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(54) Means for securing reversible rails of dual rail window regulators

(57) The present invention relates to a means for securing reversible rails (1) of dual rail window regulators intended to allow pre-assembly of the window regulators on the door (2) of the vehicle. The means in question

have a design capable of being used both in a first position and in the reversed position thereof, this is, according to a rotation through 180° such that with this new means of securing it is possible to make use of a single rail for the front and rear side.

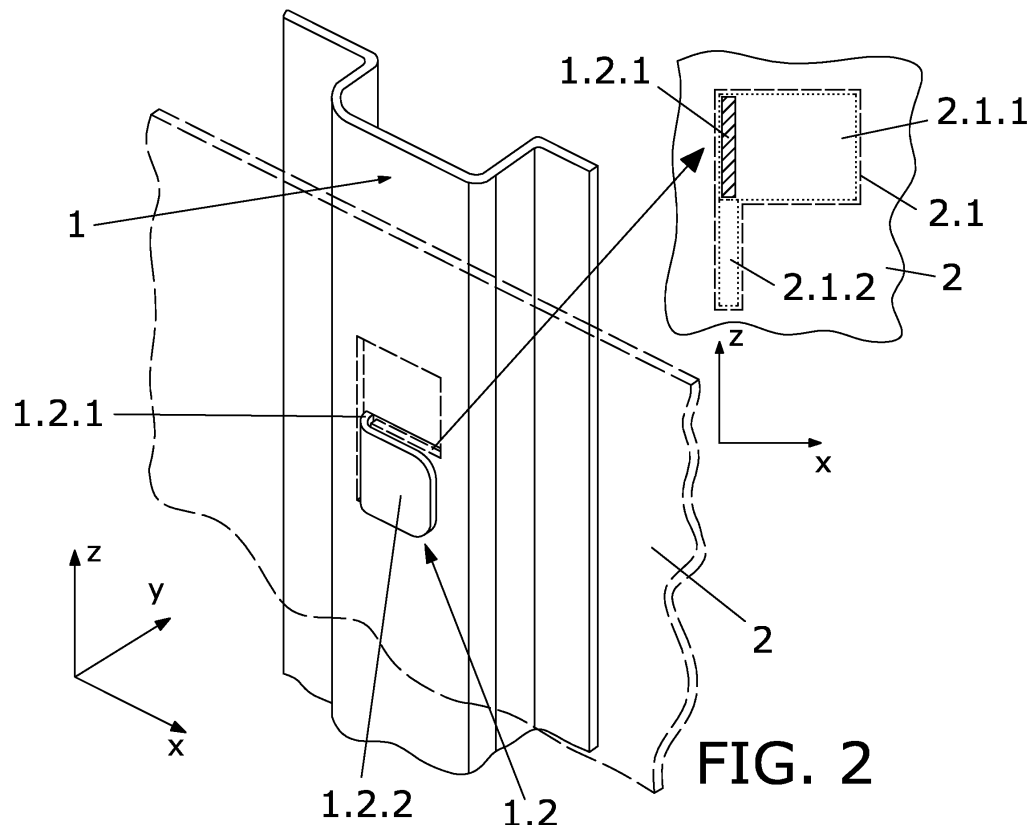


FIG. 2

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Description

OBJECT OF THE INVENTION

[0001] The present invention refers to a means of securing for reversible rails of dual rail window regulators of those intended to permit the pre-assembly of the window regulators on the door of the vehicle, in such a way that the use is possible of the same rail in two operative positions: a first position of the rail that will be considered without rotation and a second position rotated through 180° which will be termed reversed.

[0002] This means of securing therefore has a design capable of being used both in a first position and in its reversed position in such a way that it is possible to make use of a single rail for the front and rear sides understanding as the front side the location in which the left rail is situated in the window regulator assembly and as the rear side that which is located on the right side.

[0003] This invention is characterised in the combination of some hooks, which maintain their operability after being rotated, located on a window regulator rail together with some windows or cavities in which the hooks are housed and secured.

[0004] The windows or cavities have an area that in turn can be broken down into two areas, a first area for entering the hook plus a second area for receiving the root of the hook. The configuration of the window for a first position and the configuration for its reversal are designed to receive the hook of the rail before and after respectively carrying out a rotation through 180° of the window regulator rail.

