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(54) **SASH WITH LOCKING ELEMENT COMPRISING SLIDING SURFACES**

(57) A sash (1) for closing an architectural opening comprising a support frame (3) positioned toward the inside and a cover frame (4) and a plurality of locking elements (5) attachable to the weight-bearing frame (3) snap-engagable with the cover frame (4).

The cover frame (4) has, in its interior, a cavity (40) with the longitudinal sides that delimit it comprising two rims (401, 402).

Each locking element (5) comprises a support portion (55) having two locking wings (551, 552), elastically yielding, suitable to engage, respectively, the two longitudinal rims (401, 402) of the cavity (40).

Each locking wing (551, 552) comprises a sliding surface (5511, 5521) with a concave shape on which the respective rim (401, 402) slides.

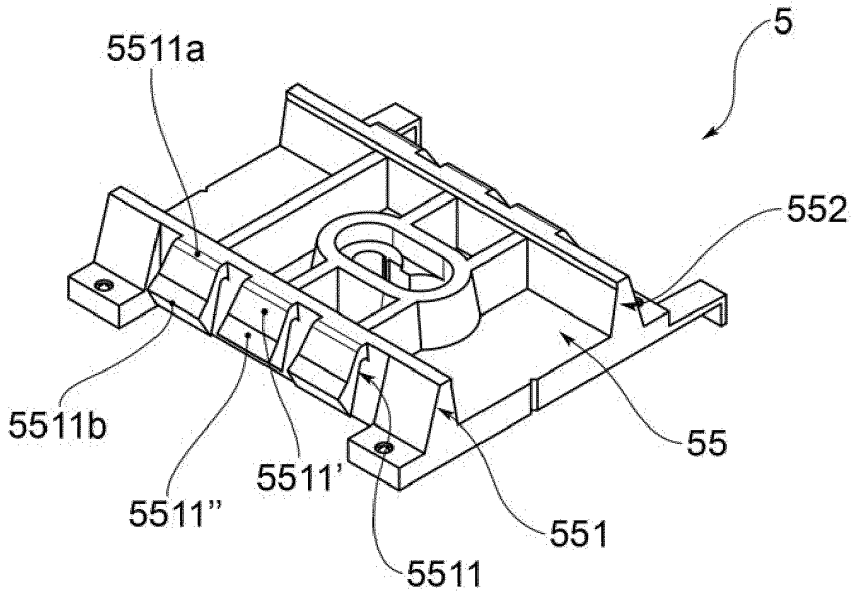

FIG.3a

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Description

[0001] The present invention relates to a sash, a locking element suitable to be a part of the sash, and a method for mounting the sash.

[0002] A sash is generally known as a component suitable to achieve the closure of an architectural opening; in other words, sashes are known for achieving a division between two environments otherwise in communication through said architectural opening.

[0003] The existence is also known of embodiments of sashes comprising several parts and portions, for example comprising movable parts, usually rotating, known as casements, and fixed parts, locked to the sub-frame, known as a frame.

[0004] According to some embodiments, sashes divide the external environment from the internal environment, or divide two internal environments.

[0005] According to some embodiments, the sashes that divide two internal environments, or the sashes that divide an internal environment from an external environment, may have different characteristics to respond to different needs, for example depending on the types of said environments, such as whether or not they are exposed to the weather.

[0006] According to a preferred embodiment, the sash covered by this invention is particularly suited to the division of an internal environment from an external environment, but may also be used to divide two internal environments.

[0007] Preferably, the sashes of this invention are of the type having a wooden part and a part in another material, for example aluminum or PVC.

[0008] Numerous sash solutions of this type are already known in the prior art.

[0009] The problem encountered in such sashes is that they present complex assembly operations, in particular with reference to the mutual engagement between the two parts of different sizes.

[0010] The present invention thus placed in the preceding context, proposing to provide a sash with a simplified assembly.

[0011] Such objective is achieved by a sash as claimed in claim 1, a locking element as claimed in claim 18, and an assembly method as claimed in claim 20. Further advantages and embodiments of the sash and the locking element and the assembly method object of the present invention will be apparent from the dependent claims provided in the accompanying set of claims.

[0012] Moreover, the features and advantages of the sash and of the locking element and of the assembly method will be apparent from the description given below by way of non-limiting example, in accordance with the accompanying figures, wherein:

- figure 1 represents a perspective view in separate parts of a sash in accordance with the present invention in a preferred embodiment;
- figures 1a and 1b show two perspective views of the sash of figure 1;
- figures 1' and 1" respectively represent a perspective view and a perspective view in separate parts of a casement portion of the sash;
- figures 2a, 2b and 2c illustrate a portion of the sash of figure 1, in particular, a locking element and a cover frame in three assembly steps, respectively in separate parts, in a resting position and in a locking position;
- figures 3, 3', 3a, 3b and 3c represent a front view, a side view, and three perspective views of a locking element according to a preferred embodiment;
- figures 4 and 5 show two sectional views of the locking element shown in figure 3, respectively along the sectional plane A-A and the sectional plane B-B;
- figures 4' and 4" show two sectional views of the locking element shown in figure 3 and the respective cover frame along the sectional plane A-A, respectively, wherein the cover frame is in two locking positions;
- figures 5' and 5" show two sectional views of the locking element shown in figure 3 and the respective cover frame along the sectional plane B-B, respectively, wherein the cover frame is in a resting position and in a locking position;
- figures 6a, 6b, and 6c illustrate three views in perspective similar to those of figures 2a, 2b and 2c, in particular, a locking element and a cover frame sectioned along the sectional plane A-A, in three assembly steps, respectively in separate parts, in the resting position and in the locking position;
- figures 7a, 7b and 7c illustrate three views in perspective similar to those in figures 2a, 2b and 2c, in particular, a locking element and a cover frame sectioned along the sectional plane B-B, in three assembly steps, respectively in separate parts, in the resting position and in the locking position;
- figures 8 and 8a show a front view of a locking element according to a preferred embodiment, and a sectional view along the sectional plane C-C;
- figure 8' illustrates an enlarged perspective view of a detail of the locking element shown in figures 8 and 8a;
- figures 9a and 9b show two sectional views of the locking element shown in figure 8 and of the respective cover frame, in two different assembly steps, along the sectional plane C-C;
- figures 9a' and 9b' illustrate two enlarged views of a detail of figures 9a and 9b;
- figures 10, 10', 10a, 10b and 10c represent a front view, a side view, and three perspective views of a locking element according to a further preferred embodiment, for example shown in figures 1' and 1";
- figures 11 and 12 show two sectional views of the locking element shown in figure 10, respectively along the sectional plane D-D and the sectional plane E-E;

- figures 13a, 13b, 13c and 13 represent a front view, a side view, and three views in perspective of a locking element in accordance with a further preferred embodiment suitable to mutually lock an upright element and a transversal element of a cover frame;
- figures 14 and 15 show two sectional views of the locking element shown in figure 13, respectively along the sectional plane F-F and the sectional plane G-G.

[0013] With reference to the tables above, reference numeral 1 denotes, as a whole, a sash for closing an architectural opening. Preferably, the sash 1 has an inner side I, facing an internal environment, and an outer side E, facing an external environment, for example open and therefore subject to weather.

[0014] Preferably, the sash 1, object of the present invention, is a window or French window. Preferably, "window" and "French window", in the following description, refer to each sash solution 1 in which there are one or more movable casements; for example, in other words, the term "window" is intended also to include solutions such as skylights or French doors.

[0015] In a preferred embodiment, the sash 1 comprises a transparent element 2 of a planar shape, suitable to allow the passage of light.

[0016] Preferably, the transparent element 2 is a glass plate, or a double glazing, or a triple glazing, or a glass block, or a glass block with integrated curtain.

[0017] According to a preferred embodiment, the sash 1 comprises a weight-bearing frame 3, preferably made of wood, placed toward the inside.

[0018] However, in other preferred embodiments, the sash 1 does not comprise the transparent element 2. For example, with reference to the attached figures 1, 1a and 1b, the sash 1 object of the present invention is both the internal sash, comprising the transparent element, and the external element consisting only of a weight-bearing frame and a cover frame.

[0019] In particular, in effect, in a preferred embodiment, the sash comprises a cover frame 4 in a material suitable to resist weather, for example aluminum; there are also embodiments in which said cover frame 4 is made of polymeric material, for example PVC.

[0020] Preferably, the cover frame 4 is placed toward the outside.

[0021] Said cover frame 4 is suitable to protect the weight-bearing frame 3 being assemblable thereon, as further described below.

[0022] In addition, the cover frame 4 has, in its interior, a cavity 40 with longitudinal extension and transverse width.

[0023] According to a preferred embodiment, the cover frame 4 comprises two upright elements 41 and two transversal elements 42 suitable to engage each other in the corner to form said cover frame 4; preferably, the cavity 40 extends in length both in the upright element 41 and in the transversal element 42, i.e. it has a longitudinal extension along the cover frame 4 in its entirety. Specifically, the cavities 40 in the upright element 41 and those in the transversal element 42 in turn engage each other in the corner.

[0024] The cavity 40, formed in the cover frame 1, comprises, on the two sides that delimit it, two rims 401, 402, preferably having a longitudinal extension protruding transversely to the center of the cavity 40.

[0025] The sash 1 of the present invention further comprises a plurality of locking elements 5 attachable to the weight-bearing frame 3 preferably by means of a screw 500, as described in greater detail hereinafter.

[0026] Each locking element 5 comprises a support portion 55, snap-engageable by the cover frame 4. In other words, each locking element 5 extends in height in a manner such that, resting on the weight-bearing frame 3, it extends in height therefrom; in other words, each locking element 5 protrudes therefrom, preferably on the external side E, to engage and to be engaged with the cover frame 4.

[0027] The support portion 55 comprises two locking wings 551, 552, elastically yielding, suitable to engage, respectively, the two longitudinal rims 401, 402 of the cavity 40. In other words, along the longitudinal extension, i.e. the extension along which the cavity 40 extends, the support portion 55 has, on its opposite sides, two locking wings 551, 552.

[0028] Preferably, each locking wing 551, 552 comprises a sliding surface 5511, 5521 on which slides the respective rim 401, 402 when applying the cover frame 4 on the locking element 5. In other words, each locking wing 551, 552 is structured to be engaged by the respective rim 401, 402 to favor the positioning of the cover frame 4 and to favor its engagement with the locking elements 5.

[0029] According to the present invention, in effect, the sliding surface 5511, 5521 has a concave shape. Preferably, as broadly described below and shown in the accompanying figures, such concavity is directed toward the rims 401, 402.

[0030] According to a preferred embodiment, each sliding surface 5511, 5521 comprises a top edge 5511a, 5521a, and a bottom edge 5511b, 5521b.

[0031] Preferably, the bottom edge 5511b, 5521b is proximal to the support frame 3, when the locking element 5 is mounted thereon. However, preferably, the top edge 5511a, 5521a is distal from the weight-bearing frame 3 when the locking element 5 is mounted thereon.

[0032] Preferably, the locking element 5, and in particular the support portion 55, defines a top distance DT, i.e. the transverse distance between the top edges 5511a, 5521a of the two locking wings 551, 552.

[0033] Also, preferably, the locking element 5, and in particular the support portion 55, defines a bottom distance DF, i.e. the transverse distance between the bottom edges 5511b, 5521b of the two locking wings 551,552.

[0034] Preferably, the top distance DT is less than the

bottom distance DF.

[0035] In addition, the cavity 40 defines the rim distance DL, i.e. the transverse distance between the two longitudinal rims 401, 402. Said rim distance DL is lower than the bottom distance DF but higher the top distance DT, as, by way of example, is shown in figures 4' and 5".

[0036] In accordance with the foregoing, the cover frame 4 is positionable in a resting position (as shown in figure 5', and in figures 2b, 6b and 7b) in which it is supported on the locking elements 5 mounted on the weight-bearing frame 3. Preferably, in said resting position, the rims 401, 402 are housed in the concavity, resting on the sliding surfaces 5511, 5521.

[0037] In addition, the cover frame 4 is positionable in a locking position (as shown by way of example in figures 4', 4", 5", 2c, 6c and 7c) in which it is locked by the locking elements 55, with the rims 401, 402 below the locking wings 551, 552. Preferably, in said locking position, the rims 401, 402 are positioned below the bottom edges 5511b, 5521b.

[0038] According to a preferred embodiment, in the passage between the resting position and the locking position, sliding on the respective sliding surfaces 5511, 5521, the rims 401, 402 perform a thrust action on the locking wings 551, 552 in a manner so as to crush them towards the center and allow the snap-locking of the cover frame 4 to the plurality of locking elements 5 attached to the weight-bearing frame 3.

[0039] According to a preferred embodiment, said concave shape has a fragmented trend; in other words, the sliding surface 5511, 5521 comprises a first linear portion 5511', 5521' and a second linear portion 5511", 5521".

[0040] Preferably, the first linear portion 5511', 5521' and the second linear portion 5511', 5521' have different angling.

[0041] According to a preferred embodiment of the above-described resting position, the rims 401, 402 are located at the point where the first linear portion 5511", 5521" and the second linear portion 5511", 5521" are adjacent to each other. In other words, the rims 401, 402 of the cover frame 4 rest in the angle created by the different inclination between the first linear portion 5511', 5521' and the second linear portion 5511", 5521".

[0042] Preferably, the first linear portion 5511', 5521' has a proximal inclination at the vertical axis of insertion (favoring, in effect, the insertion of the rims 401, 402 into the concavity), while the second linear portion 5511", 5521" has a proximal inclination at the transverse axis, for example proximal to the plane along which the weight-bearing frame extends (hence it does not favor insertion of the rims 401, 402, but rather is suitable to provide support).

[0043] According to a further preferred embodiment not shown in the accompanying figures, the concave shape follows a curvilinear trend, i.e. the sliding surface 5511, 5521 is curvilinear. Preferably, in such embodiment, in the resting position, the rims 401, 402 are housed in the space created by the curvilinear sliding surface 5511, 5521.

[0044] According to a preferred embodiment, each locking wing 551, 552 comprised in a support portion 55 is composed of a plurality of teeth 551', 551", 552', 552".

[0045] In other words, each locking wing 551, 552 comprises longitudinally a plurality of teeth 551', 551", 552', 552".

