



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.01.2011 Bulletin 2011/01

(51) Int Cl.:
E06B 3/58 (2006.01)

(21) Application number: **09164123.3**

(22) Date of filing: **30.06.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

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(54) **Window assembly and method of mounting a window pane in a window sash**

(57) The window assembly (1) comprising a window sash (2) carrying a window pane (3). The sash has a flange (5) abutting a first side (6) of the window pane and is provided with retaining members (7) holding the window pane. Each retaining member has a mounting flange (11) with opposed end faces (14, 15) and has a retaining

flange (12) abutting a second side (16) of the window pane. The mounting flange is mounted on the sash member (4) by means of a fastening element fixed to the sash member and engaging a groove (18) in the mounting flange. The groove has an inclined edge and is open for insertion of the fastening element through an end face (14, 15) of the mounting flange.

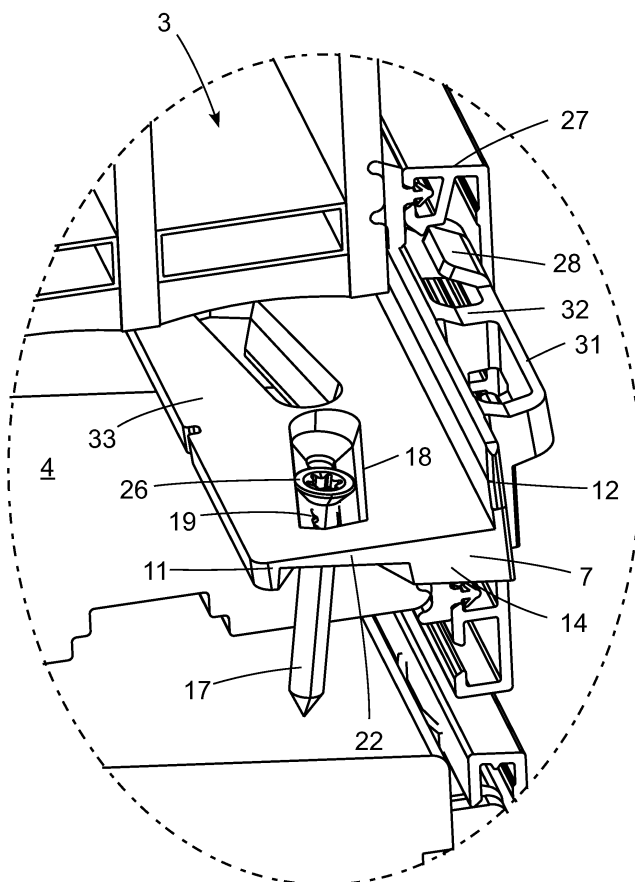


Fig. 2

Description

[0001] The present invention relates to a window assembly comprising a window sash carrying a window pane, the window sash being composed by four sash members each having a flange abutting a first side of the window pane and each being provided with a number of retaining members holding the window pane in place, each retaining member having a mounting flange and a retaining flange, the mounting flange being located in a space between a peripheral face of the window pane and the sash member and having opposed end faces spaced in the longitudinal direction of the sash member, the retaining flange abutting a second side of the window pane, the mounting flange being mounted on the sash member by means of a fastening element fixed to the sash member and engaging a groove in the mounting flange, the groove having an inclined edge with a first end and a second end, and the first end being closer to the flange of the sash than the second end.

[0002] NL 1023612 discloses a window assembly comprising a window sash carrying a window pane. The window pane is held in place by means of L-profiles having a mounting flange for mounting on the sash and a retaining flange for abutting the window pane. In order to mount a window pane in the sash, a number of screws are fastened in the sash members so that their head is slightly spaced from the sash member. The pane is located in the sash, and the L-profiles are mounted. The mounting flange of an L-profile is inserted between the peripheral face of the window and the sash member, whereby the mounting flange is thoroughly so positioned that one of the screws may enter an opening in the retaining flange as the L-profile is displaced perpendicularly to the window pane. Subsequently, the L-profile is displaced in the longitudinal direction of the sash member, whereby the screw is displaced along an inclined edge, thereby urging the retaining flange against the window pane. However, as the L-profile has to be thoroughly positioned for the screw to enter the opening in the retaining flange, the mounting procedure may be cumbersome, especially if several L-profiles are to be mounted.

[0003] GB 504,420 discloses a window assembly comprising a window sash carrying a window pane. The window pane is held in place by means of a number of V-shaped guide strips having a first flange and a second flange. The first flange is provided with angled slots movable on studs or the like fixed on the sash, whereby the second flange is pushed close to the pane. The first flange is located between the peripheral face of the pane and an opposed face of the sash. The slots are provided with an enlarged portion at an end in order for a head of the studs or the like to enter the slot. However, in order to mount a V-shaped guide strip, it must be thoroughly positioned so that the head of the stud or the like is exactly at the enlarged portion of the slot, so that it may enter the slot. Consequently, the mounting procedure may be cumbersome.

[0004] DE 1 278 721 discloses a somehow similar window assembly, whereby the window pane is held in place by means of a profile, a mounting flange of which having angled slots movable on studs on the sash in order to press a retaining flange against the window pane. However, the mounting flange is directed away from a side of the window pane.

[0005] The object of the present invention is to provide a window assembly, whereby the mounting procedure is facilitated.