BACKGROUND OF THE INVENTION

[0005] To carry out the assembly of a dual rail window regulator unit, a pre-assembly is carried out of each of the rails on the door box using pre-assembly elements.

[0006] After the rails are pre-assembled in their operating position, they are fastened to the door structure so that the worker does not have to use additional elements for fastening the rails like for example using his hands, it is sufficient to perform the fastening because the rail is perfectly positioned.

[0007] The performance of this pre-assembly requires having two different rails, one for the front side and another for the rear side.

[0008] The configuration habitually employed in this type of hooks, termed hangers in the trade, consists of some protuberances which are part of the rails and which are fabricated by means partial stamping followed by bending.

[0009] These hooks are intended to enter into a simple window or cavity made in the door structure. Once the hook has entered into the cavity and descended until coming to rest on the lower edge of this same cavity, the definitive fastening is carried out by means of screwing, riveting or other means.

[0010] This type of "hanger" is functional in only one direction, that is, if it was desired to reverse the rear rail by means of a rotation through 180° to use it as a front rail, its functionality is lost since by the action of gravity it would be positioned in the opposite direction to that in which it is capable of carrying out the securing and support.

[0011] The solution for securing based on the use of "hangers" requires the use of two different rails: one to be used as the front rail and another to be used as the rear rail. If also the rails of the doors on one side and the other of the vehicle are different, the number of references is therefore twofold. The conventional window regulators for the front doors, both for the door corresponding to the left side and that corresponding to the right side, require 4 different references, with the invention a single reference would be sufficient for the four rails.

[0012] The present invention discloses a configuration of the securing means such that its functionality is assured in a first position and in the position that corresponds to a rotation through 180° of the rail, permitting window regulator rails to be designed that are good for front and rear mounting.

DESCRIPTION OF THE INVENTION

[0013] The present invention consists of some means of securing reversible rails of dual rail window regulators of those obtained for example by partial stamping and subsequent bending, or the rails could be made for example by means of a process of aluminium injection, in which the hook would emerge from the actual injection, it being possible to use other methods for the production thereof. The means of securing has the property of maintaining its functionality in two positions which correspond to a rotation through 180° of the rail allowing the use indifferently of a same rail for the front and for the rear.

[0014] If the design of the rail also permits interchange with the rails of the rest of the doors it is possible to reduce all the references to only one.

[0015] The means of securing of this invention consists mainly of a hook with a special configuration located in the window regulator rail and the window which admits said hook located in the door structure.

[0016] The capability to serve in one position and the reverse or rotated position (everywhere in this specification the word reverse is to be interpreted as the rail rotated through 180° with respect to an axis perpendicular to the surface where it is situated) has to be fulfilled in the hook which is that which belongs to the rail since this is the piece which has to serve functionally in one position and the other. The window need not necessarily serve in the same position since by being stamped in the position that corresponds, a change in its configuration does not imply any limitation whatsoever.

[0017] Indeed, in this invention the window does not accept a rotation, instead the relationship between one hook position and its reverse is in most cases one of

vertical symmetry although, as will be seen in an example of the invention, this condition is not strictly necessary.

[0018] As it has been presented, the means of securing consists of a support which can be obtained for example by means of stamping and subsequent single or multiple bending, by means of injection, or other manufacturing processes. The manner of obtaining the means of securing is not an object of this invention, but the form which it adopts to achieve the objective pursued: the possibility of making use of the same rail in two positions, one rotated through 180° with respect to the other. For simplicity this support will be called a "hook" understanding that it will have the configuration proper of the invention and that it must not be confused with the hooks of the state of the art habitually called "hangers".

[0019] This hook has two segments which will be distinguished in the course of the description, a first segment that will be termed the root, and a second segment that will be termed the butt.

[0020] The root emerges approximately perpendicular to the surface where the hook is configured and constitutes the element which supports the vertical loads (those of greater magnitude), resting on the edge of the window stamped in the door structure where it is housed. Essentially perpendicular is said because manufacturing procedures like for example stamping give rise to small variations which have to be taken into account in practice, but this is no reason for not considering the position of the root to be essentially perpendicular.

