages stably in the cavity 6.

[0051] This, therefore, facilitates the installation technician, who is not forced to perform an extremely precise assembly and can compensate for any errors on his part; he can in fact use the means 18 to adjust the device 1 in relation to the specific installation parameters.

[0052] The adjustment means 18 might also allow to adapt the device 1 to the dimensional variations induced by temperature variations: it should be noted that shutters, blinds and leaves A in general are exposed outdoors and thus are struck directly by solar radiation and/or by wind. It is thus very probable that expansions and/or contractions occur which might not be consistent with the corresponding dimensional variations of the components of the device 1 (for example because they are made of different materials, characterized therefore by a different coefficient of thermal expansion).

[0053] According to a constructive solution of undeniable practical interest, the actuator 8 comprises an enclosure 19, which is integral with the leaf A and is accommodated thereon, and a movable slider 20 that is coupled to a sliding block 14 that is integral with a second end 17 of the pivot 5.

[0054] The enclosure 19 and the sliding block 14 are mutually integral so that they can move only together, translating by way of the action of the actuator 8.

[0055] As a consequence of an external action, the slider 20 can move between a retracted arrangement, which corresponds to the first free configuration of the pivot 5 (see Figures 9 and 12 by way of example), and a forward arrangement, which corresponds to the configuration for blocking the pivot 5 with respect to the cavity 6 (see Figures 10 and 11 by way of example).

[0056] It should be specified, moreover, that elastic disconnection means 21 are interposed between the movable slider 20 and the sliding block 14.

[0057] The elastic means 21 are intended to maintain, in the absence of external actions, the maximum mutual distance between the sliding block 14 and the slider 20: such maximum mutual distance is generally defined by the dimensions of the recess of the enclosure 19 within which the sliding block 14 and the slider 20 are enclosed at least partially.

[0058] It should be noted, further, in relation to the characteristics of the actuator 8, that a threaded element 22 is interposed, moreover, between the movable slider 20 and the sliding block 14 to adjust the "preloading" of the elastic means 21, increasing or reducing their elastic mechanical action, simply by varying the position of the threaded element 22 (generally by rotating it, by means of a specific tool, in order to adjust its protrusion with respect to the point for coupling to the enclosure 19).

[0059] In order to prevent the access to the threaded element 22 when the device 1 is correctly assembled, there is a plug 23 engaged in the enclosure 19.

[0060] The threaded element 22, moreover, can be used during installation in order to adjust the position of the component 24, interposed between the slider 20 and the elastic means 21.

[0061] This allows therefore to arrange it (the component 22) in the optimum position that allows the correct mutual coupling of the end 7 and of the cavity 6 in the blocking configuration.

[0062] With particular reference to a specific embodiment of the device 1 according to the invention, the slider 20 can be coupled to respective manually-actuated movement elements 26, which comprise a skid 27, which is retained to the slider 20 and can slide on the leaf A, and a lever 28, which is pivoted on the leaf A with respect to a first axis 29 and is pivoted on the skid 27 with respect to a second axis 30.

[0063] The orientation of the lever 28 produces translations of the skid 27 that are equal in length at most to twice the distance between the first axis 29 and the second axis 30.

[0064] Such translations are suitable for a movement of the entire kinematic chain with consequent lifting or lowering of the pivot 5 up to its engagement or respectively disengagement in the cavity 6.

[0065] It should be noted that there are suitable wings (which protrude from a segment 31 which is integral with the skid 27) for the elastic retention of the lever 28 when it is arranged in the release configuration: as clearly visible in Figure 2, in this configuration the lever 28 is held elastically by the two wings, which prevent a retrograde rotation thereof, keeping it in the arrangement that ensures the release configuration.

[0066] Advantageously, the present invention solves the problems described previously, proposing a retention device 1 for swing-leaves A which, even in the event of strong gusts of wind (or other external actions applied to the leaf A), is capable of moving the leaf A in retention conditions, does not cause any damage to the leaf A, the frame B and/or the respective pintles.

[0067] In fact, the coupling of the end 7 of the pivot 5 with the cavity 6 is such as to prevent the movements of the leaf A in standard conditions: in the event of a strong gust of wind, a collision by a user or any external action suitable to move the leaf A, the presence of the elastic means 21 within the actuator 8 and the fact that the end 7 and the inner surface of the cavity 6 can be made of polymeric material with predefined elastic deformability, the leaf A can move (oriented by the wind or by another external action) without any part of the leaf A, of the frame B and/or of the pintles being subjected to any damage.

[0068] Efficiently, the device 1 allows safe blocking of the leaf A: the presence of the contoured regions in the end 7 ensures in fact that a friction coupling is provided which increases its retention.

[0069] The fact that the end 7 and the inner surfaces of the cavity 6 can be made of polymeric material with predefined deformability allows (if external actions occur on the leaf A which are intended to move it) a mutual movement (of the end 7 of the pivot 5 in the cavity 6) as a consequence of the elastic deformation of such components.

[0070] Advantageously, the device 1 allows to retain

the leaf A substantially in any configuration defined between the maximum opening configuration and the closed configuration; this occurs because the pivot 5 can assume the second retention configuration with respect to the cavity 6 at any orientation of the leaf (except for the orientations that prevent the user from accessing the actuator 8 and actuating it).

[0071] Usefully, the device 1 has low costs, being also relatively simple to provide and safe in use. The possibility to apply the device 1 on leaves A that are already installed and/or to fit them during production is specified.

[0072] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may further be replaced with other technically equivalent elements.

[0073] For example, in the case of heavy leaves A, the installation of two (or even more) devices 1 in order to ensure an efficient blocking thereof in the desired arrangement is not ruled out.

[0074] It is essential to specify that the device 1 according to the invention can be an additional component, which can be installed on a door or window frame that is already installed and therefore in addition to the existing hinges and pintles.

[0075] However, the adoption of a constructive solution in which the device 1 constitutes the hinging pintles of the leaf A is not ruled out (if so, there can be a single device in cooperation with hinges of the standard type or multiple devices spread along an edge of said leaf A).

[0076] This solution allows to have a leaf A that can orient itself freely when the device 1 is in the free position, but can also be blocked in any intermediate configuration between the closing one and the one for complete opening through 180° of said leaf A with respect to the frame B.

[0077] Obviously, this constructive possibility allows to adapt the device 1 to any type of leaf A and frame B.

[0078] Moreover, the device 1, in a constructive solution of undeniable practical and applicative interest (illustrated exclusively by way of non-limiting example in the accompanying Figure 16), can be actuated directly by means of a handle 32 for casements (for example of the type usually known "cremone bolt" and/or "olive-shaped window knob").

[0079] It is specified that the handles 32 are usually connected to specific motion transmission assemblies 33 designed to allow the engagement/disengagement of adapted elements for blocking the leaf A within respective seats of the frame B (in order to pass from the closed configuration to the open configuration of the leaf). Within this scope, the motion transmission assemblies 33 described can also allow the leaf A to assume also a further partially open configuration (in so-called vasistas leaves, i.e., which allow a rotation of the leaf A generally with respect to its base, with consequent provision of an upper and lateral opening for the free circulation of air).

[0080] Leaves A of this type, i.e., provided with a handle 32, are particularly suitable for installing the device 1 according to the invention, since it can be connected easily to the kinematic chain associated with the handle 32.

[0081] In particular, when the handle 32 assumes the closed configuration, the upper end 7 of the pivot 5 undergoes a translation that will bring it to interfere with the cavity 6.

[0082] The device 1 therefore will be arranged laterally adjacent to normal blocking elements of the leaf A in the frame B in order to ensure stability of the closure, when the leaf A is inserted in the frame B.

[0083] When instead the leaf A is open, therefore distant from the frame B, the rotation in the closed position of the handle 32 provides the translation of the pivot 5, with interference of its end 7 with the cavity 6 and the consequent blocking of the leaf A in this specific open condition.

[0084] When the handle 32 assumes the open position, the end 7 of the pivot 5 is separated from the cavity 6 and does not interfere therewith, and thus the device 1 behaves like a normal free hinge about which the leaf A can rotate freely.

[0085] With particular reference to Figures 17-24, a friction-controlled retention device for swing-leaves A' is designated generally by the reference numeral 101.

[0086] The friction-controlled retention device 101 comprises at least one hinge 102 constituted by at least one bracket 103 that is integral with the leaf A', at least one tab 104 that is integral with a fixed frame B', and at least one pivot 105, which is accommodated at least partially within the at least one hinge 102.

[0087] At least one between the at least one bracket 103 and the at least one tab 104 comprises an internal cavity 106 for the accommodation of at least one bushing 107 made of polymeric material that has a seat 108 for at least one rigid shell 109 provided with an internal cavity whose shape and dimensions are complementary to those of a first end 110 of the pivot 105.

[0088] The pivot 105 is able to translate parallel to its own axis, by way of the action of a respective actuator 111, between a first free configuration, in which it is spaced from the internal compartment 112 of the shell 109, and a second blocking configuration, in which it is inserted within the compartment 112, with resting of at least one portion of its outer surface on at least one corresponding portion of the inner surface of the compartment 112 and consequent mutual retention by interference.

[0089] It is specified that the actuator 111 can be any device capable of generating (directly or indirectly) a translation of the pivot 105: it is evident, therefore, that the constructive solution shown in the accompanying figures has only a non-limiting function of exemplifying the type of actuator that is suitable to move the device 101 according to the invention.

[0090] The possible irregular shape of the outer surface of the end 110 of the pivot 105 and of the inner surface of the compartment 112 of the shell 109 allow mutual meshing, with consequent coupling by interfer-

ence, which will ensure optimum stability of the blocking configuration.

[0091] It should be specified that if the tab 104 comprises the internal cavity 106, it can comprise a plug 113, which in turn is accommodated on the top of the tab 104: this constructive solution is particularly simple from a constructive point of view.

[0092] With particular reference to a constructive solution of undeniable practical and applicative interest, between the internal cavity 106 and the bushing 107 made of polymeric material there is an interposed threaded element 114 for adjusting the position of the bushing 107 within the cavity 106.

[0093] By fastening the threaded element 114 it is moreover possible to force the bushing 107 made of polymeric material against the outer surfaces of the cavity 106, increasing the friction force generated between them; this is facilitated by the frustum-like shape of the bushing 107.

[0094] The threaded element 114 can be preferably of the self-locking type in order to avoid unwanted retrograde rotations.

[0095] This particular adjustment allows to obtain an optimum mutual arrangement of the bushing 107 in the internal cavity 106 with subsequent optimum meshing of the end 110 of the pivot 105 with the inner surface of the compartment 112 of the shell 109, in the blocking configuration.

[0096] Preferably, the element 114 adjusts friction intensity for the friction-control of the device 101.

[0097] When the device 101 according to the invention is installed it is thus possible to correct any small assembly irregularities (positioning and/or alignment errors of the various components) simply by acting on the threaded element 114 to adjust the arrangement height of the bushing 107.

[0098] It is specified that, with particular reference to a variation that is particularly efficient and assured to work, the pivot 105 can have an end 110 that has a diameter that corresponds to the inside diameter of the rigid shell 109 and a substantially central portion 115 having a smaller diameter, for accommodating a substantially tubular elastic element 116 intended to force the end 110 in the internal compartment 112 of the shell 109.

[0099] The substantially central portion 115 can be constituted at least partially by a threaded bar.

[0100] It should be specified that within the scope of a practical application with optimum operation, the brackets 103 that are integral with the leaf A' are two in number, a first fixed bracket 103a and a second bracket 103b that can slide along a predefined stroke (integrally with the movable end of the respective actuator 111).

[0101] The pivot 105 is, in this case, integral with the second sliding bracket 103b: the second sliding bracket 103b is interposed between the pivot 105 and the respective actuator 111.

[0102] The first fixed bracket 103a has a first portion 117 for retention to the leaf A' and a second portion 118, which is arranged substantially opposite the first portion 117, which protrudes with respect to the leaf A' in the configuration for use and is provided with a substantially cylindrical seat 119 for the free accommodation of at least one substantially central part of the pivot 105.

[0103] The fixed bracket 103a has, moreover, at least one longitudinal groove 119a inside its seat 119 which allows the accommodation of a respective ridge 105a of the pivot 105: the purpose of this constructive choice is to allow the vertical translation of the pivot 105 in the seat 119, preventing however its rotational movements (which would jeopardize the operation of the device 101).

[0104] Constructive hypotheses that entail a plurality of grooves 119a and ridges 105a and/or a particular complementary shape of the pivot 105 and of the seat 119 are not ruled out.

[0105] The second sliding bracket 103b has a first band 120 for retention to a movable slider 121 of the actuator 111 that is accommodated on the leaf A', and a second band 122, which is arranged substantially opposite the first band 120, protrudes with respect to the leaf A', in the configuration for use, and is provided with a substantially cylindrical compartment 123 for the abutment along one of its edges of a second end 124, arranged opposite the first end 110, of the pivot 105.

[0106] The second end 124 is retained to the central portion 115 of the pivot 105: in particular, if the portion 115 is threaded, the second end comprises a threaded hole within which the threaded end of the portion 115 can engage stably.

[0107] The elastic element 116, in the assembly configuration, is accommodated within the seat 119 of the fixed bracket 103a, fitted on the substantially central portion 115 of the pivot 105.

[0108] The purpose of the elastic element 116 is to force upwardly the end 110 of the pivot 105, within the compartment 112 of the shell 109, when the device 101 is in the blocking configuration.

[0109] In particular, if a blocking configuration is provided in which a possible angular misalignment of the end 110 with respect to the internal compartment 112 provides an incomplete coupling, the elastic element maintains the end 110 and the compartment 112 in mutual forcing: if, due to an external action (for example a gust of wind), a rotary forcing of the leaf A' occurs, the misalignment is compensated by the small rotation induced by the forcing and the elastic element 116 ensures the mutual meshing of the end 110 with the internal compartment 112.

