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(54) **FABRIC ROLLER BLIND**

(57) Fabric roller blind, which comprises a support frame (2) intended to be fixed to a load-bearing structure in which an opening (A) is obtained, a take-up roller (4) having a substantially vertical rotation axis (X) rotatably constrained to the lateral upright (21), a fabric (5) fixed to the take-up roller (4), a handle bar (6), to which the fabric (5) is fixed, the handle bar (6) extended along an extension axis (Z) substantially parallel to the rotation axis (X) of the take-up roller (4) and movable between an open position and a closed position, a lower pinion (11) rotatably connected to the handle bar (6) at the lower termination (7) and engaged in a shape relationship with a lower rack (15) fixed to the lower wall defining the opening (A), an upper pinion (12) rotatably connected to the handle bar (6) at the upper termination (8) and engaged in a shape relationship with an upper rack (16) fixed to the upper wall defining the opening (A), synchronization means (9) housed within the handle bar (6) to mechanically connect between the lower pinion (11) and the upper pinion (12) in order to synchronize their movement during the open position and the closed position of the handle bar (6).

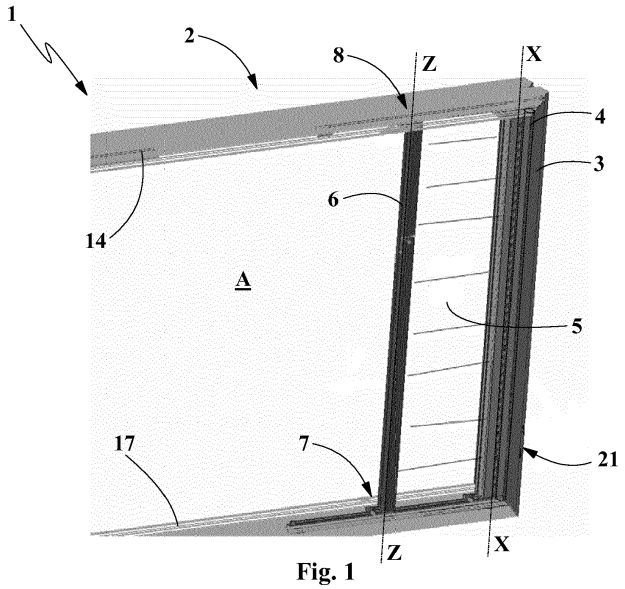

Fig. 1

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Description

Field of application

[0001] The present invention regards a fabric roller blind according to the preamble of the independent claim number 1.

[0002] The present fabric roller blind is intended to be advantageously employed for adjustably closing provided openings of building walls, in particular for windows, for doors, per French windows and similar windows/doors/shutters.

[0003] The blind, object of the present invention, is therefore inserted in the industrial field of the production of windows/doors/shutters, i.e. also in the field of production of fabrics for sun protection, in the field of mosquito netting or of similar applications.

State of the art

[0004] Blinds are known on the market for closing openings of windows/doors/shutters (such as windows, doors or French windows) provided with a rolling-shutter box, which is fixed to a building wall or to an upright that is lateral with respect to the opening to be closed and at its interior houses a roller on which a flexible cover fabric is susceptible of being wound and unwound.

[0005] The fabric usually has rectangular shape and is provided with a first lateral edge fixed to the roller and with a second lateral edge opposite the first lateral edge and fixed to a handle bar aimed to stretch the fabric itself during a movement thereof along a horizontal direction.

[0006] In addition, the blind comprises two guides arranged horizontally along the corresponding upper and lower walls which define the opening and to which the handle bar is slidably constrained. In particular, the handle bar comprises an aluminum section closed at the upper and lower ends by two terminations slidably coupled to the respective horizontal guides.

[0007] Normally, each of the upper and lower horizontal guides is generally obtained by means of an aluminum section fixed to the upper or lower wall which defines the opening. Each aluminum section of the two guides is provided with a longitudinal slit which is extended along the extension of the same section and which slidably houses at its interior the corresponding upper or lower terminal of the handle bar. The slits of the two guides face each other and delimit the two sides of the opening to be closed with the windable fabric.

[0008] The handle bar is movable by a user between an open position, in which it is side-by-side the rolling-shutter box with the fabric completely wound around the roller, so as to free the opening to be screened, and a closed position in which the handle bar is side-by-side the opposite lateral wall, with the fabric substantially completely unwound from the roller and placed to close the opening.

[0009] In operation, starting from the open position, the user grips the handle bar and drives it along the horizontal guides up to the desired position, e.g. up to the closed position, in which the fabric is placed to completely cover the opening.

[0010] During this movement, the upper and lower terminals of the handle bar respectively slide along the upper and lower guides.

[0011] The blinds of known type briefly described up to now have in practice proven that they do not lack drawbacks.

[0012] A first drawback of the blinds of known type lies in the fact that for the movement of the handle bar between the open position and the closed position, the handle bar can be gripped not exactly at the midpoint of its height but in a non-centered position, e.g. in proximity to one of the ends thereof. Such circumstance implies that the handle bar is more greatly moved along the guide closest to where the handle bar has been gripped by the user and to a lesser extent along the guide further away from where the handle bar was gripped by the user.

[0013] This determines a non-alignment between the two ends of the handle bar, i.e. in other words there will be one end of the handle bar more advanced in the direction of its movement and one end more retreated in the direction of its movement. Such non-alignment of one end of the handle bar with respect to the other brings the fabric roller to be stretched in a non-uniform manner, forming bends that can in the long term also lead to the deterioration and hence also to the breakage of the fabric itself.

[0014] In addition, such non-alignment leads to an undesired deterioration of the terminals inserted in the horizontal guides due to the stresses to which they are continuously subjected. In addition, following such non-alignment, it can happen that the same terminals exit outward from the horizontal guides, requiring the intervention by a specialized technician.

[0015] In order to at least partially overcome such drawbacks of the abovementioned prior art, fabric roller blinds, also of known type, have been developed which are provided with means for aligning the terminals of the handle bar, which maintain the terminals thereof vertically aligned during the movement of the same handle bar between the open and closed positions.

[0016] Known from the patent EP 2530236 is an example of a fabric roller blind, which is provided with the main members and components indicated above and with alignment means housed in the handle bar. More in detail, the fabric roller is constituted by an anti-mosquito net, with substantially rectangular shape, which is fixed at a lateral end thereof to the take-up roller which is housed within the vertical rolling-shutter box and at the other end is fixed to the handle bar, which is susceptible of being gripped by a user in order to move the blind between the open and closed positions.

[0017] The fabric roller blind of known type described in this patent EP 2530236 comprises a guide chain composed of a plurality of elements pivoted to each other in

succession and capable of rotating with respect to each other only in one rotation sense, so as to attain - when extended aligned in succession - a member that is rigid in the opposite rotation direction, susceptible of attaining a guide for the fabric. Such elements are housed within a corresponding vertical seat made within the handle bar when the blind is in open position. The chain is constrained at one end thereof to the rolling-shutter box in which the take-up roller is housed, while the other end is slidably inserted within the vertical seat of the handle bar.

[0018] When the blind is moved from the open position to the closed position, the guide chain is driven outside the vertical seat of the handle bar, being set on the lower wall (usually the floor or a windowsill) which delimits the opening to be screened, thus acting as lower guide for the fabric. The guide chain, with the blind in closed position, therefore defines a horizontal rectilinear guide for the fabric, which allows retaining it in the spread-out position to close the opening to be screened.

[0019] Such fabric roller blind of known type also comprises, as stated, means for aligning the terminals of the handle bar in order to remedy their vertical non-alignment, or a different sliding in the horizontal direction of the two terminals, also if the handle bar is gripped and driven in proximity to one of the ends thereof.

[0020] In accordance with such blind of known type, the alignment means comprise a metal strap with curved section placed in proximity to the upper rectilinear guide, fixed on one side to the vertical upright and on the other side fixed to the end of the guide chain through a connector strap.

[0021] Such metal strap, like the guide chain when it is stretched during the opening of the handle bar, defines a rigid member in the sense that it does not allow the upper terminal to return backward i.e. to remain back with respect to the lower terminal.

[0022] Also, the blind of known type briefly described up to now has in practice shown that it does not lack drawbacks.

[0023] The main drawback lies in the fact that the means for aligning the blind of the above-described type are rather complex to make and install and consequently involve high production and installation costs.

[0024] A further drawback lies in the fact that the metal strap of the alignment means requires being produced custom-designed/cut-to-size and therefore it cannot be modified during installation in order to adapt it to the size of the opening if, for example, the measurements were not correctly taken. Therefore, in this case, in order to modify the height of the handle bar and/or the length of the metal strap, it is necessary to send the blind back to its production site, or to a specialized laboratory with a clearly considerable increasing of the overall costs associated with this blind. Therefore, the fabric roller blind of the above-described known type can only be produced custom-designed/cut-to-size for each client, based on the measurements of the opening to be screened, since as stated it is not possible to easily vary the size of the blind on the field, during installation, and hence it is costly and requires a long time to attain.

[0025] A further drawback of the blind of known type lies in the fact that the metal strap, with the handle bar in closed position, is at least partially visible by the user, and can be aesthetically non-appreciable.

Presentation of the invention

[0026] In this situation, the problem underlying the present invention is to provide a fabric roller blind which provides a handle bar movable between a closed position and an open position, maintaining an optimal alignment between the upper and lower ends thereof, regardless of the position in which the handle bar is gripped by the user in order to move it.

[0027] A further object of the present invention is to provide a fabric roller blind which can be adapted to an opening to be screened even during its installation, in a quick and easy manner.

[0028] Another object of the present invention is to provide a fabric roller blind which is entirely reliable in operation, and in particular capable of ensuring the aforesaid alignment even after a prolonged use over the years, without requiring a periodic maintenance.

[0029] Another object of the present invention is to provide a fabric roller blind which is entirely efficient in operation, and in particular capable of ensuring the correct alignment of the upper and lower ends of the handle bar, even for the handle bars with great extension, i.e. even for handle bars provided with extension of over two meters.

[0030] A further object of the present invention is to provide a fabric roller blind which can be made in a few standardized sizes, such that an installer technician can directly adapt them to the opening to be screened, in particular by means of a cutting-to-size thereof. In this manner, the blind is inexpensive to make and easy to install.

[0031] Another object of the present invention is to provide a fabric roller blind which is structurally simple and inexpensive to make and install.

Brief description of the drawings

[0032] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen in the contents of the below-reported claims and the advantages thereof will be more evident in the following detailed description, made with reference to the enclosed drawings which represent a merely exemplifying and non-limiting embodiment of the invention, in which:

- figure 1 shows a front perspective view of the fabric roller blind, object of the present invention;
- figure 2 shows a sectional perspective view of a detail of the blind illustrated in figure 1, relative to a handle bar and to alignment means contained therein;

- figure 3 shows a detail of the fabric roller blind, object of the present invention, relative to an upper end of the handle bar, with some parts removed in order to better illustrate other parts;
- figure 4 shows a detail of the fabric roller blind, object of the present invention, relative to a lower end of the handle bar, with some parts removed in order to better illustrate other parts;
- figure 5 shows a detail of the fabric roller blind, object of the present invention, relative to the alignment means housed in the handle bar, with some parts removed in order to better illustrate other parts;
- figure 6 shows a sectional view of the handle bar of the fabric roller blind, object of the present invention, made along the trace VI-VI of figure 5;
- figure 7 shows a detail of the fabric roller blind, object of the present invention, in a second embodiment thereof, relative to the alignment means, with some parts removed in order to better illustrate other parts;
- figure 8 shows a detail of the fabric roller blind, object of the present invention, in the second embodiment thereof, relative to the alignment means, with some parts removed in order to better illustrate other parts;
- figure 9 shows a detail of the fabric roller blind, object of the present invention, in its second embodiment, relative to the alignment means, with some parts removed in order to better illustrate other parts.
- figure 10 illustrates a front perspective view of the blind in accordance with a third embodiment of the present invention, with some parts removed in order to better illustrate other parts;
- figure 11 shows a cross section view of the blind of figure 10 at a lateral upright of the blind itself, with some parts removed;
- figures 12 and 13 show two cross section views of a detail of the blind of figures 10 and 11, relative to the handle bar of the blind and a slidable wing, in two different positions;
- figures 14 and 15 show two perspective views of the handle bar and of the slidable wing, respectively in a separated configuration and a joined configuration;
- figure 16 shows a view of a detail of the lower part of the blind relative to an end stop element in order to release the handle bar from the slidable wing;
- figures 17-20 show means for coupling the handle bar to the slidable wing in corresponding different operating positions;
- figures 21 and 22 show some details of the present blind relative to slidable support means for the handle bar;
- figure 23-25 show different views relative to an end head of the lateral upright of the present blind.

