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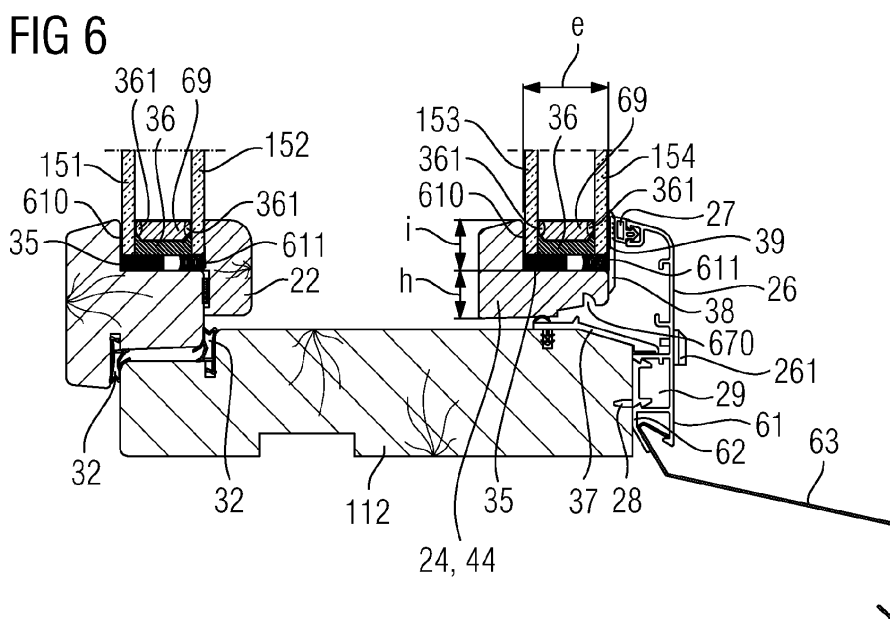
(54) **Window with two sashes and glued glass panels**

(57) A window (10) comprises an inner sash (71, 72, 710, 720) and outer sash (23, 24, 231, 241; 43, 44, 431, 441) installed in a frame structure (111, 112), between which inner sash and outer sash there is an intermediate space (2) and where the outer sash (23, 24, 231, 241; 43, 44, 431, 441) comprises an outer pane (154) of insulation glass unit of the outer sash and an inner pane (153) of insulation glass unit of the outer sash.

Over its load-bearing portion, the outer sash (23, 24, 73, 74; 43, 44, 431, 441) comprises a 15-24 mm high (h)

pane rebate, which is essentially even, and has no raising ($i=0$) on the edge on the side of the outer pane (154) of the outer sash.

The outer pane (154) of the outer sash and the inner pane (153) of the outer sash, where the surface areas of the panes are essentially equally large, are fastened on all their edges to the outer sash (23, 24, 231, 241; 43, 44, 431, 441) by means of glazing sprigs (35) and adhesive bonding (610, 611) at the pane rebate.



Description

Technical background

[0001] Windows are known from the German utility model publication DE 20 2012 002790 U1, German patent application publication DE 10 2006 046958 A1 and international patent application publication WO 2009/040589 A1.

[0002] Stringent energy efficiency requirements for buildings have led to a situation where it is difficult, if not impossible, to achieve the highest energy efficiency classification when using windows with single glazing in the outer sash. As a result of the potentially increasingly stricter energy efficiency requirements in the future, window manufacturers have started to produce windows with double-glazed outer sash.

[0003] One of the most energy efficient windows at present is Watti Eko WNS-A by Lammin Ikkuna Oy. According to the manufacturer's advertisement, the window enables an annual energy consumption (so-called E-value, energy consumption in accordance with a method of calculation by Motiva Oy and VTT Technical Research Centre of Finland in the conditions prevailing in Jyväskylä) of 42 kWh/m²/a with a coefficient of thermal transmittance (so-called U-value) of 0.66 W/m²K. The inventors have estimated that the said window is technically very challenging to manufacture.

Objective of invention

[0004] The objective of our invention is to enable an increase in the energy efficiency of a window suited to industrial-scale serial production on one hand, and on the other hand to simplify the manufacture of energy-efficient windows.

[0005] At least one of these objectives can be attained by means of the window in accordance with independent claim 1.

[0006] The dependent claims describe the preferred embodiments of the window.

Advantages of invention

[0007] The window comprises an inner sash and outer sash, which are installed in a frame structure, and an intermediate space between the sashes. The outer sash comprises the outer pane of insulation glass unit of the outer sash and the inner pane of insulation glass unit of the outer sash.

[0008] Over its load-bearing portion, the outer sash comprises a 15-24 mm high pane rebate, which is essentially even, and has no raising on the edge on the side of the outer pane of the outer sash and has a raising on the edge on the side of the inner pane of the outer sash. The surface areas of the outer pane of the outer sash and of the inner pane of the outer sash are essentially equally large. On all their edges, the outer pane of

the outer sash and the inner pane of the outer sash are fastened to the outer sash by means of adhesive bonding (which is carried out on the edge on the side of the inner pane of the outer sash by means of adhesive tape and which is carried out beside the glazing sprigs by means of bulk adhesive) and glazing sprigs at the pane rebate. The outer pane of the outer sash leaves the front side of the outer sash free.

[0009] In the window in accordance with our invention, the height of the load-carrying portion of the pane rebate is much smaller than the height of 30-60 mm commonly used in current windows with panes of insulation glass units, and somewhat smaller than the height of approximately 27 mm used in the patent applicant's product family ALFA HUURTUMATON ENERGIAIKKUNA (R). The outer sash of the window, where the outer sash is made of wood or profiled aluminium section, conducts so much better heat than a window pane made of insulation glass unit that the thermal transmittance of the window caused by the sash alone makes it challenging to attain the best A++ class (in other words, $E < 45 \text{ kWh/m}^2/\text{a}$ calculated in the conditions prevailing in Jyväskylä), even if the best available insulation glass units were used as the panes in the window. Implementing the pane rebate without a raising reduces the thermal loss taking place from the outer sash through radiation.

[0010] Implementing a window with a load-bearing portion of the pane rebate that has a height as small as this requires that the outer pane of the outer sash and the inner pane of the outer sash are fastened on all their edges to the outer sash by means of adhesive bonding (which is preferably carried out by using two-sided adhesive tape), glazing sprigs and bulk adhesive at the pane rebate. When the height of the load-bearing portion of the pane rebate is smaller than earlier, the structural solution of the window becomes so light and slender that the required strength of the structure can no longer be achieved unless the insulating glass element which comprises the outer pane of the outer sash and the inner pane of the outer sash is included as a factor which stiffens the structure of the window.