[0021] On the extremity of this root is the second segment or butt. This butt is a continuation of the root which has or has not a fold in the separation between the two segments and the function of which is that of preventing the hook from coming out once introduced in the window. It absorbs the loads perpendicular to the guide during the pre-assembly stage.

[0022] The configurations of the hook can be varied and are delimited only by the restriction that the application of a rotation through 180° of the rail gives rise to a hook which with its corresponding window, once in position, continues being functional. The hook continues being functional because its last segment or butt, once in position, is arranged behind the rail and outside the projection of the window providing the desired retention. It is to be pointed out that in the case of the "hangers" mentioned in the background, the hooks when rotated do enter in the window, but the retention is not achieved since with the configuration of the hook and the window the possibility does not exist of the butt being located outside the front projection of the window.

[0023] The second segment or butt can additionally have a small insertion angle which facilitates the engagement of the hook in the window.

[0024] If the second segment or butt has a second fold with respect to the first segment or root, then this angle can be obtained either by not completing the second 90° fold or by defining near the extremity a third fold which facilitates the entrance of the extremity. When it is indi-

cated that a fold is established, the intention is only to define the form of the hook with its different bends independently of whether such bends or folds are obtained by bending, stamping, injection in a mould or other manufacturing procedures.

[0025] On the other hand, if the second segment or butt is a continuation of the first and only being of greater width, then it will be sufficient to establish a small wedging angle which facilitates entry.

[0026] With respect to the window or entrance cavity of the hook, this is configured by means of stamping giving rise to a cavity which will be considered divided at least into two areas, a first for entrance of the hook and a second which houses the hook in its operative position. In most cases, not always, the configuration of the window will L-shaped.

[0027] The first area has to be at least coincident with the projection of the hook on the surface where the window is situated. This condition allows the hook to be introduced frontally.

[0028] When the hook has been introduced, the root of the hook is located inside the window. If we consider the section of the root according to the intermediate plane of the window, the form of this section is that which the second area of the window must adopt to secure the hook.

[0029] This second area prolongs the first in its lower part. Considering the position of the section of the root in the entrance to the window, the most advantageous configuration of the window will locate this second continuation exactly under the section. Thus the insertion of the hook will imply a first movement of insertion of the hook in the window and a vertical displacement for its fastening.

[0030] Considered likewise inside the same invention are positions of the second area displaced horizontally. This type of solution, although less advantageous, could find application for example in situations in which it is necessary to overcome some type of obstacle with a small lateral displacement before carrying out the last downward movement for the definitive fastening.

[0031] One window is not obtained from the other according to a rotation of 180.

[0032] When the last downward movement has been carried out, then the butt of the hook is located outside the window achieving the retention of the hook.

DESCRIPTION OF THE DRAWINGS

[0033] The present descriptive specification is completed with a set of drawings which illustrate but do not restrict the preferred embodiment of the invention.

Figure 1 shows a configuration drawing of a hook of those considered in the state of the art wherein the impossibility of working after being rotated 180° is shown.

Figure 2 shows a drawing of a first example of embodiment of the invention constituted by a first configuration of the hook and the window thereof in a first position.

Figure 3 shows a drawing of the same example of embodiment of the invention wherein the rail has now been rotated through 180°.

Figure 4 shows a drawing of a second example of embodiment of the invention constituted by a hook obtained with a single fold and the window thereof shown in a first position.

Figure 5 shows a drawing of the same second example of embodiment of the invention where the rail has now been rotated through 180°.

Figure 6 shows a drawing of a window or entrance cavity of the hook with the second lower area displaced horizontally.

Figure 7 shows a drawing of the first example of the invention with the end slightly bent to facilitate the entrance.

Figure 8 shows a drawing of a third example of the invention with a hook with an additional bend with respect to the hook used in the second example.

DETAILED EXPLICATION IN DIVERSE EMBODIMENTS

[0034] Figure 1 is a schematic representation (and therefore without rounding radii) of the state of the art wherein the impossibility is shown of using a "hanger" type hook in its reversed position.

[0035] The upper part of the figure shows the rail (1) in elevation and the lower part is a top plan (view seen from above) of the rail (1). The central elevation is that which represents the hooks (1.1) directed downwards.