[0110] It is specified that according to a particularly efficient constructive solution it is possible to set and adjust the elastic load of the elastic element 116 (i.e., the force that said elastic element applies in order to maintain the end 110 of the pivot 105 upwardly).

[0111] In this case, an externally threaded pad 116a is adopted which can be arranged at the preferred height within the compartment 123.

[0112] The higher the height of installation of the pad

116a in the compartment 123 (in other words, the nearer the pad 116a is to the fixed bracket 103a), the more the elastic element 116 is precompressed and applies an intense force.

[0113] In order to optimize operation and ensure extreme stability of the device 101 in blocking configuration, at least one component selected between the end 110 of the pivot 105 and the internal compartment 112 of the shell 109 comprises, on at least one respective wall that faces outwardly, a plurality of raised portions and contoured regions having mutually substantially complementary shape and dimensions.

[0114] It should be specified that the outer surface of the end 110 of the pivot 105 and the inner surface of the compartment 112 of the shell 109 can preferably have the shape of a six-point star, of the type of a so-called TORX® wrench, in order to provide stable and safe coupling.

[0115] This particular complementary set of surface teeth allows safe coupling by interference of the two components; by means of this coupling it is possible to ensure efficient blocking of the leaf A' in any position with respect to the fixed frame B'.

[0116] In this case, the shell 109 can have an outer surface provided with a plurality of contiguous raised portions, such as for example a so-called knurled surface and the like.

[0117] It is specified that in the device of Figure 17 it is possible to use, as an alternative, the pivot 105' of Figure 17a instead of the pivot 105. In this case, a portion 110' of the outer surface of the pivot 105' and the inner surface of the cavity 112 of the shell 109 can preferably have the shape of a contour that has the profile of a set of teeth of the type used in car axle shafts. This shape allows to provide a stable, safe and highly resistant coupling, such as to preserve the functionalities of the set of teeth or rather not bend the teeth of the set of teeth due to the load applied by the pivot 105' inside the bushing 107. Preferably, such set of teeth of the type used in car axle shafts is compliant with the ANSI (American National Standards Institute) standards, previously known also as ASA (American Standards Association) or with the DIN (Deutsches Institut für Normung) rules. Preferably the portion 110' is extended substantially along a partially central portion of the pivot 105' and does not comprise the ends of the pivot 105'.

[0118] It is specified that the rotation of the leaf A' with respect to the fixed frame B' can occur with respect to a vertical axis (like a normal window or door that can be opened in order to allow passage) or with respect to a horizontal axis (for example, in the case of vasistas leaves A', i.e., with tilt-down opening).

[0119] In fact, the device 101 can perform its retaining action in relation to rotations of the leaf A' that occur about a vertical axis or a horizontal axis according to the manner in which it is installed and/or provided.

[0120] It is specified that the actuator 111 can be associated functionally with a motion transmission assembly controlled by a handle retained to the leaf A' and designed for its blocking/release on the frame B'.

[0121] The handle and the motion transmission assembly are, in this case, of the type used traditionally in door or window frames.

[0122] At least one portion of the motion transmission assembly is coupled to the slider of the actuator 111.

[0123] It should be noted that the actuator 111 is integral with the leaf A', proximate to the first fixed bracket 103a and to the second sliding bracket 103b.

[0124] It is specified that the device 101 can be arranged in the second blocking configuration substantially at any orientation of the leaf A' with respect to the frame B', with the advantage, with respect to blocking assemblies of the known type, of not limiting the possibility to fix the leaf A' only at its two extreme configurations.

[0125] The fact that the bushing 107 is made of polymeric material and is fitted within the cavity 106 (optionally held in the correct position by the threaded element 114) is an undeniable advantage for the device 101.

[0126] If a strong gust of wind occurs while the leaf A' is retained by the device 101 in a partially open configuration, the bushing 107 can undergo elastic deformations that allow the shell 109 to rotate with respect to the bushing 107.

[0127] In this manner, although the coupling between the end 110 and the internal compartment 112 of the shell 109 is stable and provided by interference, a rotation of the leaf A' is still possible in case of strong external actions, following the deformation of the bushing 107.

[0128] It is specified that the bushing 107 can be made preferably of polyamide (for example, polyoxymethylene ("POM") commercially known also as Delrin, or Nylon®).

[0129] The fixing of the first portion 117 to the leaf A' can be provided by interlocking, gluing and/or with any other method of the known type.

[0130] In particular, it is specified that in the accompanying figures the fixing of the portion 117 to the leaf A' is provided by means of specific fixing screws.

[0131] Brackets 103a and 103b and tabs 104 might also be adopted in which there are shaped grooves, within which the head of a screw, which is screwed on the profile (that constitutes the leaf A' and/or the frame B'), can be accommodated slidingly: in this case also, the screw constitutes an alignment element that determines the specific arrangement of the bracket (103a or 103b) and/or of the tab 104. The arrangement of further fastening screws allows the installer to decide the exact height to be assigned to the component, with the assurance that the alignment is in any case ensured by the head of the screw that slides within such shaped groove.

[0132] Moreover, it should be noted that the end 110 of the pivot 105 is positively frustum-like (although the possibility to provide said end with a cylindrical or prism-like shape is not ruled out).

[0133] In accordance with what has been indicated previously, the internal compartment 112 of the shell 109, in this case, also is frustum-like and has a shape and

dimensions that are complementary to those of the end 110 of such pivot 105 in order to ensure optimum coupling therewith in said second blocking configuration.

[0134] It is specified that the pivot 105 is constituted by multiple components mutually interconnected by means of specific threaded portions (or other type of retention): such threaded portions have the purpose of allowing its upright or inverted installation (depending on whether it has to be installed in a leaf A' that opens to the right and/or to the left); it is in fact possible to remove the bracket 103b and reassemble it with the opposite orientation. Moreover, the presence of the threaded portions allows to simplify the arrangement of the elastic element 116 on the central portion 115 (optionally retained by the pad 116a), when the pivot 105 is arranged within the seat 119 of the bracket 103a.

[0135] Such threaded portions might also allow an adjustment of the protrusion of the pivot 105 from the bracket 103b in order to simplify the assembly operations on the part of the installer.

[0136] This adjustment is extremely advantageous because it allows to adapt, in fact, during installation (if the brackets 103a and 103b and the tab 104 are not at the ideal design distance due to an error by the installer), the placement of the pivot 105 in order to ensure that when it is moved to the blocking configuration it engages stably within the internal compartment 112.

[0137] According to a constructive solution of undeniable practical interest, the actuator 111 can comprise a plate 126, which is integral with the leaf A' and is accommodated thereon, and the movable slider 121 that is integral with the second end 124 of the pivot 105.

[0138] Following an external action, the slider 121 is movable between a retracted arrangement, which corresponds to the first free configuration of the pivot 105, and a forward arrangement, which corresponds to the configuration for blocking the pivot 105 with respect to the compartment 112.

[0139] With particular reference to a specific actuation of the device 101 according to the invention, the slider 121 can be coupled to respective manually-actuated movement elements 128, which comprise a skid 129, which is coupled to the slider 121 and can slide on the leaf A', and a lever 130, which is pivoted on the leaf A' with respect to a first axis 131 and is pivoted on the skid 129 with respect to a second axis 132.

[0140] The orientation of the lever 128 produces translations of the skid 127 that are equal in length at most to twice the distance between the first axis 129 and the second axis 132.

[0141] Such translations are suitable for a movement of the whole kinematic chain with consequent lifting, respectively lowering, of the pivot 105 up to its engagement, respectively disengagement, in the internal compartment 112.

[0142] Advantageously, the present invention solves the problems described previously, by proposing a retention device 101 for swing-leaves A' that, even in the event of strong gusts of wind (or other external actions applied to the leaf A') capable of moving the leaf A' even if the leaf is in retention conditions, does not cause any damage to the leaf A', the frame B' and/or the respective pintles.

[0143] In fact, the coupling of the end 110 of the pivot 105 with the compartment 112 is such to prevent the movements of the leaf A' in standard conditions; if a strong gust of wind, an impact by a user or any other external action suitable to move the leaf A' occurs, the presence of the bushing 107 made of polymeric material (which thus may deform within the bracket 104) in fact will allow the leaf A' to move (oriented by the wind or by another external action) without any part of the leaf A', the frame B' and/or the pintles being subject to any damage.

[0144] Efficiently, the device 101 allows to block safely the leaf A': the presence of the contoured regions in the end 110 ensures in fact that a friction coupling is provided which by improving its tightness (this result is even more evident if one considers the possibility to provide an end 110 and a cavity 112 having a shape of a six-point star like a so-called TORX® wrench).

[0145] The fact that the bushing 107 can be made of polymeric material with predefined deformability allows (if external actions occur on the leaf A' which are intended to move it) a mutual movement (of the shell 109 within the bushing 107) following the elastic deformation of the bushing 107.

[0146] Usefully, the device 101 allows to retain the leaf A' substantially in any configuration defined between the configuration of maximum opening and the closed configuration; this occurs because the pivot 105 can assume the second blocking configuration with respect to the internal compartment 112 at any orientation of the leaf A' (except for the orientations that prevent the user from accessing the actuator 111 and actuating it).

[0147] This characteristic of allowing blocking in any position is, moreover, evident both when considering a leaf A' intended to open about a vertical axis and when considering a leaf A' intended to open about a horizontal axis (vasistas).

[0148] Usefully, the device 101 has low costs and is also relatively simple to provide and safe in use. It is specified that it is possible to apply the device 101 on leaves A' that are already installed and/or to install it during production.

[0149] From the point of view of versatility of the device 101, it is useful to note that it can be an additional component, which can be installed on a casement that is already installed and thus in addition to the existing hinges and pintles.

[0150] However, the adoption of a constructive solution in which the device 101 constitutes the hinging pintles of the leaf A' is not ruled out (in this case, there can be a single device in cooperation with hinges of the standard type or multiple devices arranged along an edge of said leaf A').

[0151] This solution allows to have a leaf A' that can orient itself freely when the device 101 is in the free position, but can also be blocked in any intermediate configuration between the closure configuration and the fully open configuration at 180° of the leaf A' with respect to the frame B'.

[0152] Obviously, this constructive possibility allows to adapt the device 101 to any type of leaf A' and frame B.

[0153] The device 101, moreover, could be actuated directly by means of a handle for casements (for example of the type usually called "cremone bolt" and/or "olive-shaped window knob"), which in this case composes part of the actuator 111.

[0154] It is specified that such handles are usually connected to specific motion transmission assemblies designed to allow the engagement/disengagement of adapted elements for blocking the leaf A' within respective seats of the frame B' (in order to pass from the closing configuration to the open configuration of the leaf).

[0155] Leaves A' of this type, i.e., provided with a handle, are particularly suitable for the installation of the device 101 according to the invention, because said device can be connected easily to the kinematic chain associated with the handle.

[0156] In particular, when the handle assumes the closed configuration, the upper end 110 of the pivot 105 undergoes a translation that moves it to interfere with the internal compartment 112 of the shell 109.

[0157] The device 101 is therefore arranged laterally with respect to normal blocking elements of the leaf A' in the frame B' in order to ensure stability of the closure, when the leaf A' is inserted in the frame B'.

[0158] When instead the leaf A' is open, therefore distant from the frame B', the rotation in the closure position of the handle determines the translation of the pivot 105 with interference of its end 110 with the internal compartment 112 and the consequent blocking of the leaf A' in this specific open condition.

[0159] When the handle assumes the open position, the end 110 of the pivot 105 is separated from the internal compartment 112 and does not interfere with the shell 109 and thus the device 101 behaves like a normal free hinge about which the leaf A' can rotate freely.

[0160] It is specified, for example, that if there are multiple devices 101 in a single leaf A', they are all controlled by a single actuator 111 by means of suitable intermediate lever systems, so that they can be controlled synchronously by means of the actuator 111 (be it constituted by a dedicated component or by the handle or cremone bolt of the leaf A' associated with specific movement rods).

[0161] It is specified that the invention relates to the following items:

1. A retention device for swing-leaves, characterized in that it comprises at least one hinge constituted by at least one bracket that is integral with the leaf, at least one tab that is integral with a fixed frame, and at least one pivot, which is accommodated at least partially within said at least one hinge, at least one between said at least one bracket and at least one tab comprising an internal cavity whose shape and dimensions are complementary to those of a first end of said pivot, said pivot being able to translate parallel to its own axis, by way of the action of a respective actuator, between a first free configuration, in which it is spaced from said internal cavity, and a second blocking configuration, in which it is inserted within said cavity, with resting of at least one portion of its outer surface on at least one corresponding portion of the inner surface of said cavity and consequent mutual retention.

2. The retention device according to item 1, characterized in that said brackets that are integral with the leaf are two in number, a first fixed bracket and a second bracket that can slide along a predefined stroke, said pivot being integral with said second sliding bracket, said second sliding bracket being interposed between said pivot and the respective actuator.

3. The retention device according to item 1, characterized in that said first fixed bracket has a first portion for retention to the leaf and a second portion, which is arranged substantially opposite the first portion, protrudes with respect to the leaf, in the configuration for use, and is provided with a substantially cylindrical seat for the free accommodation of at least one substantially central part of said pivot.

4. The retention device according to item 1, characterized in that said second sliding bracket has a first band for retention to a moving sliding block of said actuator that is accommodated on said leaf, and a second band, which is substantially opposite the first band, that protrudes with respect to the leaf in the configuration for use, and is provided with a substantially cylindrical compartment for the free accommodation of a second end, opposite the first end, of said pivot.

5. The retention device according to item 1, characterized in that the end of said pivot is frustum-shaped, said internal cavity of said at least one tab that is integral with the frame having a shape that is selected preferably between cylindrical and frustum-like and having a shape and dimensions that are complementary to those of the end of said pivot.

