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(54) **OPERATING MECHANISM FOR A LIFT-SLIDING DOOR AND A LIFT-SLIDING DOOR EQUIPPED WITH SUCH MECHANISM**

(57) Operating mechanism (10) for a lift-sliding door (2) with a slideable frame (6), which comprises a rotatable operating crank (11) and a mechanism (14) to convert the rotation of the rotation axis (12) of the rotatable operating crank (11) into a vertical translation of an operating bar (15), whereby the rotatable operating crank (11) and the mechanism (14) to convert the rotation to a translation are mounted on an upstanding side (13) of the slideable frame (6), such that the rotation axis of the operating crank (12) is parallel to the plane (5) of the slideable frame (6), and the rotatable operating crank (11) rotates in a plane perpendicular to the plane (5) of the slideable frame (6). The invention also relates to a lift-sliding door (2) equipped with this operating mechanism (10).

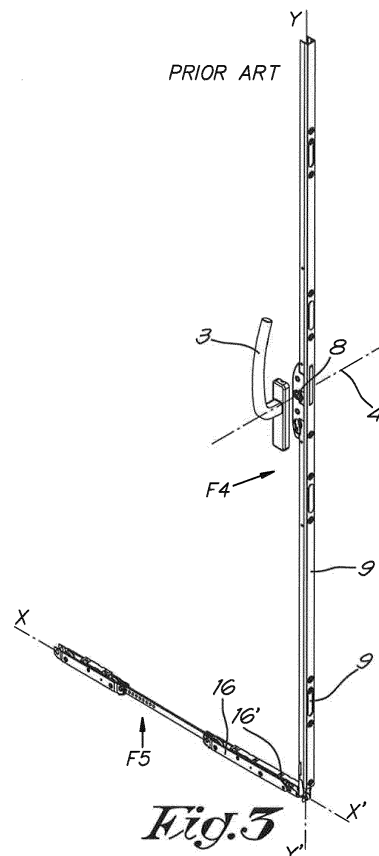


Fig. 3

Description

[0001] The present invention relates to an operating mechanism for a lift-sliding door or window and a lift-sliding door or window equipped with such mechanism

[0002] A lift-sliding door is provided with a rectangular leaf in the form of a frame containing a glass panel or the like, which is slideably or rollably mounted in a fixed frame by means of which the lift-sliding door is secured in a door aperture.

[0003] In particular the invention relates to an operating mechanism with an operating crank with which a lift-sliding door equipped with it, can be lifted and slid to open the lift-sliding door and with which the lift-sliding door can also be lowered and locked to shut the lift-sliding door.

[0004] Traditionally, such an operating mechanism uses an operating crank with a crank and a crank pin at a right angle to it, which rotates around a rotational axis perpendicular to the plane of a slideable frame that can be operated by the operating crank. The operating crank itself is hereby rotated in a plane parallel to the plane of the slideable frame and is connected to an operating bar which moves vertically up and down in a hardware groove and is itself connected to a lift mechanism of a runner on which the slideable frame rests.

[0005] The operating mechanism as such contains a crank mechanism to convert the rotational movement of the crankpin in a translation of the operating bar as well as a runner with lift mechanism that can be operated by the operating bar. By moving the operating bar with the operating crank to the highest vertical position, the lock of the lift-sliding door is unlocked and the slideable frame is lifted by the lift mechanism simultaneously, such that the underlying wheels of the runner can roll freely on or in a guide parallel to the plane of the frame, such that the slideable frame is freely slideable and can be slid open or shut.

[0006] When the operating bar is located in the lowest vertical position, the slideable frame rests on the fixed frame and the wheels of the underlying runner can no longer roll such that they can no longer be slid.

[0007] In practice, the crank rotating around an axis, perpendicular to the plane of the slideable frame, will be rotated from an upward position whereby the slideable frame is lowered and locked, to a downward position whereby the slideable frame is lifted and unlocked and the slideable frame can be moved by means of slight pressure. Hereby the crank is rotated in a plane parallel to the plane of the slideable frame.

[0008] Typically, the frame is composed of hollow profiles, for example aluminium profiles, and the operating mechanism is concealed in the hollow profiles, whereby the crank mechanism and the vertical operating bar are concealed in a vertical mullion of the slideable frame, whereas the runner with its lift mechanism is concealed in a connecting horizontal profile of the frame.

[0009] Thus, a built-in operating mechanism forms as it were an L-shaped perpendicular construction whereby

the operating bar is perpendicular to the longitudinal direction of the runner, in other words perpendicular to the running direction of the runner or thus also perpendicular to the sliding direction of the slideable frame.

[0010] A disadvantage connected to this traditional operating mechanism is the orientation of the crank mechanism which transfers the rotation of the axis by the rotating operating crank to a vertically moving operating bar and raises or lowers it vertically.

[0011] Traditionally, the crank mechanism is oriented parallel to the plane of the slideable frame itself and is built into an upstanding side of the slideable frame on the level of the rotation axis of the crank and is laterally protruding in relation to the operating bar in a direction parallel to the longitudinal direction of the runner or thus also parallel to the plane of the slideable frame. The disadvantage of this orientation is that the crank mechanism needs a wide mullion to conceal the operating mechanism, more specifically the crank mechanism, such that there is less room for the glass section and less light is allowed through and the frame also gives a less aesthetic impression because of the wide profiles of the slideable frame.

[0012] The purpose of the present invention is to provide a solution to the aforementioned and other disadvantages.

[0013] To this end, the invention relates to an operating mechanism for a lift-sliding door with a slideable frame with hollow profiles, a runner with a lift mechanism for lifting the slideable frame and intended for mounting in a horizontal profile of the frame, an operating bar that is at a right angle to the longitudinal direction of the runner and is intended for mounting in a vertical profile of the frame and which is coupled to the lift mechanism of the runner for the operation of the lift mechanism by a vertical translation of the operating bar and a crank mechanism with a swivel joint for rotation of an operating crank around the rotation axis of the swivel joint whereby the crank mechanism is coupled with the operating bar for the conversion of a rotational movement of the swivel joint to a vertical translation of the operating bar, characterised in that the crank mechanism extends in a direction perpendicular to the longitudinal direction of the runner and perpendicular to the operating bar and such that the rotation axis of the swivel joint of the crank mechanism extends parallel to the longitudinal direction of the runner.

[0014] The crank mechanism of such operating mechanism according to the invention is thus in fact rotated a quarter turn around the longitudinal axis of the operating bar in relation to the known operating mechanism.

[0015] An advantage of such an operating mechanism is that it can be built into a narrower vertical profile in an upstanding side of the slideable frame, such that there is more room for the glass section and the frame itself looks more aesthetic.

[0016] Another advantage of such an operating mechanism is that the operating crank is easier to integrate in the framing of the vertical mullion.

[0017] The vertical translation of the operating bar takes place in a hardware groove which is mounted on the upstanding side of the slideable frame, or in a hardware groove which is formed by a profiling on the inside of a profile itself, which is part of the upstanding side of the slideable frame.

[0018] The embodiment whereby the operating bar moves in a profiling on the inside of an upstanding profile is particularly advantageous as it eliminates the need to mount a fitting with a hardware groove. The uncoupling of the crank mechanism and the vertical operating bar also makes it easier to choose the height of the crank more freely.

