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(54) ROOF OR WINDOW ASSEMBLY WITH INSERT

(57) Roof assembly or window assembly comprising a frame (100) and one or more plate and/or dome elements (200) received therein, wherein at least one insert (300) is incorporated in the frame and wherein at least one functional piece (400) is attached mechanically in the insert. The insert has a first portion (301) which is arranged countersunk in the frame and a second portion (302) which protrudes from the frame, wherein the second portion comprises a first side wall (310) and a second side wall (320) lying opposite thereto, which are mutually connected via the first portion. The first and second side walls substantially lock the functional piece (400) in a first and second direction (X, Y). A spring-mounted element (500) co-acts with at least one of the first and second side wall and with the functional piece in order to secure the functional piece in the insert.

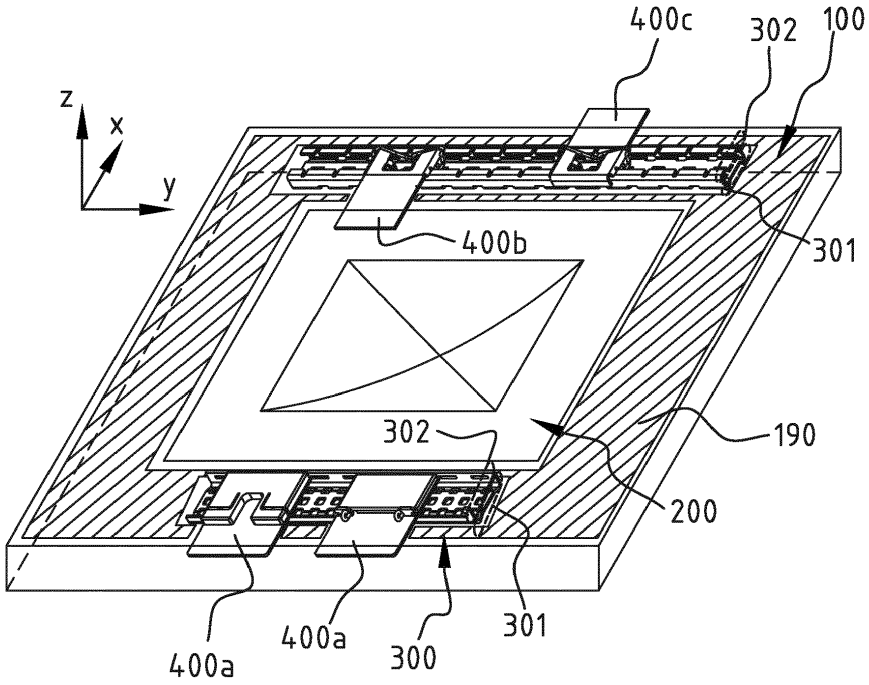

FIG. 1

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Description

Field of the invention

[0001] The present invention relates to a roof assembly or window assembly comprising a frame and one or more plate and/or dome elements received therein. The present invention relates more particularly to a roof assembly or window assembly with a frame in which at least one insert is incorporated.

Background

[0002] Roof devices in which one or more flat and/or domed plastic or glass elements are combined are known. Multi-walled plastic domes are thus for instance known in which a number of dome-like shells are arranged at a mutual distance. Dome devices in which a flat transparent plastic plate is combined with a dome-like shell are also known. Examples hereof are described in the following patent publications in the name of applicant: Belgian patent application no. 2016/5645, Belgian patent no. 1020769 and Belgian patent no. 1019311. The text of these patent publications is included here by way of reference.

[0003] Such roof devices are typically provided with a frame or peripheral frame for mounting on an upstand or on another suitable support structure. European patent application EP 3 460 160 A1 in the name of applicant describes a roof assembly with at least two plate and/or dome elements which are mutually connected along their periphery by means of a frame of plastic, preferably a cured sealing material, such as a polyurethane material. Functional elements such as an insert can be incorporated in this frame.

Summary of the invention

[0004] Embodiments of the invention have the object of providing a roof assembly or window assembly of the type stated in the preamble, which allows functional pieces, such as hinges, brackets, sensors and so on, to be attached to the frame in simple and robust manner.

[0005] According to a first aspect of the invention, a roof or window assembly is provided which has a frame and one or more plate and/or dome elements received therein. At least one insert is incorporated in the frame, wherein at least one functional piece is attached mechanically in the insert. The insert has a first portion which is arranged countersunk in the frame and a second portion which protrudes from the frame. In the case of a roof assembly the second portion can for instance protrude on an underside of the roof assembly. The invention however also allows an insert to be provided in a peripheral wall of the frame or on an outer side of the frame. The second portion comprises a first side wall and a second side wall lying opposite thereto. The first side wall is preferably provided parallel to the second side wall. The first and second side walls are configured to substantially lock the functional piece in a first direction, directed from the first to the second side wall, and in a second direction parallel to the first and/or second side wall. The roof or window assembly further comprises a spring-mounted element which co-acts with at least one of the first and second side wall and with the functional piece in order to secure the functional piece in the insert.

[0006] A functional piece can be anchored firmly in the insert by a combination of an insert with second adapted side walls on the one hand and a spring-mounted element on the other. In addition, the use of a spring-mounted element allows simple attachment of the functional piece in the insert.

[0007] The functional piece is a separate piece and can have any random function, for instance the function of a mounting plate, a hinge piece, and so on.

[0008] In an advantageous embodiment the first and/or the second side wall is provided with a number of recesses or openings in which corresponding flanges of the functional piece are received.

[0009] According to a possible embodiment, the first and/or the second side wall is provided with a wing which is directed toward respectively the opposite second and/or the first side wall, and the functional piece is configured to be arranged under the wing on at least one side. The wing of the first and/or second side wall then also provides for an anchoring perpendicularly of the first and second direction, optionally together with the spring-mounted element.

[0010] The recesses can be provided at least partially in the wing. The functional piece can then be provided with a first and second corresponding flange, which are directed substantially perpendicularly of the first and second direction. The first and second flange can optionally protrude through a first and second recess in the wing. In this way a locking in the second direction is ensured. According to an alternative, the first and second flange lie with an outer end under the wing.

[0011] In an advantageous embodiment the first and second side wall are provided with respectively a first and second wing, which is directed toward respectively the opposite second and first side wall, and the functional piece is configured to be arranged under the first wing on a first side and to be arranged under or above the second wing on a second, opposite side.

[0012] In another advantageous embodiment the first side wall is provided with a number of openings through which corresponding flanges of the functional piece protrude. The openings are preferably formed as elongate slots which preferably extend substantially parallel to a plane of the frame. The functional piece preferably has a plate-like part situated between the first and second side wall, and such a plate-like part can be provided in simple manner with flanges which fit in correspondingly formed slots.

[0013] The second side wall is then preferably provided with a recess, preferably opposite one or more openings

of the number of openings in the first side wall, wherein a part of the functional piece protrudes through the recess through the second side wall. The spring-mounted element further engages in the recess in order to secure the functional piece.

[0014] According to a preferred embodiment, the spring-mounted element has a first spring-mounted leg and a second spring-mounted leg which engage on respectively a first and second stop location of the functional piece and/or of the insert. The first and second stop locations lie at a distance from each other in the second direction.

[0015] According to a possible embodiment, the first and the second spring-mounted leg are coupled to the first and second corresponding flange. The spring-mounted element can then be connected to the functional piece, and this assembly can then be anchored in the insert in simple manner. The spring-mounted element here preferably has a middle part which connects the first and the second spring-mounted leg to each other, and the middle part is configured to engage partially under the wing. The functional piece with the spring-mounted element can be arranged by first arranging the first side of the functional piece under the first wing in an oblique position of the functional piece and by then moving the second side of the functional piece downward between the first and second side wall.

[0016] The first leg preferably engages between a first edge of the recess and the functional piece. The second leg preferably engages between a second edge of the recess and the functional piece. In this way the functional piece is thus secured in two places by respectively the first and second leg of the spring-mounted element. In an advantageous embodiment the spring-mounted element is substantially U-shaped, wherein the first spring-mounted leg is thus connected to the second spring-mounted leg by a middle part. According to a possible embodiment, the first leg and/or the second leg can be provided at a free outer end thereof with a U-shaped portion. The U-shaped portion at a free outer end of the first leg extends under the first upper edge of the recess, from the insert, and then over an upper edge of the second side wall. The U-shaped portion at a free outer end of the second leg extends over the second upper edge of the recess, from the insert, and then over an upper edge of the second side wall. In this way the functional piece is anchored still more firmly in the insert.

[0017] According to an advantageous embodiment, the roof or window assembly further comprises a spring holder in which the spring-mounted element is received. The spring holder preferably extends between the first and the second side wall. The first side wall can optionally be provided with an upper edge which extends over the spring holder. The spring holder is preferably provided on a side directed toward the functional piece with a number of protruding parts, such as pins or ribs, wherein the spring-mounted element is arranged around and/or between these protruding parts. These protruding parts thus facilitate the mounting of the spring-mounted element in the spring holder. A number of protruding parts can optionally protrude into holes in the functional piece. In this way the spring holder is anchored further in the functional piece.

[0018] The functional piece is preferably in each case provided on opposite sides with a notch which co-acts with a wall part of the second side wall. In this way an anchoring in the second direction parallel to the second side wall can be obtained.

[0019] According to an advantageous embodiment, the frame is manufactured from a plastic material, preferably a cured polymer composition, for instance a cured polyurethane material. The first portion of the insert is preferably provided with a plurality of openings in which plastic material extends.

[0020] According to an advantageous embodiment, the insert is elongate and extends over at least 20% of a length of a side of the frame and/or over at least 10% of a periphery of the frame. It is noted here that the frame can take a random form. The frame can thus be polygonal, for instance rectangular, or be round.

[0021] The insert is preferably manufactured from metal or from a fibre-reinforced material. The insert can for instance be a punched and rolled profile.