6. The retention device according to point 1, characterized in that at least one component selected between the end of said pivot and the internal cavity of said at least one tab comprises, on at least one wall thereof that faces outwardly, a plurality of raised portions and contoured regions having a shape and dimensions that are mutually substantially complementary.

7. The retention device according to one or more of the preceding items, characterized in that said pivot comprises means (18) for adjusting its length in order

to allow the assembly thereof on the bracket according to different and mutually opposite configurations.

8. The retention device according to item 1, characterized in that said actuator comprises a fixed enclosure, which is integral with said leaf and is accommodated thereon, a movable slider that is coupled to a sliding block that is integral with a second end of said pivot, as a consequence of an external action, between a retracted arrangement, which corresponds to said first free configuration of said pivot, and a forward arrangement, which corresponds to said configuration for blocking said pivot with respect to said cavity.

9. The retention device according to item 8, characterized in that elastic means for disconnection are interposed between said movable slider and said sliding block and are intended to maintain, in the absence of external actions, the maximum mutual distance provided by the dimensions of the recess of said enclosure within which they are enclosed at least partially.

10. The retention device according to item 9, characterized in that a threaded element is interposed between said movable slider and said sliding block to adjust their maximum mutual distance.

11. The retention device according to one or more of the preceding items, characterized in that said slider is coupled to respective manually-actuated movement elements, which comprise a skid, which is coupled to said slider and can slide on said leaf, and a lever, which is pivoted on said leaf with respect to a first axis and is pivoted on said skid with respect to a second axis, the orientation of said lever producing translations of said skid that are equal in length at most to twice the distance between said first axis and said second axis.

12. The retention device according to one or more of the preceding items, characterized in that said actuator is associated functionally with a motion transmission assembly that is actuated by a handle that is coupled to said leaf and is intended to block/release it on said frame, said handle and said motion transmission assembly being of the type used traditionally in doors or windows frames, at least one portion of said motion transmission assembly being coupled to said slider of said actuator.

13. A friction-controlled retention device for swing-leaves, characterized in that it comprises at least one hinge constituted by at least one bracket that is integral with the leaf, at least one tab that is integral with a fixed frame, and at least one pivot, which is accommodated at least partially within said at least one hinge, at least one between said at least one bracket and at least one tab comprising an internal cavity for the accommodation of at least one bushing made of polymeric material that has a seat for at least one rigid shell provided with an internal cavity whose shape and dimensions are complementary to those of a first end of said pivot, said pivot being able to translate parallel to its own axis, by way of the action of a respective actuator, between a first free configuration, in which it is spaced from the internal compartment of said shell, and a second blocking configuration, in which it is inserted within said compartment, with resting of at least one portion of its outer surface on at least one corresponding portion of the inner surface of said compartment and consequent mutual retention.

14. The friction-controlled retention device according to item 13, characterized in that between said internal cavity and said bushing made of polymeric material there is an interposed threaded element for adjusting the position of said bushing within said cavity and for adjusting the mutual compression of one with respect to the other, with the consequent possibility to vary the mutual friction force.

15. The friction-controlled retention device according to item 13, characterized in that said pivot has an end whose diameter corresponds to the inside diameter of said rigid shell and a substantially central portion having a smaller diameter, for the accommodation of a substantially tubular elastic element that is intended to force said end into said shell.

16. The friction-controlled retention device according to the preceding item, characterized in that it comprises a pad, which can be retained rigidly according to a plurality of different configurations to a component that is selected between said fixed bracket and said substantially central portion, in order to adjust the length, and thus the pre compression, of said elastic element when it is fitted on said portion.

17. The friction-controlled retention device according to item 13, characterized in that said brackets that are integral with the leaf are two in number, a first fixed bracket and a second bracket that can slide along a predefined stroke, said pivot being integral with said second sliding bracket, said second sliding bracket being interposed between said pivot and the respective actuator.

18. The friction-controlled retention device according to item 13, characterized in that said first fixed bracket has a first portion for retention to the leaf and a second portion, which is arranged substantially opposite the first portion and protrudes with respect to the leaf in the configuration for use and is provided with a substantially cylindrical seat for the free accommodation of at least one substantially central part of said pivot.

19. The friction-controlled retention device according to item 13, characterized in that said seat comprises at least one longitudinal groove for the sliding and translatable accommodation of a ridge of said pivot, the coupling of said ridge within said groove preventing any rotation of said pivot.

20. The friction-controlled retention device according to item 13, characterized in that said second sliding

bracket has a first band for retention to a sliding block of said actuator that is accommodated on said leaf, and a second band, which is arranged substantially opposite the first band and protrudes with respect to the leaf, in the configuration for use, and is provided with a substantially cylindrical compartment for the abutment of a second end, arranged opposite the first end, of said pivot.

21. The friction-controlled retention device according to item 13, characterized in that at least one component selected between the end of said pivot and the internal compartment of said shell comprises, on at least one respective wall that faces outwardly, a plurality of raised portions and contoured regions whose shape and dimensions are mutually substantially complementary.

22. The friction-controlled retention device according to item 13, characterized in that at least part of the outer surface of said end of said pivot and at least one corresponding part of the surface of the internal compartment of said shell have a shape of the type of a six-point star, substantially similar to that of so-called TORX® wrenches.

23. The friction-controlled retention device according to one or more of the preceding items 13 to 22, characterized in that said actuator is associated functionally with a motion transmission assembly that is actuated by a handle that is coupled to said leaf and is preset to block/release it on said frame, said handle and said motion transmission assembly being of the type used traditionally in door or window frames, at least one portion of said motion transmission assembly being coupled to said movable sliding block of said actuator.

24. The friction-controlled retention device according to one or more of the preceding items 13 to 23, characterized in that said actuator is integral with the leaf, proximate to said first fixed bracket and to said second sliding bracket.

[0162] In the illustrated examples of embodiment, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other examples of embodiment.

[0163] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0164] The disclosures in Italian Patent Applications no. BO2013A000389 and no. BO2013A000559, from which this application claims priority, are incorporated herein by reference.

[0165] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A retention device for swing-leaves (A), **characterized in that** it comprises at least one hinge (2) constituted by at least one bracket (3) that is integral with the leaf (A), at least one tab (4) that is integral with a fixed frame (B), and at least one pivot (5), which is accommodated at least partially within said at least one hinge (2), at least one between said at least one bracket (3) and at least one tab (4) comprising an internal cavity (6) whose shape and dimensions are complementary to those of a first end (7) of said pivot (5), said pivot (5) being able to translate parallel to its own axis, by way of the action of a respective actuator (8), between a first free configuration, in which it is spaced from said internal cavity (6), and a second blocking configuration, in which it is inserted within said cavity (6), with resting of at least one portion of its outer surface on at least one corresponding portion of the inner surface of said cavity (6) and consequent mutual retention.

2. The retention device according to claim 1, **characterized in that** said internal cavity (6, 106) is further adapted to accommodate at least one bushing (107) made of polymeric material that has a seat (108) for at least one rigid shell (109) provided with an internal compartment whose shape and dimensions are complementary to those of said first end (7, 110) of said pivot (5, 105), said pivot (5, 105) being adapted further to be able to translate parallel to its own axis, by way of the action of said respective actuator (8, 111), between a first free configuration, in which it is spaced from the internal compartment (112) of said shell, and a second blocking configuration, in which it is inserted within said compartment (112), with resting of at least one portion of its outer surface on at least one corresponding portion of the inner surface of said compartment (112) and consequent mutual retention, said device being of the friction-controlled type.

3. The retention device according to claim 1 or 2, **characterized in that** said brackets (3, 103) that are integral with the leaf (A, A') are two in number, a first fixed bracket (3a, 103a) and a second bracket (3b, 103b) that can slide along a predefined stroke, said pivot (5, 105) being integral with said second sliding bracket (3b, 103b), said second sliding bracket (3b, 103b) being interposed between said pivot (5, 105) and the respective actuator (8, 111).

4. The retention device according to claim 1 or 2, **characterized in that** said first fixed bracket (3a, 103a) has a first portion (9, 117) for retention to the leaf (A,

A') and a second portion (10, 118), which is arranged substantially opposite the first portion (9,117), protrudes with respect to the leaf (A, A'), in the configuration for use, and is provided with a substantially cylindrical seat (11, 119) for the free accommodation of at least one substantially central part of said pivot (5, 105).

5. The retention device according to claim 1 or 2, **characterized in that** said second sliding bracket (3b, 103b) has a first band (13, 120) for retention to a moving sliding block (14, 121) of said actuator (8, 111) that is accommodated on said leaf (A, A'), and a second band (15, 122), which is substantially opposite the first band (13, 120), protrudes with respect to the leaf (A), in the configuration for use, and is provided with a substantially cylindrical compartment (16, 123) for the free accommodation of a second end (17, 117) or for the abutment of a second end (24, 124), opposite the first end (7, 110), of said pivot (5, 105).

6. The retention device according to claim 1, **characterized in that** the end (7) of said pivot (5) is frustum-shaped, said internal cavity (6) of said at least one tab (4) that is integral with the frame (B) having a shape that is selected preferably between cylindrical and frustum-like and having a shape and dimensions that are complementary to those of the end (7) of said pivot (5).

7. The retention device according to claim 1, **characterized in that** at least one component selected between the end (7) of said pivot (5) and the internal cavity (6) of said at least one tab (4) comprises, on at least one wall thereof that faces outwardly, a plurality of raised portions and contoured regions having a shape and dimensions that are mutually substantially complementary.

8. The retention device according to one or more of the preceding claims, **characterized in that** said pivot (5) comprises means (18) for adjusting its length in order to allow the mounting thereof on the bracket (3b) according to different and mutually opposite configurations.

9. The retention device according to claim 1, **characterized in that** said actuator (8) comprises a fixed enclosure (19), which is integral with said leaf (A) and is accommodated thereon, a movable slider (20) that is coupled to a sliding block (14) that is integral with a second end (17) of said pivot (5), as a consequence of an external action, between a retracted arrangement, which corresponds to said first free configuration of said pivot (5), and a forward arrangement, which corresponds to said configuration for blocking said pivot (5) with respect to said cavity (6).

10. The retention device according to claim 9, **characterized in that** elastic means for disconnection (21) are interposed between said movable slider (20) and said sliding block (14) and are intended to maintain, in the absence of external actions, the maximum mutual distance provided by the dimensions of the recess of said enclosure (19) within which they are enclosed at least partially.

11. The retention device according to claim 10, **characterized in that** a threaded element (22) is interposed between said movable slider (20) and said sliding block (14) to adjust their maximum mutual distance.

12. The retention device according to one or more of the preceding claims, **characterized in that** said slider (20) is coupled to respective manually-actuated movement elements (26), which comprise a skid (27), which is coupled to said slider (20) and can slide on said leaf (A), and a lever (28), which is pivoted on said leaf (A) with respect to a first axis (29) and is pivoted on said skid (27) with respect to a second axis (30), the orientation of said lever (28) producing translations of said skid (27) that are equal in length at most to twice the distance between said first axis (29) and said second axis (30).

13. The retention device according to claim 2, **characterized in that** between said internal cavity (106) and said bushing made of polymeric material (107) there is an interposed threaded element (114) for adjusting the position of said bushing (107) within said cavity (106) and for adjusting the mutual compression of one with respect to the other, with the consequent possibility to vary the mutual friction force.

14. The retention device according to claim 2, **characterized in that** said pivot (105) has an end (110) whose diameter corresponds to the inside diameter of said rigid shell (109) and a substantially central portion (115) having a smaller diameter, for the accommodation of a substantially tubular elastic element (116) that is intended to force said end (110) into said shell (109).

15. The retention device according to the preceding claim, **characterized in that** it comprises a pad (16a), which can be retained rigidly according to a plurality of different configurations to a component that is selected between said fixed bracket (103a) and said substantially central portion (115), in order to adjust the length, and therefore the precompression, of said elastic element (116) when it is fitted on said portion (115).

16. The friction-controlled retention device according to claim 2, **characterized in that** said seat (119) com-

prises at least one longitudinal groove (119a) for the sliding and translatable accommodation of a ridge (105a) of said pivot (105), the coupling of said ridge (105a) within said groove (119a) preventing any rotation of said pivot (105).

17. The retention device according to claim 2, **characterized in that** at least one component selected between the end (110) of said pivot (105) and the internal compartment (112) of said shell (109) comprises, on at least one respective wall that faces outwardly, a plurality of protrusions and contoured portions whose shape and dimensions are mutually substantially complementary.

18. The retention device according to claim 2, **characterized in that** at least part of the outer surface of said end (110) of said pivot (105) and at least one corresponding part of the surface of the internal compartment (112) of said shell (109) have a shape of the type of a six-point star, substantially similar to that of so-called TORX® wrenches.

19. A retention device according to one or more of the preceding claims, **characterized in that** said actuator (8, 111) is associated functionally with a motion transmission assembly (33) that is actuated by a handle (32) that is coupled to said leaf (A) and is preset to lock/release it on said frame (B), said handle (32) and said motion transmission assembly (33) being of the type used traditionally in door or window frames, at least one portion of said motion transmission assembly (33) being coupled to said slider (20) or to said movable sliding block of said actuator (8, 111).

20. The friction-controlled retention device according to one or more of the preceding claims, **characterized in that** said actuator (111) is integral with the leaf (A'), proximate to said first fixed bracket (103a) and to said second sliding bracket (103b).

21. The device according to one or more of claims 3 to 20, **characterized in that** said first fixed bracket (3a) comprises two faces, said faces being held together by means of a screw (12).

22. The device according to one or more of claims 3 to 21, **characterized in that** said bracket (4) of said hinge (2) comprises two mutually perpendicular portions (9, 10).

