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(54)

WINDOW OR DOOR INCLUDING A LOCKING SYSTEM

(57)

The window or door includes a locking system with a locking rod (5) arranged in a window sash or door leaf and being displaceable by rotation of an operating handle whereby locking pawls move between locked and unlocked positions. The locking system includes at least one spring element (9) arranged to be loaded in the unlocked position. The spring element abuts a displaceable bracket (14) connected to a slideable rod (24) arranged

in parallel to the locking rod and at a distance from the locking rod in a transverse direction of the locking rod. The slideable rod is connected to the locking rod by means of a connecting piece (25) extending in said transverse direction so that the locking rod with locking pawls and operating handle is arranged inside a sealing plane of the window sash, and the displaceable bracket with associated spring is arranged outside said sealing plane.

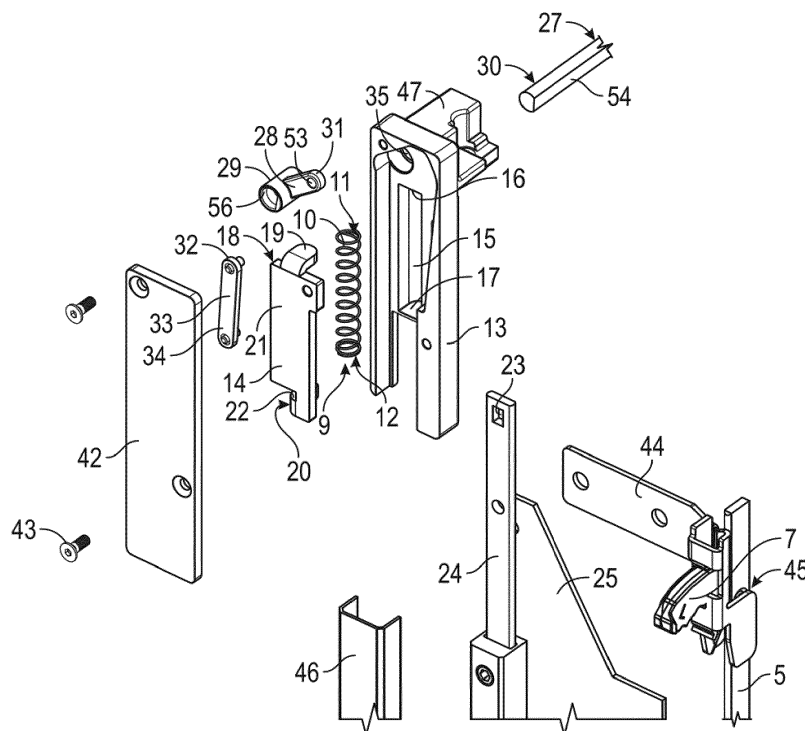


FIG. 8

Description

[0001] The present invention relates to a window or door including a window sash or door leaf arranged movable in a frame between an open position and a closed position and a locking system including a locking rod arranged displaceably in its longitudinal direction in the window sash or door leaf, wherein the locking rod is displaceable by rotation of a pivotal operating handle, wherein a number of locking pawls are movable between a locked position and an unlocked position upon displacement of the locking rod, so that, when the window sash or door leaf is in its closed position and the operating handle is in a locked position, the locking pawls are in their locked position and engage corresponding respective striking plates arranged on the frame, and when the operating handle is in an unlocked position, the locking pawls are in their unlocked position out of engagement with said striking plates, wherein, when the operating handle and the locking pawls are in their unlocked positions, the locking system has a static friction which has to be overcome in order to bring the operating handle and the locking pawls away from their unlocked positions, wherein the locking system includes at least one spring element arranged to be loaded to a maximum load when the operating handle and the locking pawls are in their unlocked positions and adapted to unload at least to a minimum load when the operating handle and the locking pawls are brought to their locked positions, wherein the at least one spring element is arranged to unload gradually from the beginning to the end of the rotation of the operating handle from the unlocked to the locked position, wherein the spring load of the at least one spring element in the unlocked position of the operating handle and the locking pawls is lower than the spring load that would be necessary to overcome said static friction of the locking system in the unlocked position without a user operating the pivotal operating handle, wherein the at least one spring element has the form of a coiled spring, wherein a first end of the coiled spring is connected with the locking rod and a second end of the coiled spring is connected with a housing of the locking system, wherein the coiled spring is a compression spring, wherein the first end of the coiled spring abuts a displaceable bracket connected with the locking rod and the second end of the coiled spring abuts a part of the housing of the locking system, wherein the coiled spring is arranged in a longitudinal groove in the housing of the locking system, wherein the longitudinal groove has a first end wall and an opposed second end wall, wherein the second end of the coiled spring abuts the second end wall of the longitudinal groove, and wherein the first end of the coiled spring abuts a first end of the displaceable bracket.

[0002] EP 0 801 194 B1 discloses a sliding door multi-point lock comprising several bolts connected to metal rods which slide linearly in guide structures on a door side member by displacement of a central bolt. Each locking bolt is inserted in a block which is firmly connected

to the rods. The blocks can be displaced linearly against a spring which is compressed by displacement of the plates corresponding to opening of the door.

[0003] EP 2 295 678 B1 discloses a locking system for a window or door including a displaceable locking rod adapted to tension a number of springs when displaced away from its locking position. In the unlocked position of the locking rod, the springs are trapped in their tensioned state and are not released before the locking rod is displaced towards its locking position by means of an operating handle. In an embodiment, the springs are arranged tiltably between the locking rod and a housing so that, in the unlocked position of the locking rod, the springs are oriented with their longitudinal axes at right angles to the locking rod. In this orientation, the springs are trapped in their compressed state and are not able to release their spring force before they are rotated to an angular position in which their longitudinal axes are obliquely arranged to the locking rod. However, although the springs may provide the entire force necessary for the last part of the locking operation, a rather large initial force may be required by the user in order to overcome the static friction of the locking system and initiate the locking operation. Moreover, this kind of release system is rather bulky and may be difficult to incorporate into many contemporary window sashes.

[0004] EP 3 144 456 A1 discloses a locking system for a door in which a spring is tensioned when a locking rod is displaced away from its locking position. In the open position of the door, a release mechanism maintains the locking rod in this tensioned position, until the door is closed, whereby a pawl is depressed when reaching a striking plate and activates the release mechanism. Thereby, the spring force is released and displaces the locking rod to its locking position. This system is therefore specifically adapted to lock the door when it reaches its fully closed position and cannot be used to assist the user when operating the handle in the open position of the door, for instance if a door brake is arranged to arrest the door in an open position by operation of the handle.

[0005] EP 2 287 426 B1 discloses another locking system for a door in which a spring may be tensioned and subsequently released in order to displace a locking rod. The system includes a release mechanism which may be operated to release the spring or prevent release of the spring.

[0006] EP 0 413 177 A1 and EP 0 385 213 A2 furthermore disclose locking systems including a release mechanism.

[0007] WO 2011/057988 A1 (VKR Holding A/S) discloses a door or window brake device actuated by a rotatable actuation rod. By rotation of the rotatable actuation rod, a slider arranged at a top side of the door leaf or window sash may be arrested. The slider is pivotally connected to an end of a stay element, the other end of which is pivotally connected to the frame of the door or window. The actuation rod is rotatable by displacement of a locking rod arranged in a side member of the door

leaf or window sash. EP 1 718 829 B9 discloses a similar locking and brake system.

[0008] The object of the present invention is to provide a simple spring assisted locking system being easy to operate and being suitable for incorporation into a slim window sash or door leaf.