[0022] According to an advantageous embodiment, the one or more plate and/or dome elements comprise at least two plate and/or dome elements which are arranged parallel to each other in the frame.

[0023] Further advantageous embodiments are described in the appended claims.

[0024] The invention further relates to an insert with one or more of the above-described features, particularly for use in an embodiment of a roof assembly or window assembly as described above.

[0025] In addition, the invention relates to an assembly of an insert, a functional piece and a spring-mounted element with one or more of the above-described features, particularly for use in a roof assembly or window assembly according to any one of the above described embodiments.

Brief figure description

[0026] The above stated and other advantageous features and objects of the invention will become more apparent, and the invention better understood, on the basis of the following detailed description when read in combination with the accompanying drawings, in which:

Figure 1 shows a schematic perspective view of a first embodiment of a roof assembly;

Figure 2A shows a cut-away schematic perspective view of an embodiment of an assembly of an insert, a functional piece and a spring-mounted element, viewing the upper side of the insert;

Figure 2B shows a schematic perspective view of the embodiment of figure 2A in the assembled state;

Figure 3A shows a schematic perspective view of the embodiment of figure 2A, viewing the underside of the insert;

Figure 3B shows a schematic perspective view of the embodiment of figure 3A in the assembled state;

Figure 4A shows a cut-away schematic perspective view of a second embodiment of an assembly of an insert, a functional piece and a spring-mounted element, viewing the upper side of the insert;

Figure 4B shows a schematic perspective view of the second embodiment of figure 4A in the assembled state;

Figure 5A shows a schematic perspective view of the embodiment of figure 4A, viewing the underside of the insert;

Figure 5B shows a schematic perspective view of the embodiment of figure 5A in the assembled state;

Figure 6 shows a cross-section of an embodiment of a roof assembly which is arranged on an upstand and which is provided with a hinge and a bracket;

Figure 7 shows a cross-section of another embodiment of a roof assembly which is arranged on an upstand and which is provided with a hinge;

Figure 8 shows a cross-section of yet another embodiment of a roof assembly which is arranged on an upstand; and

Figure 9A shows a perspective view of another embodiment of a functional piece and figure 9B shows a perspective top view of the functional piece 400 of figure 9A arranged in an insert 300.

Detailed embodiments

[0027] Figure 1 illustrates a roof assembly with a frame 100 and one or more plate and/or dome elements 200 received therein. Although the embodiment of figure 1 is described here as a roof assembly, the skilled person will appreciate that this assembly can also be used as a window assembly in a vertical or inclining wall. When the embodiment of figure 1 is used as roof assembly, figure 1 is a view of the underside of the roof assembly. The roof assembly comprises one or more plate and/or dome elements, such as one or more glass plates, one or more glass domes, one or more plastic plates such as polycarbonate plates, one or more plastic domes such as polycarbonate domes. In a roof assembly a plurality of plate and/or dome elements are preferably combined. In order to allow simple mounting of the one or more plate and/or dome elements they are received in a shared frame 100 which extends along a periphery of the one or more plate and/or dome elements. Arranging of frame 100 around the one or more plate and/or dome elements can for instance take place as described in the European patent application EP 3 460 160 in the name of applicant, or as described in the Belgian patent application BE 2018/5805 in the name of applicant, which patent applications are included here by way of reference.

[0028] At least one insert 300 is incorporated in frame 100, preferably an elongate insert 300 which extends along a part of the periphery of frame 100, for instance along one or more sides of frame 100 when it is a polygonal frame. Figure 1 shows two inserts 300, on either side of a frame. These inserts 300 are integrated partially in frame 100 (not shown in figure 1; in figure 1 the underside 301 of the insert is visible, while this underside 301 is incorporated in the material of frame 100 and is thus not normally visible). In figure 1 the two inserts 300 are different, but they can also be identical.

[0029] Frame 100 can also be round (not shown), and in this case a plurality of shorter inserts 300 can also be incorporated in frame 100.

[0030] Insert 300 is intended to be a polyvalent insert suitable for attachment of multiple types of functional piece 400a, 400b, 400c, such as a hinge, a bracket, a ventilation component, a sensor such as a rain detector, a lighting element, a support structure, for instance for one or more cables or wires, and so on. Figure 1 shows four functional pieces 400a, 400b, 400c: two functional pieces 400a which are attached in a first insert 300 and two functional pieces 400b, 400c which are attached in an opposite, second insert 300. As shown schematically, a separate functional piece 400a, 400b, 400c can protrude in inward or outward direction: piece 400b protrudes inward and can for instance be intended for attachment of a sensor, a lighting element, a screen, and more generally any element which may be necessary on the inner side of the roof assembly. Pieces 400a and 400c protrude outward and are intended to fulfil a function on the outer side of the roof assembly. In figure 1 the pieces 400a, 400b, 400c are shown schematically as substantially plate-like pieces, although these pieces 400a, 400b, 400c will typically take a form which is adapted to the desired function of the piece. The outward-extending pieces 400a can for instance be formed to form hinges, see also figures 6-8 which will be discussed below.

[0031] Insert 300 has a first portion 301 which is arranged countersunk in frame 100, and a second portion 302 which protrudes from frame 100. In the shown embodiment insert 300 is arranged such that the second portion 302 protrudes on an underside of frame 100. The underside refers to use as roof assembly. When the shown assembly is used as window assembly, this will thus be a vertical or oblique inner side. The invention is however not limited to the use of an insert 300 on the underside of the frame 100. More generally, the insert 300 can be attached at a random location in frame 100, and particularly there where functional pieces 400a, 400b, 400c are necessary.

[0032] A seal 190 is preferably arranged around the one or more inserts 300. This can for instance be one integral seal 190 in which recesses are provided at the position of the inserts 300. According to an alternative, a first sealing frame can be provided along the outer periphery of the underside of frame 100, around the inserts 300, and a second sealing frame along an inner periphery

of the underside of frame 100, such that the one or more inserts 300 lie between the first and second sealing frame. The skilled person will further appreciate that the seal can optionally be finished further at the position of the functional pieces 400a, 400b, 400c.

[0033] A first embodiment of insert 300 is shown in more detail in figures 2A, 2B, 3A, 3B. A second embodiment of insert 300 is shown in more detail in figures 4A, 4B, 5A, 5B. Similar components are designated with the same reference numerals.

[0034] The second portion 302 of insert 300 which protrudes from frame 100 comprises a first side wall 310 and a second side wall 320 lying opposite thereto. The first and second side walls 310, 320 are configured to substantially lock the functional piece 400 in a first direction X running from first side wall 310 to second side wall 320, and in a second direction Y parallel to the first and/or second side wall 310, 320. Or, in other words, side walls 310, 320 and functional piece 400 are configured such that functional piece 400 is substantially immobile in the X- and Y-direction after being arranged in insert 300. Note that it is still possible to provide some clearance (for instance a clearance smaller than 5 mm, preferably smaller than 3 mm), but insert 300 will form a stop which prevents a movement of functional piece 400 in the X-direction and in the Y-direction after placing of a spring-mounted element 500, see below.

[0035] Spring-mounted element 500 co-acts with the first and/or second side wall 310, 320 and with the functional piece 400 in order to secure functional piece 400 in insert 300, and more specifically to bring about a locking in the Z-direction. Spring-mounted element 500 has a first spring-mounted leg 501 and a second spring-mounted leg 502 which are connected by a middle part 503. First and second spring-mounted leg 501, 502 engage on a first and second stop location A1, A2 of the functional piece and/or of the insert, which first and second stop locations A1, A2 lie at a mutual distance in the Y-direction.

[0036] In the embodiment of figures 2A, 2B, 3A, 3B the first and the second side wall 310, 320 are provided with a number of recesses 311' in which corresponding flanges 411' of functional piece 400 are received. The first and second side wall 310, 320 are more particularly provided with respectively a first and a second wing 313, 323 which is directed inward, to respectively the opposite second and first side wall 320, 310. These wings 313, 323 thus extend over the countersunk first portion 301. Functional piece 400 is configured to be arranged under wing 313 on a first side 413 and to be arranged above the second wing 323 on another side 414. On this other side 414 a determined function (not shown) can then be provided, such as for instance a hinge part or a carrier to which a sensor can be attached. Note that the "other side 414" can protrude as desired on an outer side and/or inner side of the roof assembly as was described above for figure 1. The recesses 311' are provided in the first and second wing 313, 323, at a mutual pitch distance as seen in the Y-direction. This pitch distance is such that a first and second corresponding flange 411' of a functional piece 400 protrude through a first and second recess 311' in second wing 323. The first and second corresponding flange 411' extend substantially in the Z-direction and are dimensioned to bring about a locking in the X- and Y-direction. Functional piece 400 can be arranged by first arranging first side 413 under first wing 313 in an oblique position of the functional piece and by then moving the second side 414 downward between the first and second side wall 310, 320.

[0037] Spring-mounted element 500 is substantially U-shaped. The first and the second spring-mounted leg 501, 502 of spring-mounted element 500 are coupled to the first and second corresponding flange 411'. For this purpose the first and second leg 501, 502 can be provided with a first and second end part 531, 532 which protrude through a first and second hole 431, 432 in the first and second corresponding flange 411'. Spring-mounted element 500 has a middle part 503 which mutually connects the first and the second spring-mounted leg 501, 502, and middle part 503 is configured to engage partially under wing 313. For this purpose middle part 503 has an adapted curvature. Middle part 503 can optionally be provided with an operating means (not shown) which can be manipulated by an installer for the purpose of placing spring-mounted element 500 in the locked position.

[0038] Additional holes 443, 444 can optionally be provided in flanges 411' for the purpose of arranging one or more shafts. These one or more shafts can optionally further protrude through holes in additional tongues 441, 442. By providing the option of mounting one or more shafts in the functional piece 400 additional functionalities can be realized.

