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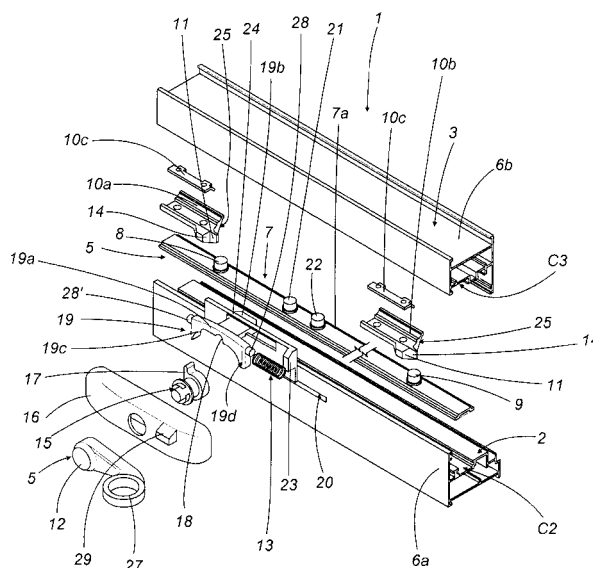
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(54) **A bottom-hung window unit.**

(57) A bottom-hung window unit comprises: a mobile frame (2) and a fixed frame (3) hinged to each other along a respective first crosspiece (4); drive means (5) acting between a second crosspiece (6a, 6b), parallel and opposite to the first crosspiece (4) on which the mobile frame (2) is hinged to the fixed frame (3), said drive means (5) being designed to enable the window to be moved to an open configuration, where the second, mobile crosspiece (6a) is away from the respective second, fixed crosspiece (6b), and a closed configuration where the

mobile crosspiece (6a) is in contact with the fixed crosspiece (6b); the drive means (5) comprise operating means (7) located on the mobile crosspiece (6a) and having at least two elements (8, 9) for closing the mobile frame (2) against the fixed frame (3), these elements being spaced far apart and being able to be securely coupled to each other by means of strikers (10a, 10b) located on the fixed crosspiece (6b); suitable means (11) act on the operating means (7) and, by operating on the mobile frame (2), enable the window unit (1) to be automatically switched from the open to the closed configuration.

FIG.3



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Description

[0001] This invention relates to a bottom-hung window unit, in particular a bottom-hung window unit whose frame is made of metal, PVC or similar materials, wood - PVC, etc.

[0002] At present, bottom-hung windows are used extensively because they meet a wide range of requirements in buildings of all kinds (residential, schools, hospitals, factories and so on).

[0003] Windows of this kind are installed in the parts of a building that are not easy to reach as, for example, is the case of transom windows or fanlights (usually above a door) or that are situated very high up (as, for example, in factory buildings) and are opened preferably using a suitable operator or other tool with hooking means at its top end.

[0004] Typically, a window of this kind has two hinge points between the mobile frame and the fixed frame on the bottom horizontal edge and a single point by which the mobile frame is closed, on the top horizontal edge.

[0005] The single closing point, which is usually located half way along the width of the window frame, consists of a well known device which those familiar with the trade refer to as "latch".

[0006] The latch is basically a fastening element, consisting of a pin mounted on suitable supporting means (plates) attached to the mobile frame, and a striker element attached to the fixed frame. The striker element (usually an inclined surface) is normally coaxial with the latch pin which can slide axially (in both directions, thanks to a spring) towards an engagement slot located at the innermost end of the striker element. The outermost end of the latch has a ring handle that can be operated by hand or engaged by a hook or operator.

[0007] With this device, the user can release the latch pin from the engagement slot so that gravity causes the mobile frame to be tilted towards the inside of the room where it is installed. To close the window, the user pushes the mobile frame towards the fixed frame until the pin springs into the slot.

[0008] Although this type of window is widely used, its structure presents several problems that are as yet unsolved.

[0009] The main drawback of this type of window is, indeed, the closing device at a single point.

[0010] The single closing point makes it difficult to close the window satisfactorily because, amongst other things, windows of this kind usually have irregular proportions (very wide and low, very narrow and tall, depending on requirements) and thus the single closing point, which is usually positioned, as mentioned above, half way along the window, cannot provide an efficient seal or sufficient guarantee of security for the entire window.

[0011] In particular, the single closing point offers little resistance to would-be burglars and applies insufficient pressure on the weather strips, especially at the corners

furthest away from it, providing an ineffective seal against rain and/or draughts (as well as low insulation against noise). The aim of this invention is to overcome the above mentioned disadvantages by providing an operating device for opening and closing bottom-hung windows which is extremely versatile and can be mounted on bottom-hung windows of any kind and size and which offers a high level of security, an effective weather seal and ease of operation when opening and closing the window.