Detailed description of a preferred embodiment

[0033] With reference to the enclosed drawings, reference number 1 overall indicates the fabric roller blind, object of the present invention.

[0034] The blind 1 is operatively employable in order to adjustably close an opening A of a window/door/shutter, e.g. of a window, of a door or of a French window, made in a load-bearing structure such as the building wall of a building.

[0035] In particular, the present blind 1 is a blind with horizontal sliding intended to be advantageously associated with a door or window with slidable wing provided, for example, with a glass panel.

[0036] In accordance with the embodiment illustrated in the enclosed figure 1, the fabric roller blind, object of the present invention, comprises a support frame 2 provided with at least one lateral upright 21 and intended to be fixed to the load-bearing structure in which the opening A is obtained, which is defined at least between two lateral walls, an upper wall and a lower wall. The support frame 2 can be fixed to the load-bearing structure at the opening by embedding it within the masonry or wooden section, or fixed with front mounting on the internal or external face of the building wall in which the opening is made.

[0037] Preferably, the lateral upright 21 of the support frame 2 comprises a rolling-shutter box 3 intended to be laterally positioned with respect to the opening A to be screened. Advantageously, the rolling-shutter box 3 comprises a hollow tubular body, in particular obtained with an aluminum extrusion, which is extended with substantially vertical axis between two opposite upper and lower ends.

[0038] The blind 1 also comprises a take-up roller 4 having a substantially vertical rotation axis X and rotatably constrained to the lateral upright 21 of the support frame 2 and preferably housed within the rolling-shutter box 3.

[0039] The blind 1, object of the present invention, also comprises a fabric 5, which preferably has rectangular shape and is extended between a first lateral edge thereof fixed to the take-up roller 4 and a second lateral edge thereof opposite the first lateral edge.

[0040] The fabric 5 can be intended for making a shading screen, e.g. in substitution of a rolling shutter, of a brise soleil screen for filtering the solar light or for making a mosquito netting. Generally, the fabric 5 can be dedicated to closing the opening of a window/door/shutter in order to protect an internal area from the sun and/or from the wind and/or, more generally, from the atmospheric conditions of the outside environment.

[0041] The fabric 5, as a function of its different applications, can be made of synthetic or natural material fabric and can have the shape of a mesh or have a continuous surface of shading, filtering or transparent type.

[0042] The fabric 5 wound around the take-up roller 4 passes through a vertical slit which is made on a lateral wall of the rolling-shutter box 3 which is directed towards the opening A.

[0043] The blind 1 also comprises a handle bar 6, to which the second lateral edge of the fabric 5 is fixed. Such handle bar 6 is extended along an extension axis

Z substantially parallel to the rotation axis X of the take-up roller 4 between a lower termination 7 and an upper termination 8. Advantageously, the handle bar 6 is made with a hollow tubular body, in particular obtained with an aluminum extrusion.

[0044] Preferably, the handle bar 6 has vertical extension axis Z extended in particular for lengths that can be quite high, e.g. over 4.5 meters.

[0045] The handle bar 6 is movable between an open position, in which the handle bar 6 itself is placed in proximal position with respect to the take-up roller 4, and in particular is placed in abutment against the rolling-shutter box 3, freeing the opening A from the fabric 5 and a closed position, in which the handle bar 6 is placed in distal position with respect to the take-up roller 4 with the fabric 5 to cover the opening A.

[0046] A second lateral upright is advantageously provided, arranged on the side of the opening A in a position facing the lateral upright 21 with the rolling-shutter box 3 associated therewith.

[0047] The handle bar 6 is associated with such second lateral upright when it reaches the closed position. Such second lateral upright advantageously also arranges locking/unlocking means for stopping the handle bar 6 in closed position or for releasing it so as to allow the return thereof in open position.

[0048] According to the idea underlying the present invention, the blind 1 also comprises a lower pinion 11, which is mechanically supported by the handle bar 6, is placed at the lower termination 7 of the latter and is engaged in a shape relationship with a lower rack 15 which is intended to be associated with the lower wall (i.e. for example with the floor or with the windowsill) delimiting the opening A.

[0049] The blind 1 also comprises an upper pinion 12 mechanically supported by the handle bar 6 at the upper termination 8 and engaged in a shape relationship with an upper rack 16 intended to be fixed to the upper wall delimiting the opening A.

[0050] Advantageously, the lower pinion 11 and the upper pinion 12 can be supported by the handle bar 6 both directly and indirectly through other mechanical members, as better specified hereinbelow.

[0051] More in detail, the handle bar 6 can comprise a lower casing 29 placed at the lower termination 7 thereof, provided with a through hole in which the lower pinion 11 is rotatably inserted. In this manner, the lower casing 29 supports, on the handle bar, the lower pinion 11, which remains free to rotate around the extension axis Z.

[0052] In the same manner, the handle bar 6 can comprise an upper casing (not illustrated in the enclosed figures) placed at the upper termination 8 thereof and provided with a through hole in which the upper pinion 12 is rotatably inserted.

[0053] In addition, according to the idea underlying the present invention, the blind 1 comprises synchronization means 9 at least partially housed within the handle bar 6 and placed to mechanically connect between the lower pinion 11 and the upper pinion 12 in order to synchronize their movement along the lower rack 11 and along the upper rack 12 during the movement of the handle bar 6 between the open position and the closed position.

[0054] In accordance with a first embodiment illustrated in the enclosed figures 1 to 4, the support frame 2 of the blind 1, object of the present invention, comprises an upper longitudinal frame member 14 and a lower longitudinal frame member 17 respectively intended to be fixed to the upper wall and to the lower wall which define the opening A to be screened. As can be appreciated from the abovementioned figures, the lower rack 15 is housed within the lower longitudinal frame member 17 of the support frame 2 and the upper rack 16 is housed within the upper longitudinal frame member 14 of the support frame 2.

[0055] Advantageously, the upper longitudinal frame member 14 and the lower longitudinal frame member 17 are both provided with a respective horizontal passage slit respectively traversed by the upper pinion 12 and by the lower pinion 11, in order to allow their engagement respectively with the upper rack 16 and with the lower rack 15 during the movement of the handle bar 6 between the open position and the closed position.

[0056] In accordance with the different embodiments illustrated in the enclosed figures, the synchronization means 9 comprise at least one rotary shaft 10 susceptible of rotating around the extension axis Z during the movement of the handle bar 6 between the open position and the closed position, housed within the handle bar 6 and supported thereby by means of connection means 30. Such rotary shaft 10 is extended along the extension axis Z to connect the lower pinion 11 and the upper pinion 12, which are fixed to the terminations of the handle bar 6 and rotate with angular velocity equal to that of the rotary shaft 10 itself.

[0057] Advantageously, the rotary shaft 10 has substantially tubular form. With the term "tubular" form, it must be intended hereinbelow a substantially prismatic shape (and hence also cylindrical hollow shape), elongated along a main extension direction and preferably internally hollow. More particularly, in accordance with the preferred embodiment illustrated in the enclosed figures, the rotary shaft has substantially cylindrical hollow tubular shape; nevertheless, the rotary shaft can be made of a substantially prismatic tubular shape that is hexagonal or octagonal (or of any substantially prismatic shape) without departing from the scope of the present patent.

[0058] The lower casing 29 and the upper casing are provided with corresponding through holes, which are traversed by a pin of connection of the respective lower pinion 11 and upper pinion 12 to the rotary shaft.

[0059] The connection means 30 preferably comprise a lower mouth and an upper mouth in which the connection pins of the respective lower pinion 11 and upper pinion 12 are fixed. Such lower and upper mouths are inserted in a respective lower and upper tubular end open-

ing of the rotary shaft 10, in order to integrally retain the pinions 11, 12 during the rotation of the rotary shaft 10 so that they rotate together, synchronized with the shaft 10 itself.

[0060] Otherwise, in accordance with a further embodiment not illustrated in the enclosed figures, the connection means 30 comprise an upper fork and a lower fork respectively fixed at the lower termination 7 and at the upper termination 8 of the handle bar 6 in order to retain the pins respectively of the lower pinion 11 and of the upper pinion 12.

[0061] Preferably, the rotary shaft 10 is made of rigid material, such as aluminum or of a plastic material.

[0062] In operation, during the movement of the handle bar 6 between the closed position and the open position, the lower pinion 11 slides, rotating around the extension axis Z with shape engagement on the lower rack 15, and in the same manner the upper pinion 12 slides, rotating around the extension axis Z with shape engagement on the upper rack 16. Such lower 11 and upper 12 pinions are connected by means of the synchronization means 9, in particular by means of the rotary shaft 10 it too susceptible of rotating around the extension axis Z at the same angular velocity as the pinions. Therefore, the lower and upper pinions 11, 12 are forced to rotate at the same speed and are substantially aligned along the extension axis Z of the handle bar 6.

[0063] In this manner, the user can grip the handle bar 6 in any position without running the risk that the lower and upper terminations 7, 8 slide with respect to each other, since the lower and upper pinions 11, 12 are constrained together to rotate aligned and at the same speed, with shape coupling along the respective lower and upper racks 15, 16 by means of the synchronization means 9.

[0064] In accordance with a further embodiment not illustrated in the enclosed figures, the synchronization means 9 comprise a kinematic chain such as a plurality of toothed wheels engaged with each other, housed within the handle bar 6, which transmit the rotary motion between the lower pinion 11 and the upper pinion 12.

[0065] Otherwise, in accordance with a further embodiment of the present invention not illustrated in the enclosed figures, the synchronization means 9 comprise a flexible element wound as a ring which connects together the lower pinion 11 and the upper pinion 12, synchronizing the motion thereof.

[0066] For example, the synchronization means 9 can comprise a lower pulley associated with the lower pinion 11 and an upper pulley associated with the upper pinion 12, connected by means of a transmission element such as a belt closed as a loop or a cord closed as a loop, or even a chain closed as a loop.

[0067] More generally, it is possible to make the aforesaid synchronization means 9 with any one motion transmission apparatus (*per se* known to the man skilled in the art) which connects the lower pinion 11 to the upper pinion 12 in order to render them synchronized in their rotation around the extension axis Z during the movement of the handle bar 6 between the open position and the closed position, without departing from the scope of the present patent.

[0068] In accordance with the preferred embodiment of the present invention illustrated in the enclosed figures, the lower pinion 11 and the upper pinion 12 respectively project from the lower termination 7 and from the upper termination 8 of the handle bar 6 in order to be engaged respectively with the lower rack 15 and the upper rack 16. More in detail, the lower pinion 11 and the upper pinion 12 axially project along the extension axis Z.

[0069] In order to maintain the rotary shaft 10 in position during its rotation around the extension axis Z, in particular if the handle bar has an extension along such axis Z equal to or greater than 2m, the handle bar 6 of the blind 1, object of the present invention, comprises at least one centering body 13 at least partially wound around the rotary shaft 10 of the synchronization means in order to stably maintain it in a housing position within the handle bar 6 during its rotation around its extension axis Z after the movement of the handle bar 6.

[0070] More in detail, in accordance with the enclosed figures 5 and 6, the centering body 13 is housed within the handle bar 6, which is preferably hollow and defines a housing space 23. Such shaped body 13 is countershaped with respect to the profile of the housing space 23 in order to be locked at its interior by means of shape coupling.

[0071] The centering body 13 is preferably provided with a through hole 24 traversed by the rotary shaft 10 of the synchronization means 9 and centered with the extension axis Z of the handle bar 6.

[0072] In this manner, the rotary shaft 10 remains aligned along the extension axis Z of the handle bar 6 even if its vertical extension is very high, in particular greater than 2m, since it is embraced by the centering body 13 which limits the oscillations and the movements thereof due to the shear stresses.

[0073] Preferably, the centering body 13 perimetrically comprises at least one locking tooth 25 (and in particular comprises three or more locking teeth 25), which interferes with the internal wall of the handle bar 6 that delimits the housing space 23 in order to lock the centering body 13 itself in the housing position.

[0074] In accordance with a further embodiment not illustrated in the enclosed figures, the handle bar 6 of the blind 1 comprises two or more centering bodies 13 housed within the housing space 23, preferably equidistant from each other along the extension axis Z, in order to better maintain the rotary shaft 10 in the housing position.