[0039] In the embodiment of figures 4A, 4B, 5A, 5B first wall 310 is provided with a number of openings 311 through which corresponding flanges 411 of the functional piece protrude, this in order to realize the locking in the X/Y-direction. Openings 311 are preferably formed as elongate slots which preferably extend substantially parallel to a plane of frame 100, i.e. in the Y-direction. These slotted openings 311 are particularly suitable for co-action with a plate-like functional piece 400 which can be provided in simple manner with flanges 411 which are adapted to fit in the slots 311. Provided in second side wall 320 is a recess 330 which lies opposite one or more openings 311 in first side wall 310. The functional piece 400, preferably a piece with a plate-like part, can then extend through recess 330 to the first side wall 310, wherein the flanges 411 are arranged in the corresponding openings 311. In order to realize the locking in the Y-direction the functional piece is provided with notches 421, 422 in which wall parts 353 of second side wall 320 are arranged. The second side wall 320 can more particularly be provided with a number of upright locking flanges 350 arranged at a mutual pitch distance and having a middle part 351 which, as seen in a longitudinal direction of insert 300, is narrower than two adjacent out-

er parts 352, 353. The lower outer part 353 is configured to co-act with the notch 421, 422 in functional piece 400. The spring-mounted element 500 extends between the lower and upper outer part 352, 353.

[0040] Spring-mounted element 500 has a first spring-mounted leg 501 and a second spring-mounted leg 502 which are mutually connected by a middle part 503, see figure 4A. First leg 501 engages between a first upper outer part 352 and functional piece 400, and second leg 502 engages between a second upper outer part 352 and functional piece 400. In this way spring-mounted element 500 can lock the functional piece 400 substantially in the Z-direction in insert 300. This spring-mounted element 500 can be arranged in insert 300 in simple manner after arranging of functional piece 400. In an advantageous embodiment spring-mounted element 500 is substantially U-shaped. First leg 501 and/or second leg 502 can further be provided at an outer end with a U-shaped or otherwise curved part 511, 512. The U-shaped or otherwise curved parts 511, 512 are intended to extend beyond an outer side of second side wall 320 and to engage against an outer side of locking flanges 350. In this way spring-mounted element 500 can thus be anchored firmly between two locking flanges 350 in order to secure the functional piece 400 lying thereunder.

[0041] Spring-mounted element 500 is preferably received in a spring holder 600, wherein the spring holder extends between first side wall 310 and second side wall 320. First side wall 310 is preferably provided with an upper edge 315, see figure 4A, which optionally extends over spring holder 600 (not shown). Spring holder 600 ensures that spring-mounted element 500 remains in the correct position and further facilitates arranging of spring-mounted element 500. Figure 4B shows spring holder 600 in the mounted state. Figure 5A shows spring holder 600 in the dismantled state, in which the rear side 610 of spring holder 600 is visible. Spring holder 600 is provided on an underside 610 directed toward functional piece 400 with a number of protruding parts 611, 612, and spring-mounted element 500 is arranged around and/or between these protruding parts. The protruding parts can for instance comprise a number of pins 612 and/or a number of ribs 611. Protruding parts 611, 612 ensure that spring-mounted element 500 can be secured in spring holder 600. In addition, the protruding parts can further provide for an anchoring of spring holder 600 in functional piece 400. In the illustrated example pins 612 extend into corresponding holes 412 in functional piece 400, see figure 5A. In this way spring holder 600 can thus be anchored in functional piece 400 with interposing of spring-mounted element 500. The U-shaped parts 511, 512 protrude from under spring holder 600 and are intended to run through locking flanges 350, as elucidated above.

[0042] Frame 100 is preferably manufactured from a plastic material, preferably a cured polymer composition and for instance a cured polyurethane (PUR) material. In order to obtain a good anchoring of insert 300 in frame 100 the insert 300 can be provided with a large number of openings 360 in session into which plastic material extends, see for instance figure 3A and figure 5A. Insert 300 is preferably formed as a U-profile with a bottom part 305 which is not completely flat. In the illustrated variants bottom part 305 has a central part 305a with a first series of openings 360 and two recessed parts 305b with openings 360 on either side of central part 305a.

[0043] Insert 300 is preferably elongate and preferably extends over at least 20% of a length of a side of frame 100, when this frame is polygonal, and/or over at least 10% of a periphery of frame 100. As illustrated in figure 1, a plurality of functional pieces 400a, 400b, 400c can be anchored in the same insert 300. Two hinge pieces 400a can thus for instance be received in a first insert 300 on a first side of the roof assembly, and a third and fourth insert 400b, 400c in the form of for instance a bracket can be anchored in a second insert 300 which is provided on a second side of the roof assembly. It is further noted that insert 300 need not necessarily be provided on an underside of the roof assembly, but can also be provided on an upper side or on a peripheral wall of frame 100. Insert 300 can more generally be provided at any suitable location in frame 100. Different types of insert 300 can further also be provided in frame 100.

[0044] In an advantageous embodiment insert 300 is manufactured from metal or from a fibre-reinforced material. Insert 300 can for instance be a punched and rolled profile.

[0045] Figures 6, 7 and 8 illustrate further developed exemplary embodiments of roof assemblies according to the invention.

[0046] Figures 6 and 7 show two possible embodiments of a roof assembly with three light-transmitting wall elements 201, 202, 203, for instance of glass or of plastic, which are arranged at a mutual distance in a frame 100 with interposing of spacers 180. In figure 6 two light-transmitting plates and one dome-like shell are combined, while in figure 7 three dome-like shells are combined. The spacers 180 which are used on the underside of a dome-like shell can for instance be formed as described in Belgian patent application BE2019/5474 in the name of applicant. A gas, such as air or argon, can optionally be arranged between the plate elements 201, 202, 203. The frame 100 can for instance be provided using the method described in the European patent application EP 3 460 160 A1 in the name of applicant, which is included here by way of reference. Frame 100 extends to a position against an underside of lower plate element 201. An insert 300 is incorporated in the frame, for instance in the above-described manner. The roof assembly is arranged on a peripheral part of upstand 700, which is for instance manufactured from PVC. A core 710 can optionally be provided in the upstand, for instance manufactured from EPS. In the variants of figures 6 and 7 a hinge piece 400 is attached in the insert 300 in the manner illustrated in figures 2A, 2B, 3A, 3B. Hinge piece 400 co-acts with a second hinge piece 800 which is attached to upstand

700. A seal 190 is further provided on either side of insert 300, for instance a foam material such as an ethylene propylene diene monomer (EPDM) foam.

[0047] Figure 8 shows an embodiment which is similar to that of figure 7, with the difference that first, second and third glass or plastic plates 201, 202, 203 are received in frame 100. Argon can for instance be provided between the first, second and third plates 201, 202, 203.

[0048] Figure 9A illustrates yet another embodiment of a functional piece. The functional piece 400 can co-act with an insert 300 which is similar to the insert 300 of figure 2A. This is illustrated in figure 9B. Insert 300 has a first portion which is arranged countersunk in a frame 100 and is not visible in figure 9B, and a second portion 302 which extends from the frame, wherein the second portion comprises a first side wall 310 and a second side wall 320 lying opposite thereto, which are mutually connected via the first portion. The first and second side wall 310, 320 is provided with respectively a first and a second wing 313, 323. First and second side walls 310, 320 are configured to substantially lock the functional piece 400 in a first direction X running from the first to the second side wall, and in a second direction Y parallel to the first and/or second side wall. In this embodiment functional element 400 is connected to a spring-mounted element 500, and more specifically embodied integrally (in one piece) with spring-mounted element 500. Spring-mounted element 500 can co-act with the first or second side wall 310, 320 and with the functional piece 400 in order to secure functional piece 400 in insert 300. Figure 9B shows a situation in which the spring-mounted element 500 co-acts with the first side wall in order to prevent a displacement of functional piece 400 in the Y-direction. More specifically, spring-mounted element 500 engages in a recess 311' in first side wall 310. Recesses 311', which are arranged in the first and second side walls 310, 320 at a mutual pitch distance, can here be deeper than in figure 2A and extended beyond wings 313, 323.

[0049] Functional piece 400 is provided with a first and second flange 411a, 411b which are directed substantially perpendicularly of the first and second direction X, Y and which extend in the mounted position between the first and second side wall 310, 320, under wings 313, 323. Functional piece 400 is thus configured to be arranged under the first wing 313 on one side 413' and to be arranged under the second wing 323 on another side 414'. Functional piece 400 can be slid to the desired position in insert 300, while pulling spring-mounted element 500 upward to some extent. Spring-mounted element 500 can then be released so that it engages in a recess 311' and thus locks functional piece 400. In this embodiment wings 313, 323 thus provide for a locking in the Z-direction, while spring-mounted element 500 provides for a locking in the Y-direction.

[0050] The skilled person will appreciate that many variants can be envisaged within the scope of the invention, which is defined solely by the following claims.

Claims

1. Roof assembly or window assembly comprising a frame (100) and one or more plate and/or dome elements (200) received therein, wherein at least one insert (300) is incorporated in the frame and wherein at least one functional piece (400, 400a, 400b, 400c) is attached mechanically in the insert, **characterized in that** the insert has a first portion (301) which is arranged countersunk in the frame and a second portion (302) which protrudes from the frame, wherein the second portion comprises a first side wall (310) and a second side wall (320) lying opposite thereto, which are mutually connected via the first portion, wherein the first and second side walls (310, 320) are configured to substantially lock the functional piece (400) in a first direction (X) running from the first to the second side wall, and in a second direction (Y) parallel to the first and/or second side wall, further comprising a spring-mounted element (500) which co-acts with at least one of the first and second side wall and with the functional piece in order to secure the functional piece in the insert.

2. Roof assembly or window assembly according to claim 1, wherein the first and/or the second side wall (310, 320) is provided with a number of recesses or openings (311', 311) in which corresponding flanges (411', 411) of the functional piece are optionally received.

3. Roof assembly or window assembly according to claim 1 or 2, wherein the first and/or the second side wall (310, 320) is provided with a wing (313, 323) which is directed toward respectively the opposite second and/or the first side wall (310, 320), and the functional piece is configured to be arranged under the wing (313) on at least one side (413).