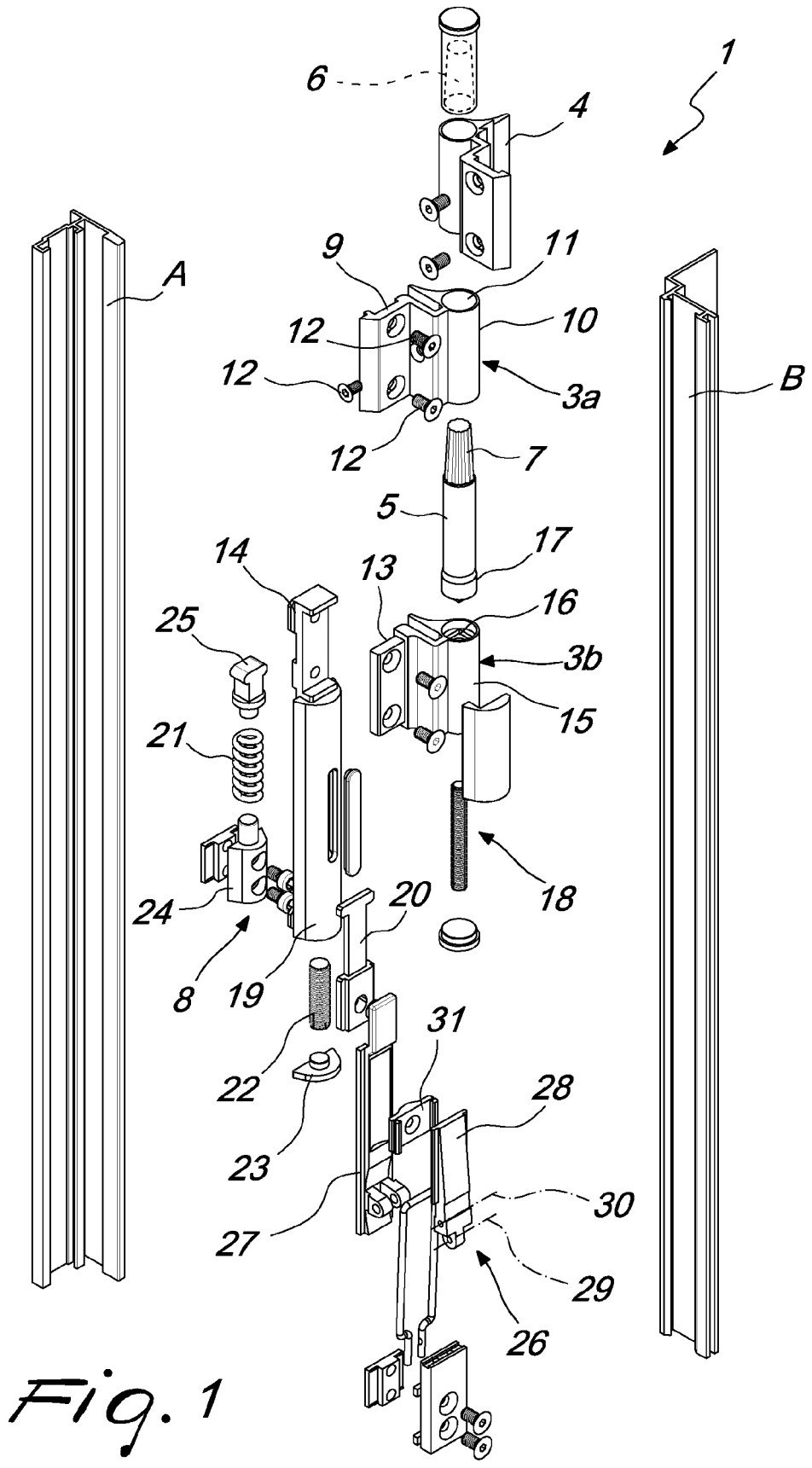
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Fig. 1

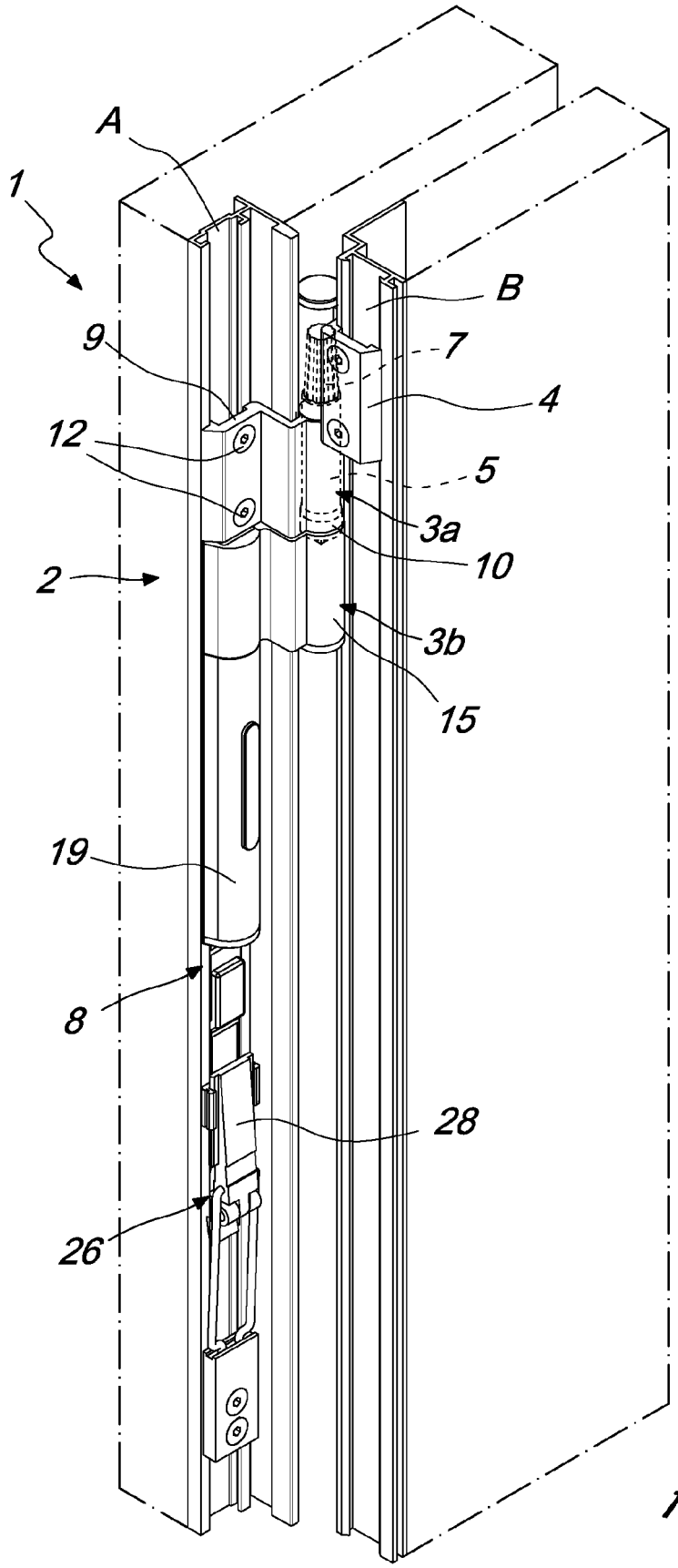

Fig. 2

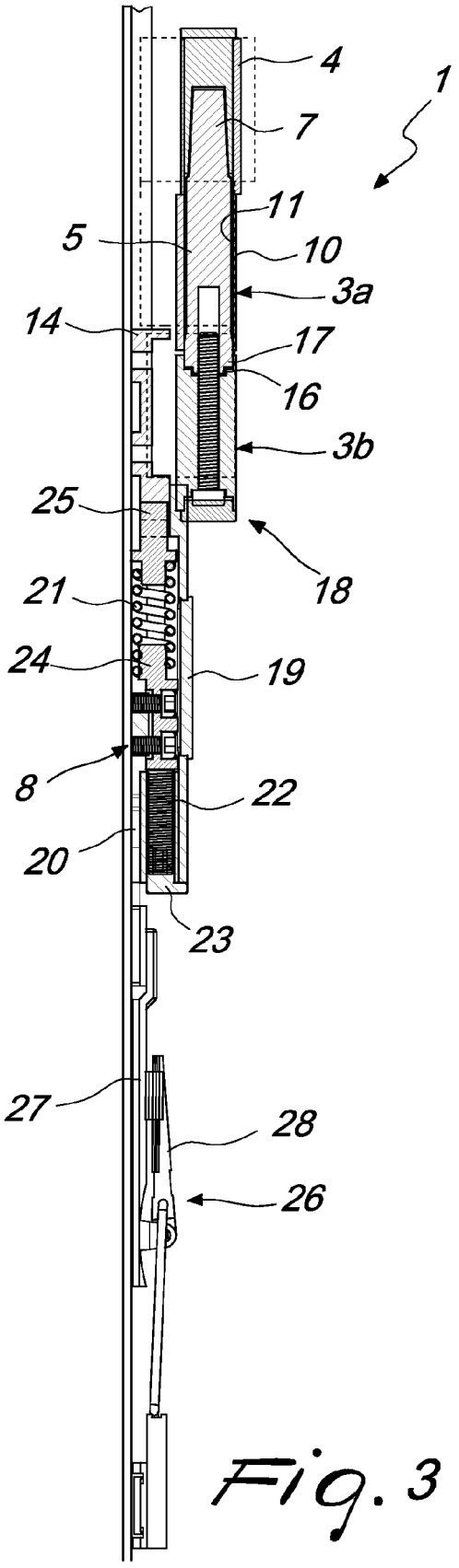
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Fig. 3

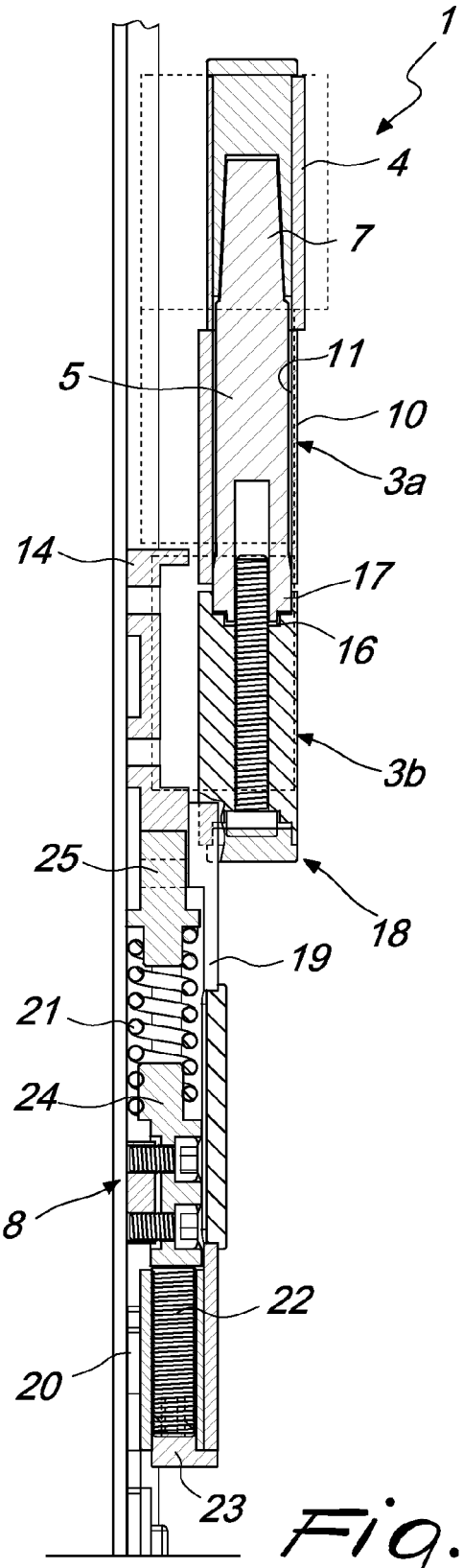
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Fig. 4

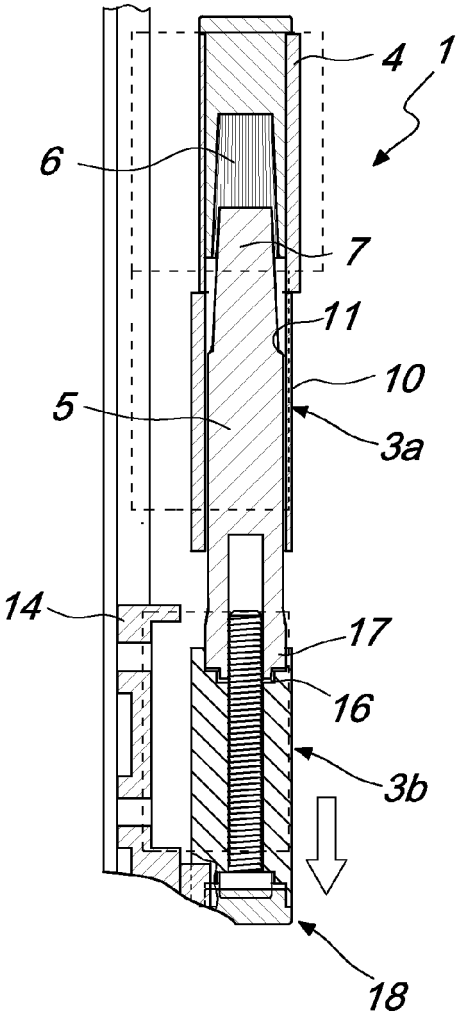
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Fig. 4A