[0075] In accordance with the embodiment illustrated in the example of figures 3 and 4, the lower rack 15 and the upper rack 16 are fixed, being in particular integral with the support frame 2 or with the upper and lower walls that delimit the opening A.

[0076] In accordance with a second embodiment of the blind 1, object of the present invention, illustrated in the

enclosed figures 7 to 9, the lower rack 15 comprises a guide chain 18 movable between a retracted position in which it is housed within the handle bar 6 with the latter in open position and an extended position in which it is unwound below the fabric 5, in particular it is unwound on the visible surface of the lower wall which defines the opening A, with the handle bar 6 in closed position.

[0077] In particular, the lower rack 15 is advantageously provided on the face of the guide chain 18 directed towards the fabric 5.

[0078] Advantageously, the guide chain 18 of the lower rack 15 is provided with a plurality of aligned cavities 19 in succession along the extension of the chain for the shape engagement with the lower pinion 11.

[0079] More in detail, the guide chain 18 is formed by a plurality of guide elements 22 that are aligned with and pivoted to each other. Each guide element 22 is advantageously provided, on the surface, with at least one cavity 19 aligned with adjacent cavities 19 of adjacent guide elements 22.

[0080] The guide chain 18 is preferably fixed at a first end 27 thereof to the upright 21 of the support frame 2 at the bottom wall which delimits the opening A. The second end of the guide chain 18 (not illustrated in the enclosed figures) is free and slidably inserted within a vertical seat made in the handle bar 6.

[0081] In accordance with the second embodiment illustrated in the enclosed figures 7 - 9, the blind 1, object of the present invention, comprises a guide rail 31 intended to be fixed on the lower wall which defines the opening A and adapted to guide the guide chain 18 while it is set on the lower wall, during the movement of the handle bar 6 from the open position to the closed position.

[0082] In operation, when the user moves the handle bar 6 of the blind 1 in order to bring it from the open position to the closed position, the guide chain 18 which is initially housed within the seat made in the handle bar 6 slides on the latter and is set on the bottom wall which delimits the opening A to be screened.

[0083] In the same manner, when the user moves the handle bar 6 in order to bring it from the closed position to the open position, the guide chain 18, constrained by one side to the upright 21 of the support frame 2, is thrust to slide in the seat made in the handle bar 6.

[0084] Advantageously, the handle bar 6 comprises a shaped slide 28 placed at the lower termination 7 thereof, shaped for accompanying the guide chain 18 during its movement entering into and exiting out of the seat made in the handle bar 6.

[0085] Each guide element 22 of the guide chain 18 of the lower rack 15 is provided on one side with at least one pin 26 and on the other it is provided with at least one recess, shaped for containing the pin 26 of an adjacent guide element 22. In this manner, each guide element 22 is rotatably connected to two adjacent guide elements 22.

[0086] In accordance with the second embodiment illustrated in the enclosed figures 7 - 9, each guide element 22 of the guide chain 18 is on the surface provided with at least two aligned cavities 19 and in particular with three aligned cavities 19, facing towards the upper rack 16.

[0087] In order to engage the lower pinion 11 with the lower rack 15, in particular with the aforesaid guide chain 18, the lower pinion 11 comprises two conical toothed wheels 20 engaged with each other, of which a first conical toothed wheel 20' is fixed to the lower termination 7 of the rotary shaft 10 and a second conical toothed wheel 20" is integral with the lower pinion 11 engaged with the lower rack 15 by means of shape coupling and in particular is engaged with the aligned cavities 19 made on the guide chain 18.

[0088] More in detail, the first conical toothed wheel 20' is projectingly extended towards the guide chain 18 of the lower rack 15 and is retained by the lower casing 29 of the connection means 30. More in detail, in order to maintain protected the two conical toothed wheels 20 of the lower pinion 11, such conical toothed wheels 20 are housed within the handle bar 6 at the lower termination 7 thereof.

[0089] Therefore, the lower pinion 11, fixed to the second conical toothed wheel 20", engages the aligned concavities 19 of the guide chain 18 on the upper part with respect to the aforesaid shaped slide 28, with the guide chain 18 itself slidably inserted in the seat made in the handle bar 6.

[0090] Advantageously, the blind 1 comprises slidable support means 50 connected to the handle bar 6 and placed in vertical abutment against the support frame 2 in order to support the weight of the handle bar 6, which, as stated above, can have size (e.g. height greater than 4.5 meters) and thus weight that are relatively high.

[0091] Preferably, the slidable support means 50 comprise at least one rotatable element 51 mounted on the handle bar 6, susceptible of sliding via rolling during the movement of the handle bar 6 between the open position and the closed position, and susceptible of unloading the weight of the handle bar 6 on the support frame 2 or, in an equivalent manner, on the ground. Advantageously, the rotatable element 51 comprises a wheel (or a bearing) rotatably mounted (in particular idle) on the handle bar 6 and susceptible of sliding in abutment within a track 52 made on the support frame 2 and parallel to the racks 15, 16.

[0092] Preferably, with reference to the embodiment illustrated in figures 21 and 22, the slidable support means 50, and in particular the rotatable element 51, are arranged at the lower termination 7 of the handle bar 6 and the track 52 (in which the rotatable element 51 is slidably abutted) is made in the lower longitudinal frame member 17 of the support frame 2. In accordance with a different non-illustrated embodiment, the rotatable element 51 is arranged at the upper termination 8 of the handle bar 6 and is hung from a track made in the upper longitudinal frame member 14 of the support frame 2.

[0093] Advantageously, with reference to the embodiment illustrated in figures 10-20, the blind 1 comprises

a slidable wing 100 slidably constrained to the support frame 2 along a horizontal movement direction K parallel to the movement direction of the handle bar 6 between the open position and the closed position.

[0094] In particular, the slidable wing 100 is constrained to an upper guide and preferably to a lower guide made at the upper longitudinal frame member 14 and preferably at the lower longitudinal frame member 17 of the support frame 2 and parallel to the movement direction K.

[0095] Preferably, the slidable wing 100 comprises a framework (e.g. quadrangular) bearing, mounted thereon, a panel 102 constituted for example by a glass panel.

[0096] The framework is provided with a vertical upright 103 parallel to the lateral upright 21 of the support frame 2 and provided with a handle 104 susceptible of being constrained to the handle bar 6 by means of coupling means 200, in a manner such to integrally constrain the movable wing 100 to the handle bar 6 in order to be able to move them together, e.g. by acting on the handle 104.

[0097] In particular, the slidable wing 100 is movable between an open position, in which the vertical upright 103 is spaced from the lateral upright 21 in order to free the opening A, and a closed position, in which the vertical upright 103 is placed at the lateral upright 21 in a manner such that the panel 102 closes the opening A. In such closed position, the slidable wing 100 is susceptible of being engaged with the handle bar 6 (placed in open position) by means of the aforesaid coupling means 200 (as illustrated in figure 12). In this manner, when the slidable wing 100 is moved from the closed position to the open position, it drives the handle bar 6 towards the closed position, unrolling the fabric 5 (as illustrated in figure 13).

[0098] Advantageously, with reference to the embodiments of figures 17-20, the coupling means 200 comprise at least one engagement element 202 fixed to the vertical upright 103, and at least one coupling element 203 placed on the handle bar 6 and movable between a position of interference, in which the coupling element 203 retains the engagement element 202 in order to retain vertical upright 103 of the slidable wing 100 fixed to the handle bar 6, and a position of non-interference, in which the coupling element 203 releases the engagement element 202 in order to allow separating the vertical upright 103 from the handle bar 6.

[0099] Preferably, the engagement element 202 is positioned at a lower end and/or upper end of the vertical upright 103 of the slidable wing 100 and the coupling element 203 is placed at the lower termination 7 and/or at the upper termination 8 of the handle bar 6.

[0100] The engagement element 202 advantageously comprises a ratchet 202' fixed to the vertical upright 103.

[0101] Preferably, the coupling element 203 comprises a tooth 204 mounted on the handle bar 6 (e.g. on the lower casing 29 and/or upper casing of the latter) and slidably engaged on a track orthogonal to the movement direction K, and also comprises an elastic element 205 (such as a spring) acting on the tooth 204 in order to push it towards a position of interference. The tooth 204 is provided with a retention wall 206, directed towards the lateral upright 21 (e.g. substantially orthogonal to the movement direction K) and an opposite actuation wall 207 with tapered shape and tilted in a manner such that, when the slidable wing 100 is moved into the closed position, the engagement element 202 of the wing 100 impacts against the actuation wall 207 of the tooth 204, moving the latter into the position of non-interference by overcoming the force of the elastic element 205. When the engagement element 202 has gone beyond the actuation wall 207 of the tooth 204, the latter is brought into a position of interference by the elastic element 205, in a manner such that, when the slidable wing 100 is moved towards the open position, the engagement element 202 impacts against the retention wall 206, driving the handle bar 6 to slide towards the closed position.

[0102] Advantageously, the blind 1 comprises an end stop element 210 placed along the lower longitudinal frame member 17 and/or upper longitudinal frame member 18 and susceptible of intercepting the coupling element 203 in order to push it into a position of non-interference, so as to release the handle bar 6 from the slidable wing 100. In particular, with reference to the example of figures 19 and 20, the end stop element 210 comprises an appendage fixed to the longitudinal frame member 17 (or 18) and adapted, when the handle bar 6 is driven by the slidable wing 100 towards the closed position, to intercept the actuation wall 207 of the tooth 204 in order to move it into a position of non-interference. In this manner, the engagement element 202 is released from the coupling element 203 and the handle bar 6 can be separated from the vertical upright 103 of the slidable wing 100 and, advantageously, it is returned towards the closed position by a return spring of the take-up roller 4. The handle bar 6 is returned into open position, maintaining a vertical position due to the synchronized movement of the pinions 11, 12 on the corresponding racks 15, 16.

[0103] Advantageously, the end stop element 210 defines the maximum distance of the handle bar 6 (in closed position) from the lateral upright 21.

[0104] Preferably, the sliding wing 100 has an opening travel greater than the distance of the end stop element 210 from the lateral upright 21, such that the user can command the handle bar 6 to return into the open position, bringing it beyond the end stop element 210 by acting on the handle 104 of the slidable wing 100.

[0105] Advantageously, with reference to figures 14 and 15, the coupling means 200 comprise at least one flexible hook 201 fixed to the vertical upright 103 of the slidable wing 100 and susceptible of being coupled to the handle bar 6 when the slidable wing 100 is brought into closed position. Such flexible hook 201 is preferably placed in an intermediate position between the lower and upper ends of the vertical upright 101 of the slidable wing

100 in a manner such to engage the movable bar 6 with the latter at an intermediate elevation between the lower termination 7 and upper termination 8 of the movable bar 6 itself, in order to prevent bending of the latter. Advantageously, when the slidable wing 100 is brought towards the open position, the flexible hook 201 is such to engage the slidable wing 100 with the movable bar 6 in the presence of low tensile forces (i.e. when the movable bar 6 is engaged with the slidable wing 100 by means of the engagement element 202 and coupling element 203), and be detached, via elastic deformation, from the handle bar 6 in the presence of high tensile forces (i.e. when the engagement element 202 is uncoupled from the coupling element 203 and hence such flexible hook 201 is subjected to the entire tensile force applied to the slidable wing 100 and possibly to the return force applied on the handle bar 6 by the return spring of the take-up roller 4). Advantageously, with reference to figures 23-25, the lateral upright 21 (and in particular its rolling-shutter box 3) comprises an upper end head and a lower end head 300 respectively placed at the lower rack 15 and at the upper rack 16. The end heads are made with components separate from the racks 15, 16. At least one of such end heads, and preferably both, is provided with a rack section 301 placed as an extension of the corresponding rack 15, 16 and intended to be engaged by the corresponding pinion 11, 12 when the handle bar 6 is in open position. In this manner, it is possible to assemble the rolling-shutter box 3 with the handle bar 6 adjacent to the latter, and subsequently mount the lower and upper rack 15, 16, fitting them with the end heads aligned with the rack sections 301 of the latter racks. Without such configuration, once one rack is mounted, the other rack cannot be inserted since the corresponding pinion would be blocked by the engagement of the other pinion with the already-mounted rack.

[0106] The finding thus conceived therefore attains the provided objects.

