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(54) A FRAME STRUCTURE, SUCH AS A SASH OR A STATIONARY FRAME FOR A WINDOW OR DOOR, AND A METHOD FOR MANUFACTURING A FRAME STRUCTURE

(57) The invention relates to a frame structure, such as a sash or a stationary frame for a window or door, comprising a core (25) and a cover layer (26) encasing the core, said cover layer being applied to the core by moulding, said frame structure further including a fastening member reception section formed by the material used for the cover layer forming a plug (27) extending into a hole or recess in at least one core member. The plug of cover layer material fills the hole or recess substantially entirely and extends from a surface of the core member facing a surface of a frame piece. The distance D_{end} in the length direction from the surface of the frame piece to the end of the plug defines a maximum allowable fastening member penetration depth D_{pen}, where D_{end}-$D_{pen} \geq 1$ mm. The invention further relates to a method for manufacturing a frame structure.

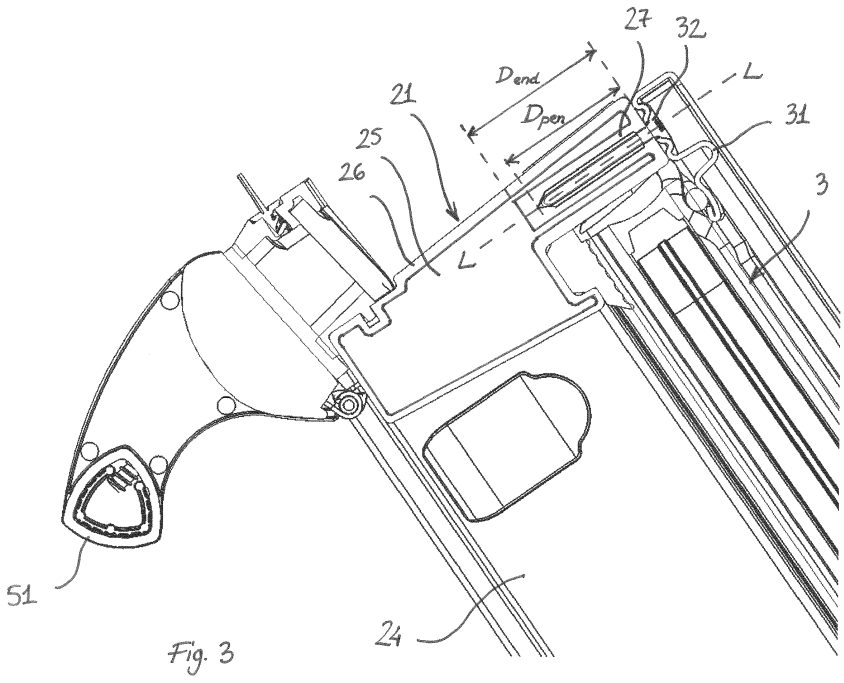

Fig. 3

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Description

[0001] The present invention relates to a frame structure including side, top and bottom frame pieces, said frame structure comprising a core and a cover layer applied to the core by moulding and encasing the core, said core comprising at least one core member. The invention also relates to a method for manufacturing a frame structure.

[0002] Frame structures of this type are widely used as sashes and as stationary frames for windows and doors.

[0003] The cover layer material is typically a polymer, which sets either by cooling, an example being polyvinylchloride (PVC), or by a chemical reaction, an example being polyurethane (PUR).

[0004] The core has traditionally been made from wooden core members as described in WO2007/057029 and WO2008/141642, but it has also been attempted to use insulating polymer foams, such as expanded polystyrene (EPS) as described in WO2013/167144. The possibility for using a combination of different materials, including also reinforcing inlays of metal, is also envisaged in WO2013/167144.

[0005] Depending on the intended use of the frame structure it typically includes additional elements attached to one or more frame pieces, such as hinges and/or weather shielding arrangements. Typically screws or like fastening members penetrating through the additional elements and into a frame piece are used for the attachment of such additional elements.

[0006] The use of screws and like fastening member provides for an easy interconnection of the additional elements to the frame structure, but experience has shown that it may pose problems in the longer perspective. Particularly it has been discovered that moisture may penetrate into the frame structure along the sides of the fastening member and cause deterioration of core materials sensitive to water.

[0007] Additionally the screws themselves must be carefully chosen with respect to their material characteristics, so that they can withstand the various environmental conditions (humidity, pH variations etc.) both outside the frame and inside the frame structure.

[0008] Several attempts have been made to solve this problem, including the use of rubber sleeves or liners arranged around the fastenings member where it penetrates into the frame structure as described with reference to a traditionally wooden frame in DE19914938A1. This solution works well, but has the disadvantage of necessitating the use of an additional component for each fastening member.

[0009] Another example is described in EP0251804A1, where the cover layer has been made relatively thin or left out altogether on the side of the frame structure intended to be facing the exterior, where the relative humidity is usually the lowest. This allows moisture, which has penetrated into the frame structure, to escape, but complicates the moulding process.

[0010] It is therefore the object of the invention to provide an alternative frame structure, which is both resistant to moisture and easy to manufacture.

[0011] This is achieved with a frame structure, which includes a fastening member reception section formed by the material used for the cover layer forming a plug extending into a hole or recess in at least one core member, filling the hole or recess substantially entirely, and where said hole or recess extends in a length direction of the fastening member reception section from a surface of the core member facing a surface of a frame piece, and wherein the distance D_{end} in the length direction from the surface of the frame piece to the end of the plug defines a maximum allowable fastening member penetration depth D_{pen}, where D_{end}-$D_{pen} \geq 1$ mm. In other words, D_{pen} corresponds to the maximum allowable distance in the length direction from the frame piece surface to the end of the fastening member located inside the fastening member reception section upon insertion.

[0012] A frame structure of this type may be made by a method comprising the steps of:

providing a plurality of core members,
assembling a core of the plurality of core members,
placing the core in a mould,
injecting a cover layer material in the mould so that is encases the core members,
allowing the cover layer material to set so that the core members are fixated in relation to each other and a frame structure is formed,
removing the frame structure from the mould,
wherein, before placing the core in the mould, at least one core member is provided with a hole or recess adapted for being filled substantially entirely with cover layer material during the moulding process so that during the injection step the cover layer material forms a plug extending into the hole or recess, thereby forming a fastening member reception section.

[0013] In this way, the fastening member may penetrate into the frame structure without perforating the outer moisture shield provided by the cover layer. Moreover, the plug formed from the cover layer material will be embedded in the frame structure and provide strong and stable point of attachment for the fastening member, thus potentially eliminating the need for reinforcing inlays.

[0014] It will be understood that the fastening member can be chosen more or less freely as long as its penetration into the fastening member reception section leaves at least 1 mm of the plug in the length direction uninterrupted. It is, however, noted that it may be advantageous to choose a relatively shorter fastening member, since the risk of unintended perforation of the cover layer is then reduced, particularly if the cover layer material used is prone to cracking. In some embodiments, the distance D_{end} in the length direction from the surface of the frame piece to the interior end of the plug is 15-100

mm, preferably 25-60 mm, and for the attachment of cladding and/or covering members to a window sash or stationary frame still more preferred 30-45 mm.