[0046] In a preferred embodiment, each locking wing 551, 552 comprises the features described above, having a plurality of slits spaced apart longitudinally, so as to define the plurality of teeth 551', 551", 552', 552". In other words, each tooth has the above-described concave shape and the above-described sliding surface, as well as the above-described first and second edges; i.e., in each tooth, the same features as those described above with respect to the respective locking wing are found.

[0047] Preferably, said plurality of teeth 551', 551", 552', 552" comprises at least one vertical fixing tooth 551', 552' suitable to exert a vertical thrust action on the respective rim 401, 402, to vertically lock the cover frame 4 to the respective locking element 5.

[0048] Furthermore, preferably, said plurality of teeth 551', 551", 552', 552" comprise at least one centering tooth 551", 552" suitable to exert a transverse thrust action on the respective rim 401, 402 to transversally lock the cover frame 4 to the respective locking element 5. In other words, said centering teeth 551", 552" are suitable to allow the transverse play between the locking elements 5 and the cover frame 4 to be compensated for.

[0049] In a preferred embodiment, each locking wing 551, 552 comprises a vertical fixing tooth 551', 552' and two centering teeth 551", 552". Preferably, the vertical fixing tooth 551', 552' is positioned centrally at the two centering teeth 551", 552".

[0050] Further embodiments provide that each locking wing 551, 552 comprises more than one vertical fixing tooth 551', 552' enclosed between two centering teeth 551", 552" at the sides.

[0051] According to a preferred embodiment, each vertical fixing tooth 551', 552' comprises a vertical thrust foot 5510', 5520' inclined with respect to the horizontal axis of a vertical thrust angle α comprised between 20° and 45°, preferably 45°. Preferably, said vertical thrust foot 5510', 5520' is placed below the respective sliding surface 5511, 5521. In other words, the vertical thrust foot 5510', 5520' is placed proximal to the weight-bearing frame 3 with respect to the bottom edge 5511b, 5521b.

[0052] Preferably, by means of the vertical thrust foot 5510', 5520', any play in the height coupling between the cover frame and the respective locking element 5 is compensated for.

[0053] According to a preferred embodiment, each vertical thrust tooth, adjacent to the convex shape of the sliding surface, has a vertical thrust foot.

[0054] According to a preferred embodiment, furthermore, each locking element 5 also includes locking projections 57 engageable in support by the respective rim 401, 402.

[0055] Preferably, each locking projection 57 has elastically yielding behavior.

[0056] Preferably, each locking projection 57 has a pyramidal shape so that its top serves as a support for the respective rim 401, 402 and is crushable thereby.

[0057] According to a preferred embodiment, in effect, each projection 57 extends in an axial direction opposite to its respective vertical thrust foot 5510', 5520'. Preferably, the combination of the action of the vertical thrust foot 5510', 5520' and the action of the projection 57 causes the engaged rims 401, 402 to be substantially pinched by the locking element 5. Preferably, the vertical thrust foot 5510', 5520' synergistically with the projection 57 allow a solid engagement of the cover frame 4 to the engagement element 5, even in the presence of any axial dimensional discrepancies, compensated for by the presence and action on the rims of these components.

[0058] According to a preferred embodiment, at least one projection 57 is made at the longitudinal ends of each locking wing 551, 552.

[0059] Preferably, each centering tooth 551", 552" includes a centering foot 5510", 5520" inclined with respect to the horizontal axis of a transverse thrust angle β between 45° and 75°, preferably about 60°. Preferably, said centering foot 5510", 5520" is placed below the respective sliding surface 5511, 5521.

[0060] In other words, the centering foot 5510", 5520" is placed proximal to the weight-bearing frame 3 with respect to the bottom edge 5511b, 5521b.

[0061] That is to say, in a preferred embodiment, each centering tooth, adjacent to the convex shape of the respective sliding surface, has a centering foot.

[0062] According to this preferred embodiment, the opposite action, achieved by the two centering feet 5510", 5520" on respective rims 401, 402, allows the locking element 5 to be retained solidly transversally centered with the cover frame 4.

[0063] Preferably, the two centering feet 5510', 5520' synergistically with each other allow the cover frame 4 to engage solidly with the engagement element 5 even in the presence of any transverse dimensional discrepancies therebetween, which in effect are compensated for due to the presence and action on the rims of these components.

[0064] According to a preferred embodiment, each locking element 5 comprises a locking portion 50 suitable to engage the transparent element 2 to lock it on the weight-bearing frame 3. In other words, each locking element 5, in this preferred embodiment, has the dual function of locking the transparent element 2 and supporting the cover frame 4.

[0065] Preferably, in effect, as in the embodiment shown in figures 1' and 1", such as in figures 10, 11 and 12, the locking element 5 comprises a locking portion 50 having a planar transverse extension to engage a surface of the transparent element 2, if provided, to lock it to the weight-bearing frame 3.

[0066] According to a preferred embodiment, said locking portion 50 extends orthogonally to the support portion 55 which, as described, has a preferential extension perpendicular to the weight-bearing frame 3. In other words, the locking portion 50 extends parallel to the weight-bearing frame 3 and the transparent element 2.

[0067] According to a preferred embodiment, the locking element 5 comprises a self-positioning lip, or tooth 52, suitable to rest on an inner surface of the supporting frame 3 extending into a gap between the transparent element 2 and said inner surface, on which said transparent element is suitable to rest.

[0068] This self-positioning lip 52 is thus suitable to permit positioning of the locking element 5 on the weight-bearing frame 3 at the same height with respect to said inner surface.

[0069] According to a preferred embodiment, the locking element 5 is fastenable to the weight-bearing frame 3 by means of a screw 500. Preferably, the locking element 5 is retained by the screw head 500.

[0070] According to a preferred embodiment, the locking element 5 has a locking through-hole 58 having a specially shaped opening for the passage of the shank of the screw 500, wherein said locking hole 58 is located between the two locking wings 551, 552.

[0071] In addition, in accordance with a preferred embodiment, the locking element 5 has a release hole 59 having a specially shaped opening for the passage of the head of the screw 500. Preferably, the release hole 59 is arranged beside the locking hole 58.

[0072] According to a preferred embodiment, the release hole 59 and the locking hole 58 are mutually divided by a retention septum 56 suitable to elastically change and/or break to permit the passage of the shank between the locking hole 58 and the release hole 59.

[0073] In accordance with a preferred embodiment, the locking element 5 is composed of a single piece. Preferably, the locking element 5 is made of molded plastic material.

[0074] In accordance with figures 13a, 13b, 13c, 13, 14 and 15, some embodiments of the locking element 5 are also the object of the present invention, which rather than being specifically for locking the cover frame 4 to the weight-bearing frame 3, is instead suitable for mutual locking between the transversal element 42 and the upright element 41 of the cover frame 4.

[0075] Likewise, also such embodiments of such locking elements comprise all of the above-described components and the above-described mutual features.

[0076] In other words, the locking elements in accordance with such embodiment are suitable to have interdependent portions for carrying out the mutual locking between the transversal element 42 and the upright element 41; such locking elements are thus suited to be comprised directly in the cover frame 4 and are not fastened, for example by means of screws, to the weight-bearing frame 3.

[0077] The object of the present invention, in addition to the sash 1 comprising a locking element 5, is the lock-

ing element 5 itself.

[0078] In addition, the object of the present invention is also the method of mounting a sash 1 as described above. The assembly method of a sash in accordance with the present invention, comprises the steps of:

- assembling the weight-bearing frame 3;
- assembling the cover frame 4;
- attaching the locking elements 5, preferably by means of screws 500 to the weight-bearing frame 3;
- resting the cover frame 4 on the locking elements 5 in such a way that the rims 401, 402 of the cavity 40 of the cover frame 4 are housed in the concave shape, that is in the resting position;
- exerting a vertical thrust action on the cover frame 4 towards the weight-bearing frame 3 to snap-lock the cover frame 4 to the locking elements 5.

[0079] In the embodiment of the sash, further comprising also the transparent element, the relative assembly method comprises the steps of:

- assembling the weight-bearing frame 3;
- inserting the transparent element 2 on the weight-bearing frame 3;
- assembling the cover frame 4;
- attaching the locking elements 5, preferably by means of screws 500, to the weight-bearing frame 3 in such a way as to engage the outer face of the transparent element 2, locking it to the weight-bearing frame 3;
- resting the cover frame 4 on the locking elements 5, in such a way that the rims 401, 402 of the cavity 40 of the cover frame 4 are housed in the concave shape, i.e. in the resting position;
- exerting a vertical thrust action on the cover frame 4 towards the weight-bearing frame 3 to snap-lock the cover frame 4 to the locking elements 5.

[0080] Innovatively, the sash of the present invention fully resolves the intended object by providing a simplified assembly. Similarly, this object is also fully resolved by the locking element and by the assembly method of a sash in turn which is the object of the present invention.

[0081] Advantageously, the locking elements mounted on the weight-bearing frame provide a resting seat for the cover frame such as to simplify the assembly of the cover frame. Advantageously, in effect, on the locking elements, the cover frame is arranged in a position substantially parallel to the weight-bearing frame, so that, with the thrust action, the weight-bearing frame snap-engages all the locking elements. That is to say, the risk that the cover frame will only engage some locking elements without engaging others is advantageously minimized.

[0082] Furthermore, advantageously the locking elements provide a maximum and solid mutual locking with the cover frame.

[0083] Advantageously, the locking elements are suitable to compensate for any play between components, for example due to production errors.

[0084] Moreover, advantageously, the installer does not have to undertake particularly complex assembly operations. Indeed, advantageously the positioning operations of the various components and the mutual engagement between the components are substantially guided by the same components, thus not requiring particular attention from the installer.

[0085] Advantageously, the disassembly of the locking element is also extremely simplified, requiring only the translation of the locking element with respect to the screw with which it is attached to the weight-bearing frame, such that the screw is aligned from the locking hole to the release hole.

[0086] To the embodiments of the sash, the locking element and the aforementioned methods, a person skilled in the art, in order to meet specific requirements, may make variants or substitutions of elements with other functionally equivalent elements.

[0087] These variants are also contained within the scope of protection as defined by the following claims.

[0088] Furthermore, each variant described as belonging to a possible embodiment may be achieved independently of the other variants described.

Claims

1. Sash (1) for closing an architectural opening, comprising:

i) weight-bearing frame (3), placed towards the inside, preferably in wood;
ii) a cover frame (4), placed towards the outside, preferably in aluminum, mountable on the weight-bearing frame (3), wherein the cover frame (4) has inside it a cavity (40) with longitudinal extension and transverse width, wherein the cavity (40), at the two sides that delimit it, comprises two rims (401, 402), preferably with longitudinal extension, projecting transversely towards the center of the cavity (40);
iii) a plurality of locking elements (5) attachable to the weight-bearing frame (3) wherein each locking element (5) comprises a support portion (55) snap-engageable by the cover frame (4);

wherein said support portion (55) comprises two locking wings (551, 552), elastically yielding, suitable to engage, respectively, the two longitudinal rims (401, 402) of the cavity (40);
wherein each locking wing (551, 552) comprises a sliding surface (5511, 5521) on which slides the respective rim (401, 402) in the application of the cover frame (4) on the locking element (5);
wherein said sliding surface (5511, 5521) has a con-

cave shape.

2. Sash (1) according to claim 1, wherein each sliding surface (5511, 5521), comprises a top edge (5511a, 5521a) and a bottom edge (5511b, 5521b), which identifies a top distance (DT), that is the transverse distance between the top edges (5511a, 5521a) of the two locking wings (551, 552), and a bottom distance (DF), that is the transverse distance between the bottom edges (5511b, 5521b) of the two locking wings (551, 552), and wherein the cavity (40) identifies the rim distance (DL), that is the transverse distance between the two longitudinal rims (401, 402);
wherein the top distance (DT) is less than the bottom distance (DF) and the rim distance (DL) is less than the bottom distance (DF), but more than the top distance (DT).

3. Sash (1) according to any one of the preceding claims, wherein the cover frame (4) is positionable in a resting position in which it is resting on the locking elements (5) mounted on the weight-bearing frame (3) in such a way that the rims (401, 402) are accommodated in the concavity resting on the sliding surfaces (5511, 5521), and a locking position in which it is locked to the locking elements (55) having the rims (401, 402) below the locking wings (551, 552), that is in a position in which the rims (401, 402) are placed below the bottom edges (5511b, 5521b).

4. Sash (1) according to claim 3, wherein in the transition between the resting position and the locking position, sliding on respective sliding surfaces (5511, 5521), the rims (401, 402) exert a thrust action on the locking wings (551, 552) in such a way as to crush them towards the center and allow snap-locking.

5. Sash (1) according to any one of the preceding claims, wherein the concave shape has a fragmented trend, in which the sliding surface (5511, 5521) comprises a first linear portion (5511', 5521') and a second portion linear (5511", 5521"), wherein the first linear portion (5511', 5521') and the second linear portion (5511', 5521") have different angling.

6. Sash (1) according to claim 5 in combination with claim 4, wherein in the resting position the rims (401, 402) are located at the point in which the first linear portion (5511', 5521') and the second linear section (5511", 5521") are adjacent to each other.

7. Sash (1) according to any of claims 1 to 4, wherein the concave shape follows a curvilinear trend, that is wherein the sliding surface (5511, 5521) is curvilinear.

8. Sash (1) according to any of the preceding claims, wherein each locking wing (551, 552) is constituted by a plurality of teeth (551', 551", 552', 552").

9. Sash (1) according to claim 8, wherein said plurality of teeth (551', 551", 552', 552") comprises:

- at least one vertical fixing tooth (551', 552') suitable to exert a vertical thrust action on the respective rim (401, 402), to vertically lock the cover frame (4) to the respective locking element (5); and
- at least one centering tooth (551", 552") suitable to exert a transverse thrust action on the respective rim (401, 402), to transversely lock the cover frame (4) to the respective locking element (5)

10. Sash (1) according to claim 9, wherein each of vertical fixing tooth (551', 552') comprises a vertical thrust foot (5510', 5520') inclined with respect to the horizontal axis of a vertical thrust angle (β) comprised between 20° and 45°, preferably 45°.

11. Sash (1) according to claim 9 or with claim 10, wherein each of centering tooth (551', 552') comprises a centering foot (5510", 5520") inclined with respect to the horizontal axis of a transverse thrust angle (α) comprised between 45° and 75°, preferably 60°.