[0107] In particular, the blind, object of the present invention, allows the user to grip the handle bar 6 in any position along its vertical extension along the extension axis Z without creating a non-alignment between the lower 7 and upper 8 terminations of the handle bar 6 itself, since the latter is moved along two racks 15, 16 by means of two pinions 11, 12 joined together by means of synchronization means which force the rotation thereof at the same speed and aligned along the extension axis Z of the handle bar 6.

[0108] In addition, the blind 1, object of the present invention, allows an adaptation thereof also during mounting, by simply cutting the lateral upright 21, the handle bar 6 and the synchronization means 9, in particular by shortening the rotary shaft 10, in accordance with the preferred embodiments illustrated in the enclosed figures.

Claims

1. Fabric roller blind, which comprises:

- a support frame (2) provided with at least one lateral upright (21) and intended to be fixed to a load-bearing structure in which an opening (A) is made, which is defined at least between two lateral walls, an upper wall and a lower wall;
- a take-up roller (4) having a substantially vertical rotation axis (X) rotatably constrained to said lateral upright (21) of said support frame (2);
- a fabric (5) extended between a first lateral edge thereof fixed to said take-up roller (4) and a second lateral edge thereof opposite said first lateral edge;
- a handle bar (6), to which the second lateral edge of said fabric (5) is fixed, said handle bar (6) extended along an extension axis (Z) substantially parallel to the rotation axis (X) of said take-up roller (4) between a lower termination (7) and an upper termination (8) and movable between:
  - an open position, in which said handle bar (6) is placed in proximal position with respect to said take-up roller (4), at least partially freeing said opening (4) from said fabric (5), and
  - a closed position, in which said handle bar (6) is placed in distal position with respect to said take-up roller (4) with said fabric (5) at least partially covering said opening (A);

said blind being **characterized in that** it also comprises:

- a lower pinion (11) mechanically supported at said handle bar (6), placed at the lower termination (7) thereof and engaged in a shape relationship with a lower rack (15) intended to be associated with the lower wall defining said opening (A);
- an upper pinion (12) mechanically supported at said handle bar (6) at said upper termination (8) and engaged in a shape relationship with an upper rack (16) intended to be fixed to the upper wall defining said opening (A);
- synchronization means (9) at least partially housed within said handle bar (6) and placed to mechanically connect between said lower pinion (11) and said upper pinion (12) in order to synchronize their movement along said lower rack (15) and along said upper rack (16) during the movement of said handle bar (6) between the open position and the closed position.

2. Blind according to claim 1, **characterized in that**

said synchronization means (9) comprise at least one rotary shaft (10) susceptible of rotating around the extension axis (Z) during the movement of said handle bar (6) between the open position and the closed position, housed within said handle bar (6) and supported thereby by means of connection means (30), said rotary shaft (10) extended along said extension axis (Z) to connect said lower pinion (11) and said upper pinion (12), which are fixed to the ends thereof and rotate with angular velocity equal to that of said rotary shaft (10).

3. Blind according to claim 2, **characterized in that** said rotary shaft (10) has substantially tubular form.

4. Blind according to any one of the preceding claims, **characterized in that** said lower pinion (11) and said upper pinion (12) respectively project from said lower termination (7) and from said upper termination (8) of said handle bar (6) in order to be engaged with said lower rack (15) and said upper rack (16).

5. Blind according to any one of the claims 2 or 3, **characterized in that** said handle bar (6) comprises at least one centering body (13) at least partially wound around said rotary shaft (10) in order to stably maintain it in a housing position within said handle bar (6).

6. Blind according to claim 1, **characterized in that** it comprises a guide chain (18) movable between a retracted position, in which it is housed within said handle bar (6) with said handle bar (6) in open position and a stretched position in which it is unwound below the fabric (5) with said handle bar (6) in closed position; said lower rack (15) being provided on the face of said guide chain (18) directed towards said fabric (5).

7. Blind according to claim 6, **characterized in that** said guide chain (18) is provided with a plurality of aligned cavities (19) in succession along the extension of said guide chain (18) for the shape engagement with said lower pinion (11).

8. Blind according to claim 7, **characterized in that** said synchronization means (9) comprise at least one rotary shaft (10) susceptible of rotating around the extension axis (Z) during the movement of said handle bar (6) between the open position and the closed position, housed within said handle bar (6) and supported thereby by means of connection means (30) and at least two conical toothed wheels (20) engaged with each other, of which a first conical toothed wheel (20') is fixed to the lower termination (7) of said rotary shaft (10) and a second conical toothed wheel (20") is integral with said lower pinion (11) engaged in said lower rack (15).

9. Blind according to claim 1, **characterized in that** said synchronization means (9) comprise a flexible element wound as a ring, which connects together said upper pinion (12) and said lower pinion (11), synchronizing the motion thereof.

10. Blind according to claim 1, **characterized in that** it comprises slidable support means (50) connected to said handle bar (6) and placed in vertical abutment against said support frame (2) or against the ground in order to at least partially support the weight of said handle bar (6).

11. Blind according to claim 10, **characterized in that** said slidable support means (50) are arranged at the lower termination (7) of said handle bar (6).

12. Blind according to claim 1, **characterized in that** it comprises at least one slidable wing (100) slidably constrained to said support frame (2) along a horizontal movement direction (K), and provided with a vertical upright (103) parallel to said lateral upright (21) and provided with a handle (104) susceptible of being constrained to said handle bar (6) by means of coupling means (200).

13. Blind according to claim 12, **characterized in that** said coupling means (200) comprise at least one engagement element (202) fixed to said vertical upright (103), and at least one coupling element (203) mounted on said handle bar (6) and movable between a position of interference, in which said coupling element (203) retains said engagement element (202) in order to retain the vertical upright (103) of said slidable wing (100) fixed to said handle bar (6), and a position of non-interference, in which said coupling element (203) releases said engagement element (202) in order to allow separating said vertical upright (103) from said handle bar (6).

14. Blind according to claim 1, **characterized in that** said lateral upright (21) comprises at least one end head (300) provided with at least one rack section (301) placed as an extension of said lower rack (7) or of said upper rack (8) and, with said handle bar (6) in said open position, is respectively engaged by said lower pinion (11) or by said upper pinion (12).