[0036] The central representation shows the rail (1) installed in the door structure (2) (section in black). The assembly kinematics consists of a first insertion of each of the hooks (1.1) into its corresponding window and a second downward movement which leaves the rail (1) resting on the bottom edge of the window.

[0037] The representation on the right shows the same rail (1) rotated through 180° with its hooks (1.1) inserted in each window. The vertical and downward direction of the action of gravity prevents this securing from being functional.

First example

[0038] In figure 2 a perspective is shown in outline of a segment of rail (1) for window regulators with a means of securing consisting of a hook (1.2) according to the

present invention.

[0039] This means of securing will continue to be termed "hook" although it does not have the characteristics of the hanger type hooks of the state of the art.

[0040] In figure 2 the trihedron is also represented which determines the axes of coordinates as they have been taken in this description. The z-axis is the vertical axis, the y-axis will be taken as perpendicular to the main surface of the rail (1) from which emerges the hook (1.2) and finally the x-axis is prolonged horizontally and parallel to this same surface.

[0041] The hook (1.2) is formed by a partial stamping in the rail (1) plus a double bend according to axes parallel to the z-axis: a first bend that projects according to the y-axis, outwards, giving rise to what in the description has been termed the first segment (1.2.1) or root, and after the second fold is the second segment (1.2.2) or butt.

[0042] The first segment is prolonged parallel to the y-axis and the second segment is mainly contained in the x-z plane. The word "mainly" is used since it can have a third fold (1.2.3) such as is shown in figure 7, also according to an axis parallel to the z-axis, which gives a small angle of inclination on the end of the hook (1.2) to allow easier entry into the corresponding window or cavity of the door structure.

[0043] In this same figure 2 a detail of the cavity has been represented (2.1) of the door structure which receives this hook (1.2). The cavity (2.1) has been defined by means of a dashed line in which in turn it is possible to distinguish two areas: an upper first area (2.1.1) and a lower second area (2.1.2) of smaller dimensions.

[0044] The first area (2.1.1) corresponds at least to the projection of the hook (1.2) on a plane parallel to the plane with x-z coordinates giving rise to a cavity (2.1.1) which is capable of receiving the hook (1.2) when in the first operation it is inserted in the door structure.

[0045] When the hook (1.2) has been inserted, a section of this hook according to the middle plane of the metal sheet (2) that forms the door structure wherein the cavity or window (2.1) is to be found according to the rectangular hatched representation (1.2.1).

[0046] This section corresponds to the first segment (1.2.1) of the hook (1.2) which is that which will rest on the rim of the cavity or window (2.1) supporting the vertical loads of the rail (1).

[0047] The window has a second area (2.1.2) which prolongs the first (2.1.1). This second area (2.1.2) coincides with the section of the hook (1.2) and is where the latter (1.2) is housed definitively after the downward vertical displacement.

[0048] The assembly kinematics required for the installation of the rail (1) is the following:

- The rail is directed by means of a horizontal movement according to the y-axis towards the door structure.
- When the hook (1.2) has been introduced into the

corresponding cavity (2.1), a downward vertical movement is made.

[0049] Figure 3 is a representation of the same hook (1.2) rotated through 180° according to the y-axis by rotating the rail which holds it. A configuration results from this rotation which is equivalent to a symmetry with respect to a plane parallel to the y-z coordinates plane.

[0050] For its part, the window or cavity (2.1) which receives the front rail has a configuration symmetrical to the window which receives the rear rail (the rear rail being the same rail as the front one to which a rotation of 180° has been applied with respect to the y-axis) with respect to the same y-z plane. It is necessary to point out that the cavity (2.1) does not have a configuration that corresponds to a rotation of 180°. This aspect is irrelevant since the important thing is that the rail (1) admits a rotation of 180° and the fastening means maintains its functionality. The configuration of the cavity (2.1) on the door structure (2) is what the hook requires and does not affect the advantages of the invention.

Second Example

[0051] This second example is represented in figures 4 and 5.

[0052] The hook (1.3) is now constituted by means of a double fold. Observe that with the numbering 1.1, 1.2 and 1.3 diverse configurations of the hook are identified, the first belonging to the state of the art.