[0012] According to the invention, the above mentioned aim is achieved by a bottom-hung window unit comprising at least: a mobile frame and a fixed frame hinged to each other along a respective first crosspiece; drive means acting between a second crosspiece, parallel and opposite to the first crosspiece, on which the mobile frame is hinged to the fixed frame, said drive means being designed to enable the window to be moved to an open configuration, where the second, mobile crosspiece is away from the respective second, fixed crosspiece, and a closed configuration, where the mobile crosspiece is in contact with the fixed crosspiece; the drive means comprise operating means located on the mobile crosspiece and having at least two elements for closing the mobile frame against the fixed frame, these elements being spaced far apart and being able to be securely coupled to each other by means of strikers located on the fixed crosspiece; suitable means act on the operating means and, by operating on the mobile frame, enable the window unit to be automatically switched from the open to the closed configuration.

[0013] The technical characteristics of the invention, with reference to the above aims, are clearly described in the claims below and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred embodiment of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figures 1 and 2 illustrate a bottom-hung window unit according to the invention in a schematic front and side view, respectively;
- Figure 3 is a perspective, exploded view, with some parts cut away in order to better illustrate others, of the top of the bottom-hung-window unit of Figures 1 and 2;
- Figure 4 is a side view, with some parts cut away and others in cross section, of a detail of the bottom-hung window unit shown in the illustrations listed above, in the closed configuration;
- Figure 5 is a schematic front view, with some parts cut away in order to better illustrate others, of another detail of the bottom-hung-window unit shown in the illustrations listed above;
- Figure 6 illustrates the top of the bottom-hung window unit of Figures 1 to 5 and shows the drive means for opening and closing the window, in the closed configuration in a view from above, with some parts

cut away in order to better illustrate others;

- Figure 7 is a schematic top plan view, with some parts cut away, of a detail from Figure 6 showing the action of the operating means that move the window from the closed to the open configuration.

[0014] With reference to the accompanying drawings, in particular Figures 1 to 3, the window unit according to the invention, is of the bottom-hung type.

[0015] This type of window unit, labelled 1 in its entirety, basically comprises a mobile frame 2 and a fixed frame 3 hinged to each other, at 3i, by a pair of customary hinge bodies, along a respective first crosspiece 4 and drive means 5 for opening and closing the window unit 1.

[0016] More specifically, the mobile frame 2 and the fixed frame 3 each have respective longitudinal grooves C2 and C3 in which operating accessories can be fastened.

[0017] As shown in Figure 2, the drive means 5 act between a second crosspiece 6a and 6b, parallel and opposite the first crosspiece 4 on which the mobile frame 2 is hinged to the fixed frame 3.

[0018] The drive means 5 enable the window to be moved between an open configuration, where the second crosspiece 6a of the mobile frame 2 is away from the respective second crosspiece 6b of the fixed frame 3 (that is to say, where the mobile frame is tilted towards the inside of the room relative to the fixed frame 3) and a closed configuration where the mobile crosspiece 6a is in contact with the fixed crosspiece 6b (see arrow F2, Figure 2). The open position at a predetermined angle is attained by a stay rod, labelled 2t and not described in further detail because it is of well known type.

[0019] The drive means 5 at least comprise operating means 7 located on the mobile crosspiece 6a and having at least two elements 8 and 9 for closing the mobile frame 2 against the fixed frame 3.

[0020] The closing elements 8 and 9 are spaced far apart and can be securely coupled to each other by means of strikers 10a and 10b located on the crosspiece 6b of the fixed frame 3.

[0021] In addition to the above, means 11 are provided to act on the operating means 7 to actuate the mobile frame 2 in such a way that the window 1 is moved automatically from the open to the closed configuration.

[0022] As shown in Figures 1 and 3, the aforementioned closing elements 8 and 9 are preferably, but not necessarily, equally spaced from a central point on the mobile crosspiece 6a.

[0023] In particular, the two closing elements 8 and 9 may be positioned in the vicinity of the respective corner zones of the mobile crosspiece 6a.

[0024] Two closing points are shown in the accompanying drawings but it will be understood that there may be more closing points, depending on the shape and size of the window.

[0025] Looking more closely at the technical details (see Figures 3 to 6) the drive means 5 further comprise

an actuating element 12 located on the outside of the mobile crosspiece 6a and acting on the operating means 7 in such a way as to enable the operating means 7 at least to switch from the closed to the open configuration.

[0026] More specifically, the actuating element consists of a lever or handle 12 that rotates about an axis perpendicular to the plane of the mobile frame and associated with a spindle 15 housed in a respective covering element 16 associated with the outside of the mobile crosspiece 6a.

