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(54) **Carriage unit for sliding door or window of the lift and slide type**

(57) Described is a carriage unit applicable to sliding doors or windows of the lift and slide type (1) comprising a fixed frame (2) and a sash (3) horizontally slidable relative to the frame (2), between an open position and a closed position; the carriage unit comprises at least one main carriage (4, 5), associated, in use, on the lower crosspiece (6) of the sash (3) and resting on a horizontal base track (7) to allow the sliding of the sash (3) in both the opening and closing directions; the main carriage (4, 5) comprises a first box-type frame (8) having an upper portion (8a) configured to be slidably coupled, in use, to the lower crosspiece (6) of the sash; a second frame (9) supporting a pair of wheels (10, 11) positioned, in use, resting on the track (7); the second frame (9) is configured to allow a pivoting movement of the two wheels (10, 11) about a single pivot point (P1); a link mechanism (12) for lifting and lowering the sash (3) relative to the track (7), corresponding to the open and closed positions, respectively, of the sash (3); the link mechanism (12) is positioned and acting between the first frame (8) and, in use, a drive linkage (13) controlled by a handle (14) positioned on the sash (3).

FIG.2

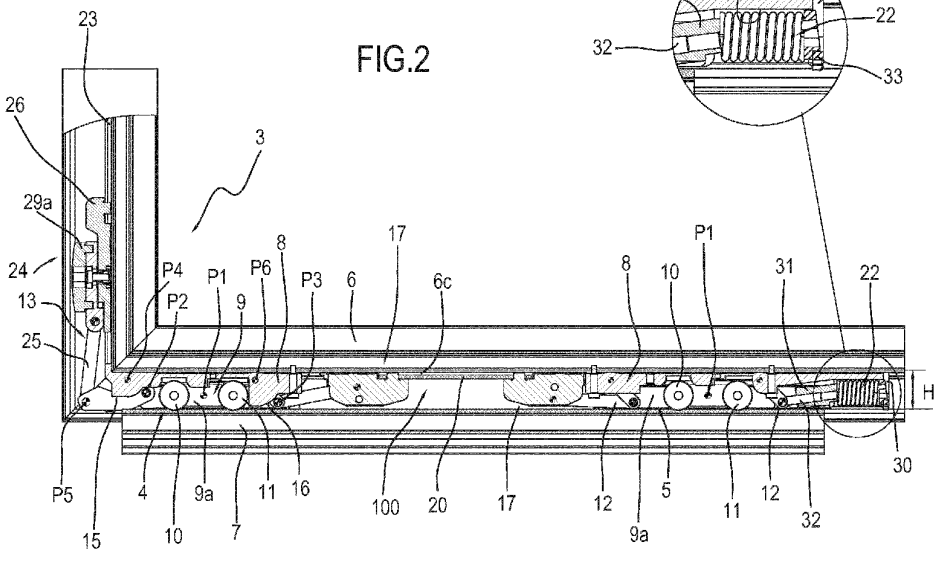

FIG.3

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Description

[0001] This invention relates to a carriage unit for sliding doors or windows, in particular forming part of a carriage unit for doors or windows known in the jargon of the trade as "lift and slide".

[0002] These doors and windows normally comprise:

- a fixed frame;
- at least one movable sash, horizontally slidable relative to the fixed frame between an open position and a closed position;
- at least one sliding unit, or carriage unit, which is associated with the bottom crosspiece of the sash and is guided by a horizontal base track to allow the sliding of the sash to and from the above-mentioned open and closed positions;
- a control handle, positioned on the sash, which, firstly, allows the sash to be lifted so as to move the lower seals of the sash away from the sides of the track and thereby allow the sliding of the latter to and from the above-mentioned open and closed positions, and, secondly, allows the sash to be lowered in the closed position so as to seal the door or window;
- locking / unlocking means, which act between the vertical member of the sash and the fixed frame for locking/unlocking the sash in its closed position controlled by the above-mentioned handle.

[0003] In this specification, attention is focused on the carriage unit which, in the majority of the embodiments on the market, comprises a pair of carriages (main and secondary) so as to support the sliding sash in a distributed manner.

[0004] Currently, the structures of each carriage of the unit comprise:

- a box-shaped frame, on which are hinged, at its ends, a pair of wheels configured to rest on the track, and
- a connecting body, interposed between the box-shaped frame and the lower part of the sliding sash, to allow the lifting and lowering of the sash relative to the box-shaped frame.

[0005] More specifically, according to a prior art structure (of which some embodiments mat be seen in patents DE 7816563U, EP 1298271, EP 1298272, EP 1437471), the connecting body is, on one side, connected to the lower part of the sash, and, on the other side, connected to the box-shaped frame by means of a coupling between a pin and an inclined slot (applied and made on the box-shaped frame and on the connecting body or vice versa depending on the solutions adopted).

[0006] The movement of the connecting body (and of the sash) relative to the box-shaped frame of the carriage is imparted by the above-mentioned control handle, through a drive linkage which changes the relative position between the pin and the inclined slot.

[0007] Further examples of carriages used in the field of sliding sashes are known from patent documents KR 200 397 177, EP 2.220.316 (in the name of the same Applicant), DE 24 43 647 and BE 645 016.

[0008] In light of this, so as to increase the efficiency of the lift and slide mechanisms (where the term "efficiency" means a smaller force to be applied to the handle to lift even heavy sashes), pre-loaded springs are used, configured to reduce the weight of the sash to be lifted and facilitate the opening movement. A prior art solution, by this Applicant, is illustrated in patent EP 2220316.

[0009] However, this type of solution, that is, the presence of the pin - slot - spring combination, has several drawbacks.

[0010] A first problem is the reduced capacity of the assistance by the spring, due to the fact that as the lifting of the sash increases, the spring tends to "unload" and progressively reduce the relative contribution in the lifting of the sash.

[0011] This reduced effect of the spring is therefore reflected on the manoeuvre performed by the user on the handle which, in effect, requires a greater effort during the last degrees of rotation of the handle coinciding with the last step of lifting the sash.

[0012] A second problem is due to the "inclined slot" guide unit present on the carriages.

[0013] It should be noted that the control mechanism starting from the operation of the handle and ending with the secondary carriage determines a sum of clearances due to the mechanical couplings in series which are present. This sum of clearances may translate into a loss of stroke of the main carriage and to a sometimes even greater degree of the secondary carriage with consequent non-use of the stroke space of the pin in the inclined slot.

[0014] In light of this, the loss of stroke therefore becomes a reduction in the height of lifting of the sash.

[0015] In other words, with this slot system, the effective value of lifting the sash is more or less high depending on the sum of clearances which are created. This is without being able to make adjustments, since the system structured in this way on the carriages is, so to speak, of the rigid type. Another problem encountered is due to the weight of the sash when it is lifted.

[0016] In the system with slot, pin and spring, the weight of the sash always bears on the inclined slot and, in cascade, on the entire train of the mechanism until reaching the handle.

[0017] This cascade effect of the weight on heavy sashes may result in a poor stability of the handle which, in some cases, tends, merely by touching it, to release itself from the open position precisely because of the effect of the weight of the sash.

[0018] The aim of this invention is to provide a carriage unit for sliding doors or windows of the lift and slide type which overcomes the above mentioned drawbacks of the prior art.

[0019] More specifically, the aim of this invention is to

provide a carriage unit for sliding doors or windows of the lift and slide type which allows the opening and closing of the door or window without excessive effort for the user and with a high degree of stability of the movable sash in the open position.