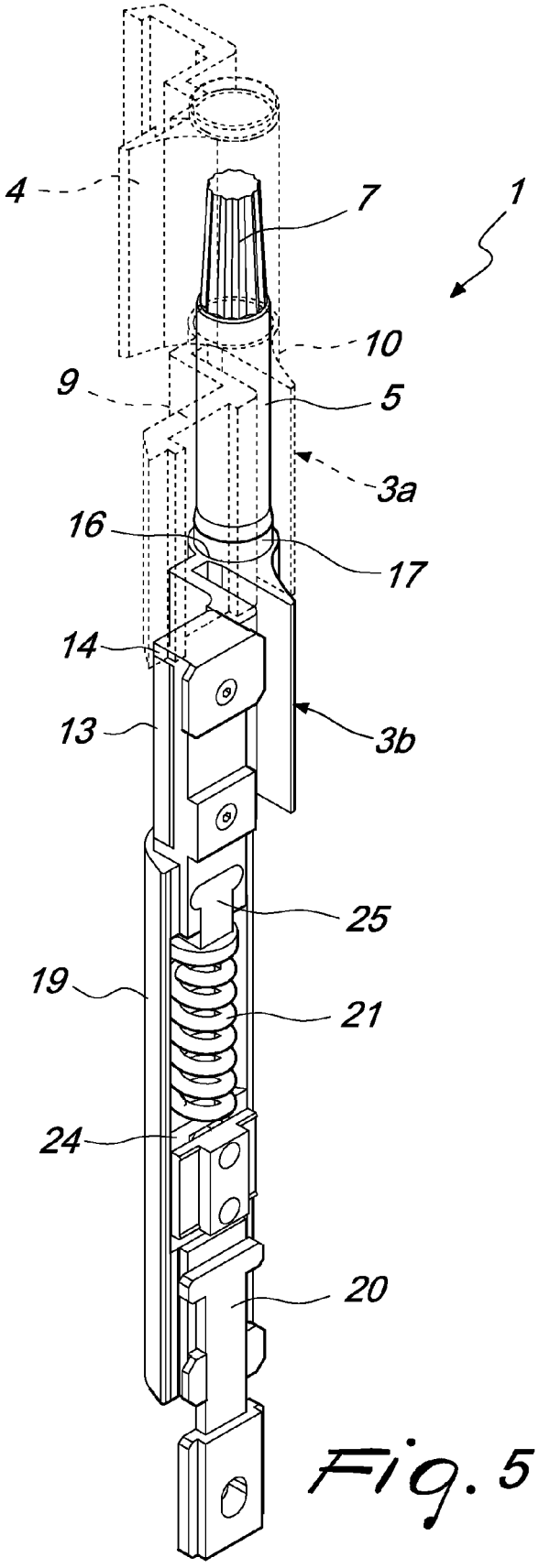
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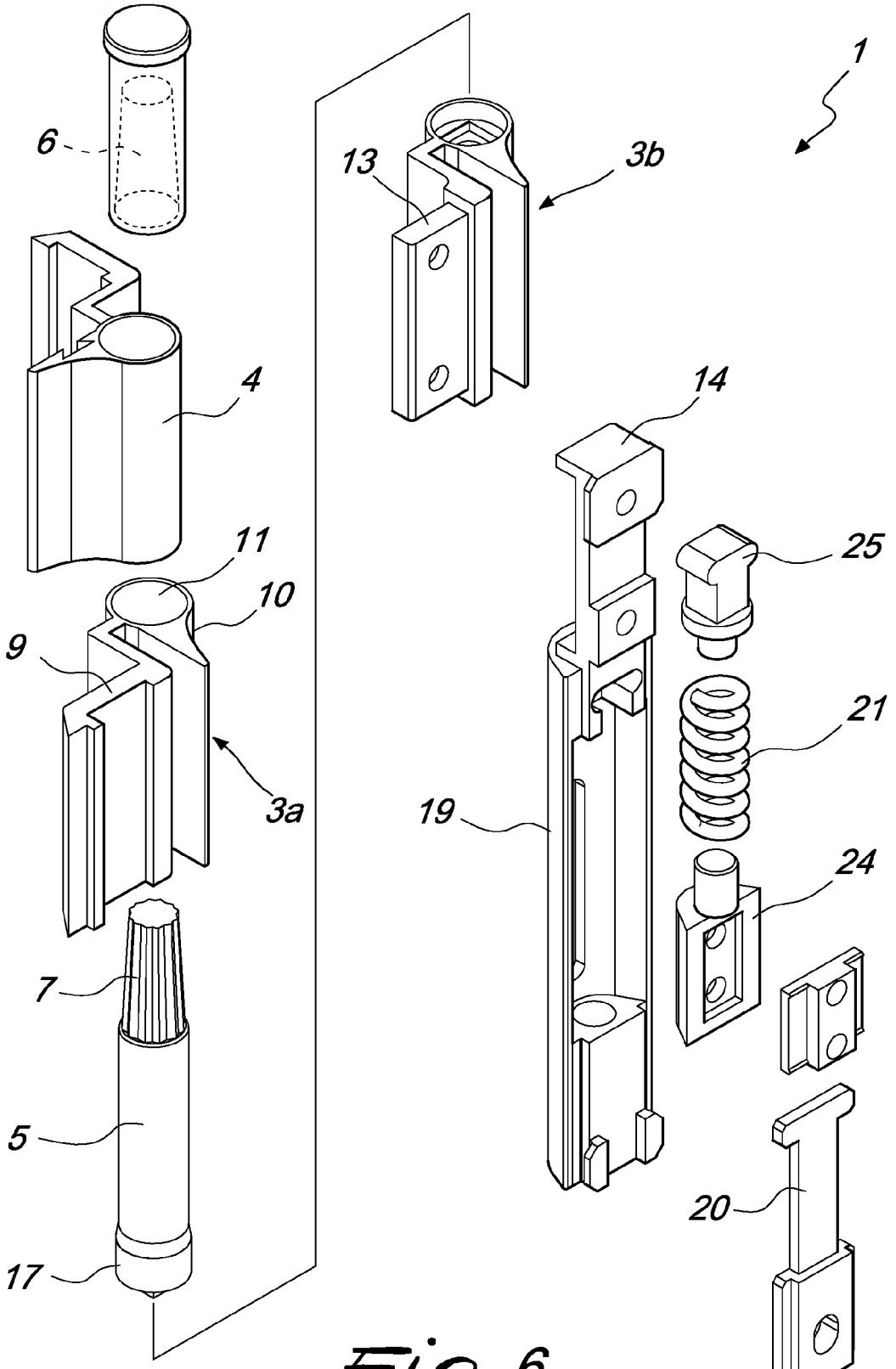
Fig. 5



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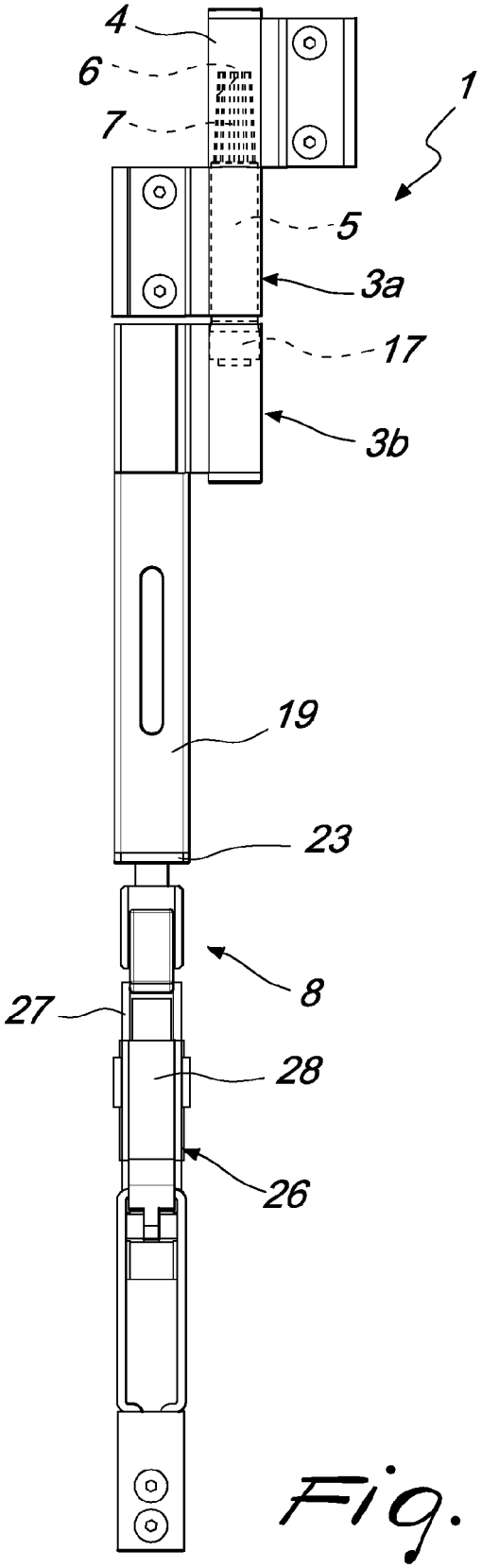

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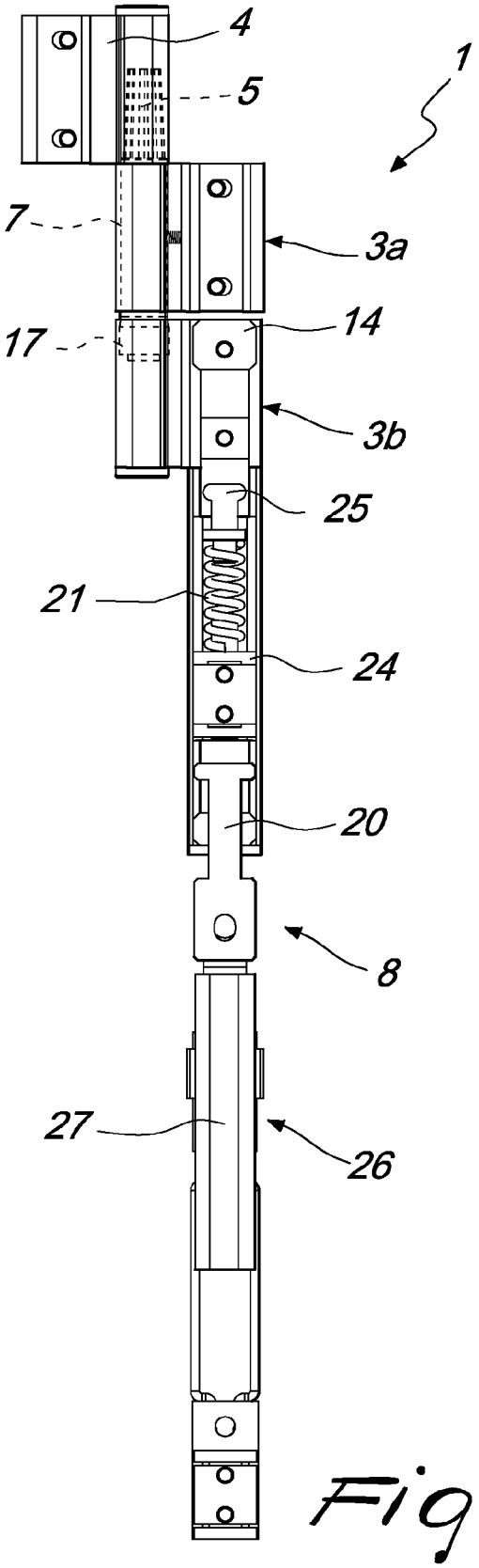

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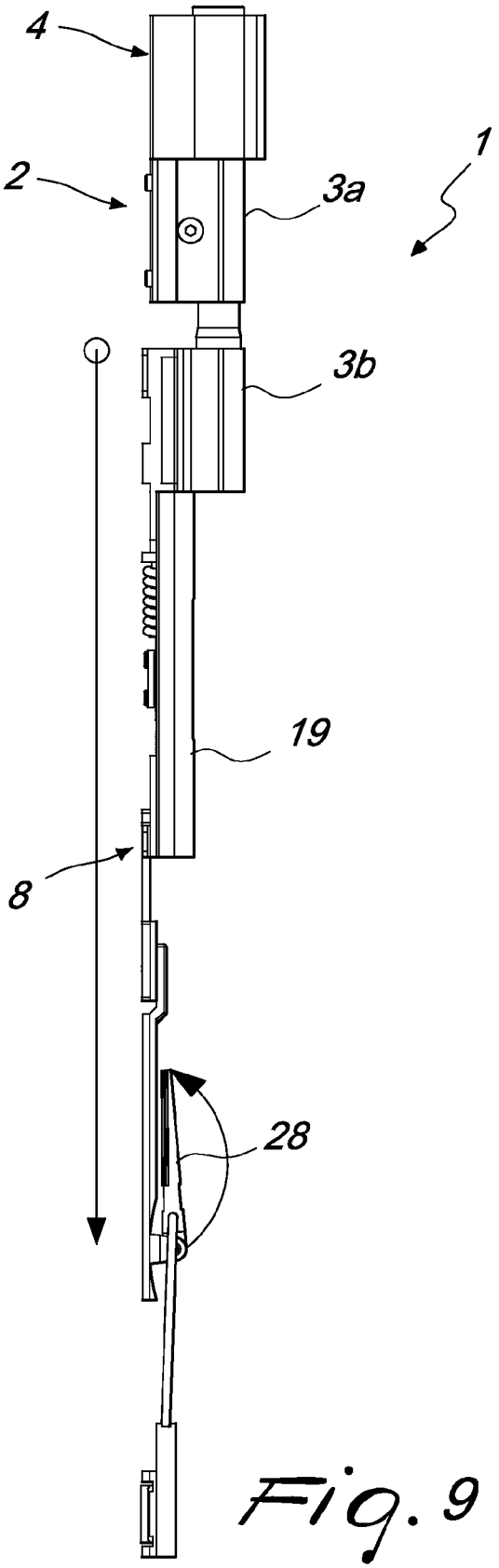