[0015] The size (volume) of the fastening member reception section should be bigger than the size of the fastening member to be received, and the diameter of the fastening member perpendicular to the length direction should be chosen so that the sides of the plug are not perforated during insertion of the fastening member. At present it is preferred that the volume of the plug or thickening forming the fastening member reception section is at least twice and preferably 3-10 times the volume of the part of the fastening member intended to project into it.

[0016] If the fastening member is a screw, the diameter of the fastening member reception section should normally be more than twice the diameter of that screw, for example a screw with a diameter (ø) of 4 mm would then require a reception section diameter of 8 mm and a screw diameter (ø) of 8 mm would require a reception section diameter of 16 mm.

[0017] Advantageously, instructions for use of the frame structure are provided with information on appropriate types of fastening members and their optimal sizes.

[0018] It is also noted that one frame structure may of course be provided with different fastening member reception sections of different depth and/or diameter, and that the hole or recess and the plug formed therein does not need to have a circular cross-sectional shape in the direction perpendicular to the length direction even though it will often be the case. If using a reception section with a non-circular cross-sectional shape the diameters described above apply to the smallest diameter of the reception section. The plug may be a local plug adapted for receiving only a single fastening member or have a bigger volume and being adapted for receiving several fastening members.

[0019] In order to ease the insertion of the fastening member and reduce the risk of cracks in the cover layer material, the fastening member reception section can be provided with a pilot hole for the fastening member. The pilot hole may be drilled after the frame structure has been removed from the mould or formed by a pin inserted or held in the hole or recess during the injection and/or setting step(s).

[0020] It is presently considered to be advantageous to use a setting polymer material, such as polyurethane, as cover layer material. It is noted that whenever reference is made to polyurethane or other polymers it is to be understood as a reference to a material based primarily on the polymer in question, where different additives may have been added to achieve the needed properties. Likewise it will be understood that mixtures of different polymers may be employed.

[0021] The invention is advantageous when at least one core member is made of wood or a wood-based materiel, since these materials are sensitive to moisture, but widely used due to price and a low weight-to-strength ratio. The frame structure may, however, also include at least one core member made of a foamed polymer, such as low density polyurethane, in which case the advantage of a secure attachment to the comparatively strong and stiff cover layer material may be exploited.

[0022] Frame structures according to the invention are presently considered to be particularly advantageous for roof window sashes and frames, which are provided with cladding and/or cover members and subjected to relatively high moisture levels, including also direct exposure to precipitation. For this and like purposes, the frame structure may include an additional member in the form of a weather-protecting shielding arrangement covering at least parts of the frame pieces adapted to face the exterior of a building in a mounted position of the frame structure, at least one elongate fastening member interconnecting the weather-protecting shielding arrangement to at least one frame piece and said fastening member projecting into a fastening member reception section.

[0023] In the following description embodiments of the invention will be described with reference to the schematic drawing, in which

Fig. 1 is a perspective view of a roof window seen from the exterior side,
Fig. 2 is a perspective view of the roof window in Fig. 1 seen from the interior side,
Fig. 3 is a cross-sectional view of a window sash along the line III-III in Fig. 2,
Fig. 4 is a cross-sectional view of a window sash along the line IV-IV in Figs 1 and 2,
Fig. 5 is a cross-sectional view of a window frame along the line V-V in Figs 1 and 2, but where the sash and mounting brackets have been left out,
Fig. 6 is a cross-sectional view of a window frame along the line VI-VI in Figs 1 and 2, but showing only the window frame side member, the mounting bracket and the screw used for attachment thereof,
Fig. 7 is a perspective view of another embodiment of a window frame for a centre-hung window seen from the exterior side,
Fig. 8 is a closer view of the detail marked VIII in Fig. 7,
Fig. 9 is a cross-sectional view of the window frame along the line IX-IX in Fig. 8, and
Fig. 10 is a cross-sectional view of another embodiment of a window frame showing only the frame side member.

[0024] Fig. 1 and Fig. 2 show an embodiment of a centre-hung roof window comprising, when installed in a building, a stationary window frame 1 and a moveable sash 2 carrying a pane 3, each of the window frame and the sash including a frame structure according to the invention. The stationary window frame includes a top piece 11, a bottom piece 12 and two side pieces 13, 14 together defining a window frame plane, and the sash

includes a top piece 21, a bottom piece 22 and two side pieces 23, 24 together defining a sash plane. The sash 2 is connected to the window frame 1 by a pair of pivot hinges 4 provided between the respective side pieces 13, 14; 23, 24 of the window frame and the sash, so that the window may be opened by turning the sash 2 in relation to the window frame 1 about a pivot axis 40 defined by the pair of pivot hinges.

[0025] Each pivot hinge comprises a window frame part 41 and a sash part 42 and in the embodiment shown they are of the type described in the applicant's earlier patent applications WO9928581 and GB1028251, where a curved member and a tap on one hinge part travels in a curved guide track in the other hinge part during opening and closing of the window. The radius of curvature entails that when using such hinges, the hinge axis lies at a small distance above the actual hinge parts, and as the sash is turned, first the curved member and then the tap comes out of the track. In combination this provides a pattern of movement which allows easy operation of a centre-hung window and allows the sash to be turned substantially entirely around. It is, however, to be understood that other types of hinges may also be employed.

[0026] As used in this description, a closed position of the window means a position in which the window frame plane and the sash plane coincide, that is form an angle of 0 degrees with each other. Similarly an open position of the window as used herein generally means a position in which the sash 2 has been turned about the pivot hinge axis 40 such that the window frame plane and the sash plane no longer coincide.

[0027] The window in Figs 1 and 2 shown furthermore comprises a locking assembly 5, a generally circumferentially extending sealing 6, cladding members 7 and a set of mounting brackets 8 (only shown on one side of the window) for interconnecting the window frame 1 to a load bearing structure in a building.

[0028] The locking assembly 5 is used for locking the window frame 1 and sash 2 to each other and can be opened and closed using a handle bar 51.

[0029] The sealing 6 is provided for sealing the gap between the window frame 1 and the sash 2 in the closed position of the window and comprises at least one, preferably at least two sealing strips extending along each window frame and sash piece in the closed state of the window. The cladding members 7 form part of a weather shielding arrangement.

[0030] In the following the invention will be described with reference to a centre-hung window, but it will be understood that the invention may also be used in connection with other types of windows including top-hung windows, with or without an intermediate frame structure, windows having the hinge axis somewhere between the top and the centre, and side-hung windows.

[0031] The frame structures used in the window frame structure 1 and the sash 2 both comprise a core 25 and a moulded cover layer 26 encasing the core.