[0020] A further aim of the invention is to provide a carriage unit for sliding doors or windows of the lift and slide type which may be adapted to any type of profile making the movable sash, that is, also in the case of small sized profiles, whilst maintaining high lifting strokes.

[0021] These aims are fully achieved by the carriage unit for sliding doors or windows of the lift and slide type according to this invention, as characterized in the appended claims.

[0022] More specifically, the carriage unit has a main carriage comprising a first box-type frame having an upper portion configured to be slidably coupled, in use, to a lower crosspiece of the sash; a second frame supporting a pair of wheels positioned, in use, resting on a track; the second frame being configured to allow a pivoting movement of the two wheels about a single pivot point; a link mechanism for lifting and lowering the sash relative to the track, corresponding to the open and closed positions, respectively, of a sash; the link mechanism is positioned and acting between the first frame and, in use, a drive linkage controlled by a handle positioned on the sash.

[0023] Thanks to this structure of the main carriage it is possible to obtain an extremely large and precise lifting and lowering stroke of the sash even with small sizes of the sash profiles thanks to the presence of the link mechanism acting uniformly on the first frame.

[0024] This uniformity of action of the link mechanism allows a considerable stability of the position adopted by the sash and less force on the handle by the user during opening and closing.

[0025] Moreover, the main carriage unit comprises the first frame having a surface shaped at each of its ends and configured for forming a contact guide cam for the hinge points of the link mechanism connected to the drive linkage; each of the shaped surfaces forms a resting and supporting point of the first frame to the hinge point at the raised opening position of the sash.

[0026] Thanks to this feature, the first frame, on the one hand, guides the movement of the link mechanism in the lifting and lowering positions and, on the other hand, allows the lifting and the stable lifted positioning of the first frame in a balanced and bilateral fashion: this reduces the stresses of the first frame relative to the second frame and the pair of wheels.

[0027] Preferably, the main carriage has the pair of wheels rotatably fixed to a pair of horizontal rockers, forming a further independent frame inside the second frame, having the central pivot point hinged to the second frame. This feature:

- allows the wheels to pivot, allowing a correct sliding of the sash on the track to be always maintained even in the presence of discontinuities on the track;
- avoids the wheels affecting the kinematic movement of the other frames and keep the wheels centrally placed relative to the other frames;
- reduces the stresses on the wheels during the steps for lifting and lowering the first frame.

[0028] These and other features of the invention will become more apparent from the following description of a preferred, non-limiting embodiment of it, with reference to the accompanying drawings, in which:

- Figure 1 is a schematic front view of a sliding door or window of the lift and slide type equipped with the carriage unit according to the invention;
- Figure 2 is a front view the carriage unit of the sliding door or window, according to the invention, with some parts in cross section in a configuration where the movable sash of the door or window is closed;
- Figure 3 is an enlarged view of a secondary carriage of Figure 2;
- Figure 4 is a schematic rear view of the carriage unit and the sash of Figure 2;
- Figure 5 is a front view the carriage unit of the sliding door or window, according to the invention, with some parts in cross section in a configuration where the movable sash of the door or window is open;
- Figure 6 is a schematic rear view of the carriage unit and the sash of Figure 5;
- Figure 7 is an exploded perspective view of a main carriage forming part of the carriage unit of the preceding figures;
- Figure 8 is an exploded perspective view of a secondary carriage forming part of the carriage unit of the preceding figures;
- Figures 9 and 10 illustrate means of adjusting the secondary carriage in a first operating configuration, in an assembled perspective view and in a partially exploded view, respectively;
- Figures 11 and 12 illustrate means of adjusting the secondary carriage in a second operating configuration, in an assembled perspective view and in a partially exploded view, respectively.

[0029] With reference to the accompanying drawings, in particular Figures 1 to 6, the carriage unit according to the invention, denoted by the numeral 100, can be used for sliding doors or windows of the lift and slide type and denoted by the numeral 1.

[0030] These doors and windows 1 essentially comprise: a fixed frame 2, at least one movable sash 3, a pair of carriage 4 and 5 forming the above-mentioned carriage unit and a control element 14 comprising a handle.

[0031] In light of this, the sash 3 is slidable relative to the fixed frame 2 between a closed position (see Figure 1) and an open position (not illustrated).

[0032] It should be noted that the sash 3 is slidable

horizontally along a fixed track 7 positioned at the base of the fixed frame 2 and, in its fully open position (not illustrated), can (purely by way of example) be superposed over a fixed sash 101 or a sash that is also mobile.

[0033] The pair of carriages 4, 5 are associated with the bottom crosspiece 6 of the sash 3 and are guided by the track 7 to allow the sliding of the sash 3 to and from the above-mentioned open and closed positions.

[0034] The carriage 4 will hereafter be called "main", which, in the direction F2 of closing the sash 3, is positioned in front of the other carriage 5, which on the other hand will be called "secondary", and is connected, in series with the main carriage 4.

[0035] The door or window 1 comprises, as indicated, a control handle 14 positioned on the sash 3.

[0036] The control handle 14 is connected to the carriage unit 100 using a connecting rod 23 slidable inside the vertical member of the movable sash 3.

[0037] In turn, the rod 23 is connected to a drive linkage 13 of the movement imparted by the handle 14 connected to the main carriage 4.

[0038] In this way, the rotation of the handle 14 in one direction or the other allows:

- the sash 3 to be lifted so as to move the lower seals of the sash 3 away from the sides of the track 7 and thereby allow the sliding of the latter to and from the above-mentioned open and closed positions (see arrow F1 and Figures 5 and 6), or
- the sash 3 to be lowered to the closed position so that the seals close the door or window 1 (see arrow F2 and Figures 2 and 4).

[0039] According to the invention, the main carriage 4 comprises a first box-type frame 8 having an upper portion 8a configured to be slidably coupled, in use, to the lower crosspiece 6 of the sash.

[0040] Also according to the invention, the main carriage 4 comprises a second frame 9 supporting a pair of wheels 10 and 11 positioned, in use, resting on the track 7.

[0041] In light of this, the second frame 9 is configured to allow a pivoting movement of the two wheels 10 and 11 about a single pivot point P1.

[0042] Also according to the invention, the main carriage 4 comprises a link mechanism 12 for lifting and lowering the sash 3 relative to the track 7, corresponding to the open and closed positions, respectively, of the sash. The link mechanism 12 is positioned and acting between the first frame 8 and, in use, the drive linkage 13 controlled by the handle 14 positioned on the sash 3.

[0043] Preferably (see Figure 7), the link mechanism 12 is also connected to the second frame 9 for allowing a movement, in both directions, of the pair of wheels 10 and 11 on the track 7 during the lifting and lowering movement of the sash 3 and keeping the same pair of wheels 10 and 11 centred relative to the first frame 8 during lifting or lowering.

[0044] Preferably, the first frame 8 comprises its respective upper portion 8a shaped to form two coupling grooves S1 and S2 in a channel 6c made on the bottom crosspiece 6 of the sash 3.

[0045] Preferably, the first frame 8 comprises a surface 15 and 16 shaped at each of its ends and configured for forming a contact guide cam for the hinge point P2, P3 of the link mechanism 12 connected to the drive linkage 13.

[0046] In light of this, each shaped surface 15 and 16 forms a point for resting and supporting at a height (from the bottom) the first frame 8 to the hinge point P2, P3 at the raised opening position of the sash 3.

