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(54) **An assembly of rolling shutter with guides, especially for roof window and a method for installing the same**

(57) The assembly of rolling shutter with guides comprises the casing (1) containing the shaft for winding the flexible screen, and the guides for sliding beam (2) attached to this screen; the said beam during its movement away from the casing is driven by cords (6) threaded over the return pulleys (51) located in return assemblies (5). During installation of the casing (1) on the roof window, return assemblies with cords (6) connected to the supporting beam (2) are detachably attached to the casing (1) to form the mounting kit together with it. After installation, in ready for use configuration, the return assemblies (5) are connected to remote ends of screen guides (3) by polygonal tenons (52). The sliding beam contains the tensioning assembly in the form of springs which tension the cords. The tensioning assembly is equipped with locking means which neutralise the tensioning action of springs by fixing them in such positions that the cords are given slack.

The method for installation of the assembly of rolling shutter with guides consists in that the mounting kit is installed and attached to the top of roof window, the said mounting kit containing the casing (1) with detachably attached return assemblies (5) with cords (6) threaded through them. Then return assemblies (5) are detached from the casing, the cords (6) are uncoiled, return assemblies (5) are connected to guides (3) and joined with the casing (1). Finally, the locks for tensioning springs are removed from the sliding beam.

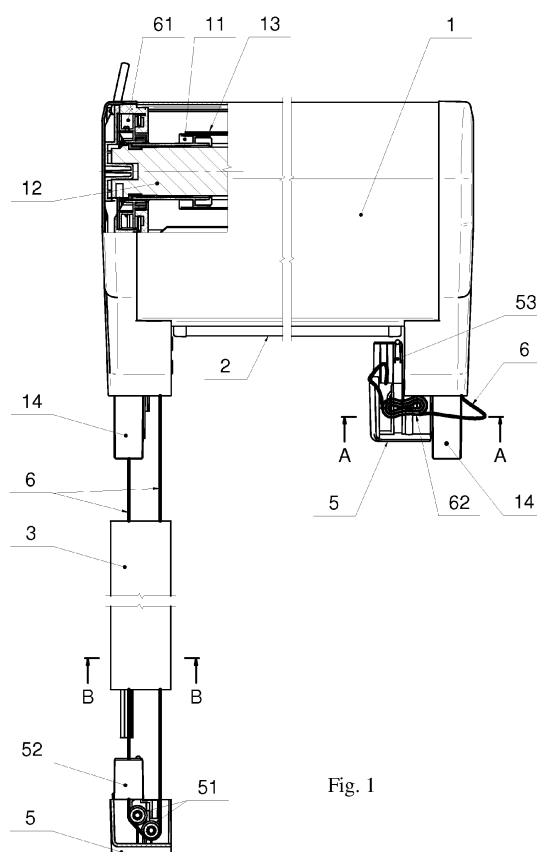


Fig. 1

Description

[0001] The present invention relates to the assembly consisting of the rolling shutter and guides, mainly designed for installation on the external side of a roof window, particularly the window that opens by rotating its sash around horizontal axis located above the half of the window height. The purpose of rolling shutter is to protect the attic equipped with such roof window against excessive solar radiation. The invention also relates to the method of installing the assembly of rolling shutter and guides on the window. The assembly is so designed that easy installation on the roof window is possible and can easily be carried out by a person standing in the attic, with no need for this person to go out on the roof.

[0002] State of the art. From publication WO 2006/074654 A1 a solution is known consisting in a rolling shutter with guides, the said solution comprising a top casing containing a rolling shutter and two side guides, and also containing in the installation kit the cords that drag the rolling shutter when pulling it out from the casing. The length of each cord is factory set and the ends of each cord are fixed to the casing and to sliding beam installed at the end of the rolling shutter. The top casing is also equipped with clamps to which both guides, designed for attaching to the window, are fixed in the position parallel to the casing, thus forming a complete assembly. For normal use of the shutter the guides are, one by one, detached from the casing and then re-attached in perpendicular direction.

[0003] The disadvantages of the above solution are such that the casing with guide is heavy, and in addition the guides protrude beyond the casing over the window side; this is because the length of a roof window is usually greater than its width, so the length of guides is greater than the length of the top casing.

THE ESSENCE OF THE INVENTION

[0004] The assembly of rolling shutter with guides, particularly designed for roof window, the said assembly comprising the flexible screen terminated with sliding beam with ends guided by the screen guides, wherein the sliding beam is driven by the cords when moved away from the casing. The ends of guides are equipped with return assemblies having the rotating pulleys for cords; the said return assemblies in delivery mode and during installation of the casing in a window are detachably, and with no guides, attached to the casing, thus forming an installation kit which is to be mounted and installed on the window. To keep the mounting kit compact during installation on the window, the casing has means provided on its external surface for attaching the return assemblies belonging to both guides. In the ready for use mode each return assembly is connected to this end of screen guide which is distant from the casing. This connection is made using the polygonal tenon being the part of the said return assembly and entering

the internal space of guide.

[0005] The assembly of rolling shutter with guides comprises the casing in which a flexible screen is stored in coiled state. The term "flexible screen" used in this description means both a screen which is flexible in longitudinal and transversal direction, for instance a screen made of fabric, and a screen which is flexible in one direction only, for instance a screen in the form of lamellas mutually connected in articulated manner along their long edges. The casing is, preferably in a tilting manner, fixed to the top of the window, particularly to the upper member of the window frame. The casing contains a shaft designed for winding the flexible screen and driven by a motor, particularly an electric one. The cords that pull the sliding beam to cause its movement out from the casing winds on the cord winding rollers located inside the casing and pass on redirecting pulleys located in return assemblies. In delivery condition one end of each cord is already fixed to the respective winding roller, the cord is threaded through redirecting rollers in respective return assemblies and the other end of the cord is fixed to the supporting beam. The cords remain under the action of tensioning assembly which, in particular, is arranged in the form of springs which tension the cords and are located in the sliding beam. The purpose of tensioning assembly is to take up any cord slack resulting from different and varying diameters of flexible screen wound on the shaft and cords wound on winding rollers.

[0006] The assembly of rolling shutter with guides is mainly designed for installation on the external side of roof window, particularly the window that opens by rotating its sash around horizontal axis located above the half of the window height. The screen guides, which after installation on the window should be located at the sides of window, in delivery state are not attached to the screen storage casing. The guides are fabricated in the form of profiles arranged to have the guiding cavities for engaging the ends of sliding beam; in installed state these cavities face each other. In addition, the screen guide also has the closed polygonal channel for engaging the polygonal tenon which is the part of the return assembly and connects this assembly to the guide.

[0007] Since the assembly according to the invention is designed for the window sash rotating along the horizontal axis, and this axis may be located near the half of the window height (pivot window), the assembly of rolling shutter with guides is also equipped with tilting guides. These tilting guides have cavities in which the elements connecting the guides to lower corners of the window sash move. During window opening or closing the movement of its corners cause tilting movement of the guides, preferably together with the flexible screen storage casing. The tilting guide is made of channel bar with the internal cavity directed towards the guide located on the opposite side of the window, and the flanges of channel bar are bent towards each other and form the cavity access slot which is narrower than the cavity itself. The tilting guide can be made in the form of a profile separate

from the screen guide and located in parallel to it, on the side closer to the window frame. In other embodiment of the invention both screen guide and tilting guide can be manufactured as one profile.

[0008] The tilting guide is connected to the window sash using the tenon fixed to the sash corner, preferably to the fishplate attached to the sash frame. The tenon is attached to the slider which moves inside the tilting guide cavity in such manner that the tenon is inserted into the socket formed in the slider and is fixed by the latch; however the tenon can rotate in fixed position.

[0009] In another embodiment of connection between the guide and window sash a roller is attached to the tenon fixed to the corner of window sash, the said roller having a bearing to allow rotating movement and the diameter greater than the width of tilting guide cavity access slot. During installation the roller is inserted into this cavity from the guide face.

