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(54) **Snap-action fastener for fastening a covering member for roof window sash**

(57) The fastener for connecting the external member covering the pivoting or double action sash of the roof window with the side member of the sash, the fastener has two functional parts, the base part (3) and the movable part (4), which are connected together during

assembly and positioning on the supporting arm (2), in the base part (3) is hole (31) and in movable part (4) is blind hole (41), and both holes in closed position of the fastener are coaxial and define the socket for elements used for fastening the covering member.

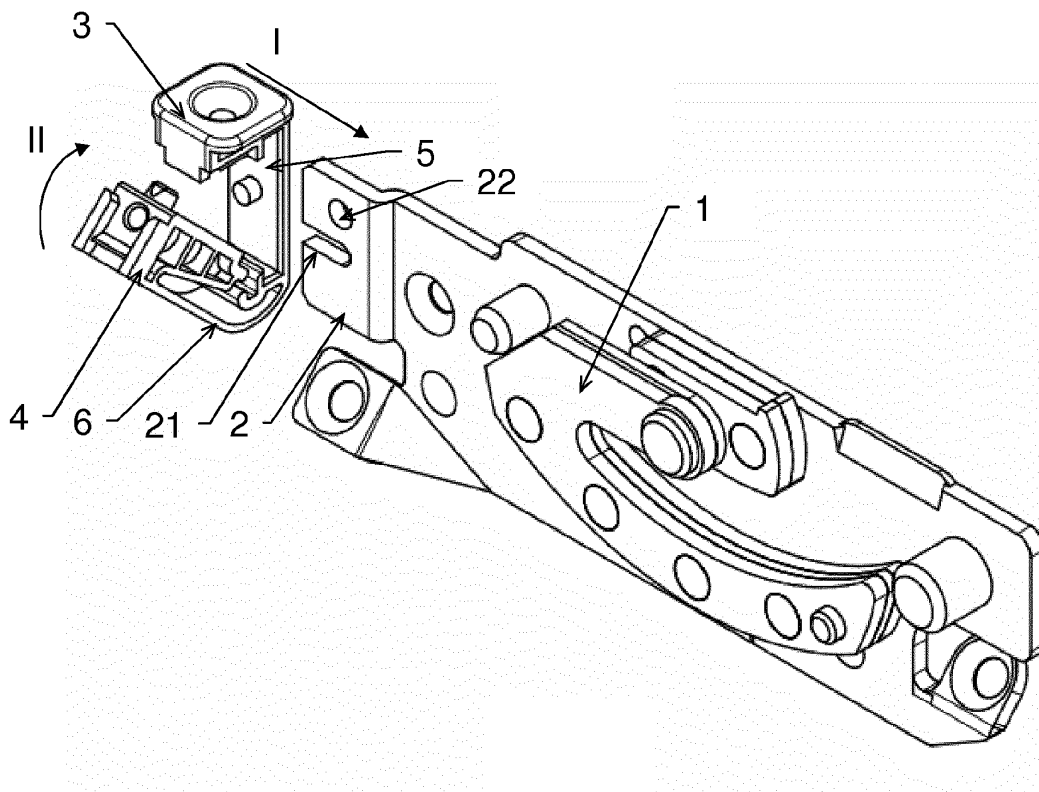


Fig. 1

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Description

[0001] The present invention concerns a fastener designed for fastening of a covering member that protects the side members of roof window sash against weather conditions, said fastener being mounted on rotary hinge of pivoting or dual action roof window sash.

[0002] On the external side the roof windows are equipped with covering members, usually made of metal sheet and protecting the window frame and the sash against adverse effects of weather conditions. In the case of windows with pivoting or dual-action sashes, in which the rotation axis extends between the top member and the bottom member of window frame, two covering members are used which are secured to the window side members, one of them above and the other one below the sash rotation axis.

[0003] Most often, the side covering members are screw fastened and for this purpose they have screw holes with the same spacing in all members. In the side members of a roof window the holes for fastening screws which are located near the top member of a window frame and the bottom member of a sash are usually drilled in fixed or sliding securing sockets provided at both ends of the side members of a window, whereas near the sash pivoting axis the holes for fastening screws are located in fasteners constituting a part of the pivot hinge.