[0047] Thanks to this mechanical combination and the large supporting surface of the first frame 8 on the sash 3, the lifted position of the sash 3 is extremely stable even in the presence of heavy sashes.

[0048] More in detail, the link mechanism 12 comprises a first proximal movement rod 12a hinged, at three different points P4, P5, P2, to the first frame 8, to the drive linkage 13 and to the second frame 9, respectively.

[0049] In light of this, the link mechanism 12 comprises a second rod 12b, distal relative to the drive linkage 13, hinged to the first frame 8 at a point P6, at one end, and at the other end, hinged at a single point P3 to the second frame 9 and to a rigid connecting unit 17 associated with the lower crosspiece 6 of the sash 3 for forming a rigid contact between second rod 12b and crosspiece 6 during the lifting and lowering movement. Preferably, the rigid connecting unit 17 is also associated, in series, with the second secondary carriage 5.

[0050] It should be noted that the first and second rods 12a and 12b form two bilateral pairs of rods forming the movement mechanism.

[0051] In light of this, it should be noted that the above-mentioned pivot points or hinge points (P1, P2, P3, P4, P5, P6) are formed by relative rotatable fixing pins between the various components.

[0052] Preferably, the second frame 9 comprises two flat plates 9a, 9b partially housed in the first frame 8 and movable relative to the first frame 8.

[0053] In light of this, each plate 9a, 9b is hinged, at its relative ends, to the link mechanism 12.

[0054] It should be noted that the two flat plates 9a, 9b forming the second frame 9 have a single pivot point P1 for the pair of wheels 10 and 11 in an intermediate area relative to the two hinge points P2, P3 with the link mechanism 12.

[0055] In light of this, the pair of wheels 10 and 11 are rotatably fixed to a pair of horizontal rockers 18 and 19 having the central pivot point P1 hinged to the second frame 9.

[0056] The pair of rockers 18 and 19 forms a further frame inside the second frame 9 and makes the pair of wheels 10 and 11 independent from the second frame 9 and from the first frame 8.

[0057] The pair of wheels 10 and 11 are indirectly connected to the second frame 9 by the pivot point P1.

[0058] The link mechanism 12 connecting between the first frame 8, second frame 9 and drive linkage 13 therefore determines a movement for lifting or lowering the first frame 8, with the action of the handle 14, with consequent lifting and lowering of the sash 3 (see Figures 2 to 6).

[0059] These movements are determined by the rotation of the connecting rods 12a and 12b which lift or lower the first frame 8 with relative backwards or forwards sliding of the second frame 9 thanks to the pair of wheels 10 and 11 connected to it.

[0060] The presence of the cam surfaces 15, 16 on the first frame 8 facilitates the lifting and lowering movements of the first frame 8 and also keeps the lifted position stable.

[0061] Thanks to this kinematic mechanism, the rotation of the handle, especially during the lifting of the sash 3, is extremely fast and "smooth" without excessive effort by the user.

[0062] Preferably, between the motion drive linkage 13 and the rod 23 there are adjustable means 24 for joining the drive linkage 13 with the rod 23 for adjusting, if necessary, the connection of the drive linkage 13 with the movement rod 23 keeping stable the relative position adopted by the handle 14 and the main carriage 4 (as well as the secondary carriage 5, all upon assembly), see in particular Figures 2, 5 and 7.

[0063] Preferably, the drive linkage 13 comprises a movement arm 25 articulated with the link mechanism 12 for lifting and lowering the sash 3 positioned and acting on the carriage 4.

[0064] Preferably, the adjustable joining means 24 are connected to the free end of the movement arm 25.

[0065] Preferably, the adjustable joining means 24 comprises an end 26 for connecting with the movement rod 23; the end 26 being slidingly insertable, in use, in the sash 3.

[0066] The adjustable means 24 also comprise a slide 27 articulated with the movement arm 25 and configured for the contact and the front joining with the end 26.

[0067] Preferably, the adjustable means 24 also comprise means 28 for adjusting the relative position between the end 26 and the slide 27.

[0068] These adjusting means 28 are positioned between the two contact surfaces 26a, 27a of the end 26 and of the slide 27, so as to allow a variation, in use, of the position of the end 26 relative to the arm 25.

[0069] In light of this, the adjustable means 24 also comprise means 29 for clamping the slide 27 to the end 26 and configured for locking the slide 27 to the end 26 in the defined position.

[0070] Preferably, the adjusting means 28 comprise a toothed surface 27a and a counter-toothed surface 26a made on the corresponding contact surfaces of the slide 27 and of the end 26 which can be coupled to or copenetrated in each other to allow a plurality of separate positions between the slide 27 and the end 26 which can be coupled, in use, with the rod 23.

[0071] It should be noted that the clamping means 29 comprise a cap 29a which can be coupled on the outer surface of the slide 27.

[0072] In light of this, the cap 29a comprises screw elements 29b passing through a slot-shaped cavity 29c made on the slide 27 and screwably engageable, in use, in a cavity 26b of the end 26 for locking the latter with the slide 27 in the adopted position.

[0073] In practice, if the coupling between the end 26 and the rod 23 is difficult during assembly of the movement accessories due to errors in cutting and drilling holes in the rod 23, the assembly technician can loosen the screws 31 and, therefore, the coupling between slide 27 and terminal 26.

[0074] At this point, the technician can translate, in steps, the end 27 until reaching the correct coupling in the cavity of the rod 23: this is without modifying the position adopted by the arm 25 and by the handle 14.

[0075] Once the rod 23 - end 27 has been coupled, the technician can again clamp end 27 and slide 26 in the adopted position.

[0076] Thanks to this system, which comprises a toothed and adjustable connecting joint, the movement given by the mechanisms which control the carriages is maintained in perfect timing between the handle at zero degrees when the sash is in the lowered position and the handle at 180° when the sash is in the raised position.

[0077] In this way, any errors in cutting the rod are eliminated, allowing the door or window installer to work without particular precision requirements and without this having an impact on the final quality of the door or window.

[0078] Preferably (see Figure 8), the structure and the functions of the elements of the secondary carriage 5 are very similar to those of the main carriage 4.

[0079] Preferably, the secondary carriage comprises a first box-type frame 8 having an upper portion 8a designed to be slidably coupled, in use, to the lower crosspiece 6 of the sash 3.

[0080] Again preferably, the secondary carriage 5 comprises a second frame 9 supporting a pair of wheels 10 and 11 positioned, in use, resting on the track 7.

[0081] In light of this, the second frame 9 is configured to allow a pivoting movement of the two wheels 10 and 11 about a single pivot point P1. Again preferably, the secondary carriage 5 comprises a link mechanism 12 for lifting and lowering the sash 3 relative to the track 7, corresponding to the open and closed positions, respectively, of the sash 3.

[0082] In light of this, the link mechanism 12 is positioned and acting between the first frame 8 and, in use, a connecting unit 17 in series with the first carriage 4.

[0083] It should be noted that, thanks to the connecting unit 17, the movement for lifting and lowering the sash 3 is synchronized with the movement of the main carriage 4 which, in turn , is connected to the drive linkage 13. Preferably, the connecting unit 17 in series, for example, comprises two slides 17a and 17b slidably connected to

the channel 6c of the crosspiece 6.

[0084] Each slide 17a, 17b is, on one side, hinged to the corresponding link mechanisms 12 of the two carriages 4 and 5 and, on the other side, it is joined to the corresponding slide 17 or 17b using a rigid rod 20 with a suitable length depending on the size of the sash 3.