[0027] The spindle 15 has a radially protruding pin 17 that engages a recess 18 made in a first operating portion 19a of a slider 19 for moving a drive rod 7a located in the mobile crosspiece 6a.

[0028] A second operating portion 19b of the slider 19 extends into the mobile crosspiece 6a through a slot 20 made in the mobile crosspiece 6a itself; in use, the second, internal operating portion 19b is interposed between two contact elements or bosses 21 and 22 located on the rod 7a (see Figure 6) and in such a way as to enable the rod 7a itself to be actuated in both directions, corresponding to the closed and open configurations of the mobile frame 2 (see arrows F7a).

[0029] As already mentioned, the operating means 7 comprise the aforementioned drive rod 7a, which is slidably accommodated in the groove C2 in the mobile crosspiece 6a.

[0030] As clearly shown in Figures 3 to 6, the drive rod 7a is associated with vertically protruding bosses 8 and 9 constituting the aforementioned closing elements.

[0031] The aforementioned automatic switch means 11 comprise return means 13 and cam means 14 located in the vicinity of the two strikers 10a and 10b.

[0032] More specifically, the return means 13 act on the lever or handle 12 in such a way as to move the lever 12 back into the window closed configuration when no force is applied to the lever 12 itself (see arrows F12, Figure 5).

[0033] As clearly shown in Figures 3 to 6, the return means consist of a spring 13 interposed between the first, operating portion 19a of the slider 19 and a fixed contact element 23 protruding perpendicularly from the mobile crosspiece 6a on a mounting plate 24 attached to the mobile crosspiece 6a itself.

[0034] The aforementioned cam means 14 are located, as stated, in the vicinity of the two strikers 10a and 10b and operate on the respective bosses 8 and 9 in such a way as to cause:

- the operating means 7 to momentarily switch from the closed to the open configuration so that the mobile crosspiece 6a can move as close as possible to the fixed crosspiece 6b (see arrow F70, Figure 7);
- and the bosses 8 and 9 to then engage the strikers 10a and 10b securely under the action of the return spring 13 which moves the rod 7a and the lever 12 to the closed position (see arrow F71, Figure 7).

[0035] The strikers may consist of at least two blocks 10a, 10b positioned on and attached to the fixed crosspiece 6b at the respective longitudinal groove C3 (through customary contact counterplates 10c acting between the groove C3 and the respective block 10a, 10b).

[0036] Each block 10a and 10b has a half slot 25, open on the inside of the mobile crosspiece 6b, for securely engaging a respective boss 8 and 9 in such a way as to define the aforementioned closed configuration.

In addition to this, each block 10a and 10b has a first surface 14, facing the mobile crosspiece 6a, with an inclined profile, for striking the respective boss 8 and 9, and, in practice, constituting the aforementioned cam means.

[0037] Thus, contact between the bosses 8, 9 and the first surface 14 when the crosspieces 6a and 6b move closer together, causes:

- the bosses 8, 9 (and, hence, the drive rod 7a) to move from the closed to the open position so that the two crosspieces 6a and 6b can move as close together as possible;
- and the bosses 8 and 9 to then return to the closed configuration automatically under the action of the return spring 13, in such a way as to lock the bosses 8 and 9 in the recesses 25 in the blocks 10a and 10b (see Figure 7 again).

[0038] In addition to this, each half slot recess 25 has a second profile 26 for coming into contact with the respective boss 8, 9 and inclined in the direction opposite that of the first surface 14, so that the mobile and fixed crosspieces 6a and 6b can be pressed even closer together, thereby compressing the weather stripping (not illustrated) when the window is closed.

[0039] Still with reference to Figures 3 to 6, the first, operating portion of the slider 19 consists of a C-shaped element 19a having the function of a rack with a single recess defined by the aforementioned central recess 18 for engaging the central area of the pin 17, and two end walls 19c and 19d having respective opposite cylindrical protrusions 28, 28' at least one of which is designed to engage (by insertion into) the end of the spring 13 constituting the return means.

[0040] The lever or handle 12 comprises another feature, and that is, a ring 27 to be gripped by the user's hand or hooked by an operator or other suitable tool T (shown in Figure 2 in dashed line style) allowing the lever 12 to be turned in order to open the window 1.

[0041] Lastly, the above mentioned covering element 16 may be equipped with an outward protrusion 29 for engaging the lever or handle 12 and keeping the lever 12 in the position corresponding to the closed configuration of the mobile frame 2.

[0042] In use, the window 1 according to the invention can be opened and closed as follows: the user can turn the lever 12 downwards acting on it either directly or, if the window is out of reach, using the operator T, thus

compressing the spring 13 (see arrow F13, Figure 5) and moving the slider 19 (in the direction of the arrow F19) in such a way as to actuate the drive rod 7a.