12. Sash (1) according to any of the previous claims, wherein the locking element (5) is attachable to the weight-bearing frame (3) by a screw (500), so that it is retained by the top of the screw (500), wherein the locking element (5) has a through locking hole (58), having a specially shaped aperture for the passage of the shank of the screw (500), wherein said locking hole (58) is located between the two locking wings (551, 552).

13. Sash (1) according to claim 12, wherein the locking element (5) has a release hole (59) have an aperture specifically shaped for the passage of the top of the screw (500), wherein the release hole (59) is next to the locking hole (58) mutually divided by a retention septum (56) suitable to adapt itself elastically and/or break itself to allow the passage of the shank between the locking hole (58) and the release hole (59).

14. Sash (1) according to any of the previous claims, also comprising at least one transparent element (2) accommodated on the weight-bearing frame (3), wherein said transparent element is a glass plate, or is double glazing, or triple glazing, or a glass block, or a glass block with integrated curtain.

15. Sash (1) according to claim 14, wherein each locking element (5) comprises a locking portion (50) suitable

to engage the transparent element (2) to lock it on the weight-bearing frame (3), wherein said locking portion (55) extends transversely in a planar manner from the support portion (55).

16. Sash (1) according any of the preceding claims, wherein the locking element (5) is made in one piece.

17. Sash (1) according to any of the previous claims, wherein the cover frame (4) comprises two upright elements (41) and two transversal elements (42) suitable to engage each other at the edge to form said cover frame (4), wherein the cavity (40) extends in length in both the upright element (41) and in the transversal element (42).

18. Locking element (5), suitable to be part of a sash (1) that comprises a weight-bearing frame (3) and a cover frame (4), the latter comprising inside it a cavity (40) with longitudinal extension and transverse width, wherein the cavity (40) on the two sides that delimit it comprises two rims (401, 402), preferably with longitudinal extension, projecting transversely towards the center of the cavity (40), wherein the locking element (5) is made in one piece, is attachable on the weight-bearing frame (3) and comprises a support portion (55), suitable to be snap-engaged by the cover frame (4) to perform its locking on the weight-bearing frame (3), in which the support portion (55) comprises two locking wings (551, 552), elastically yielding, each comprising a sliding surface (5511, 5521) on which the respective rim (401, 402) is free to slide in the application of the cover frame (4) on the locking element (5);
wherein said sliding surface (5511, 5521), has a concave shape and comprises a top edge (5511a, 5521a) and a bottom edge (5511b, 5521b) identifying a top distance (DT), that is the transverse distance between the top edges (5511a, 5521a) of the two locking wings (551, 552), and a bottom distance (DF), that is the transverse distance between the bottom edges (5511b, 5521b) of the two locking wings (551, 552);
wherein the top distance (DT) is less than the bottom distance (DF).

19. Locking element (5) according to claim 18, suitable to be part of a sash (1) that also comprises a transparent portion (2), wherein the locking element (5) also comprises a locking portion (50) suitable to engage the transparent element (2) to lock it on the weight-bearing frame (3), wherein said locking portion (55) extends transversely in a planar manner from the support portion (55).

20. Assembly method of a sash (1) according to any of claims 1 to 17, comprising the steps of:

- assembling the weight-bearing frame (3);
- assembling the cover frame (4);
- fixing the locking elements (5), preferably by means of screws (500) to the weight-bearing frame (3);
- resting the cover frame (4) on the locking elements (5), in such a way that the rims (401, 402) of the cavity (40) of the cover frame (4) are accommodated in the concave shape, that is in the resting position;
- exerting a vertical thrust action on the cover frame (4) towards the weight-bearing frame (3) to snap-lock the cover frame (4) to the locking elements (5).

21. Assembly method of a sash (1) according to claim 15, comprising the steps of:

- assembling the weight-bearing frame (3);
- inserting the transparent element (2) on the weight-bearing frame (3);
- assembling the cover frame (4);
- attaching the locking elements (5), preferably by means of screws (500), to the weight-bearing frame (3) in such a way as to engage the outer face of the transparent element (2) locking it to the weight-bearing frame (3);
- resting the cover frame (4) on the locking elements (5), in such a way that the rims (401, 402) of the cavity (40) of the cover frame (4) are accommodated in the concave shape, that is in the resting position;
- exerting a vertical thrust action on the cover frame (4) towards the weight-bearing frame (3) to snap-lock the cover frame (4) to the locking elements (5).