[0006] In view of this object, the groove is open for insertion of the fastening element through one of the end faces of the mounting flange, and the first end of the inclined edge is located at said end face.

[0007] Thereby, mounting of the retaining members is easily performed by inserting the mounting flange in the space between the peripheral face of the window pane and the sash member, and by subsequently displacing the retaining member in the longitudinal direction of the respective sash member, whereby the mounting flange automatically grips a fastening element and urges the retaining flange against the second side of the window pane. Consequently, no cumbersome positioning of each retaining members is necessary, and thereby the window pane may be mounted quicker than according to the prior art solutions.

[0008] In an embodiment, the mounting flange forms a bridge over the groove at said end face. Thereby, stability and integrity of the retaining member may be ensured.

[0009] In an embodiment, the groove comprises a substantially wedge-shaped opening section opening out in said end face of the mounting flange. Thereby, the mounting procedure of the retaining members is further facilitated, because the fastening element may be guided into the groove by means of the substantially wedge-shaped opening section.

[0010] In an embodiment, the opening of the groove in said end face of the mounting flange has a cross-sectional dimension that is at least 1,5, and preferably 2, times the largest diameter of a head of the fastening element. Thereby, the mounting procedure of the retaining members is further facilitated, because the fastening element may be guided into the groove by means of a suitably large tapering opening section.

[0011] In an embodiment, the groove has a substantially tapered cross-section corresponding substantially to a head of the fastening element. Thereby, a good engagement between the fastening element and the retaining member may be obtained. For instance, a screw having a countersunk head may be used as the fastening element.

[0012] In an embodiment, the inclined edge of the groove is serrated. Thereby, the fastening element may better maintain its position along the inclined edge of the groove, thereby facilitating and securing the tensioning the retaining member against the window pane.

[0013] In an embodiment, each sash member is pro-

vided with a profile covering the area between the peripheral face of the window pane and the sash member, and the profile is snap-connected to a flange of each retaining member. Thereby, the second side of the window pane may be sealed against the sash and/or the transition between the window pane and the sash may be covered visually for aesthetic reasons. The snap-connection to a flange of each retaining member facilitates the mounting of the profile.

[0014] In a structurally advantageous embodiment, said flange of the retaining member is provided on a rib connected to and extending at a distance from the retaining flange of the retaining member and being provided, at a first longitudinal position, with a first flange directed upward, and at a second longitudinal position, with a second flange directed downward.

[0015] The present invention further relates to a method of mounting a window pane in a window sash being composed by four sash members each having a flange adapted to abut a first side of the window pane, whereby a number of fastening elements are fixed to the sash member, whereby the window pane is inserted into the window sash so that the first side of the window pane abuts the flange of each sash member, whereby a number of retaining members are mounted along each sash member so that a mounting flange of each retaining member is located in a space between a peripheral face of the window pane and the sash member, and whereby each retaining member is displaced in the longitudinal direction of the respective sash member so that a corresponding fastening element slides along an inclined edge of a groove of the mounting flange, thereby urging a retaining flange of said retaining member against a second side of the window pane.

[0016] The method is characterized by that the fastening element enters the groove of the mounting flange through an end face of the mounting flange during the displacement of the retaining member in the longitudinal direction of the respective sash member. Thereby, the above-mentioned features may be obtained.

[0017] In an embodiment, the fastening element passes a bridge formed over the groove in the mounting flange at said end face. Thereby, the above-mentioned features may be obtained.

[0018] In an embodiment, the fastening element is guided into the groove by a substantially wedge-shaped opening section opening out in said end face of the mounting flange. Thereby, the above-mentioned features may be obtained.

[0019] In an embodiment, as the retaining flange of each retaining member is urged to abut the second side of the window pane, the fastening element jumps through a number of indentations in the inclined edge of the groove of the mounting flange. Thereby, the above-mentioned features may be obtained.

[0020] In an embodiment, each retaining member is mounted along the corresponding sash member by the following steps:

1) the retaining member is displaced into the space between the peripheral face of the window pane and the sash member until it abuts either the window pane or the fastening element,

2) it is evaluated whether the retaining member abuts the window pane or the fastening element,

a) if the retaining member abuts the window pane, it is displaced in the longitudinal direction of the respective sash member until the fastening element enters the groove and the retaining flange of the retaining member is urged against the second side of the window pane,

b) if the retaining member abuts the fastening element, it is displaced in the longitudinal direction of the respective sash member until it jumps further into the space between the peripheral face of the window pane and the sash member, so that the retaining member abuts the window pane, and step a) is performed.

[0021] Thereby, the mounting procedure is further facilitated in that each retaining member may be inserted at any position along a sash member and subsequently be correctly positioned by easily performed standardized movements.

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

Fig. 1 is a cross-sectional view of a window assembly according to the invention,

Fig. 2 is perspective, partially cross-sectional view of a detail of the window assembly in Fig. 1,

Fig. 3 and 4 are different perspective views of a retaining member of the window assembly in Fig. 1, seen from above,

Fig. 5 is a perspective view of the retaining member in Fig. 3, seen from below,

Fig. 6 is a bottom view of the retaining member in Fig. 3,

Fig. 7 is an end view of the retaining member in Fig. 3, and

Fig. 8 is a top view of the retaining member in Fig. 3.