[0010] In the installed state, when the assembly is ready for use, the screen guides are connected to the casing by polygonal tenons protruding from the casing and entering into the guides, i.e. into their polygonal cavity, in similar way as the polygonal tenons of return assembly do. Moreover, additional tenons are provided in the casing which are parallel to the polygonal tenons and enter the cavities in tilting guides. The shaped connections between the casing and guides, obtained using the above-mentioned polygonal tenons and additional tenons, are protected against inadvertent disconnection by threaded fasteners screwed in the tenons protruding from the casing. These fasteners are screwed from the side of the additional tenons, but preferably the ends of their threaded parts are also screwed in material of polygonal tenons. The return assembly is fixed against the guide by snap detent, preferably by snap detent arranged to be a part of polygonal tenon seated in mortise of the screen guide. A part of this tenon, which is closer to the return assembly body and performs the function of seating this return assembly in the screen guide, has the cross-sectional shape corresponding to the contour of mortise in the guide, whereas the cross-section of this part of tenon which is more distant from the return assembly body has smaller dimensions to accommodate the movable arm of snap detent.

[0011] On the additional tenons the holders are provided in which the return assemblies are retained during transportation and storage of the rolling shutter and guides assembly and during installation of the casing on the upper part of roof window, i.e. when return assemblies and the casing forms the mounting kit. Preferably each holder is made in the form of two angled ribs with legs facing outside, and since the return assembly body has two ribs facing each other, the holders can slide over these ribs in the rolling shutter mounting kit. Transport holders are located on the surfaces of both additional casing tenons facing each other, and the distance between holders fixed to the same tenon is so adjusted that when the shutter is assembled for use, the holders enter

the access slot in the tilting guide cavity and are not disturbing during normal use of the rolling shutter.

[0012] Preferably, the screen guides and tilting guides are arranged in the form of separate aluminium profiles. In this arrangement the tilting guide made of channel bar with legs bent towards each other is so shaped that one of the legs has longitudinal holder in the form of T- bar, and this T- bar enters the tee slot formed in the screen guide profile, inserted at the front of this shape. When both guides are arranged as separate profiles joined together, it is easy to differentiate their lengths; the importance of this feature particularly manifests itself near the return assembly, where the screen guide is shorter and its face touches the return assembly body, whereas the tilting guide is longer and extends up to the cover located at the end of return assembly.

[0013] The guide profile as a whole, regardless of embodiment, i.e. monolithic or composed of two profiles, has an angular cavity located on the opposite side with respect to guiding cavity. In this angular cavity a part of cord moves, extending from the winding roller located in the casing to the return pulley located in the return assembly. The entrance slot of angular cavity is arranged between the tilting guide wall and guide side cover and opens towards the side of window frame, whereas the cord moves in this cavity in the part inclined with respect to this entrance slot.

[0014] The assembly of rolling shutter with guides, particularly designed for roof window, having technical features described above and being equipped with tensioning means in the form of springs located in sliding beam, wherein these tensioning means are designed for taking up any cord slack resulting from different and varying winding diameters of flexible screen on winding shaft and cords on winding reels, is equipped with locking means that neutralise the tensioning action of the said tensioning means for the time of assembly storage, transportation and installation by fixing the spring in such position that the cord is slack.

[0015] The spring locking means are arranged in the form of a fastener, preferably a threaded one, located in the sliding beam perpendicularly to the direction of spring movement. The cord inside the sliding beam is threaded over the tensioning pulley seated in the bearing provided in the tensioning slider. In this arrangement the slack compensating action of tensioning spring is enhanced, since slack is taken up along the cord length equal to double travel of tensioning spring. In the tensioning slider an opening is provided for the fastener which blocks the spring for the time of storage, transportation and installation of the shutter assembly with guides. The end of cord threaded over tensioning pulley is adjustably fixed in the fishplate located at the end of sliding beam, so adjustment of the cord length is possible.

[0016] A method for installing the assembly of rolling shutter with guides, particularly designed for roof windows, the assembly comprising the flexible screen ended with a sliding beam, the ends of which move in

two opposite guides, and further comprising the casing with shaft for winding the flexible screen, preferably a shaft which is fixed to the upper member of window frame, and further comprising the cords designed for driving the sliding beam during its movement away from the casing, the cord being wound on winding reels located in the casing and threaded over the return pulleys located in return assemblies which in installed mode are located at the guide ends opposite to the casing, the said method consisting in that the mounting kit is installed firstly at the top of window, particularly on the upper member of window frame, the said mounting kit consisting the casing with flexible screen inside and two return assemblies detachably fixed to this casing. The casing is equipped with two polygonal tenons, each of them designed for attaching the guide through sliding the polygonal mortise provided in the guide channel, over these tenons. The guides are not included in the assembly kit and are attached to the casing later on during installation. Preferably, the casing also has two additional tenons designed for sliding the tilting guides over them.

[0017] For the time of casing transportation, storage and installation on the upper part of the window, both return assemblies remain attached to the casing, thus forming the mounting kit. Preferably, the return assemblies are attached to the casing by sliding them over transportation holders located on additional tenons provided on the casing and arranged in the form of angular ribs with legs directed outside. To enable attaching to the said holders, the return assembly has two ribs pointing to each other, on which the angular ribs of transportation holder are slid over during assembly in manufacturer's plant.

[0018] In the second embodiment of the installation method according to the invention, both return assemblies are fixed by bows extending over this part of casing housing perimeter which extends externally with respect to the window on which the casing is fixed; the said bows are attached to the casing on the basis of snap action obtained by their self-distortion. After attaching of return assemblies to the ends of guides in normal use positions, the bows are removed since they are no longer useful.

[0019] In the third embodiment of method according to the invention, the return assemblies are fixed on the casing using self-adhesive tape which is torn off to detach the return assembly from the casing in order to install it on the end of guide.

[0020] The casing mounting kit also contains two cords; the first end of each cord is fixed to the winding roller inside the casing and the second end is inserted to the sliding beam and fixed after being threaded through the tensioning assembly. The cords are threaded over the return pulleys located in return assemblies fixed to the casing. The length of cords is factory adjusted depending on the length of guides, which in turn depends on the window length. Since guides do not constitute a part of mounting kit, and return assemblies are located in the mounting kit closer to the casing, the excess length

of each cord is coiled into a hank.

[0021] After installing the mounting kit onto a window, one return assembly is detached from the casing and the cord which passes through this assembly is unwound and straightened. Then the return assembly is fixed to the first guide by inserting the polygonal tenon in the polygonal mortise in this guide. The parts of cord belonging to this return assembly are placed in the cavities of the first return assembly profile. The part of cord between first return assembly and sliding beam is placed in guiding cavity, where one of the ends of sliding beam moves during use of the rolling shutter, and the part of cord between winding roller in the casing and return assembly corresponding to the first guide is placed into angular cavity in the guide. Then the first guide is joined with the casing by sliding the polygonal mortise in the guide onto the polygonal tenon of the casing, and if the casing is equipped with additional tenon, at the same time the cavity of tilting guide is slid over this tenon.

[0022] During mounting of the guide with casing and return assembly, the guide is also joined with the corner of window sash; these operations will be discussed in the further part of the method description.

[0023] After joining of the first guide with first return assembly, the second return assembly is detached from the casing and the cord is unwound and straightened which passes through this return assembly. Then the return assembly is fixed to the second guide by inserting its polygonal tenon to the interior of polygonal mortise in this guide. When the return assembly is already fixed, the parts of cord which pass through this return assembly are placed in cavities of the second guide profile.

[0024] The part of cord extending between the second return assembly and the sliding beam is placed in guiding cavity, and the part of cord extending between winding roller in the casing and return assembly corresponding to the second guide is placed in the angular cavity in this guide. Then the second guide is joined with the casing by sliding the polygonal mortise in the guide onto the polygonal tenon of the casing, and if the casing is equipped with additional tenon, at the same time the cavity of tilting guide is slid over this tenon.

[0025] The terms "first" and "second" used in previous paragraphs in relation to guides and return assemblies are introduced for the sake of description clarity and order only and should not be construed as introducing any importance hierarchy of guides on left and right side of window. The installation order, i.e. starting from left or right side, is for the user or installer choice and is of no influence on the method according to the invention.