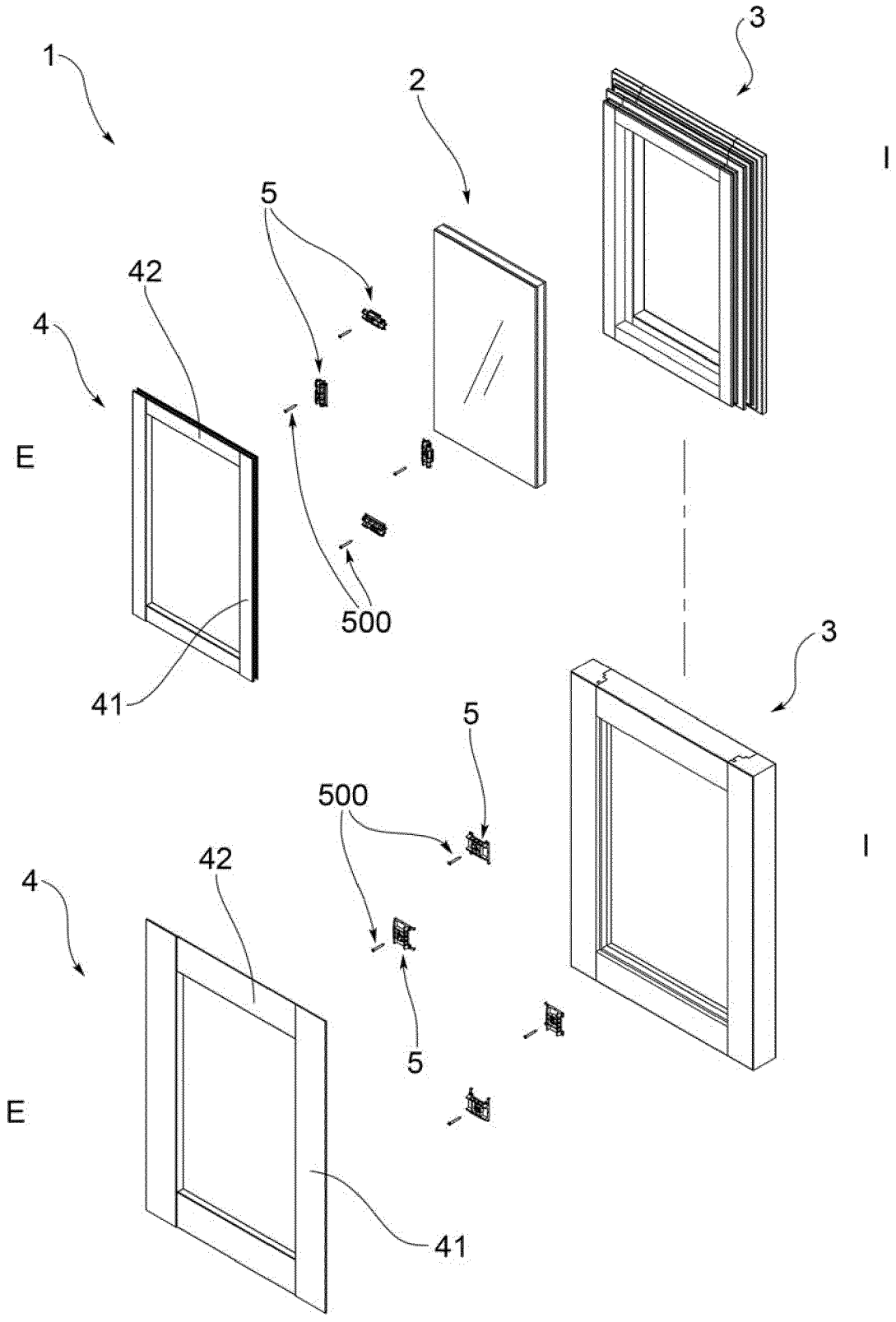

FIG.1

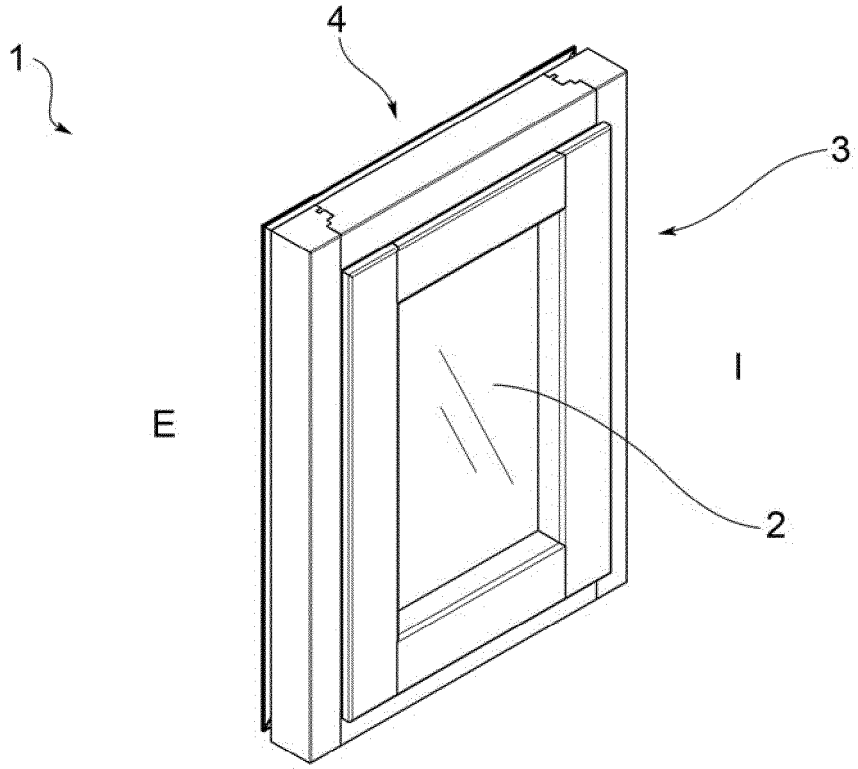

FIG.1a

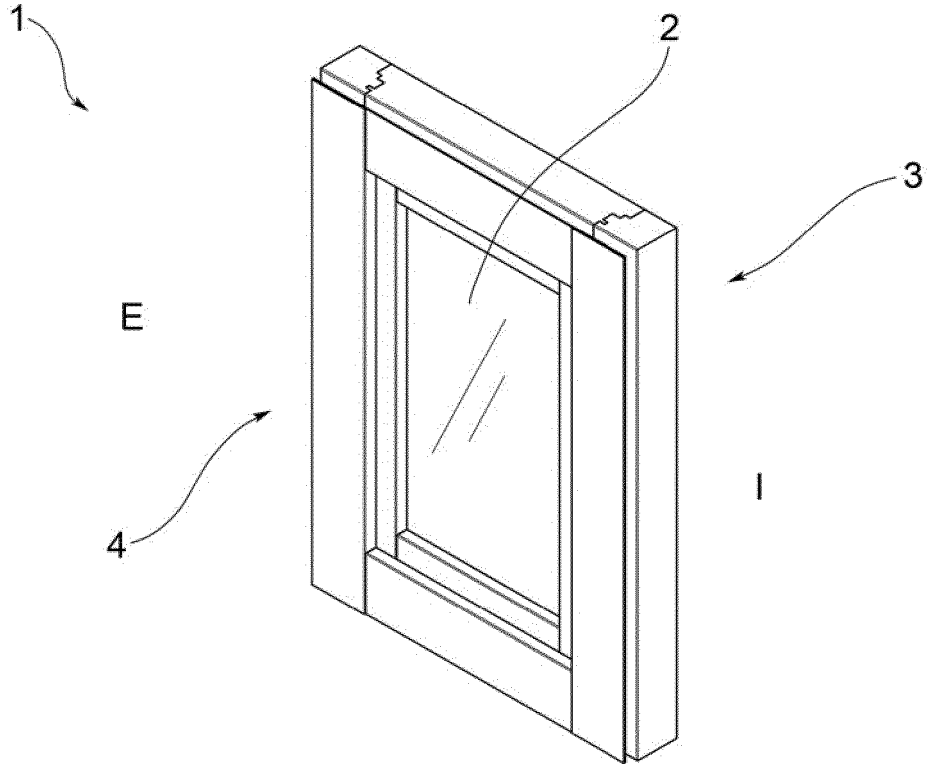

FIG.1b

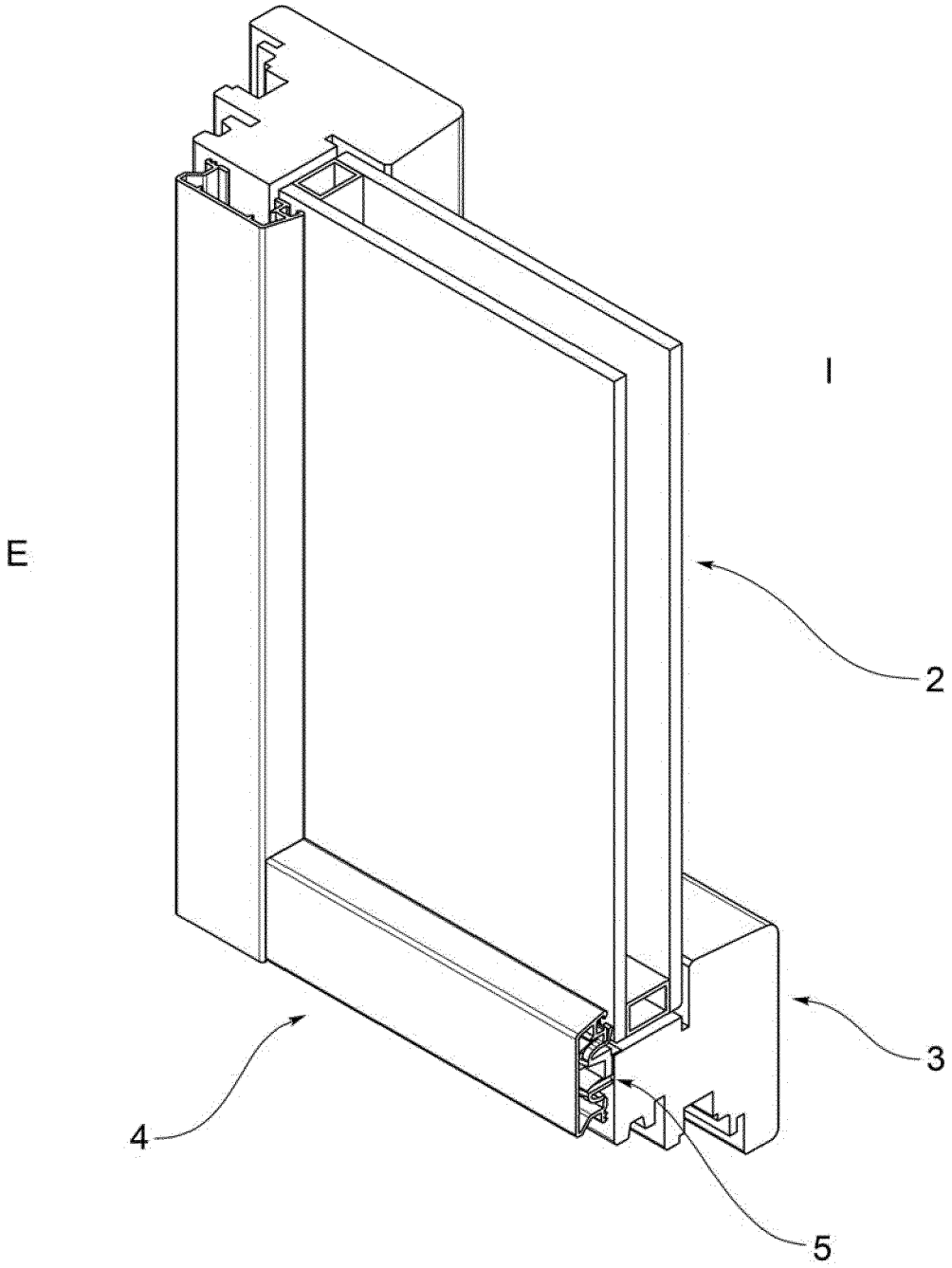

FIG.1'

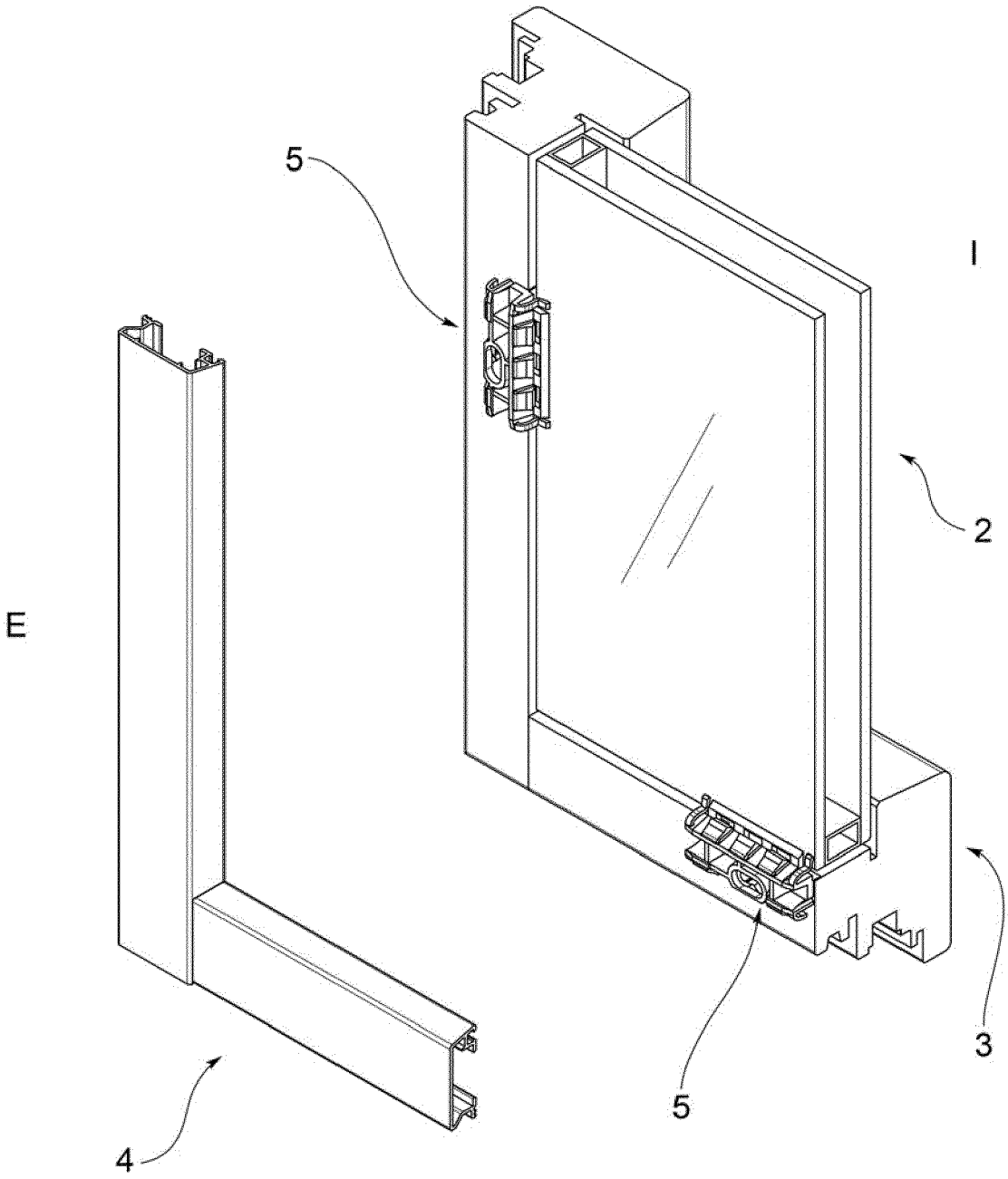

FIG.1"

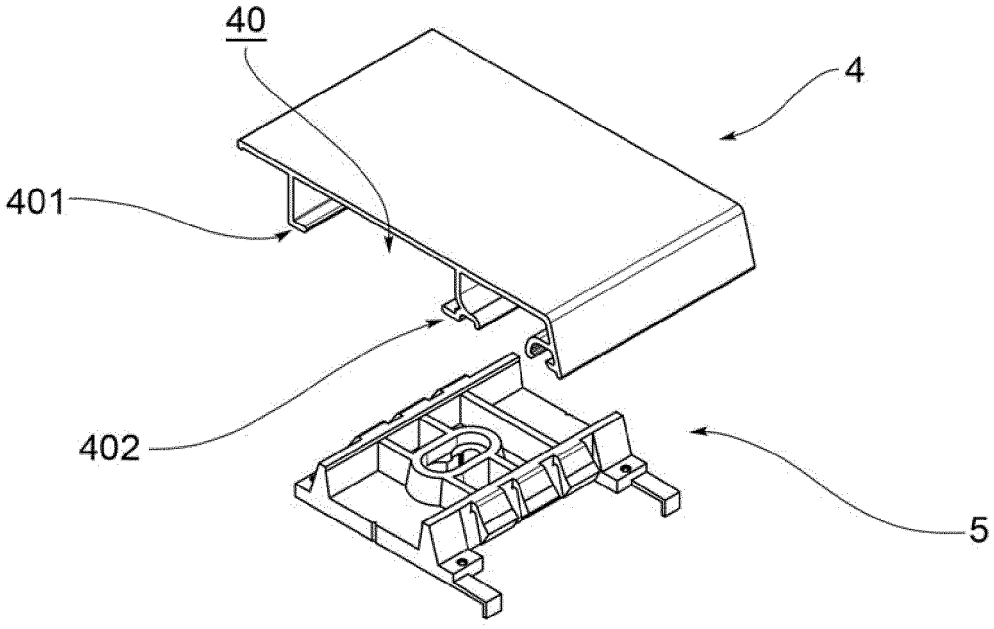

FIG.2a

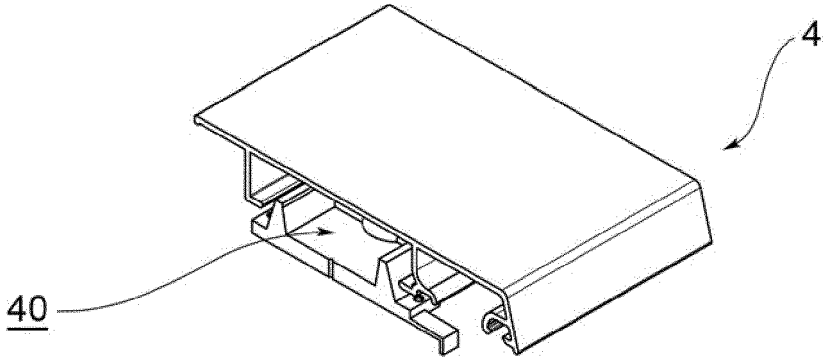

FIG.2b

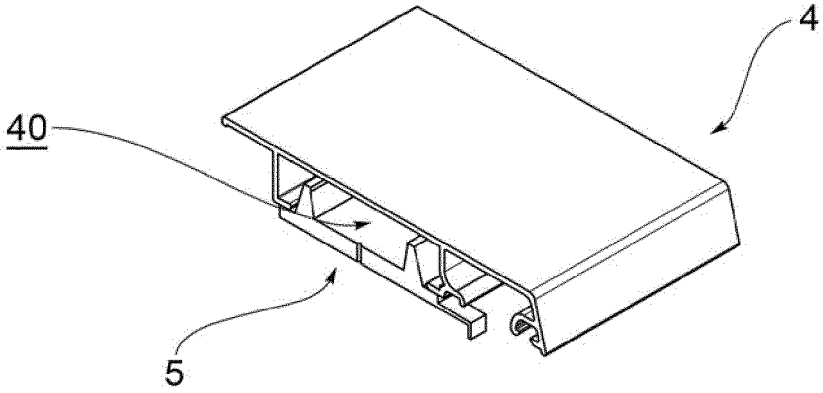

FIG.2c

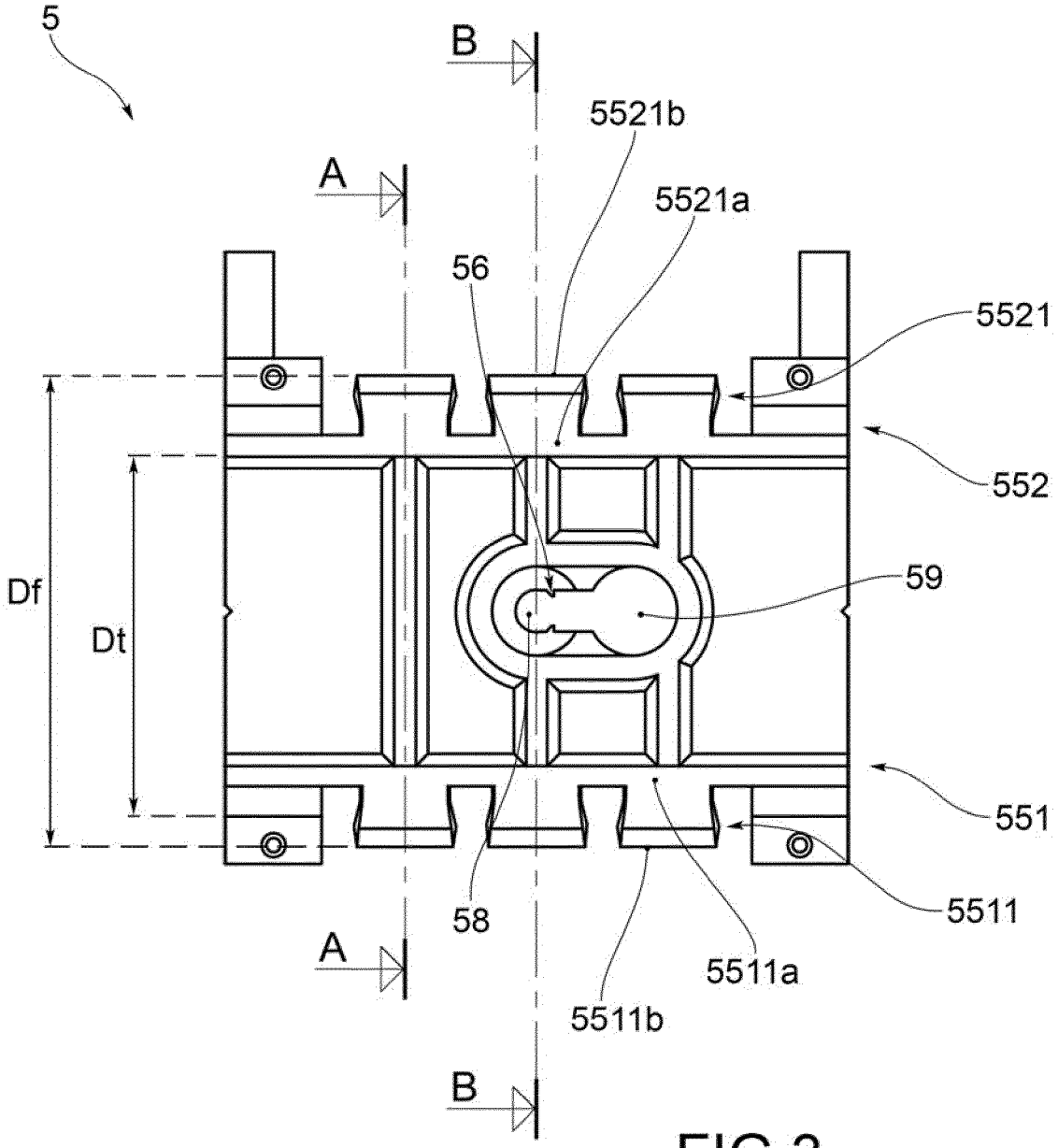
5
B
5521b
A
5521a
56
5521
552
Df
Dt
59
551
58
5511
A
5511a
5511b
B