[0085] Preferably, the first frame 8 of the secondary carriage 5 comprises a rear end cavity 21 for housing an auxiliary elastic element 22, interposed between the first frame 8 and the link mechanism 12, and pushing on the link mechanism 12 during lifting of the sash 3.

[0086] Thanks to this structure, the secondary carriage 5, or, more precisely, its link mechanism 12, is facilitated in the lifting of the sash 3 by a suitable modulation of the movement of the connecting rods 12b positioned in the rear point of the sash 3.

[0087] It should be noted that the secondary carriage 5 differs in certain details with respect to the main carriage 4, in addition to the presence of the auxiliary elastic element 22.

[0088] The two connecting rods 12a and 12b are of the simple type with only two pivot points each (P4 and P2 in front and P3, P6 in the rear).

[0089] The first frame 8 of the secondary carriage 5 can be free of the cam surfaces, since the assistance and the stabilization in the movements and in the stabilization of the position is performed by the elastic element 22. Preferably, the first frame 8 comprises the cavity 21 for housing the elastic element 22 open below and formed by a rear end vertical wall 30.

[0090] A front contact or retaining block 31 is constrained to the second frame 9. In light of this, the block 31 is interposed between the end of the elastic element 22 and the link mechanism 12 (see Figures 2, 8 and 9 to 12). More specifically, the block is interposed between the front end of the elastic element 22 and a rear pivot point of the link mechanism 12 connected to the second frame 9.

[0091] It should be noted that retaining block 31 comprises an adjustable means for the contact with the link mechanism 12.

[0092] In light of this, the retaining block 31 comprises threaded screw means 32 for the contact with the link mechanism 12.

[0093] More specifically, the screw means 32 are in direct contact with the rear pivot point P3 of the link mechanism 12.

[0094] Preferably, the vertical wall 30 of the first frame 8 and the block 31 comprise corresponding through holes 30a, 31a configured for allowing the direct access from the outside of operating elements for actuating the screw means 32 (which is described in more detail below).

[0095] To complete the structure, the first frame 8 of the secondary carriage 5 comprises an end spacer 33 for the snap-on attachment and the quick release of the elastic element 22 from the cavity 21 of the first frame 8 and positioned, in use, between the end of the elastic element 22 and the rear vertical wall 30 of the first frame 8.

[0096] The spacer 33 allows the elastic element to be replaced quickly and easily, for example, if it is decided, during assembly, to increase or decrease the elastic response on the connecting rods.

[0097] Preferably, the secondary carriage 5 also comprises the pair of wheels 10 and 11 rotatably fixed to a pair of horizontal rockers 18, 19 having the central pivot point P1 hinged to the second frame 9.

[0098] Preferably, the secondary carriage 5 has the first frame 8 comprising its respective upper portion 8a shaped to form two coupling grooves S1 and S2 in the channel 6c made on the bottom crosspiece 6 of the sash 3. Preferably, the secondary carriage 5 comprises means 34 for adjusting the distance of the sash 3 relative to the track 7 at least in its lowered position, positioned between the first frame 8 and the second frame 9 and acting directly on the first frame 8 (see Figures 9 to 12).

[0099] In other words, these means allow the height H of the rear part of the sash 3 to be varied relative to the track 7 for adjusting any misalignments during assembly between the vertical member of the sash and the vertical member of the fixed frame 1: all with the carriage unit 100 already assembled.

[0100] Preferably, the adjustment means 34 comprise the second frame 9 equipped with a pair of slots 35 with a vertical extension engaged in the single pivot point P1 of the wheels 10 and 11.

[0101] Preferably, the adjustment means 34 comprise a movable third frame 36 interposed between the pair of wheels 10 and 11 and the second frame 9 and connected to the second frame 9 at the single pivot point P1 using a pair of inclined slots 37.

[0102] Preferably, the adjustment means 34 also comprise movement means 38 positioned on the second carriage 5 and configured for translating the third frame 36 in both directions with corresponding lifting and lowering of the second frame 9 along the single pivot point P1 with relative lifting and lowering of the first frame 8 and of the sash 3 relative to the track 7.

[0103] It should be noted that the second and third frames 9 and 36 comprise corresponding pairs of flat plates 9a, 9b and 36a, 36b equipped with the above-mentioned slots 35 and 37.

[0104] In light of this, the means 38 for moving the second 9 and third 36 frame comprise a drive 31 slidably housed inside the first frame 8 and configured for connecting to the rear end of the second 9 and third 36 frame and moving the rear ends of the second 9 and third 36 frame.

[0105] It should be noted that the drive comprises the above-mentioned block 31 for retaining the elastic element 22.

[0106] The block 31 is equipped, on both sides, with enlargements 40 for guiding (pushing and pulling) the two frames 9 and 36.

[0107] The enlargements are engaged in corresponding slot-shaped cavities 41, 42 made on the rear ends of the second 9 and third 36 frame.

[0108] The means 32 housed in the block 31 also form part of the adjustment means 38.

[0109] The means 32 are adjustable and allow adjustment of the height of the sash 3.

[0110] In light of this, the means 32 are in contact with the link mechanism 12 forming a fixed contact point during adjustment of the height.

[0111] More specifically, the above-mentioned screw means 32 are threaded and housed in the block 31.

[0112] In light of this, the screw means 38 are used for adjusting the height of the sash 3 and in contact with the link mechanism 12 forming the fixed contrast point when adjusting the height H.

[0113] As already mentioned, the first frame 8 comprises the vertical end wall 30 equipped with a through hole 30a.

[0114] In turn, the block 31 comprises a corresponding through hole 31a configured, together with the through hole 30a of the first frame 8, for allowing direct access from the outside of operating elements for adjusting the screw means 32 in such a way as to translate, in both directions, the block 31 and the second 9 and third 36 frame (the operating elements are not illustrated since of known type).

[0115] The adjustment system structured in this way allows the position of the sash 3 to be adapted/aligned if, after assembly, an imperfect alignment is found between the vertical member of the fixed frame and the vertical member of the movable sash.

[0116] The adjustment is extremely easy and fast thanks to the possibility of inserting a suitable tool inside the rear end of the secondary carriage and operating on the screw means 32.

[0117] The screw means 32 are a contrast with one of the pivot points of the connecting rod 12b lever which, in effect, is a fixed contact element: this therefore allows the translation of the block 31 which, in turn, acts on the second 9 and third 36 frame using the relative slotted end cavities 41 and 42.

[0118] The movement / translation of the third frame 36 determines a vertical movement (high-low) of the second frame 9 in contact with the first frame 8 due to the coupling between the slots 35 and 37 with the pivot point P1 of the wheels 10 and 11.

[0119] The vertical movement of the second frame 9 determines a lifting or lowering of the first frame 8 and, therefore, of the sash 3 in that area, thereby determining a correction of alignment of the sash relative to the fixed frame.

[0120] Therefore, thanks to the above-mentioned structure, the carriage unit according to this invention fully achieves the pre-set aims.

[0121] The unit with the movement system using connecting rods and pairs of wheels with a reduced centre-to-centre distance and pivoting allows the "lift & slide" function to be achieved within smaller spaces with the advantage of being able to reduce the dimensions of the profile receiving the carriage unit and therefore with a competitive advantage in terms of cost of the profile.

[0122] The pairs of pivoting wheels allow a correct movement of the sash along the track even in the absence of linearity on the track caused by irregularities of the track or of the floor on which the door or window rests. The connecting rod unit mounted on the carriages uses its reduced stroke and the maximum preloading of the rear spring in the position in which the connecting rods are kinematically in the most critical position, that is, at approximately 45°.