[0009] In view of this object, the first end of the displaceable bracket has the form of a tab being arranged between the first end wall of the longitudinal groove and the first end of the coiled spring and being adapted to slide in the longitudinal direction of the longitudinal groove, the displaceable bracket has a second end connected with the locking rod, an intermediate part of the displaceable bracket extends between the first end of the displaceable bracket and the second end of the displaceable bracket, the intermediate part of the displaceable bracket covers the coiled spring in the longitudinal groove, the second end of the displaceable bracket is connected to a slideable rod arranged in parallel to the locking rod and at a distance from the locking rod in a transverse direction of the locking rod, and the slideable rod is connected to the locking rod by means of a connecting piece extending in said transverse direction so that the locking rod with locking pawls and operating handle is arranged inside a sealing plane of the window sash, and the displaceable bracket with associated spring is arranged outside said sealing plane.

[0010] In this way, it may be possible to arrange a spring assisted locking system in a window sash or door leaf having a relatively slim configuration inside its sealing plane, because the displaceable bracket with associated spring is arranged outside the sealing plane. In some types of window sash or door leaf, this arrangement may be structurally particularly advantageous. Furthermore, it may be an advantage that the locking rod with locking pawls and operating handle may be isolated from the outside environment and thereby be protected from rain, dust etc, whereas the displaceable bracket with associated spring may be arranged outside the sealing plane and still be protected from the outside environment by means of the housing of the locking system in which the spring is arranged.

[0011] Furthermore, it may be possible to balance the spring force in relation to the static friction of the locking system so that the operating handle may be maintained in the unlocked position when the handle is not operated, and so that the locking operation may be initiated by the user with a very little operating force being much smaller than the static friction of the locking system. By arranging the at least one spring element to unload gradually from the beginning to the end of the rotation of the operating handle from the unlocked to the locked position, the entire locking operation may be assisted by the at least one spring element, thereby greatly facilitating the locking operation performed by the user. The coiled spring may be maintained in its linear form by side walls of the longitudinal groove. The displaceable bracket may be guided by means of the tab sliding in the groove. The first end

wall of the longitudinal groove may function as an endstop for the displaceable bracket in the locked position of the locking system. The coiled spring may be maintained in its linear form by side walls and a bottom of the longitudinal groove, and finally by the intermediate part of the displaceable bracket which maintains the coiled spring in the longitudinal groove.

[0012] In an embodiment, the spring load of the at least one spring element in the unlocked position of the operating handle and the locking pawls is at least 3 per cent lower, preferably at least 6 per cent lower, and most preferred at least 10 per cent lower than the spring load that would be necessary to overcome said static friction of the locking system in the unlocked position without a user operating the pivotal operating handle. Thereby, it may be possible to obtain a suitable balance between the spring force in relation to the static friction of the locking system so that the operating handle may be maintained in the unlocked position when the handle is not operated, also after longer use of the system, whereby the static friction may be reduced due to wear. Furthermore, a suitable balance between said spring force in relation to said static friction may be obtained so that the handle is not operated too easy by the user, which could lead to unintentional operation of the handle.

[0013] In a structurally particularly advantageous embodiment, the coiled spring has a longitudinal direction extending at least substantially in parallel with the locking rod. By arranging the coiled spring with its longitudinal direction extending at least substantially in parallel with the locking rod, the spring may be closely integrated with the locking rod.

[0014] In an embodiment, the locking system includes a brake device adapted to, in a braking state, prevent the window sash or door leaf from moving in relation to the frame in any position between the open position and the closed position, and the locking system is adapted to bring the brake device into its braking state when the operating handle is in its locked position.

[0015] In an embodiment, the brake device is arranged outside said sealing plane and may be brought from its braking state to a non-braking state by displacement of the displaceable bracket.

[0016] In an embodiment, the brake device includes a rotatable actuation rod, in a first rotational position of the rotatable actuation rod, the brake device is in its braking state, and, in a second rotational position of the rotatable actuation rod, the brake device is in a non-braking state, and the rotatable actuation rod is rotatable upon displacement of the locking rod.

[0017] In an embodiment, the rotatable actuation rod is rotatable by means of the displaceable bracket. For instance, advantageously, the rotatable actuation rod may extend along an upper and/or lower sash member of the window sash, and the locking rod may extend along a vertical sash member of the window sash, and in this case, the displaceable bracket with associated spring may advantageously be arranged at a corner of the win-

dow sash connecting the upper and/or lower sash member with the vertical sash member.

[0018] In a structurally particularly advantageous embodiment, a first link arm has a first end fixedly connected to a first end of the rotatable actuation rod and a second end pivotally connected to a first end of a second link arm, and the second link arm has a second end pivotally connected to the displaceable bracket.

[0019] In an embodiment, the first end of the rotatable actuation rod extends through a hole in the housing of the locking system.

[0020] In a structurally particularly advantageous embodiment, the brake device comprises a track element having a first side wall and a second side wall opposed to each other and a slider guided in the track element, a second end of the rotatable actuation rod has a non-circular cross-section so that, in the second rotational position, the slider is free to slide and, in the first rotational position, the rotatable actuation rod presses the slider against the first side wall, and a stay element has a first end pivotally connected to the slider and a second end adapted to be pivotally connected to a frame of a window or door.

[0021] The present invention further relates to a window or door including a window sash or door leaf arranged movable in a frame between an open position and a closed position and including a locking system as described above.

[0022] The invention will now be explained in more detail below by means of examples of embodiments with reference to the very schematic drawing, in which

Fig. 1 is a perspective view of a window with a locking system according to the invention;

Fig. 2 is a perspective view of the locking system of the window of Fig. 1, before mounting on the window;

Fig. 3 is a perspective view of part of the window sash of Fig. 1, seen on a larger scale, and wherein a cover plate of the locking system has been removed;

Fig. 4 is a side view of part of the window sash of Fig. 1, seen on a larger scale, wherein a cover plate of the locking system has been removed, and wherein the locking system is in a locked stated;

Fig. 5 is a side view of part of the window sash of Fig. 1, seen on a larger scale, wherein a cover plate of the locking system has been removed, and wherein the locking system is in an unlocked stated;

Fig. 6 is cross-sectional view along the line VI - VI of Fig. 4;

Fig. 7 is cross-sectional view along the line VII - VII of Fig. 4;

Fig. 8 is a perspective exploded view of part of the locking system of Fig. 2, seen on a larger scale; and

Fig. 9 is a perspective exploded view corresponding to that of Fig. 8, but seen from a different angle of view.

[0023] Fig. 1 shows a window 2 including a window sash 3 arranged movable in a frame 4 between an open position and a closed position, wherein the open position is illustrated in the figure. The window 2 includes a locking system 1 according to the present invention.

[0024] Fig. 2 illustrates the locking system 1 of the window 2 illustrated in Fig. 1, before mounting of the system on the window. The locking system 1 includes a locking rod 5 adapted to be arranged displaceably in its longitudinal direction in the window sash 3 in a manner known *per se*, wherein the locking rod 5 is displaceable by rotation of a pivotal operating handle 6. Thereby, upon displacement of the locking rod 5, a number of locking pawls 7 are movable between a locked position and an unlocked position so that, in the mounted position of the locking system 1 on the window 2, when the window sash 3 is in its closed position and the operating handle 6 is in a locked position, the locking pawls 7 are in their locked position and engage corresponding respective not shown striking plates 8 arranged on the frame 4, and when the operating handle 6 is in an unlocked position, the locking pawls 7 are in their unlocked position out of engagement with said striking plates 8. Although the striking plates 8 are not visible in Fig. 1, the respective positions where they are mounted on the frame 4 are indicated by the reference numeral 8.

[0025] When the operating handle 6 and the locking pawls 7 are in their unlocked positions, the locking system 1 has a static friction which has to be overcome in order to bring the operating handle 6 and the locking pawls 7 away from their unlocked positions in order to initiate locking of the locking system. In order to assist the user in overcoming said static friction, the locking system 1 includes a spring element 9 arranged to be loaded to a maximum load when the operating handle 6 and the locking pawls 7 are in their unlocked positions and adapted to unload at least to a minimum load when the operating handle 6 and the locking pawls 7 are brought to their locked positions.