[0004] A hinge for a roof pivot window is known, also from the patent specification WO/ 0131155, which consists of a part secured to a window frame and a part secured to window sash. Each part of a hinge has a base plate with holes for fastening screws. Moreover, each base plate has at one end a fastener with a screw hole for securing side covering members near the pivot axis of a window sash. The fastener constitutes a monolithic part of the base plate with fixed position.

[0005] Also, from patent specification WO/ 2006002633 a hinge for a roof window with a pivot sash is known, which is equipped with two fasteners having screw holes. One fastener is snap fastened in a holder formed as the monolithic part of the base plate secured to a sash, and the other one is a monolithic part of the hinge intermediate member which is riveted to the base plate fastened to the side member of a window frame. The position of both fasteners with screw holes is fixed relative to the base plates of the pivot hinge.

[0006] Even if the production regime is followed, it often happens that the hole spacing in the side member of a window is not the same as the screw hole spacing in the covering member. If the corresponding pairs of holes in window members and covering members being connected together are not as coaxial as required, a fastening screw will be screwed in at an angle other than 90°. This hinders assembly work and affects the aesthetic qualities of joints between cover members and the side members of a window.

[0007] As the experience proves, fastening of cover members to side members of a window by screws put

into holes located in fixed positions causes problems during assembly.

[0008] The invention disclosed in patent specification WO 2008010735 could solve the above problems, as it proposes to introduce to the hinge of roof window with pivoting sash at least one fastener slidably fixed to the rectangular arm. Such fastener has the hole perpendicular to the direction of its movement along an arm in the hinge, and also has a supporting element parallel to the direction of fastener movement. In this case, regardless the solution adopted, the second fastening point of cover member has a fixed location relative to window sash. Despite advantages, in this solution the uncontrolled movements of covering member can occur relative to the window frame covering member which is installed in fixed position in upper part of window frame, and cause leakages.

[0009] An object of the present invention is to eliminate this inconvenience by using the pivoting or double-action roof window with the hinge equipped with a fastener connected to it and put during assembly on the supporting arm with preferably rectangular profile formed in the hinge close to the sash pivoting axis and snap-fixed after achieving the required position. This fastener constitutes a base for connecting the external covering member to the side member of window sash by using fastening means, usually screws.

[0010] The fastener is composed of two functional parts, i.e. the base part and the movable part. Both parts are connected and positioned relative to each other during assembly with simultaneous positioning on the supporting arm. In base part and the movable part the holes are provided which are coaxial in the closed position of the fastener, thus forming the socket for elements that fasten the covering member. When the fastener is mounted, the socket axis should be substantially perpendicular to the sash plane. The hole in base part of the fastener is a through hole, whereas the hole in movable part may be a blind one. However, it should be noted that hole depth must match the length of screw used to fasten the covering member.

[0011] In the operating position the fastener must be precisely positioned against the supporting arm, hence means for correct positioning of fastener's parts relative to each other and correct positioning of the fastener relative to the supporting arm must be provided. For this purpose, among other things, the snap-on mechanism is used, with the recess preferably formed in the base part and the tongue located on the movable part. The second fulcrum for the movable part being closed is created by the positioning assembly consisting of the longitudinal holder formed in the base part of the fastener and the tongue which enters the holder when the fastener is in closed position. Such supporting method allows for free, but limited to a certain range, angular movement of movable part around the axis passing through the bottom of the holder and substantially perpendicular to the fastener's symmetry plane.

[0012] Additionally, in order to limit the movement and ensure correct positioning in the direction perpendicular to the symmetry plane, the fastener in its movable part has retaining strips shaped preferably parallel to each other and symmetrically with respect to the plane perpendicular to the apparent axis of rotation of movable part relative to the base part. During closing of the fastener these strips enter the retaining sockets having the shape and dimensions corresponding to the shape and dimensions of these retaining strips. In this solution the rotation of movable part relative to the base part during screwing the fastening element into the socket is blocked. When closed, such fastener constitutes a fully rigid body.