[0123] As the connecting rods move towards the vertical position, the spring loses its load but the kinematic mechanism increases in efficiency so much so that with the connecting rods at about 90° the effort exerted on the handle is only needed to overcome friction and not also lift the sash. The entire general structure of the carriages described above ensures a constant and repetitive lifting height of the sash regardless of the weight of the sash and any clearances present in the kinematic mechanism.

[0124] In effect, when the connecting rods which generate the lifting are at about 90° they generate the same lifting value.

[0125] The combination between lifting rods and first frame also allows, in the lifted position, to discharge the load of the sash on the connecting rods, on the wheels etc., but it is not transmitted to the handle which, in effect, will no longer be sensitive to the weight of the sash and the risk of undesired rotation.

Claims

1. A carriage unit for sliding doors or windows of the lift and slide type (1), the door or window comprising at least one fixed frame (2) and a sash (3) horizontally slidable relative to the frame (2), between an open position and a closed position; at least one main carriage (4, 5), associated, in use, with the bottom crosspiece (6) of the sash (3) and resting on a horizontal base track (7) to allow the sliding of the sash (3) in both the opening and closing directions; the at least one main carriage (4, 5) comprising:

- a first box-type frame (8) having an upper portion (8a) configured to be coupled, in use, to the lower crosspiece (6) of the sash;
- a second frame (9) supporting a pair of wheels (10, 11) positioned, in use, resting on the track (7); the second frame (9) being configured to allow a pivoting movement of the two wheels (10, 11) about a single pivot point (P1);
- a link mechanism (12) for lifting and lowering the sash (3) relative to the track (7), corresponding to the open and closed positions, respectively, of the sash (3); the link mechanism (12) being positioned and acting between the first frame (8) and, in use, a drive linkage (13) controlled by a

handle (14) positioned on the sash (3),
characterised in that the link mechanism (12) is also connected to the second frame (9) for allowing a movement, in both directions, of the pair of wheels (10, 11) on the track (7) during the lifting and lowering movement of the sash (3) and keeping the same pair of wheels (10, 11) centred relative to the first frame 8 during lifting or lowering; the link mechanism (12) having a first proximal movement rod (12a) hinged, at three different points, at three different points (P4, P5, P2), respectively, to the first frame (8), to the drive linkage (13) and to the second frame (9); the link mechanism (12) also comprising a second rod (12b), distal relative to the drive linkage (13), hinged to the first frame (8) at a point (P6), at one end, and at the other end, hinged at a single point (P3) to the second frame (9) and to a rigid connecting unit (17) associated at least with the crosspiece (6) of the sash (3), and wherein the first frame (8) comprises a surface (15, 16) shaped at each of its ends and configured for forming a contact guide cam for the hinge point (P2, P3) of the link mechanism (12) connected to the drive linkage (13); each shaped surface (15, 16) forming a supporting point of the first frame (8) to the hinge point (P2, P3) at the raised opening position of the sash (3).

2. The carriage unit according to claim 1, wherein the link mechanism (12) comprises a second rod (12b), distal relative to the drive linkage (13), hinged to the first frame (8) at a point (P6), at one end, and at the end, hinged at a single point (P3) to the second frame (9) and to a rigid connecting unit (17) in series with a second secondary carriage (5).

3. The carriage unit according to claim 1 or 2, wherein the second frame (9) comprises two flat plates (9a, 9b) partially housed in the first frame (8) and movable relative to the first frame (8); each plate (9a, 9b) being hinged, at its relative ends, to the link mechanism (12).

4. The carriage unit according to claim 3, wherein the two flat plates (9a, 9b) forming the second frame (9) have a single pivot point (P1) for the pair of wheels (10, 11) in an intermediate area relative to the two hinge points (P2, P3) with the link mechanism (12).

5. The carriage unit according to any one of the preceding claims, wherein the pair of wheels (10, 11) are rotatably fixed to a pair of horizontal rockers (18, 19), forming a further independent frame inside the second frame (9), having the central pivot point (P1) hinged to the second frame (9).

6. The carriage unit according to any one of the preceding claims, comprising a secondary carriage (5) having:

- a first box-type frame (8) having an upper portion (8a) configured to be slidably coupled, in use, to the lower crosspiece (6) of the sash (3);
- a second frame (9) supporting a pair of wheels (10, 11) positioned, in use, resting on the track (7); the second frame (9) being configured to allow a pivoting movement of the two wheels (10, 11) about a single pivot point (P1);
- a link mechanism (12) for lifting and lowering the sash (3) relative to the track (7), corresponding to the open and closed positions, respectively, of the sash (3); the link mechanism (12) being positioned and acting between the first frame (8) and, in use, a connecting unit (20) in series with the main carriage (4).

7. The carriage unit according to claim 6, wherein the first frame (8) of the secondary carriage (5) comprises a rear end cavity (21) for housing an auxiliary elastic element (22), interposed between the first frame (8) and the link mechanism (12), and pushing on the link mechanism (12) during lifting of the sash (3).

8. The carriage unit according to any one of the preceding claims, wherein the first frame (8) comprises its respective upper portion (8a) shaped to form two coupling grooves (S1, S2) in a channel (6c) made on the bottom crosspiece (6) of the sash (3).