[0011] Our invention allows to have a window where the coefficient of thermal transmittance is 0.69 W/m²K or smaller with an outer sash made of profiled aluminium section and below 0.60 W/m²K with an outer sash made of wood.

[0012] As compared to the Watti Eko WNS-A window, a window in accordance with our invention equipped with an outer sash made of wood can achieve a smaller coefficient of thermal transmittance (0.58 vs. 0.66) than the Watti Eko WNS-A window equipped with an outer sash made of wood, and, when equipped with an outer sash made of profiled aluminium section, a coefficient of thermal transmittance (0.65-0.69 vs. 0.66) which is in the same range as that of the Watti Eko WNS-A window equipped with an outer sash made of wood.

[0013] By implementing our invention by using an outer sash made of wood, the energy efficiency of the window

can hence be increased by reducing the coefficient of thermal transmittance of the window considerably as compared to current technology.

[0014] By implementing our invention by using an outer sash made of profiled aluminium section, the manufacture of energy-efficient windows can be simplified as compared to current technology: a profiled aluminium section with similar characteristics can be cut, joined and surface-treated much more easily than wood during the manufacture of the window.

[0015] With a window in accordance with our invention, it is possible to achieve better protection against the breaking of the outer pane of the outer sash when the window is open, if the depth of the pane rebate has been chosen so that the outer pane of the outer sash has enough room to go inside the pane rebate in the depth direction. This is of great importance especially when the window is being washed or if the window is a ventilation window.

[0016] The fastening enables the achievement of especially the effect that both panes of the outer sash support the outer sash, and on the other hand the outer sash supports the panes against torsion from all directions or impacts.

[0017] In thermodynamic examination, the lack of a threshold in the pane rebate in the window of our invention reduces the transmission of heat especially through radiation away from the outer pane of the outer sash, because, due to the lack of a raising in the pane rebate on the edge on the side of the outer pane, the surface area of the outer side of the outer sash can be reduced as compared to for example the patent applicant's ALFA HUURTUMATON ENERGIAIKKUNA (R) series windows. The escape of heat from the sash to outside air through radiation can therefore be limited almost exclusively to the load-carrying portion of the pane rebate.

[0018] Our invention also gives another advantage as compared to a window specified in the Watti Eko WNS-A product card. In accordance with common practice in the window industry, a factory making insulation glass units delivers the complete window elements to the window factory. In this case, the outer pane and the inner pane are usually delivered fastened to each other and built into an air-tight window element. A window built in accordance with prior art technology is technically very challenging to manufacture due to the fact that the surface area of the outer pane of the outer sash is larger than that of the inner pane: it is more difficult to handle and coat and/or potentially paint window elements containing panes of different sizes at the factory making insulation glass units. Moreover, transport from the factory making insulation glass units is more challenging, and handling at the window factory is more complicated. In addition, in order to ensure the durability of such a structure, the outer pane of the outer sash should generally be made of tempered glass, which adds further to the manufacturing costs. These drawbacks can be avoided by the use of a window in accordance with our invention.

[0019] When the outer pane of the outer sash and the inner pane of the outer sash are connected together by means of gas seal in order to make up an air-tight intermediate space and when the outer edge of the pane rebate, which edge does not have a raising, is covered by a screen fastened to the outer pane of the outer sash, which screen also extends over the outer sash, it is possible to better ensure the long lifetime of the gas seal when the screen protects the gas seal against the UV radiation of the sun on one hand, and on the other hand it is also possible to better avoid the breaking of the outer pane of the outer sash as a result of impacts coming from the outside, when the screen dissipates some of the energy of the impacts to the outer sash. Potential uneven spots remaining in the bulk adhesive when bulk adhesive is used can also be hidden well, which gives an opportunity to have a neat and aesthetically pleasant end result. The adhesive bonding of the screen to the glass prevents water and ice from getting between the screen and glass.

[0020] When the screen is also fastened by means of bulk adhesive at the pane rebate, the seal can be fastened in the same conjunction as when the outer pane and inner pane of the outer sash are fastened to the outer sash. When the bulk adhesive is wet, the screen remains in place because it is fastened to the outer pane of the outer sash. This facilitates and expedites the handling of the window at the glass factory during manufacture.

[0021] The long lifetime of the gas seal can be ensured better by means of the screen also for example when the window is kept open. The screen prevents the premature ageing of the gas seal due to UV radiation. If the window is a ventilation window, the screen may have decisive importance in the retained energy efficiency of the window over the years.

[0022] When the window also comprises a profile fastened to the frame structure so as to protect the area between the frame structure and the outer sash, where the profile is sealed in the area between the profile and the screen, the profile can reduce the transmission of heat to the cold outside air by convection.

[0023] When the profile is shaped so that the mechanical contact of the profile with the outer pane of the outer sash is arranged primarily or exclusively through the seal at the screen, it is possible to better avoid the breaking of the glass in the outer sash as a result of impacts directed at the profile. The seal absorbs some of the energy of the impacts, and the screen also absorbs some of the energy of the impacts before the energy is transmitted to the window, and the screen distributes the energy over a wider area. The screen dissipates some of the energy of the impacts also to the outer sash and therefore reduces the risk of breaking of the outer pane of the outer sash.

[0024] When the area between the frame structure and outer sash, with the exception of the drainage holes, is enclosed by means of the profile and seals, it is possible to considerably reduce the convection of cold outside air

to the outer sash. This contributes to the improved energy efficiency of the window.

[0025] The window can also comprise a lower weathering that is fastened or that can be fastened to the profile, where the lower weathering is supported by the lower part of the profile to lead rain water further away from the level specified by the outer pane of the outer sash. The profile can most preferably be fastened to the lower part of the profile without tools.

[0026] In accordance with the preferred embodiment of the window, there is at least one reduction resistance in the outer sash on the side opposite to the even area of the pane rebate. In favourable conditions, the reduction resistance may reduce the conduction of heat from the inside of the window to the outside of the window. At the reduction resistance, the outer sash becomes narrower. In the sash underneath, the reduction resistance serves as a water guide so that any water running along the outer pane of the outer sash does not end up on the lower frame wood.

[0027] The reduction resistance can be implemented so that it contains at least one notch. There is practically no conduction of heat at the notch, in which case only that part of the outer sash, which remains between the inner surface of the notch and the even area of the pane rebate, conducts heat. Such a reduction can serve as a heat conduction resistance. With a suitable shape of the notch, the reduction can serve well as a water guide.

[0028] In addition to this or instead of this, the window can be implemented so that the reduction resistance contains at least one bevel. By means of the bevel, the stopping of the conduction of heat does not take place that quickly, in which case the thermal gradient occurring in very cold weather can be modified so that the amount of potential condensation water can be reduced, and when there is a threshold at the lower end of the bevel, it is easier to guide any water drops running along the bevel away from the lower frame wood.