[0023] Fig. 1 shows a cross-section through a window assembly 1 according to the invention. The window assembly 1 comprises a window sash 2 carrying a window pane 3, whereby the window sash 2 is composed by four sash members 4, of which only one is shown. The window sash 2 may be fixed in a window opening in a wall, or it may be hingedly connected to a frame. Each sash member 4 is substantially L-formed and has a flange 5 abutting a first side 6 of the window pane 3, and each sash member 4 is provided with a number of retaining members 7 holding the window pane 3 in place in the sash 2.

[0024] For illustrative purposes, Fig. 2 shows a perspective, partially cross-sectional view of a detail of the

window assembly in Fig. 1, whereby a retaining member 7 located in the cross-sectional plane has not been cut through.

[0025] In the embodiment shown, the sash members 4 are made of wood, and the sash member 4 has a main body 8 with an inclined face 9 in order for water not to collect in the sash 2. However, the sash members may be made of any suitable material, such as, for instance, a pultruded composite material. Furthermore, in the embodiment shown, the flange 5 abuts the first side 6 of the window pane 3 by means of an intermediate sealing strip 10. The window pane 3 is shown as an isolating pane comprising three glass layers; however, any suitable pane may be employed. The invention is advantageous in the case of window panes comprising more layers of glass mounted in a slimline sash, as in this case relatively little sash material may be available for mounting a retaining member outside the space between the peripheral face of the pane and the sash. Preferably, the retaining member 7 may be injection moulded; however, any suitable manufacturing method is possible.

[0026] As indicated in Fig. 1, each retaining member 7 has a mounting flange 11 and a retaining flange 12. The mounting flange 11 is located in a space between a peripheral face 13 of the window pane 3 and the main body 8 of the sash member 4. As indicated for instance in Fig. 4, the mounting flange 11 has a first end face 14 and a second end face 15 that are spaced in the longitudinal direction of the sash member 4, when the mounting flange 11 is mounted on the sash member. The retaining flange 12 abuts a second side 16 of the window pane 3, and the mounting flange 11 is mounted on the inclined face 9 of the main body 8 of the sash member 4 by means of a fastening element in the form of a screw 17 fixed into the sash member and engaging a groove 18 in the mounting flange 11. Other fastening elements than screws, such as nails, taps, plugs, flaps, flanges or the like, may also be employed.

[0027] The groove 18 has an inclined edge 19 with a first end 20 and a second end 21, whereby the first end 20 is closer to the flange 5 of the sash 2 than the second end 21, when the retaining member 7 is mounted on the sash member. The groove 18 is open for insertion of the screw 17 through the first end face 14 or the second end face 15, respectively, of the mounting flange 11, and the first end 20 of the inclined edge 19 is located at said end face 14, 15 of the mounting flange 11. Furthermore, the mounting flange 11 forms a bridge 22 over the groove 18 at said end face 14 of the mounting flange 11. The bridge 22 may extend over a longer part of the groove 18, in fact it may extend over the entire groove. The bridge 22 may provide stiffness and integrity to the retaining member 7. As shown in the figures, the bridge 22 is flush with a top face 33 of the retaining member 7; however, it may also protrude up from this top face 33.

[0028] As it may be best seen in Figs. 5 and 6, the groove 18 comprises a substantially wedge-shaped opening section 23 opening out in the first end face 14

or the second end face 15, respectively, of the mounting flange 11. The wedge-shaped form of the opening section 23 is formed by two opposed, mutually inclined faces 24, 25 of the opening section 23. The opening of the groove 18 in said end face 14, 15 of the mounting flange 11 may have a cross-sectional dimension that is at least 1,5, and preferably 2, times the largest diameter of a head of the fastening element. Said cross-sectional dimension is, in the embodiment shown, the distance between the two opposed, mutually inclined faces 24, 25 of the opening section 23 at the respective end face 14, 15 of the mounting flange 11.

[0029] As well indicated in Figs. 1, 5 and 7, the groove 18 has a substantially tapered cross-section corresponding substantially to a head 26 of the screw 17. The inclined edge 19 of the groove 18 is preferably serrated, as best indicated in Figs. 4, 6 and 8.

[0030] As shown in Fig. 1, each sash member 4 is provided with a profile 27 covering the area between the peripheral face 13 of the window pane 3 and the sash member 4. The profile 27 is snap-connected to a flange 28, 29 of each retaining member 7. The profile 27 abuts the second side 16 of the window pane 3 by means of an intermediate sealing strip 30.

[0031] The flange 28, 29 of the retaining member 7 is provided on a rib 31 connected to and extending at a distance from the retaining flange 12 of the retaining member. The rib 31 is connected to the retaining flange 12 by means of three connections 32. The rib 31 is provided, at a first longitudinal position, with a first flange 28 directed upward, and at a second longitudinal position, with a second flange 29 directed downward.