FIG.1

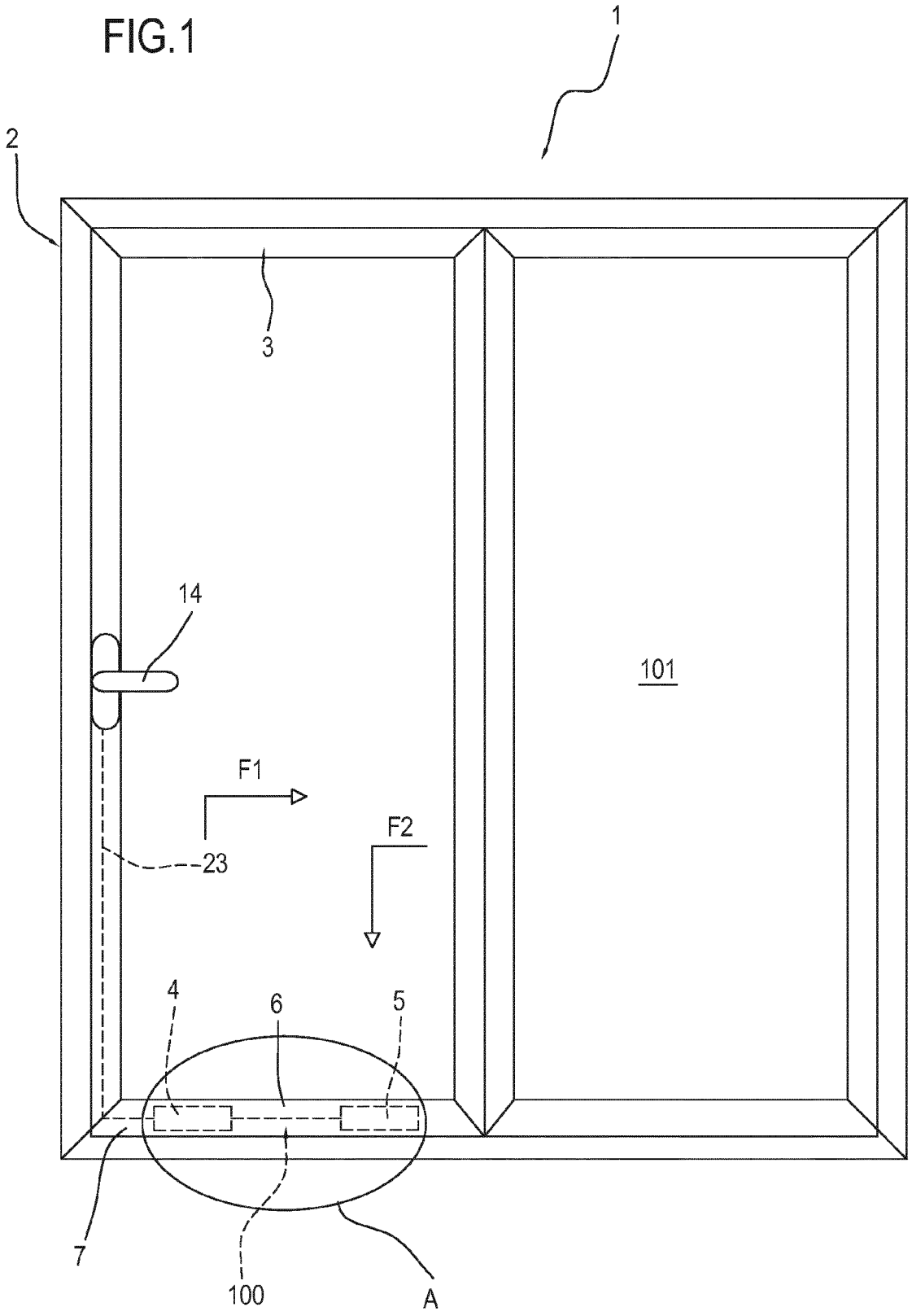


FIG.4

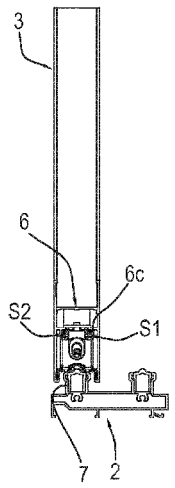


FIG.2

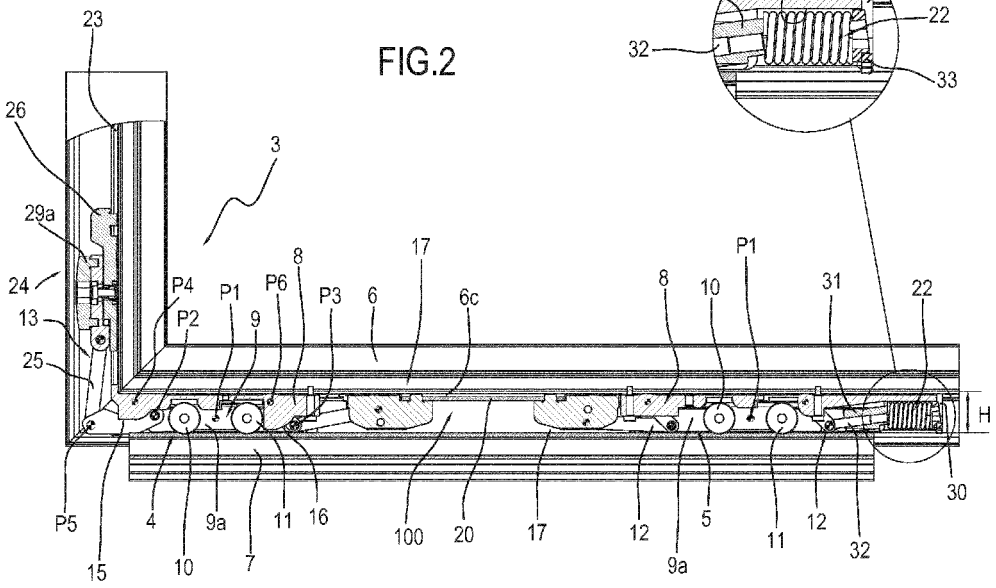


FIG.3

FIG.6

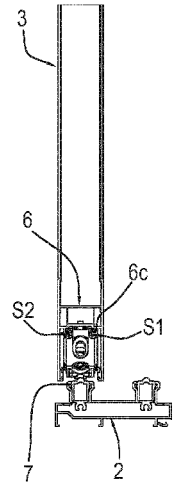
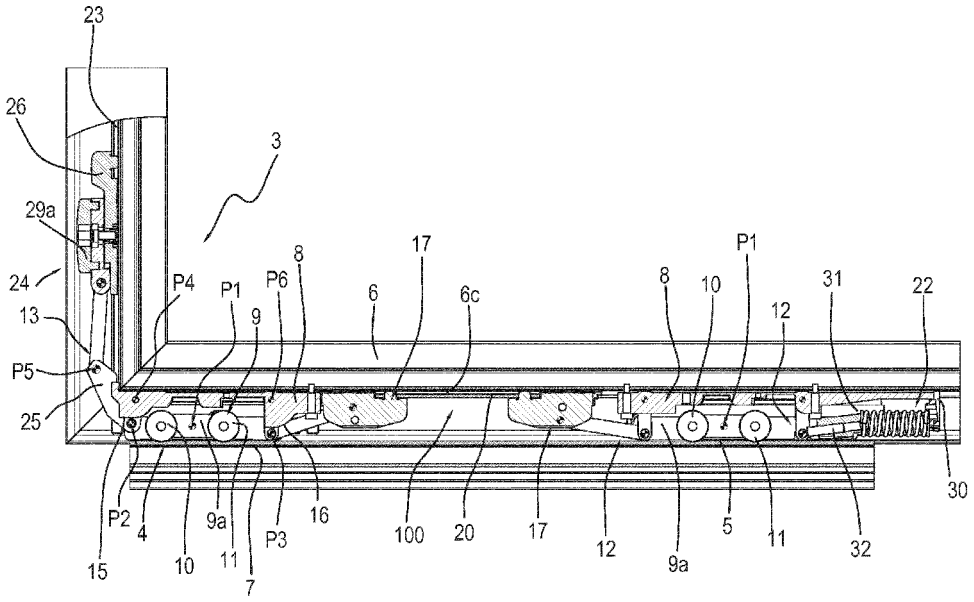

3
6
6c
S2
S1
7
2

FIG.5


23
26
3
29a
24
P4
P1
P6
8
17
6
6c
8
10
P1
31
22
13
9
12
P5
25
P2
4
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9a
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7
P3
16
15
100
20
17
12
9a
5
11
32
30