[0053] With this fold in an L-shaped partial stamping, a hook is obtained which has a first segment (1.3.1) or root which is prolonged according to the y-axis in a second segment (1.3.2) coplanar with the first one (1.3.1).

[0054] This second segment (1.3.2) is prolonged toward one side and it is that which will serve as a butt.

[0055] In this case the cavity (2.2) or window is of smaller dimensions since the projection (2.2.1) of the hook on a plane parallel to the plane with x-z coordinates only has the thickness of the metal sheet with respect to the height of the cavity.

[0056] In the representation of the cavity (2.2) where the hook (1.3) enters, the hatched section of the root (1.3.1) is also shown according to the middle plane of the sheet metal of the door structure where the cavity (2.2) where the hook (1.3) enters is located.

[0057] A vertical displacement of this section (1.3.1) defines the continuation (2.2.2) of the first area (2.2.1) which completes the hollow of the cavity.

[0058] Considering the reversing operation, it is likewise established that the rail (1), after the rotation through 180° with respect to the y-axis has its hook (1.3) according to a symmetry with respect to a plane parallel to the plane with y-z coordinates. It is true that the symmetry is not established considering the cavity that remains after the stamping, however this cavity has no purpose whatever from the functional point of view. The cavity is the result of the stamping on obtaining the material from the

actual metal sheet of the rail (1) and this could even not exist in the event of using another manufacturing procedure. It can be affirmed therefore that the hook (1.3) establishes such a symmetry.

[0059] Just as in the previous example, the cavity (2.2) also maintains a symmetrical relationship according to the y-z plane with that corresponding to a hook (1.3) rotated through 180°.

[0060] The assembly kinematics is also coincident with that of the first example.

[0061] If it is required to include a small wedging angle on the butt (1.3.2), this is achieved not by means of a small fold, but by incorporating such an angle in the configuration of the internal segment of the butt (1.3.2).

[0062] In all cases it has been indicated that the areas established in the cavities (2.1, 2.2) are minimal by means of the term "at least". This means that the requirements imposed assure the entry of the hook (1.2, 1.3) in the cavity (2.1, 2.2) but, additionally, it is possible to enlarge such cavities or incorporate other small ones without the functionality being affected.

[0063] What is of greater entity, is the change that consists in establishing the second area (2.1, 2.2) of the cavity or window of the door structure displaced horizontally with respect to the position considered up to now.

[0064] The most advantageous feature in the pre-assembly operation is that this second area (2.1, 2.2) is immediately under where the section of the root (1.2.1, 1.3.1) of the hook is located so that the assembly kinematics, after the entry of the hook (1.2, 1.3) consists only of a downward vertical movement.

[0065] However, there can be situations which require overcoming some obstacle wherein the second area (2.1.2, 2.2.2) is slightly displaced horizontally.

[0066] Figure 6 shows schematically the configuration of the window for a hook (1.2) like that of the first example. The entry of the segment of the root (1.2.1) into the second area requires a horizontal displacement. This displacement has to be defined equally both in the cavity of the front rail (1) and in the rear one, since the assembly kinematics consists of a series of movements common to the two rails.

[0067] In this situation the capability of reversing the rail (1) is not affected, however it is possible that the symmetry of configuration of the cavity (2.1, 2.2) be affected.

Third Example

[0068] This third example represented in figure 8 can be considered as a variation with respect to the second example. For this reason each of the parts of the hook (1.4) of this third example are identified with the same numeric references as those employed in the second example except that use is made of the reference 1.4 instead of 1.3 to distinguish one example of embodiment from the other.

[0069] The hook (1.4) is likewise configured in as an L-shape with a first segment (1.4.1) which is prolonged

according to the y-axis and a second segment (1.4.2) coplanar with the first one (1.4.1).

[0070] The main difference is in the end (1.4.3) of the butt (1.4.2) which is raised with a certain angle giving rise to a small fold according to the y-axis. Likewise this example could be based on a configuration with the inclination of the end (1.4.3) of butt (1.4.2) downwards.