[0019] The profiling on the inside that serves as hardware groove, consists of two metal profiles and an intermediate third part made of plastic, that ensures a thermal break between the side facing outward and the side facing inward of the slideable frame.

[0020] Preferably, the operating bar only comes into contact with plastic on the inside of the profile, such that no thermal bridge can be formed.

[0021] The operating bar itself is connected with a lift mechanism of a runner on which the slideable frame rests. In its highest vertical position, the operating bar pulls the lift mechanism upward, whereby the sliding window is lifted and the wheels of the runner, on which the sliding window rests, can roll freely. In this position the sliding window can be moved to shut or open it.

[0022] In its lowest vertical position, the operating bar pushes the lift mechanism downward, whereby the slideable frame is lowered, and is locked in this position and the wheels of the runner can no longer roll. Such lift mechanisms and runners belong to the known state of technology.

[0023] The operating bar can also serve to lock the slideable frame with an adjacent fixed or movable frame in closed condition. To this end, the operating bar is provided with protrusions, respectively recesses that can co-operate with recesses, respectively protrusions in the adjacent frame such that the two frames interlock when lowering the first frame which is provided with an operating crank.

[0024] This invention also relates to a lift-sliding door that is equipped with the operating mechanism according to the invention.

[0025] The invention also relates to a lift-sliding door with a slideable frame that has been slideably mounted in a fixed frame and which is built of hollow profiles, whereby the slideable frame is provided with an operating mechanism as described and whereby the runner is concealed in a horizontal profile of the slideable frame to support the slideable frame and whereby the connected operating bar with the crank mechanism is concealed in a vertical profile of the slideable frame.

[0026] With the intention of better showing the characteristics of the invention, a few preferred embodiments of an operating mechanism for a lift-sliding door according to the invention and a lift-sliding door equipped with

such mechanism are described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

- 5 figure 1 shows a perspective view of a slideable frame of a traditional lift-sliding door;
- figure 2 shows a frontal view according to arrow F2 of the frame of figure 1;
- figure 3 shows a perspective view of the part indicated in figure 1 with F3;
- 10 figures 4 and 5 show a frontal and a bottom view according to arrows F4 and F5 of the operating mechanism of figure 3;
- figure 6 shows a cross-section according to line VI-VI in figure 2;
- 15 figures 7 to 11 are analogue figures to those of the figures 1 to 5, but for an operating mechanism and lift-sliding door according to the invention;
- figure 12 shows a cross-section according to line XII-XII in figure 8 for a lift-sliding door according to the invention;
- figure 13 shows a top view of the operating mechanism of figure 9 provided with a mounted operating crank;
- 25 figure 14 shows a component of figure 4 indicated with F14 on a larger scale;
- figure 15 schematically shows a cross-section of a variant embodiment of figure 12;
- figure 16 shows an alternative mounting of an operating crank on the operating mechanism of figure 9.
- 30

[0027] Frame 6 shown in figure 1 is a slideable rectangular frame of a lift-sliding door 2 with a traditional operating mechanism 1 as shown in figures 3 to 5 to open the lift-sliding door 2 by unlocking the frame 6 and sliding this frame 6 in a fixed frame (not shown) with which the lift-sliding door 2 is mounted in a door aperture.

[0028] To open, the frame 6 is slid open in the direction of arrow O.

40 **[0029]** Figure 3 shows an operating mechanism 1 of a lift-sliding door 2 according to the known state of the art that is provided with a rotatable operating crank 3, the rotation axis 4 of which is perpendicular to the plane 5 of the lift-sliding door 2 operated with it.

45 **[0030]** The slideable frame 6 is made up of vertical profiles 6' and horizontal profiles 6'' that are hollow and in which the aforementioned operating mechanism 1 is concealed.

[0031] In the example shown in figure 3, the operating mechanism 1 contains two connected runners 16 on which the frame 6 rests and which is provided with a lift mechanism 16' to lift the frame 6 in order to unlock the frame from the fixed frame and to slide or roll it in the fixed frame in the running direction X-X' of the runners 16.

55 **[0032]** The runners 16 are concealed in the bottom horizontal profile 6''.

[0033] For the operation of the lift mechanism 16', a crank mechanism 8 is provided, which is located at a

certain height in a vertical profile 6', in front of an operating crank 3 and an operating bar 9 which connects the crank mechanism 8 with one of the runners 16.

[0034] In this case the operating bar 9 is slideably enclosed in a guiding profile 9' that is attached against the profile 6'.

[0035] The crank mechanism 8 and the operating bar 9 and the guiding profile 9' are concealed in a vertical profile 6'.

[0036] In the example, the operating crank 3 is provided with a crank pin which is coupled via an opening in the front of the vertical profile 6' with a swivel joint 8' of the crank mechanism 8 which is provided with a hole 8" that is not round in which the crank pin can be fittingly enclosed.

[0037] The swivel joint 8' and the fitting crank pin are rotatable around a horizontal rotation axis 4 perpendicular to the longitudinal direction of the runners 16 or thus perpendicular to the running direction X-X' of the runners 16 and perpendicular to the longitudinal direction Y-Y' of the operating bar 9.

[0038] In this known embodiment, the crank mechanism 8 extends to the left of the operating bar 9 and, including the operating bar 9 coupled thereto and possible guiding profile 9', it has a length D measured perpendicular to the rotation axis 4. The crank mechanism 8 extends with its length parallel to the longitudinal direction X-X' of the runners 16.

[0039] On the level of the rotation axis 4 of the operating crank 3, the width B of the slideable frame 6 covers the crank mechanism 8 and operating bar 9 over the length D to convert the rotation of the rotation axis 4 of the rotatable operating crank 3 into a vertical translation of an operating bar 9 in the direction Y-Y' which is connected with a runner 16 under the slideable frame 6. In view of the relatively large width of the crank mechanism 8 in a direction perpendicular to the rotation axis 4, a profile 6' is necessary with a relatively large width B to be able to conceal the crank mechanism 8 lengthways D.

[0040] Figure 7 and 8 show a slideable frame 6 of a lift-sliding door 1, according to the invention, with an operating mechanism 10, according to the invention, as shown in the figures 9 to 11.

[0041] The operating mechanism 10 according to the invention differs chiefly from the operating mechanism 1 of the figures 3 to 5 in the fact that according to the invention, the crank mechanism 14 extends lengthways D in a direction perpendicular to the longitudinal direction X-X' of the runners 16 and perpendicular to the longitudinal direction Y-Y' of the operating bar 15, i.e. perpendicular to the plane X-X' / Y-Y', and such that the rotation axis 12 of the swivel joint 14' of the crank mechanism 14 extends parallel to the longitudinal direction X-X' of the runners 16.

[0042] As appears from the perpendicular projection of the operating mechanism 10 on a plane that extends perpendicular to the operating bar 15, the crank mechanism 14 in this case protrudes forward in relation to the

projected silhouette of the runners 16 and operating bar 15.

[0043] On the level of the rotation axis 12 of the operating crank 11, the width C of the upstanding front 13 of the vertical profile 6' of the slideable frame 6 covers the crank mechanism 14 in its width E to be able to convert the rotation of the rotation axis 12 of the rotatable operating crank 11 to a vertical translation of an operating bar 15 that is connected with a runner under the slideable frame 6.