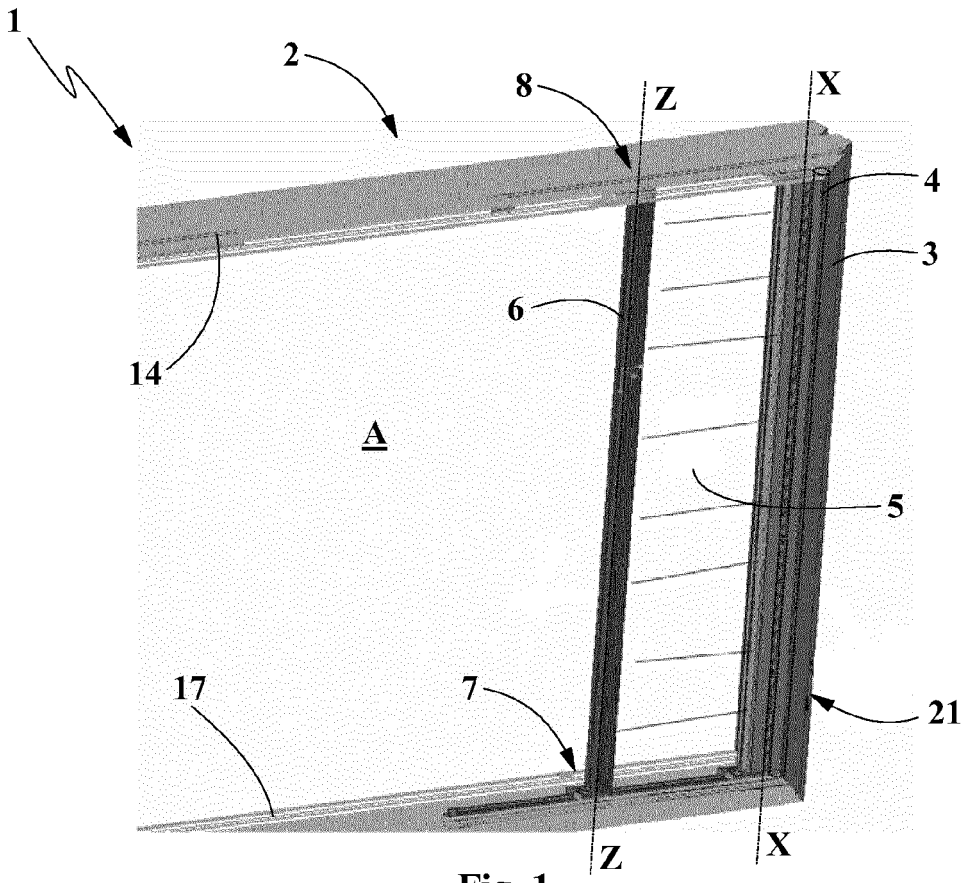

Fig. 1

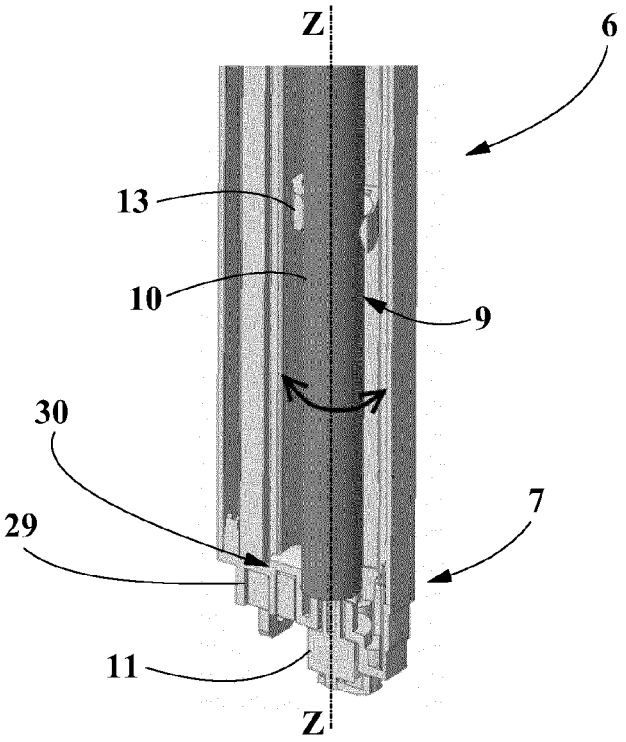

Fig. 2

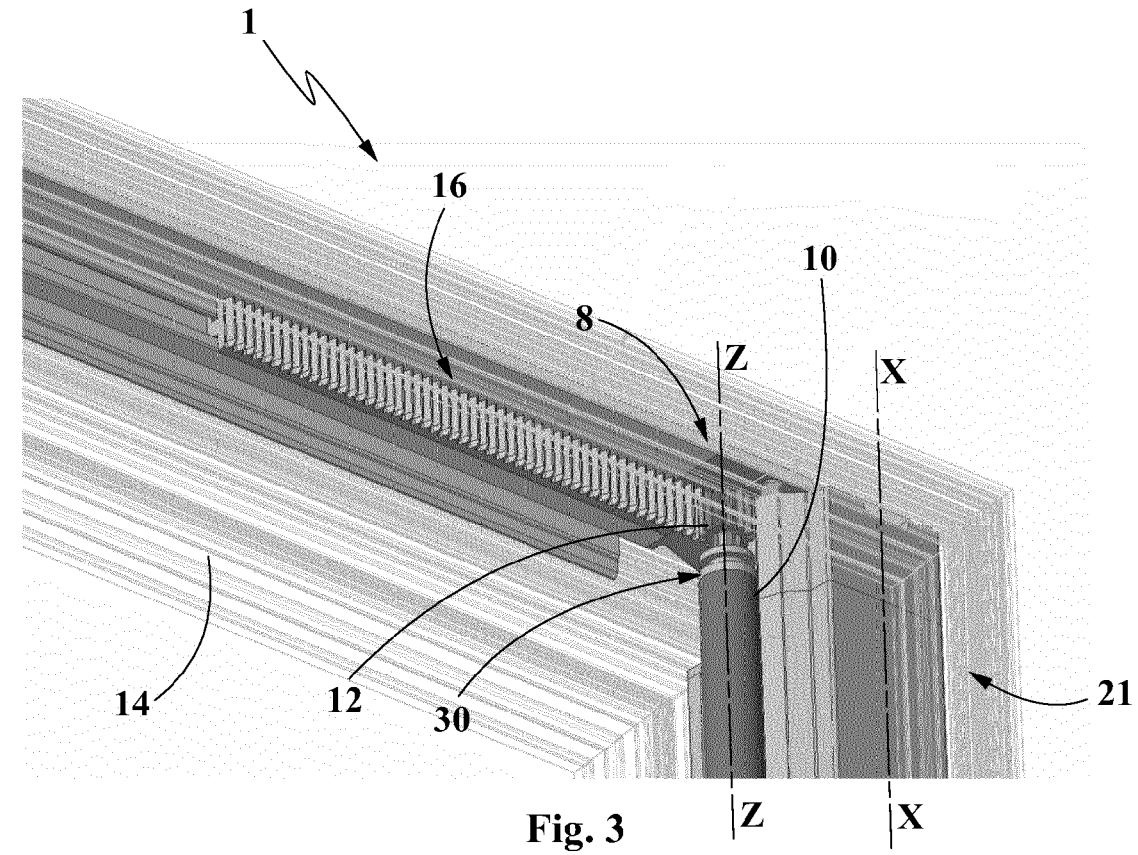

Fig. 3

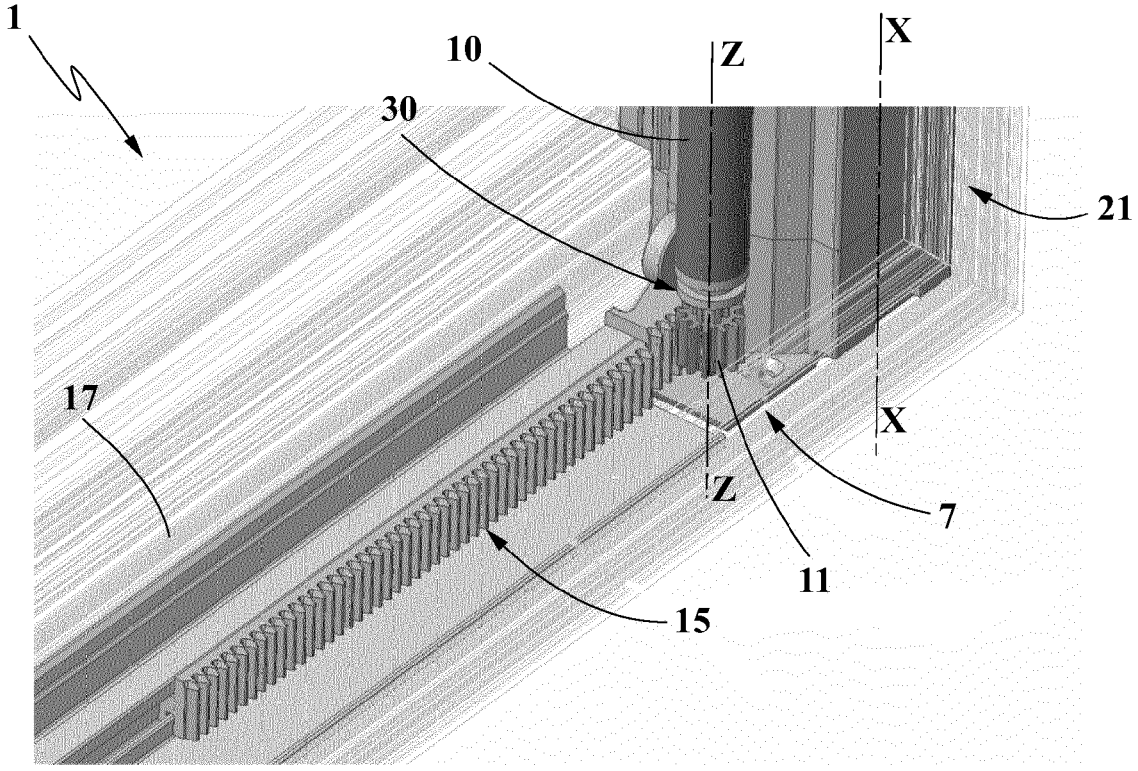

Fig. 4

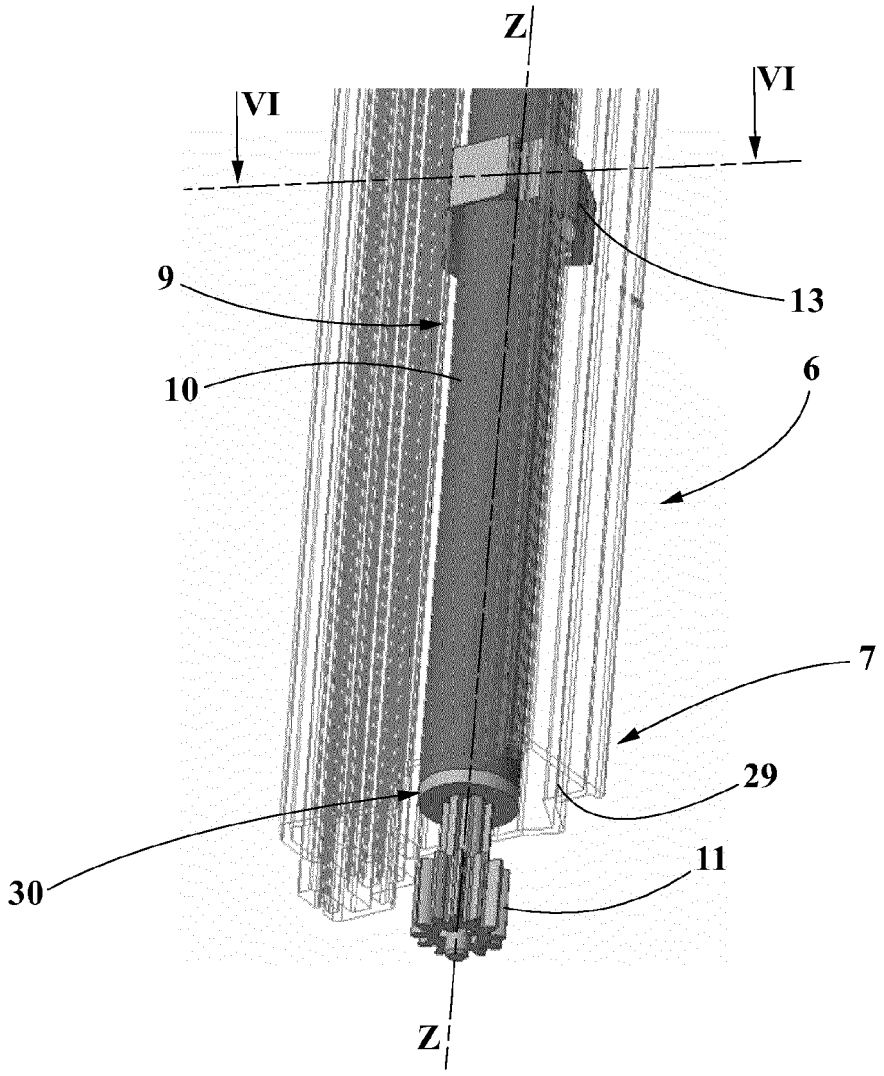

Fig. 5

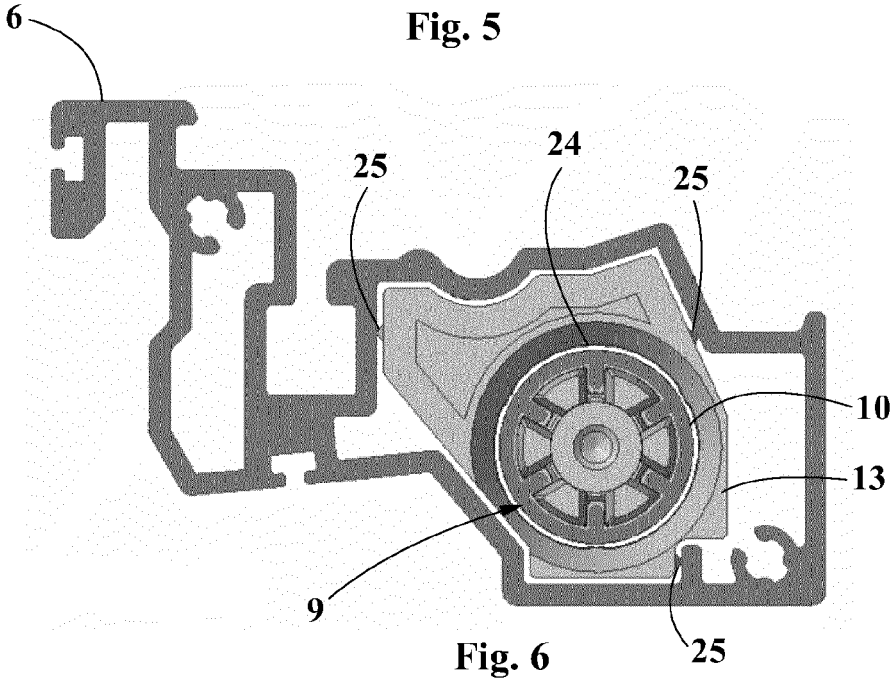

Fig. 6

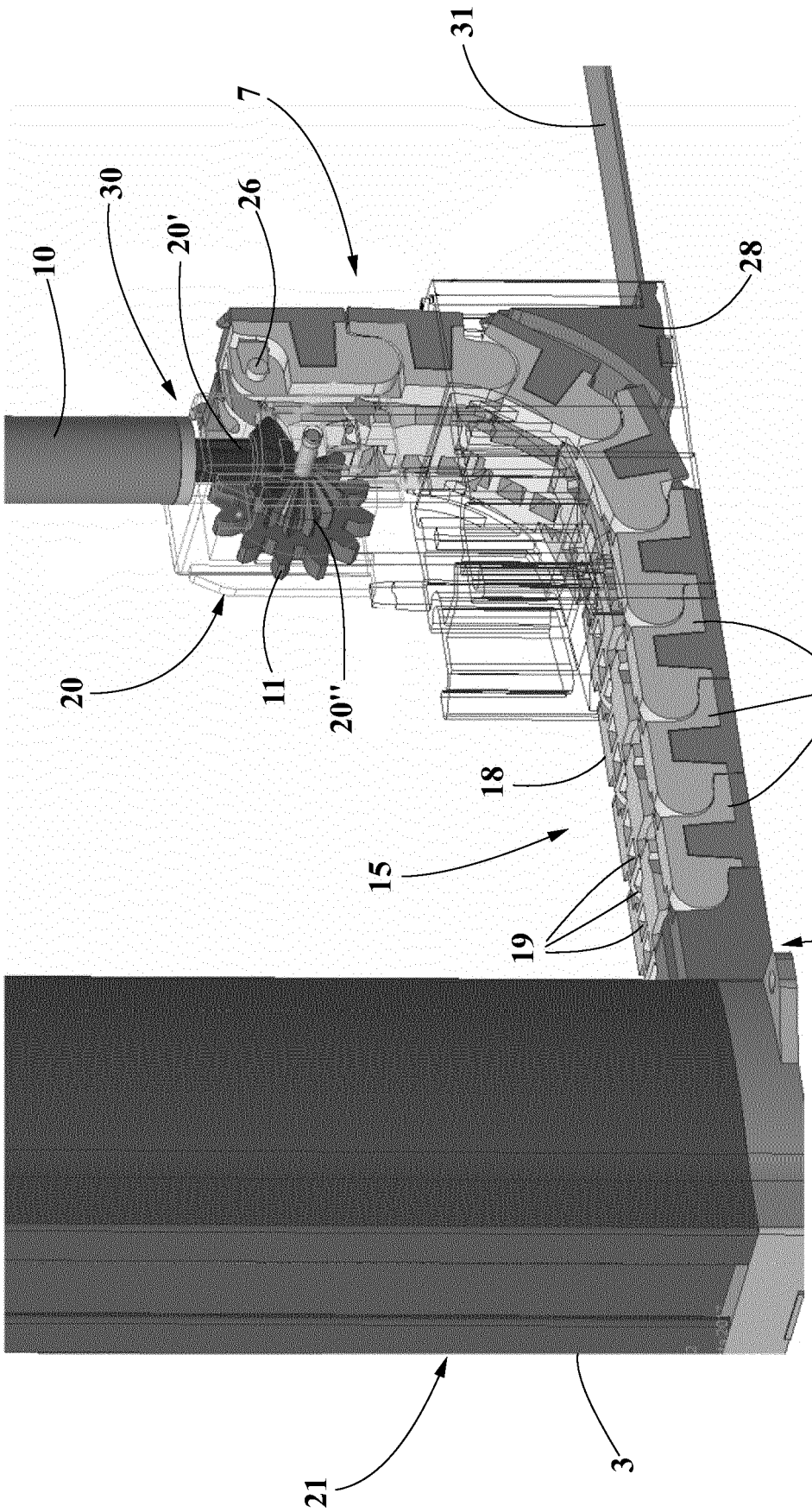

Fig. 7

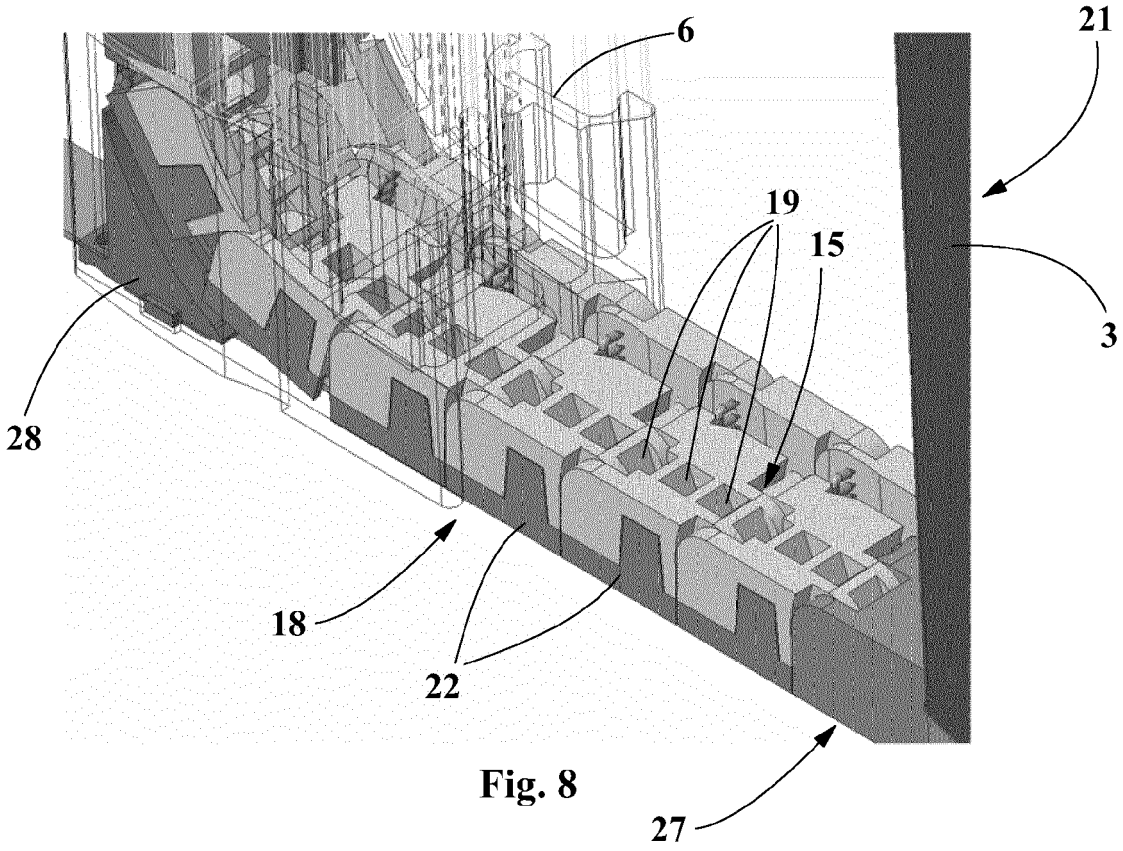

Fig. 8

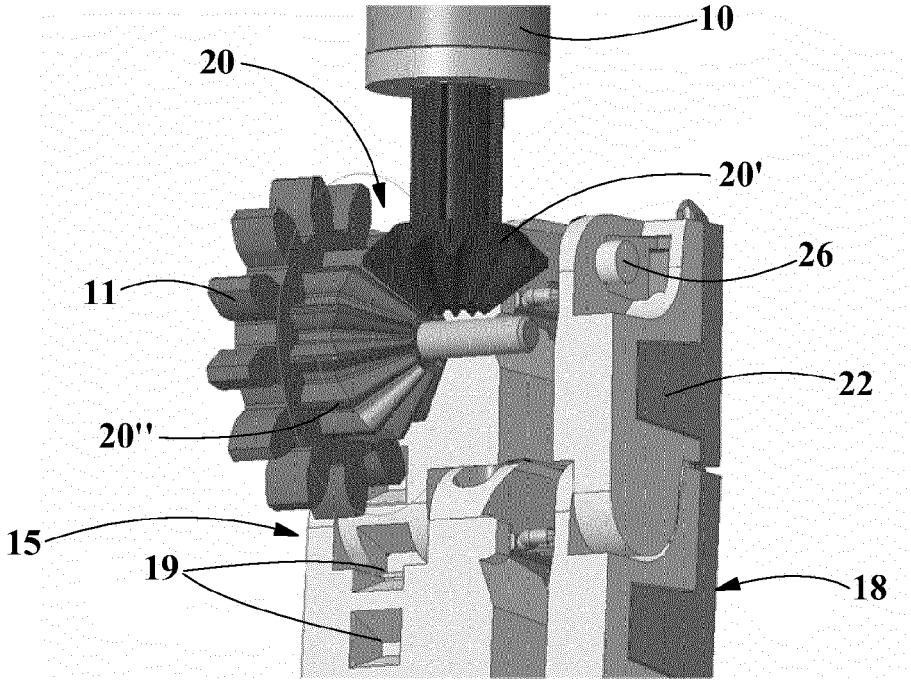

Fig. 9

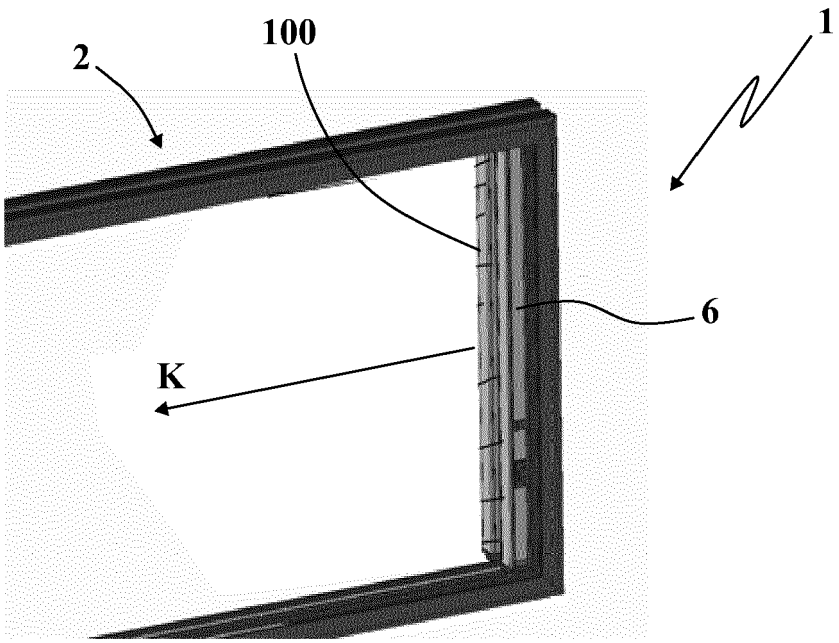

Fig. 10

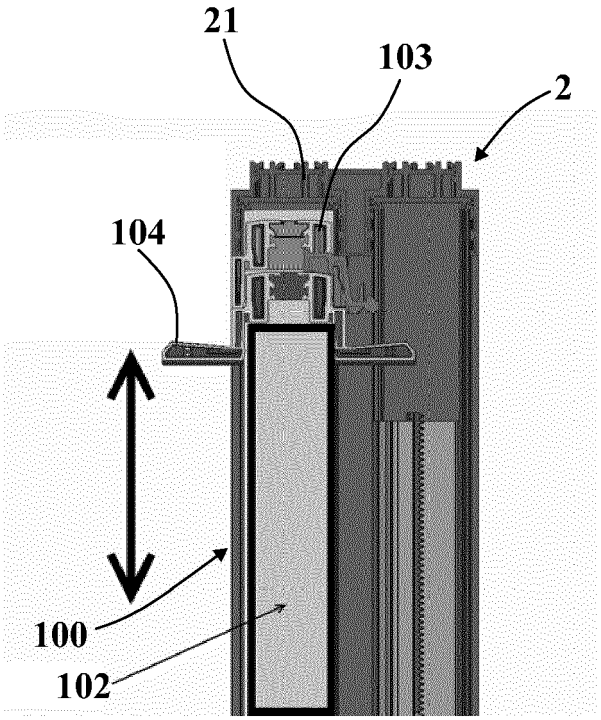