[0026] Referring to Figs. 3 to 9, the spring element 9 is arranged to unload gradually from the beginning to the end of the rotation of the operating handle 6 from the unlocked to the locked position. The unlocked position is illustrated in Figs. 5 and 7. The locked position is illustrated in Figs. 1 to 4 and 6. The spring load of the spring element 9 in the unlocked position of the operating handle 6 and the locking pawls 7 is lower than the spring load that would be necessary to overcome said static friction of the locking system 1 in the unlocked position without a user operating the pivotal operating handle 6. Thereby, the spring force is balanced in relation to the static friction

of the locking system 1 so that the operating handle 6 may be maintained in the unlocked position when the handle is not operated, and so that the locking operation may be initiated by the user with a very little operating force being much smaller than the static friction of the locking system 1. The entire locking operation is assisted by the spring element 9, thereby greatly facilitating the locking operation performed by the user.

[0027] The spring load of the spring element 9 in the unlocked position of the operating handle 6 and the locking pawls 7 may be at least 3 per cent lower, preferably at least 6 per cent lower, and most preferred at least 10 per cent lower than the spring load that would be necessary to overcome said static friction of the locking system 1 in the unlocked position without a user operating the pivotal operating handle 6. Thereby, the operating handle 6 may be maintained in the unlocked position when the handle is not operated, also after longer use of the system, whereby the static friction may be reduced due to wear. Furthermore, a suitable balance between said spring force in relation to said static friction may be obtained so that the operating handle 6 is not operated too easy by the user, which could lead to unintentional operation of the operating handle.

[0028] As illustrated in Figs. 6 to 9, the spring element 9 has the form of a coiled spring 10 having a longitudinal direction extending substantially in parallel with the locking rod 5. A first end 11 of the coiled spring 10 is connected with the locking rod 5 and a second end 12 of the coiled spring 10 is connected with a housing 13 of the locking system 1. Furthermore, the coiled spring 10 is a compression spring, and the first end 11 of the coiled spring 10 abuts a displaceable bracket 14 connected with the locking rod 5 and the second end 12 of the coiled spring 10 abuts a part of the housing 13 of the locking system 1. It should be understood that although the housing 13 of the locking system 1 has been illustrated as a separate element, the housing may in other embodiments just as well be formed by the window sash or a door leaf.

[0029] The coiled spring 10 is arranged in a longitudinal groove 15 in the housing 13 of the locking system 1. The longitudinal groove 15 has a first end wall 16 and an opposed second end wall 17. The second end 12 of the coiled spring 10 abuts the second end wall 17 of the longitudinal groove 15, and the first end 11 of the coiled spring 10 abuts a first end 18 of the displaceable bracket 14.

[0030] The first end 18 of the displaceable bracket 14 has the form of a tab 19 arranged between the first end wall 16 of the longitudinal groove 15 and the first end 11 of the coiled spring 10. The tab 19 is adapted to slide in the longitudinal direction of the longitudinal groove 15.

[0031] The displaceable bracket 14 has a second end 20 connected with the locking rod 5, and an intermediate part 21 of the displaceable bracket 14 extends between the first end 18 of the displaceable bracket 14 and the second end 20 of the displaceable bracket 14. The inter-

mediate part 21 of the displaceable bracket 14 covers the coiled spring 10 in the longitudinal groove 15 so that the coiled spring 10 is maintained in the longitudinal groove 15.

[0032] The second end 20 of the displaceable bracket 14 is connected to a slideable rod 24 arranged in parallel to the locking rod 5 and at a distance from the locking rod in a transverse direction of the locking rod. The slideable rod 24 is connected to the locking rod 5 by means of a connecting piece 25 extending in said transverse direction. Comparing Figs. 1 and 2, it is understood that by means of the connection between the slideable rod 24 and the locking rod 5 by means of the connecting piece 25, the locking rod 5 with locking pawls 7 and operating handle 6 has been arranged inside a sealing plane 57 of the window sash 3, and the displaceable bracket 14 with associated spring 9 has been arranged outside said sealing plane 57. In illustrated type of window sash, this arrangement is structurally particularly advantageous.

[0033] In the illustrated embodiment, the locking system 1 includes a brake device 26 adapted to, in a braking state, prevent the window sash 3 from moving in relation to the frame 4 in any position between the open position and the closed position. The locking system 1 is adapted to bring the brake device 26 into its braking state when the operating handle 6 is in its locked position, as illustrated in Figs. 1 and 2.

[0034] The brake device 26 includes a rotatable actuation rod 27. In a first rotational position of the rotatable actuation rod 27, the brake device 26 is in its braking state, and, in a second rotational position of the rotatable actuation rod 27, the brake device 26 is in a non-braking state. The rotatable actuation rod 27 is rotatable upon displacement of the locking rod 5 as explained in more detail below.

[0035] As seen particularly well in Figs. 3 to 5, the rotatable actuation rod 27 is rotatable by means of the displaceable bracket 14. A first link arm 28 has a first end 29 fixedly connected to a first end 30 of the rotatable actuation rod 27 and a second end 31 pivotally connected to a first end 32 of a second link arm 33. The second link arm 33 has a second end 34 pivotally connected to the displaceable bracket 14. The first end 30 of the rotatable actuation rod 27 extends through a hole 35 in the housing 13 of the locking system 1, as illustrated in Fig. 8.

[0036] The brake device 26 comprises a track element 36 having a first side wall and a second side wall opposed to each other and a slider 37 guided in the track element 36 as indicated in Figs. 1 and 2. A second end 38 of the rotatable actuation rod 27 has a non-circular cross-section so that, in the second rotational position, the slider 37 is free to slide and, in the first rotational position, the rotatable actuation rod 27 presses the slider 37 against the first side wall and brakes, whereby the sliding motion of the slider 37 is stopped. A stay element 39 has a first end 40 pivotally connected to the slider 37 and a second end 41 pivotally connected to the frame 4 of the window

2. The brake device 26 may furthermore be of the type which is described in WO 2011/057988 A1 (VKR Holding A/S).

[0037] In an alternative embodiment, the spring element 9 may be formed as a torsion spring, for instance arranged around the rotatable actuation rod 27 of the brake device 26. Thereby, a particularly compact arrangement of the spring element 9 in the locking system 1 may be obtained. A first end of the torsion spring may be fixed to the rotatable actuation rod 27 and a second end of the torsion spring may be fixed to the window sash 3 or door leaf.

[0038] Contemplating Figs. 6 and 7, it is also easily understood that in an alternative embodiment, the spring element 9 could have the form of a compressible block or piece of rubber or other suitable elastic material. In fact, such a compressible block or piece could replace the compression spring 10 of Figs. 6 and 7 practically without any other adaptation of the locking device. Any other suitable material or device may replace the spring element 9, such as a stack of disc springs or diaphragm springs, a gas spring, etc.

[0039] It is noted that although Figs. 6 and 7 illustrate cross-sectional views, the cut-through elements of these figures have not been hatched.