[0013] The fixed connection of the fastener to the supporting arm is ensured by using three independent solutions described below.

[0014] Thanks to the suitably shaped walls of the base part and the movable part, the fastener in its closed position defines a through channel extending in the direction parallel to the axis of mutual rotation of the fastener parts. The dimensions and cross-sectional shape of this channel reflect the dimensions and cross-sectional shape of the supporting arm to which the fastener is fixed. In this solution the system with one degree of freedom, i.e. movement along the supporting arm, is created.

[0015] It should be noted that for practical and geometrical reasons it is favourable when the securing channel does not intersect with the recess provided for fastening element used for fastening of the covering member. In order to enhance the precision of assembly operations and to obtain better stiffness of the connection between the fastener and supporting arm the additional positioning pair can be employed in the form of longitudinal slot extending in the direction parallel to the direction of fastener's movement relative to the securing arm and, as a second element of the positioning pair, the retaining pin preferably located in the base member in such position that its sliding engagement in the securing slot is possible.

[0016] The third positioning solution that fully blocks the fastener's movement relative to the supporting arm is the assembly composed of retaining opening, preferably formed in the supporting arm, and the retaining pin ensuring precise final positioning of the fastener relative to the supporting arm and, consequently, to the window sash.

[0017] The base part and the movable part can be executed in the form of separate elements, but for practical reasons and for convenience of assembly work it is advisable to connect them together with elastic link. From practical and economical point of view the most beneficial solution is that the base part, movable part and the connecting link are made in the form of a single member.

[0018] The proposed embodiment of the invention is depicted in Fig. 1 where the fastener is shown in open position, together with the hinge (1) of pivoting sash. Fig. 2 shows the fastener in closed position, seated on the supporting arm (2) being the part of the hinge (1). In this

position the fastener is ready for engagement of fastening element, e.g. a screw. Figures 3a and 3b show, in two different perspective views, the fastener in open position allowing for sliding it onto the supporting arm (2). Fig. 4 shows the section of the open fastener along its symmetry plane, whereas the Fig. 5 shows similar section of closed fastener in the position ready for screwing the fastening element in.

[0019] The fastener consists of two functional parts, i.e. the base part (3) and the movable part (4). The base part (3) has a through hole (31), whereas a movable part (4) has a blind hole (41). In closed position, both these holes are coaxial and form the socket for fastening element securing the side covering element of window sash. In mounted position of the fastener the axis of this socket should be substantially perpendicular to the window sash plane. The socket depth, being the sum of the blind hole (31) and the through hole (41) lengths, is matched to required length of fastening element that fixes the side covering member of window sash.

[0020] For proper positioning of the base part (3) and movable part (4) relative to each other, the fastener is equipped with snap-on mechanism consisting of the recess (32) formed in the base part (3) and the tongue (42) formed in the movable part (4). As the second point of support for movable part (4) the positioning assembly is employed consisting of the longitudinal holder (33) formed in the base part (3) of the fastener and the tongue (41) which enters the holder (33) when the fastener is closed. With such supporting mechanism the movable part (4) can freely, but within a certain angular range, rotate around the axis intersecting the bottom of the holder (33) and perpendicular to the fastener's symmetry plane, until the fastener snaps on in the closed position. In this closed position the movable part (4) is blocked in the base part (3) by latching the tongue (43) in the recess (32) and entering the tongue (43) into the holder (33). Additionally, for restricting the movement range and ensuring proper positioning in the direction perpendicular to the symmetry plane, the movable part (4) of the fastener has retaining strips (44) shaped preferably parallel to each other and symmetrically with respect to the symmetry plane perpendicular to the apparent axis of rotation of movable part (4) relative to the base part (3). During closing of the fastener the retaining strips (44) enter the retaining sockets (34) having the shape and dimensions substantially corresponding to the shape and dimensions of retaining strips (44). In this solution the last degree of freedom of the movable part (4) relative to the base part (3) is blocked, therefore the fastener parts cannot move relative to each other during screwing the fastening element into the socket.