List of drawings

[0029] In what follows, the window is presented in more detail by means of the exemplary embodiments in the enclosed drawings FIG 1-7. The drawings show:

- FIG 1 window seen from the front of the light opening area from outside;
- FIG 2 cross-section of a window with an outer sash made of wood in direction A1-A2 in accordance with FIG 1;
- FIG 3 cross-section of a window with an outer sash made of wood in direction B1-B2 in accordance with FIG 1;
- FIG 4 cross-section of a window with an outer sash made of profiled aluminium section in direction

A1-A2 in accordance with FIG 1;

FIG 5 cross-section of a window with an outer sash made of profiled aluminium section in direction B1-B2 in accordance with FIG 1;

FIG 6 cross-section of the lower sash of a window presented in FIG 2 or 4 in more detail; and

FIG 7 certain individual components of the window.

[0030] The same reference numbers refer to the same parts in all FIGs.

Detailed description of the invention

[0031] FIG 1 shows window 10 seen from the front of light opening area 15. Window 10 has upper frame 11, lower frame 12, right frame 13 and left frame 14. Light opening area 15 comprises window glass.

[0032] The frames of window 10 can be made of wood, plastic, composite (especially wood fibre composite), metal or combinations of these.

[0033] FIG 2 shows the cross-section of window 10 with an outer sash made of wood in direction A1-A2 in accordance with FIG 1, and FIG 3 shows the cross-section in direction B1-B2.

[0034] In the manner shown in the cross-section, upper frame 11 of window 10 comprises upper frame wood 111, and lower frame 12 comprises lower frame wood 112. Left frame 14 comprises left frame wood 141 and right frame wood 142.

[0035] Lower frame wood 112, upper frame wood 111, left frame wood 141 and right frame wood 142 are not necessarily made of the material suggested by their description, but other material options presented for the frame are also possible.

[0036] Window 10 has inner side 1 and outer side 3 (cf. FIG 2 and 3). Window 10 is installed into place so that its inner side 1 faces the inside of the building and outer side 3 faces the outside. Intermediate space 2 remains between inner side 1 and outer side 3.

[0037] There is an inner element between inner side 1 and intermediate space 2. The inner element comprises inner pane 151 of the inner sash and outer pane 152 of the inner sash, and intermediate space 4 of the inner element exists between the panes.

[0038] There is an outer element between intermediate space 2 and outer side 3. The outer element comprises inner pane 153 of the outer sash and outer pane 154 of the outer sash, and intermediate space 5 of the outer element exists between the panes.

[0039] Inner pane 151 of the inner sash, outer pane 152 of the inner sash, inner pane 153 of the outer sash and outer pane 154 of the outer sash are made of insulation glass units when high energy efficiency is sought.

[0040] Inner pane 151 of the inner sash and outer pane 152 of the inner sash are assembled into a single element

at the factory making insulation glass units. In what follows, this element is referred to as inner element. Inner pane 153 of the outer sash and outer pane 154 of the outer sash are also assembled into a single element at the factory making insulation glass units. In what follows, this element is referred to as outer element.

[0041] When we wish entire window 10, with the outer sash made of profiled aluminium section, to have a coefficient of thermal transmittance in the range of ≤ 0.69 W/m²K or with the outer sash made of wood to have a coefficient of thermal transmittance in the range of ≤ 0.59 W/m²K, we select the glasses for example as follows:

- As outer pane 154 of the outer sash, we use non-fogging glass with special coating on the outer surface ($\varepsilon = 0.017$).
- As inner pane 153 of the outer sash, we use low-energy selective glass ($\varepsilon = 0.013$).
- As inner pane 151 of the inner sash, we use low-energy selective glass ($\varepsilon = 0.013$).

[0042] As inner pane 153 of the outer sash, we can especially use Pilkington Optitherm (TM) S1N glass or glass with at least the same emissivity. We can also use the same glass as outer pane 152 of the inner sash and as inner pane 151 of the inner sash. Intermediate space 4 of the inner element and intermediate space 5 of the outer element are so-called air-tight intermediate spaces, and the various surfaces of the inner element and outer element can be coated in a manner known for example from the applicant's Finnish patent application 20106030.

[0043] The air-tightness and gas-tightness of the inner element and outer element are secured by means of butyl sealant 361 between spacer strip 69 and each pane and by means of insulation glass package sealant 36. Insulation glass package sealant 36 can be for example polysulphide, polyurethane, silicone or more generally any applicable sealant for a hermetic space. Insulation glass package sealant 36, butyl sealant 361 and the use of drying agents are specified in standard SFS-EN 1279-6.

[0044] Spacer strips 69 (cf. FIG 6) keep the panes apart from each other. Spacer strips 69 are usually also made of a heat-insulating material and thus contribute to reduced conduction of heat. The drying agent inside spacer strips 69 aims to keep constant moisture in the intermediate space.

[0045] The inner sash of window 10 in accordance with our invention can be implemented in the same way as in current windows. Alternatively, it can be made applying the same principle as for the outer sash of window 10 in accordance with our invention. In this case, the profiled aluminium section presented below can also be included in the inner sash, or it can be omitted.

[0046] The inner element is installed between upper

inner sash 71 and lower inner sash 72 of the inner sash and fastened to inner sash 71, 72, 710, 720 glazing beads 21, 22. The inner sash is fastened to the frame of window 10 by means of inner sash hinge 33. Inner sash seal 32 is used for sealing the gap between the inner sash and frames.

[0047] Upper outer sash 23, lower outer sash 24, left outer sash 241 and right outer sash 231 make up the outer sash frame of window 10 in accordance with outer sash FIG 2 and 3. The outer sash is fastened to the frame by means of outer sash hinge 135.

[0048] Outer sash seal 31 is used for sealing the gap between the outer sash and frames over the portion of upper frame 11. Outer sash seal 31 is used for sealing the gap between the outer sash and frames over the portion of right frame 13 and left frame 14, in other words only at the top and sides; however, without installing outer sash seal 31 at the potentially required ventilation air gap.

[0049] The outer element including outer pane 154 of the outer sash and inner pane 153 of the outer sash is installed into the pane rebate in upper outer sash 23, lower outer sash 24, left outer sash 241 and right outer sash 231, with the depth of the pane rebate being e. Height i of the pane rebate is approximately 15-18 mm. Height h of the load-bearing portion is 15-24 mm. The pane rebate is essentially even and has no raising on the edge on the side of outer pane 154 of the outer sash.

[0050] In the outer element, the surface areas of outer pane 154 of the outer sash and of inner pane 153 of the outer sash are essentially equally large.