[0032] Fig. 3 shows a cross-section of the top piece 21 of the sash along the line III-III in Figs 1 and 2, where a glazing list 31 used for attaching the pane 3 to the sash 2 has been interconnected to the sash top piece using a fastening member in the form of a screw 32. The screw 32 penetrates into a fastening member reception section 27 formed by the material used for the cover layer 26 extending into a hole in the core 25, filling the hole substantially entirely and forming a local plug or thickening 27 at this particular location in the sash. The screw 32 does not puncture the shield formed by the cover layer 26 and the core 25 will therefore not be exposed. This means that the core 25 can be made from materials, which are sensitive to moisture. In order to ensure that the cover layer is not punctured, the distance D_{end} in the length direction L from the exterior surface of the frame piece to the interior end of the plug should be at least 1 mm longer than the distance D_{pen}, which the fastening member penetrates into the frame. Here it is approximately 5 mm.

[0033] In order to be able to receive the screw, the hole in the core and thus also the plug 27 extends in the direction of insertion of the fastening member, i.e. the intended length direction of the fastening member in the mounted state, and is here relatively narrow compared to the width of the screw, but it will be understood that it may be wider than shown. A larger width reduces the risk of the fastening member puncturing the cover layer if not inserted entirely correctly. On the other hand, the cover layer might be made of a material having relatively poor insulating properties in comparison to the core, and it can therefore be advantageous to minimize the volume of the fastening member reception section(s). If the insulating properties of the used cover layer material are poor it will also be advantageous to position the fastening member reception section(s) in section(s) of the frame structure, where it/they have the smallest possible influence on the insulating properties of the total frame structure in its mounted use state.

[0034] In the embodiment shown in Fig. 3 the cover layer 26 is of approximately the same thickness all around except for the plug 27, but it will be understood that this need not be the case. For example the cover layer may be thicker on outer and exterior sides, where the frame is exposed to the weather, than on the inner and interior sides. It is even possible to leave one or more sections of the core uncovered by the cover layer, but providing a cover layer which surrounds the core entirely usually provides for a better protection of the core.

[0035] A different embodiment of the plug 27, which extends all the way through the top sash piece 21, is shown in Fig. 4, where the fastening member 32 is used for attaching a locking assembly 5. Allowing the two sides of the frame piece to be interconnected by the cover layer material 26 in this way may contribute to the strength and stability of the frame piece when using a relatively weak material for the core 25. Depending on the material used for the cover layer it may, however, also have a negative influence on the insulating properties of the frame piece.

Similar effects may be achieved by making the frame piece with two separate core members and a layer of cover layer material extending between them over substantially the entire length of frame piece instead of a local plug as in Fig. 4.

[0036] As will be understood from the description of Figs 1-4 one frame piece, here the top frame piece, may comprise several local fastening member reception sections, which may extend from different surfaces of the frame piece and/or in different directions and are each adapted for receiving a single fastening member. Such fastening member reception sections may be arranged so close to each other that there is a direct contact between the cover layer material forming them and/or flow passages may be provided between holes or recesses in the core, so as to facilitate the filling of the holes or recesses with cover layer material. A single reception section may also be adapted for receiving two or more fastening members.

[0037] It is also possible to provide different fastening member reception sections intended for different installation situations in one frame piece and to use only some of them during installation of the frame structure. As an example, fastening member reception sections for use in the attachment of a locking assembly may be provided both in the top frame piece and in the bottom frame piece so that a locking assembly may be arranged either at the top or at the bottom depending on demand. Another example is the provision of fastening member reception sections, which are intended for use in the mounting of a screening arrangement (not shown) and which will only be used if and when the owner of the window decides to install a screening arrangement. Similar examples will apply to other uses of the frame structure than in a roof window.

[0038] In Fig. 5 the fastening member 32 is used for attachment of the window frame part 41 of the hinge 4 to the side piece 14 of the window frame 1 and thus extends from the inner side of the window frame towards the outer side.

[0039] The core member 25 is here provided with grooves extending in the longitudinal direction of the window frame side piece 14, but which have not been filled entirely with the cover layer material. Two of these grooves are used for the attachment of a sealing strip 6 and a strip of insulating material 15, and a third extends along the entire side piece and is adapted for receiving a mounting bracket as will be explained later. Other such grooves, recesses or openings filled only partially with cover layer material may be provided for other purposes. These grooves, recesses and/or openings are provided by making the mould used for applying the cover layer with corresponding ribs, lists, pin or the like projecting into the respective grooves, recesses and/or openings in the core member during the moulding step. Alternatively, the grooves, recesses and openings may be provided by milling, cutting and/or drilling into the cover layer material after the moulding step.

[0040] In Fig. 6 a mounting bracket 8 is attached to the window frame side piece 14 by means of a screw 32 penetrating into a local plug 27, which extends all the way through the core member 25 from the outer side to the inner side in the same way as the plug in Fig. 4. Here the fastening member reception section 27 is somewhat wider at the outer side to make room for a groove 82, which houses a flange 81 on the mounting bracket. The flange 81 is provided to prevent the mounting bracket from rotating about the fastening point provided by the screw. The groove could also have been made separate from the plug 27.

[0041] Even though the fastening member reception sections described above with reference to Figs 3-6 have been described as being provided in the same window it will be understood that they are structurally and functionally independent. This means that they may used alone or in combination with other types of fastening member reception sections and/or on other types of window frame and/or sashes, including those described below.

[0042] Fig. 7 shows a different embodiment of a stationary window frame 1 with window frame hinge parts 41 mounted on the inner side. Apart for having a different shape this window frame is intended for the being used in a window of the same type as shown in Figs 1 and 2 and the same reference numbers have therefore been used.

[0043] The upper left-hand corner of the window frame in Fig. 7 is shown in Fig. 8. As may be seen, the surfaces of the window frame is provided with a plurality of recesses, holes and grooves intended for use in the handling of the window frame and the attachment of additional components thereto. One example is the groove 82 intended for attachment of a mounting bracket as also described with reference to Fig. 6, but which in this embodiment is only found at the corner of the frame structure. Another is the indentations 28, which are provided above fastening member receptions sections in the frame. These indentations not only indicate the positions of the fastening member reception sections but may also contribute to guiding the fastening members during the initial phase of the insertion, where they might otherwise tend to skid over the surface of the cover layer. Yet another example is the grove 83 which is intended for insertion of a second positioning means in the form of a small flange (not shown) on the mounting bracket which small flange corporates with the bigger flange of the bracket for making it more easy to place the bracket in the right orientation (up/down) at the frame side.

[0044] A single screw 32 has been shown in Fig. 8 in its inserted state and Fig. 9 shows a cross-section through the window frame side piece 13 at this point. As may be seen, the fastening member reception section 27 is here in the form of a thickening at the outer exterior corner of the frame piece 13 filling a recess in the core 25.

[0045] The core 25 in Fig. 9 comprises three different core members 251, 252, 253 arranged in parallel and

interconnected to form a single core piece. A first core member 251 is made from plywood, a second 252 from regular oven-dried wood, and a third 253 from heat-treated wood with improved insulating and moisture resistance properties compared to regular wood. The strength and dimensional stability of the plywood makes it particularly well suited for transferring loads at the mounting brackets and where the hinge members are attachment to the frame structure, whereas such strength may not be needed at other sections of the frame, which are subjected to smaller loads.