List of reference numbers

[0040]

- 1 locking system
- 2 window
- 3 window sash
- 4 frame
- 5 locking rod
- 6 pivotal operating handle
- 7 locking pawl
- 8 striking plate
- 9 spring element
- 10 coiled spring
- 11 first end of coiled spring
- 12 second end of coiled spring
- 13 housing
- 14 displaceable bracket
- 15 longitudinal groove
- 16 first end wall of longitudinal groove
- 17 second end wall of longitudinal groove
- 18 first end of displaceable bracket
- 19 tab first end of displaceable bracket
- 20 second end of displaceable bracket
- 21 intermediate part of displaceable bracket
- 22 tab of second end of displaceable bracket
- 23 square hole in slideable rod
- 24 slideable rod
- 25 connecting piece
- 26 brake device
- 27 rotatable actuation rod of brake device
- 28 first link arm

- 29 first end of first link arm
- 30 first end of rotatable actuation rod
- 31 second end of first link arm
- 32 first end of second link arm
- 5 33 second link arm
- 34 second end of second link arm
- 35 hole in housing
- 36 track element of brake device
- 37 slider of brake device
- 10 38 second end of rotatable actuation rod
- 39 stay element of brake device
- 40 first end of stay element
- 41 second end of stay element
- 42 cover plate of housing
- 15 43 mounting screws for cover plate
- 44 mounting bracket for locking pawl mechanism
- 45 locking pawl mechanism
- 46 cover bracket for slideable rod
- 47 protrusion of housing
- 20 48 window pane
- 49 hinge system between window sash and frame
- 50 pivot bearing in first end of displaceable bracket
- 51 first pivot pin of second link arm
- 52 second pivot pin of second link arm
- 25 53 pivot bearing in second end of first link arm
- 54 flat side of first end of rotatable actuation rod
- 55 flat side of mounting hole in first link arm
- 56 mounting hole in first end of first link arm
- 57 sealing plane of window sash
- 30

Claims

- 1. A window (2) or door including a window sash (3) or door leaf arranged movable in a frame (4) between an open position and a closed position and a locking system (1) including a locking rod (5) arranged displaceably in its longitudinal direction in the window sash (3) or door leaf, wherein the locking rod (5) is displaceable by rotation of a pivotal operating handle (6), wherein a number of locking pawls (7) are movable between a locked position and an unlocked position upon displacement of the locking rod (5), so that, when the window sash (3) or door leaf is in its closed position and the operating handle (6) is in a locked position, the locking pawls (7) are in their locked position and engage corresponding respective striking plates (8) arranged on the frame (4), and when the operating handle (6) is in an unlocked position, the locking pawls (7) are in their unlocked position out of engagement with said striking plates (8), wherein, when the operating handle (6) and the locking pawls (7) are in their unlocked positions, the locking system (1) has a static friction which has to be overcome in order to bring the operating handle (6) and the locking pawls (7) away from their unlocked positions, wherein the locking system (1) includes at least one spring element (9) arranged to be loaded

to a maximum load when the operating handle (6) and the locking pawls (7) are in their unlocked positions and adapted to unload at least to a minimum load when the operating handle (6) and the locking pawls (7) are brought to their locked positions, wherein the at least one spring element (9) is arranged to unload gradually from the beginning to the end of the rotation of the operating handle (6) from the unlocked to the locked position, wherein the spring load of the at least one spring element (9) in the unlocked position of the operating handle (6) and the locking pawls (7) is lower than the spring load that would be necessary to overcome said static friction of the locking system (1) in the unlocked position without a user operating the pivotal operating handle (6), wherein the at least one spring element (9) has the form of a coiled spring (10), wherein a first end (11) of the coiled spring (10) is connected with the locking rod (5) and a second end (12) of the coiled spring (10) is connected with a housing (13) of the locking system (1), wherein the coiled spring (10) is a compression spring, wherein the first end (11) of the coiled spring (10) abuts a displaceable bracket (14) connected with the locking rod (5) and the second end (12) of the coiled spring (10) abuts a part of the housing (13) of the locking system (1), wherein the coiled spring (10) is arranged in a longitudinal groove (15) in the housing (13) of the locking system (1), wherein the longitudinal groove (15) has a first end wall (16) and an opposed second end wall (17), wherein the second end (12) of the coiled spring (10) abuts the second end wall (17) of the longitudinal groove (15), and wherein the first end (11) of the coiled spring (10) abuts a first end (18) of the displaceable bracket (14), **characterised in that** the first end (18) of the displaceable bracket (14) has the form of a tab (19) being arranged between the first end wall (16) of the longitudinal groove (15) and the first end (11) of the coiled spring (10) and being adapted to slide in the longitudinal direction of the longitudinal groove (15), **in that** the displaceable bracket (14) has a second end (20) connected with the locking rod (5), **in that** an intermediate part (21) of the displaceable bracket (14) extends between the first end (18) of the displaceable bracket (14) and the second end (20) of the displaceable bracket (14), **in that** the intermediate part (21) of the displaceable bracket (14) covers the coiled spring (10) in the longitudinal groove (15), **in that** the second end (20) of the displaceable bracket (14) is connected to a slideable rod (24) arranged in parallel to the locking rod (5) and at a distance from the locking rod in a transverse direction of the locking rod, and **in that** the slideable rod (24) is connected to the locking rod (5) by means of a connecting piece (25) extending in said transverse direction so that the locking rod (5) with locking pawls (7) and operating handle (6) is arranged inside a sealing plane (57) of the window

sash (3), and the displaceable bracket (14) with associated spring (9) is arranged outside said sealing plane (57).

2. A window or door according to claim 1, wherein the spring load of the at least one spring element (9) in the unlocked position of the operating handle (6) and the locking pawls (7) is at least 3 per cent lower, preferably at least 6 per cent lower, and most preferred at least 10 per cent lower than the spring load that would be necessary to overcome said static friction of the locking system (1) in the unlocked position without a user operating the pivotal operating handle (6).
3. A window or door according to claim 1 or 2, wherein the locking system (1) includes a brake device (26) adapted to, in a braking state, prevent the window sash (3) or door leaf from moving in relation to the frame (4) in any position between the open position and the closed position, and wherein the locking system (1) is adapted to bring the brake device (26) into its braking state when the operating handle (6) is in its locked position.
4. A window or door according to claim 3, wherein the brake device (26) is arranged outside said sealing plane (57) and may be brought from its braking state to a non-braking state by displacement of the displaceable bracket (14).
5. A window or door according to claim 3 or 4, wherein the brake device (26) includes a rotatable actuation rod (27), wherein, in a first rotational position of the rotatable actuation rod (27), the brake device (26) is in its braking state, and, in a second rotational position of the rotatable actuation rod (27), the brake device (26) is in a non-braking state, and wherein the rotatable actuation rod (27) is rotatable upon displacement of the locking rod (5).
6. A window or door according to claim 5, wherein the rotatable actuation rod (27) is rotatable by means of the displaceable bracket (14).
7. A window or door according to claim 6, wherein a first link arm (28) has a first end (29) fixedly connected to a first end (30) of the rotatable actuation rod (27) and a second end (31) pivotally connected to a first end (32) of a second link arm (33), and wherein the second link arm (33) has a second end (34) pivotally connected to the displaceable bracket (14).
8. A window or door according to claim 7, wherein the first end (30) of the rotatable actuation rod (27) extends through a hole (35) in the housing (13) of the locking system (1).

9. A window or door according to any one of the claims 5 to 8, wherein the brake device (26) comprises a track element (36) having a first side wall and a second side wall opposed to each other and a slider (37) guided in the track element (36), wherein a second end (38) of the rotatable actuation rod (27) has a non-circular cross-section so that, in the second rotational position, the slider (37) is free to slide and, in the first rotational position, the rotatable actuation rod (27) presses the slider (37) against the first side wall, and wherein a stay element (39) has a first end (40) pivotally connected to the slider (37) and a second end (41) adapted to be pivotally connected to a frame (4) of a window (2) or door.