Fig. 11

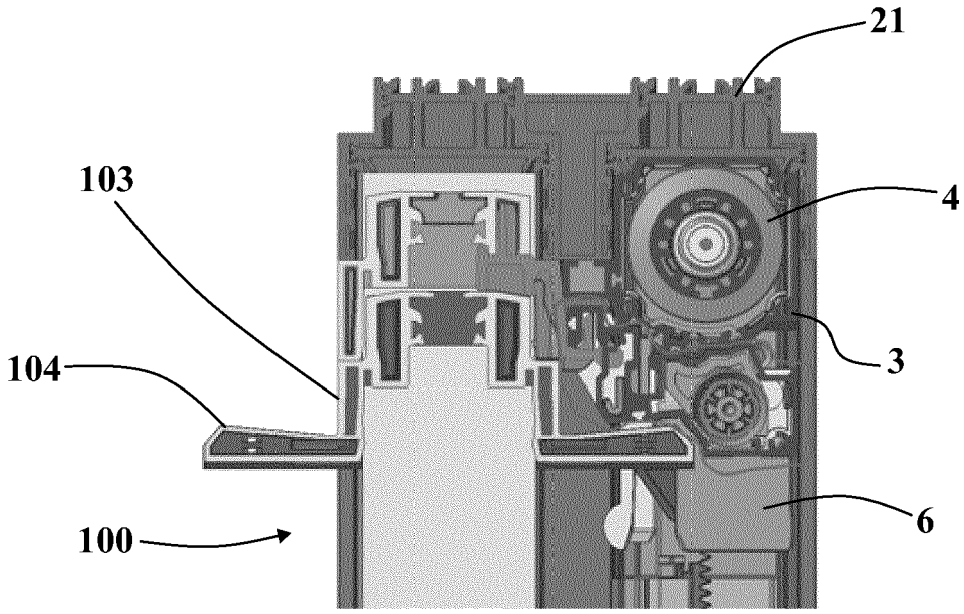

Fig. 12

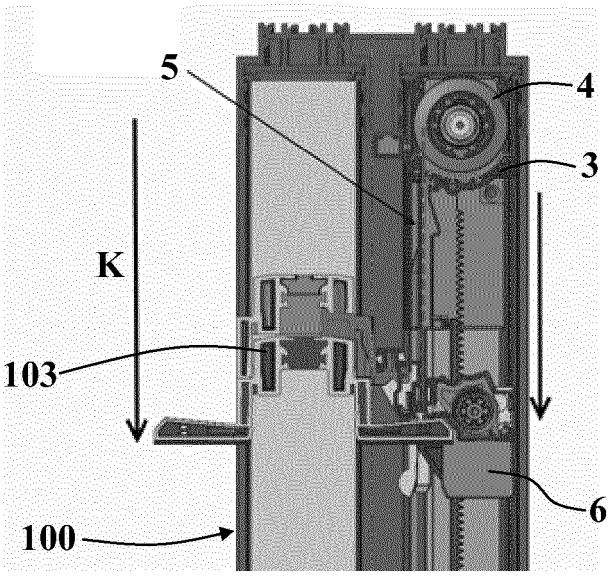

Fig. 13

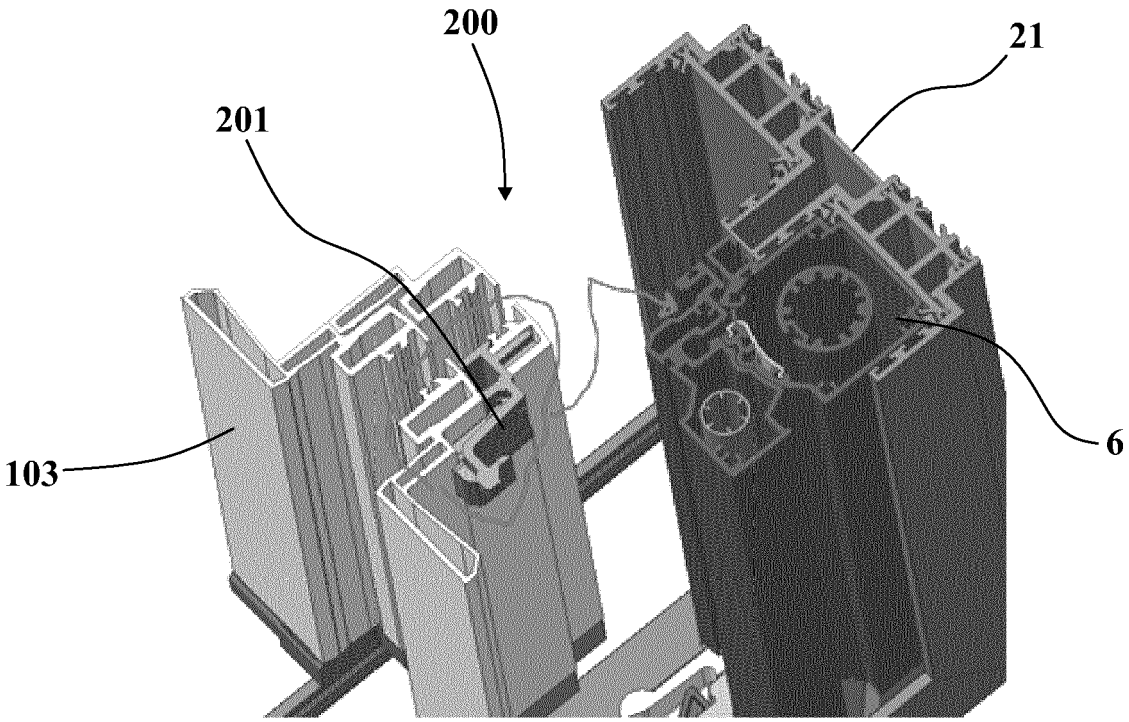

Fig. 14

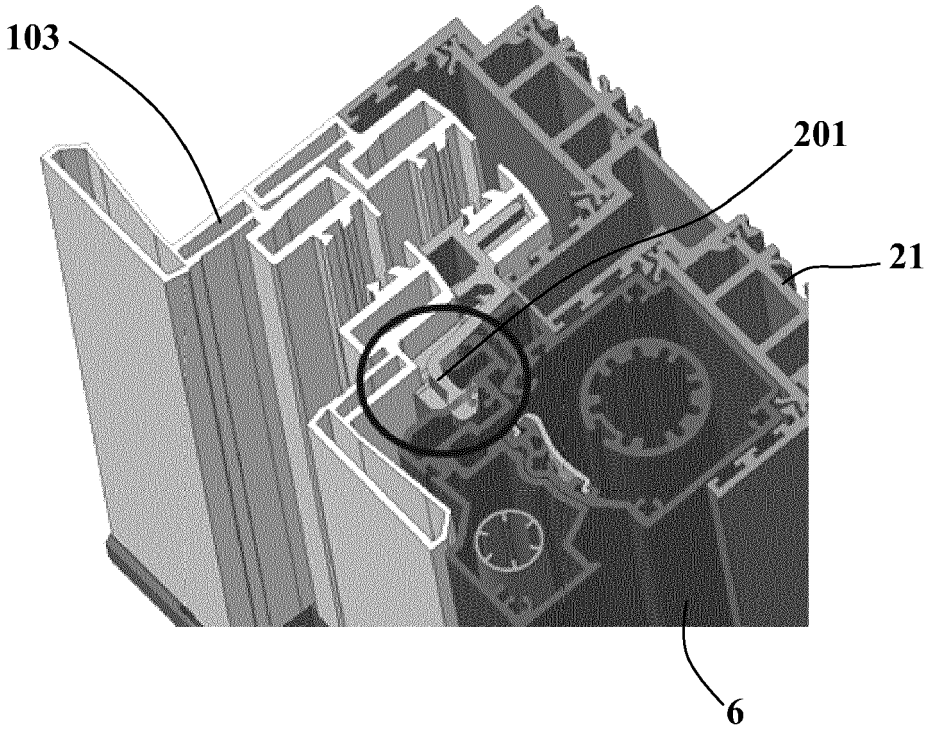

Fig. 15

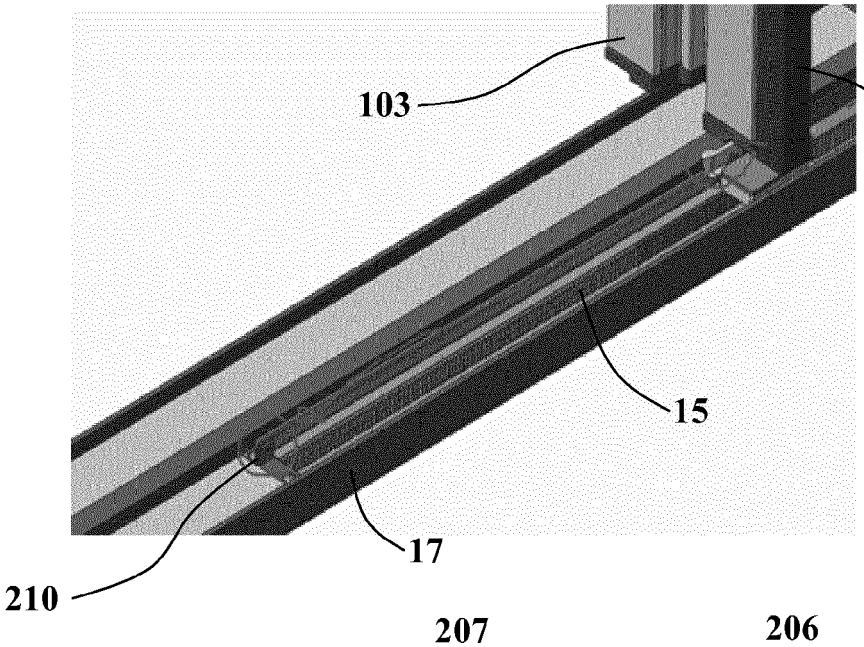

Fig. 16

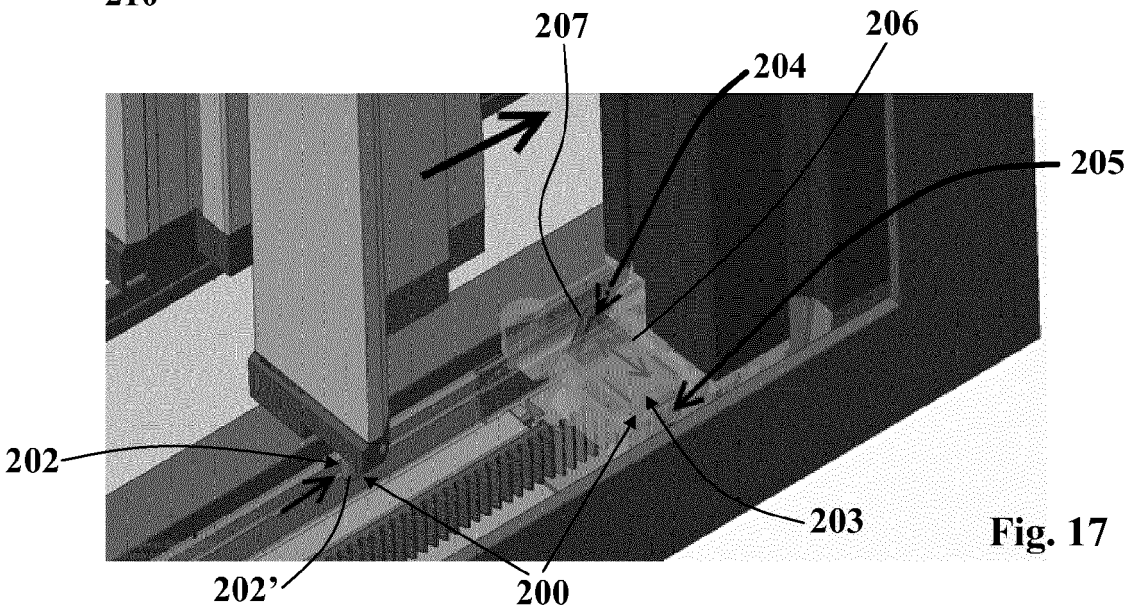

Fig. 17

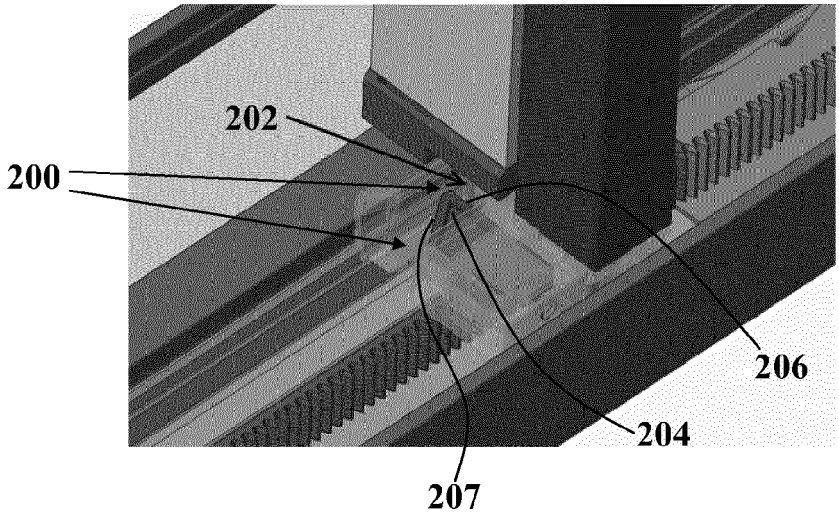

Fig. 18

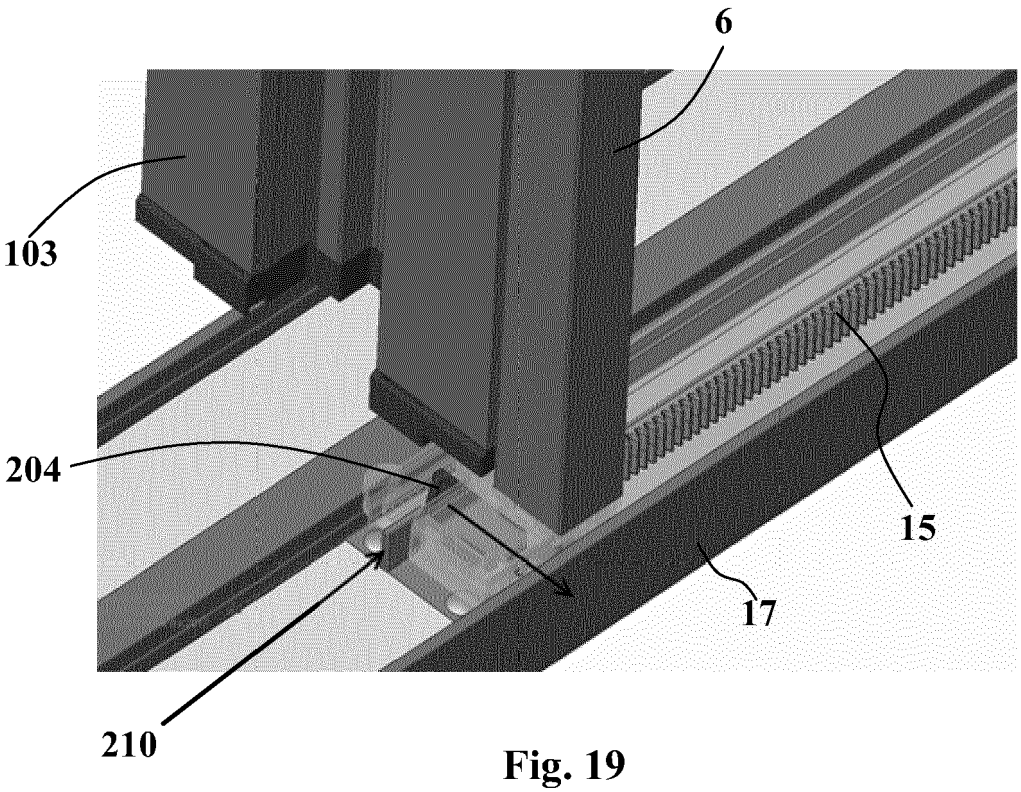

Fig. 19

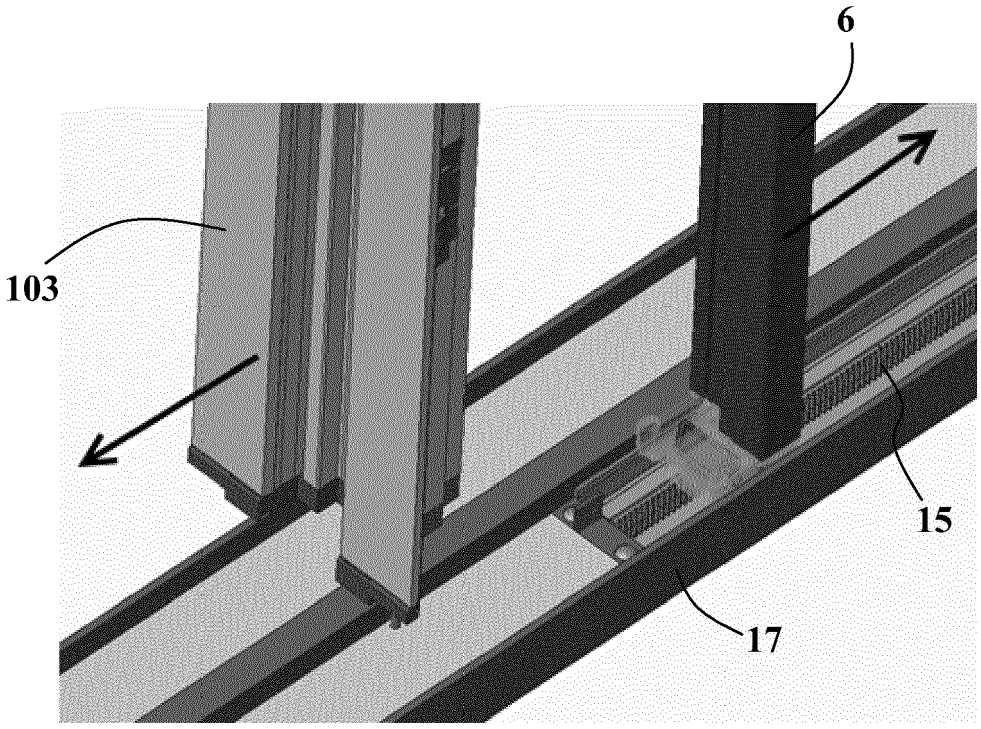

Fig. 20

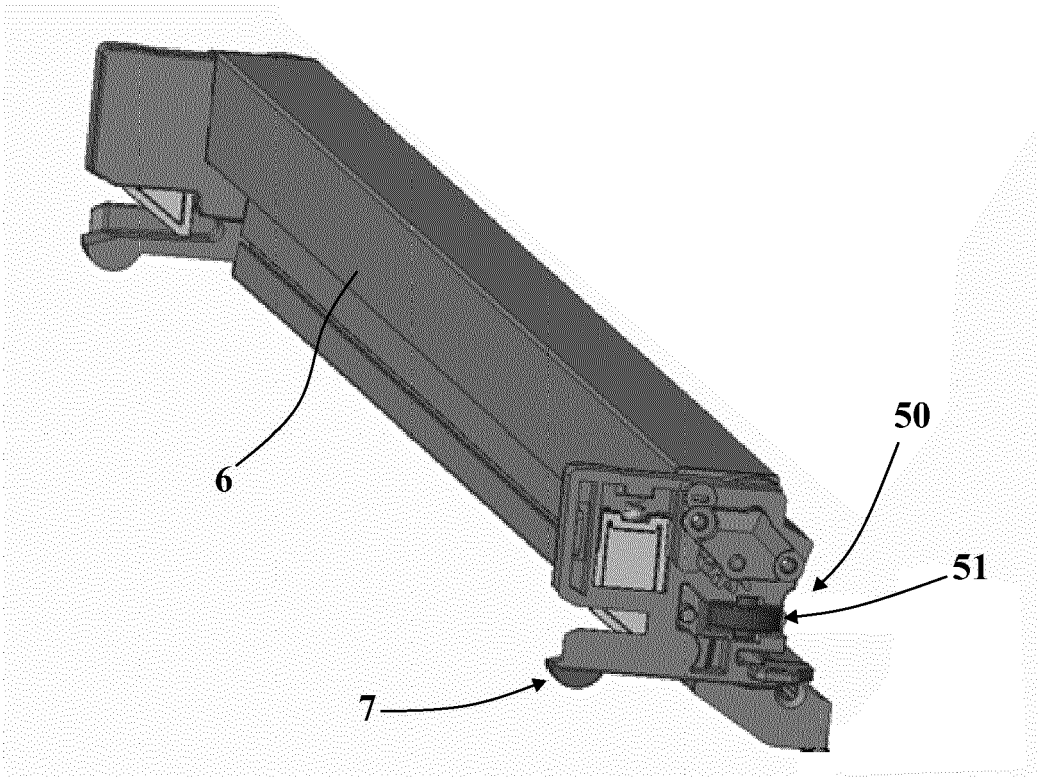

Fig. 21

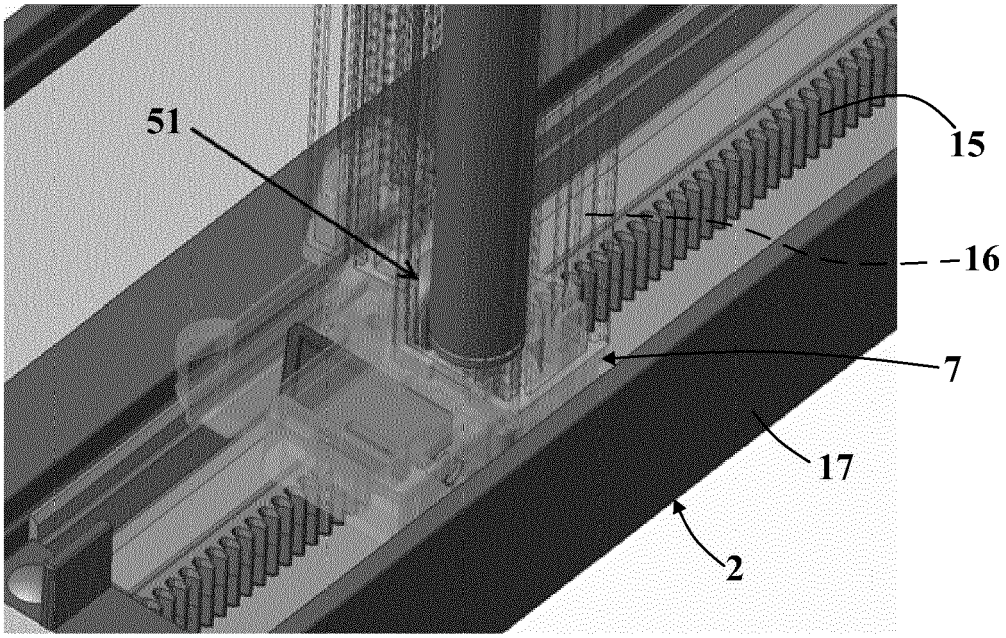