[0051] The outer element is fastened on all edges to the outer sash by means of glazing sprigs 35, double-sided tape 610 and bulk adhesive 611 (for example polyurethane or silicone) at the pane rebate. The adhesive bonding can also be carried out without double-sided tape, but double-sided tape 610 simplifies the manufacturing process of window 10 at the window factory.

[0052] Depth e of the pane rebate is most preferably chosen so that thickness d of the outer element is smaller than or equal to e. In this way, outer pane 154 of the outer sash has room to go entirely inside the pane rebate in the depth direction.

[0053] By turning each lock 34 around their axis, the outer sash and inner sash can be opened for example for washing or ventilation.

[0054] Screen 38 is installed on the glass surface of outer pane 154 of the outer sash. One of the purposes of screen 38 is to protect butyl sealant 361 and insulation glass package sealant 36 against ultraviolet radiation, thus preventing the premature ageing of butyl sealant 361 and insulation glass package sealant 36. Screen 38 is fastened to outer pane 154 preferably by means of adhesive bonding by double-sided tape 39 (cf. FIG 6). Screen 38 is installed into place preferably immediately after the outer element has been fastened to the outer sash by means of bulk adhesive 611. In this way, screen 38 also adheres by means of bulk adhesive 611. On the other hand, double-sided tape 39 keeps screen 38 in

place also when bulk adhesive 611 is still wet, which facilitates the handling of window 10 at the window factory.

[0055] Screen 38 may have foot 711 (cf. FIG 7). Foot 711 can be implemented as separate feet, as a uniform foot profile or as a combination of these, and it is fastened by means of bulk adhesive 611.

[0056] Screen 38 may go around the entire window. Alternatively, screen 38 can be installed only on the lower edge of the window, or in addition to this also on the upper edge of the window.

[0057] Profiled aluminium frame section 26 goes around outer pane 154 of the outer sash on the outside. Profiled aluminium frame section 26 is fastened to upper frame wood 111, lower frame wood 112, left frame wood 141 and right frame wood 142 by means of frame clips 28 installed preferably at regular intervals, for example 30-40 cm apart. The shape of profiled aluminium frame section 26 is preferably such that it forms air spaces 29 between itself and upper frame wood 111, lower frame wood 112, left frame wood 141 and right frame wood 142 in order to cut the conduction of heat. The shape of the profiled aluminium frame section can be chosen on the basis of the desired appearance.

[0058] Profiled aluminium frame section 26 extends to the height of screen 38. Between profiled aluminium frame section 26 and screen 38, there is profiled aluminium frame section seal 27.

[0059] Profiled aluminium frame section 26 also preferably comprises a segment that forms drainage space 30 with lower frame wood 112. Drainage space 30 is provided with lower frame seal 37, the structure of which is described in more detail in FIG 7. Lower frame seal 37 comprises seal foot 371, with which lower frame seal 37 is fastened to lower frame wood 112; seal part 372, which forms outer sash seal 31; and outlet part 373. The lower end of outlet part 373 is fastened to profiled aluminium frame section 26 by means of adhesive bonding, for example using double-sided tape 39. Lower frame seal 37 is sealed at its ends to the other window 10 structure. Lower frame seal 37 prevents water from running into the inner structure of window 10 or the wall.

[0060] If water gets to into drainage space 30 from between profiled aluminium frame section seal 27 and screen 38, the water runs along lower frame seal 37 to the lower part of drainage space 30. Profiled aluminium frame section 26 to be installed at lower frame wood 112 is preferably perforated at regular intervals, for example at intervals of 15-30 cm. Cap 261 with hole is installed on the holes, and water which has ended up in drainage space 30 can run out of drainage space 30 through the hole in the cap. The outlet hole in cap 261 with hole is preferably at the lower part of cap 261.

[0061] Alternatively, the perforation can be made directly downwards from beside seal foot 371, in which case water is led downwards to outside window 10 onto lower weathering 36 (in other words weather strip) to be installed down. In this case, the outward perforation and cap 261 can be omitted.

[0062] FIG 4 and 5 show an embodiment of window 10, where the outer sash is implemented using a profiled aluminium section. The only difference between the embodiments is that now upper outer sash 43, lower outer sash 44, right outer sash 431 and left outer sash 441 are made of profiled aluminium section.

[0063] The coefficient of thermal transmittance U is a key parameter in the calculation formula of energy efficiency specified for windows by Motiva Oy and VTT Technical Research Centre of Finland:

$$E = 140U - 160g + 50L,$$

where E = annual energy consumption (kWh/m²/a), U = coefficient of thermal transmittance (W/m²K), g = total transmittance ratio of solar radiation of the window (-) and L = air permeability (m³/m²h).

[0064] The annual energy consumption of window 10 can be reduced significantly by decreasing the coefficient of thermal transmittance U of the window even if the total transmittance ratio of solar radiation of the window g and the air permeability L remained constant or roughly constant.

[0065] Profiled aluminium frame sections 26 are cut with a mitre and assembled by means of corner pieces before being installed into the actual frame. Profiled aluminium frame section 26 is snapped into place after the frame clips 28 have been installed into place for the installation of profiled aluminium frame sections 26 into the frames. The fixing teeth in profiled aluminium frame section 26 at air space 29 are attached to the fixing teeth in the frame clips.

[0066] Caps 261 of profiled aluminium frame section 26 are put into place at the drainage holes of drainage space 30.

[0067] Lower weathering 63 is fastened to lower part 61 of profiled aluminium frame section 26 at the work site. For this, profiled aluminium frame section 26 may have shaped tongue 62, with which lower weathering 63 can be tilted to the desired position. Lower weathering 63 is preferably implemented so that its turning is also prevented by means of the shaped tongue in lower part 61 of profiled aluminium frame section 26. In addition to this or as an alternative to this, lower weathering 63 can be installed for example to lower frame wood 112 by means of screw fixing.

[0068] The invention should not be understood to be limited only by the below claims, but the invention is to be understood to include all their legal equivalents and the combinations of the embodiments presented.

[0069] Profiled aluminium frame section 26 can also be implemented using a material other than aluminium. The materials serving as alternatives to aluminium comprise especially sheet metal and various plastics.

[0070] Profiled aluminium frame section 26 may have

screen groove 723 as shown in FIG 7, in which case window 10 resembles such an older model window where the outer sash can be seen outside. Alternatively, profiled aluminium frame section 26 may be implemented without screen groove 723 (for example with a straight profile) as presented in the exemplary embodiments of FIG 2 - 6. Teeth 721, 722, which constitute the groove in profiled aluminium frame section 26, enable the fastening of profiled aluminium frame section 26, which has been sawn with a mitre, by means of fastening pieces going from the corners into the groove.