4. Roof assembly or window assembly according to claims 2 and 3, wherein the recesses (311') are provided at least partially in the wing (313, 323).

5. Roof assembly or window assembly according to the foregoing claim, wherein the functional piece is provided with a first and second corresponding flange (411'; 411a, 411b) which are directed substantially perpendicularly of the first and second direction (X, Y) and protrude through a first and second recess (311') in the wing (323) or lie partially under the wing (313, 323);
wherein the first and second side wall (310, 320) is preferably provided with respectively a first and second wing (313, 323), which is directed toward respectively the opposite second and first side wall (310, 320), and the functional piece is configured to be arranged under the first wing (313) on one side (413, 413') and to be arranged under or above the

second wing (323) on another side (414, 414').

6. Roof assembly or window assembly according to any one of the foregoing claims, wherein the first side wall (310) is provided with a number of openings (311) through which corresponding flanges (411) of the functional piece protrude;
wherein the openings (311) are preferably formed as elongate slots which preferably extend substantially parallel to a plane of the frame (100).

7. Roof assembly or window assembly according to any one of the foregoing claims, wherein the second side wall (320) is provided with a recess (330) through which a part of the functional piece (400) protrudes and in which the spring-mounted element (500) engages in order to secure the functional piece.

8. Roof assembly or window assembly according to any one of the foregoing claims, wherein the spring-mounted element (500) has a first spring-mounted leg (501) and a second spring-mounted leg (502) which engage on respectively a first and second stop location (A1, A2) of the functional piece and/or of the insert, which first and second stop locations lie at a distance from each other in the second direction (Y); wherein the spring-mounted element is preferably substantially U-shaped.

9. Roof assembly or window assembly according to claims 5 and 8, wherein the first and the second spring-mounted leg are coupled to the first and second corresponding flange (411').

10. Roof assembly or window assembly according to claims 3 and 8 or 9, wherein the spring-mounted element comprises a middle part (503) which connects the first and the second spring-mounted leg (501, 502) to each other, and the middle part is configured to engage partially under the wing (313).

11. Roof assembly or window assembly according to any one of the foregoing claims, further comprising a spring holder (600) in which the spring-mounted element is received, which spring holder extends between the first and the second side wall;
wherein the first and/or the second side wall is preferably provided with an upper edge which extends over the spring holder.

12. Roof assembly or window assembly according to any one of the foregoing claims,
wherein the frame (100) is manufactured from a plastic material, preferably a cured polymer composition, for instance a cured PUR material, and wherein the first portion of the insert is provided with a plurality of openings (361, 362, 363) in which plastic material extends.

13. Roof assembly or window assembly according to any one of the foregoing claims, wherein the insert (300) is elongate and extends over at least 20% of a length of a side of the frame and/or over at least 10% of a periphery of the frame.

14. Roof assembly or window assembly according to any one of the foregoing claims, wherein the insert is a punched and rolled profile; and/or
wherein the insert is manufactured from metal or from a fibre-reinforced material; and/or
wherein the one or more plate and/or dome elements (200) comprise at least two plate and/or dome elements (201, 202, 203) which are arranged parallel to each other in the frame; and/or
wherein a spacer is arranged between the at least two plate and/or dome elements and the frame is formed from a cured sealing material which extends along the whole periphery of the at least two plate and/or dome elements and up against the spacer, wherein the sealing material is attached to the whole periphery of the at least two plate and/or dome elements and to the spacer; and/or
wherein the frame (100) extends to an underside (210) of the one or more plate and/or dome elements (200) and the insert (300) is provided in the part of the frame lying on the underside; and/or
wherein the frame (100) has a substantially rectangular periphery; and/or
wherein the one or more plate and/or dome elements comprise one or more of the following: a glass plate, a glass dome, a polycarbonate plate, a polycarbonate dome; and/or
wherein the one or more plate and/or dome elements comprise a plate and a dome.

15. Assembly of an insert (300), a functional piece (400) and a spring-mounted element (500) for use in a roof assembly or window assembly according to any one of the claims 1-14.

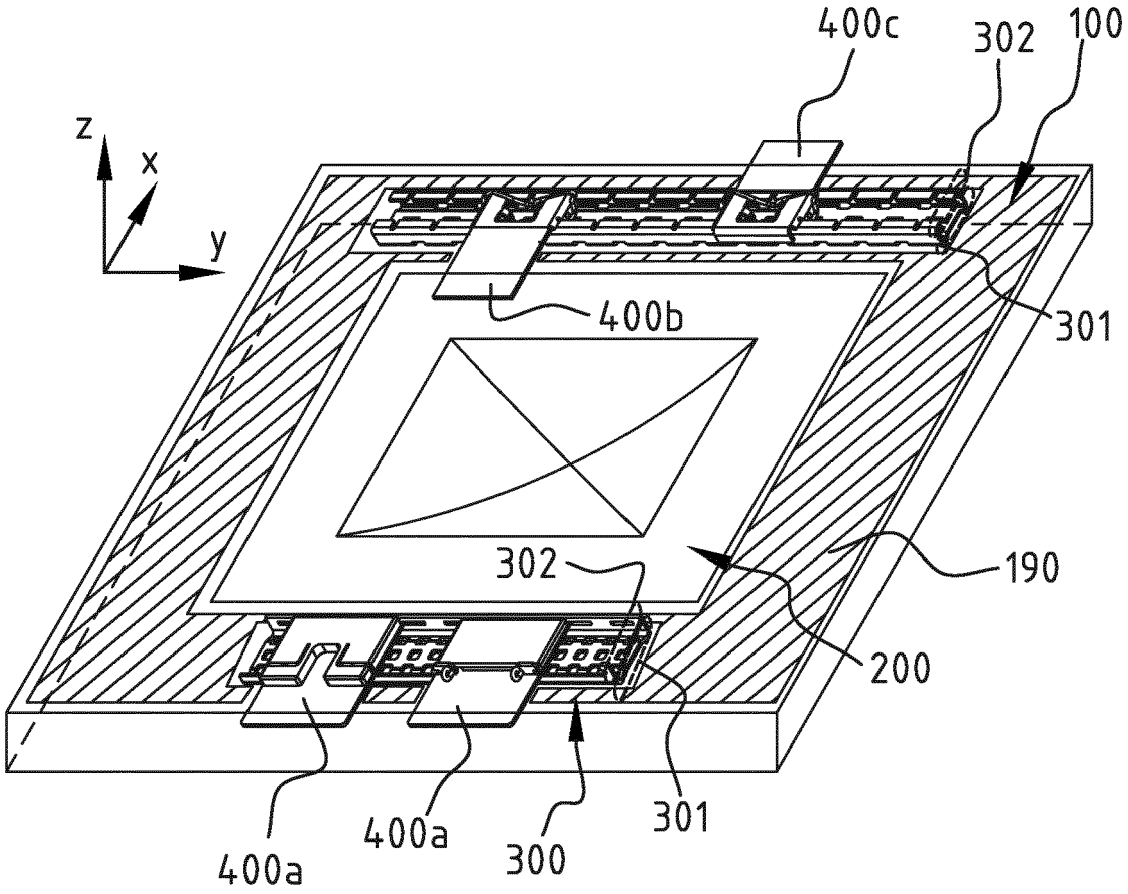

FIG. 1

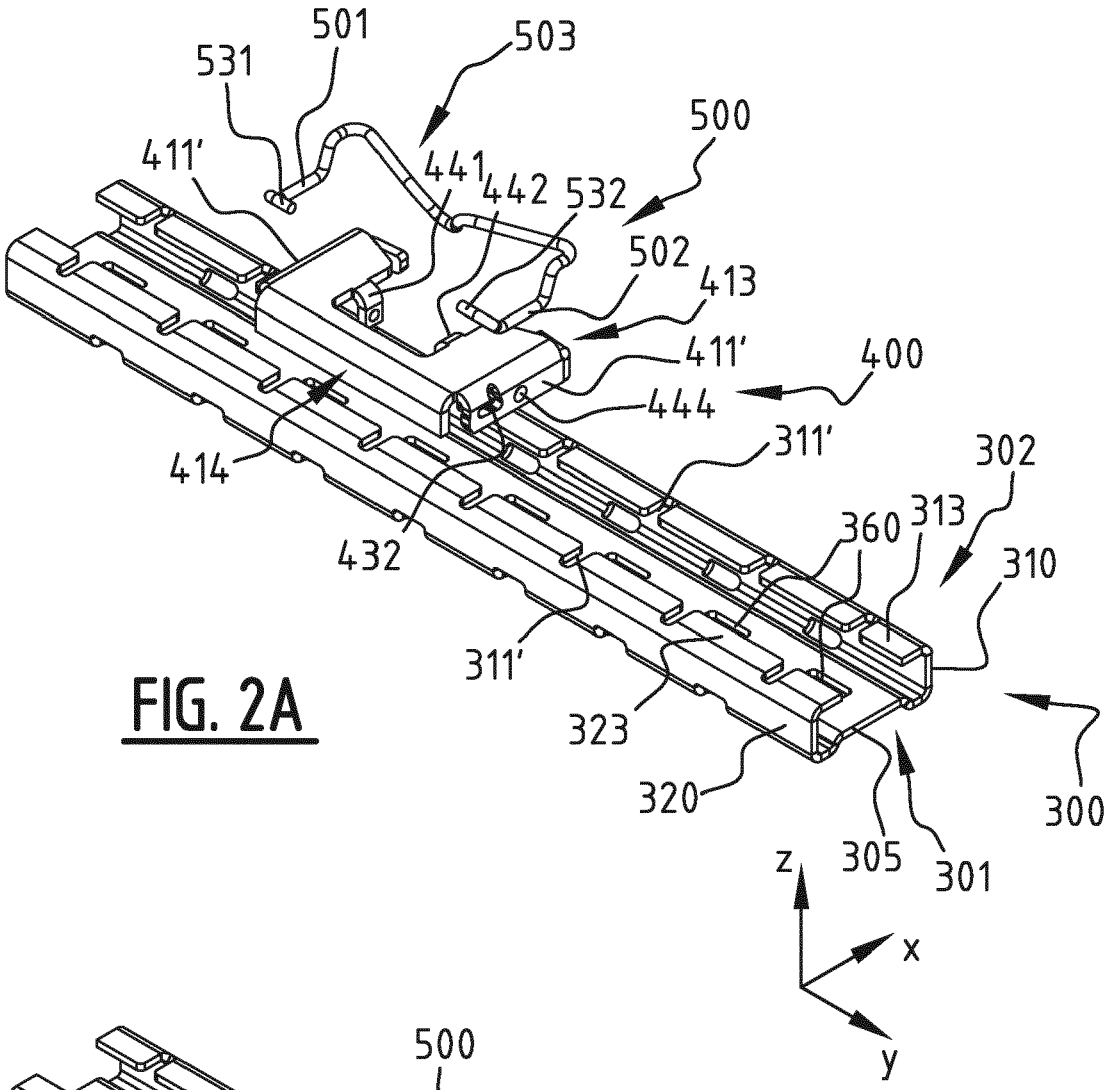
501
503
531
500
411'
441
442
532
502
413
411'
400
444
311'
302
414
360
313
432
310
311'
323
320
300
305
301
z
x
y