[0021] The precise and fixed connection of the fastener to the supporting arm (2) is ensured by three mutually co-operating mechanisms described below.

[0022] Thanks to the suitably shaped walls of the base part and the movable part, the fastener in its closed position defines a through channel (5) extending in the di-

rection parallel to the axis of mutual rotation of the fastener parts during closing and perpendicular to the axis of blind hole (41). The dimensions and cross-sectional shape of channel (5) reflect the dimensions and rectangular cross-sectional shape of the supporting arm (2) to which the fastener is fixed. The channel (5) has three fixed walls formed in the base part (3), i.e. the base wall (51), the bottom wall (52), and top wall (53). The bottom wall (52) and top wall (53) are located symmetrically and perpendicularly to the base wall (51). In the presented exemplary embodiment of the invention, the closing wall (54) is partially, in the area perpendicularly adjacent to the bottom wall (52) and the upper wall (53), formed in the base part (3).

[0023] In such arrangement upon sliding the fastener onto supporting arm (2) the system with one degree of freedom is created, i.e. the movement along the supporting arm (2), regardless the position of movable part (4). In closed position of the fastener the closing wall (54) complements the periphery of the channel (5), ensuring better stiffness of the fastener and therefore better resistance against deformation. The channel (5) does not intersect with the socket for fastening elements.

[0024] To enhance precision of assembly and to obtain more stiff connection of the fastener with supporting arm (2), the longitudinally extending slot (21) is cut out in the supporting arm in the direction parallel to the direction of fastener's movement relative to the supporting arm (2).

[0025] The fastener is positioned relative to the base member (3) by the pin (34) formed on the base wall (51) and slidably engaging into the slot (21). The length of the slot (21) defines the extreme position of the fastener on the supporting arm (2). In this position it is possible to employ a third positioning set that ensures full blocking of fastener's movement relative to the supporting arm. This set is composed of the retaining opening (22) made in the supporting arm (2) and the retaining pin (35). During closing of the fastener, the retaining pin (35) gets in the retaining opening (22), thus ensuring the precise final positioning of the fastener relative to the supporting arm and, in consequence, to the window sash.

[0026] The base part (3) and the movable part (4) are connected together by flexible link (6) that allows for easy tilting of one element relative to the other in the fastener symmetry plane. All three elements being the parts of the fastener form a solid part which can be easily produced by using injection moulding technique; this is a feature important for keeping the production costs low.

Claims

1. The fastener for connecting the external member covering the pivoting or double action sash of the roof window with the side member of the sash, wherein nearby the sash pivoting axis the fastener is equipped with supporting arm preferably having a rectangular cross-sectional shape and designed for

accepting the fastener during assembly, **characterized in that** the fastener has two functional parts, i.e. the base part (3) and the movable part (4), which are connected together during assembly and positioning on the supporting arm (2).

2. The fastener according to claim 1, **characterized in that** the through hole (31) is made in the base part (3), and the blind hole (41) is made in the movable part (4), and both holes in closed position of the fastener are coaxial and define the socket for elements used for fastening the covering member.

3. The fastener according to claim 2, **characterized in that** the supporting arm (2) has the retaining opening (22) and the fastener has the retaining pin (35) which ensures precise final positioning of the fastener relative to the supporting arm (2).

4. The fastener according to claim 2, **characterized in that the** base part (3) and the movable part (4) are connected together by flexible link (6).

5. The fastener according to claim 4, **characterized in that** the fastener is executed in the form of a monolithic member consisting of the base part (3), the movable part (4) and the flexible link (6) connecting both these parts together.

6. The fastener according to claim 2, **characterized in that** in the closed position of the fastener the base part (3) and the movable part (4) are connected together by the latch formed in them and consisting of the recess (32) and the tongue (42) and by the positioning set consisting of the longitudinal holder (33) and the tongue (43).

7. The fastener according to claim 2, **characterized in that** the movable part (4) has retaining strips (44) preferably parallel to each other and both perpendicular to the apparent axis of rotation of the movable part (4) in relation to the base part (2).