[0026] After joining with the casing, each guide is secured by threaded fasteners screwed in the casing tenons. Preferably, the fasteners are screwed from the side facing the additional tenons, and end of their threaded parts are also screwed in the material of polygonal tenons. Since the joints between guides and return assemblies are equipped with snap detents, after insertion of polygonal tenon in the guide each joint automatically

locks itself.

[0027] During installation the guides are also joined with lower corners of window sash. These operations start with fixing the fishplates with outside protruding lateral tenons to the window sash. Each of these tenons joins with the slider, which in delivery mode is, preferably, factory mounted in tilting guide and protected against inadvertent slipping out by bends formed at the ends of this guide. Joining of the guide with lower corner of the sash consists in inserting the fishplate tenon in latching seat provided in the slider located inside the cavity of tilting guide. The tenon inserts to the slider seat from the side facing the casing, preferably prior to joining the guide with casing, i.e. prior to sliding the guide on polygonal tenons and additional tenons of the casing.

[0028] In a second option of joining the guides with window sash, the rollers with bearings are mounted on tenons provided in fishplates fixed to lower corners of the sash; the said rollers can move in tilting guides during normal use of the rolling shutter. Joining of each guide with window sash consists in inserting the roller in the cavity in tilting guide, starting from the guide face. Preferably, the roller is inserted from the side facing the casing, after joining of return assembly with guide, but before joining the guide with the casing.

[0029] During mounting operations described above the locking means are installed in the tensioning assembly in sliding beam, which fix the springs in such positions that the cords are given slack. This facilitates the mounting operations, particularly joining the guides with polygonal tenons of the casing and both return assemblies. When the guides are joined with the casing and both return assemblies, the locking means are removed from the sliding beam, thus releasing the springs to tension the cords and take up any excess length in various positions of the beam.

[0030] Beneficial effects of the invention. The mounting kit of the assembly of rolling shutter with guides contains the compact and lightweight return assemblies without guides; hence the person standing in open roof window can easily install the casing with rolling screen in the upper part of this window. Moreover, the guides installed one by one are light and easy to handle. The installation operations can be performed faster, since the guides connect to the casing and return assemblies using polygonal tenons and the tenon on the window sash connects to the slider in the guide by snap action, and in such arrangement the risk of mismatching the parts is eliminated. Locking of tensioning springs in cord slack positions facilitates handling of the cords and their installation in right cavities in screen guide.

[0031] Exemplary embodiments of the invention. The assembly of rolling shutter with guides, particularly for roof window and the method for installing this assembly according to the invention are presented on examples of the assembly installed on the roof window and illustrated on figures, from which:

- Fig. 1 depicts the assembly of rolling shutter with guides during installation, as seen from the exterior of the window;
- 5 Fig. 2 depicts the right-side return assembly attached to the casing as the part of mounting kit - in the "A-A" cross-section from Fig. 1, made through this return assembly and transportation holders on the casing tenons;
- 10 Fig. 3 depicts the left-side return assembly with the cord inserted in it - as the superimposed "B-B" cross-section from Fig. 1;
- 15 Fig. 4 depicts the right-side return assembly with the end of guide to be joined with it - in axonometric projection before joining them together;
- Fig. 5 depicts the right-side return assembly joined with the guide - in side view as seen from the side opposite with respect to the guide;
- 20 Fig. 6 depicts the right-side return assembly and casing tenons to be joined with it - in axonometric projection before joining them together;
- 25 Fig. 7 depicts the connection between left-side guide and casing tenons - in transverse cross-section perpendicular to the guide;
- 30 Fig. 8 depicts the connection between right-side guide and the window sash - in side view as seen from the side opposite with respect to the guide;
- 35 Fig. 9 depicts the connection between right-side guide and the window sash - in longitudinal cross-section through the guide;
- 40 Fig. 10 depicts the sliding beam with tensioning assembly, in position close to return assemblies - as seen from exterior of the window, in partial cross-section;
- 45 Fig. 11 depicts the tensioning assembly in axonometric projection.

[0032] Example 1. An assembly of rolling shutter with guides, having the casing **1** with the shaft **11** driven by a motor **12** located inside this shaft in order to reel the flexible screen **13** which is terminated with sliding beam **2**. The assembly is also equipped with two guides, the right and the left one, manufactured as the aluminium profiles. Each guide consists of the screen guide **3** and tilting guide **4**, which are parallel to each other. The screen guide **3** has a guiding cavity **31** with the opening facing the other opposite guide, and the ends of transverse beam **2** moves in the cavities of both screen guides. The tilting

guide 4 is made in the form of channel profiles with legs bent and pointing one to the other (closed-type channel shape) in order to define an access slot open towards the other opposite guide. The tilting guide 4 is located under the screen guide 3, i.e. from the side of window on which the guides are installed. The upper leg of the tilting guide 4 channel shape the longitudinal holder 41 is provided in the form of T-bar and inserted in T-slot in screen guide 3. The tilting guide 4 is slightly longer than the screen guide 3, and its protruding end enters the return assembly 5; both guides are fixed with respect to each other by crimping the holder 41 in T-slot of screen guide.

[0033] The assembly of rolling shutter with guides also contains two return assemblies 5 which, when the assembly is installed for normal use, are located at these ends of both screen guides 3 which are opposite to the casing 1. Each return assembly is equipped with two return pulleys 51 used for changing the direction of the cord 6 which drives the ends of sliding beam 2 in their movement away from the casing 1 in order to slide out the flexible screen 13 from the casing. The return assembly 5 joins with the screen guide 3 using the polygonal tenon 52 which is inserted in polygonal mortise 32 in the screen guide. Both the polygonal tenon 52 and the mortise 32 are formed in the shape of polygon with one vertex concave, thus forming the angular cross-section of adjacent surfaces. The part of polygonal tenon 52 in return assembly from the side of its body has the cross-section completely filling up the mortise 32 in the guide, while the part of this tenon, most inserted in mortise has a reduced height. In so obtained space the snap detent 53 is placed which protects the connection between return assembly 5 and screen guide 3 against inadvertent disconnection.

[0034] The ends of screen guide 3 opposite to the return assemblies are joined with the casing 1 by polygonal tenons 14 protruding from the casing and placed in mortises 32 of screen guides. In the areas of connection to guides, the casing 1 also has additional tenons 14 placed in cavities of tilting guides 4. The connections of guides to the casing are secured by threaded fasteners 16 screwed in additional tenons 15; the length of each fastener is so adjusted that the end of its threaded part also screws in the polygonal tenon 14. Two threaded fasteners 16 are associated with each guide, and their guiding holes 17 with the diameter less than the thread core are factory drilled in tenons 14 and 15 of the casing and in the guides 3 and 4.

[0035] The assembly of rolling shutter in as-delivered state and during installation on the roof window is configured in different fashion than for normal use and forms a mounting kit that facilitates installation of the casing 1 and other components of the whole assembly on the roof window. In the mounting kit arrangement the return assemblies 5 are mounted on additional tenons 15 of the casing 1 (see Fig. 1 - right side, and Fig. 2). On additional tenons 15 the transportation holders 18 are provided in the form of a set of two angular ribs with legs facing out-

side. The body of return assembly 5 has two ribs 54 facing each other, which in mounting kit arrangement are slid over transportation holders 18. Further, the transportation holders 18 are placed on the opposing surfaces of additional tenons 15 and when the shutter assembly is installed for use, they enter the access slot in the tilting guide 4 cavity and are not disturbing during normal use of the rolling shutter with guides.

[0036] In as-delivered state the cords 6 are installed in the mounting kit; each cord is fixed by one end to the winding roller 61 rotating coaxially with the shaft 11 in the casing 1 and wound on this roller in the direction opposite to the winding direction of flexible screen 13, while the other end of the cord 6 is fixed in transversal beam 2. The length of cord 6 is adjusted by the manufacturer according to the length of guides, which in turn depends on the height of roof window. Since the guides do not constitute a part of mounting kit, but are installed on the window later, after installing the mounting kit, excess length of the cord is coiled into a hank and secured by a band.