FIG. 2A

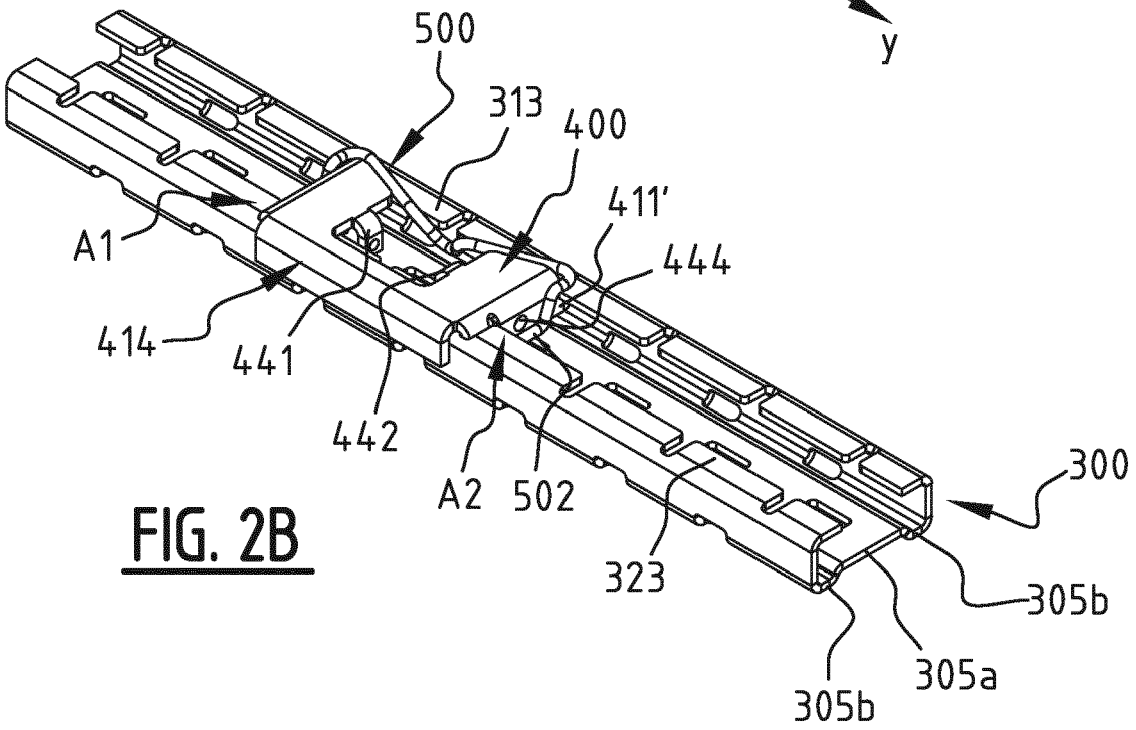
500
313
400
411'
A1
444
414
441
442
A2
502
323
300
305b
305a
305b

FIG. 2B

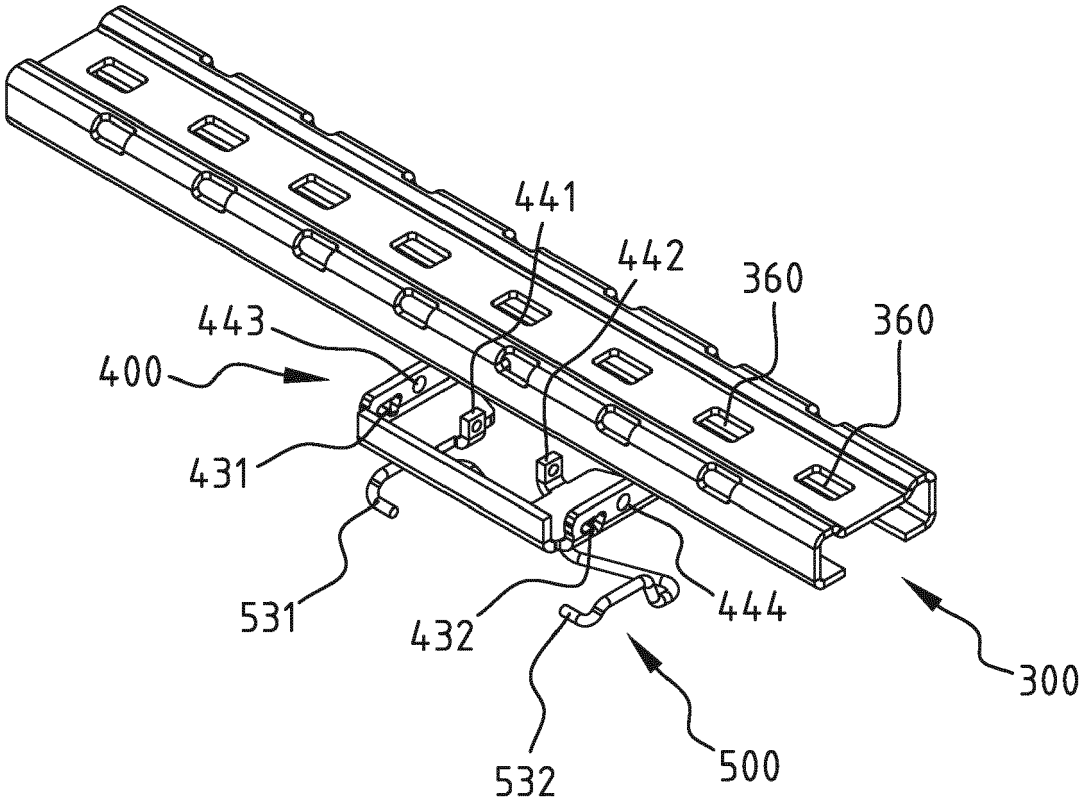
441
442
360
360
443
400
431
531
432
444
300
532
500