FIG.7

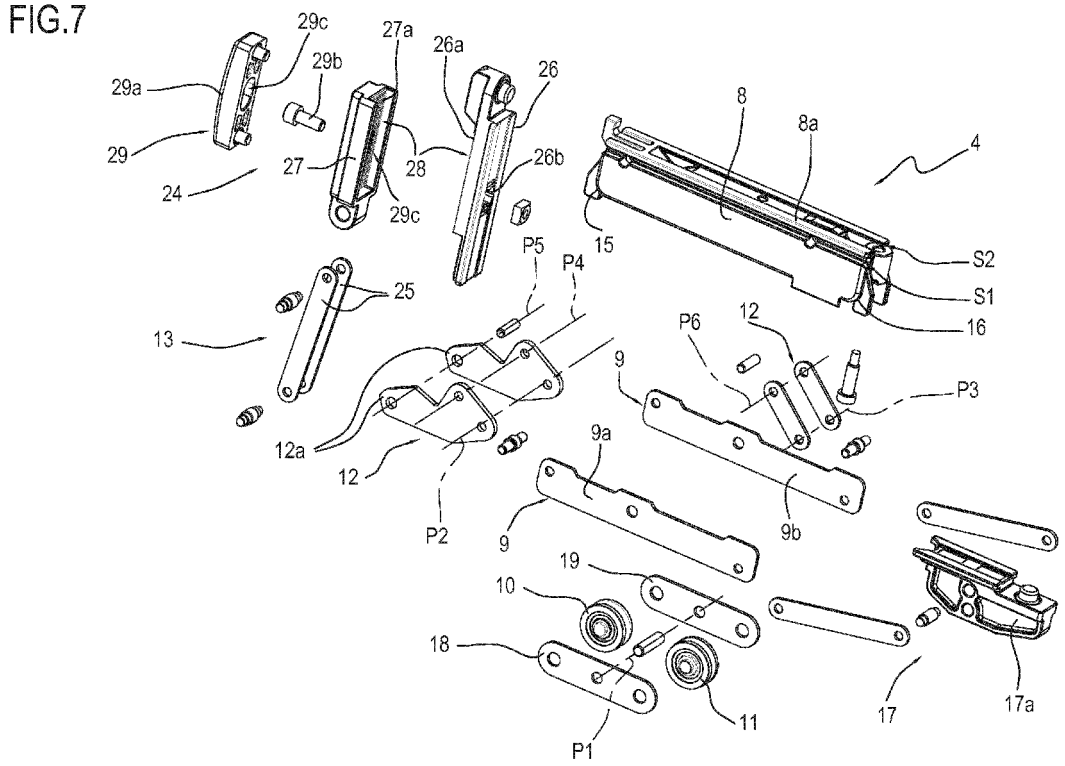

29c
27a
26a
29b
26
29a
8
8a
4
29
27
28
26b
24
29c
15
S2
S1
16
P5
P4
25
13
P6
12
9
P3
12a
12
9a
P2
9
9b
19
10
18
11
17
17a
P1

FIG.8

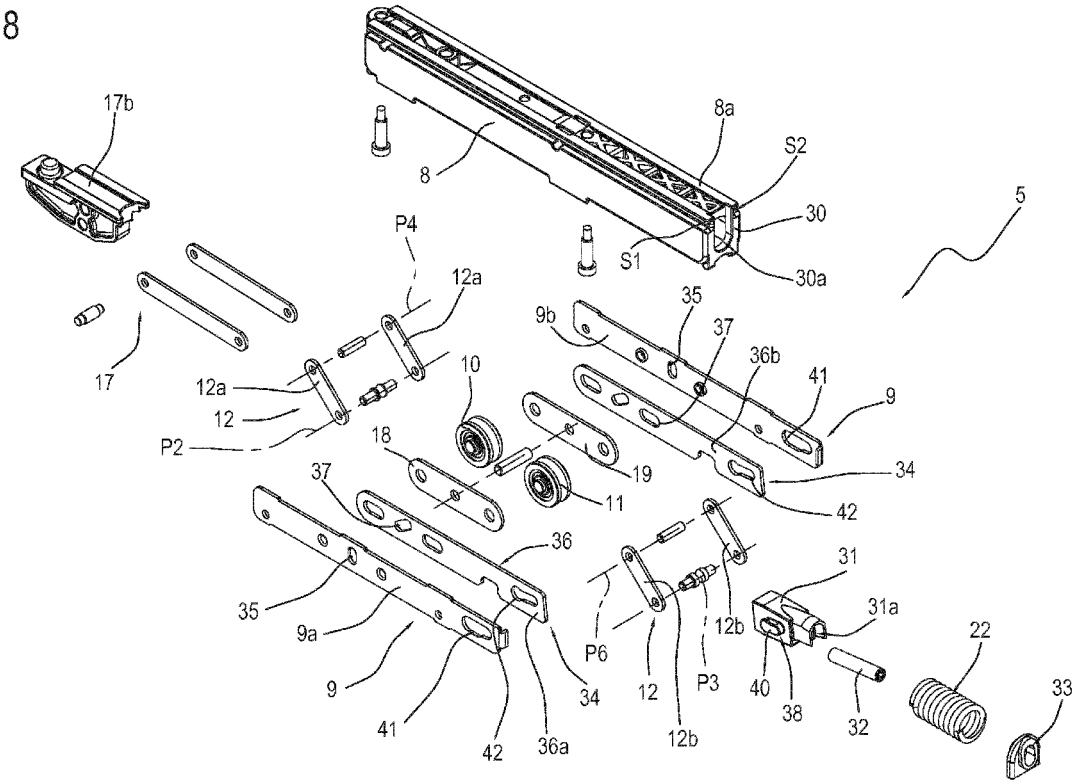

17b
8
8a
S2
30
30a
S1
5
P4
12a
17
12a
12
P2
10
18
37
35
9a
9
41
42
36
36a
34
11
19
9b
35
37
36b
41
9
34
42
31
31a
22
33
P6
12
12b
P3
12b
40
38
32