[0046] In this context, heat-treated wood is to be understood as meaning wood, which has been subjected to a constant temperature in the interval of 150-240°C for 0.5-4 hours, possibly in combination with acetylation and impregnation.

[0047] The three core members 251, 252, 253 are held together primarily by being encased in the cover layer material 26, but the connection between the second 252 and third 253 core member is strengthened by teethed surfaces engaging with each other. The first core member 251 is provided with recesses 254 which have been filled with the cover layer material during the moulding of the cover layer, so that the cover layer material functions as an adhesive interconnecting the core members. To keep the first core member in place during the moulding process, it may be advantageous to first attach it to the second and/or third core member, for example by means of staples, but this need not be the case.

[0048] Another feature, which separates the embodiment in Fig. 9 from those in Figs 3-6 is the thickness of the cover layer 26, which here varies greatly. Generally the material used for the core is cheaper than the cover layer material and in such cases it will be advantageous from an economic point of view to only use thick layers of cover layer material, where it is actually needed. Also it will be seen that the core in Fig. 9 has a relatively simple cross-sectional shape and that variations in the thickness of the cover layer has been used for giving the window frame side piece the desired shape, one example being a flange 17 provided on the inner side and adapted for holding a sealing strip (not shown).

[0049] Fig. 10 shows yet another embodiment of a window frame side piece resembling that in Fig. 9, but where an additional fourth core member 255 has been provided at the centre of the second core member 252, which has thus been divided into two. Again the first core member 251 is made from plywood, the second 252 of regular wood, and the third 253 from heat-treated wood, while the fourth core member 255 is made from a foamed polymer, such as low density polyurethane, expanded polystyrene (EPS) or the like. The purpose of the fourth core member is to increase the thermal insulating properties of the window frame piece and it will be understood that other frame pieces may include a similar foamed core member. Likewise, as described with reference to the plywood core member 251 above, this fourth core member 255 does not need to be found at all sections of the frame structure, and it will generally be understood that for example the top and bottom pieces of a frame structure may be embodied differently from the side pieces with respect not only to cross-sectional shape but also with respect to the number, type and mutual position of the core members used.

[0050] No fastening member reception section is shown in Fig. 10, but such sections may be provided in this frame piece in the same way as in any of the frame pieces described with reference to Figs 3-6 or 9.

[0051] All fastening members have here been shown and described as screws, which are most commonly used, but it will be understood that other types of fastening members such as nails, pegs or staples may also be employed. Screws will often be self-tapping, i.e. drilling their own holes as they are screwed into material, but it may be advantageous to provide pilot holes for guiding them in the right direction. The same applies to nails and staples. If using pegs or like fastening members, which are not able to cut into the cover layer material, it will be necessary to make holes for them. For most purposes it will be advantageous that the fastening member has some kind of projection(s) in a direction perpendicular to the length direction, such as a threading or barbs, in order to keep the fastening member from being pulled out of the fastening member reception section. Premade holes in fastening member reception sections may be provided with an indentation or widening adapted for receiving a barb or the like.

[0052] The dimension of the window frame 1 and sash 2 shown in Figs 1-9 as well as of the core members and cover layers used therein are consistent with the cores being made primarily from wood and wood-based materials and the cover layer being made of cast or extruded polyurethane (PUR). If using other materials, the thickness of the cover layer may need to be slightly different and the dimensions of the core and individual core members may also have to be adapted. As an example, a core made from a material having better insulating properties than wood may be made with smaller dimensions while still providing the window with satisfactory insulating properties, but it will usually be weaker and therefore necessitate that the cover layer is made thicker and/or from a stronger material. Examples of such alternative core materials are mineral wool and plant-based fibre wools, while the cover layer may for example be reinforced with glass fibres and/or made from other weather resistant polymers.

[0053] The core members may be made in several different ways depending on the material used as will be readily imaginable to the skilled person. When using wood or wood base materials core members will usually be cut to size and then assembled into a core using glue, adhesives, nail and/or staples, whereas fibre based and foamed materials may often be given the intended shape during manufacture.

[0054] In order to facilitate the adherence of the cover layer to the core and avoid delamination, the surface of

one or more core members may be pretreated for example by applying an adhesion promoting primer and/or by roughening the surface of the core member.

[0055] Above the invention has been described with reference to the sash and frame of a roof window, but it will be understood that it also applies to other frame structures, such as for example door frames.

Claims

1. A frame structure, such as a sash or a stationary frame for a window or door, including side, top and bottom frame pieces, said frame structure comprising a core and a cover layer applied to the core by moulding and encasing the core, said core comprising at least one core member,
characterized in that
it includes a fastening member reception section formed by the material used for the cover layer forming a plug extending into a hole or recess in at least one core member, filling the hole or recess substantially entirely, and said hole or recess extending in a length direction of the fastening member reception section from a surface of the core member facing a surface of a frame piece, and **in that** the distance D_{end} in the length direction from the surface of the frame piece to the end of the plug defines a maximum allowable fastening member penetration depth D_{pen}, and **in that** D_{end}-$D_{pen} \geq 1$ mm.

2. A frame structure according to claim 1, wherein the distance D_{end} in the length direction from the surface of the frame piece to the end of the plug is 15-100 mm, preferably 25-60 mm, and for the attachment of cladding and/or covering members to a window frame still more preferred 30-45 mm.

3. A frame structure according to any of the preceding claims, wherein the fastening member reception section is provided with a pilot hole for the fastening member.

4. A frame structure according to any of the preceding claims, wherein at least one fastening member reception section is a local plug with a circular cross-sectional shape in the direction perpendicular to the length direction.

5. A frame structure according to any of the preceding claims, wherein the cover layer material is a setting polymer material, preferably polyurethane.

6. A frame structure according to any of the preceding claims, wherein at least one core member is made of wood or a wood-based material.

7. A frame structure according to any of the preceding claims, wherein at least one core member is made of a foamed polymer, such as low density polyurethane.

8. A frame structure according to any of the preceding claims, further including a weather-protecting shielding arrangement covering at least parts of the frame pieces adapted to face the exterior of a building in a mounted position of the frame structure, at least one elongate fastening member interconnecting the weather-protecting shielding arrangement to at least one frame piece, said fastening member projecting into the fastening member reception section.

9. A method for manufacturing a frame structure comprising the steps of:

providing a plurality of core members,
assembling a core of the plurality of core members,
placing the core in a mould,
injecting a cover layer material in the mould so that it encases the core members,
allowing the cover layer material to set so that the core members are fixated in relation to each other and a frame structure is formed,
removing the frame structure from the mould,
characterized in that,
before placing the core in the mould, at least one core member is provided with a hole or recess adapted for being filled substantially entirely with the cover layer material during the moulding process so that the cover layer material forms a plug extending into the hole or recess, thereby forming a fastening member reception section, said plug extending in a length direction of the fastening member reception section from a surface of the core member facing a surface of a frame piece, and **in that** when providing the hole in the core member a maximum allowable fastening member penetration depth D_{pen} is defined, where D_{end}-$D_{pen} \geq 1$ mm when D_{end} is the distance in the length direction from the surface of the finished frame piece to the end of the plug.