[0043] The sliding of the rod 7a enables the bosses 8 and 9 to move away momentarily from the recesses 25 in the blocks 10a and 10b, allowing the mobile frame 2 to be tilted open towards the interior of the room (see arrow F2, Figure 2).

[0044] The spring 13 moves all the operating means 7 and the lever 12 back to the closed configuration as soon as force stops being applied to the lever 12 itself.

[0045] To close the window 1, it is sufficient to push the mobile frame 2 towards the fixed frame 3 until the bosses 8 and 9 come into contact with the first surface 14, thereby actuating the rod 7a and moving the operating means 7 (now in the closed position) to the open position. The momentary movement is transmitted also to the slider 19 and to the lever 12, thus compressing the spring 13.

[0046] This momentary open configuration enables the bosses 8 and 9 to move past the blocks 10a and 10b and to be positioned near their recesses 25 (the movements are indicated in Figure 7 by the arrows F70).

[0047] At this point, the return spring 13, previously compressed, enables the bosses 8 and 9 to be positioned in the recesses 25 in the blocks 10a and 10b, since there is no longer any resistance from their respective contact surfaces 14, thus securing the window 1 in the fully closed position (see arrows F71, again in Figure 7).

[0048] A window unit made as described above achieves the aforementioned aims thanks to a combination of components forming an extremely practical and secure multiple closing system including automatic closing of the window.

[0049] The presence of the sliding rod with two or more bosses provides a closure that is at once secure, without weak points, and balanced according to the shape and size of the window.

[0050] The use of a slider, driven to the closed position by a spring, and of cam-style strikers makes it possible to close the window quickly, effortlessly and with the certainty that the window is perfectly sealed against wind and rain and safe against burglars.

[0051] It will be understood that the invention described may be useful in many industrial applications and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A bottom-hung window unit, the window unit (1) comprising at least:

- a mobile frame (2) and a fixed frame (3) hinged to each other along a respective first crosspiece (4); the mobile frame (2) and the fixed frame (3)

each having respective longitudinal grooves (C2, C3) in which operating accessories can be fastened;

- drive means (5) acting between a second crosspiece (6a, 6b), parallel and opposite to the first crosspiece (4) on which the mobile frame (2) is hinged to the fixed frame (3), said drive means (5) being designed to enable the window to be moved to an open configuration, where the second crosspiece (6a) of the mobile frame (2) is away from the respective second crosspiece (6b) of the fixed frame (3), and a closed configuration where the mobile crosspiece (6a) is in contact with the fixed crosspiece (6b); the window unit being **characterised in that** the drive means (5) at least further comprise operating means (7) located on the mobile crosspiece (6a) and having at least two elements (8, 9) for closing the mobile frame (2) against the fixed frame (3), these elements being spaced far apart and being able to be securely coupled to each other by means of strikers (10a, 10b) located on the second crosspiece (6b) of the fixed frame (3); suitable means (11) acting on the operating means (7) and, by operating on the mobile frame (2), enabling the window unit (1) to be automatically switched from the open to the closed configuration.

2. The window unit according to claim 1, **characterised in that** the at least two closing elements (8, 9) are equally spaced from a central point on the mobile crosspiece (6a).
3. The window unit according to claim 1, **characterised in that** the two closing elements (8, 9) are positioned in the vicinity of the respective corner zones of the mobile crosspiece (6a).
4. The window unit according to claim 1, **characterised in that** the drive means (5) further comprise an actuating element (12) located on the outside of the mobile crosspiece (6a) and acting on the operating means (7) in such a way as to enable the operating means (7) at least to switch from the closed to the open configuration.
5. The window unit according to claims 1 and 4, **characterised in that** the automatic switching means (11) comprise return means (13) acting on the actuating element (12) in such a way as to move the actuating element (12) back into the closed configuration when no force is applied to the actuating element (12) itself.
6. The window unit according to any of the foregoing claims from 1 to 5, **characterised in that** the automatic switching means (11) comprise cam means

(14) located in the vicinity of the at least two strikers (10a, 10b), acting on the respective closing elements (8, 9) in such a way that the operating means (7) momentarily switch from the closed to the open configuration, allowing the mobile crosspiece (6a) to move as close as possible to the fixed crosspiece (6b), and the closing elements (8, 9) to then securely engage the strikers (10a, 10b).