FIG.3

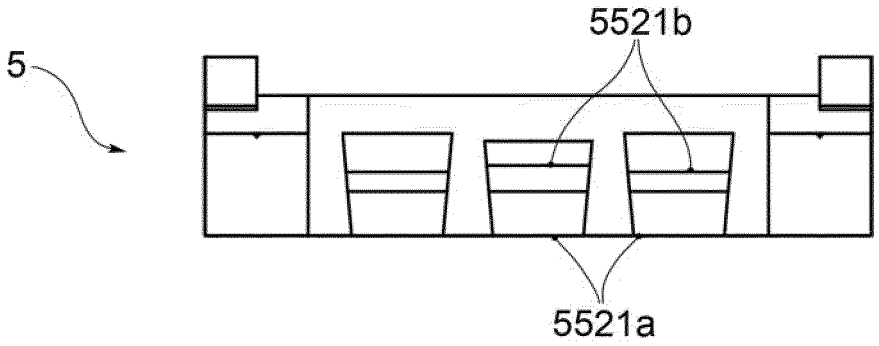
5
5521b
5521a

FIG.3'

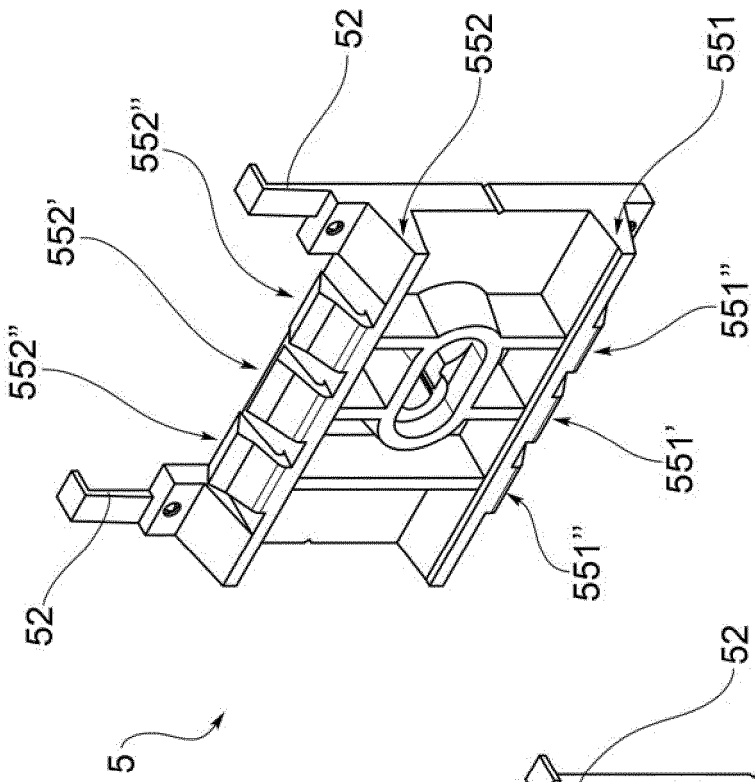

FIG.3b

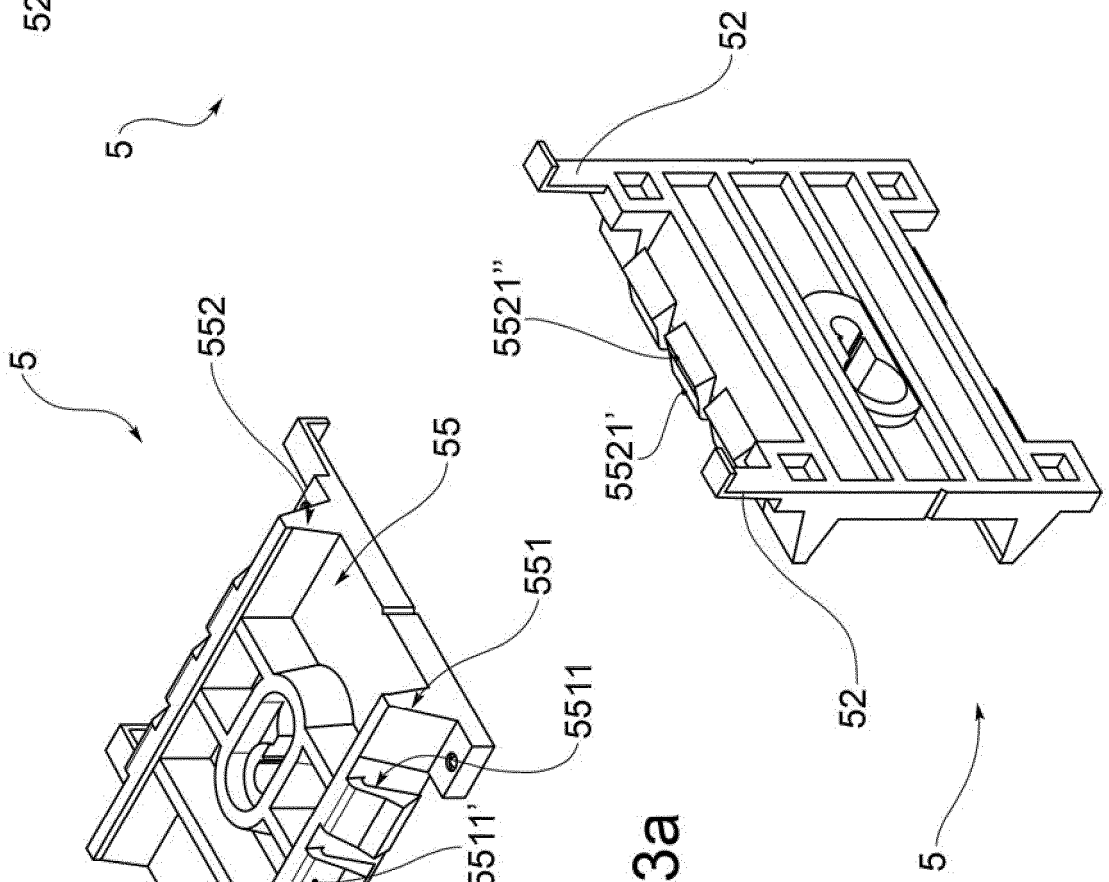

FIG.3c

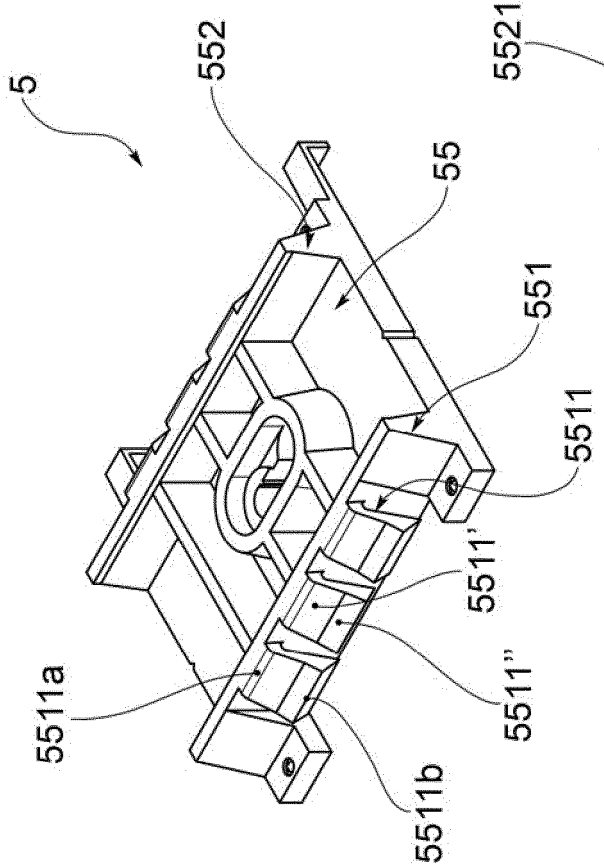

FIG.3a

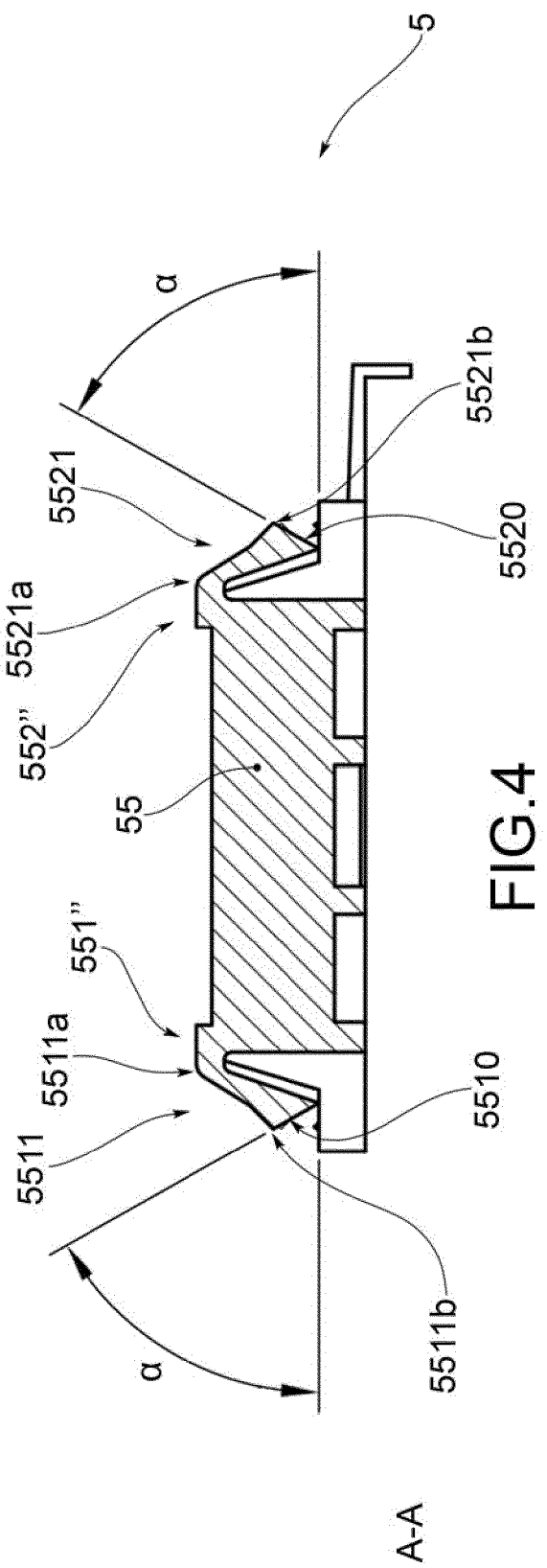
5
α
5521
5521b
5520
5521a
552''
55
551''
5511a
5511
5510
5511b
α
A-A

FIG.4

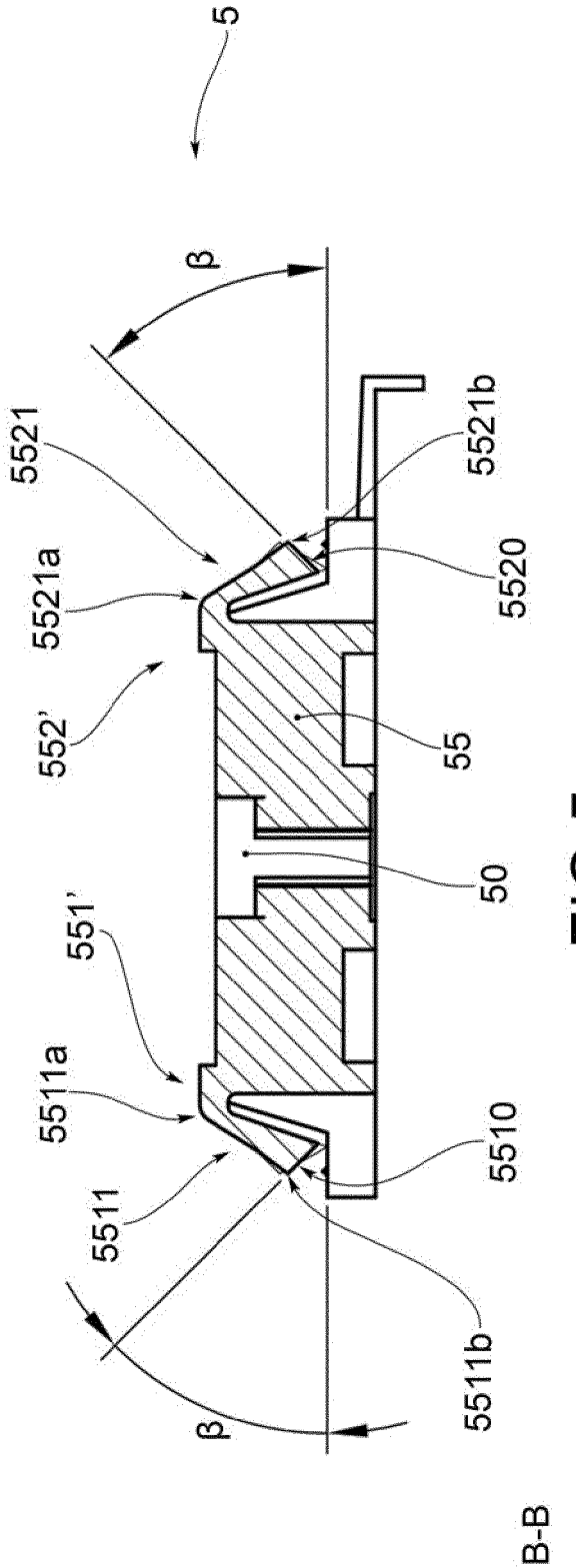
5
β
5521
5521b
5521a
5520
552'
55
50
551'
5511a
5511
5510
5511b
β
B-B

FIG.5

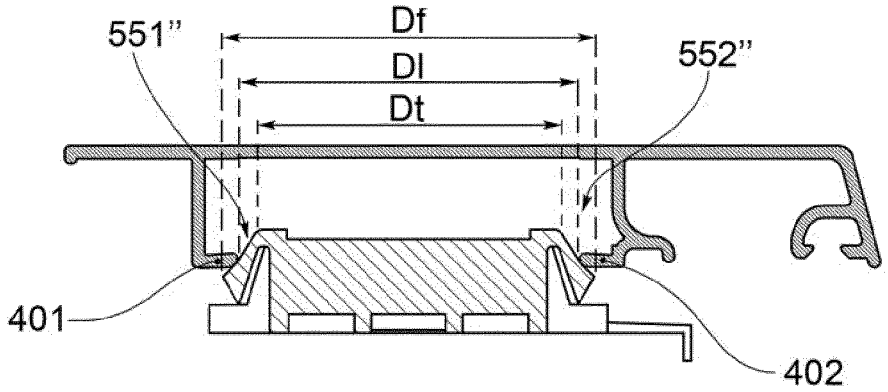

FIG.4'