Fig. 22

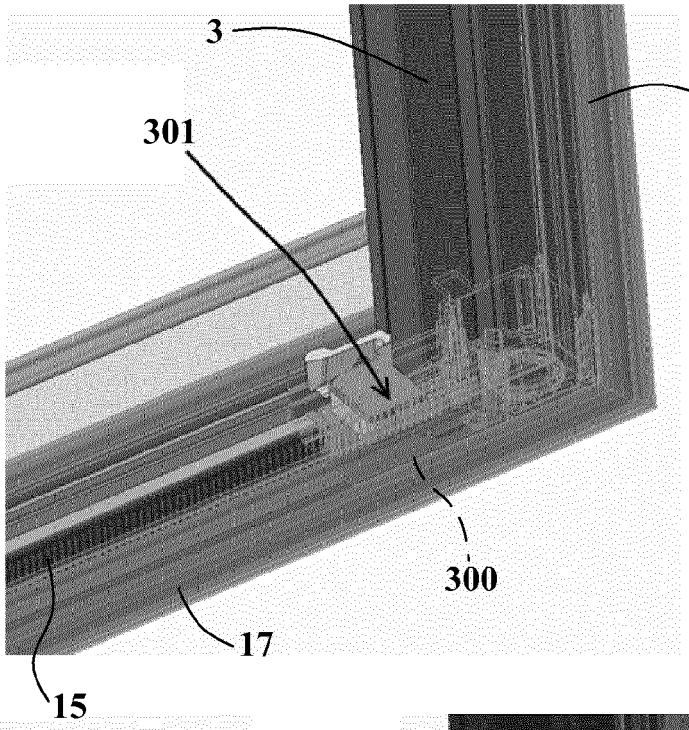

Fig. 23

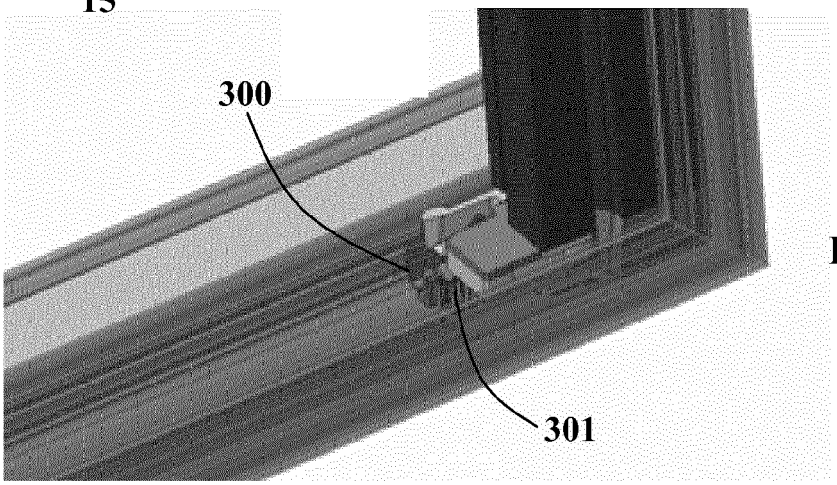

Fig. 24

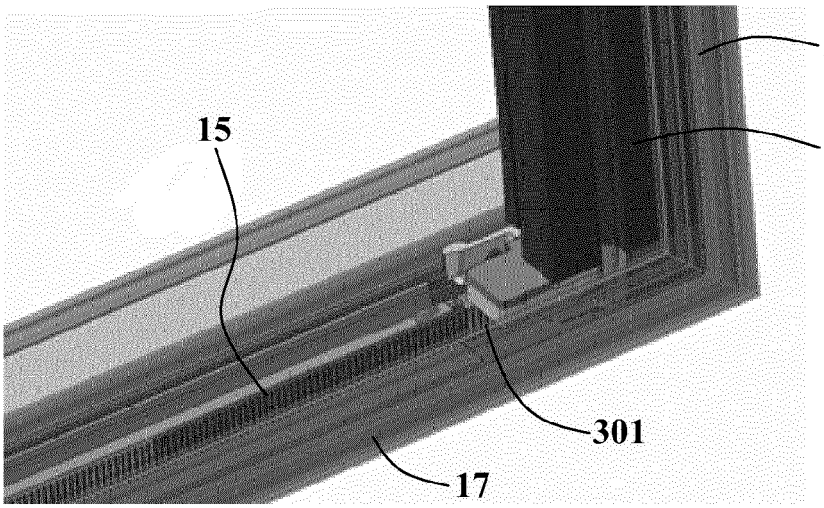

Fig. 25

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EUROPEAN SEARCH REPORT

Application Number
EP 18 18 4485

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y A	US 503 037 A (G. A. CRISSON) 8 August 1893 (1893-08-08) * page 1, lines 93-101; figures 1,5 * -----	1-5, 9-11,14 12,13 6-8	INV. E06B9/40
Y	DE 20 2004 011525 U1 (MACAUTO IND CO [TW]) 25 November 2004 (2004-11-25) * paragraph [0023]; figures 1,4 * -----	12,13	
A	DE 20 2012 010976 U1 (MACAUTO IND CO [TW]) 10 December 2012 (2012-12-10) * abstract; figures 1,2 * -----	1-9,12	

TECHNICAL FIELDS SEARCHED (IPC)

E06B
B60J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 October 2018	Koulo, Anicet

CATEGORY OF CITED DOCUMENTS

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24-10-2018

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Patent documents cited in the description

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