7. The window unit according to claim 1, **characterised in that** the operating means (7) comprise at least one drive rod (7a) slidably accommodated in the groove (C2) in the mobile crosspiece (6a); the drive rod (7a) being associated with vertically protruding bosses (8, 9) constituting said closing elements.
8. The window unit according to claim 4, **characterised in that** the actuating element consists of a lever or handle (12) that rotates about an axis perpendicular to the plane defined by the mobile frame (2) and associated with a spindle (15) housed in a respective covering element (16) associated with the outside of the mobile crosspiece (6a); the spindle (15) having a radially protruding pin (17) that engages a recess (18) made in a first operating portion (19a) of a slider (19) for moving a drive rod (7a) located in the mobile crosspiece (6a); a second operating portion (19b) of the slider (19) extending into the mobile crosspiece (6a) through a slot (20) made in the mobile crosspiece (6a) and being, in use, interposed between two further contact bosses (21, 22) located on the rod (7a) in such a way as to enable the rod (7a) itself to be actuated in both directions, corresponding to the closed and open configurations of the mobile frame (2).
9. The window unit according to claims 5 to 8, **characterised in that** the return means consist of a spring (13) interposed between the first, operating portion (19a) of the slider (19) and a fixed contact element (23) on a mounting plate (24), the fixed contact element (23) being attached to the mobile crosspiece (6a) and protruding perpendicularly from the mobile crosspiece (6a) itself.
10. The window unit according to claim 1, **characterised in that** the strikers consist of at least two blocks (10a, 10b) positioned on and attached to the fixed crosspiece (6b) in the respective longitudinal groove (C3); each block (10a, 10b) having a half slot (25), open on the inside of the mobile crosspiece (6b), for securely engaging a respective boss (8, 9) constituting one of the closing elements, in such a way as to define the aforementioned closed configuration.
11. The window unit according to claims 5, 6 and 10, **characterised in that** each block (10a, 10b) has, on the part of it facing the mobile crosspiece (6a) a

first surface (14) with an inclined profile, for striking the respective boss (8, 9) and constituting said cam means, so that the bosses (8, 9) can move from the closed configuration to the open configuration, thereby allowing the two crosspieces (6a, 6b) to move as close together as possible; the return means (13) then automatically re-engaging the bosses (8, 9) with the striker blocks (10a, 10b) by moving the bosses (8, 9) back to the closed configuration.

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12. The window unit according to claim 11, **characterised in that** each half-slot recess (25) has a second profile (26) for coming into contact with the respective boss (8, 9) and inclined in the direction opposite that of the first surface (14), so that the mobile and fixed crosspieces (6a, 6b) can be pressed even closer together.
13. The window unit according to claim 8, **characterised in that** the lever or handle (12) has on the free end of it a ring (27) to be gripped by the user's hand or hooked by an operator or other suitable tool to allow the lever (12) itself to be turned.
14. The window unit according to claims 8 and 9, **characterised in that** the first operating portion of the slider (19) consists of a C-shaped element (19a) having the function of a rack with a single central recess (18) for engaging the central area of the pin (17), and two end walls (19c, 19d) having respective opposite cylindrical protrusions (28, 28') at least one of which is designed to engage the end of the spring (13) constituting the return means.
15. The window unit according to claim 8, **characterised in that** the covering element (16) has an outward protrusion (29) for engaging the lever or handle (12) and keeping the lever (12) itself in the position corresponding to the closed configuration of the mobile frame (2).