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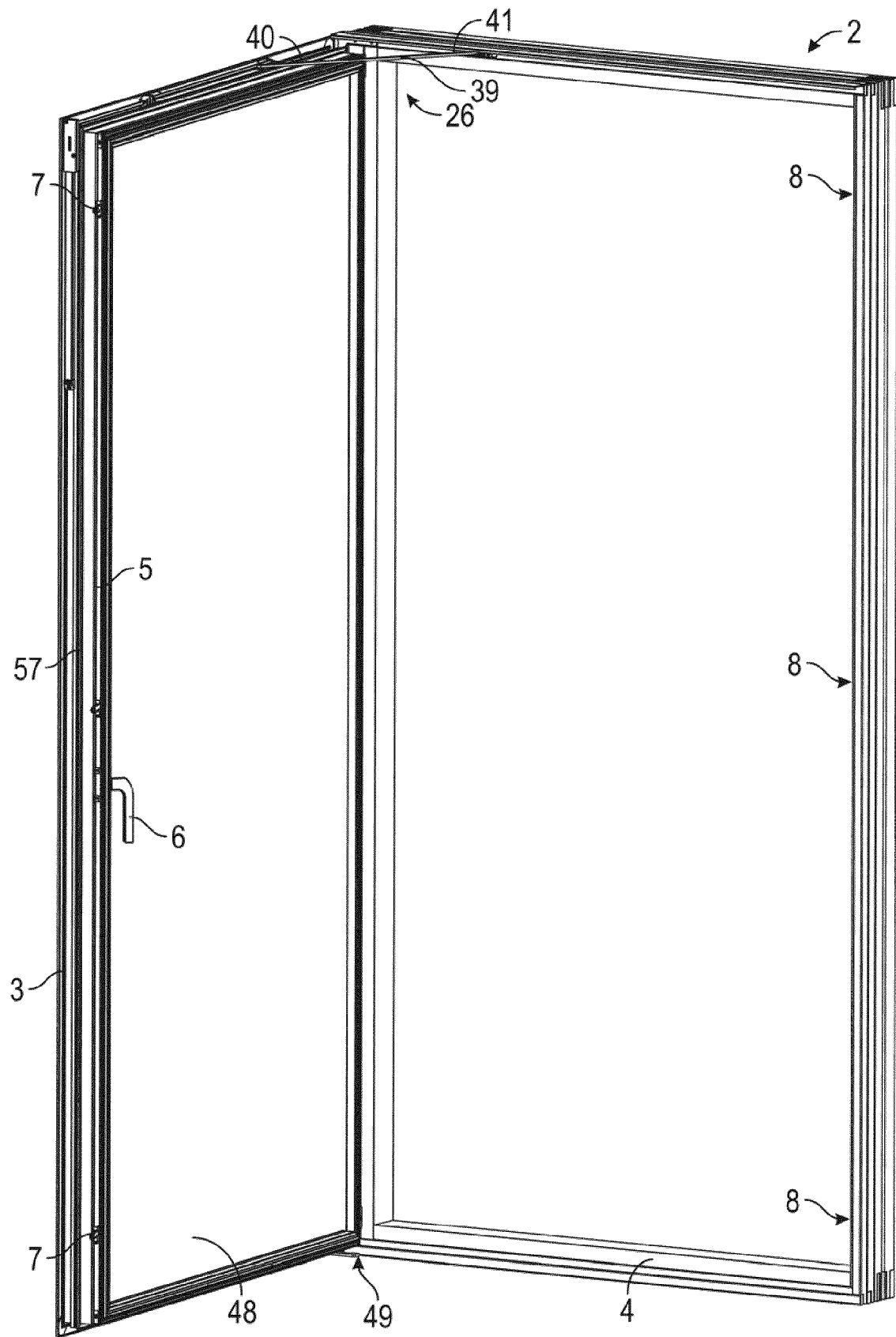