[0044] Comparison of the figures 6 and 13 shows that the invention allows a vertical profile 6' to be provided with a width C that is considerably smaller than the corresponding width B of a profile 6' of a known lift-sliding door.

[0045] In this case the operating crank 3 is attached on the inside of the frame 6, more specifically on the side 22 facing the glass 7 of the vertical profile 6' of the frame 6, whereby the operating crank 3 is coupled through an opening in this side 22 with the swivel joint 14' of the crank mechanism 14.

[0046] As is clear from figure 16, the operating crank 3 can alternatively also be mounted on the opposite outer side 22' of the vertical profile 6'.

[0047] The cross-section of figure 12 also shows that in this case the operating bar is located behind the crank mechanism seen from a direction perpendicular to the X-X' / Y-Y' plane.

[0048] Figure 13 shows a top view of figure 9, with a surface-mounted operating crank 13, whereby the location of the operating bar 15 in the profile 6' of the slideable frame 6 is visible, as is the location of a carriage 17, which is connected in a fixed way to the operating bar 15 and transfers its movement to the runner 16.

[0049] Figure 14 shows a detail indicated in figure 13 as F15 on a larger scale, with the operating mechanism 10 according to the invention consisting of the rotatable operating crank 11, the rotation axis 12 of which is coupled to a mechanism 14 to convert the rotation of the rotation axis to a vertical translation of the operating bar 15 which by means of an carriage 17 attached thereto, lifts or lowers a hinged attachment 18. This hinged attachment 18 is hingeably connected with underlying hinged links 19 of the runner 16.

[0050] Figure 15 shows a cross-section of a variant embodiment of the operating mechanism 10 according to the invention on the level of the rotation axis 12 of the operating crank 11, whereby the structure and profile composition of the upstanding side 13 of the slideable frame 6 are shown in more detail. The upstanding side 13 is composed of an outer metal profile 20 and an inner metal profile 21, which are held together by two thermally insulating spacers 23, 24 made of plastic, whereby a protruding section 20' of the outer metal profile 20, and a protruding section 21' of the inner metal profile 21, together with the thermally insulating spacer 23 form a guide for the operating bar 15 which is vertically moved by a lifter 25 which is connected with the operating bar

25 by means of a fixed connection.

[0051] The lifter 25 is moved by the mechanism 14 that converts the rotation of the rotatable operating crank 11 to a vertical translation of the operating bar 15. The inner metal profile 20 is provided with a hooking attachment 27 which clamps a rubber seal 28 against the outer glass panel 7a. The inner glass panel 7a is also held by a rubber seal 29 which is clamped between the inner metal profile 21 and the glass. The outer glass panel 7a and the inner glass panel 7b of the glass section are kept apart by a gas-tight spacer 30.

[0052] The invention also relates to a lift-sliding door 2 with a slideable frame 6 provided with an operating mechanism 10 according to one of the described embodiments whereby the operating mechanism 10 is mounted in a upstanding side 13 of the slideable frame 6 of the lift-sliding door 2 and the operating bar 5 is vertically movable in this upstanding side 13 of the slideable frame 6 of the lift-sliding door 2.

[0053] The present invention is by no means limited to the embodiments described as an example and shown in the figures, but an operating mechanism for a lift-sliding door according to the invention and a lift-sliding door equipped with such mechanism can be realised in all kinds of forms and dimensions without departing from the scope of the invention, as is described in the following claims.

Claims

1. Operating mechanism 10) for a lift-sliding door (2) with a slideable frame (6) with hollow profiles, a runner with a lift mechanism for lifting the slideable frame and intended for mounting in a horizontal profile of the frame, an operating bar that is at a right angle to the longitudinal direction of the runner and is intended for mounting in a vertical profile of the frame and which is coupled to the lift mechanism of the runner for the operation of the lift mechanism by a vertical translation of the operating bar and a crank mechanism with a swivel joint for rotation of an operating crank around the rotation axis of the swivel joint, whereby the crank mechanism is coupled with the operating bar for the conversion of a rotational movement of the swivel joint to a vertical translation of the operating bar (15), **characterised in that** the crank mechanism extends in a direction perpendicular to the longitudinal direction of the runner and perpendicular to the operating bar and such that the rotation axis (12) of the swivel joint of the crank mechanism extends parallel to the longitudinal direction of the runner.
2. Operating mechanism (10) according to claim 1, **characterised in that**, in a perpendicular projection of the operating mechanism (10) on a plane that extends perpendicularly to the operating bar, the crank

mechanism protrudes in relation to the projected silhouette of the runner and operating bar.

3. Operating mechanism (10) according to claim 1 or 2, **characterised in that** it is provided with a guiding profile with a hardware groove for mounting in a vertical profile of the slideable frame and intended for guiding the operating bar in the hardware groove.
4. Operating mechanism (10) according to any one of the previous claims, **characterised in that** seen in a cross-section view, the operating bar is located behind the crank mechanism seen from a direction perpendicular to the longitudinal direction of the runner and to the longitudinal direction of the operating bar.
5. Lift-sliding door (2) with a slideable frame (6) that has been slideably mounted in a fixed frame and is built of hollow profiles, **characterised in that** the slideable frame is provided with an operating mechanism (10) according to one of the previous claims, whereby the runner is concealed in a horizontal profile of the slideable frame (6) to support the slideable frame and whereby the connected operating bar with the crank mechanism are concealed in a vertical profile of the slideable frame. (6).
6. Lift-sliding door according to claim 5, **characterised in that** the crank mechanism is provided with a crank on the inside or the outside of the vertical profile in which the crank mechanism is mounted and which through an opening in this side is coupled with the swivel joint of the crank mechanism.
7. Lift-sliding door according to claim 5 or 6, **characterised in that** the operating bar (5) is slideably mounted in a hardware groove of the vertical profile of the slideable frame (6) or in a hardware groove of a guiding profile which is mounted in the vertical profile of the slideable frame (6).
8. Lift-sliding door according to any one of the claims 5 to 7, **characterised in that** the hardware groove which is formed on the inside of profiles (20, 21), consists of two metal profiles (20, 21), each provided with a protruding section (20', 21') and an intermediate part made of plastic (23), which together with another intermediate part made of plastic (24) ensures a thermal break between the side facing outward (20) and the side facing inward (21) of the slideable frame (13).
9. Lift-sliding door according to any one of the claims 5 to 8, **characterised in that** the operating bar (15) also serves to lock the slideable frame with an adjacent fixed or slideable frame in closed condition.