10. A method according to claim 8, further including providing a shielding arrangement to cover at least parts of the frame structure adapted to face the exterior of a building in a mounted position, said shielding arrangement being interconnected to at least one frame piece by at least one fastening member, which is driven into the fastening member reception section.

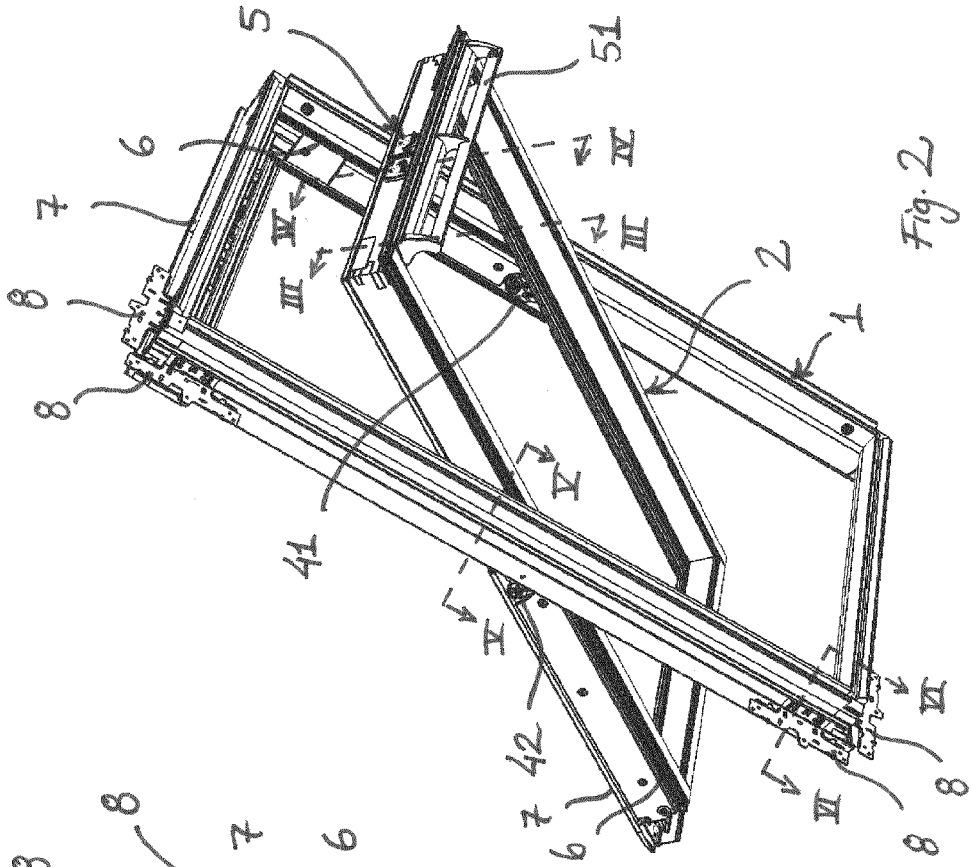
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Fig. 2

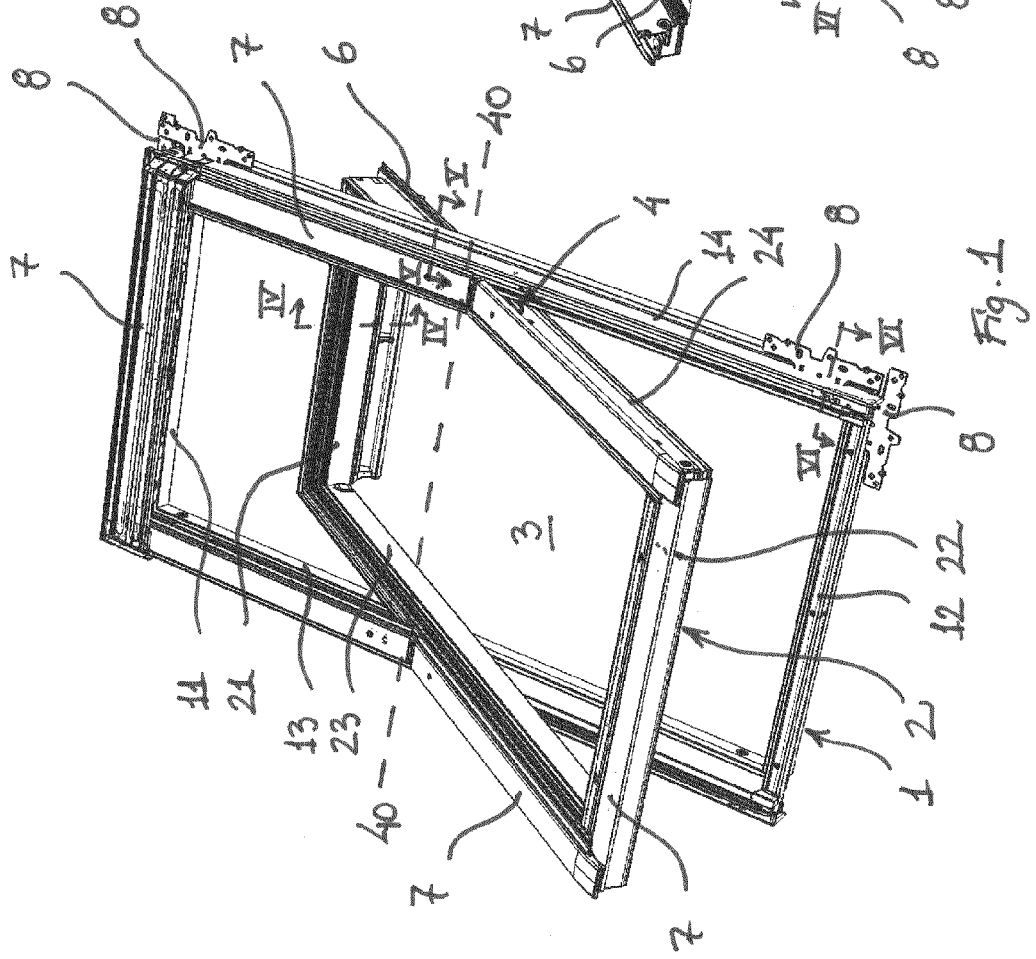
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Fig. 1