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FIG.1

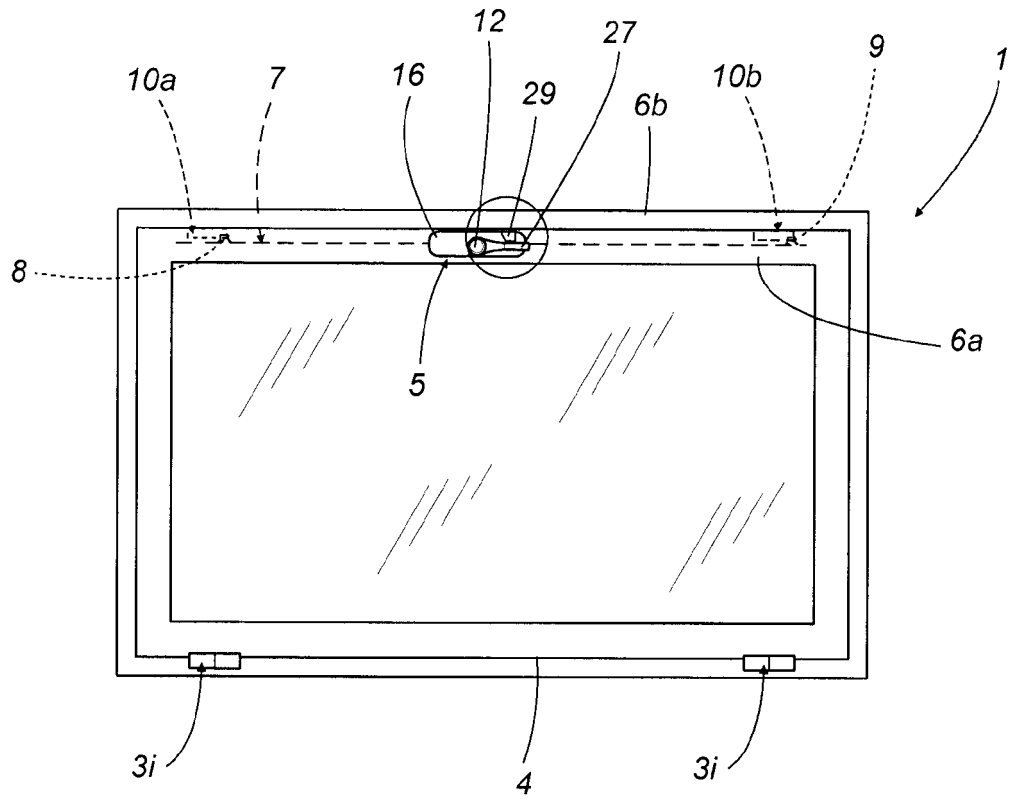


FIG.2

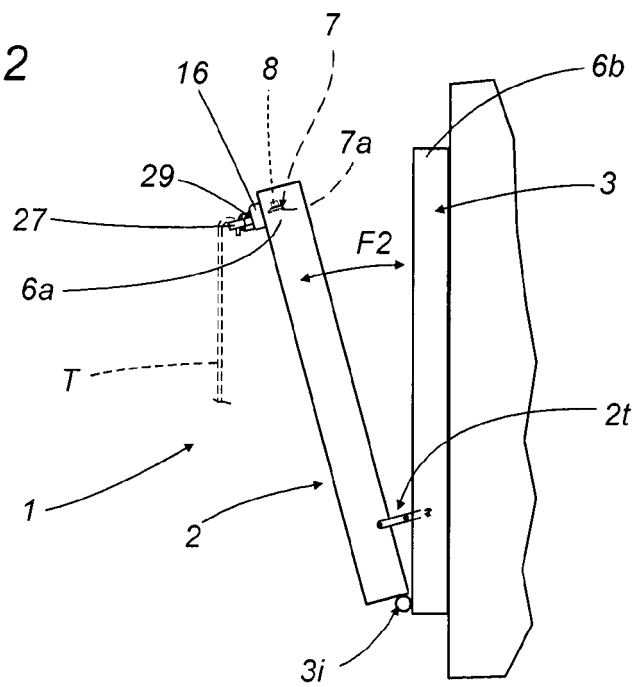


FIG.3

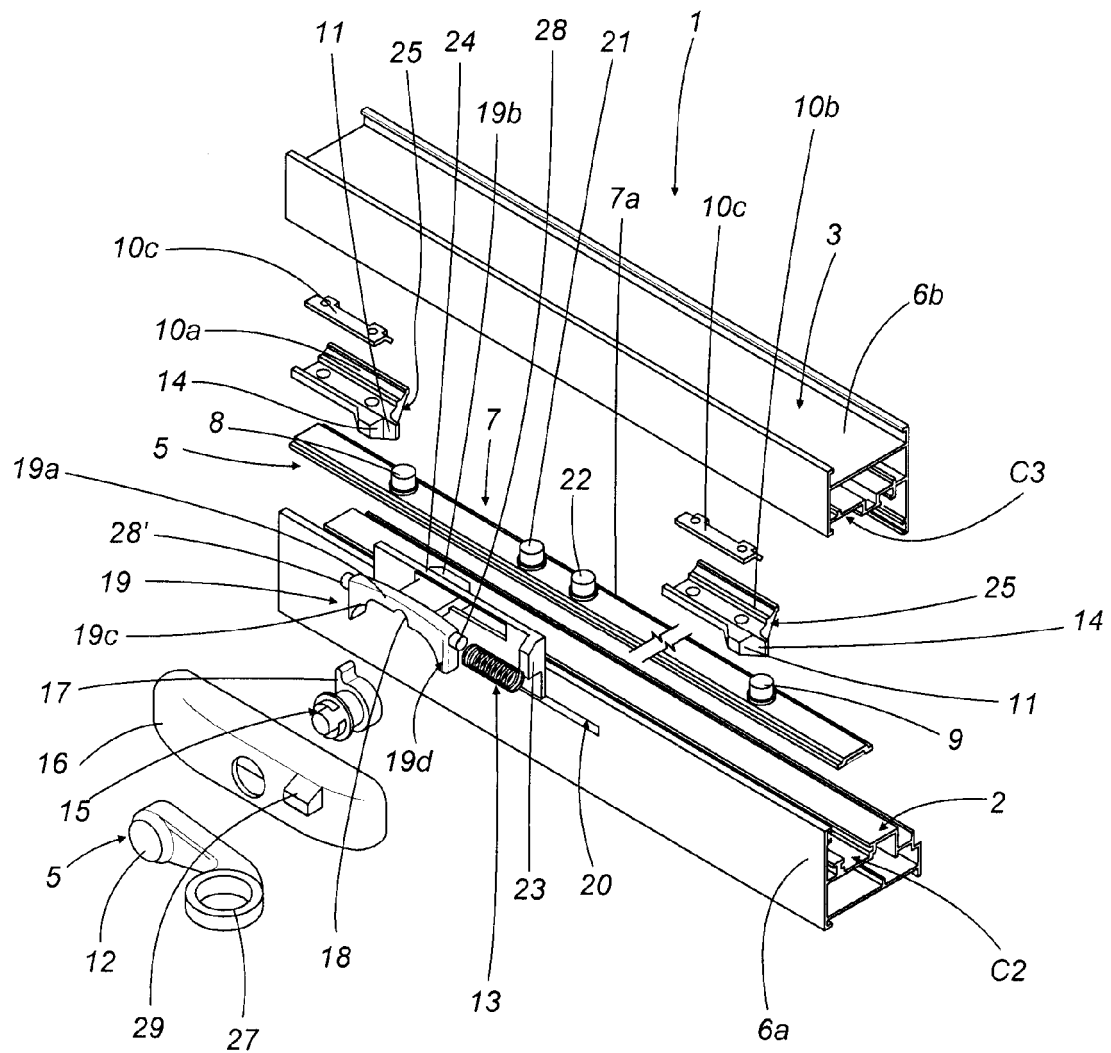


FIG.4