[0037] The assembly of rolling shutter with guides also contains the components designed for joining the guides with lower corners of a roof window sash. These components include fishplates 7 on the window sash, each equipped with the tenon 71 protruding towards the tilting guide 4 and co-operating with the slider 42 which moves in the cavity of this tilting guide. The fishplate 7 is secured to the lower corner part of window frame member 72, namely to its metal shield, and is fixed to the sash frame and its shield by screws (not shown in the figure). The fishplate has the border 73 adjoining the border part of window sash frame shield and facilitating positioning of the fishplate during fastening it to the sash. The tenon 71 is made in the form of screw 74 with cylindrical head and is screwed in the fishplate 7; the head of this screw is placed in the socket 43 provided in the slider 42 and secured against slipping out by snap-acting angle strut of this slider. On both ends of tilting guide 4 the bends 45 are provided which protect the slider 42 against slipping out from the tilting guide.

[0038] The part of cord 6 co-operating with sliding beam 2 is inserted in this beam through directional pulley 21 and then passes through the tensioning assembly composed of the spring 22 and tensioning slider 23 with tensioning pulley 24, the latter being rotatable in the bearing. The cord 6 is wrapped around the tensioning roller 24 and extends in two directions inside the spring 22, and the end of cord is formed as the knot 63 fixed in the socket 25 provided in the fishplate near the end of the sliding beam 2. If necessary, the cord 6 may be shortened during use of the rolling shutter by making a new knot on the cord and placing it in the socket of fishplate 25. The tensioning assembly is equipped with locking mechanism which neutralises the tensioning action of springs for the time of storage, transportation and installation of the shutter assembly, by fixing the springs in such position that the cord is given slack. The locking mechanism

has the form of threaded fastener, namely the screw 27, located in the sliding beam perpendicularly to the direction of spring movement. In blocked position the screw passes through holes provided in sliding beam 2 and in tensioning slider 23, fixing this slider with respect to the beam and, therefore, fixing the spring 22 in such position that the cord is given slack.

[0039] The part of cord extending from transverse beam 2 to return assembly 5 runs inside the guiding cavity of the screen guide 3, while the part of cord 6 extending from the return assembly 5 to winding pulley 61 in the casing 1 runs in the angular cavity 33 in the screen guide. The inlet slot of angular cavity 33 is located between tilting guide 4 and side cover 34 of the screen guide and is open towards the window.

[0040] **Example 2.** The method for installing the assembly of rolling shutter with guides consists in that, first of all, the mounting kit is installed and fastened to the top of window, the said kit consisting of complete casing 1 with two return assemblies 5 detachably retained in transport holders 18 provided on the casing. The mounting kit also contains two cords 6, and the first end of each cord is fixed to the winding roller 61 inside the casing and the second end is inserted to the sliding beam 2 and fixed after being threaded through the tensioning assembly equipped with springs. The cords 6 are threaded over the return pulleys located in return assemblies 5 fixed to the casing, and the excess length of these cords existing in mounting kit arrangement is coiled into hanks 62. In delivery arrangement and during installation of the assembly, the springs of tensioning assembly are blocked by screws 27 in such positions that the cords are slack.

[0041] Since the guides are not included in the mounting kit, they are to be attached to the casing at later stage of mounting procedure. The stage of attaching the guides to the casing is also preceded by the operation of attaching the fishplates with tenons protruding on both sides to lower corners of window frame; these tenons join with guides at later installation stages. The fishplates are fastened by screws to the window frame and, also by screws entering from the bottom, to metal shields on side members of this frame.

[0042] As soon as the above described initial operations are completed, the left (as seen from the exterior of the window) return assembly 5 is removed from the casing 1 and the cord 6 passing through this assembly is uncoiled from the hank 62 and straightened. Then the left return assembly 5 is fastened to the left guide by inserting the polygonal tenon 52 of this assembly to the polygonal mortise 32 of the left screen guide 3, and when it is inserted fully, the snap detent 53 locks this joint. The parts of cord 6 passing through the return assembly 5 are placed in cavities of the left guide profile, the part of cord extending from return assembly 5 and sliding beam 2 are placed in guiding cavity 31, and the part of cord 6 extending from the winding roller 61 in the casing to the return assembly 5 is placed in angular cavity of this guide.

[0043] During next operation the tenon 71 protruding

to the side from left fishplate 7 on the sash 72 connects to the slider 42 which, already in as-delivered configuration, is placed in the tilting guide 4 belonging to the left guide assembly. The tenon 71, in the form of the screw with cylindrical head 74, is inserted to the socket 43 in slider 42 from the side of casing 1 until the angle strut 44 locks it in the position and prevents against disconnection.

[0044] Next operations include connecting the left guide to the casing 1 by sliding the polygonal mortise 32 in the screen guide 3 onto the left polygonal tenon 14 and, simultaneously, sliding the tilting guide 4 onto the additional tenon 15 of the casing 1. The joint between left guide and the casing is secured by two threaded fasteners 16 screwed in the additional tenon 15 and, partially, in the polygonal tenon 14 of the casing 1, employing the guiding holes 17, factory drilled for this purpose.

[0045] After installing the left guide with its return assembly, the right return assembly 5 is removed from the casing 1 and the cord 6 passing through this assembly is uncoiled from the hank 62 and straightened. Then the right return assembly 5 is fastened to the right guide by inserting the polygonal tenon 52 of this assembly to the polygonal mortise 32 of the left screen guide 3, and parts of the cord 6 are placed in cavities of the shape. The tenon 71 protruding to the side from right fishplate 7 on the window sash 72 connects to slider 42 in tilting guide 4 - these operations are performed in the same way as these on the window left side. Then the right guide is connected to casing 1 by sliding the polygonal mortise 32 in the screen guide 3 onto the right polygonal tenon 14 and, simultaneously, sliding the tilting guide 4 onto the additional tenon 15 of the casing 1. The joint between right guide and the casing is secured by two threaded fasteners screwed in the additional tenon and partially in the polygonal tenon of the casing, making use of guiding holes 17 previously prepared for this purpose.

[0046] After connecting the guides to the casing the locks, i.e. screws 27 blocking the tensioning springs, are removed from sliding beam 2, resulting in tensioning of cords 6 by springs 22 and taking up any cord slack in various positions of the sliding beam. The locks can be removed from the beam individually, after installing each single guide, or after installing the entire assembly.

Claims

1. The assembly of rolling shutter with guides, especially for roof window, particularly the window that opens by rotating its sash around horizontal axis located above the half of the window height, comprising the flexible screen (13) terminated with sliding beam (2) with ends guided in screen guides, said assembly further comprising the casing (1) fixed, preferably in a tilting manner, to the top of the window, especially to the upper member of the window frame, the said casing being designed for holding