PRIOR ART

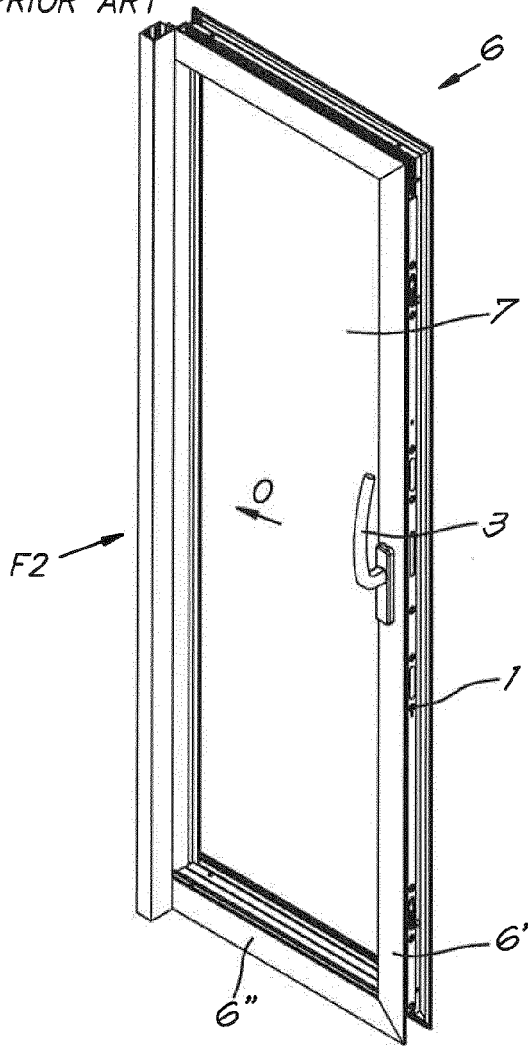


Fig. 1

PRIOR ART

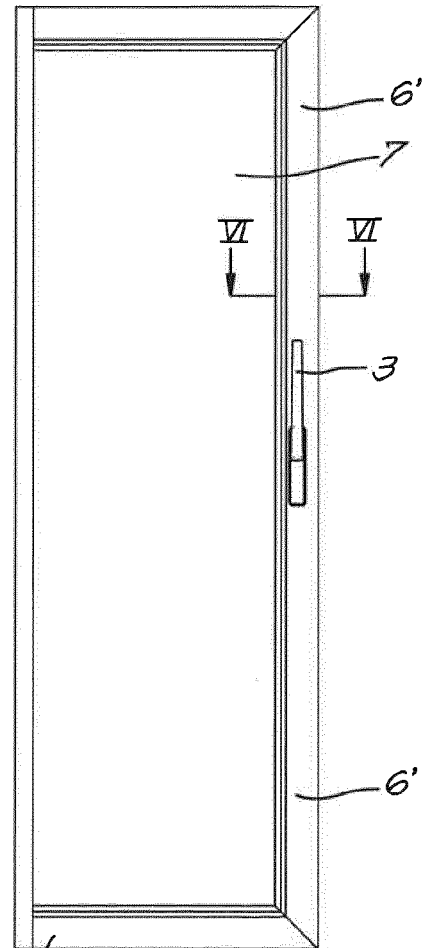
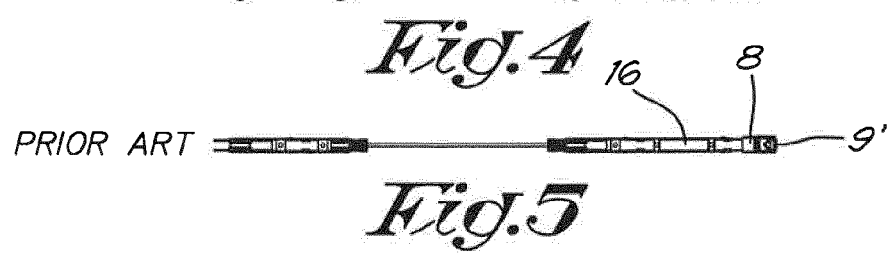
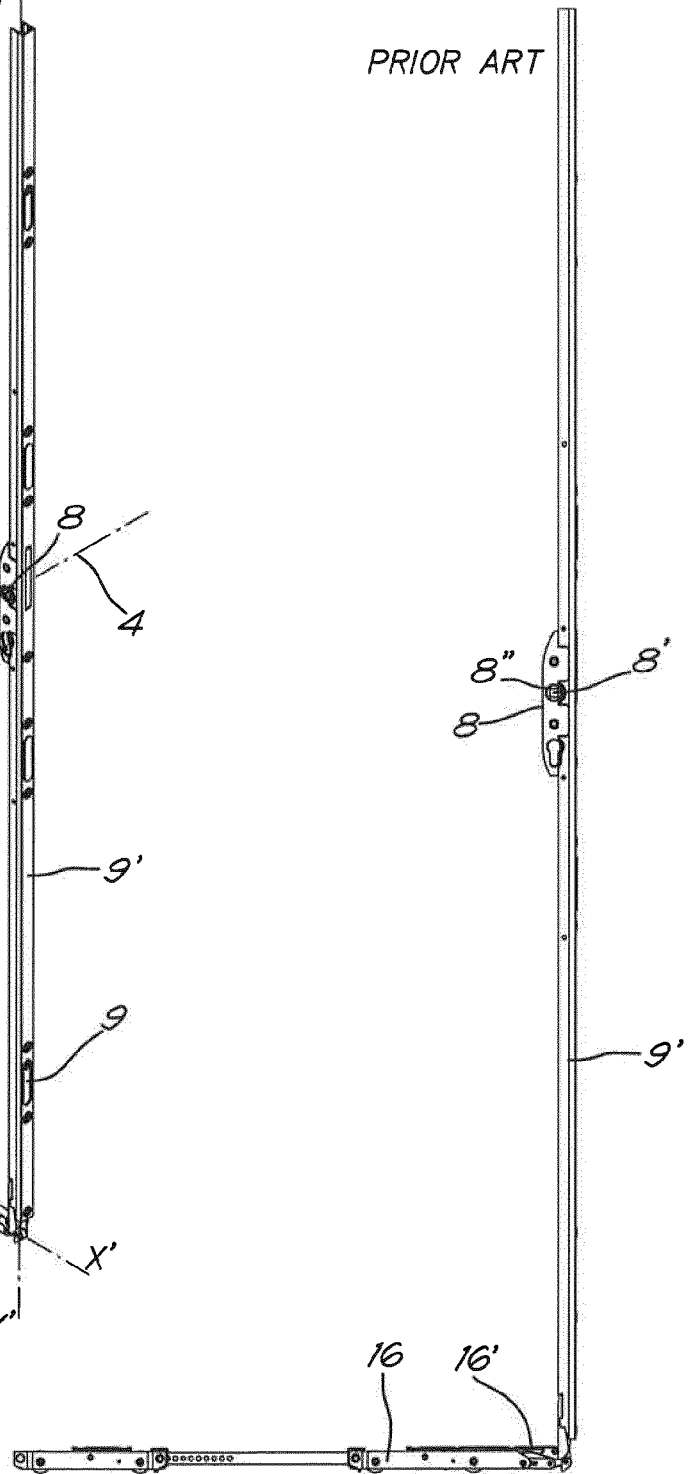
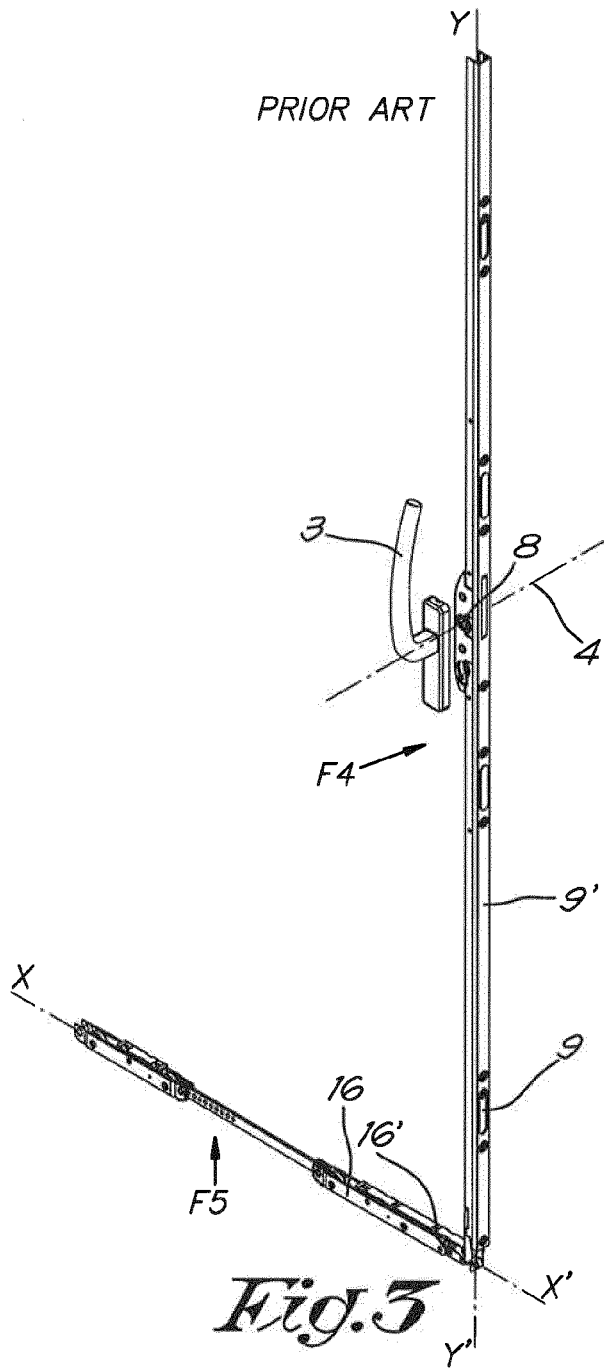