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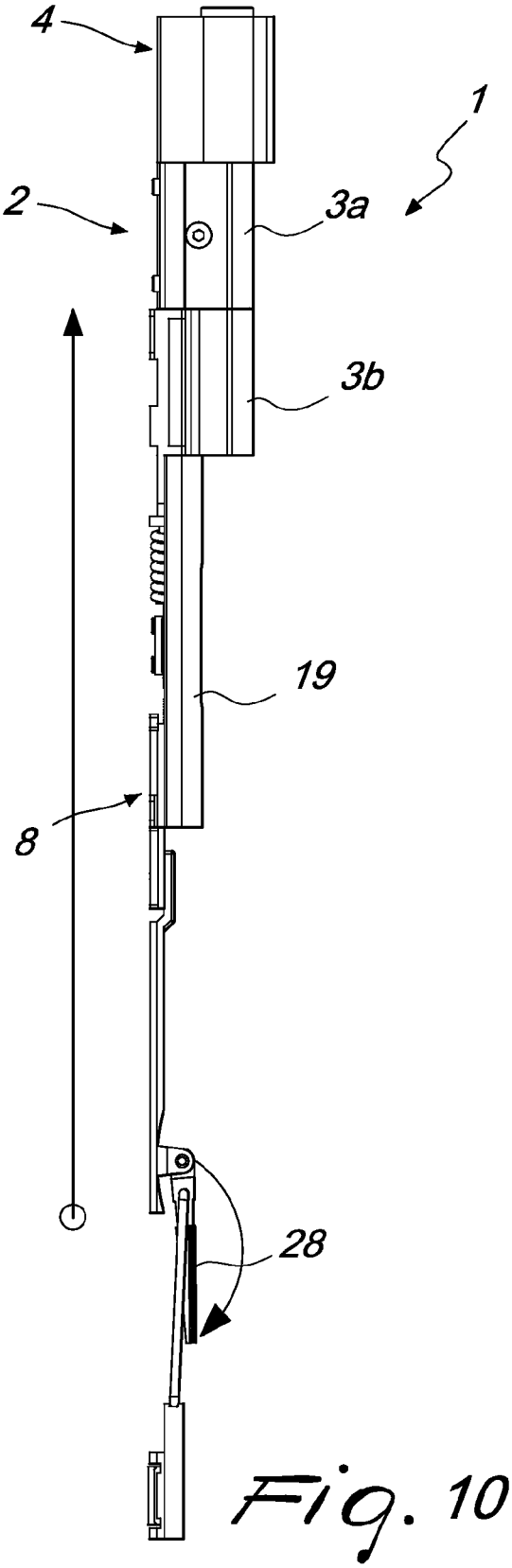
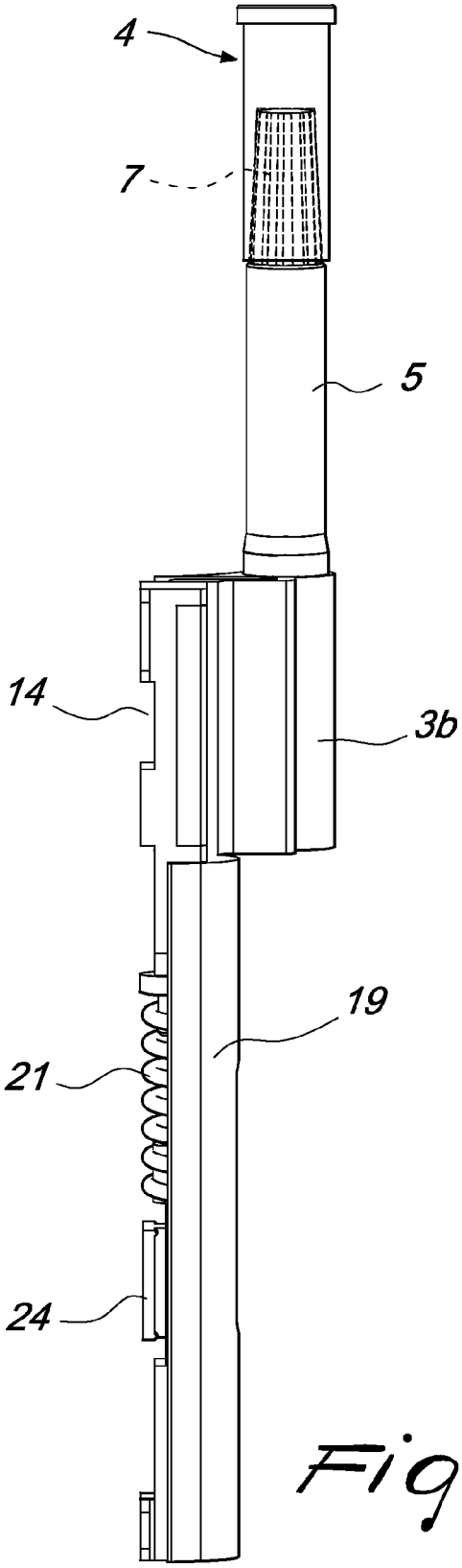


Fig. 10



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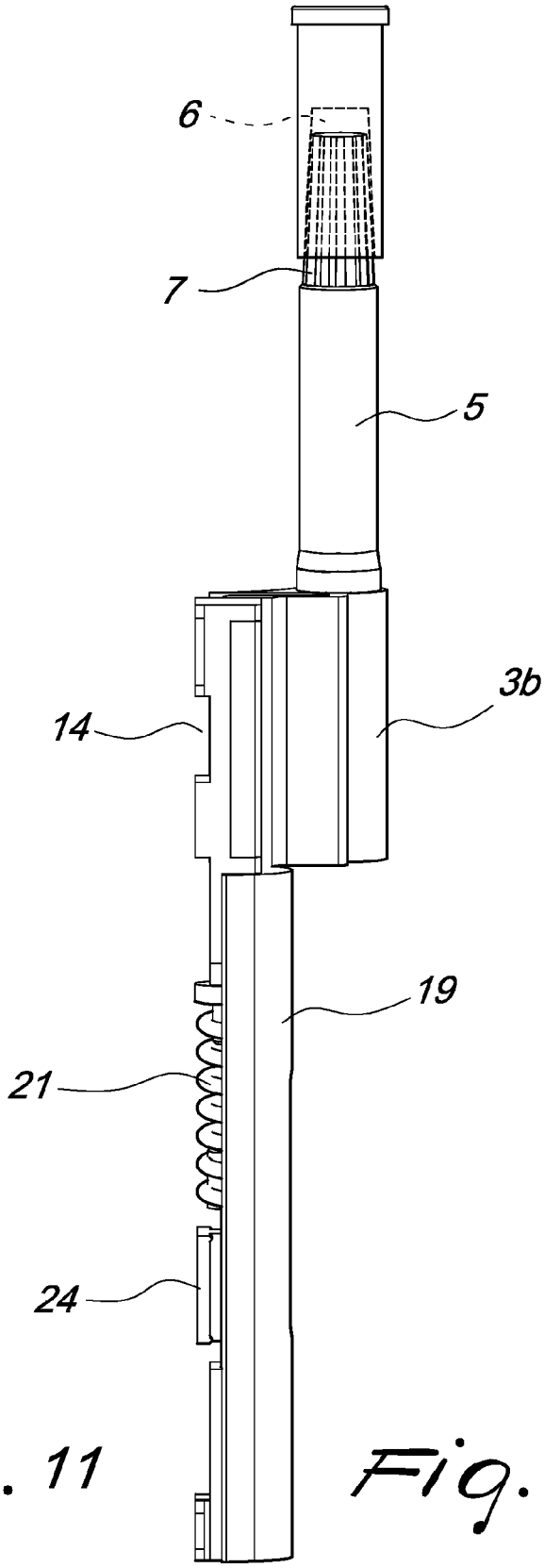

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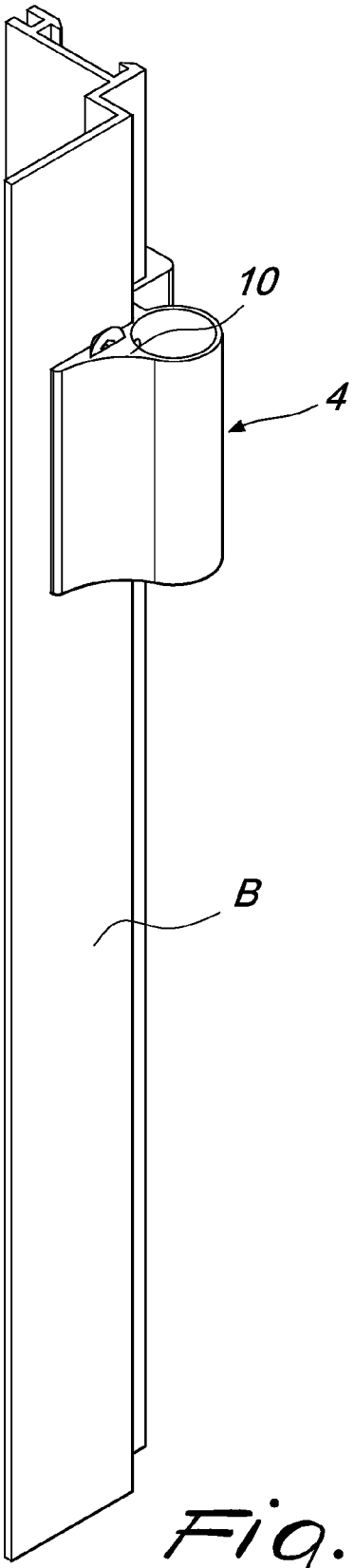

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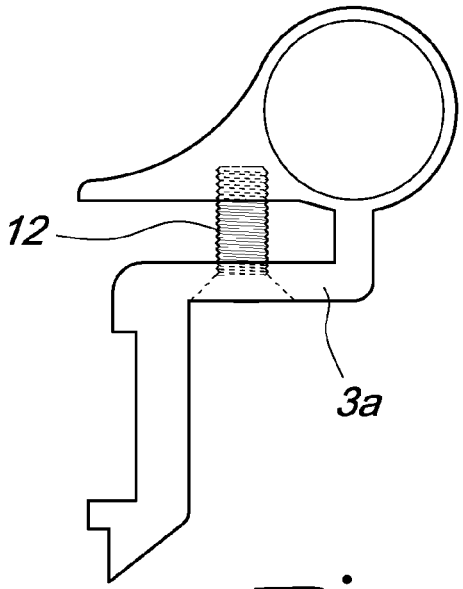
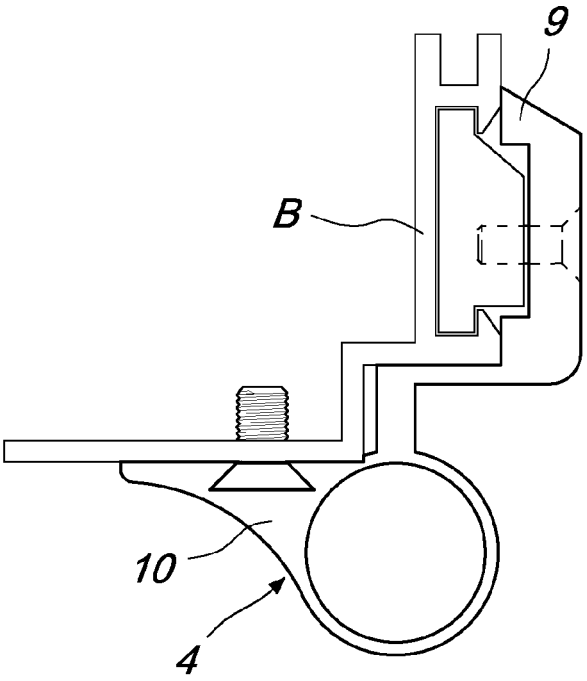


Fig. 13



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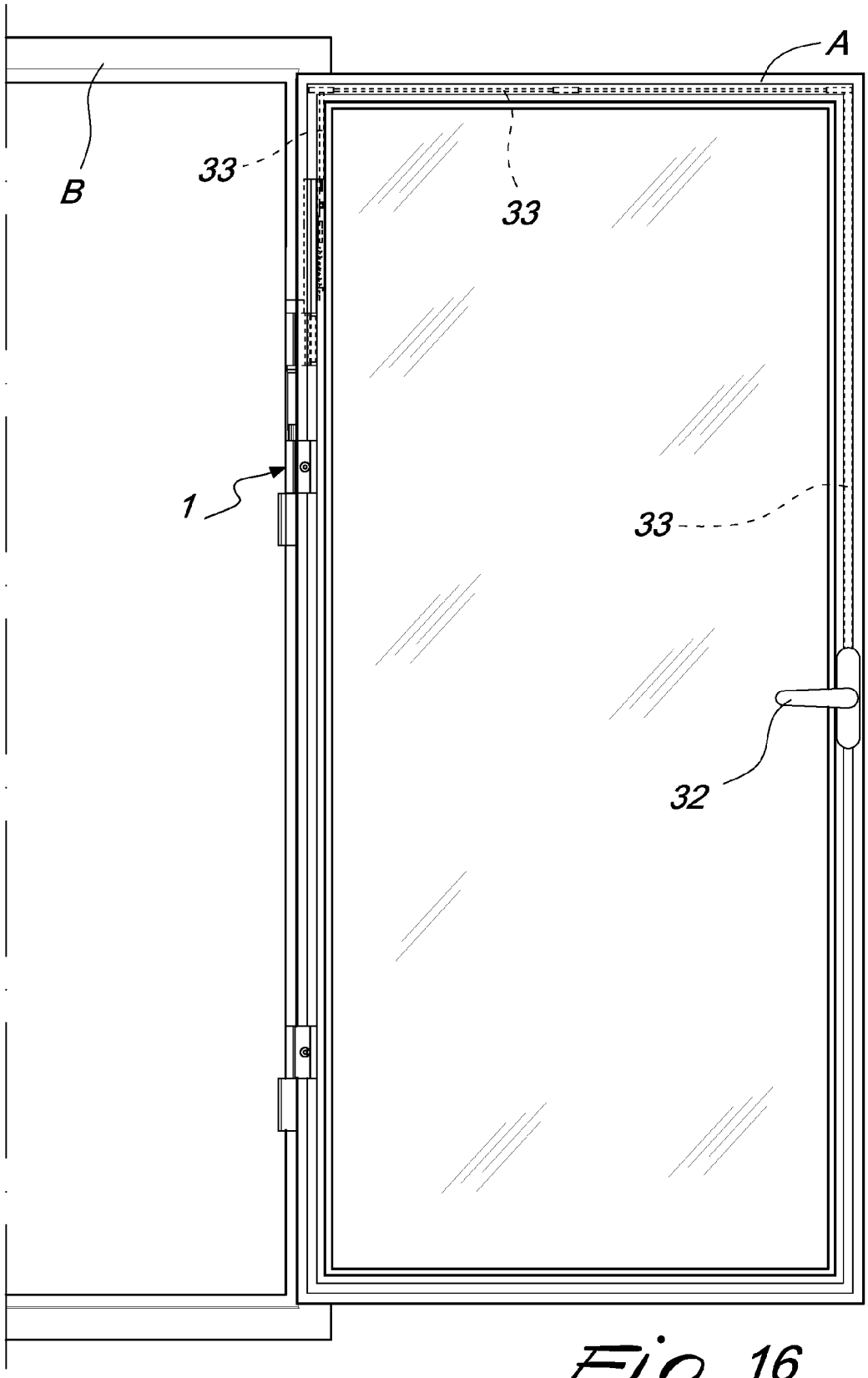