- the flexible screen (13) in a coiled state and containing the shaft (11) for coiling this flexible screen and driven by a motor (12), preferably an electric one, wherein the screen guides are made of profiles with guiding cavities open towards each other for guiding the ends of sliding beam (2) which, in its movement away from the casing is driven by cords (6) wound on winding pulleys (61) located in the casing and scrolled by the return pulleys (51) located at the ends of screen guides opposite to the casing, and the said cords (6) cooperate with tensioning assembly, particularly the tensioning assembly in the form of springs located in the said sliding beam (2) and exerting the tensioning force on the cords (6), **wherein**, said assembly of rolling shutter has the return assemblies (5) with rotatable return pulleys (51) for cord (6) seated in the said return assemblies which, in as-delivered state and during installation of the casing (1) with flexible screen (13) on the window, are detachably attached to the casing (1) and form the mounting kit, and in installed and ready for use arrangement are joined with the ends of screen guides (3), the said ends being opposite to the casing, using the polygonal tenons (52) entering the interior of these guides, and the cords (6) fixed by one end to the winding pulley (61) in the casing (1) are, already in as-delivered state, threaded over return pulleys (51) in return assemblies (5) and fixed by another end to the supporting beam (2).
2. The assembly of rolling shutter with guides according to Claim 1, **wherein** the holders for retaining of return assemblies (5) are provided on the external surface of casing (1).
 3. The assembly of rolling shutter with guides according to Claim 1 or Claim 2, **characterized in that** it comprises the tilting guides (4), each of them with a cavity where the elements move that join the guide with lower corners of window sash and, during window opening and closing, tilt the guide assembly (3, 4), preferably together with the casing (1).
 4. The assembly of rolling shutter with guides according to Claim 3, **characterized in that** the element which joins the tilting guide (4) and the sash (72) has the form of tenon (71) fixed to the window sash corner, preferably to the fishplate (7) fixed to the window frame, and the said tenon is, in rotating manner, connected to the slider (42) which moves inside the cavity of tilting guide (4), and the said tenon is placed in the socket (43) provided in this slider and secured by snap connection.
 5. The assembly of rolling shutter with guides according to Claim 3 or Claim 4, **characterized in that** in the ready-for use configuration the screen guides (3) are attached to the casing (1) by polygonal tenons (14) protruding from the casing and entering these guides, and further the additional tenons (15) are provided in the casing, the said tenons entering the cavities in tilting guides (4), and on the said additional tenons the transportation holders (18) for return assemblies (5) are provided, preferably in the form of angular ribs, and the return assembly has the ribs (54) facing each other and which, in mounting kit configuration, are slid over transportation holders.
 6. The assembly of rolling shutter with guides according to Claim 1 or Claim 2, or Claim 3, or Claim 4, **characterized in that** the profiled connection employing the polygonal tenons (14) and, preferably, additional tenons (15) are fixed in position by threaded fasteners (16) screwed in tenons protruding from the casing (1), and the position of return assembly (5) is fixed with respect to the guide by snap detent (53).
 7. The assembly of rolling shutter with guides according to Claim 3, or Claim 4, or Claim 5, or Claim 6, **characterized in that** the tilting guide (4) is made in the form of channel bar with ends with legs bent towards each other, and that the longitudinal holder (41) is provided on one of these legs, the said holder having T-shaped cross-section and entering the T-slot in the profile from which the screen guide (3) is made.
 8. The assembly of rolling shutter with guides according to Claim 1, or Claim 2, or Claim 3, or Claim 4, or Claim 5, or Claim 6, or Claim 7, **characterized in that** the profile from which the guide (3) is fabricated has an angular cavity (33) located on the side opposite with respect to the guiding cavity (31), and that the part of cord (6) extending from winding roller (61) to return pulley (51) moves inside this angular cavity, and further that inlet slot of the angular cavity (33) located between the wall of tilting guide (4) and side cover (34) of screen guide (3) is open from the side of window frame.
 9. The assembly of the rolling shutter with guides, especially for roof window, particularly the window that opens by rotating its sash around horizontal axis located above the half of the window height, comprising the flexible screen terminated with sliding beam with ends guided in screen guides, further comprising the casing fixed, preferably in a tilting manner, to the top of the window, especially to the upper member of the window frame, the said casing designed for holding the flexible screen in a coiled state and containing the shaft for coiling this flexible screen and driven by a motor, preferably an electric one, wherein the screen guides are made of profiles with guiding cavities open towards each other for guiding the ends of sliding beam which, in its movement away from the casing is driven by cords wound on winding pulleys located in the casing and thread-

ed over the return pulleys located at the ends of screen guides opposite to the casing, and the said cords are under the action of tensioning assembly, particularly the tensioning assembly in the form of springs located in the said sliding beam and exerting the tensioning force on the cords, **characterized in that** the locking means are provided for springs (22) which for the time of assembly storage, transportation and installation neutralize the tensioning action of these springs by fixing them in such position that the cord (6) is slack.

10. The assembly of rolling shutter with guides according to Claim 9, **characterized in that** the spring locking means (22) is provided in the form of a fastener, preferably threaded one, and particularly this fastener is made as the screw (27) located inside the sliding beam (2) perpendicularly to the direction of this sliding beam movement.

11. The assembly of rolling shutter with guides according to Claim 9 or Claim 10, **characterized in that** the cord (6) along its part inside the sliding beam (2) is threaded over the tensioning roller (24) and the end of cord is fixed to the end of sliding beam (2), preferably to the fishplate (25), with the possibility to adjust the cord length.

12. The method for installing of the assembly of rolling shutter with guides, especially for roof window, particularly the window that opens by rotating its sash around horizontal axis located above the half of the window height, comprising the flexible screen terminated with sliding beam with ends guided in screen guides, further comprising the casing fixed, preferably in a tilting manner, to the top of the window, especially to the upper member of the window frame, the said casing being designed for holding the flexible screen in a coiled state and containing the shaft for coiling this flexible screen and driven by a motor, preferably an electric one, wherein the screen guides are made of profiles with guiding cavities open towards each other for guiding the ends of sliding beam which, in its movement away from the casing is driven by cords wound on winding pulleys located in the casing and threaded over the return pulleys located at the ends of screen guides opposite to the casing, and the said cords are under the action of tensioning assembly, particularly the tensioning assembly in the form of springs located in the said sliding beam and exerting the tensioning force on the cords, **characterized in that** it comprises the following steps:

- Installing and attaching of the mounting kit to the top of window, the said kit consisting of the casing (1) containing flexible screen (13), two return assemblies (5) detachably secured to the casing, and the cords (6) threaded over return

pulleys (51) in the said return assemblies, with excess length of cords in mounting kit is preferably coiled into hanks (62);

- Detaching the first return assembly (5) from the casing and unwinding the cord (6), then attaching this return assembly to the first guide (3) by inserting the polygonal tenon (52) provided in this return assembly into the guide;

- After securing the first return assembly, placing these parts of cord (6) which extend from winding roller (61) in the casing (1) to the first return assembly (5) and from this return assembly to sliding beam (2) in cavities existing in the profile from which the first guide (3) is made, and then joining this guide with casing (1) by sliding it over the polygonal tenon (14) provided in the casing;

- Detaching the second return assembly (5) from the casing and unwinding the cord (6), then attaching this return assembly to the second guide (3) by inserting the polygonal tenon (52) provided in this return assembly into the guide;

- After securing the second return assembly, placing these parts of cord (6) which extend from winding roller (61) in the casing (1) to the second return assembly (5) and from this return assembly to sliding beam (2) in cavities existing in the profile from which the second guide (3) is made, and then joining this guide with casing (1) by sliding it over the polygonal tenon (14) provided in the casing.

13. A method according to Claim 12, **characterized in that** each of these two guides, preferably before joining it with the casing, is joined with lower corner of window sash (72) through inserting the tenon (71) secured to the sash, preferably to the fishplate secured to this window sash, into latching socket (43) in the slider (42) located in the cavity in the tilting guide (4).

14. A method according to Claim 12 or Claim 13, **characterized in that** each guide (3, 4), after joining it with the casing (1), is locked by threaded fasteners (16) screwed in tenons (14, 15) provided in the casing.

15. A method according to Claim 12, or Claim 13, or Claim 14, **characterized in that** during installation operations the locking means that fix the positions of springs (22) are installed, and when the guides (3) are joined with the casing (1), these locking means are removed.