Fig. 2



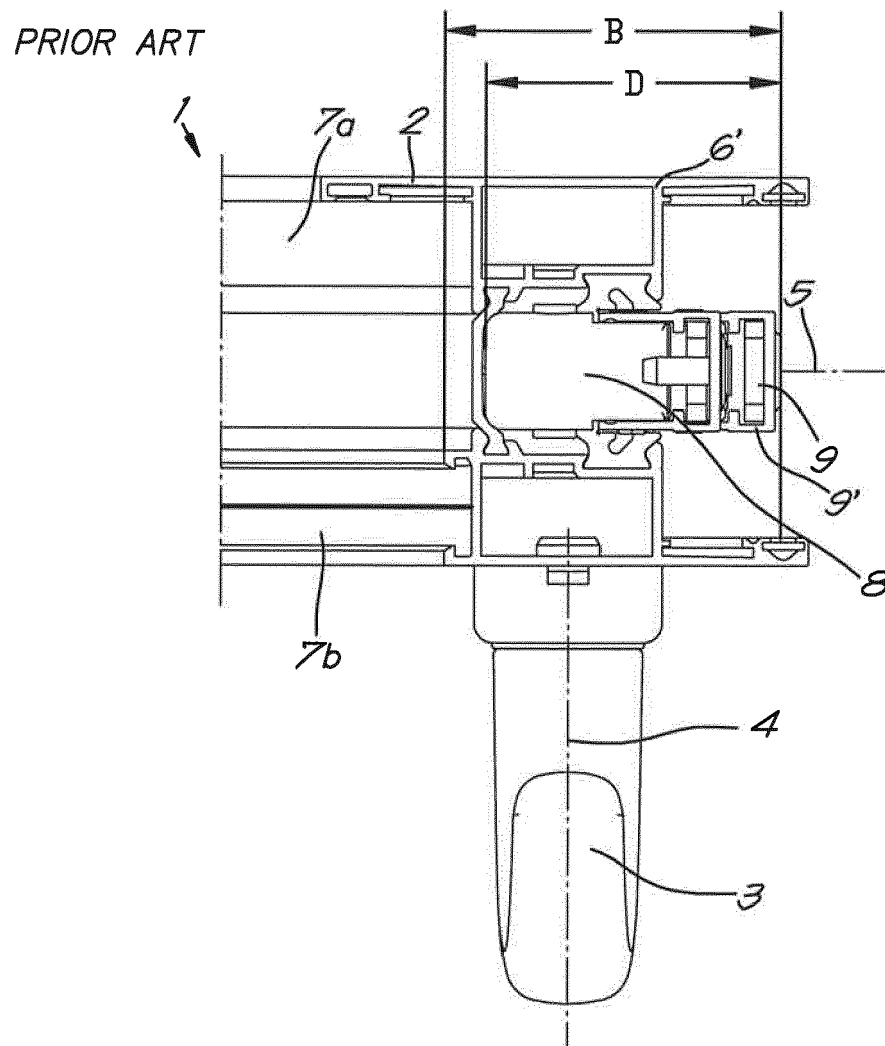


Fig.6

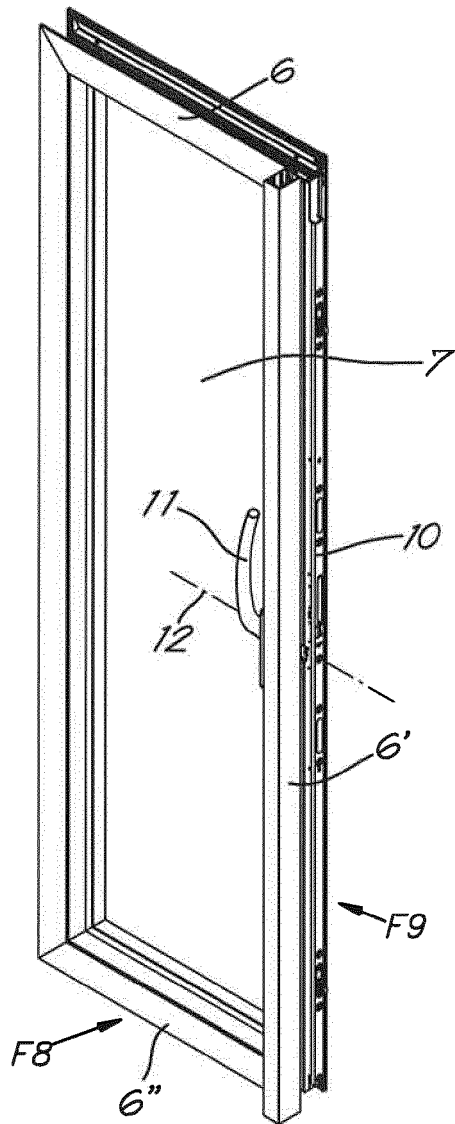


Fig. 7

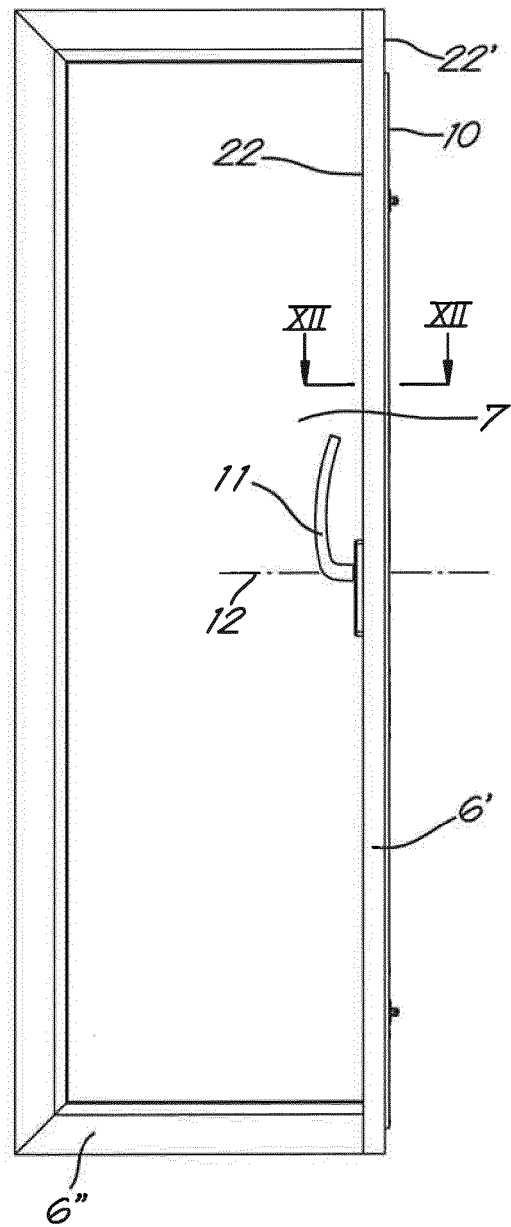


Fig. 8

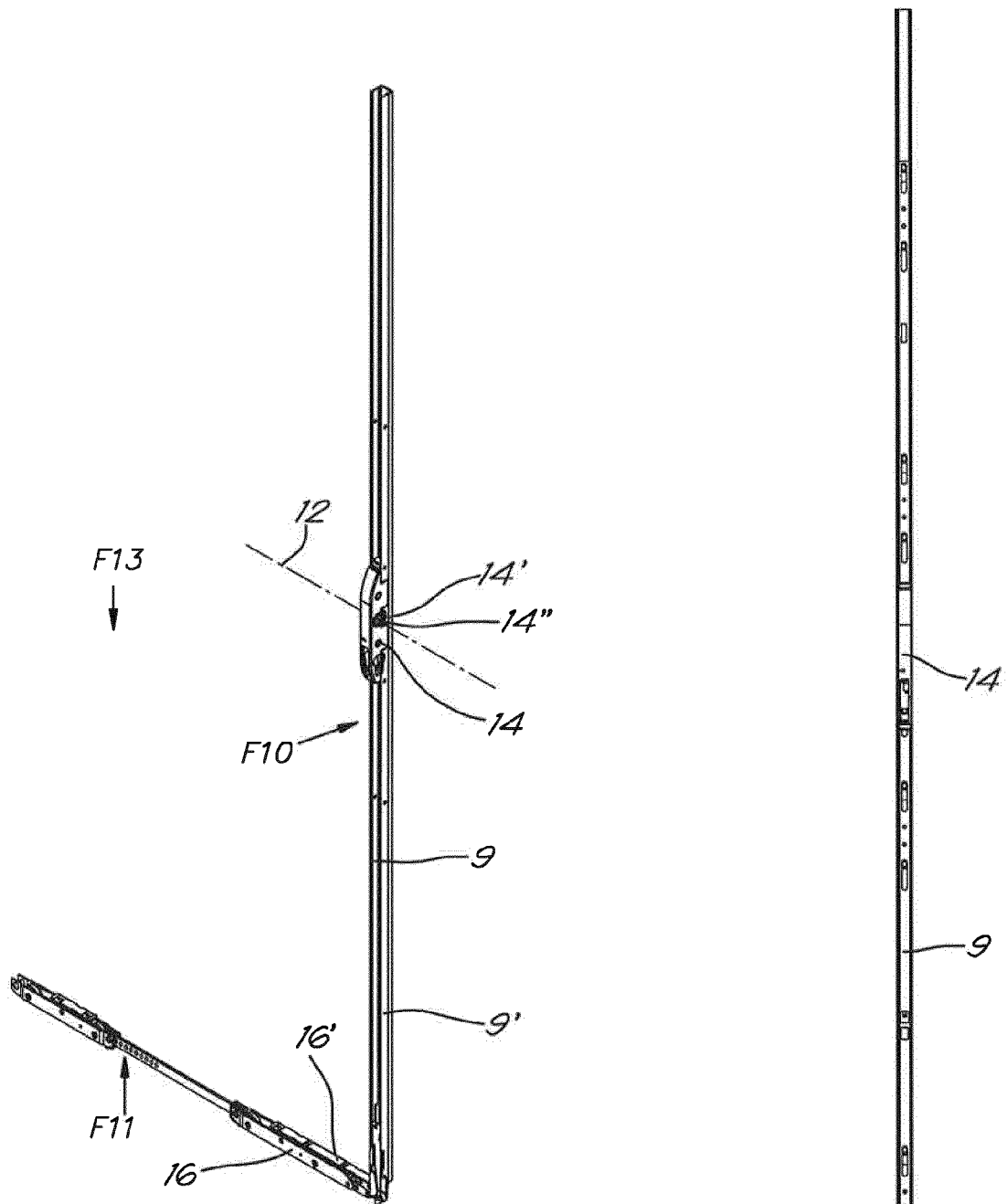


Fig. 9