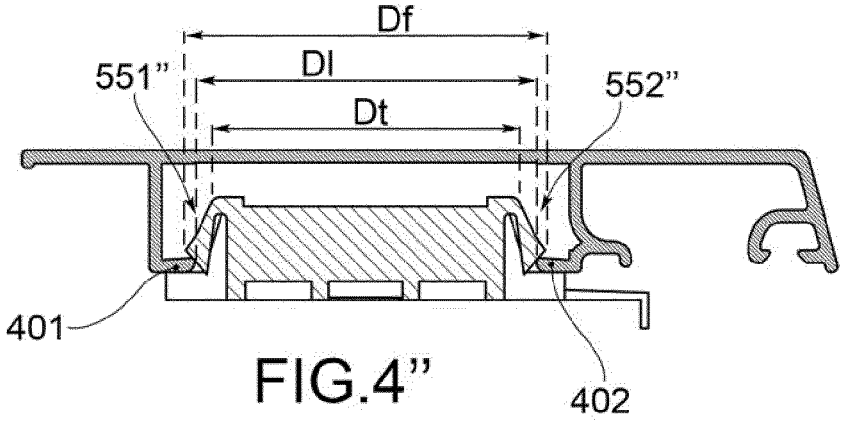

FIG.4"

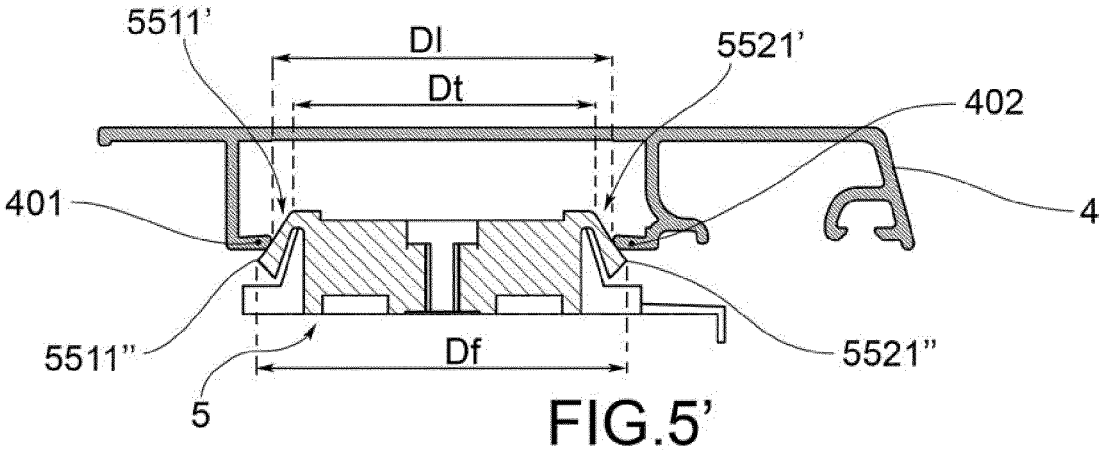

FIG.5'

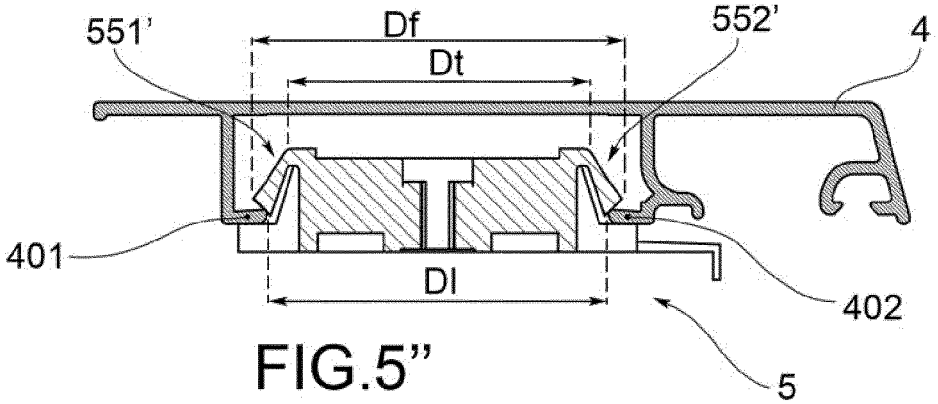

FIG.5"

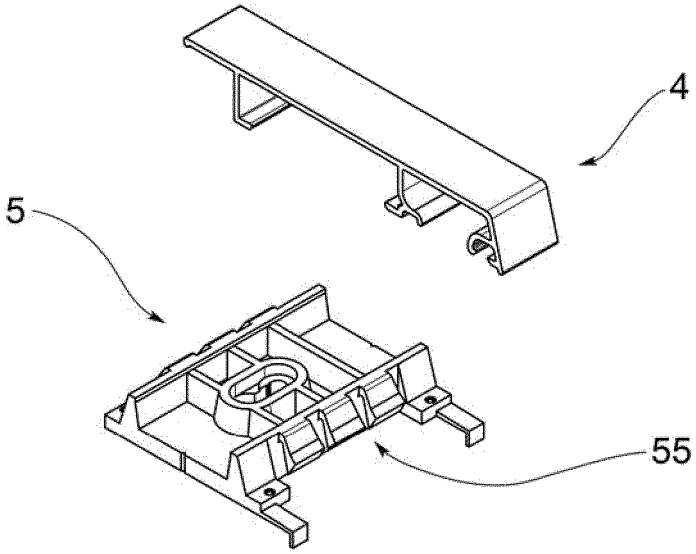

FIG.6a

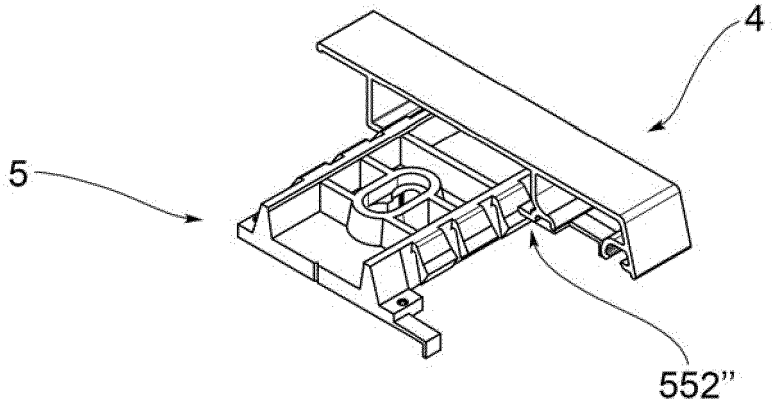

FIG.6b

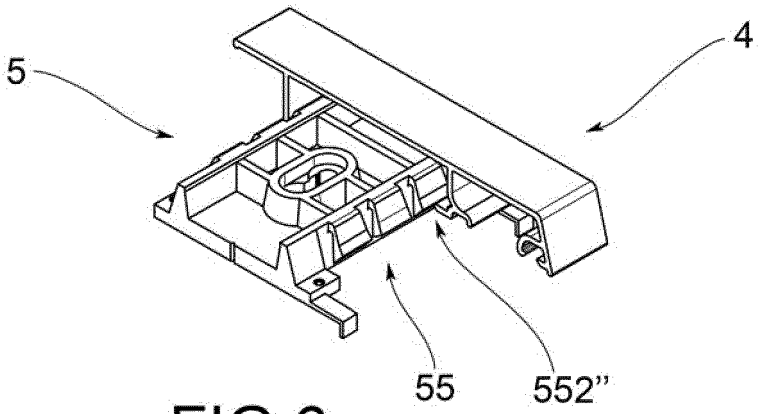

FIG.6c

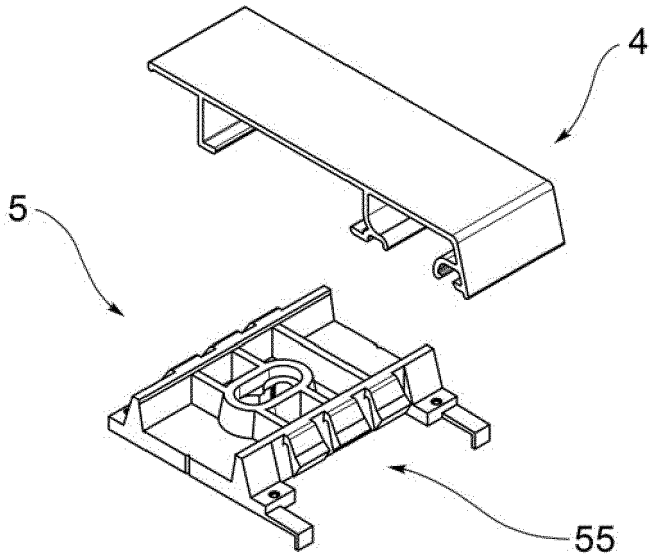

FIG.7a

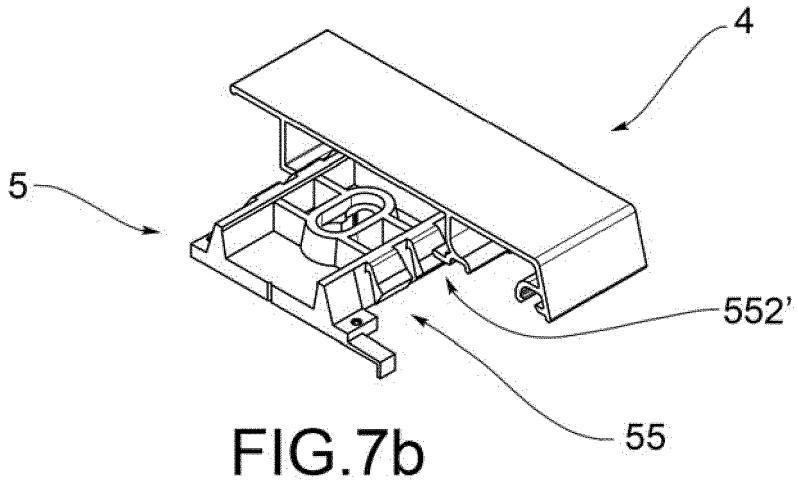

FIG.7b

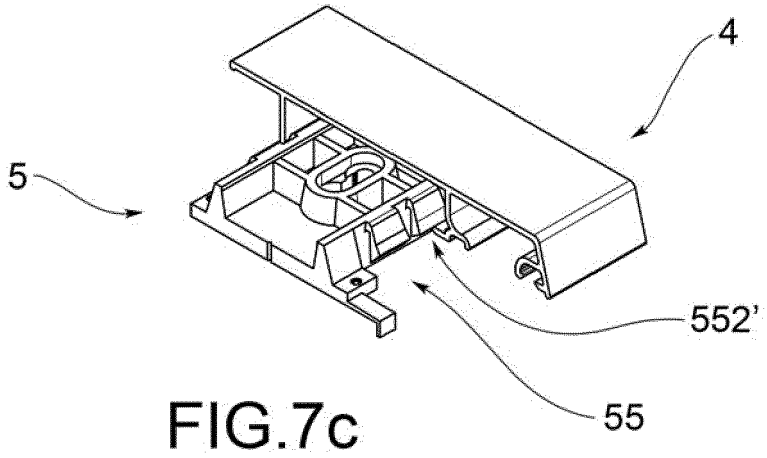

FIG.7c

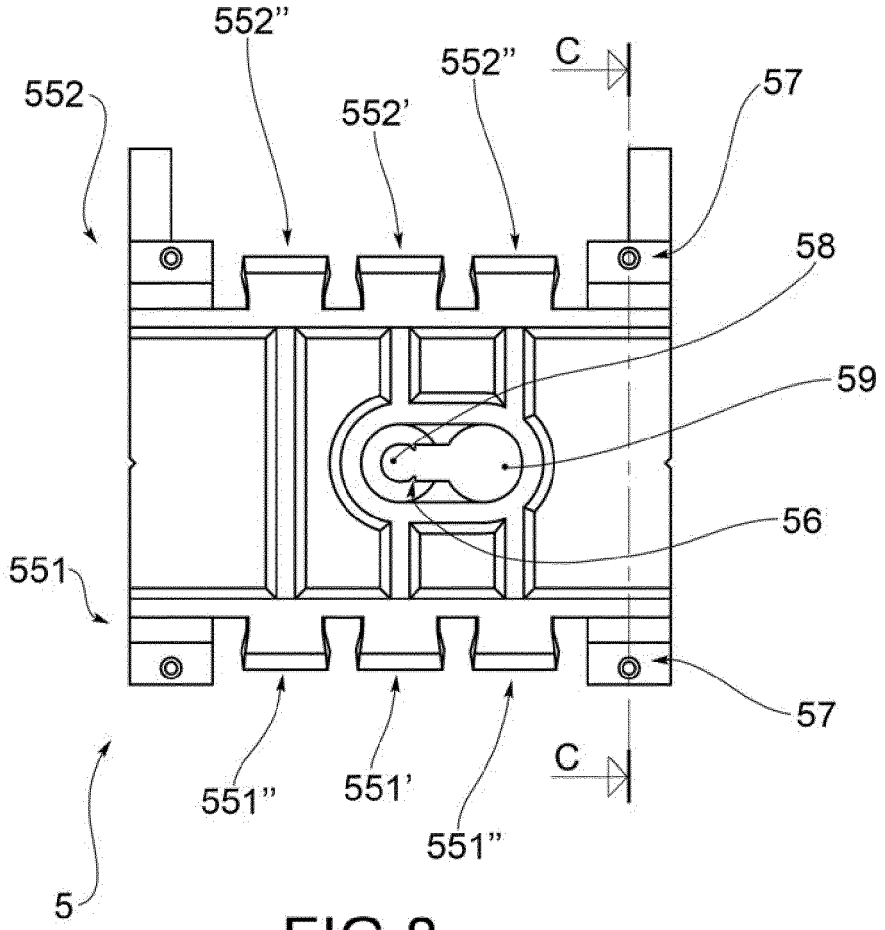

FIG.8

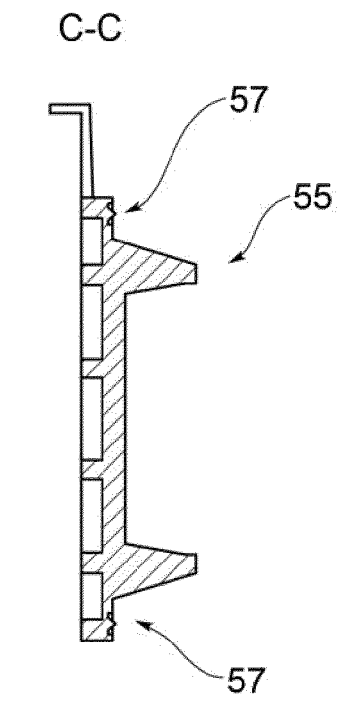

FIG.8a

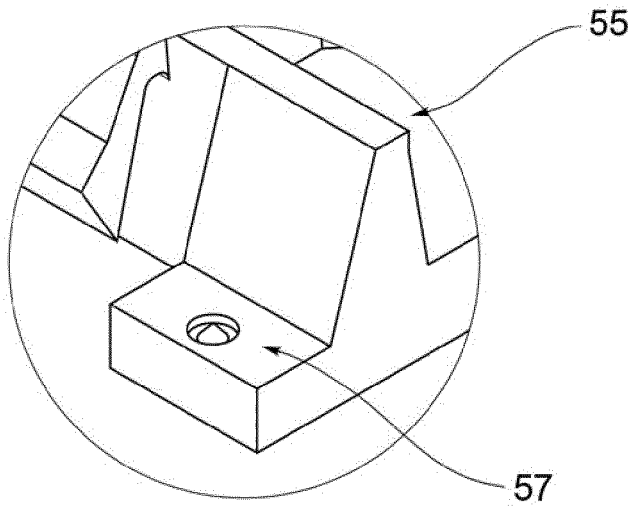

FIG.8'