8. The fastener according to claim 7, **characterized in that** the base part (3) has symmetrically arranged retaining sockets (34), wherein the shape and dimensions of the retaining sockets reflect the shape and dimensions of retaining strips and the retaining sockets (34) block the movement of the movable part (4) relative to the base part (3) at the time when the fastening element is screwed in the socket defined by the through hole (31) and the blind hole (41).

9. The fastener according to claim 2 **characterized in that** in the closed position of the fastener the base wall (51), the bottom wall (52), and the top wall (53) of the base part (3), together with the closing wall (54) of the movable part (4), define the through chan-

nel (5) having the cross-sectional shape and dimensions mating with cross-sectional shape and dimensions of the supporting arm (2) which enters the channel (5), and the channel (5) does not intersect with the socket defined by the through hole (31) and the blind hole (41) and provided for the elements used for fastening the covering member.

10. The fastener according to claim 2, **characterized in that** the supporting arm (2) has the longitudinal slot (21) extending in the direction same as the direction of the through channel (5), and the fastener is equipped with the pin (51) located in such position that it can go into the slot (21).

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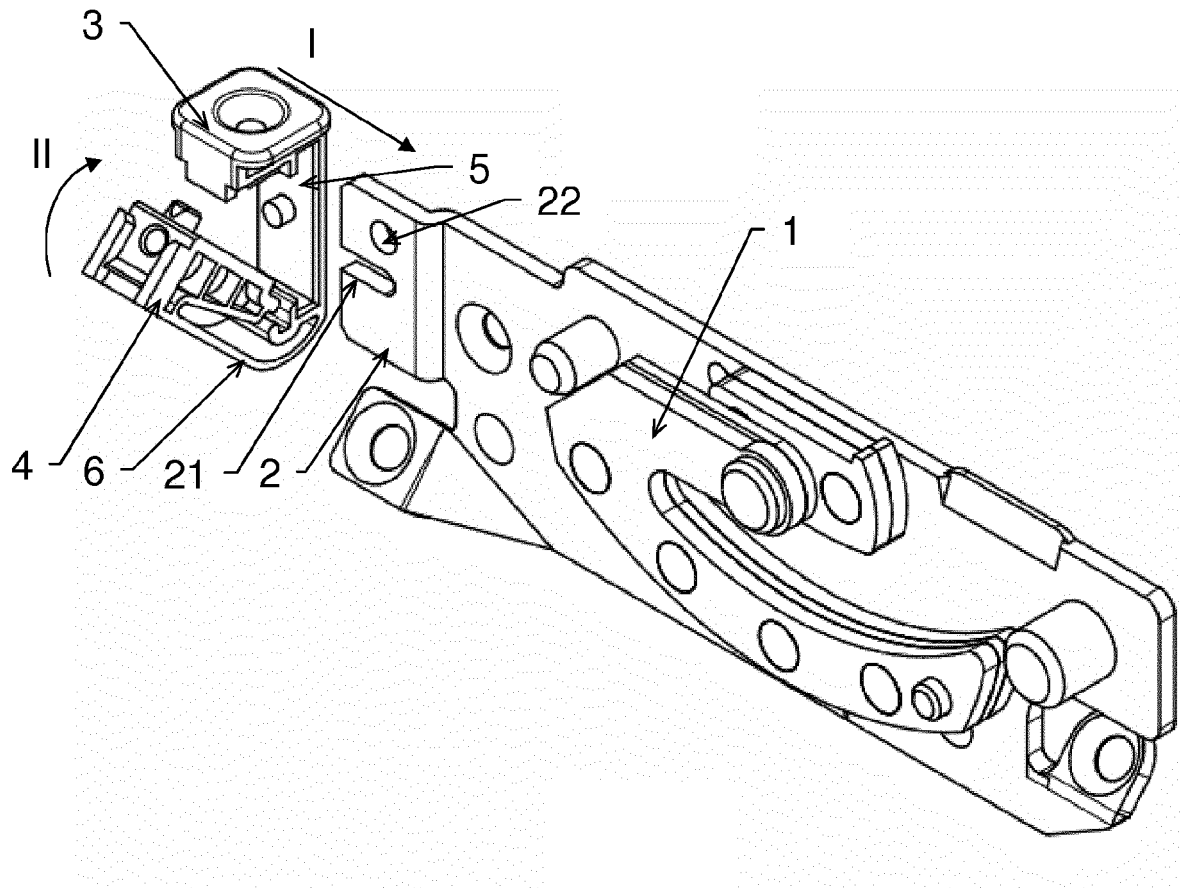