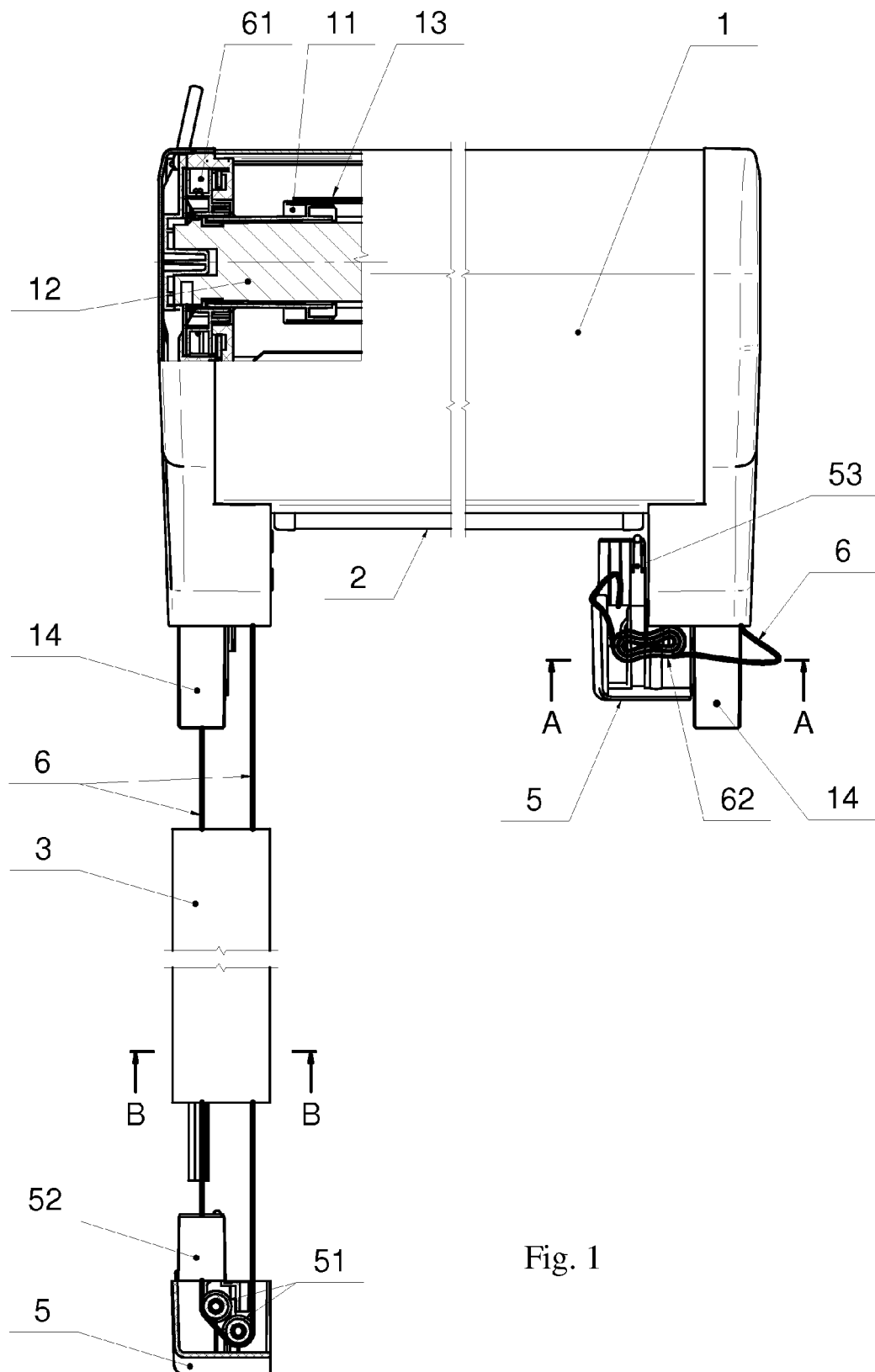


Fig. 1

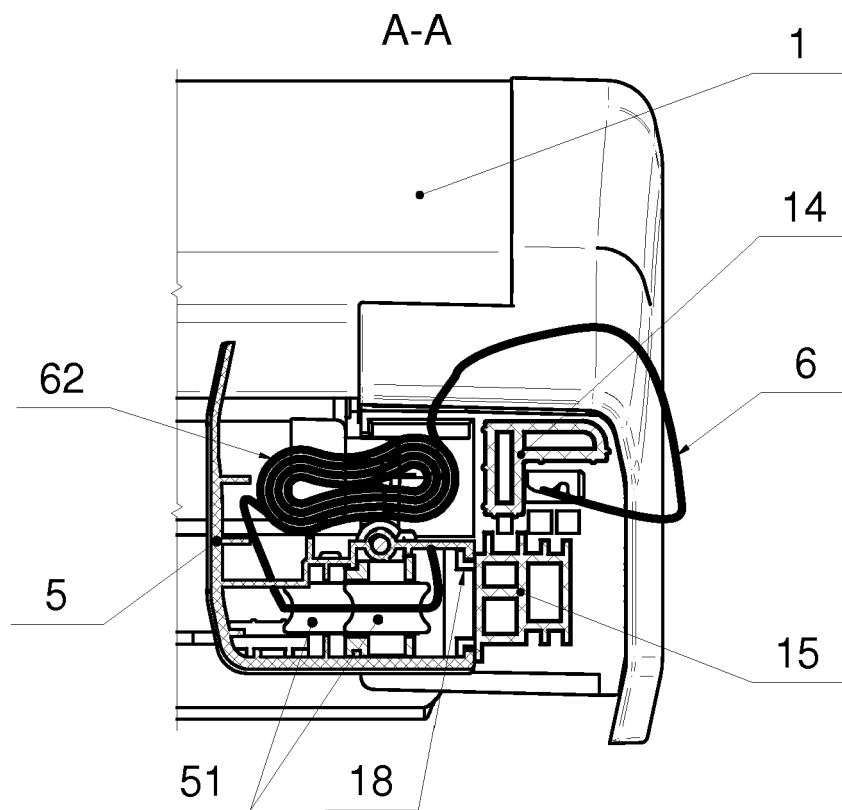


Fig. 2

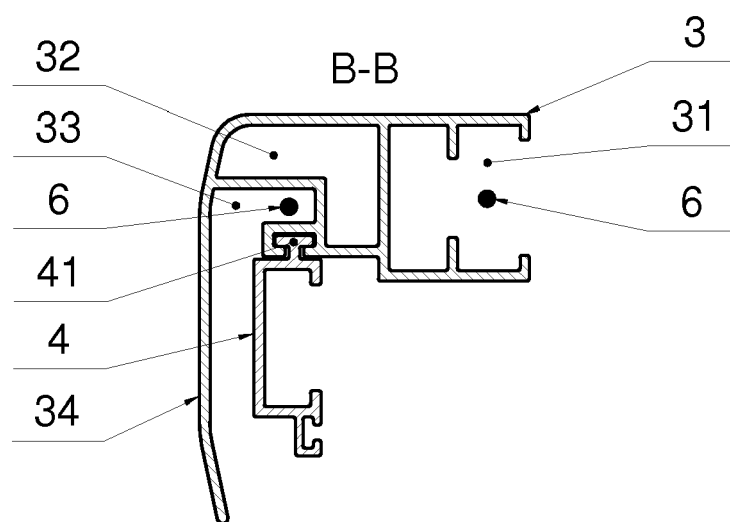


Fig. 3

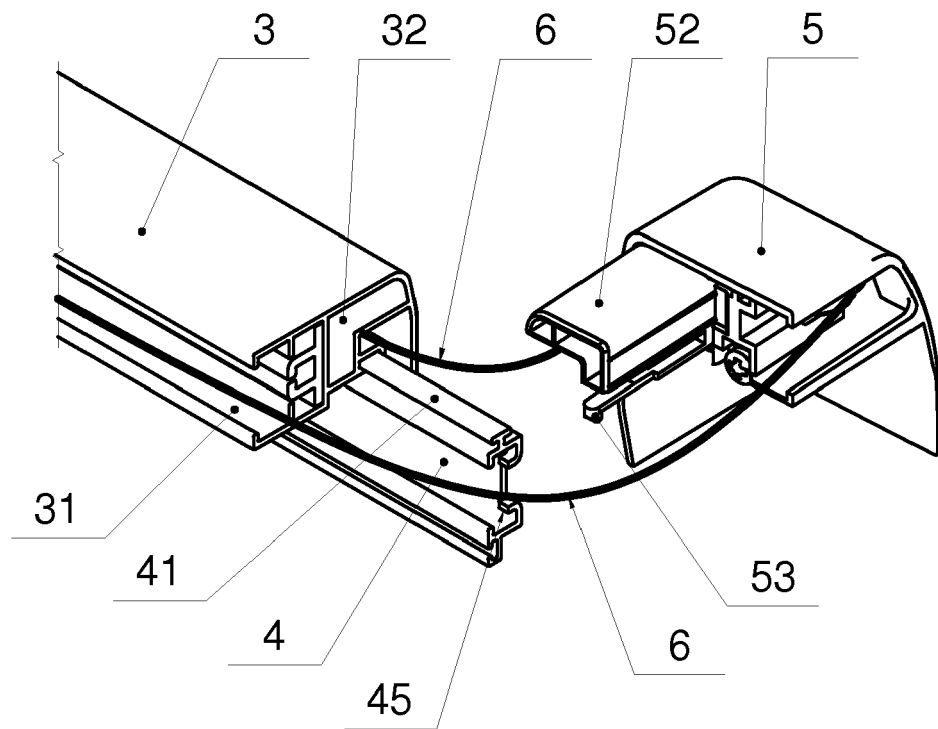


Fig. 4