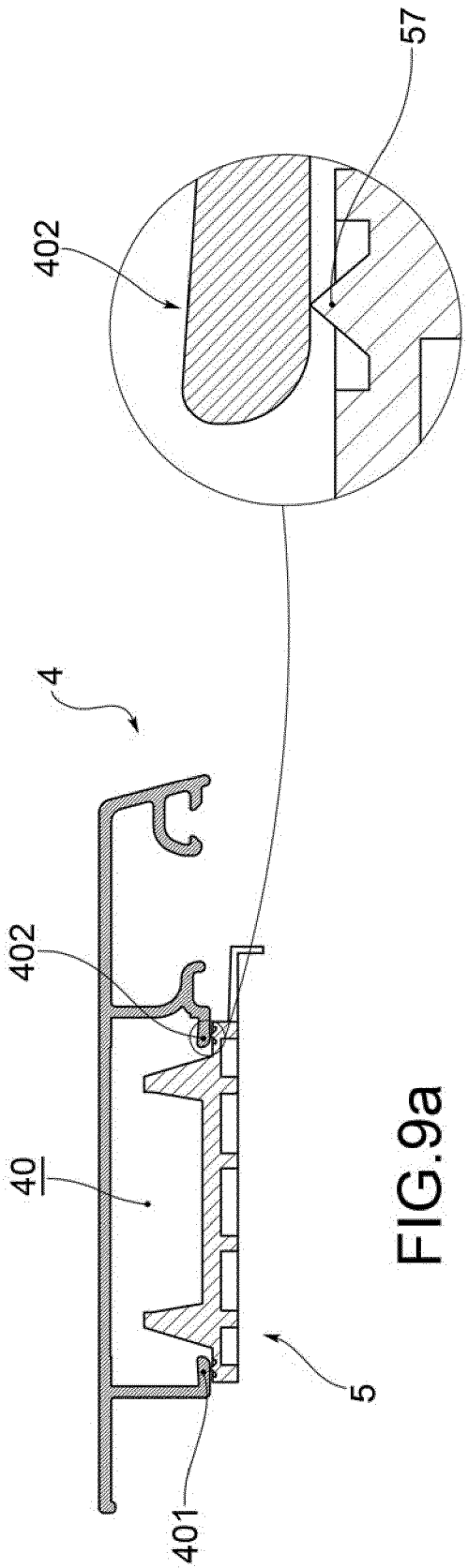

FIG.9a

FIG.9a'

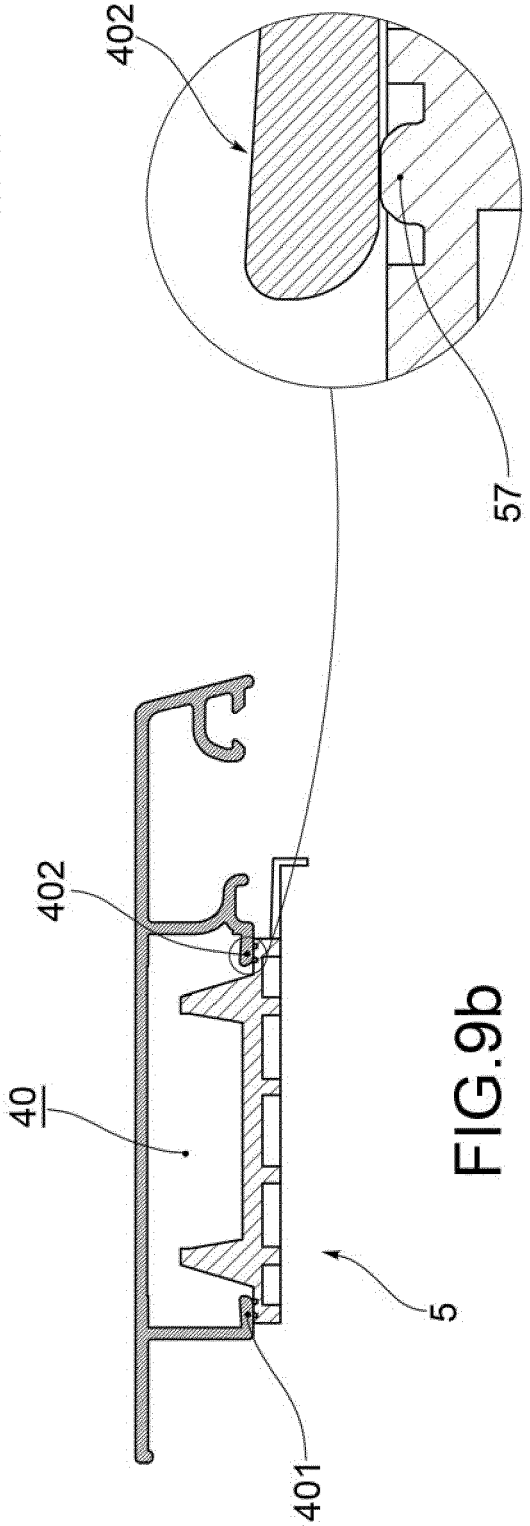

FIG.9b

FIG.9b'

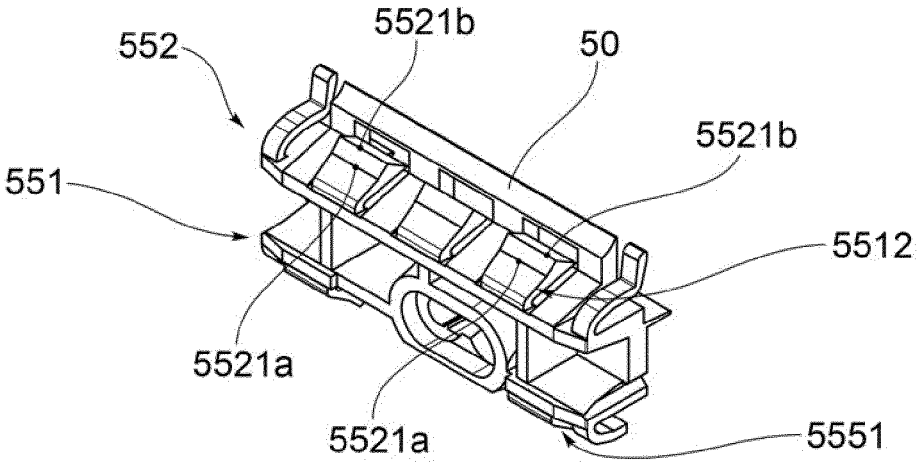

FIG.10a

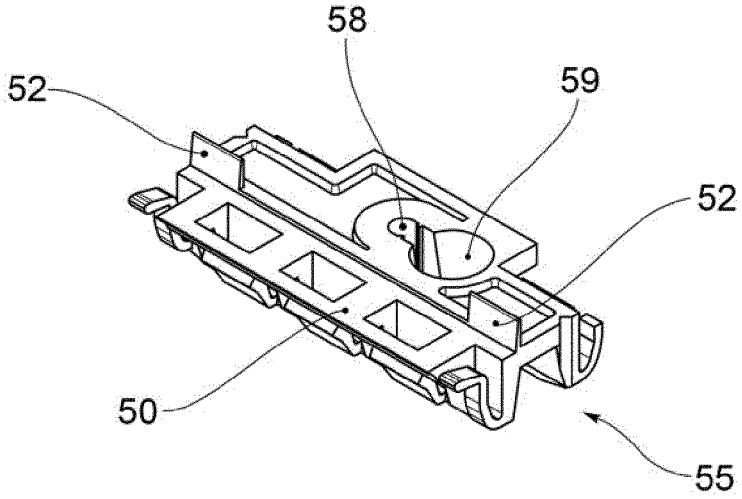

FIG.10b

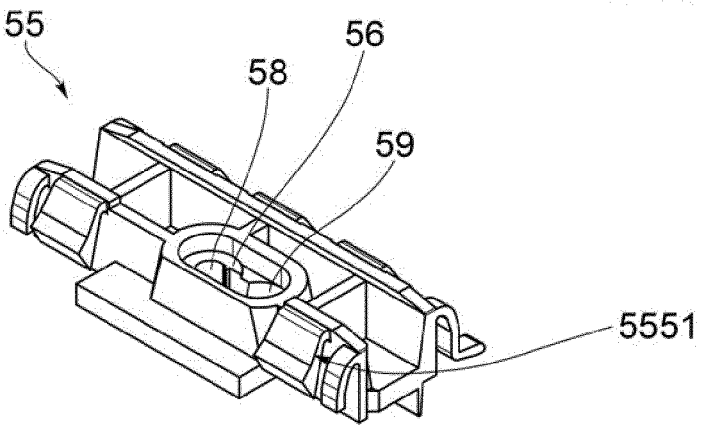

FIG.10c

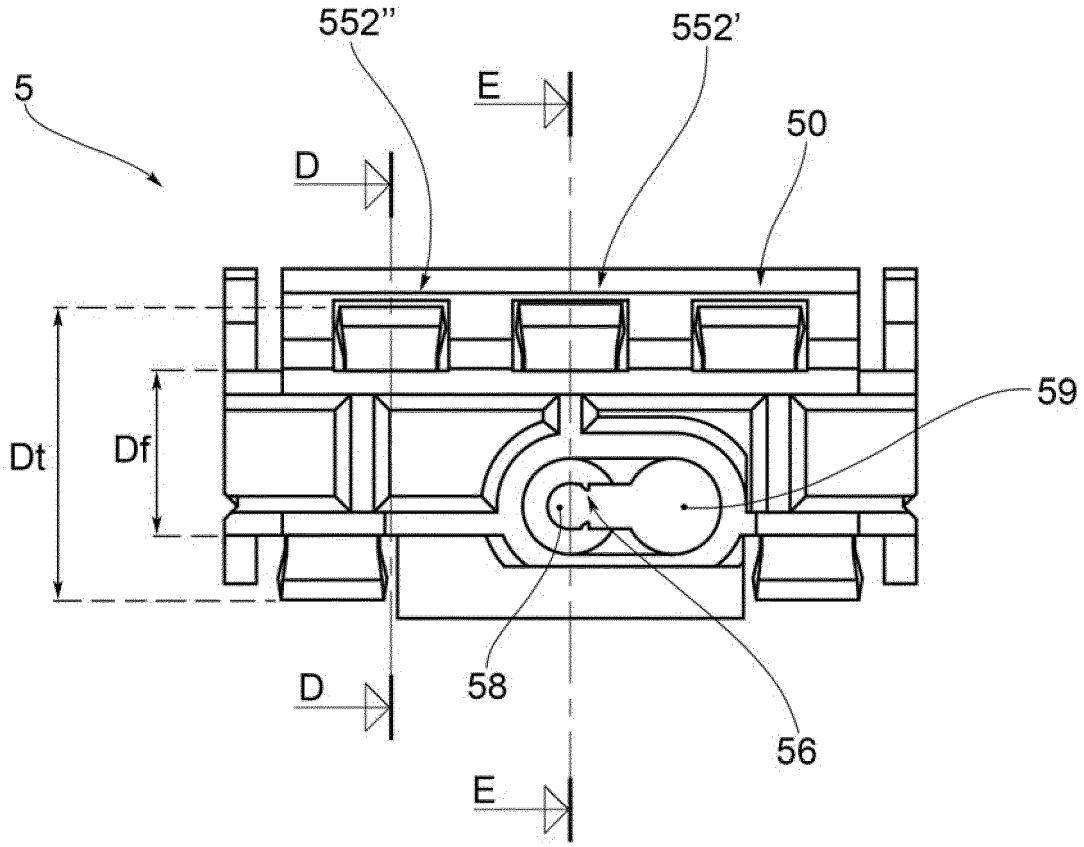
552''
552'
5
E
50
D
59
Dt
Df
58
56
D
E

FIG.10

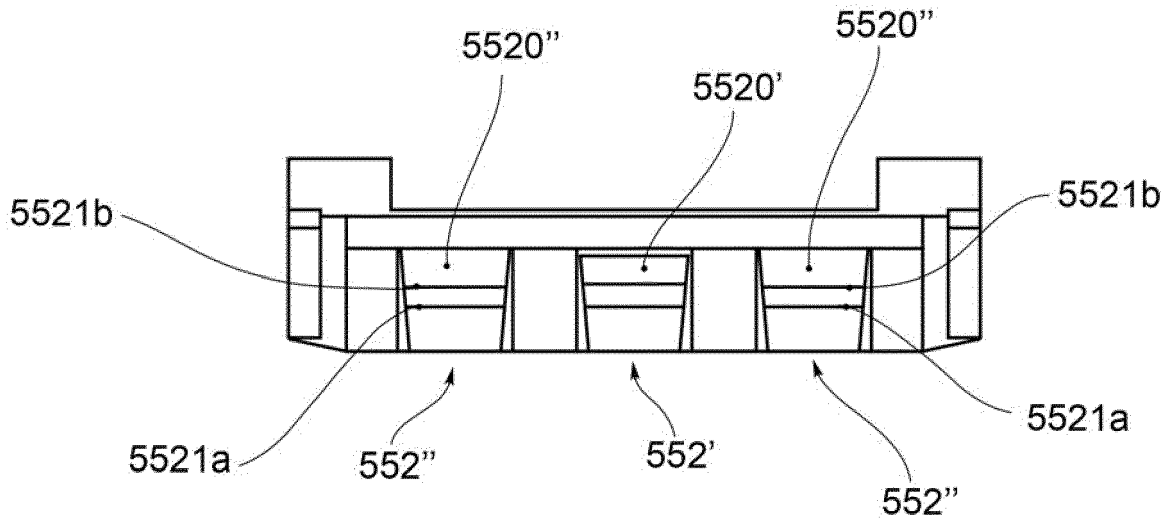
5520''
5520''
5520'
5521b
5521b
5521a
5521a
552''
552'
552''