Fig. 1

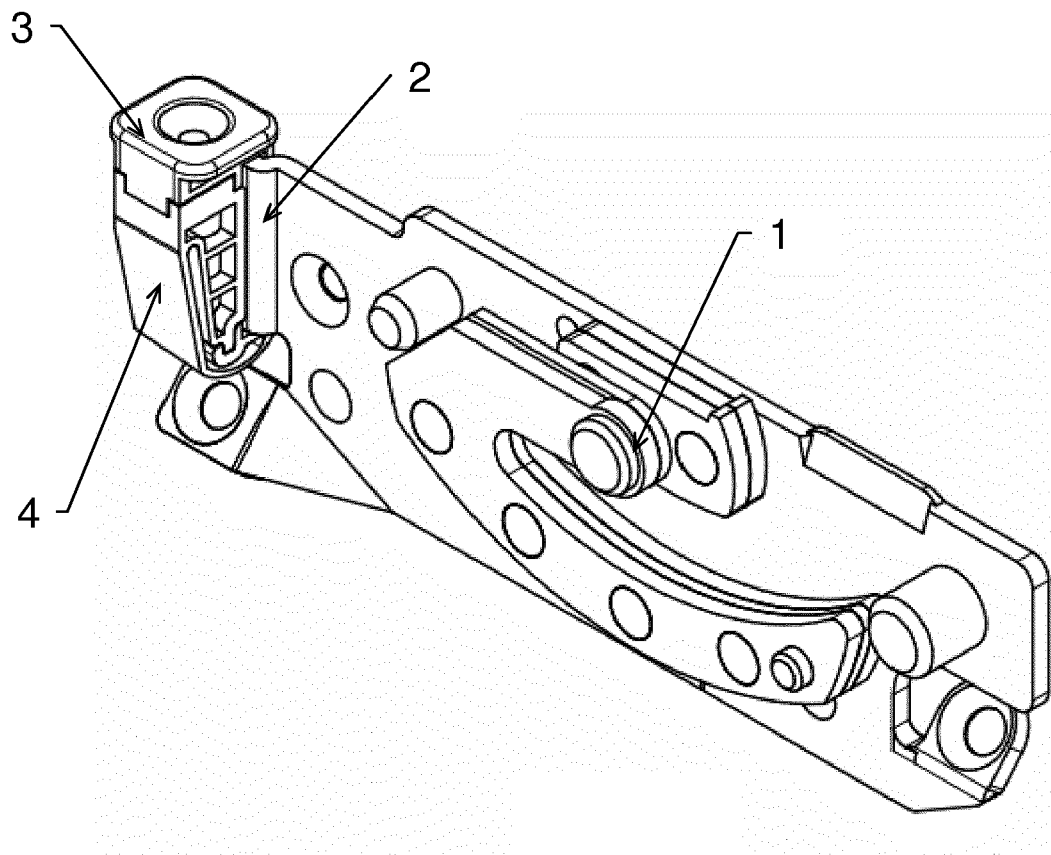


Fig. 2

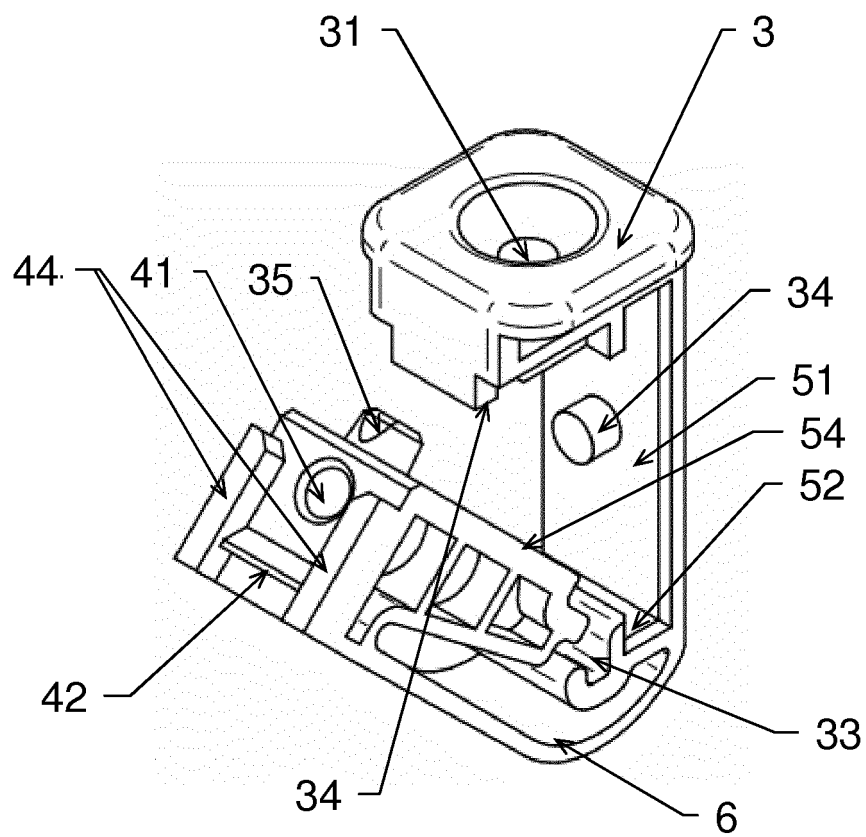


Fig. 3a