[0071] A window in accordance with the embodiment shown in FIG 4 and 5, where the outer sash of the window is made of profiled aluminium section, is relatively simple to manufacture industrially. The strength characteristics of profiled aluminium section are also favourable in view of the weight and necessary material thicknesses of the outer element. However, the window can be implemented so that instead of using aluminium, the outer sash is implemented with a composite structure (for example with a wood fibre composite structure), in another metal, such as especially (preferably stainless) steel, or as a combination of these.

List of reference numbers used:

[0072]

1 inner side
2 intermediate space
3 outer side
4 intermediate space of inner element
5 intermediate space of outer element
10 window
11 upper sash
12 lower sash
13 right sash
14 left sash
15 light opening area
21, 22 glazing bead
23 upper outer sash
24 lower outer sash
26 profiled aluminium frame section

27 profiled aluminium frame section seal
28 frame clip
29 air space
30 drainage space
31 outer sash seal
32 sash seal
33 inner sash hinge
34 lock
35 glazing sprig
36 insulation glass package sealant
37 lower sash seal
38 screen
39 double-sided tape
43 upper outer sash (profile)
44 lower outer sash (profile)
63 lower weathering
69 spacer strip
71 upper inner sash
72 lower inner sash
111 upper frame wood
112 lower frame wood
135 outer sash hinge
141 left frame wood
142 right frame wood
151 inner pane of inner sash
152 outer pane of inner sash
153 inner pane of outer sash
154 outer pane of outer sash
231 right outer sash

241	left outer sash		by means of glazing sprigs (35) and adhesive bonding (610, 611) at the pane rebate; adhesive bonding (610, 611) is carried out on the edge on the side of the inner pane (153) of the outer sash
261	cap		by means of double-sided tape (610) and beside the glazing sprigs (35) by means of bulk adhesive (611), in which case the outer pane (154) of the outer sash leaves the front side of the outer sash (23, 24, 231, 241; 43, 44, 431, 441) free.
361	butyl sealant	5	
371	seal foot		
372	seal part	10	
373	outlet part		
431	right outer sash (profile)		2. A window (10) according to claim 1, where the depth (e) of the pane rebate is chosen so that the outer pane (154) of the outer sash has room to go inside the pane rebate in the depth direction.
441	left outer sash (profile)	15	
610	double-sided tape		3. A window (10) according to claim 1 or 2, where the outer pane (154) of the outer sash and the inner pane (153) of the outer sash are connected together by means of a gas seal (69, 36, 361) in order to make up an air-tight intermediate space (5) and when the outer edge of the pane rebate, which edge does not have a raising, is covered by a screen (38) to the outer pane (154) of the outer sash, which screen (38) also extends over the outer sash (23, 24, 231, 241; 43, 44, 431, 441).
611	bulk adhesive	20	
670	notch (water groove)		
710	left inner sash		
711	screen foot	25	
720	right inner sash		
721, 722	tooth	30	4. A window (10) according to claim 3, where the screen (38) is also fastened by means bulk adhesive (611) at the pane rebate.
723	screen groove		

Claims

1. A window (10) comprising an inner sash (71, 72, 710, 720) and outer sash (23, 24, 231, 241; 43, 44, 431, 441) installed in a frame structure (111, 112), between which inner sash and outer sash there is an intermediate space (2) and where the outer sash (23, 24, 231, 241; 43, 44, 431, 441) comprises an outer pane (154) of insulation glass unit of the outer sash and an inner pane (153) of insulation glass unit of the outer sash, **characterized in that:**
 - over its load-bearing portion, the outer sash (23, 24, 73, 74; 43, 44, 431, 441) comprises a 15-24 mm high (h) pane rebate, which is essentially even, and has no raising ($i=0$) on the edge on the side of the outer pane (154) of the outer sash and has a raising ($i>0$) on the edge on the side of the inner pane (153) of the outer sash; and
 - the outer pane (154) of the outer sash and the inner pane (153) of the outer sash, where the surface areas of the panes are essentially equally large, are fastened on all their edges to the outer sash (23, 24, 231, 241; 43, 44, 431, 441)
2. A window (10) according to claim 1, where the depth (e) of the pane rebate is chosen so that the outer pane (154) of the outer sash has room to go inside the pane rebate in the depth direction.
3. A window (10) according to claim 1 or 2, where the outer pane (154) of the outer sash and the inner pane (153) of the outer sash are connected together by means of a gas seal (69, 36, 361) in order to make up an air-tight intermediate space (5) and when the outer edge of the pane rebate, which edge does not have a raising, is covered by a screen (38) to the outer pane (154) of the outer sash, which screen (38) also extends over the outer sash (23, 24, 231, 241; 43, 44, 431, 441).
4. A window (10) according to claim 3, where the screen (38) is also fastened by means bulk adhesive (611) at the pane rebate.
5. A window (10) according to claim 3 or 4, which also comprises a profile (26) fastened to the frame structure (111, 112) in order to protect the area between the frame structure (111, 112) and the outer sash (23, 24, 231, 241; 43, 44, 431, 441), which profile (26) is sealed in the area between the profile (26) and the screen (38).
6. A window (4) according to claim 5, where the profile (26) is shaped so that the mechanical contact of the profile (26) with the outer pane (154) of the outer sash is arranged primarily or exclusively through the seal (27) at the screen (38).
7. A window (10) according to claim 5 or 6, where the area between the frame structure (111, 112) and the outer sash (23, 24, 231, 241; 43, 44, 431, 441) is closed, with the exception of the drainage holes, by means of the profile (26), screen (38) and seals (27, 37).
8. A window (10) according to any one of the preceding claims 5-7, which also comprises a lower weathering (63) that is fastened or that can be fastened to the profile (26), where the lower weathering (63) is supported by the lower part (62) of the profile (26) to lead rain water further away from the level specified

by the outer pane (154) of the outer sash.

9. A window (10) according to any one of the preceding claims, where the outer sash (23, 24, 231, 241; 43, 44, 431, 441) has at least one reduction resistance (670) on the side opposite to the even area of the pane rebate. 5
10. A window (10) according to claim 9, where the reduction resistance (670) contains at least one notch. 10
11. A window (10) according to claim 9 or 10, where the reduction resistance contains at least one bevel.