[0032] In order to mount the window pane 3 in the window sash 2, firstly, a number of screws 17 are screwed into the sash member 4 in the inclined face 9, and the window pane 3 is inserted into the window sash 2 so that the first side of the window pane abuts the flange 5 of each sash member 4. In the shown embodiment, the screws are of the type with countersunk head, and the screws are inserted only so much into the sash member that their heads protrude from the inclined face 9 of the sash member. Before inserting the window pane into the sash, a number of well-known, but not shown spacer elements may be located on the inclined face 9 of the lower sash member 4 in order for the window pane to rest on these spacer elements at a distance from the inclined face 9. After insertion of the window pane, further, a number of such well-known spacer elements may be located in the space between the peripheral face 13 of the window pane 3 and the main body 8 of the side sash members 4 and of the top sash member 4 in order to position the window pane correctly in relation to the sash.

[0033] Subsequently, a number of retaining members 7 are mounted along each sash member 4 so that the mounting flange 11 of each retaining member 7 is located in the space between a peripheral face 13 of the window pane 3 and the sash member 4. If the above-mentioned spacer elements have been inserted into said space, the

retaining members 7 may be inserted in between such spacer members.

[0034] Subsequently to the insertion, each retaining member 7 is displaced in the longitudinal direction of the respective sash member 4 so that the head 26 of a corresponding screw 17 enters the groove 18 of the mounting flange 11 through the end face 14, 15 of the mounting flange and slides along the inclined edge 19 of the groove 18 of the mounting flange, whereby the retaining flange 12 of said retaining member 7 is urged against the second side 16 of the window pane 3. The screw head is guided into the groove 18 by means of the two opposed, mutually inclined faces 24, 25 of the wedge-shaped opening section 23. During insertion into the groove 18, the screw 17 passes the bridge 22 formed over the groove 18 in the mounting flange at said end face. As the screw 17 slides along the inclined edge 19, it jumps through a number of indentations in the serrated, inclined edge of the groove 18 of the mounting flange, whereby the retaining member 7 is prevented from sliding backwards after being tensioned against the window pane.

[0035] It is noted that the retaining member 7, as shown in the figures, advantageously is symmetrical about a not shown centreline so that it comprises two symmetrically arranged grooves 18 having wedge-shaped opening sections 23 at the respective end faces 14, 15. Thereby, the retaining member 7 may "find" and connect to a screw 17 by displacement in either direction longitudinally in relation to the sash member 4 and consequently the distribution and positioning of a number of retaining members 7 may be easier.

[0036] In order to further facilitate the distribution and positioning of the retaining members 7, each retaining member may be mounted by the following steps:

- 1) the retaining member 7 is displaced into the space between the peripheral face 13 of the window pane 3 and the sash member 4 until it abuts either the window pane 3 or the screw 17,
- 2) it is evaluated whether the retaining member 7 abuts the window pane 3 or the screw 17,

a) if the retaining member 7 abuts the window pane 3, it is displaced in the longitudinal direction of the respective sash member 4 until the head 26 of the screw 17 enters the groove 18 and the retaining flange 12 of the retaining member 7 is urged against the second side 16 of the window pane 3,

b) if the retaining member 7 abuts the screw 17, it is displaced in the longitudinal direction of the respective sash member 4 until it jumps further into the space between the peripheral face 13 of the window pane 3 and the sash member 4, so that the retaining member 7 abuts the window pane, and step a) is performed.

Claims

1. A window assembly (1) comprising a window sash (2) carrying a window pane (3), the window sash being composed by four sash members (4) each having a flange (5) abutting a first side (6) of the window pane and each being provided with a number of retaining members (7) holding the window pane in place, each retaining member having a mounting flange (11) and a retaining flange (12), the mounting flange being located in a space between a peripheral face (13) of the window pane (3) and the sash member (4) and having opposed end faces (14, 15) spaced in the longitudinal direction of the sash member, the retaining flange (12) abutting a second side (16) of the window pane, the mounting flange (11) being mounted on the sash member (4) by means of a fastening element (17) fixed to the sash member and engaging a groove (18) in the mounting flange (11), the groove having an inclined edge (19) with a first end (20) and a second end (21), and the first end (20) being closer to the flange (5) of the sash (2) than the second end (21), **characterized in that** the groove (18) is open for insertion of the fastening element (17) through one of the end faces (14, 15) of the mounting flange (11), and **in that** the first end (20) of the inclined edge (19) is located at said end face (14, 15).
2. A window assembly according to claim 1, **characterized in that** the mounting flange (11) forms a bridge (22) over the groove (18) at said end face (14).
3. A window assembly according to claim 1 or 2, **characterized in that** the groove (18) comprises a substantially wedge-shaped opening section (23) opening out in said end face (14, 15) of the mounting flange (11).
4. A window assembly according to any one of the preceding claims, **characterized in that** the opening of the groove (18) in said end face (14, 15) of the mounting flange (11) has a cross-sectional dimension that is at least 1,5, and preferably 2, times the largest diameter of a head of the fastening element (17).
5. A window assembly according to any one of the preceding claims, **characterized in that** the groove (18) has a substantially tapered cross-section corresponding substantially to a head (26) of the fastening element (17).
6. A window assembly according to any one of the preceding claims, **characterized in that** the inclined edge (19) of the groove (18) is serrated.
7. A window assembly according to any one of the preceding claims, **characterized in that** each sash

member (4) is provided with a profile (27) covering the area between the peripheral face (13) of the window pane (3) and the sash member (4), and **in that** the profile (27) is snap-connected to a flange (28, 29) of each retaining member (7).