[0071] In the detail of the window (2.3) which admits the entry of the hook (1.4), it is observed how the first area has a coincident bent configuration, at least the same, with the projection according to the y-axis of the hook on the x-z plane, and the second area (2.3.2) located under the first one with a configuration coincident with the section of the root (1.4.1) of the hook (1.4).

[0072] In the description of the invention it has been indicated that in most cases a rotation of 180° applied to the rail (1) results in a hook which has vertical symmetry with respect to the first one and that the window which corresponds to the rotated hook also has vertical symmetry. This third example is the exception which demonstrates that the symmetry condition is not established in the totality of hook and window configurations.

[0073] However, this hook configuration falls within the invention since on being rotated through 180° it continues to be operative provided the window that receives the rotated hook has a first area configured according to the projection on the x-z plane of the hook in its new position.

[0074] The essential nature of this invention is not altered by variations in materials, forms, size and arrangement of the component elements, described in a non-restrictive manner, sufficient for an expert to proceed to the reproduction thereof.

Claims

1. Means of securing for reversible rails of dual rail window regulators **characterised in that** they consist of a hook (1.2, 1.3, 1.4) arranged on the rail (1) of the window regulator and a window (2.1, 2.2, 2.3) or cavity in the bodywork, where it is established that:

the hook (1.2, 1.3, 1.4) has two segments, a root segment (1.2.1, 1.3.1, 1.4.1) which emerges essentially perpendicular to the front surface of the rail (1), plus a second segment (1.2.2, 1.3.2, 1.4.2) a continuation of the front one and which fulfils the function of a butt, and

the window (2.1, 2.2, 2.3) or cavity made in the bodywork is the sum of two areas, one (2.1.1, 2.2.1, 2.3.1) with a surface or cavity at least the same as the front projection of the hook (1.2, 1.3, 1.4) plus a second area (2.1.2, 2.2.2, 2.3.2) coincident with the section of the root (1.2.1, 1.3.1, 1.4.1) and positioned under the front area (2.1.1, 2.2.1, 2.3.1), the first (2.1.1, 2.2.1, 2.3.1) being able to have any geometry, where additionally the hook (1.2, 1.3, 1.4)

mounted both in the first position and in the reverse position with the window (2.1, 2.2, 2.3) corresponding to its position shows the butt (1.2.2, 1.3.2, 1.4.2), after assembly, with the front projection located outside the window (2.1, 2.2, 2.3).

2. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the configuration of the hook (1.2, 1.3) in the original position and the configuration obtained after a rotation through 180° corresponding to the reverse position, are symmetrical with respect to the y-z vertical plane.
3. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the configurations of the windows (2.1, 2.2) corresponding to the original and reversed positions of the hook (1.2, 1.3) are symmetrical with respect to the vertical y-z plane.
4. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the window or door cavity has an L-shaped configuration.
5. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the hook (1.2) is constituted by two folds according to axes parallel to an axis contained in the plane with x-z coordinates, giving rise to a root (1.2.1) which is projected according to the y-axis, plus a butt (1.2.2) parallel to the plane with x-z coordinates.
6. Means of securing for reversible rails of dual rail window regulators according to claim 5 **characterised in that** the parallel axes around which the two folds of the hook (1.2) are defined, are in turn parallel to the z-axis.
7. Means of securing for reversible rails of dual rail window regulators according to claim 5 **characterised in that** the end of the butt (1.2.2) is slightly open outwards to facilitate entry into the window (2.1).
8. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the hook (1.3) is constituted by a fold according to an axis parallel to the x-axis, giving rise to a root (1.3.1) which is projected according to the y-axis, plus a butt (1.3.2) coplanar with the root (1.3.1).
9. Means of securing for reversible rails of dual rail window regulators according to claim 8 **characterised in that** the butt (1.3.2) coplanar with the root (1.3.1) has a fold which gives rise to its oblique extremity (1.3.3).