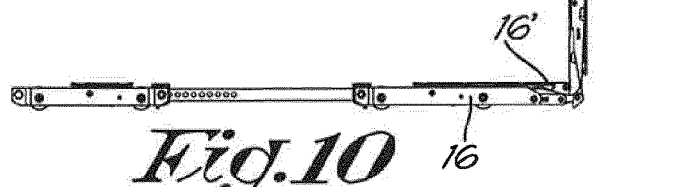


Fig. 10

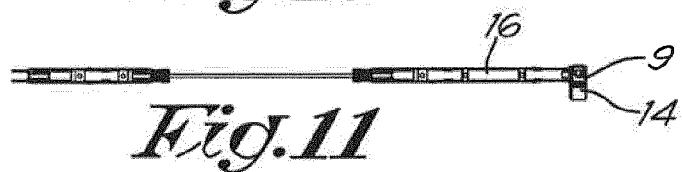


Fig. 11

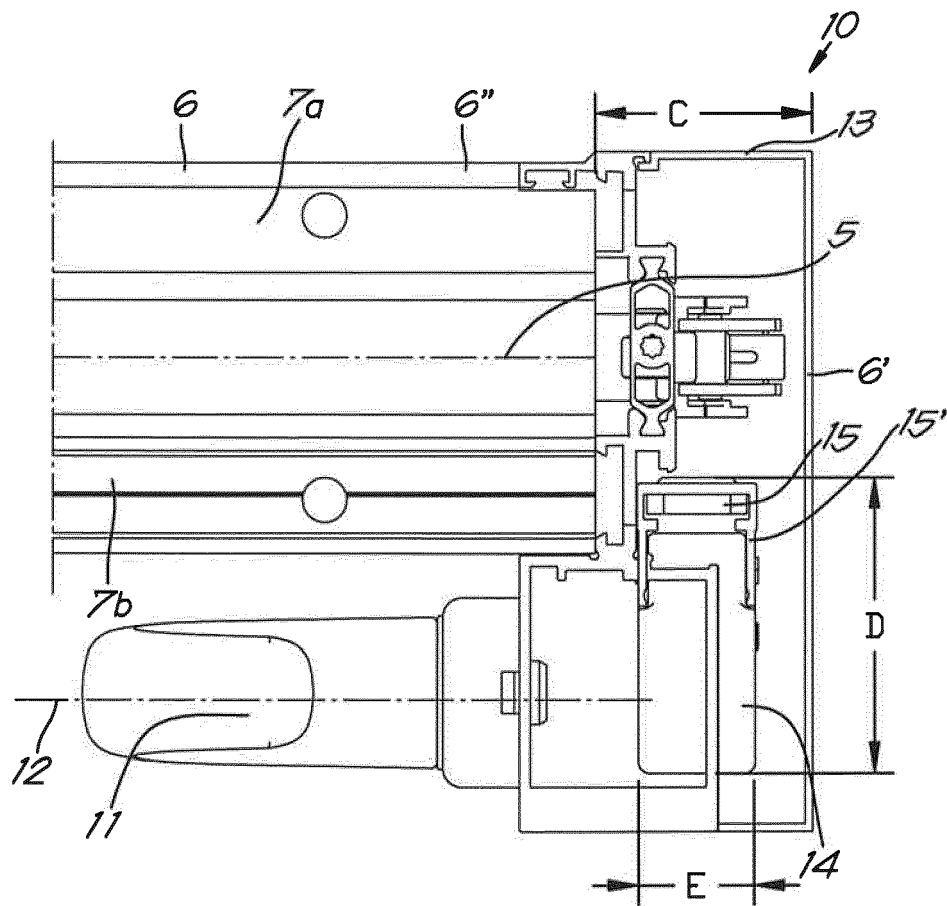


Fig. 12

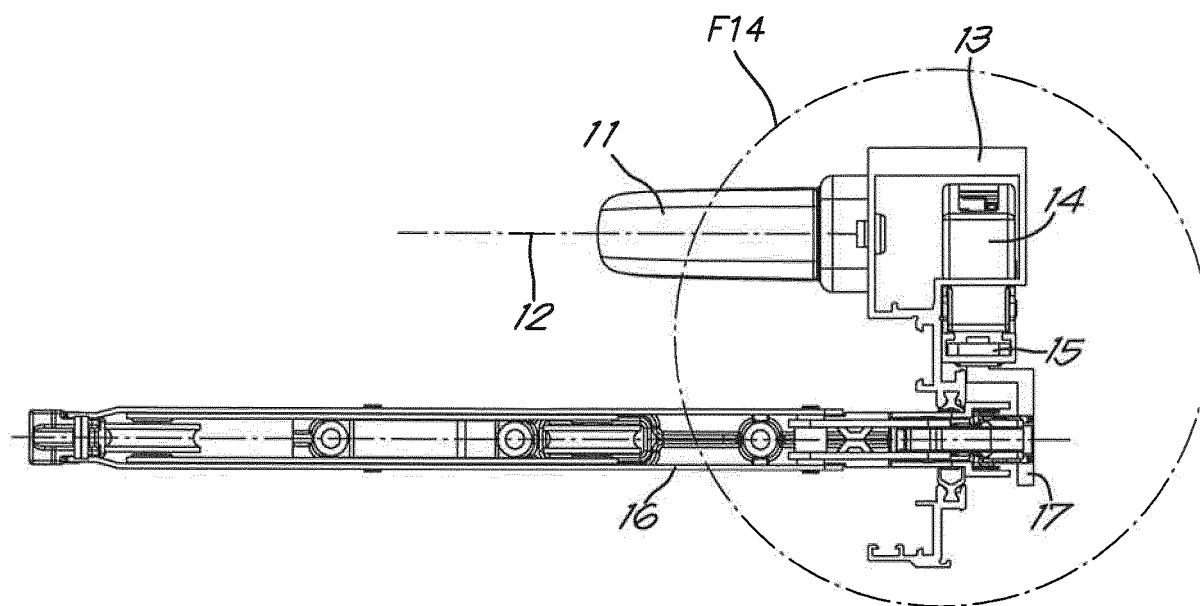


Fig. 13