8. A window assembly according to claim 7, **characterized in that** said flange (28, 29) of the retaining member (7) is provided on a rib (31) connected to and extending at a distance from the retaining flange (12) of the retaining member (7) and being provided, at a first longitudinal position, with a first flange (28) directed upward, and at a second longitudinal position, with a second flange (29) directed downward.
9. A method of mounting a window pane (3) in a window sash (2) being composed by four sash members (4) each having a flange (5) adapted to abut a first side (6) of the window pane, whereby a number of fastening elements (7) are fixed to the sash member (4), whereby the window pane (3) is inserted into the window sash (2) so that the first side (6) of the window pane abuts the flange (5) of each sash member, whereby a number of retaining members (7) are mounted along each sash member so that a mounting flange (11) of each retaining member is located in a space between a peripheral face (13) of the window pane and the sash member, and whereby each retaining member is displaced in the longitudinal direction of the respective sash member so that a corresponding fastening element (7) slides along an inclined edge (19) of a groove (18) of the mounting flange (11), thereby urging a retaining flange (12) of said retaining member against a second side (16) of the window pane, **characterized by** that the fastening element (17) enters the groove (18) of the mounting flange (11) through an end face (14, 15) of the mounting flange during the displacement of the retaining member in the longitudinal direction of the respective sash member.
10. A method of mounting a window pane according to claim 9, **characterized by** that the fastening element passes a bridge (22) formed over the groove (18) in the mounting flange at said end face.
11. A method of mounting a window pane according to claim 9, **characterized by** that the fastening element (17) is guided into the groove (18) by a substantially wedge-shaped opening section (23) opening out in said end face (14, 15) of the mounting flange (11).
12. A method of mounting a window pane according to any one of the claims 9 to 11, **characterized by** that, as the retaining flange (12) of each retaining member (7) is urged to abut the second side (16) of the window pane (3), the fastening element (17) jumps through a number of indentations in the inclined edge

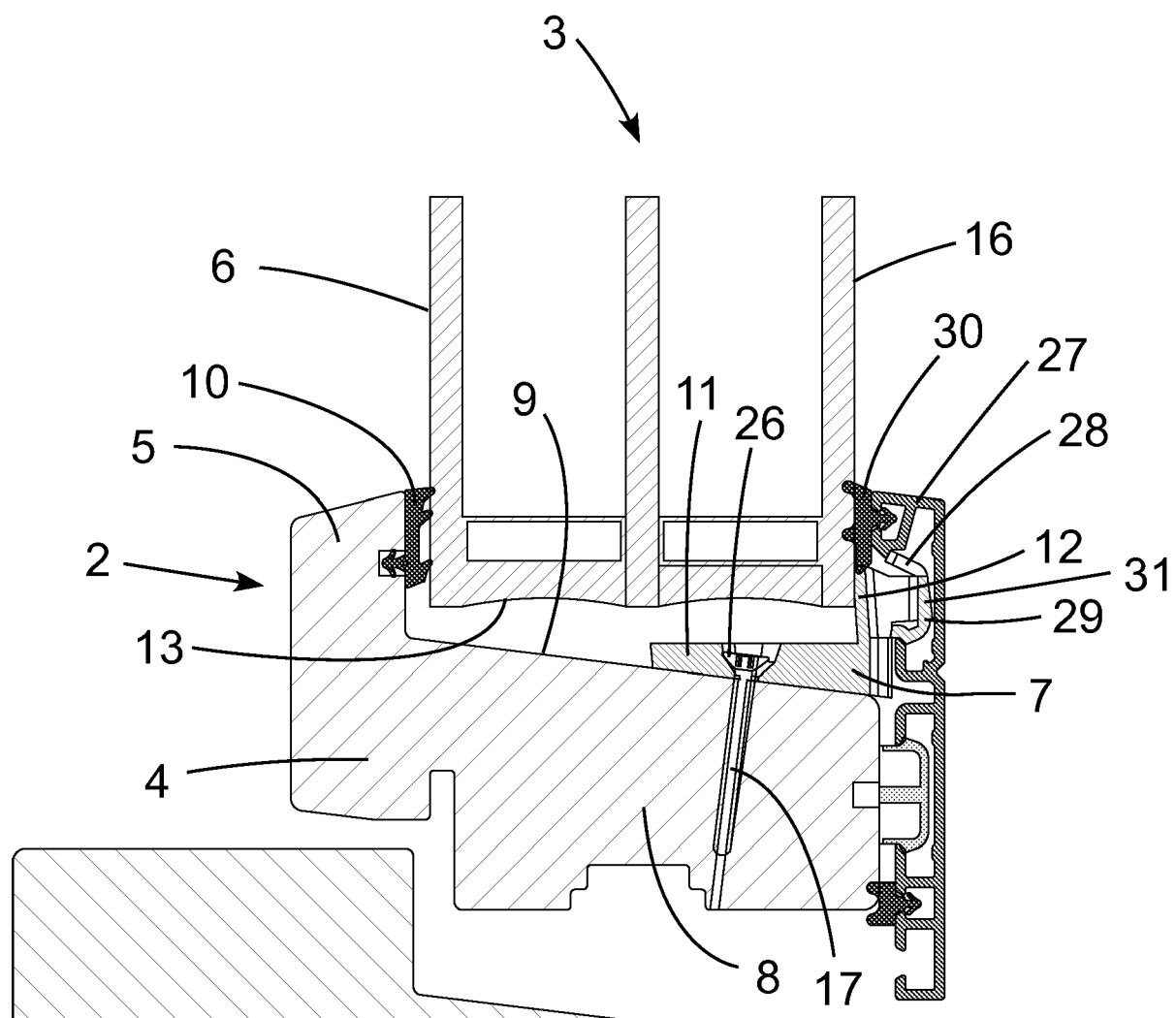
(19) of the groove (18) of the mounting flange.