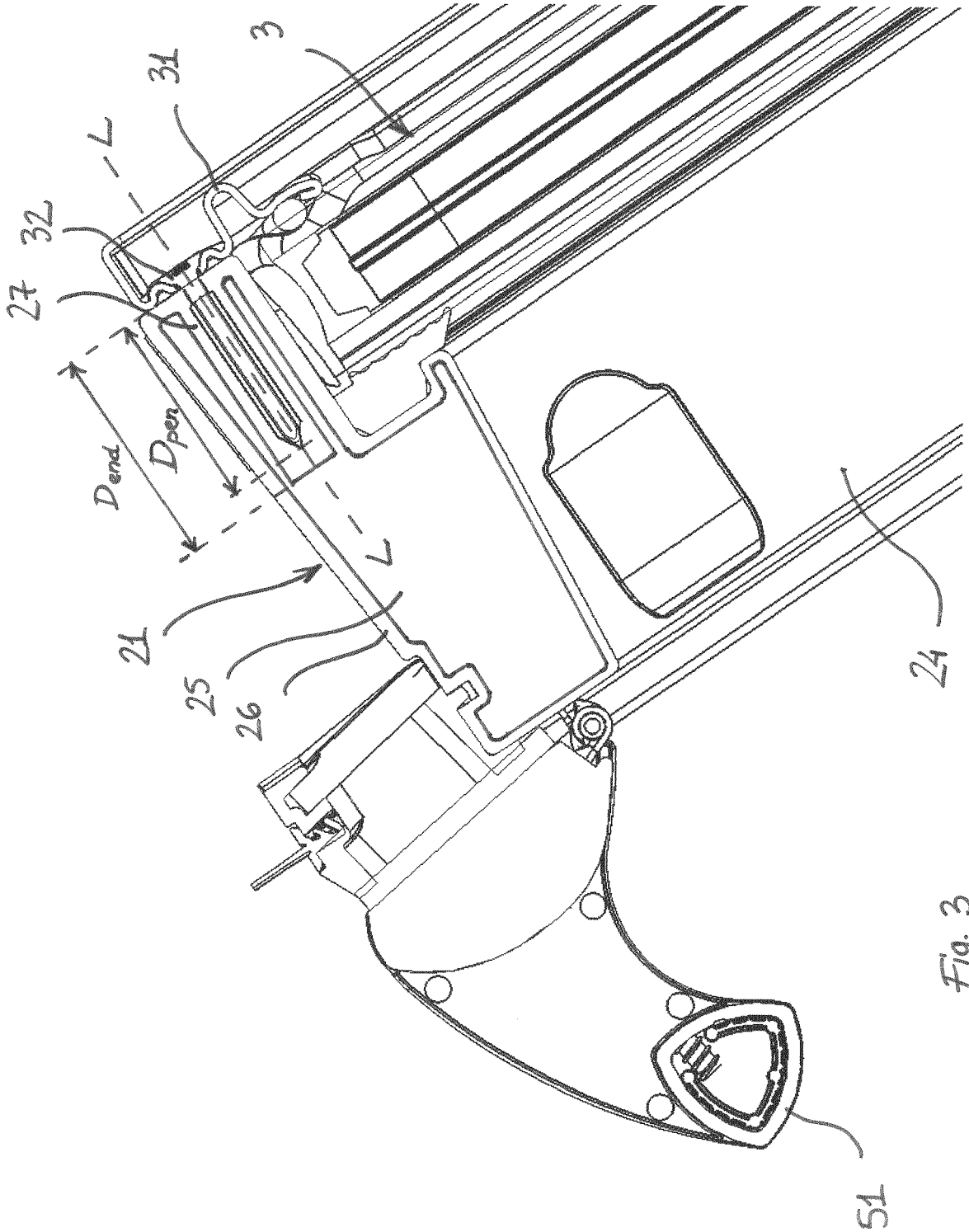
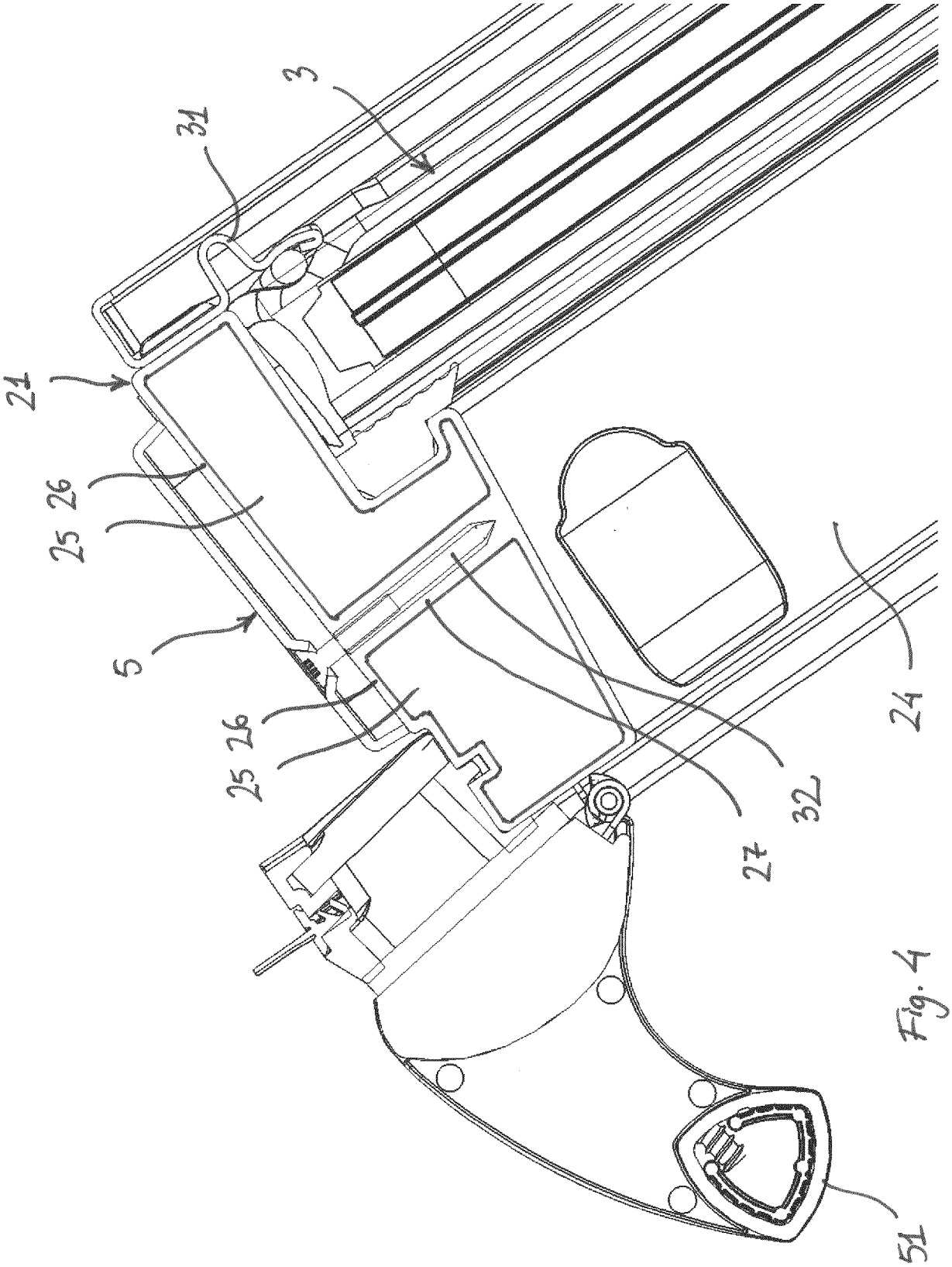