Fig. 16

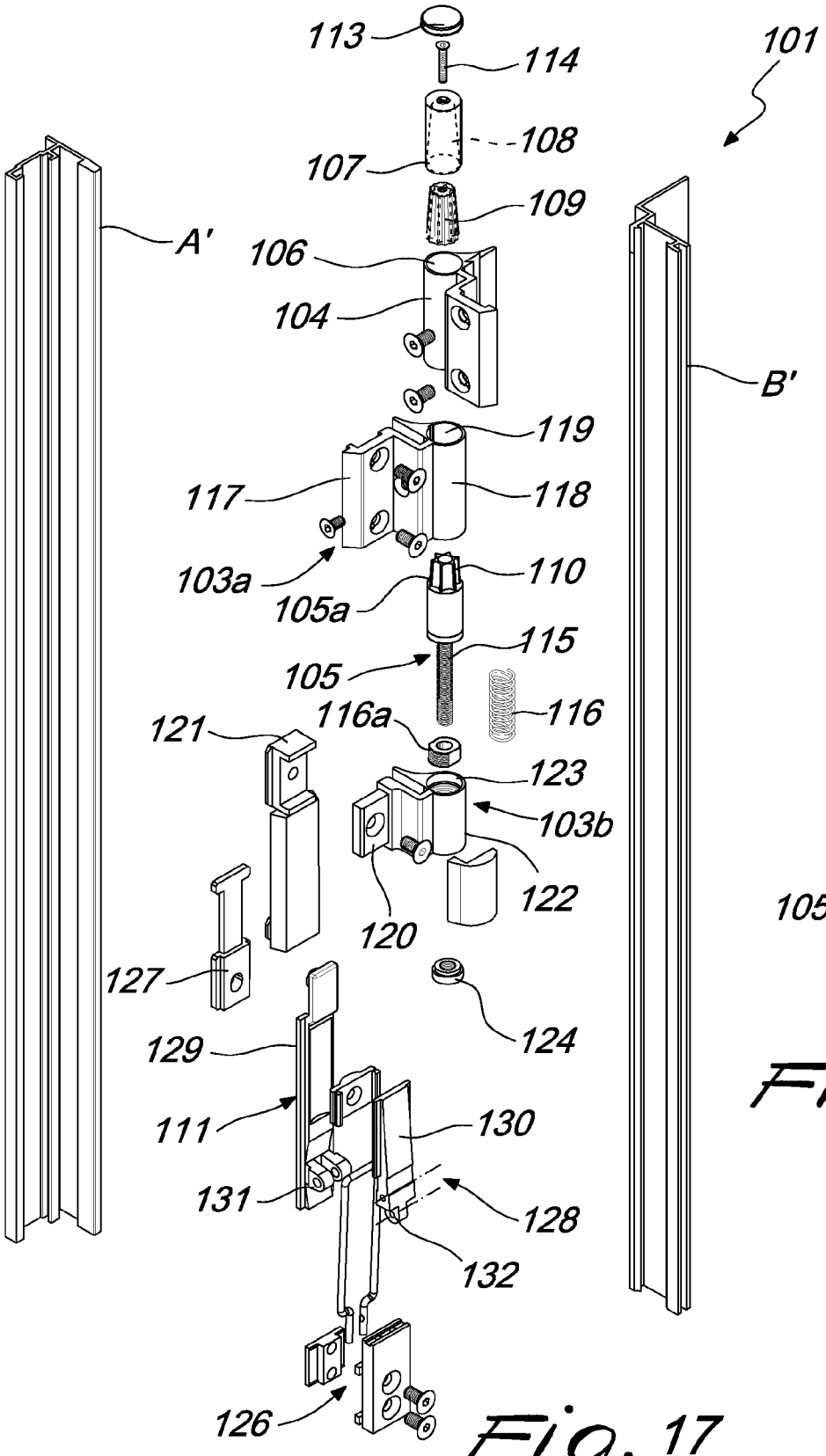

Fig. 17

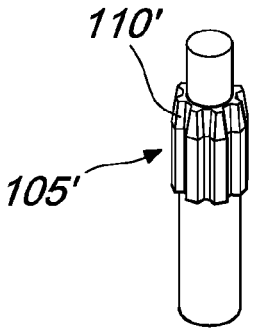

Fig.17a

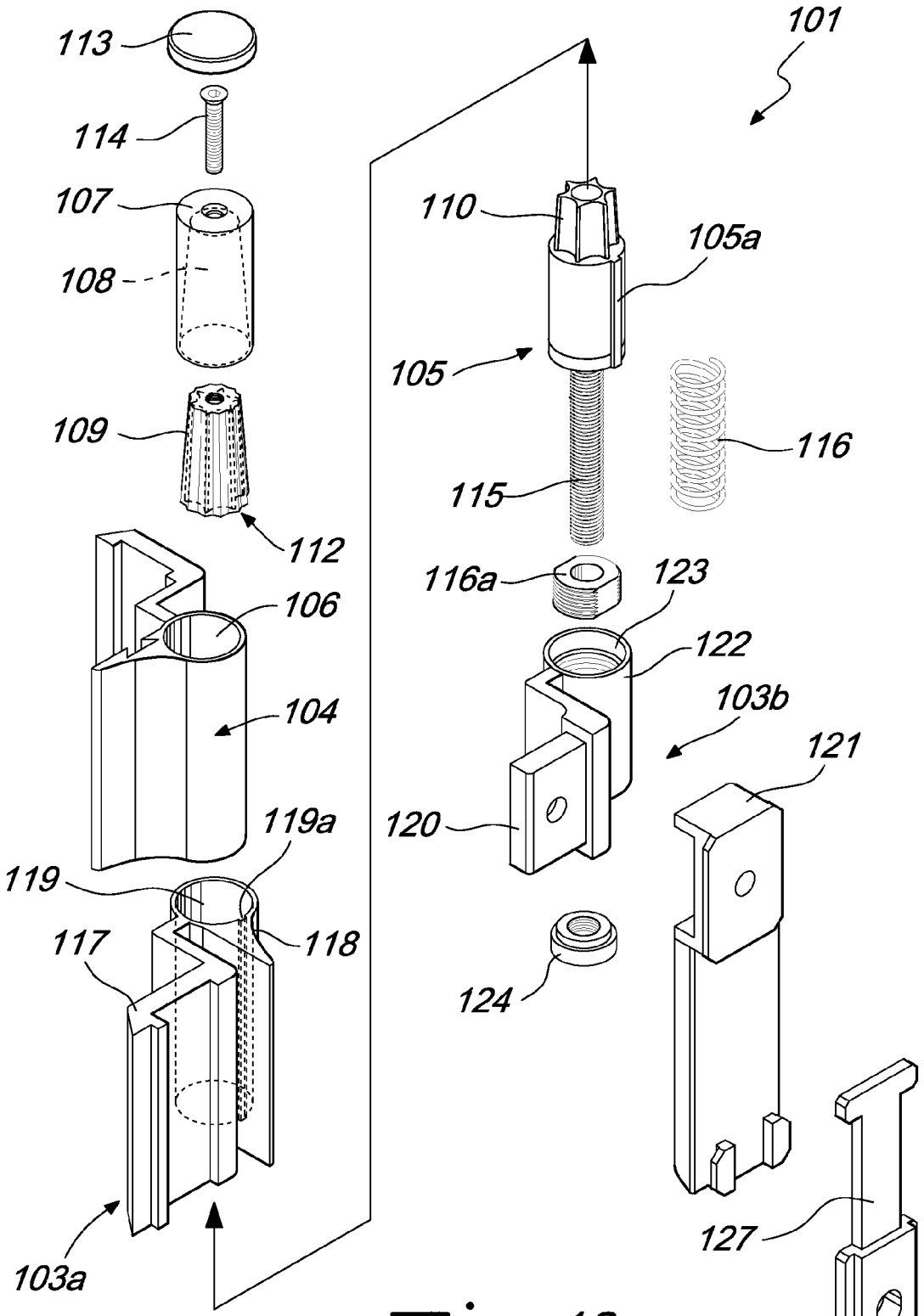
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Fig. 18

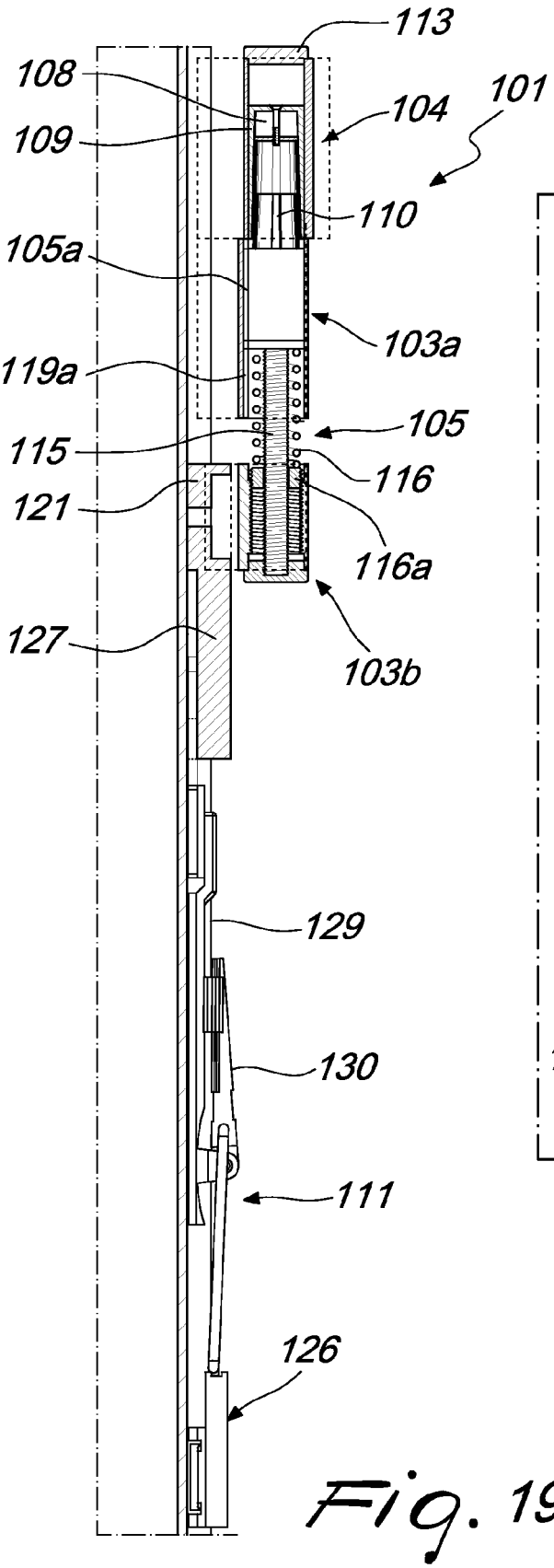
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Fig. 19

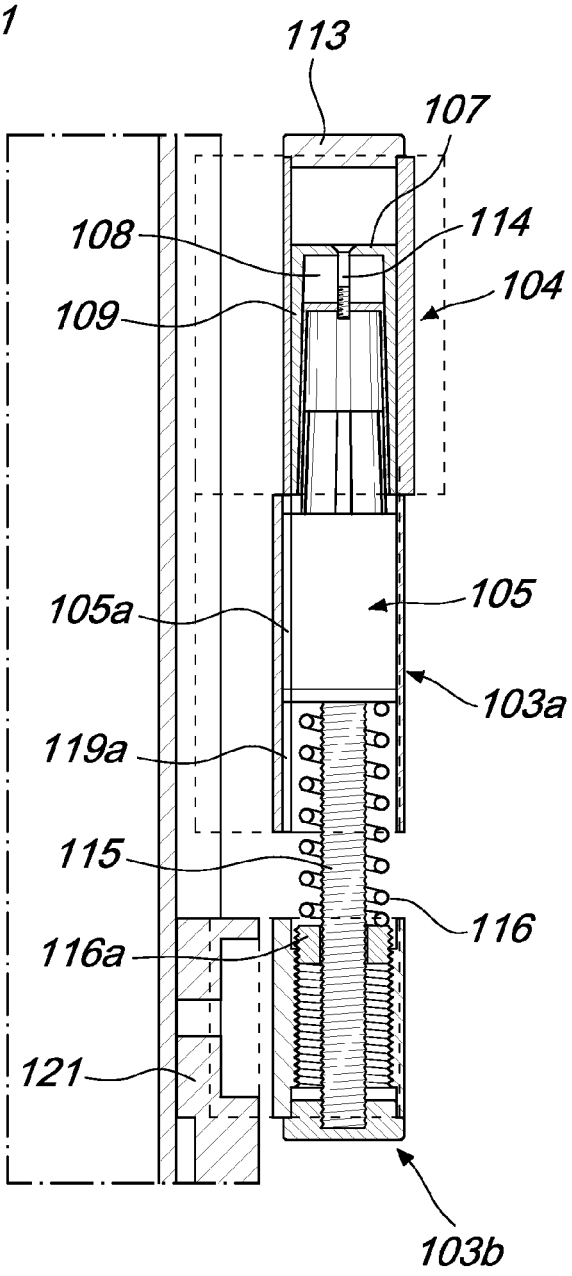
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Fig. 20