13. A method of mounting a window pane according to any one of the claims 9 to 12, **characterized by** that each retaining member (7) is mounted along the corresponding sash member (4) by the following steps:

- 1) the retaining member (7) is displaced into the space between the peripheral face (13) of the window pane (3) and the sash member until it abuts either the window pane or the fastening element (17),
- 2) it is evaluated whether the retaining member abuts the window pane or the fastening element,

a) if the retaining member abuts the window pane, it is displaced in the longitudinal direction of the respective sash member until the fastening element enters the groove and the retaining flange of the retaining member is urged against the second side (16) of the window pane,

b) if the retaining member abuts the fastening element, it is displaced in the longitudinal direction of the respective sash member (4) until it jumps further into the space between the peripheral face (13) of the window pane and the sash member, so that the retaining member abuts the window pane, and step a) is performed.



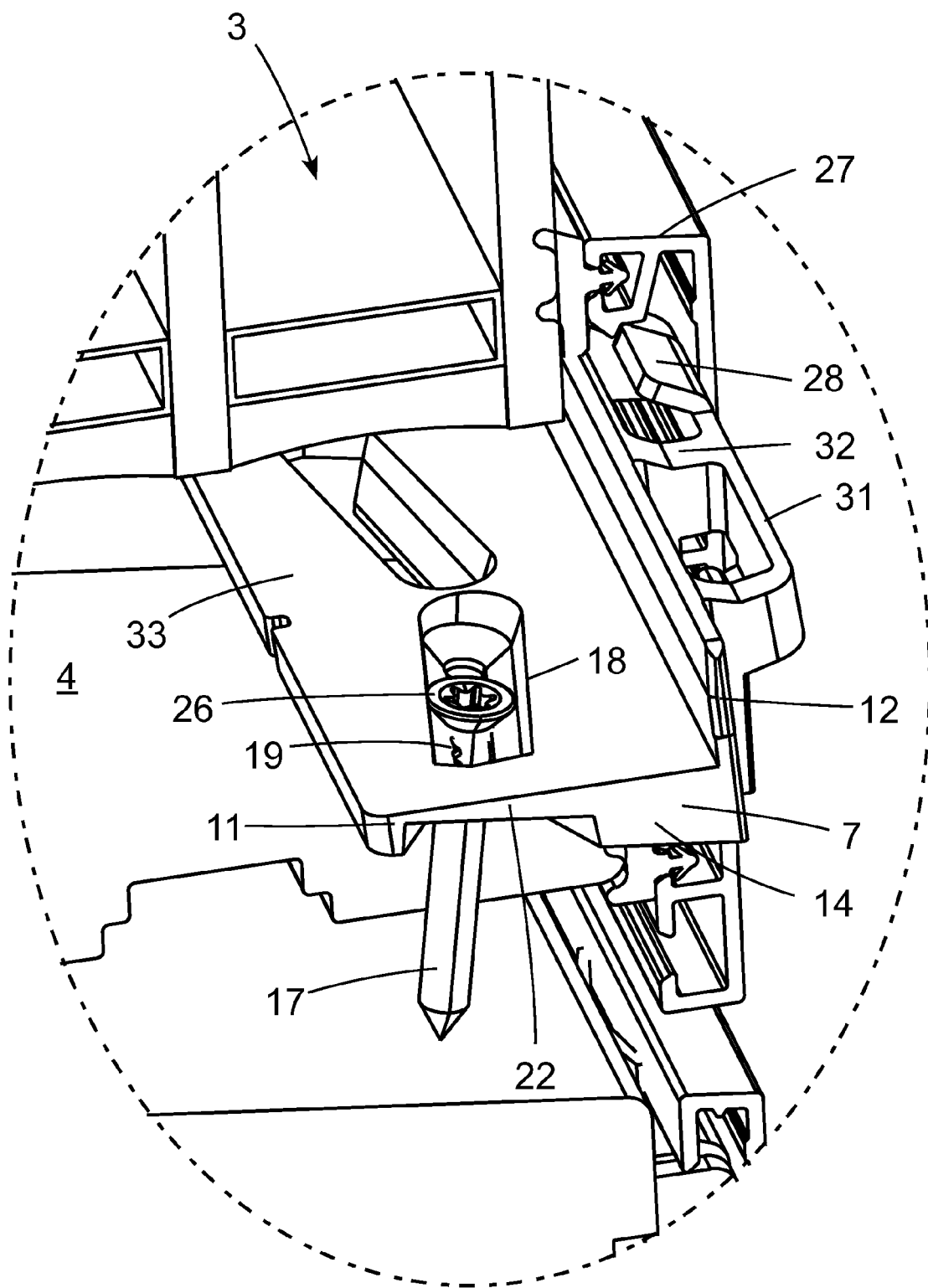


Fig. 2

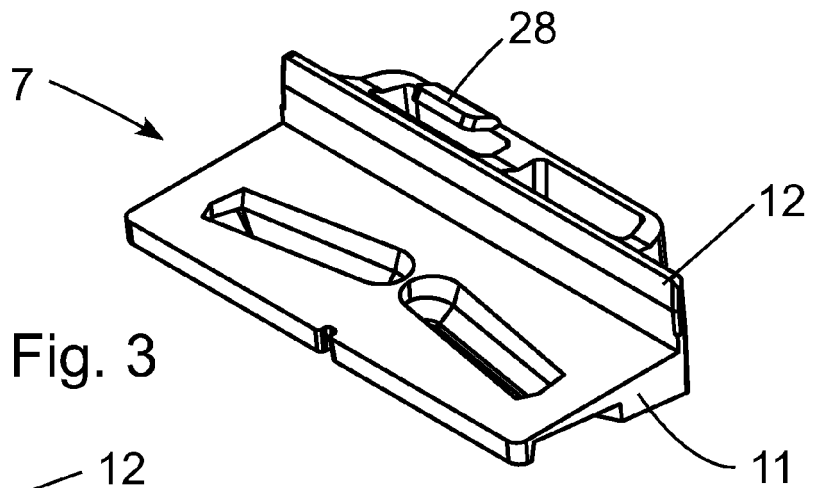


Fig. 3

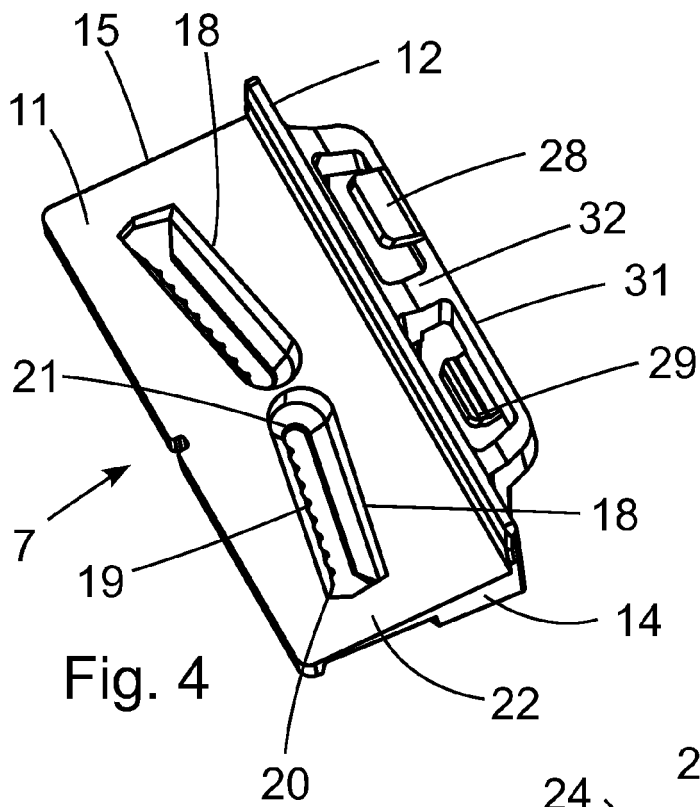


Fig. 4

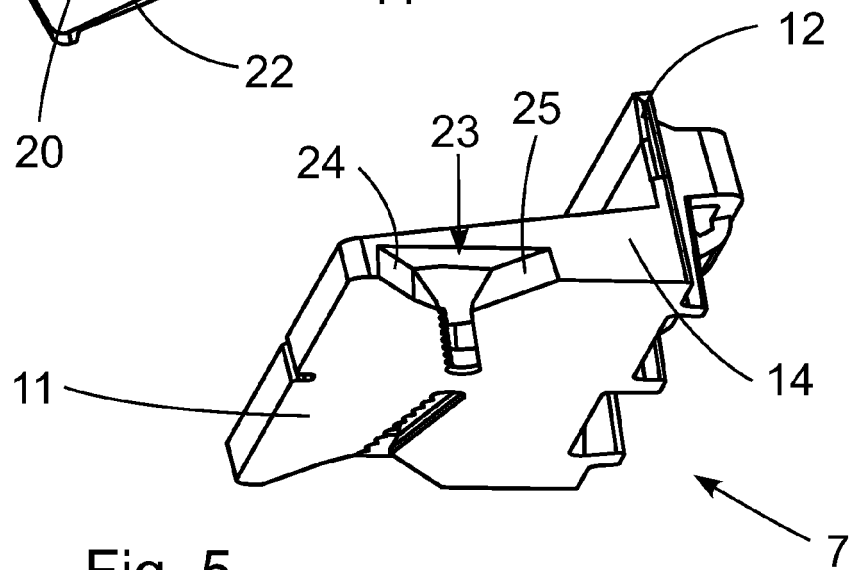
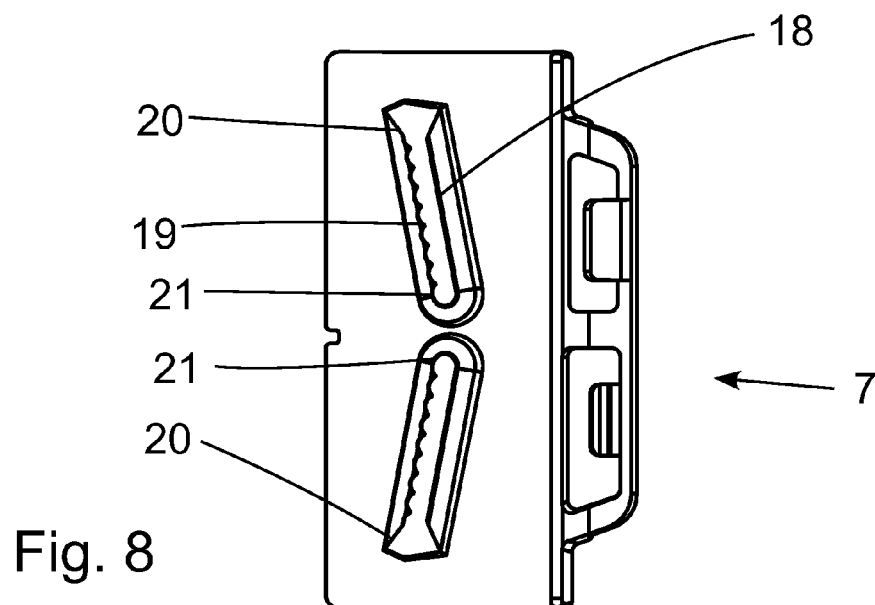
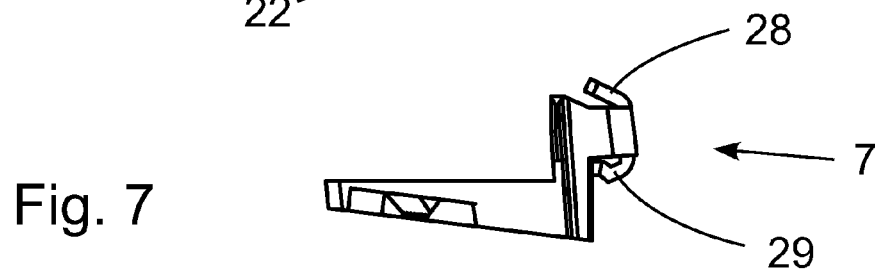
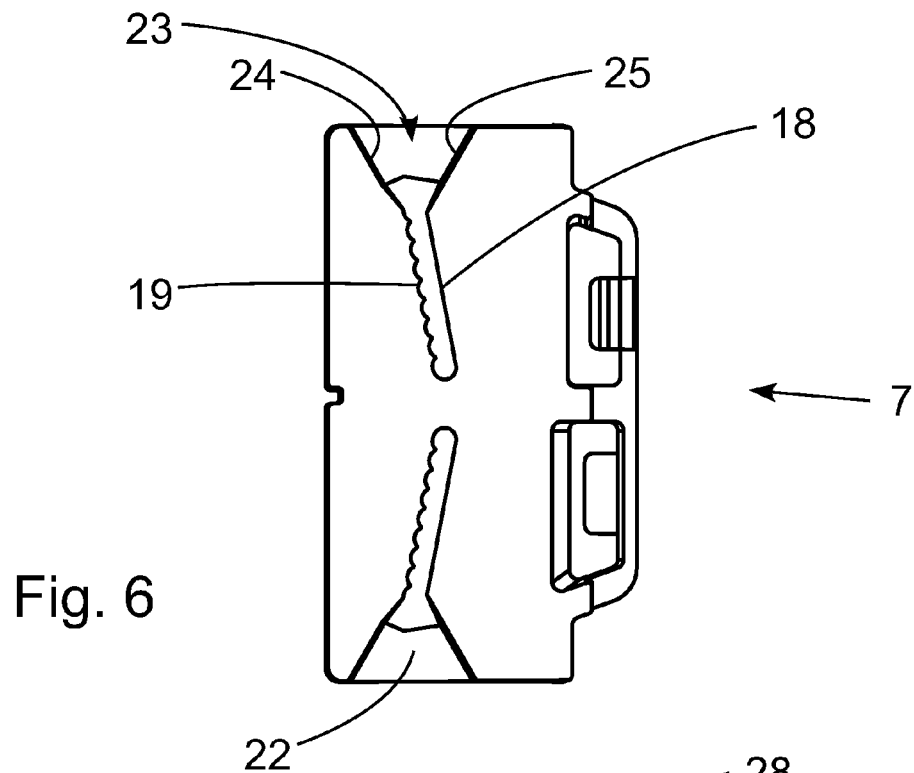


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 09 16 4123

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 4 197 688 A (MAUER DIETER [DE]) 15 April 1980 (1980-04-15) * column 2, line 51 - column 3, line 2; figure 1 *	1-13	INV. E06B3/58
Y	----- GB 2 212 545 A (CEGO LTD [GB]) 26 July 1989 (1989-07-26) * page 18, last paragraph - page 19, paragraph 1 * * *	1-13	
A	----- GB 1 272 750 A (FT PRODUCTS LTD [GB]) 3 May 1972 (1972-05-03) -----	12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
Place of search		Date of completion of the search	Examiner
The Hague		26 November 2009	Verdonck, Benoit
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 16 4123

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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26-11-2009

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REFERENCES CITED IN THE DESCRIPTION

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- GB 504420 A [0003]
- DE 1278721 [0004]