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FIG 1

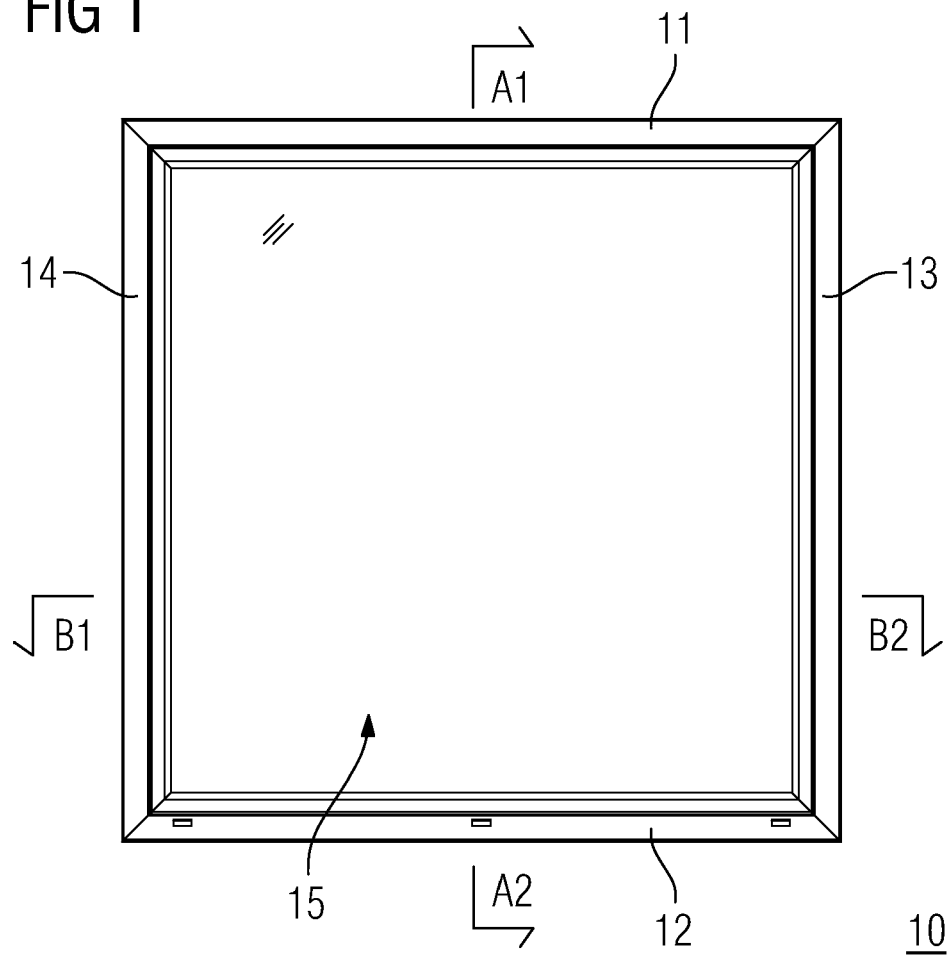


FIG 2

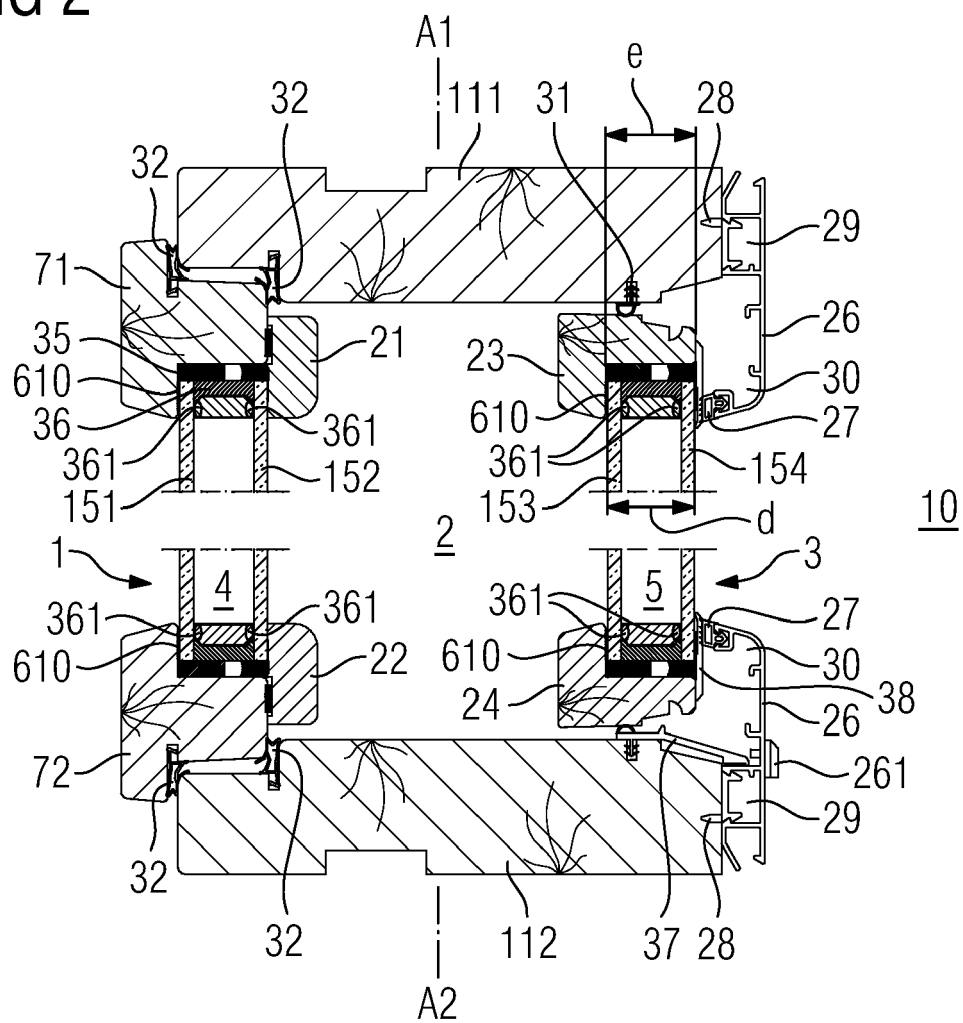


FIG 3

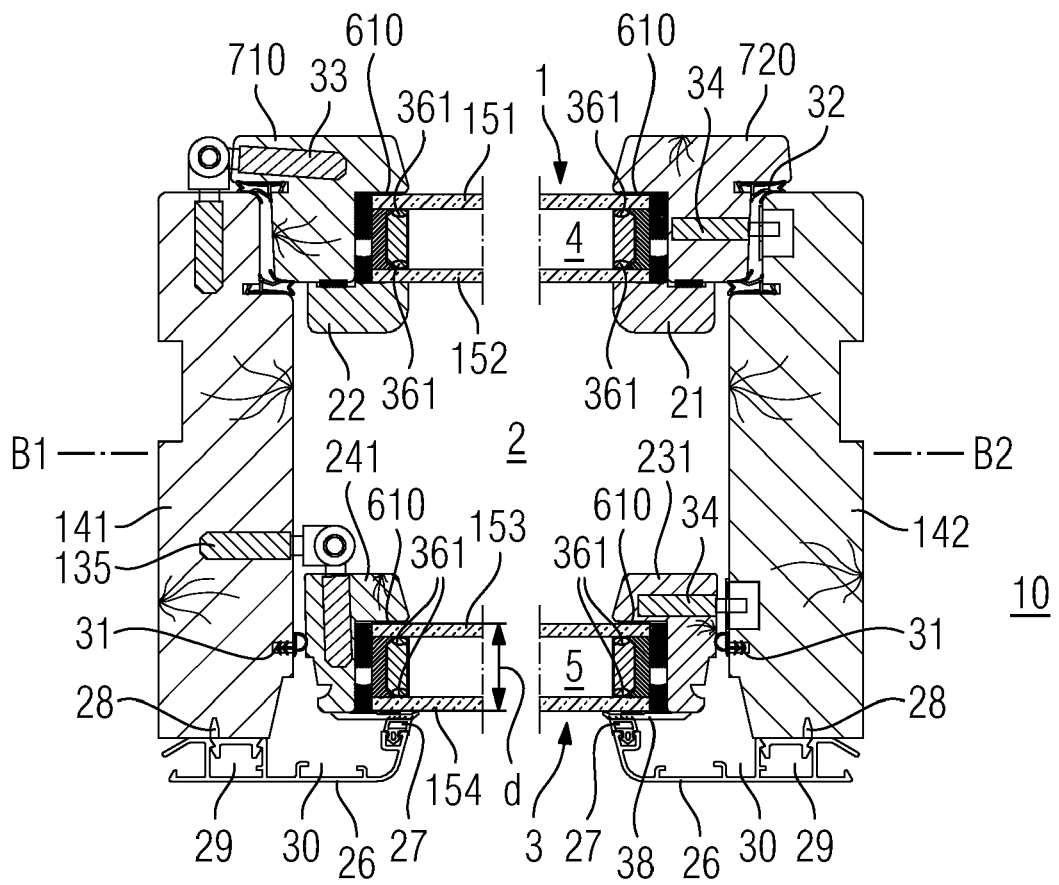


FIG 4

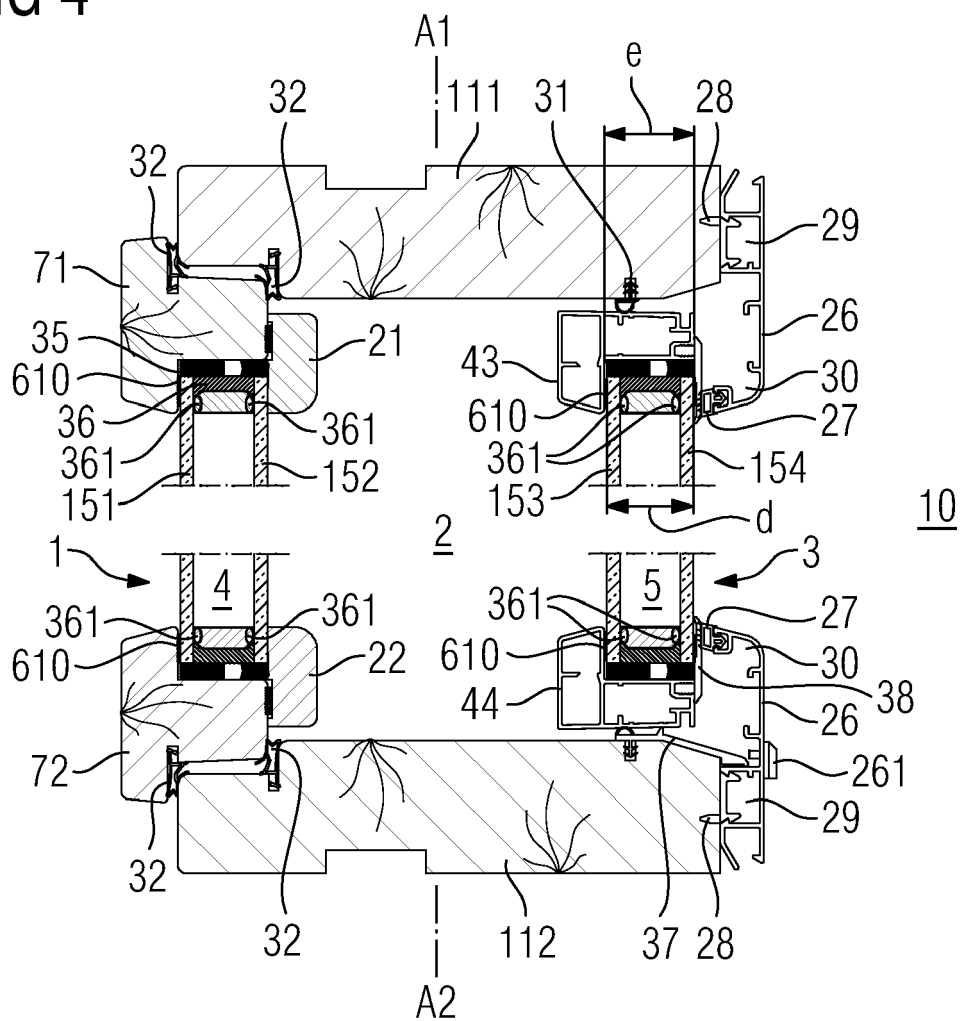


FIG 5

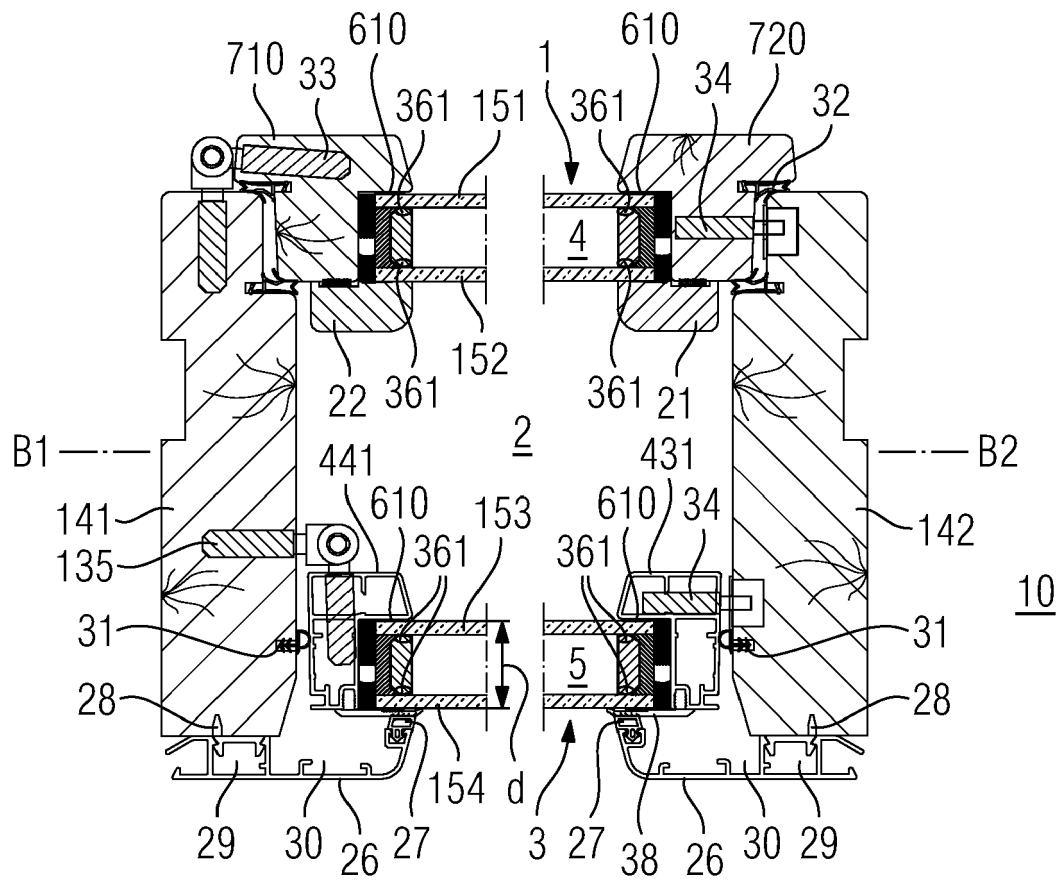


FIG 6

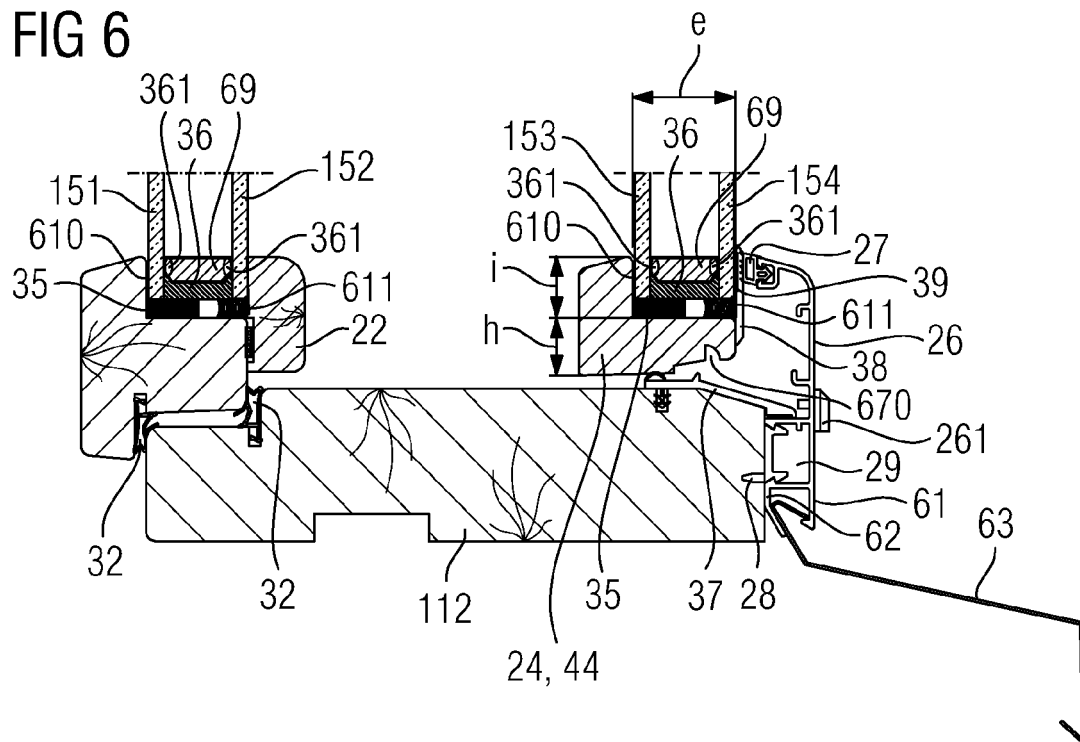
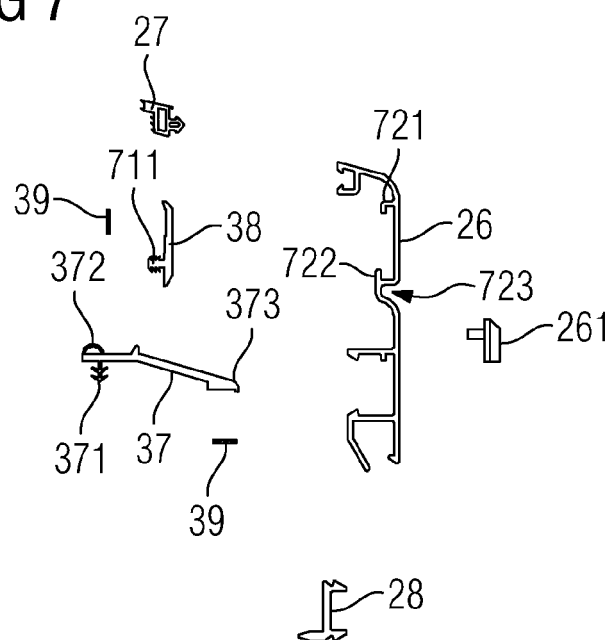


FIG 7





EUROPEAN SEARCH REPORT

Application Number
EP 13 18 7676

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	EP 0 017 870 A1 (MEETH ERNST JOSEF) 29 October 1980 (1980-10-29) * figure 1 *	1-11	INV. E06B3/58 E06B3/26
Y	DE 20 2012 002790 U1 (GLASER HELMUTH [DE]) 4 July 2012 (2012-07-04) * paragraph [0008]; figures 1, 3 *	1-11	
A	Hohe: "Zum Holz-Glas-Verbund in sechs Schritten", 31 March 2010 (2010-03-31), XP055093849, Retrieved from the Internet: URL: http://www.gff-magazin.de/files/smfiledata/1/7/2/6/9/7/klabeteknikottochemie.pdf [retrieved on 2013-12-17] * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 December 2013	Examiner Cobusneanu, D
CATEGORY OF CITED DOCUMENTS 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 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			

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ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 7676

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17-12-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0017870 A1	29-10-1980	DE 2915329 A1	16-10-1980
		DK 153780 A	15-10-1980
		EP 0017870 A1	29-10-1980

DE 202012002790 U1	04-07-2012	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 202012002790 U1 **[0001]**
- DE 102006046958 A1 **[0001]**
- WO 2009040589 A1 **[0001]**
- FI 20106030 **[0042]**