FIG.9

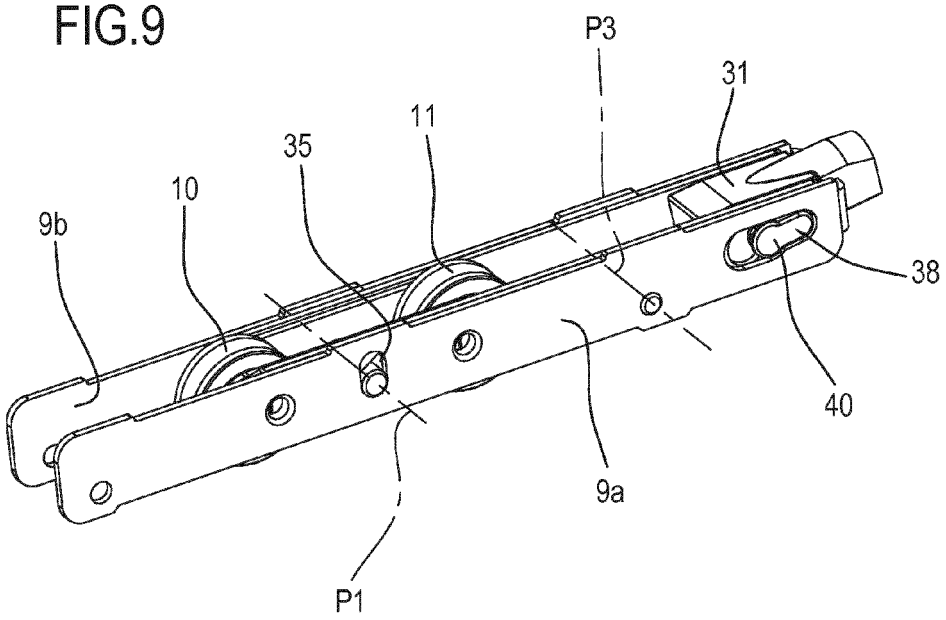

P3
31
11
35
10
9b
38
40
9a
P1

FIG.10

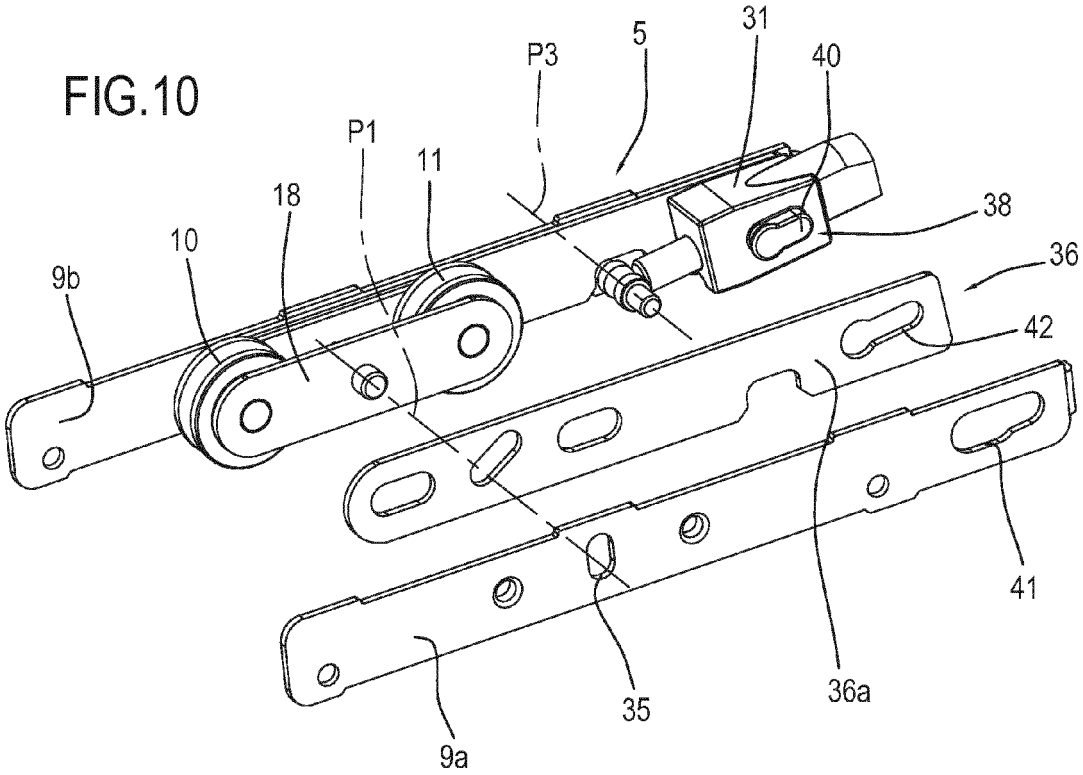

31
5
P3
40
P1
11
18
38
10
36
9b
42
41
35
36a
9a

FIG.11

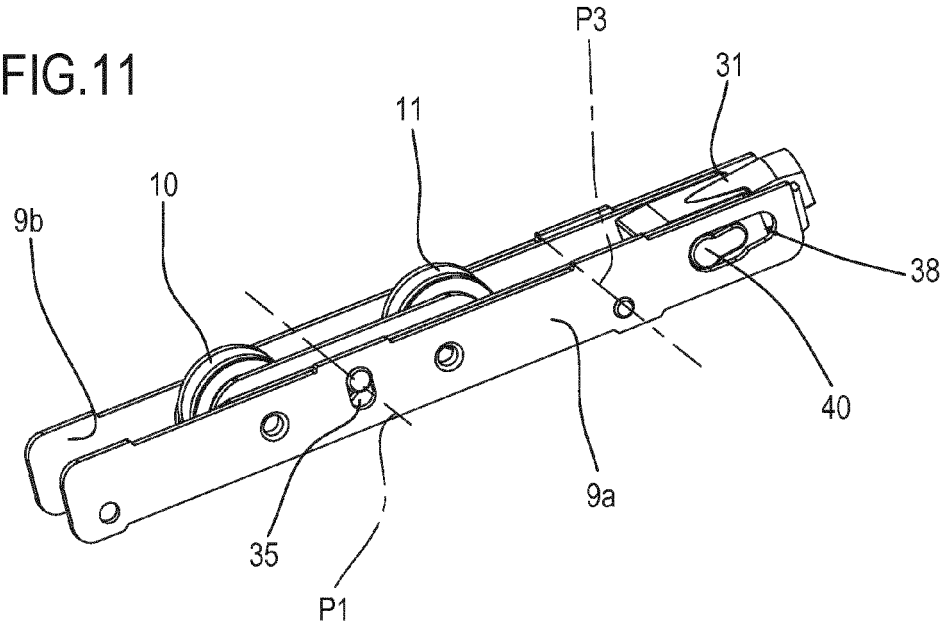
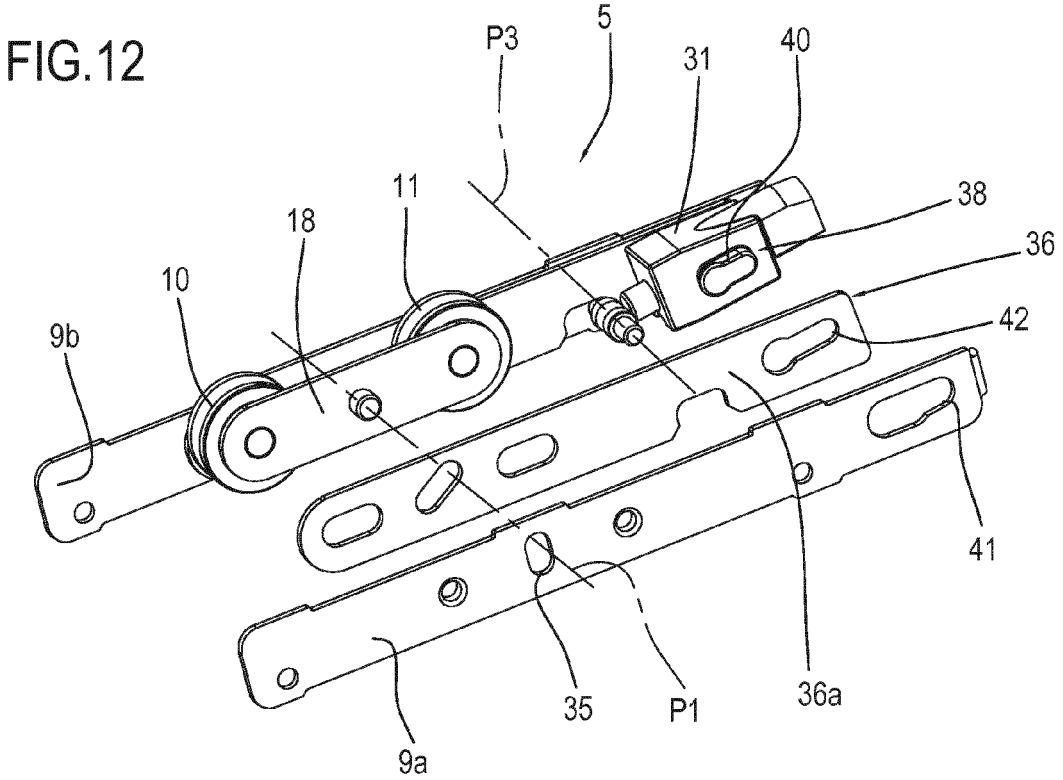

P3
31
11
10
9b
38
40
9a
35
P1

FIG.12


P3
5
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11
38
18
36
10
42
9b
41
35
P1
36a
9a

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EUROPEAN SEARCH REPORT

Application Number
EP 13 18 6066

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Place of search	Date of completion of the search	Examiner
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