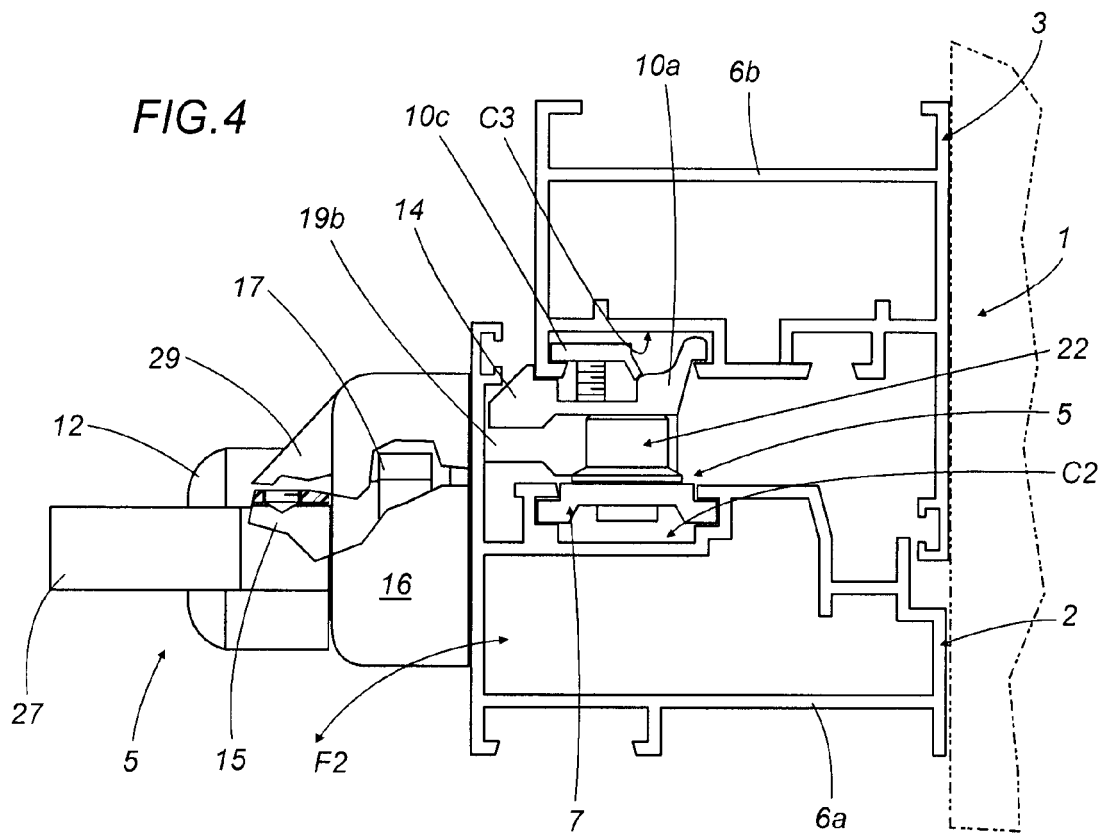


FIG.5

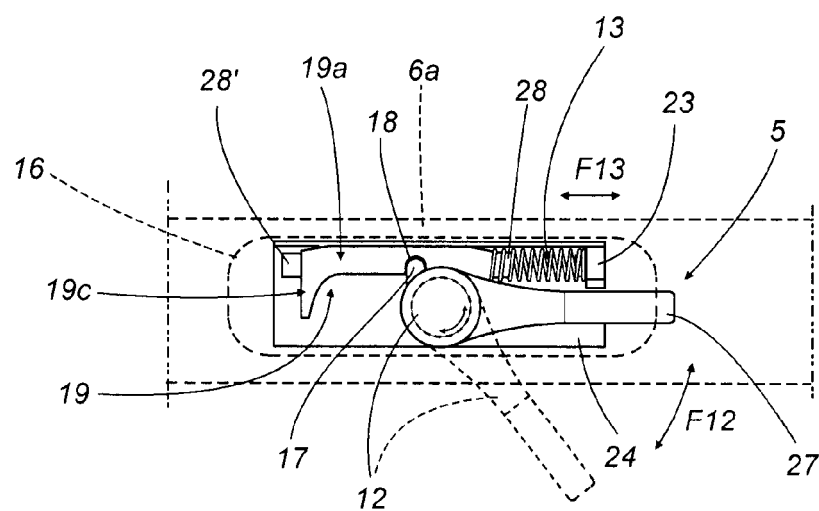


FIG.6

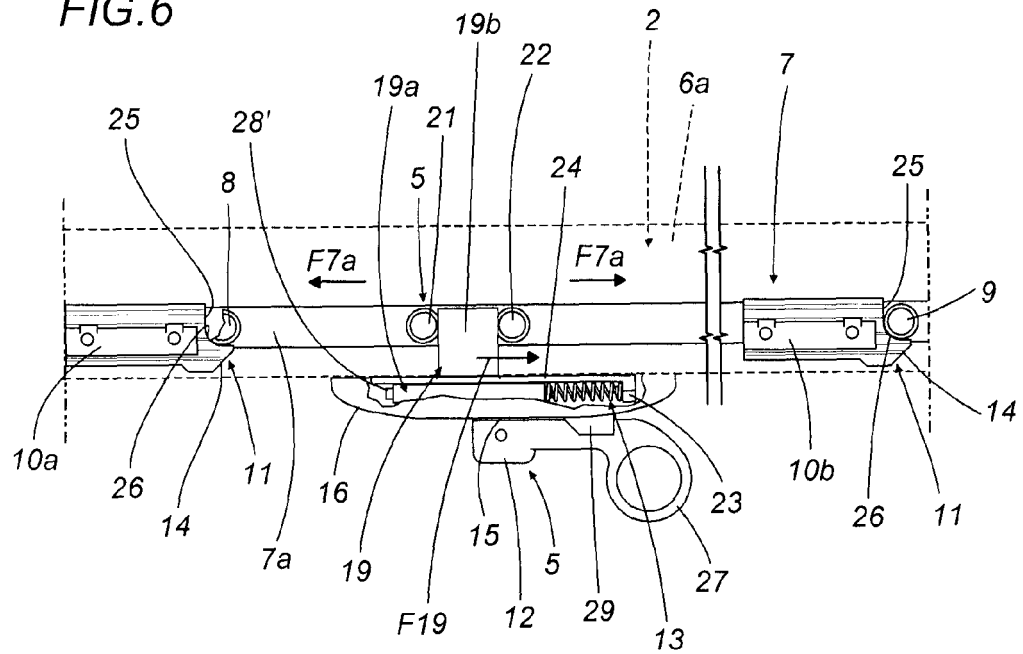
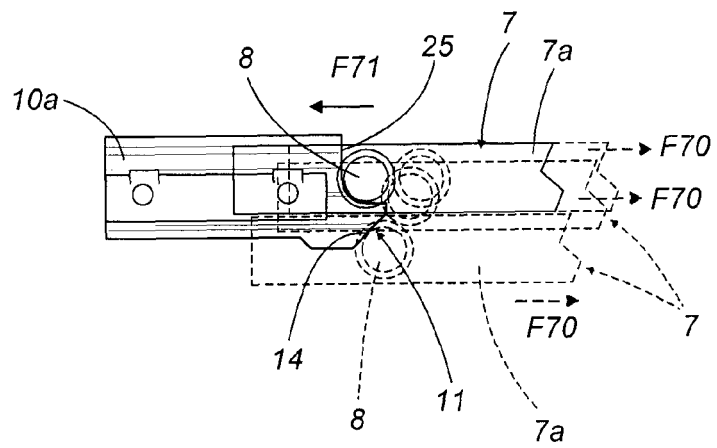


FIG.7





European Patent
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EUROPEAN SEARCH REPORT

Application Number
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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