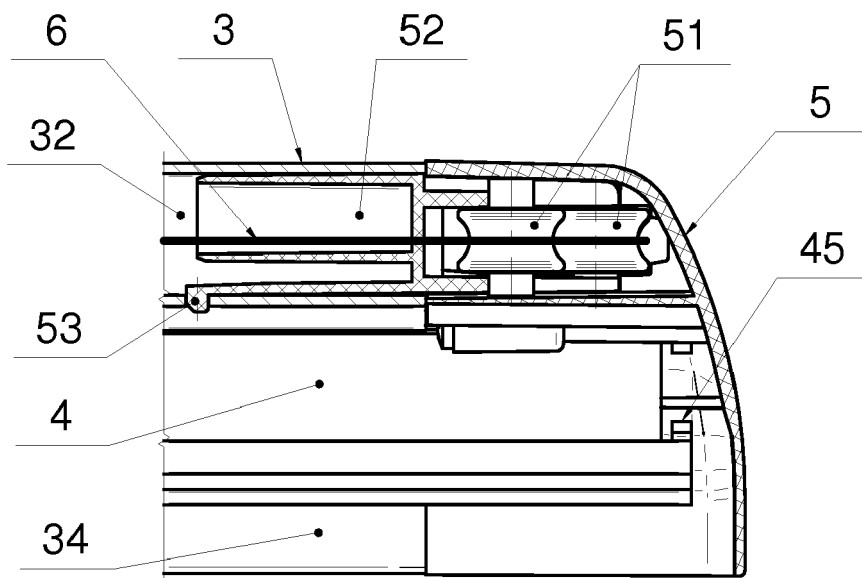


Fig. 5

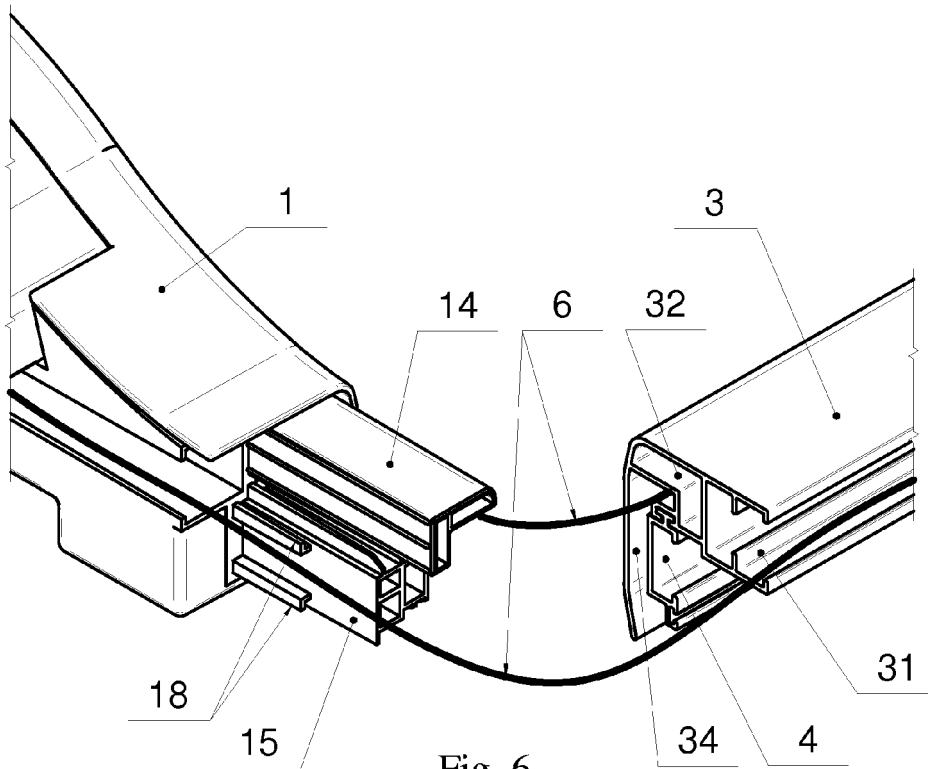


Fig. 6

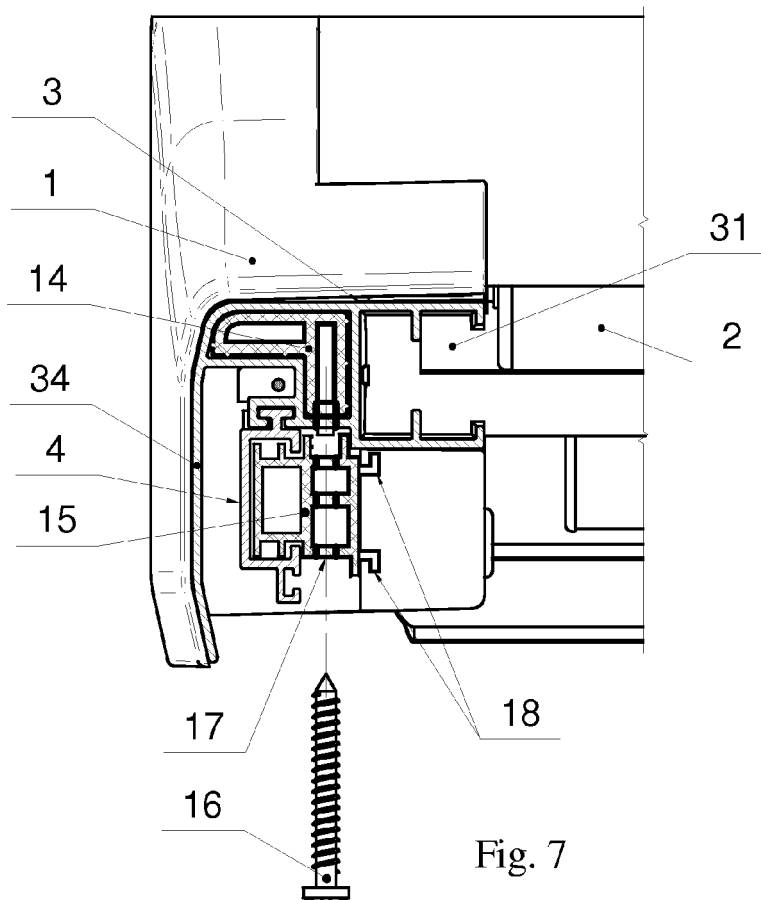


Fig. 7

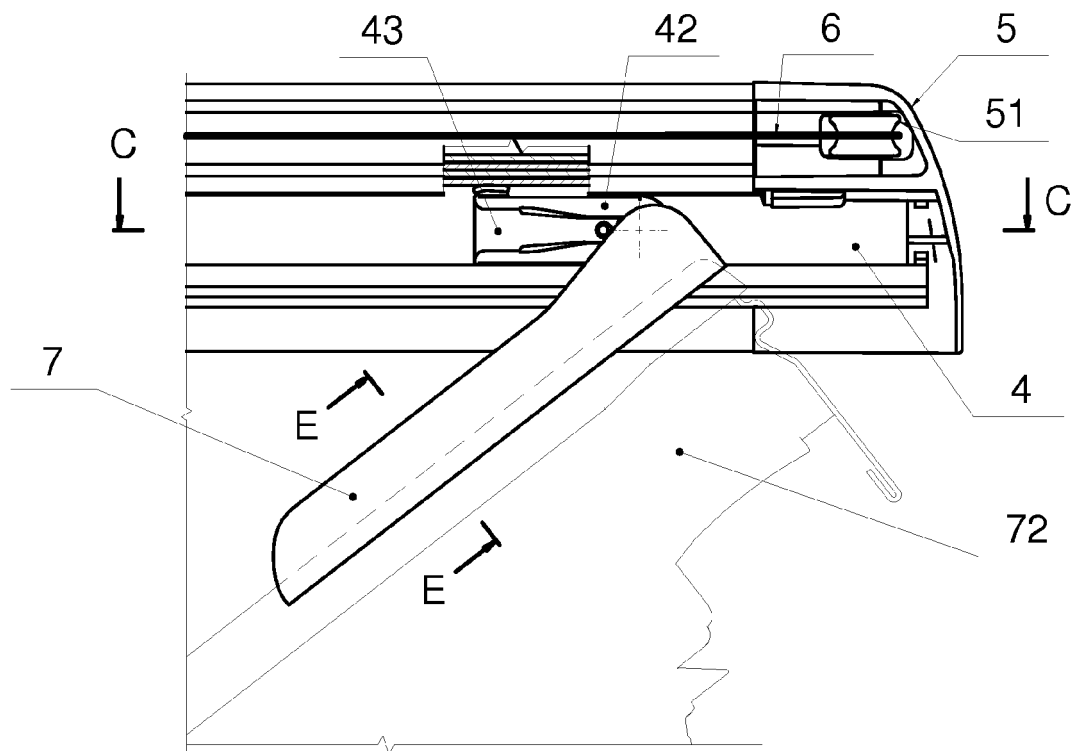


Fig. 8

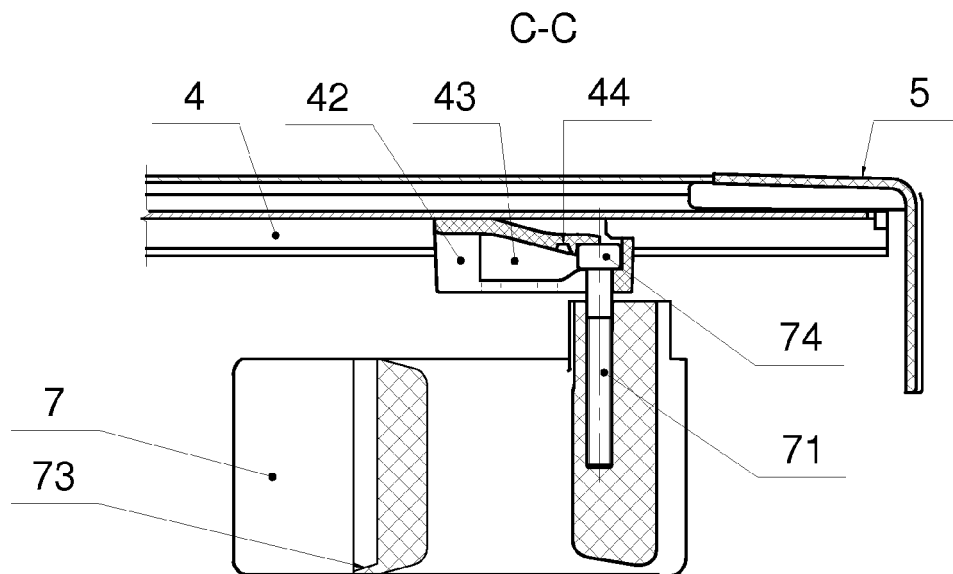