FIG. 3A

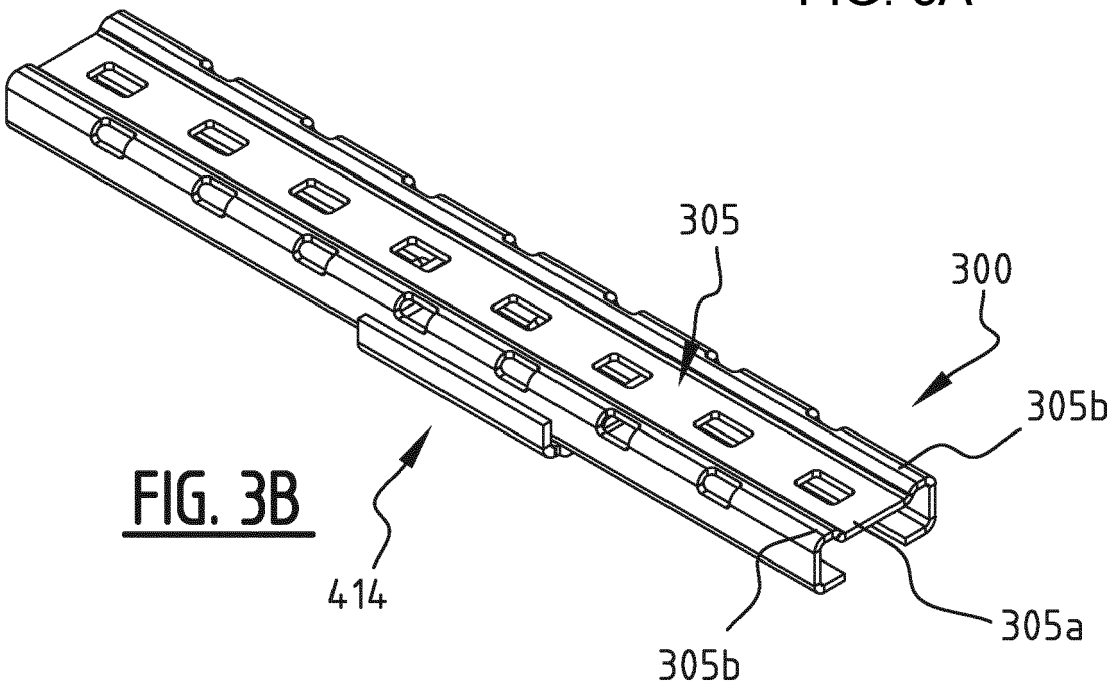
305
300
305b
414
305b
305a

FIG. 3B

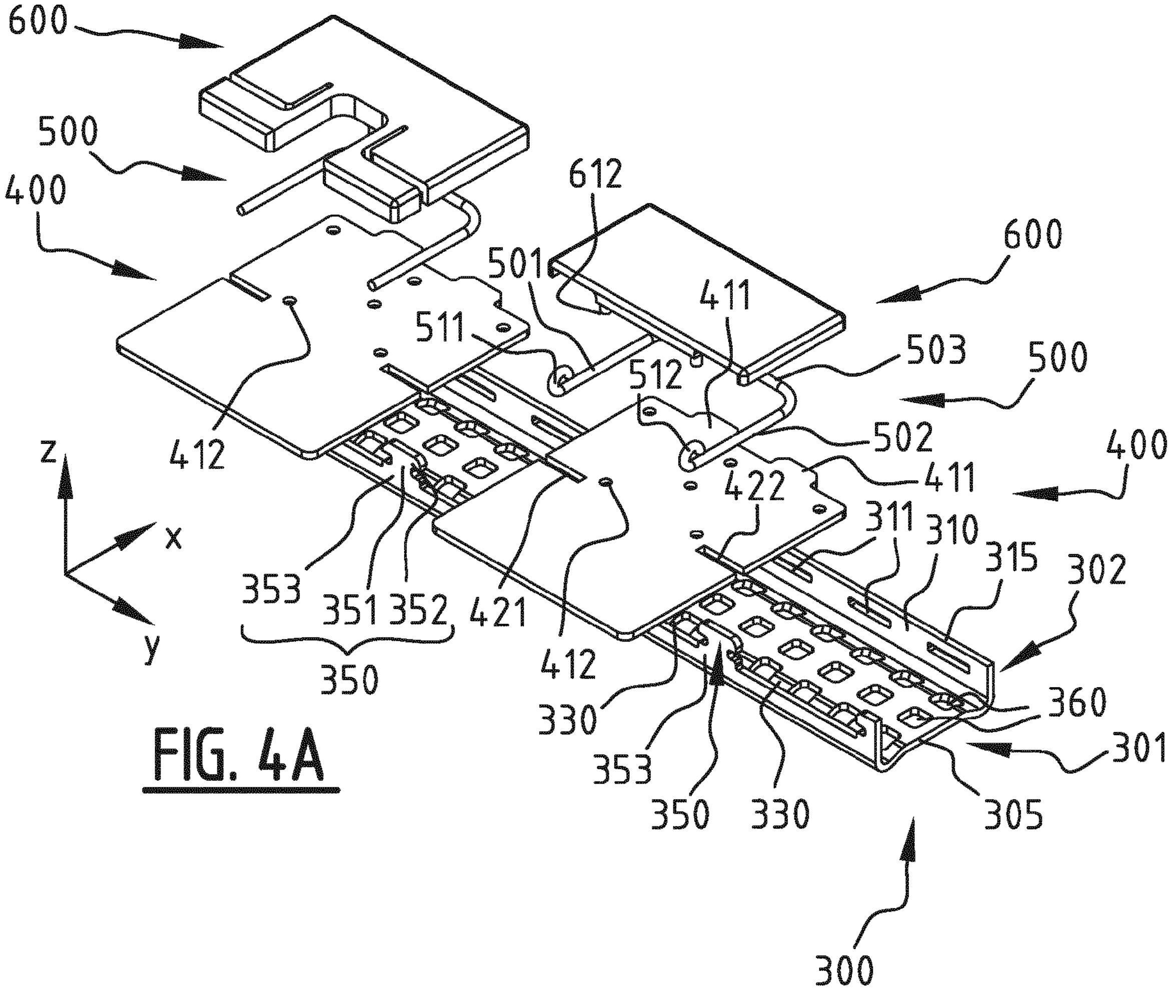
600
500
400
612
501
600
411
511
503
500
512
502
412
411
400
422
z
x
311
310
315
302
353
351
352
421
y
412
350
330
360
353
301
350
330
305
300

FIG. 4A

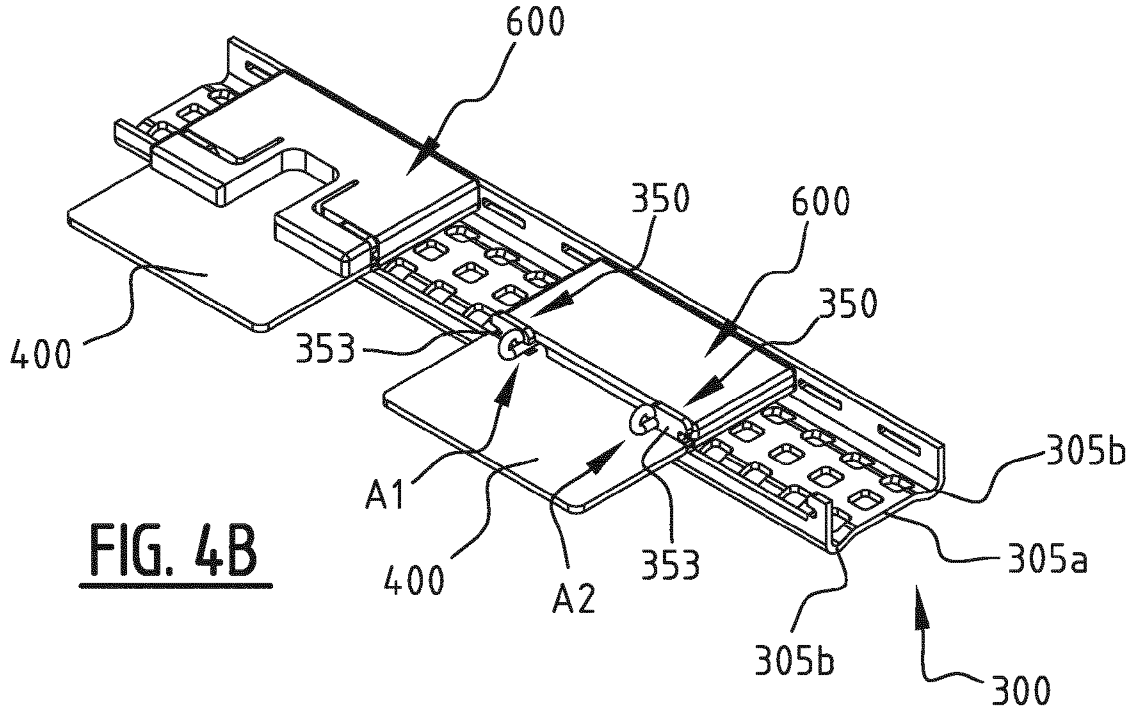
600
350
600
350
400
353
305b
A1
400
A2
353
305a
305b
300

FIG. 4B

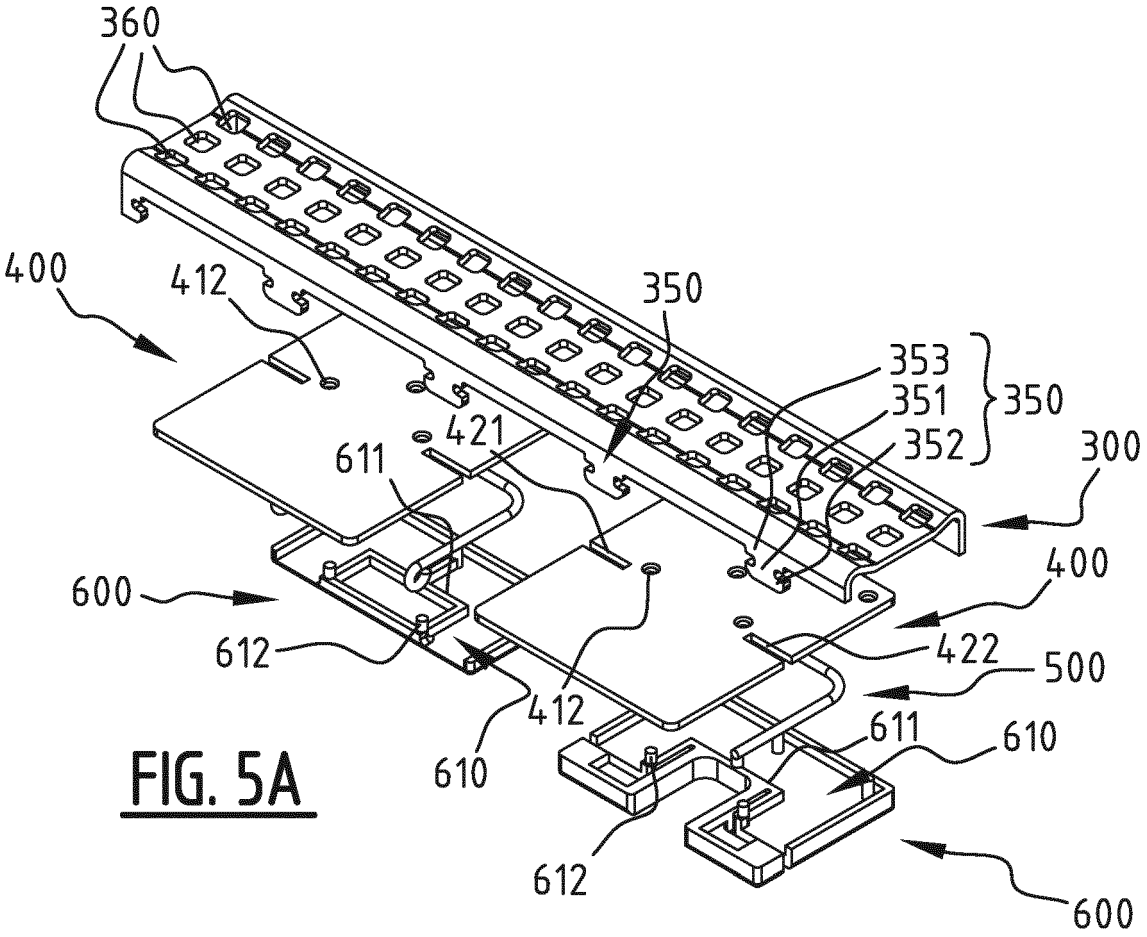
360
400
412
350
353
351
352
350
421
611
300
600
400
422
612
500
412
611
610
610
612
600