Fig. 3



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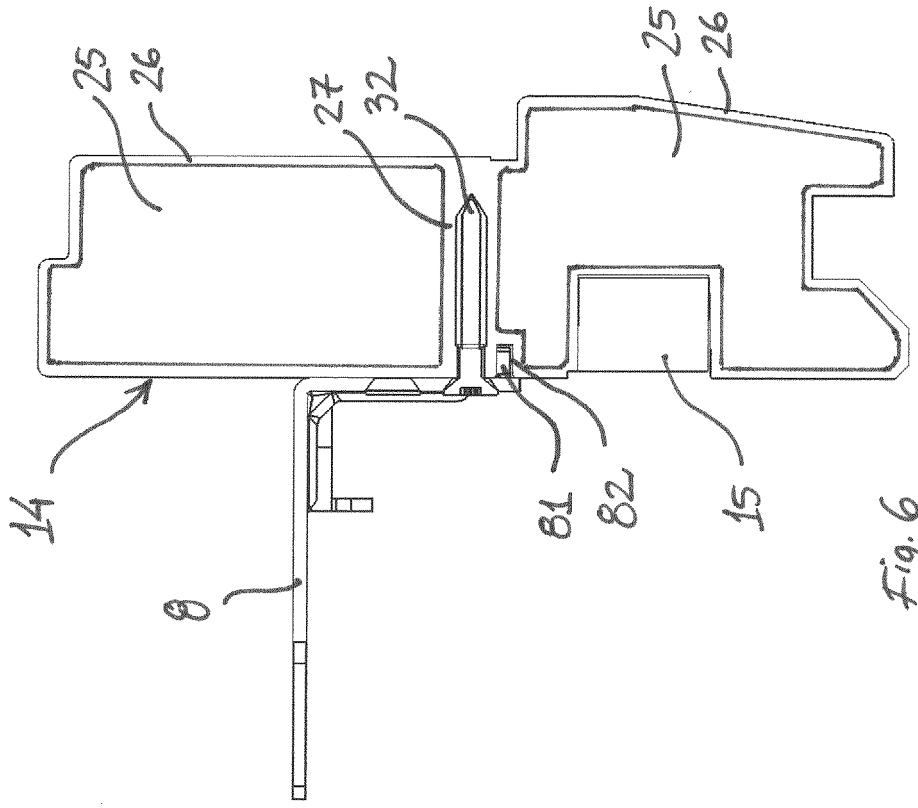