FIG. 1

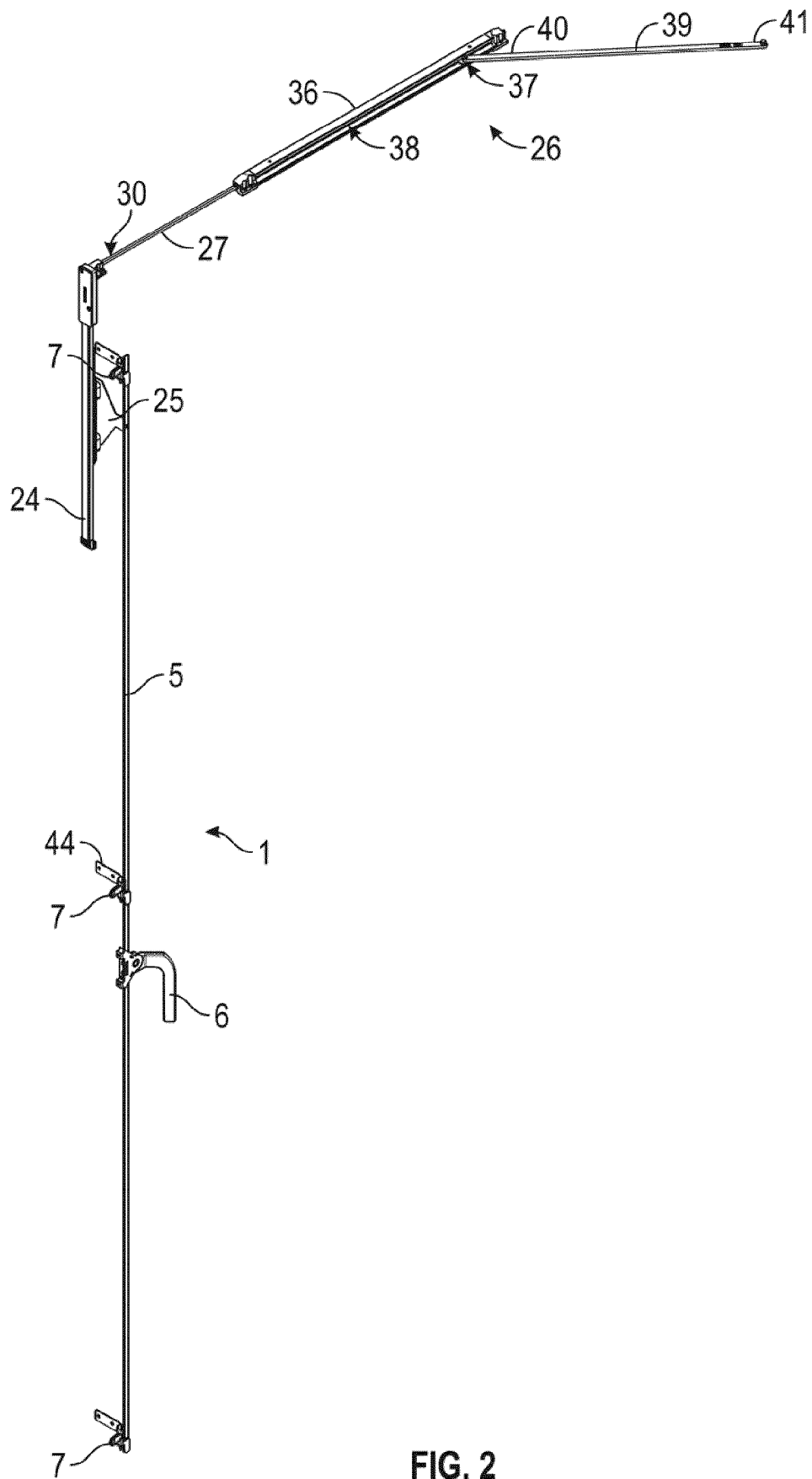


FIG. 2

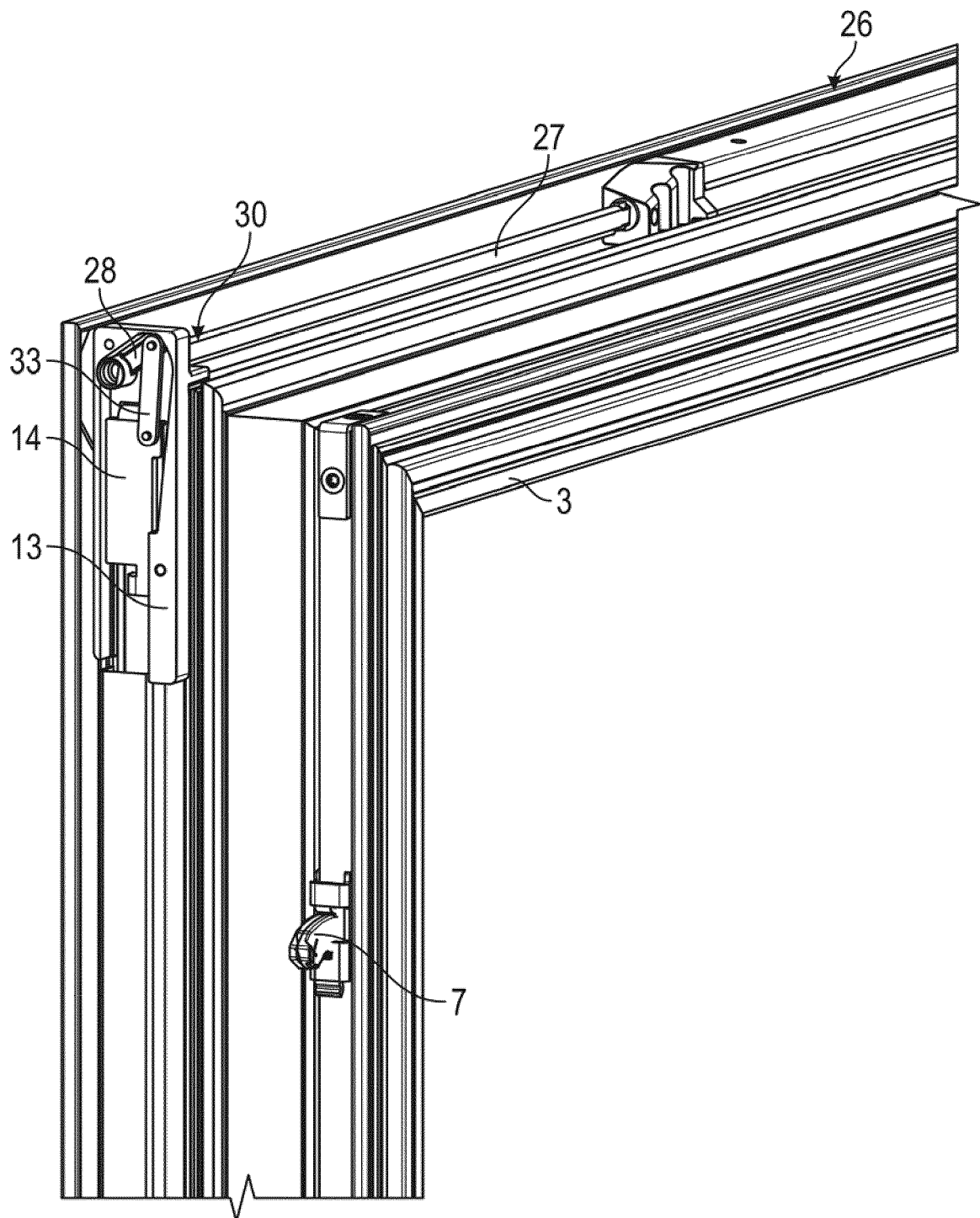
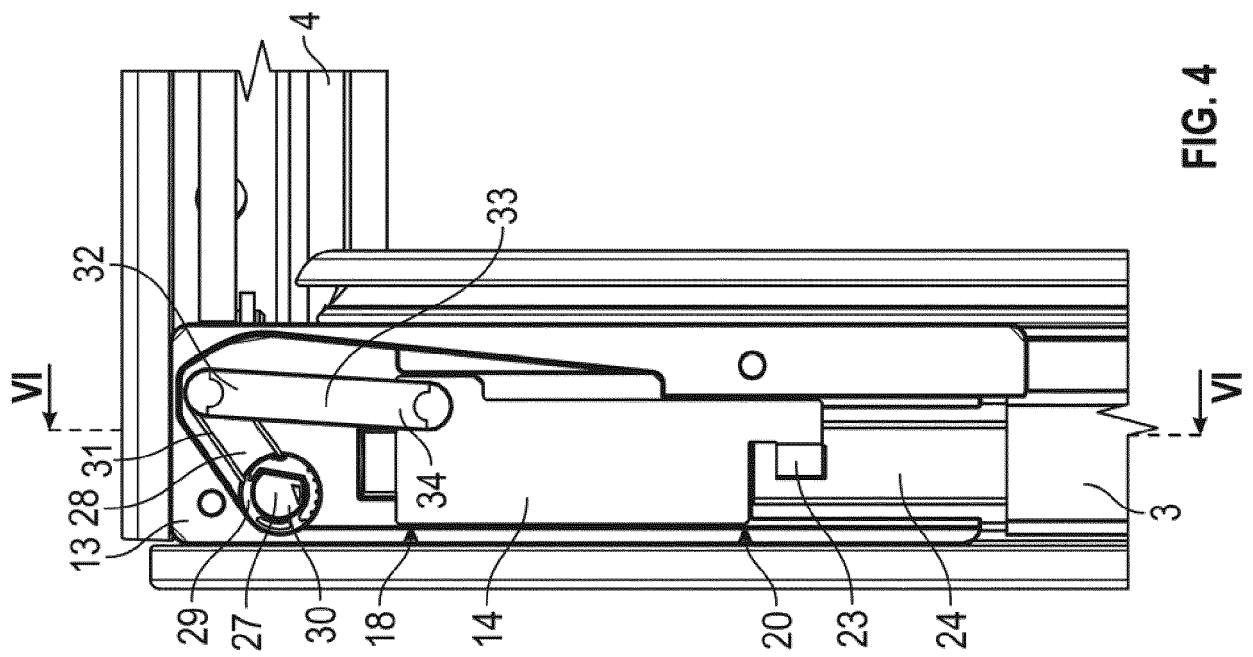