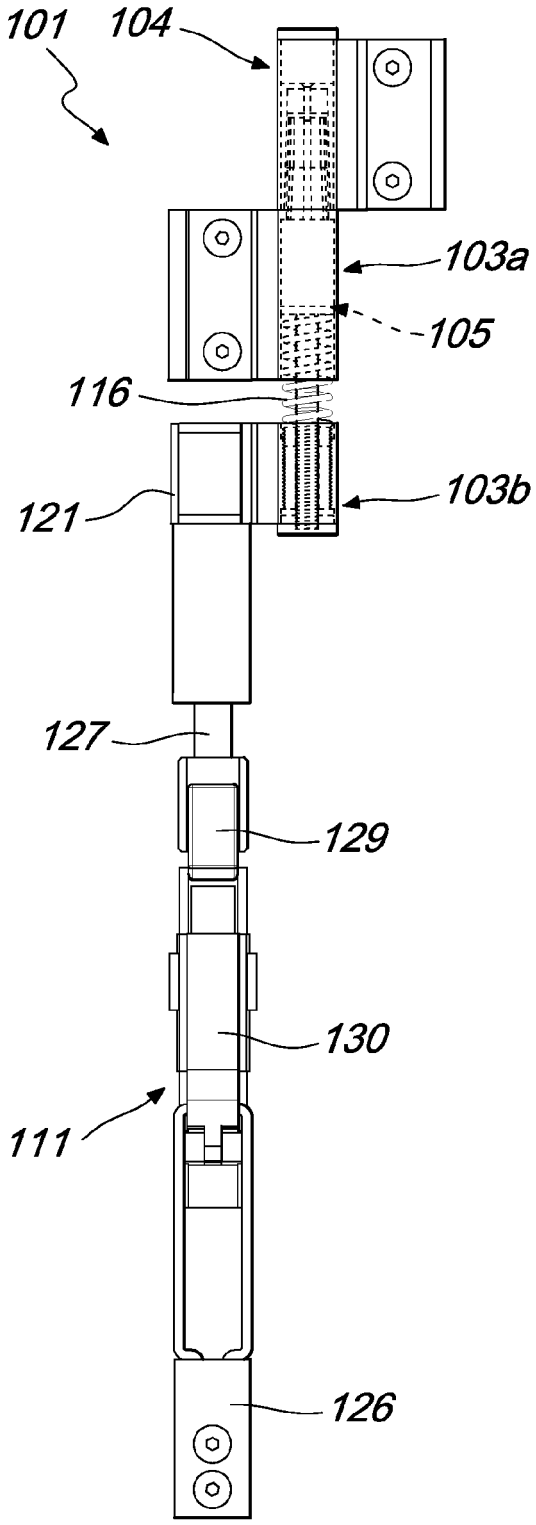
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Fig. 21

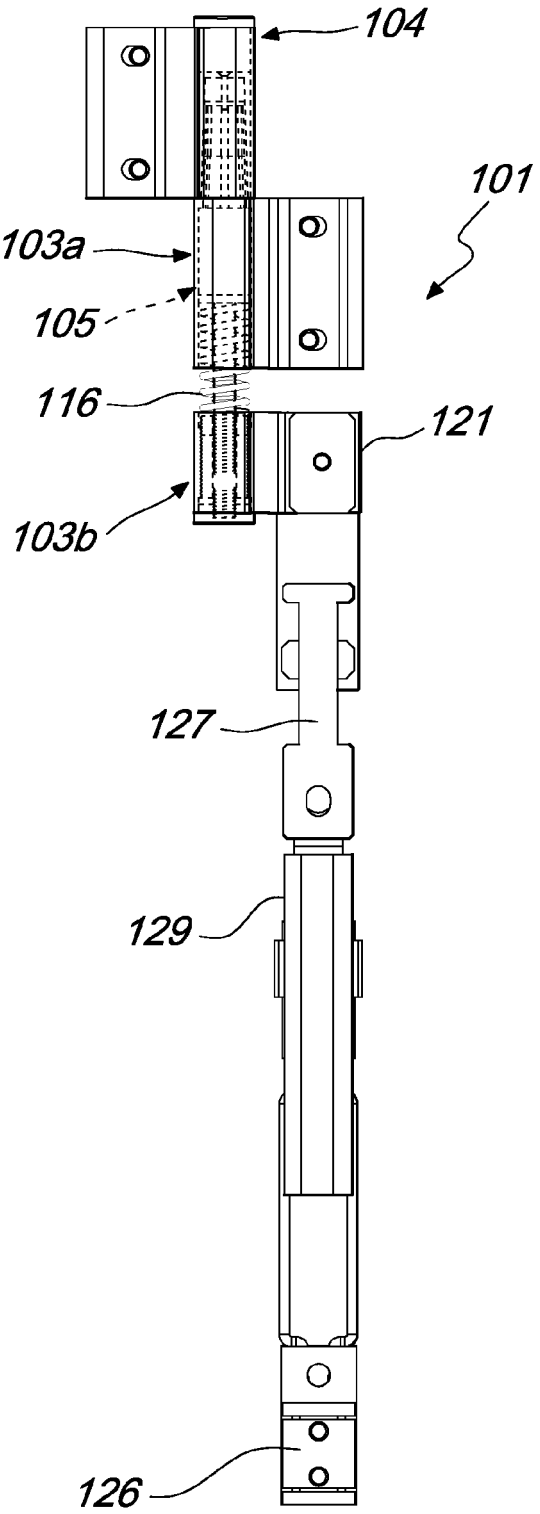
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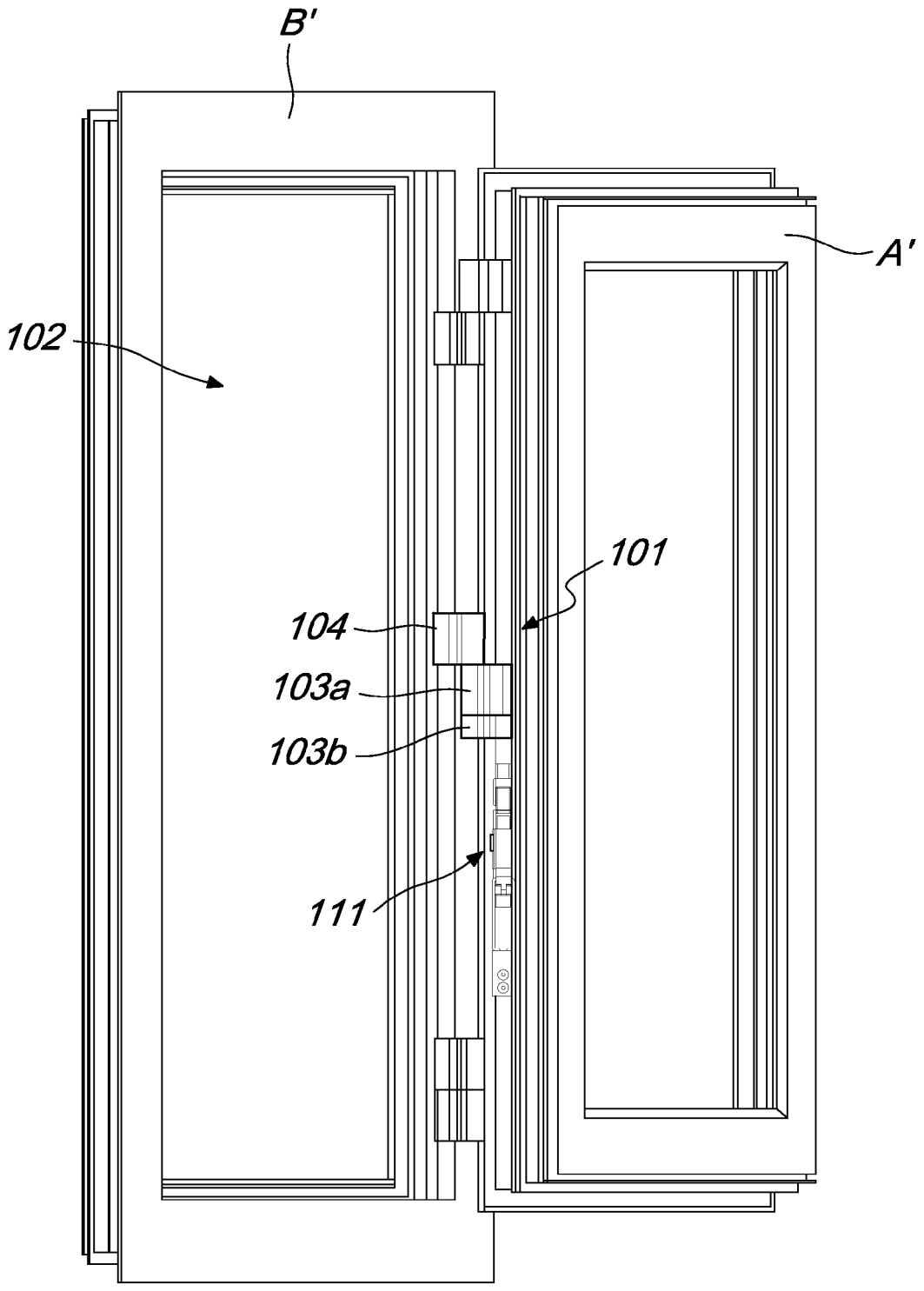
Fig. 22



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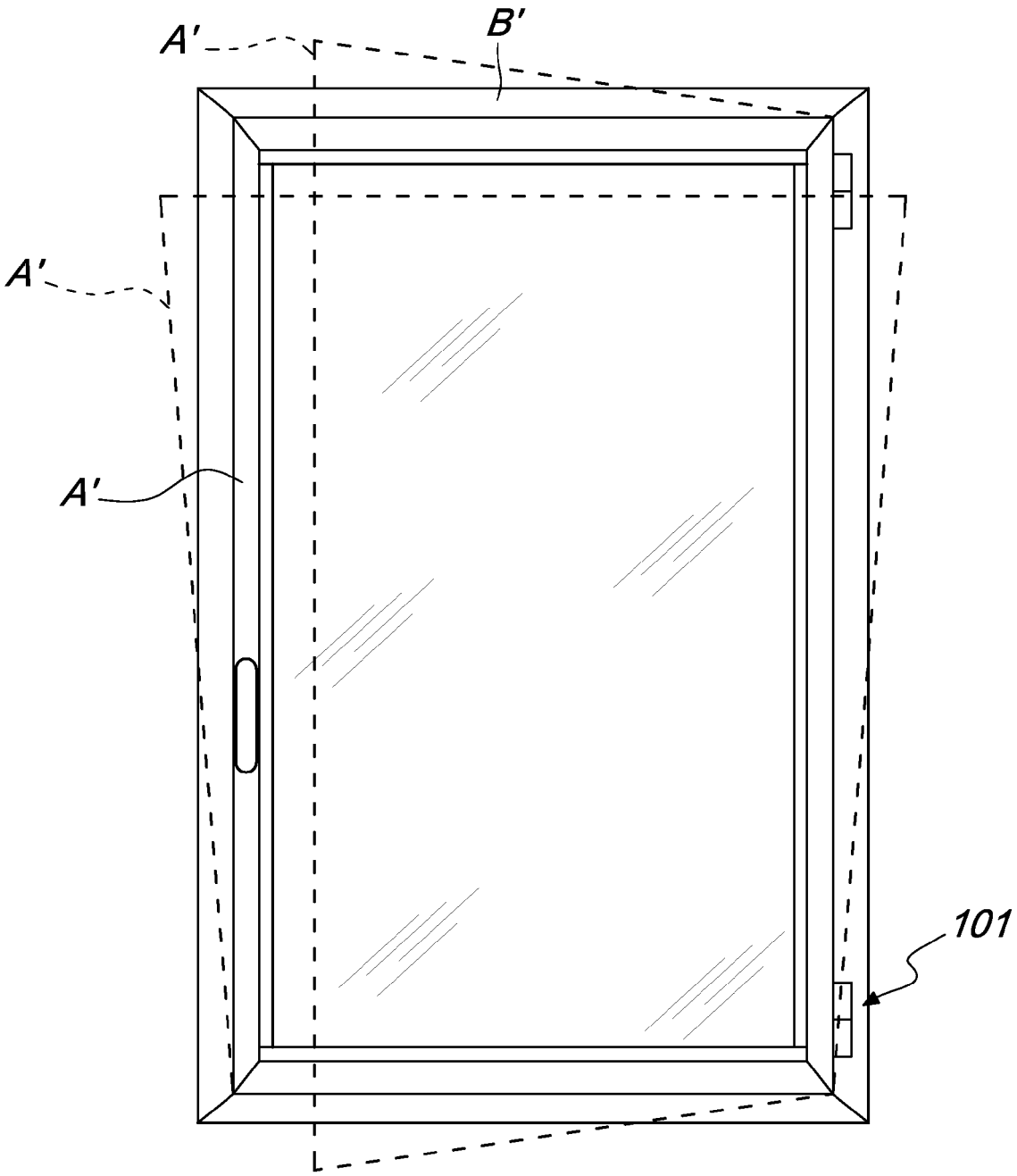

Fig. 24

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- IT BO20130559 A **[0164]**