Fig. 9

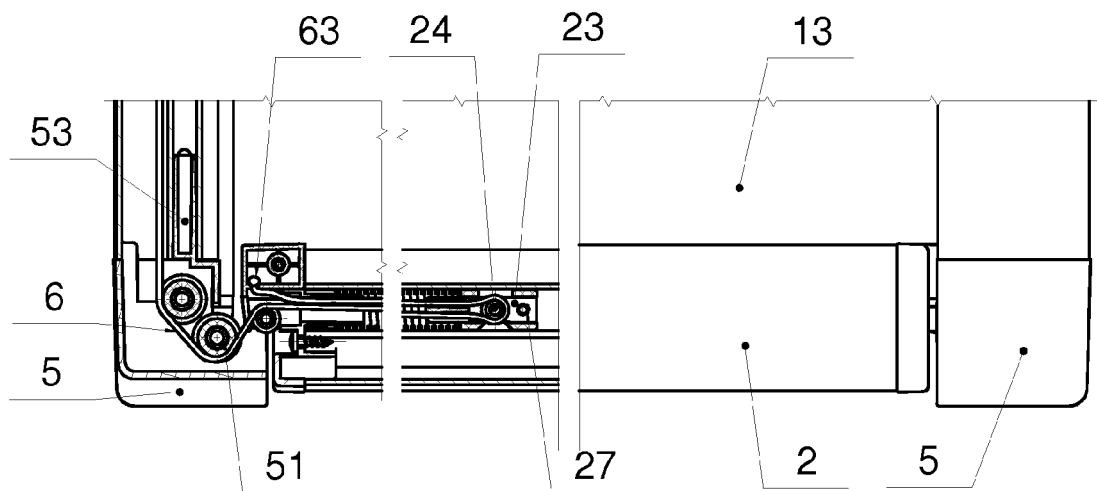


Fig. 10

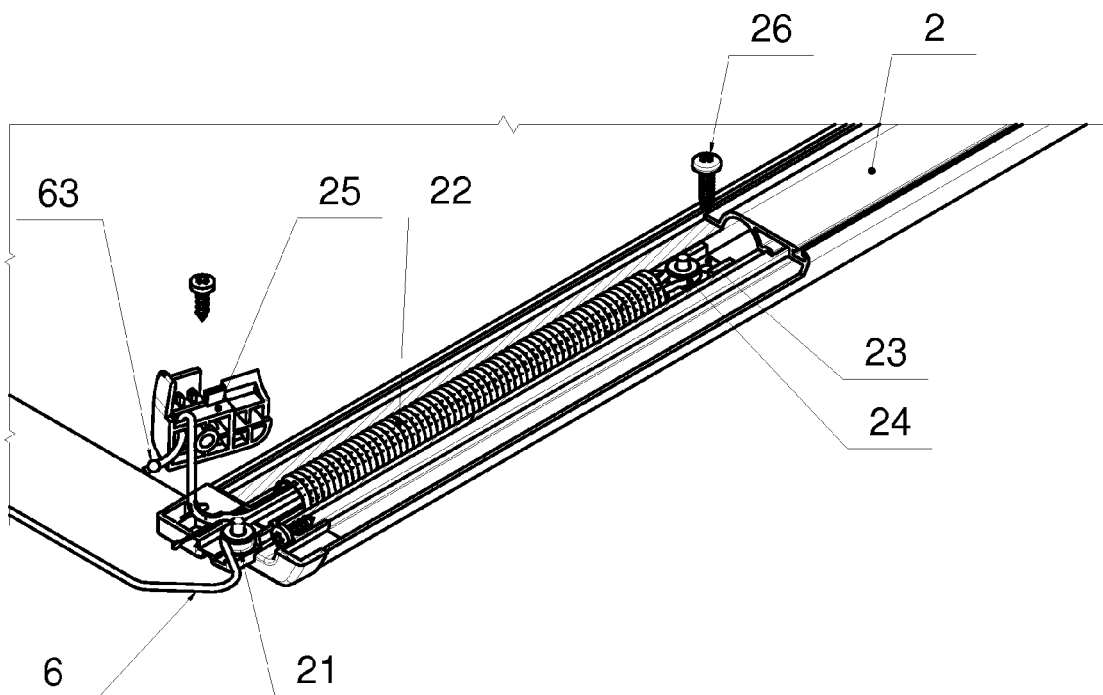


Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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