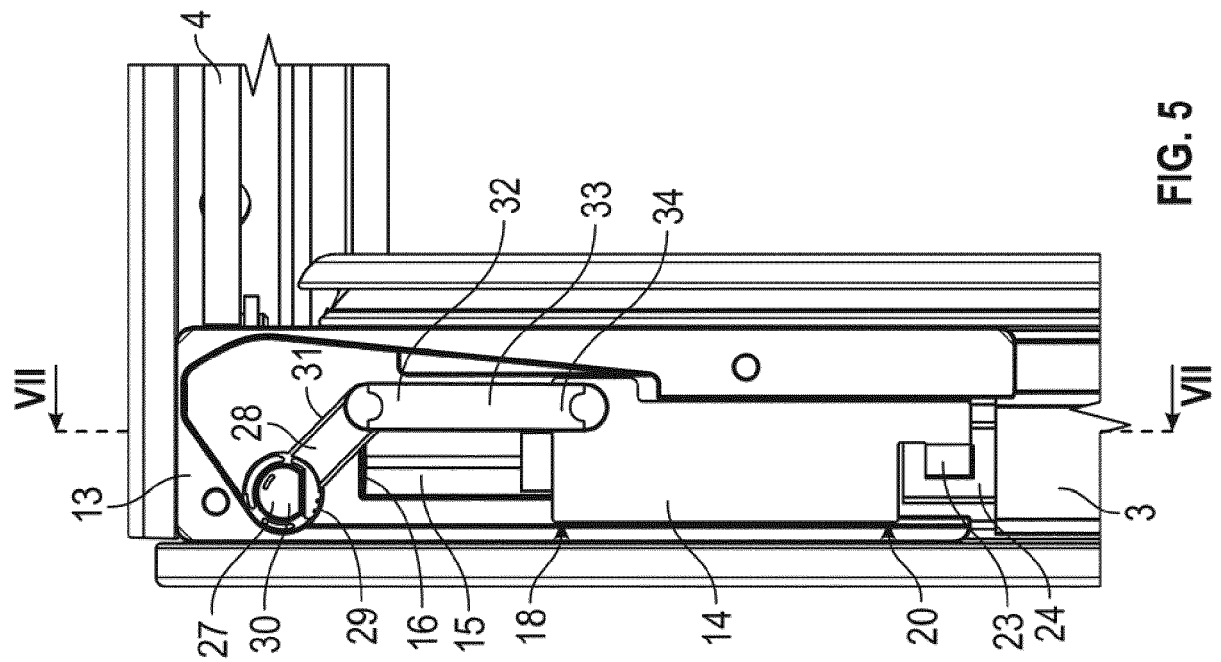
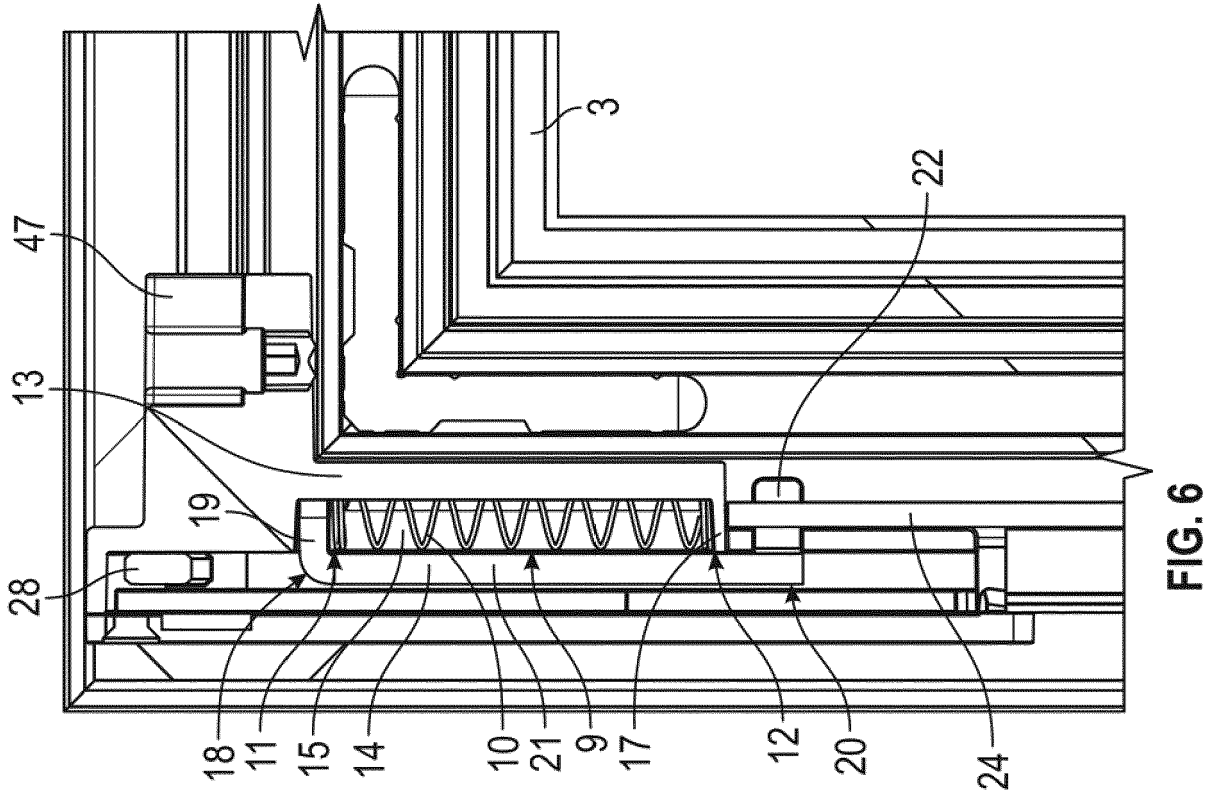
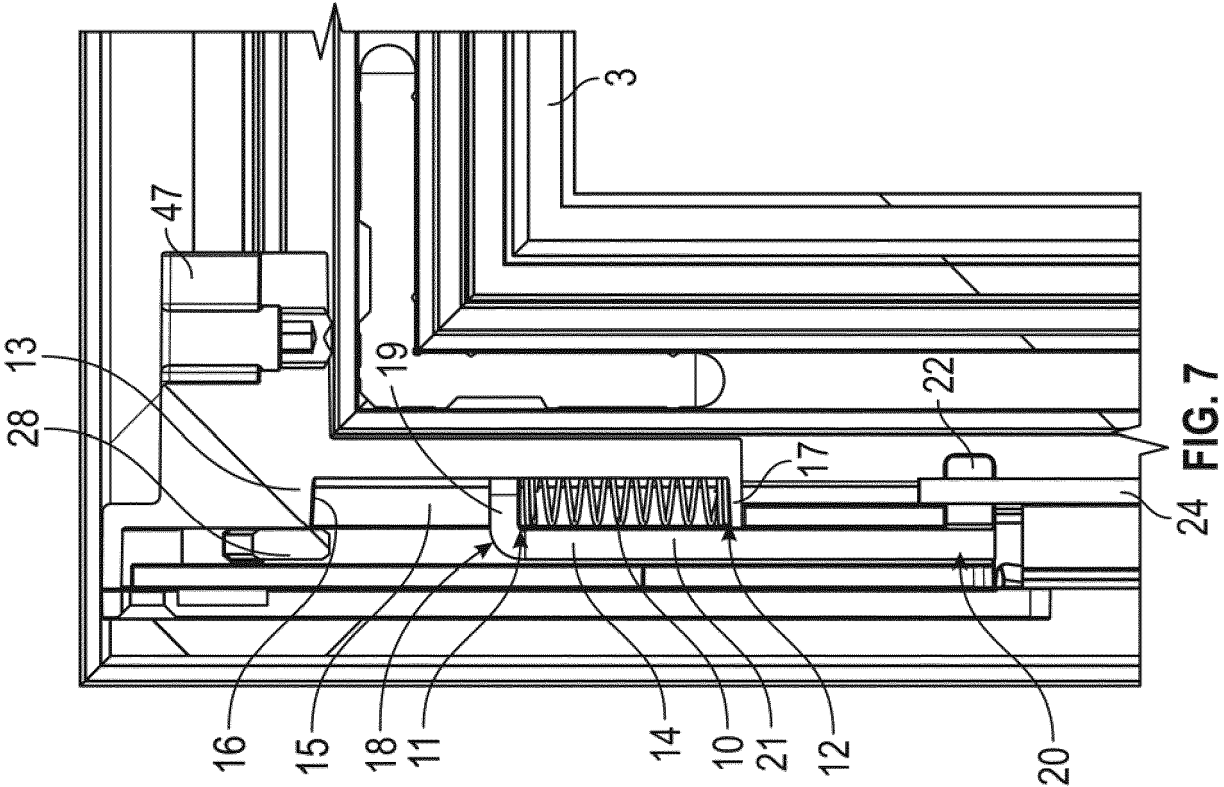