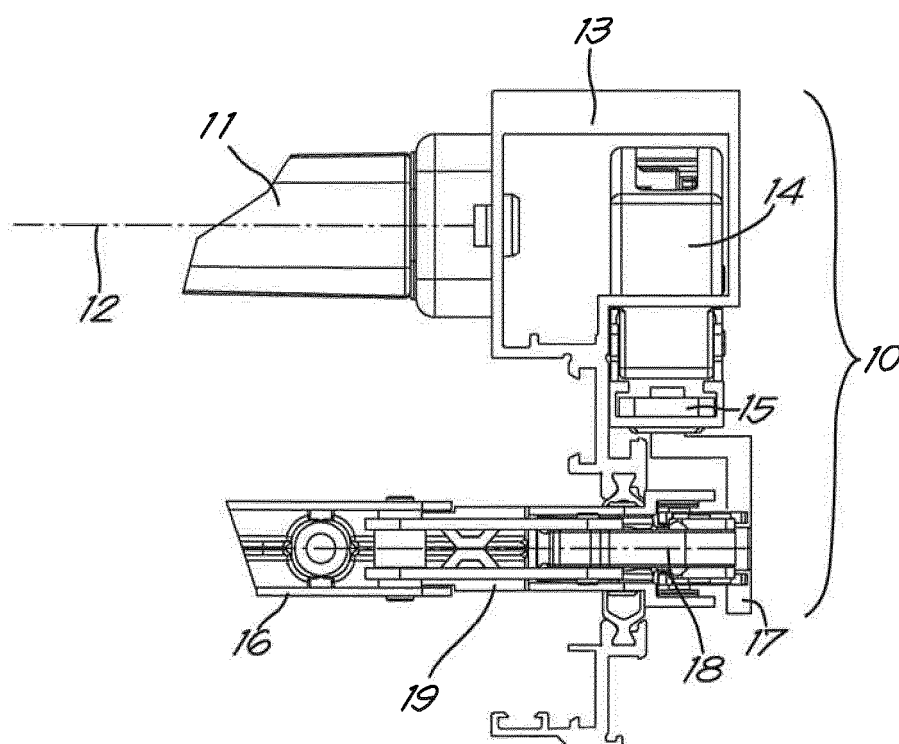


Fig. 14

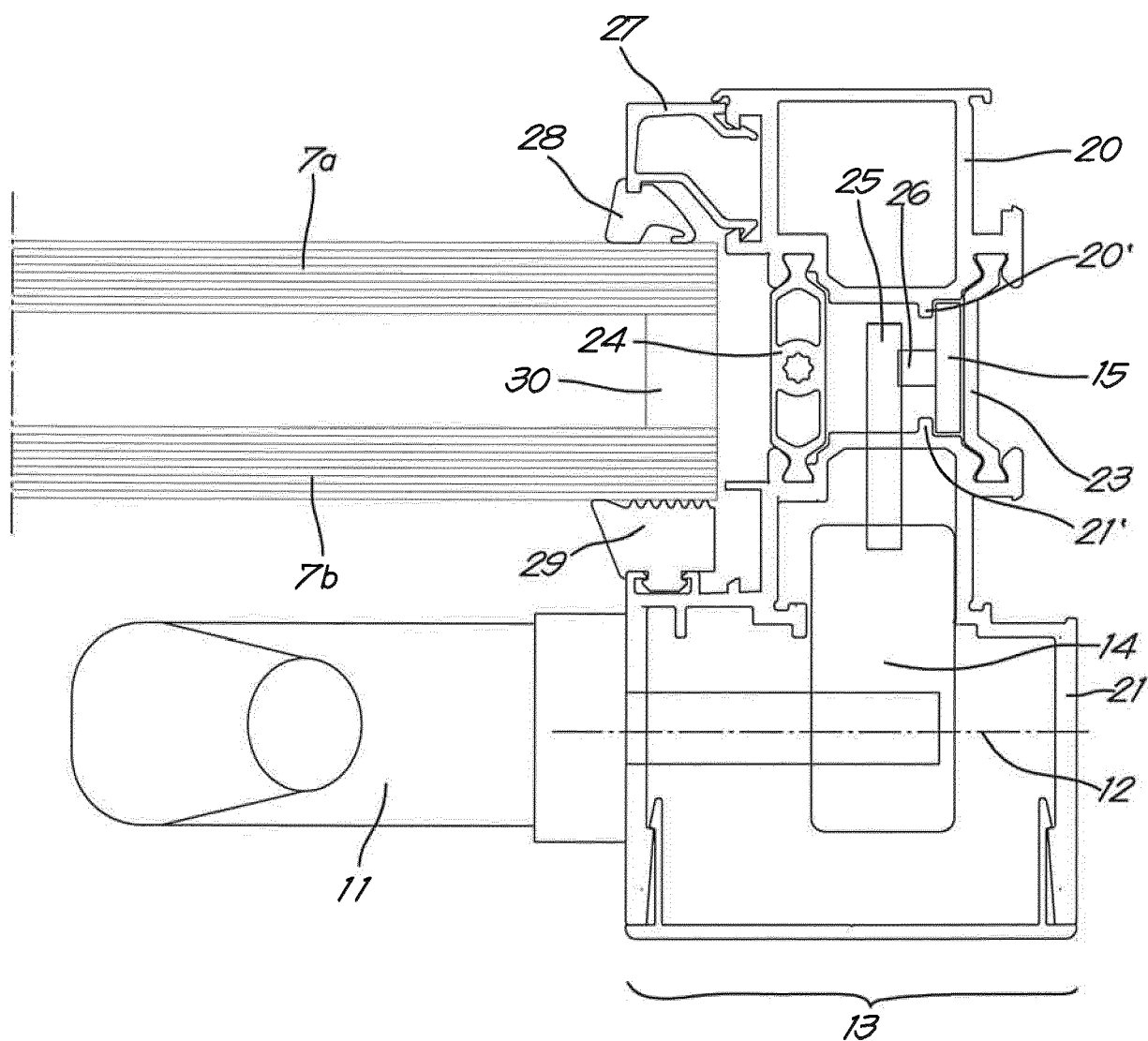
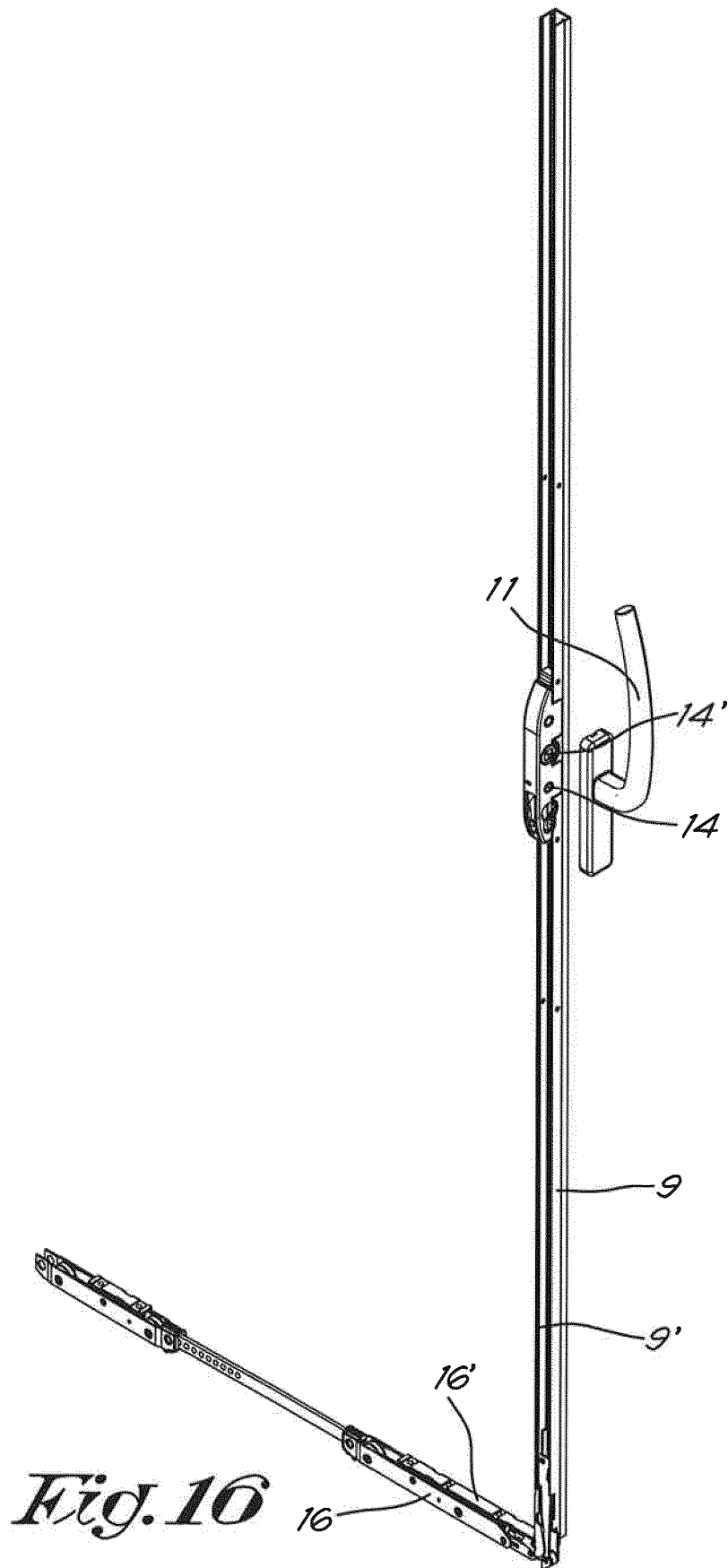


Fig. 15





EUROPEAN SEARCH REPORT

 Application Number
 EP 19 17 8505

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 September 2019	Examiner Hellberg, Jan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 19 17 8505

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