FIG. 5A

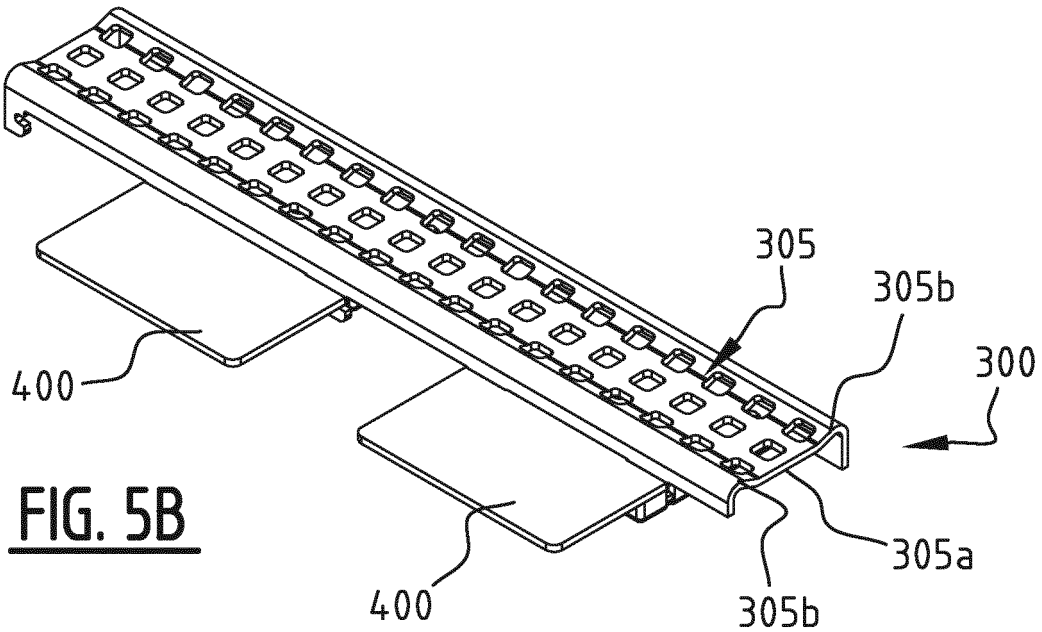
305
305b
300
400
305a
400
305b

FIG. 5B

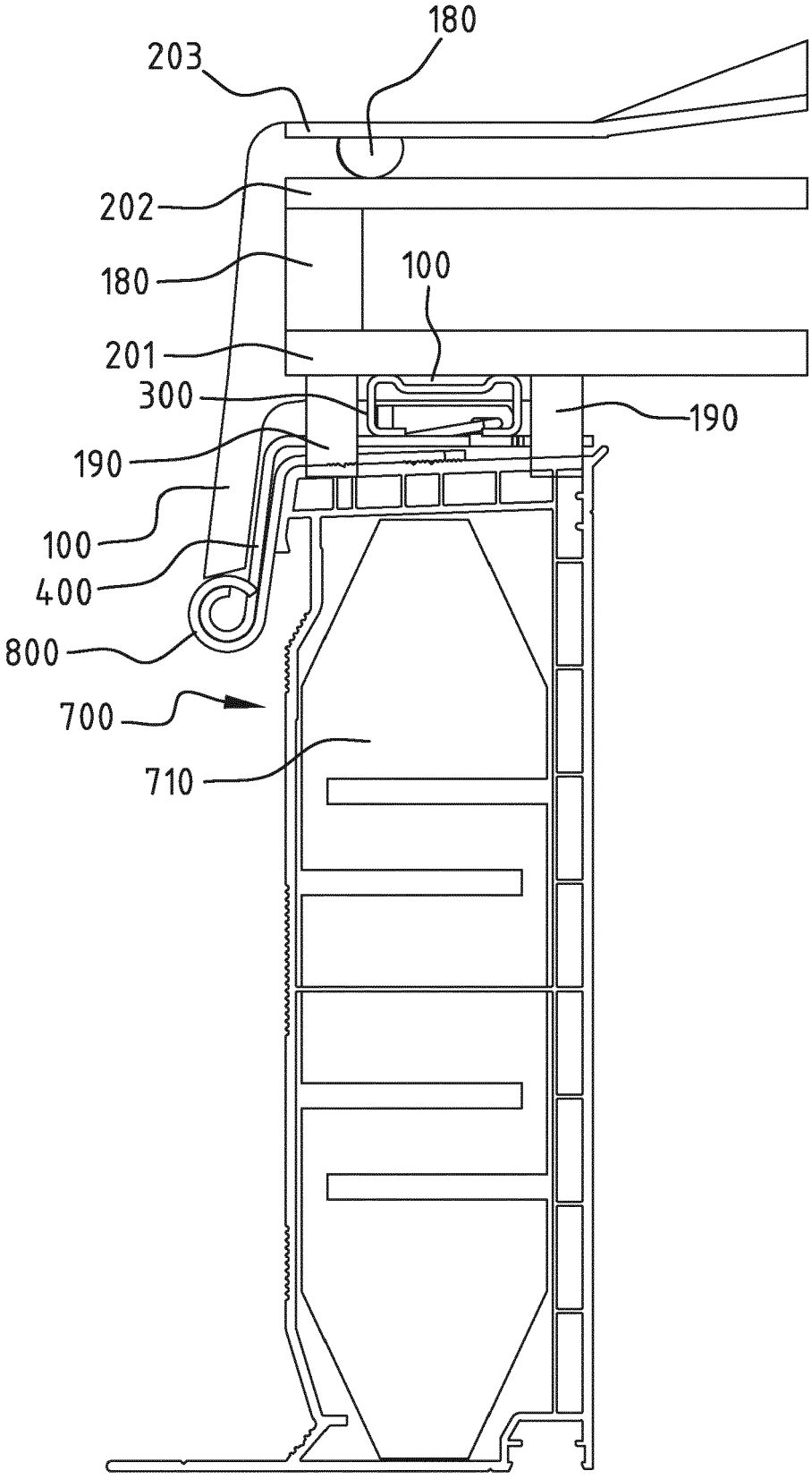

FIG. 6

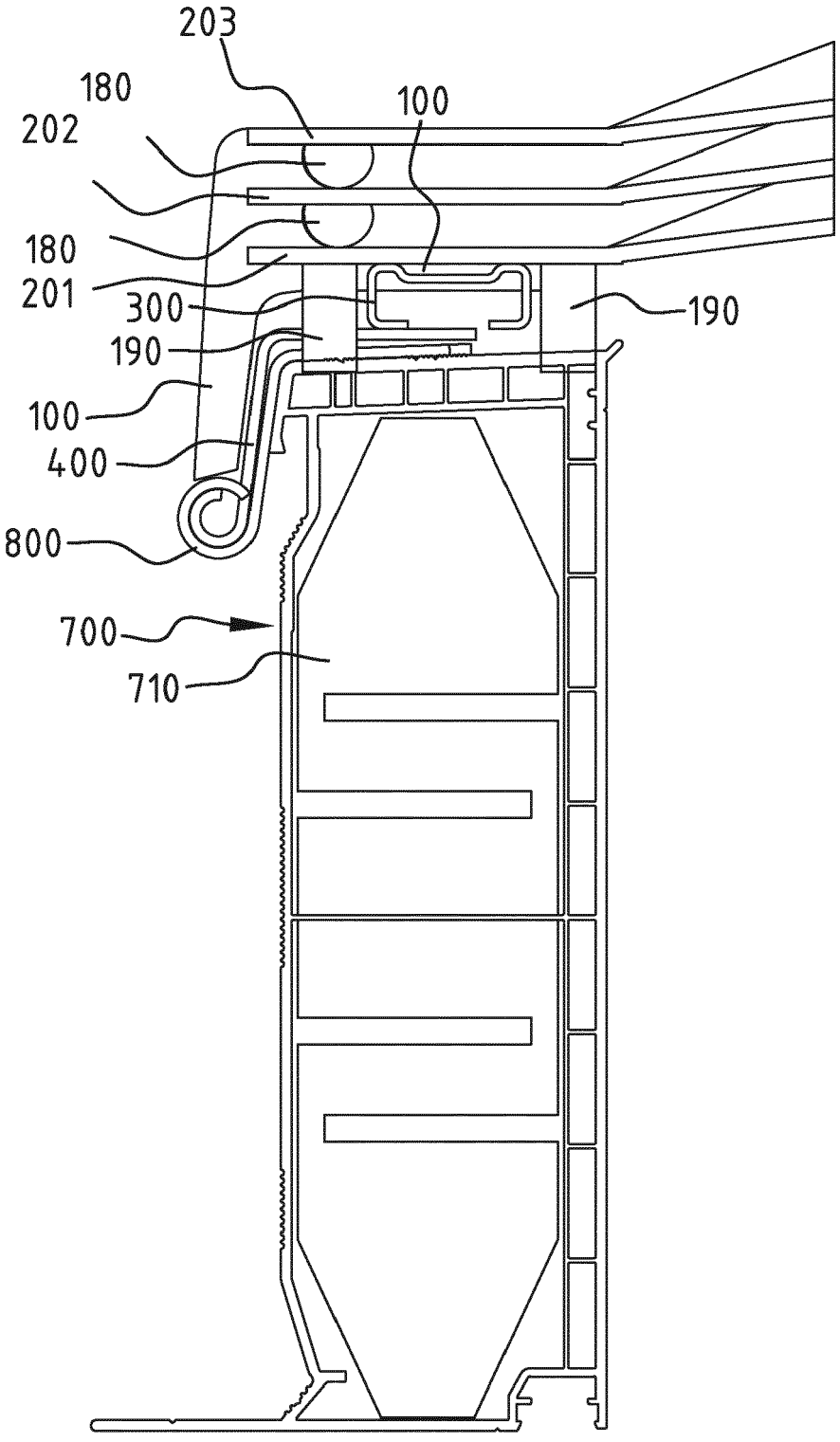

FIG. 7

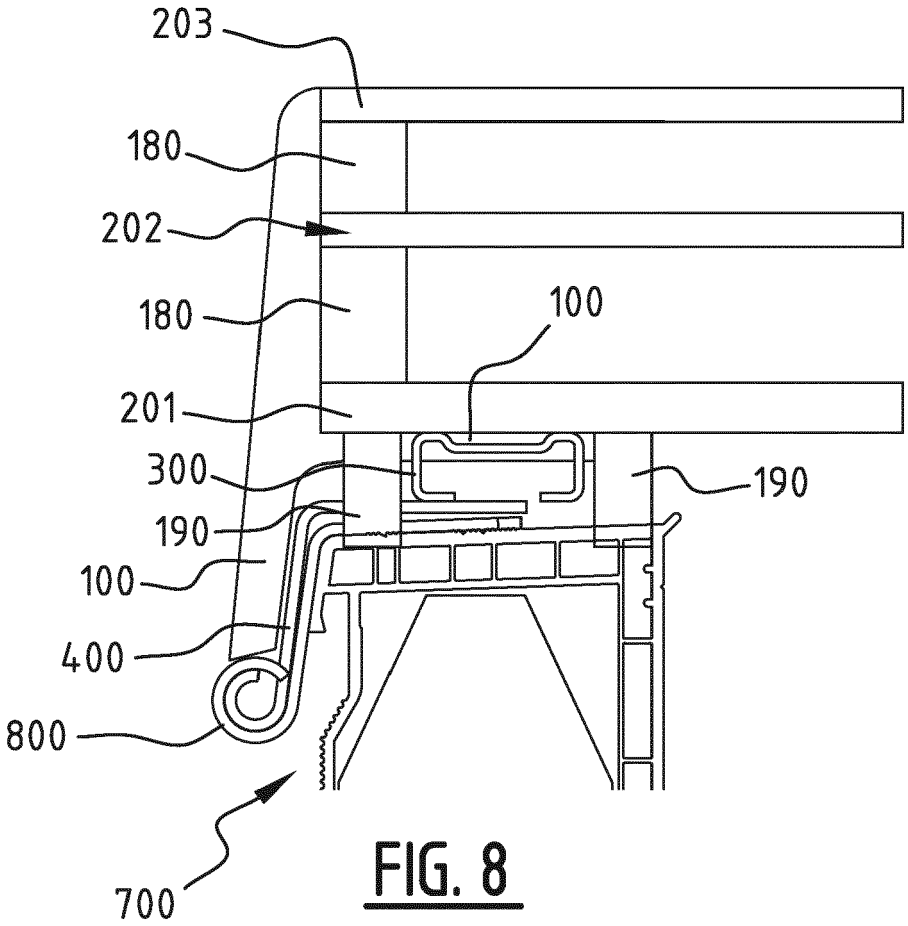

FIG. 8

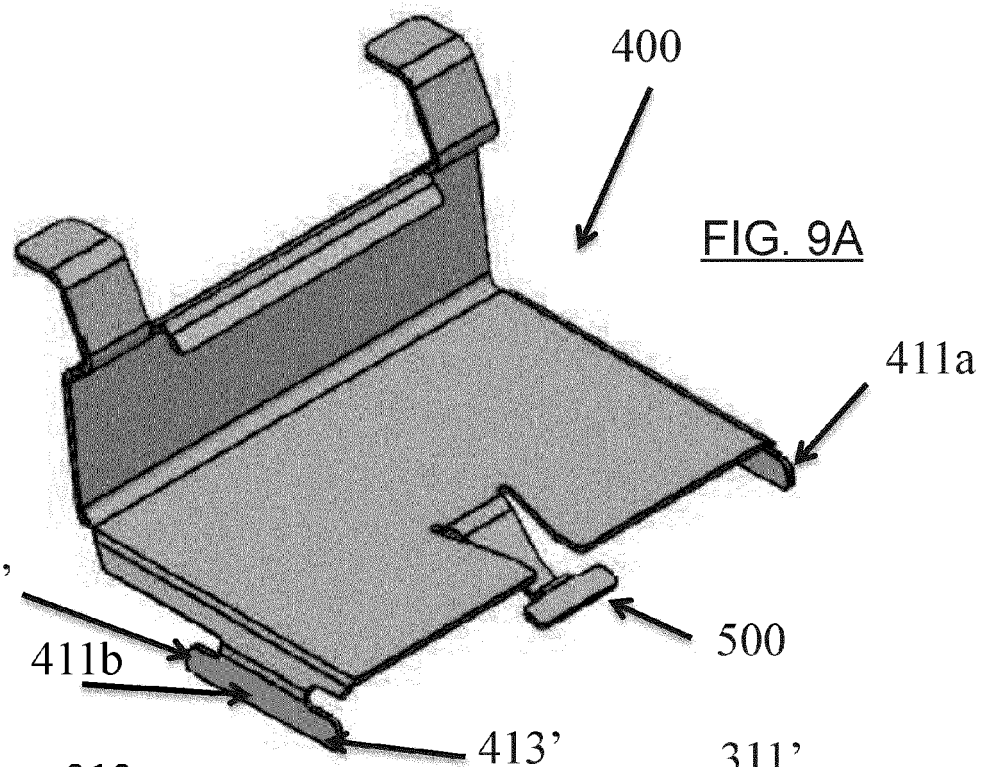
400
411a
414'
411b
500
413'

FIG. 9A

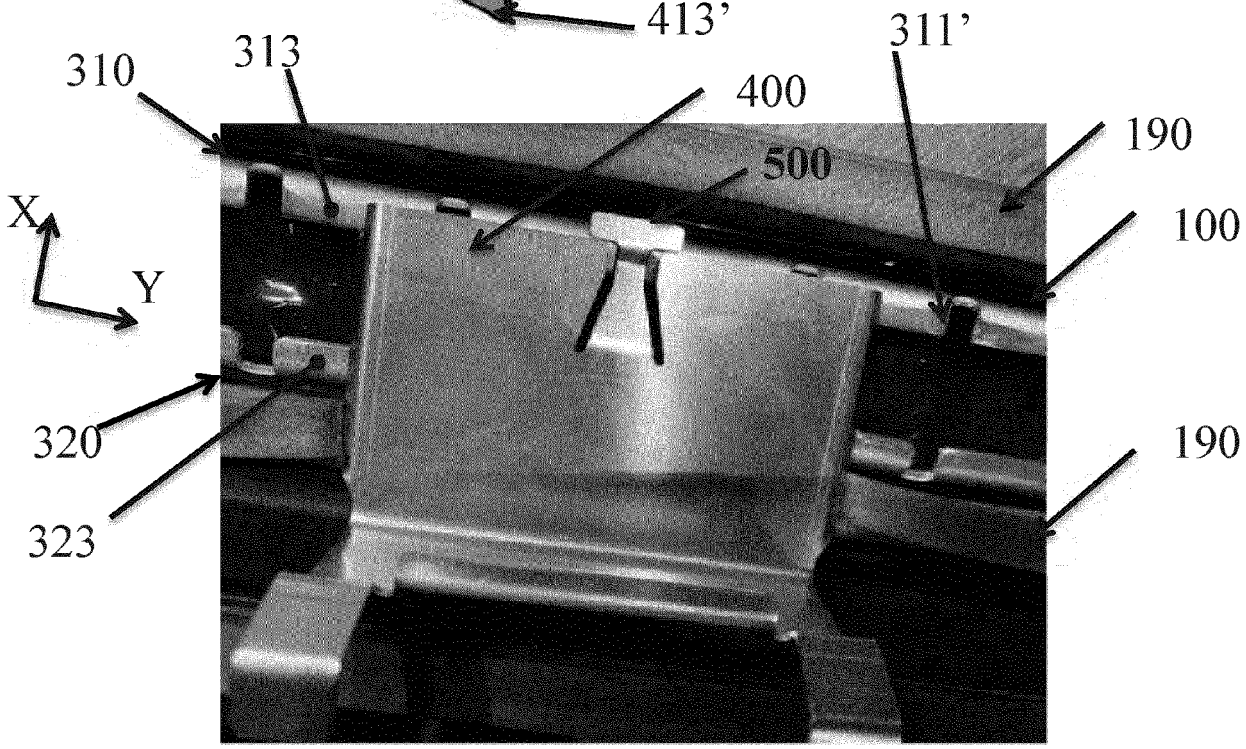
310
313
400
311'
190
500
100
X
Y
320
323
190

FIG. 9B

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EUROPEAN SEARCH REPORT

Application Number
EP 20 21 0742

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 460 160 A1 (SKYLUX N V [BE]) 27 March 2019 (2019-03-27) * column 9, line 50 - line 55; figure 6 *	1-14	INV. E04D13/03
A	EP 2 868 831 A1 (JET TAGESLICHT UND RWA GMBH [DE]) 6 May 2015 (2015-05-06) * paragraph [0020]; figure 1 *	1-14	
X	DE 43 44 144 A1 (LANZ OENSINGEN AG [CH]) 7 July 1994 (1994-07-07) * figures *	15	
X	CA 2 193 426 A1 (ROBINSON GILBERT PAUL [CA]) 19 June 1998 (1998-06-19) * figure 1 *	15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 March 2021	Demeester, Jan

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18-03-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3460160 A1	27-03-2019	EP 3453810 A1	13-03-2019
		EP 3460160 A1	27-03-2019
EP 2868831 A1	06-05-2015	NONE	
DE 4344144 A1	07-07-1994	CH 684448 A5	15-09-1994
		DE 4344144 A1	07-07-1994
CA 2193426 A1	19-06-1998	NONE	

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Patent documents cited in the description

- BE 20165645 **[0002]**
- BE 1020769 **[0002]**
- BE 1019311 **[0002]**
- EP 3460160 A1 **[0003] [0046]**
- EP 3460160 A **[0027]**
- BE 20185805 **[0027]**
- BE 20195474 **[0046]**