FIG.10'

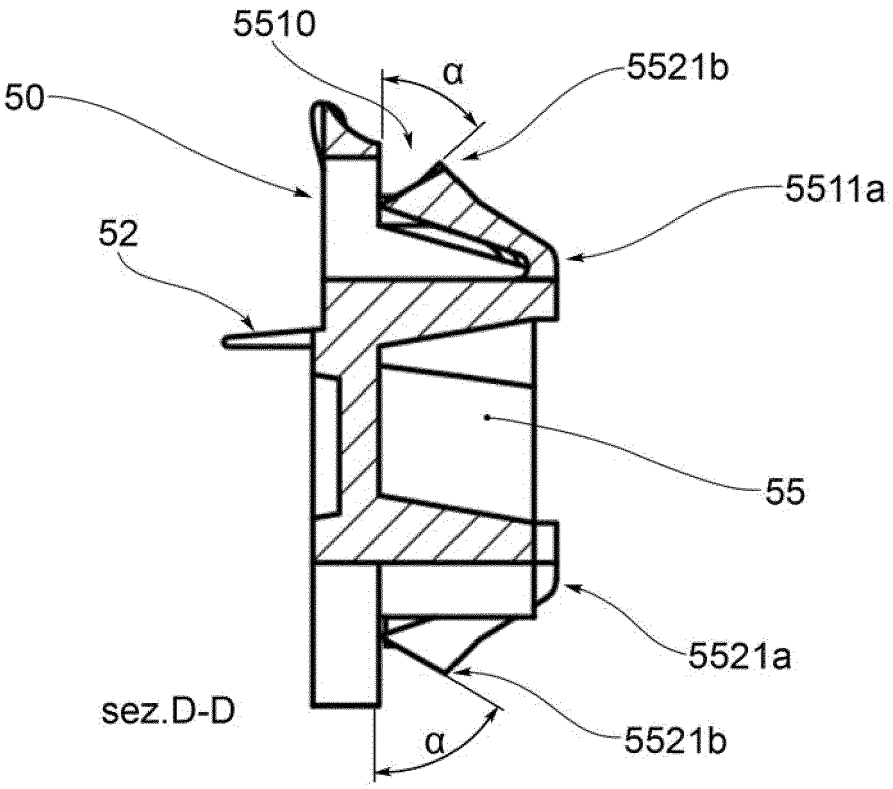
5510
α
5521b
50
5511a
52
55
5521a
sez.D-D
α
5521b

FIG.11

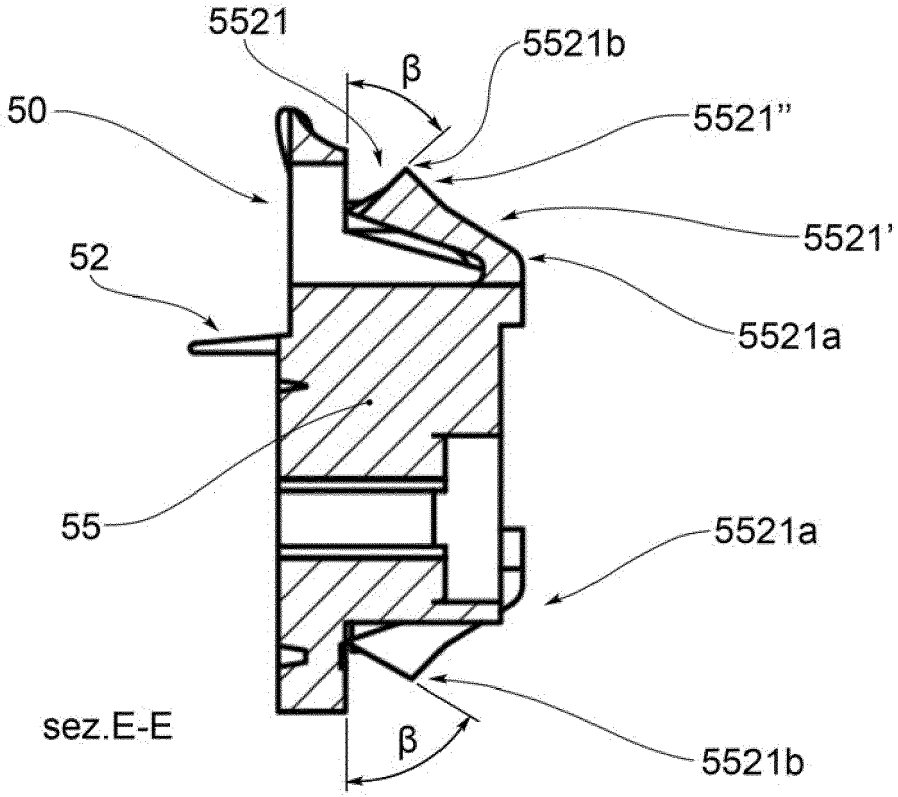
5521
β
5521b
50
5521"
5521'
52
5521a
55
5521a
sez.E-E
β
5521b

FIG.12

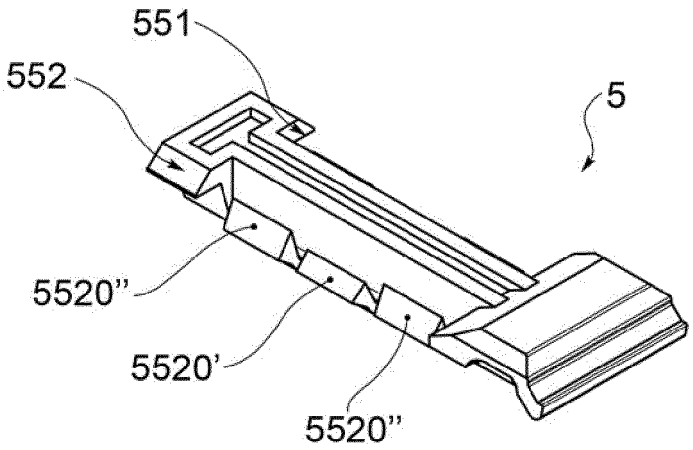

FIG.13a

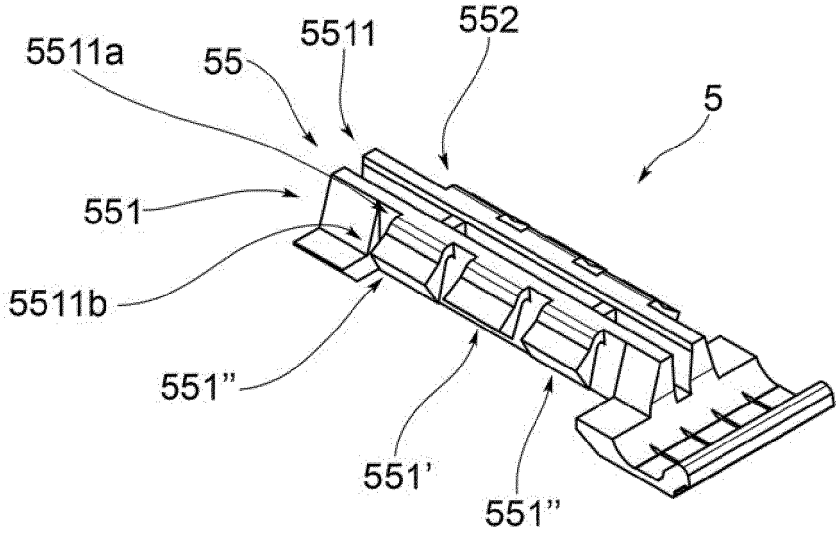

FIG.13b

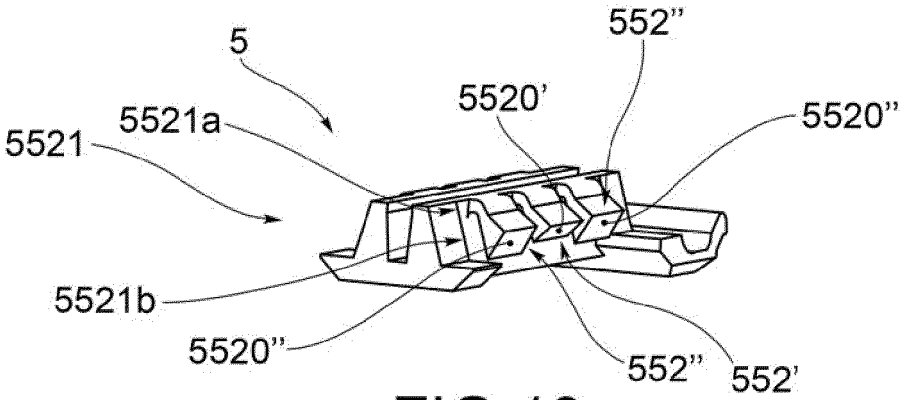

FIG.13c

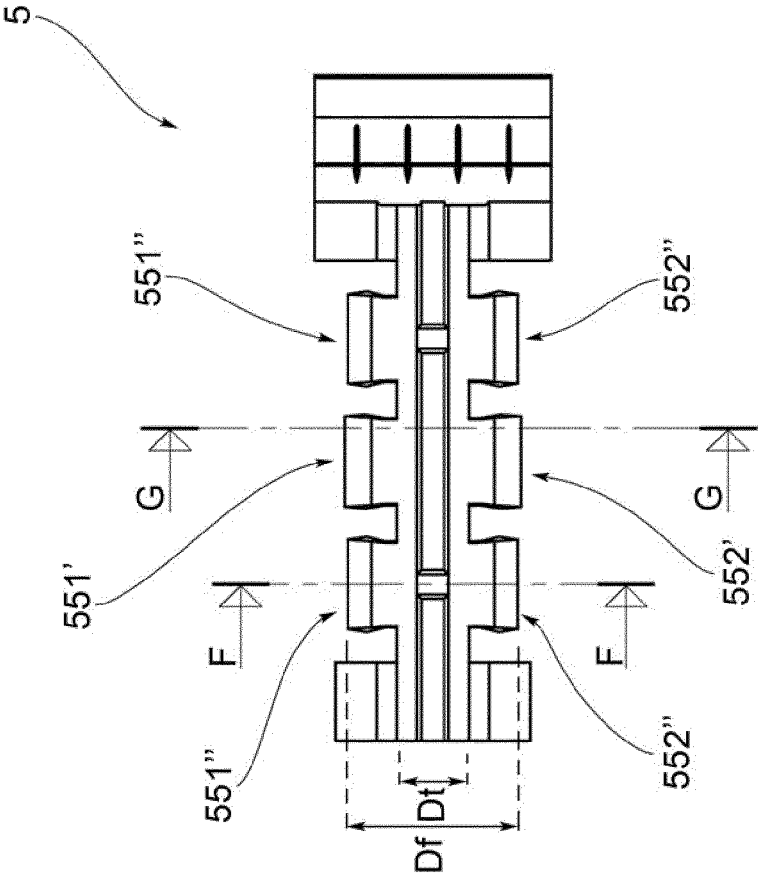

FIG.13

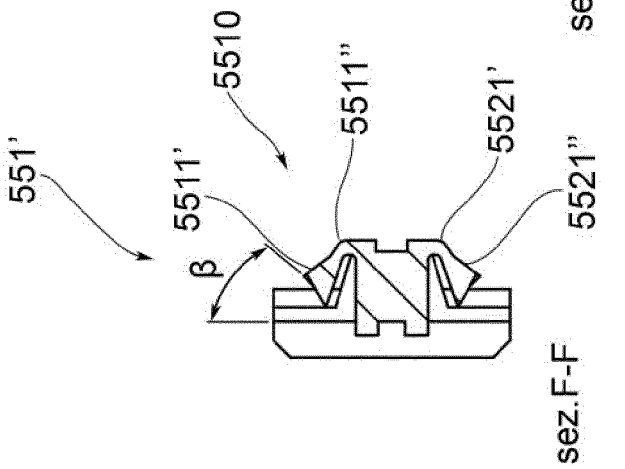

FIG.14

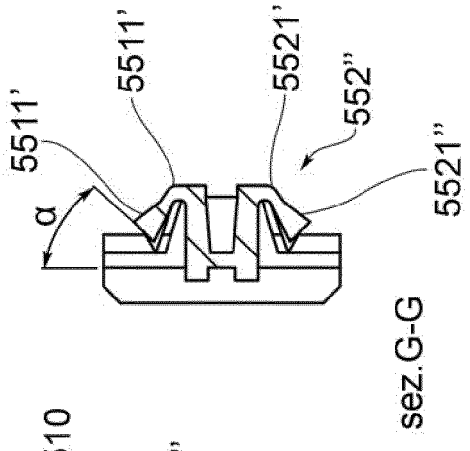

FIG.15

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7834

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 2 955 310 A1 (EUROPROFILI GROUP S P A [IT]) 16 December 2015 (2015-12-16) * figures * -----	1,18,20	INV. E06B3/30

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 April 2018	Verdonck, Benoit

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 19 7834

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03-04-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2955310 A1	16-12-2015	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82