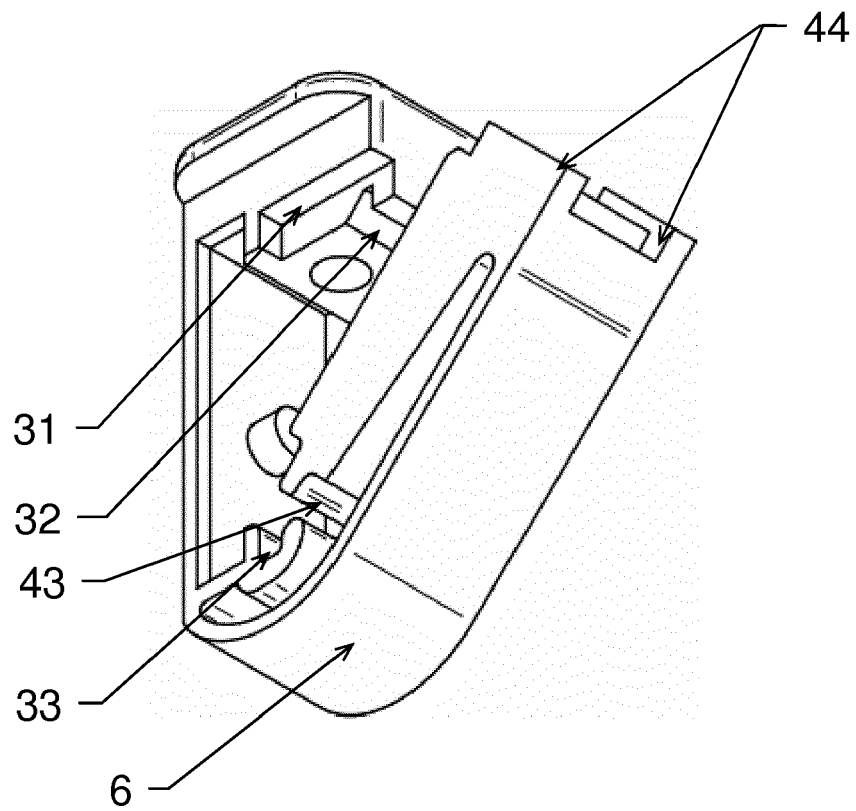


Fig. 3b

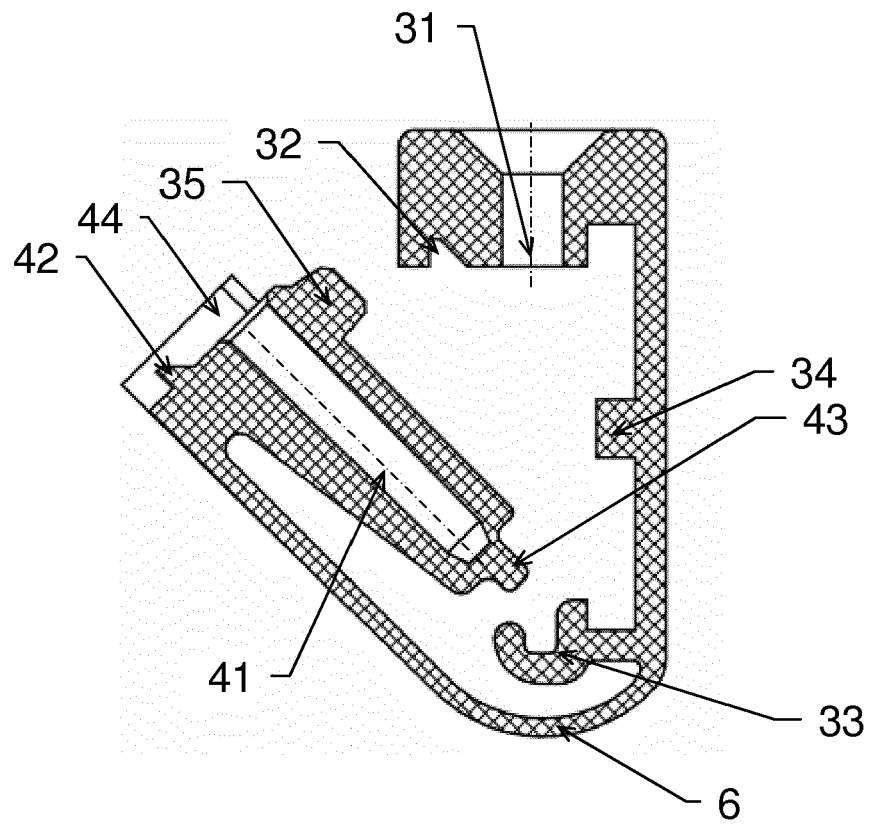


Fig. 4

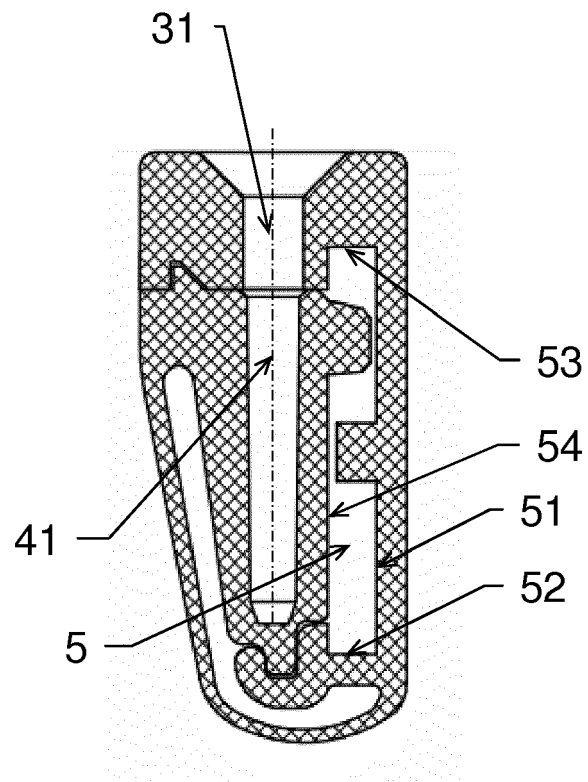


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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