Fig. 6

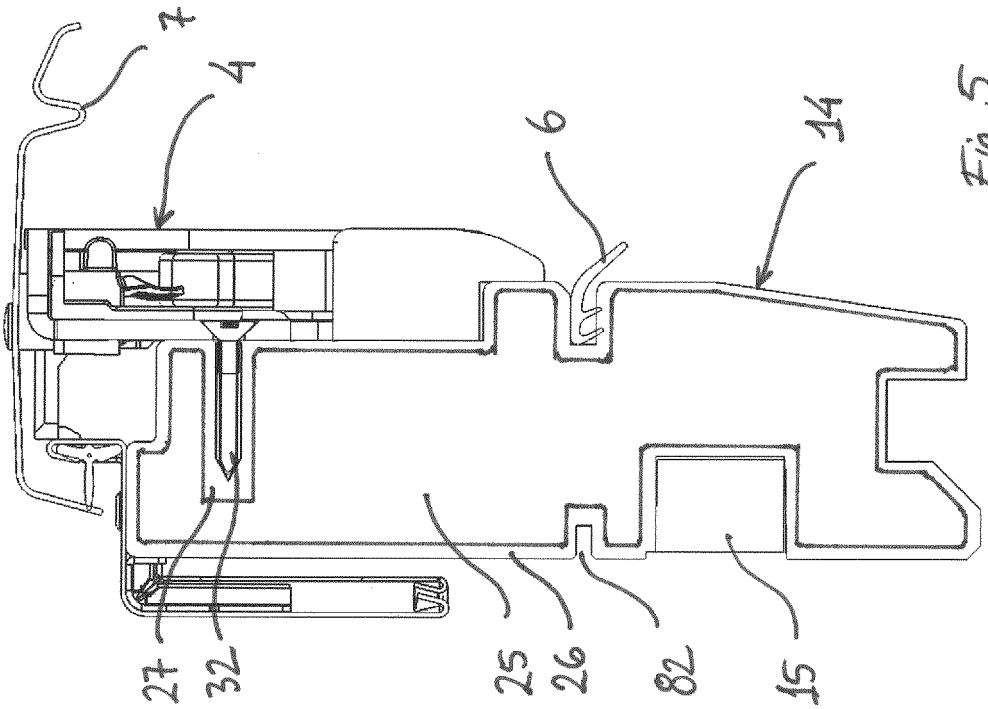

Fig. 5

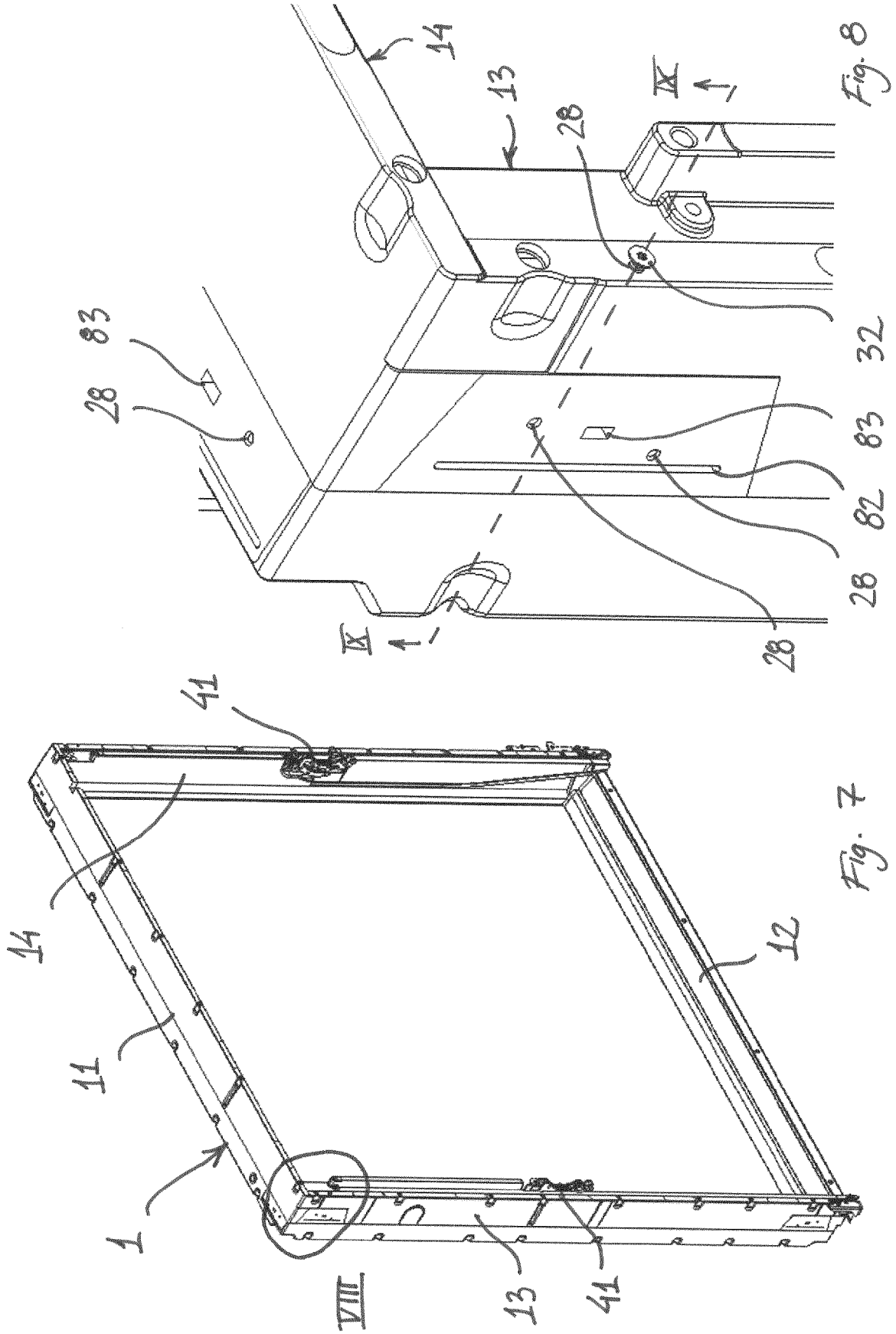

Fig. 7

Fig. 8

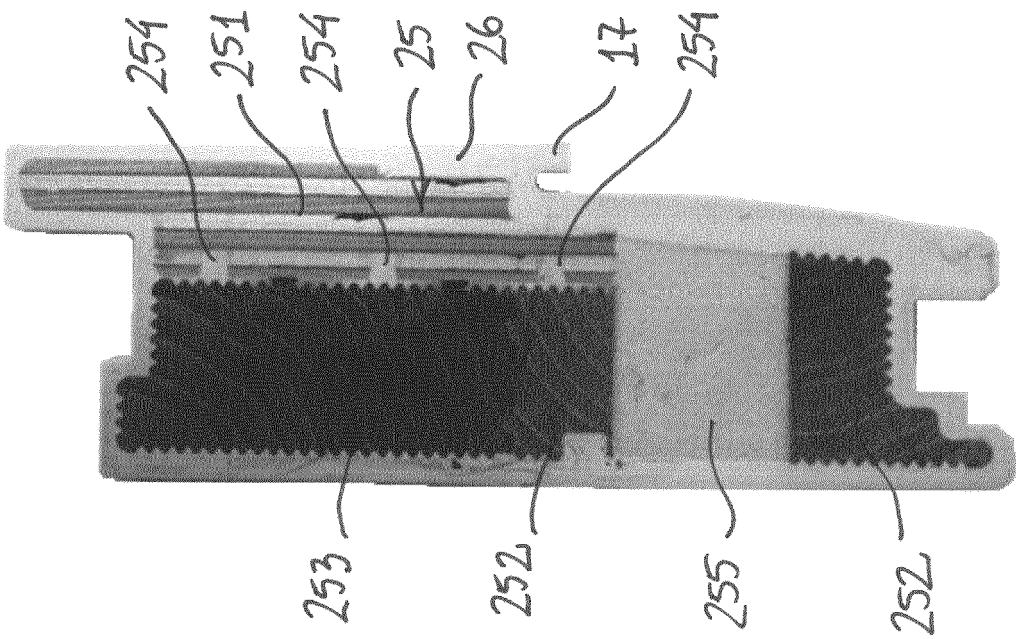
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Fig. 10

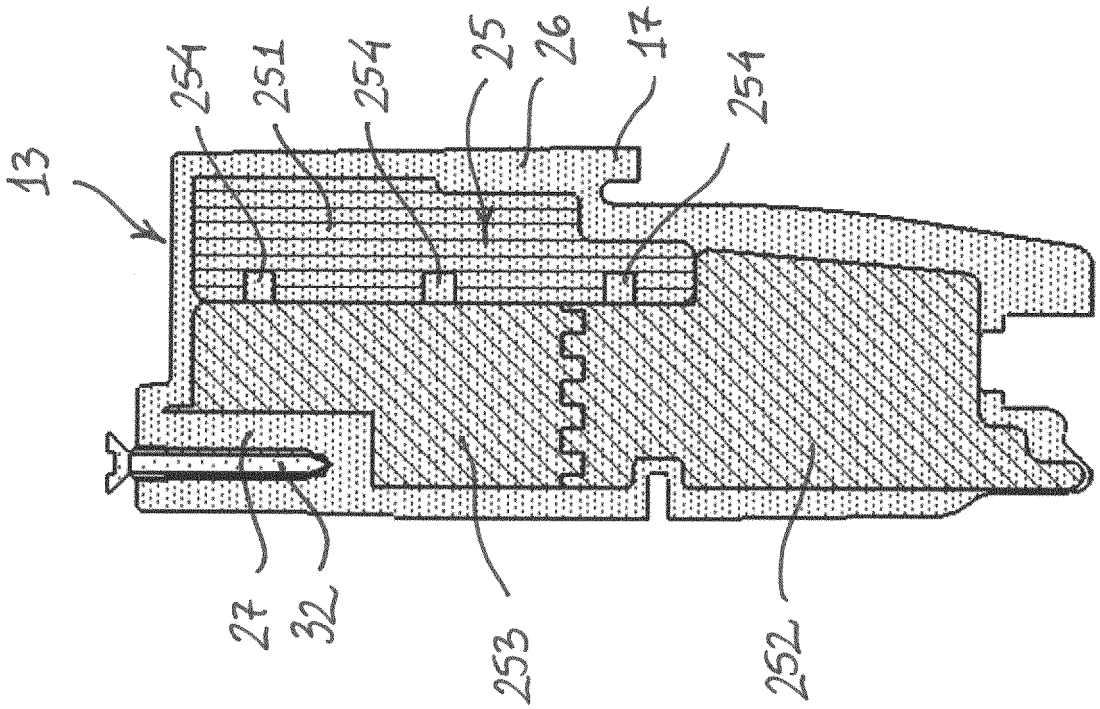
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Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 1599

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2007/057029 A1 (VKR HOLDING AS [DK]; DANIELSEN HENRIK [DK]) 24 May 2007 (2007-05-24) * page 1, lines 3-8 * * page 5, lines 1-22 * * page 8, line 3 - page 9, line 29; figures 1-3 *	1,3-10	INV. E06B3/30 E06B3/20
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E06B
B27K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 May 2016	Couprie, Brice

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