FIG. 3





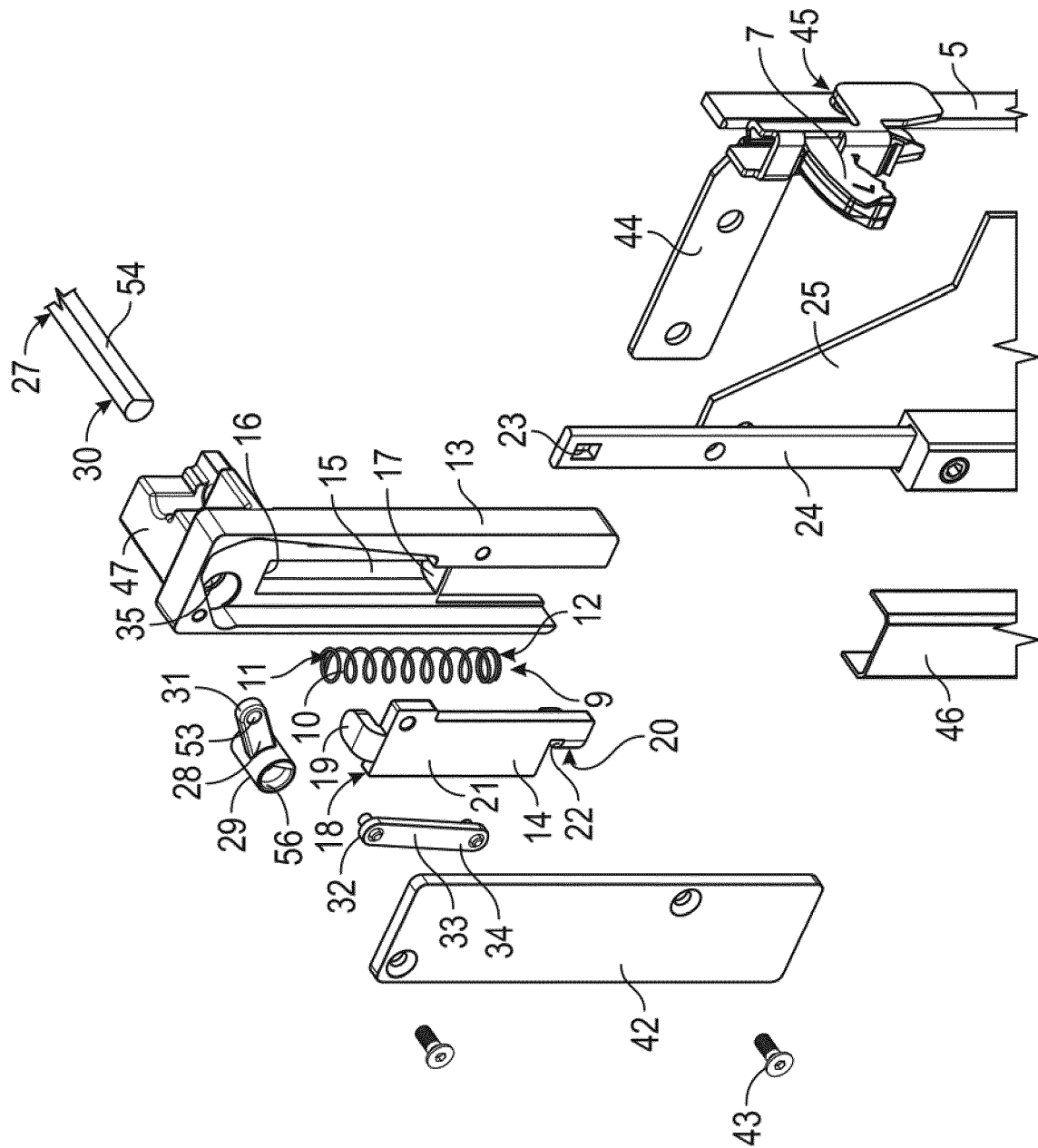


FIG. 8

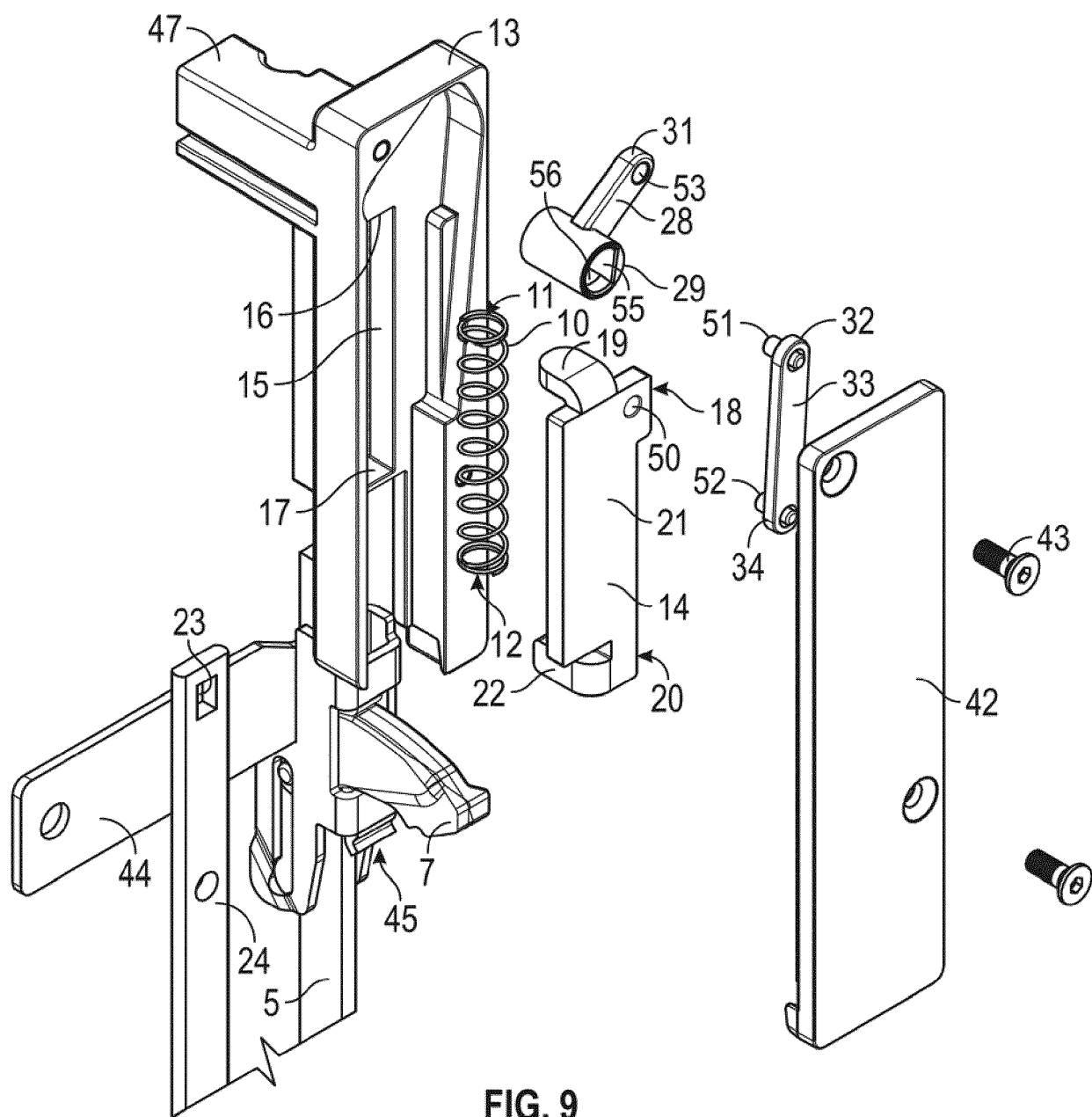


FIG. 9



EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 0 801 194 A1 (ATP SA) 15 October 1997 (1997-10-15) * the whole document *	1-9	INV. E05C9/02 E05C9/18 E05C17/04
A	EP 0 389 447 A2 (GIESSE SPA) 26 September 1990 (1990-09-26) * column 5, lines 11-35; figure 4 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05C E05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 April 2019	Examiner Van Beurden, Jason
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 20 8651

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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03-04-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0801194 A1	15-10-1997	DE 69612273 D1	03-05-2001
		DE 69612273 T2	15-11-2001
		EP 0801194 A1	15-10-1997
		ES 2157415 T3	16-08-2001
		GR 3036107 T3	28-09-2001
		PT 801194 E	28-09-2001
EP 0389447 A2	26-09-1990	EP 0389447 A2	26-09-1990
		IT 1234030 B	24-04-1992

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0801194 B1 **[0002]**
- EP 2295678 B1 **[0003]**
- EP 3144456 A1 **[0004]**
- EP 2287426 B1 **[0005]**
- EP 0413177 A1 **[0006]**
- EP 0385213 A2 **[0006]**
- WO 2011057988 A1 **[0007] [0036]**
- EP 1718829 B9 **[0007]**