10. Means of securing for reversible rails of dual rail window regulators according to claim 8 **characterised in that** the end of the butt (1.3.3) has its internal rim slightly oblique establishing a certain capability of wedging. 5
11. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the lower area (2.1.2, 2.2.2) of the window (2.1, 2.2) is displaced horizontally. 10
12. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the area of the window (2.1, 2.2) is prolonged in some of its boundaries with respect to the minimum area. 15
13. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the hooks are obtained by partial stamping and subsequent bending. 20
14. Means of securing for reversible rails of dual rail window regulators according to claim 1 **characterised in that** the hooks are obtained in aluminium by means of an injection process in which the hook emerges from the actual injection. 25

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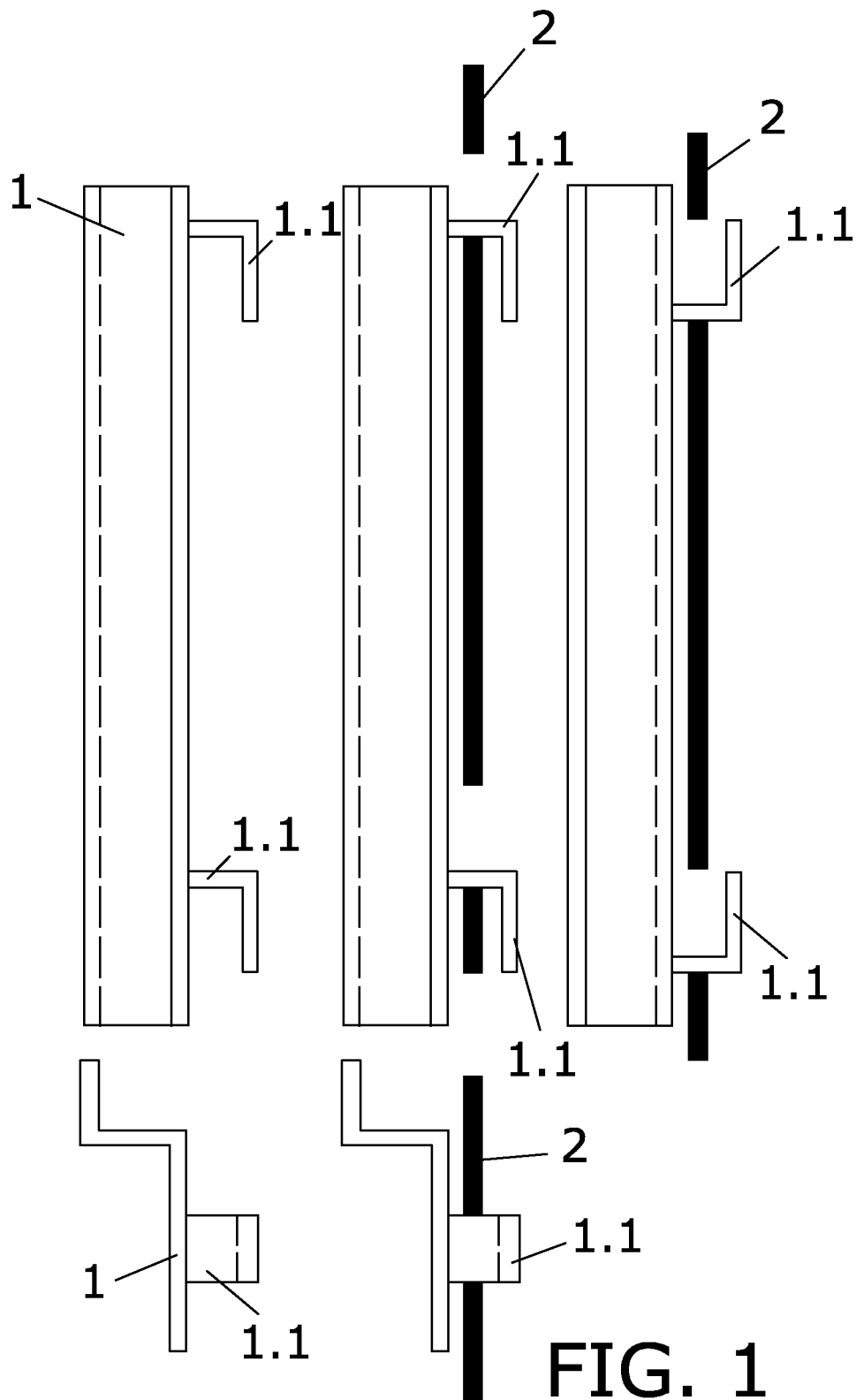
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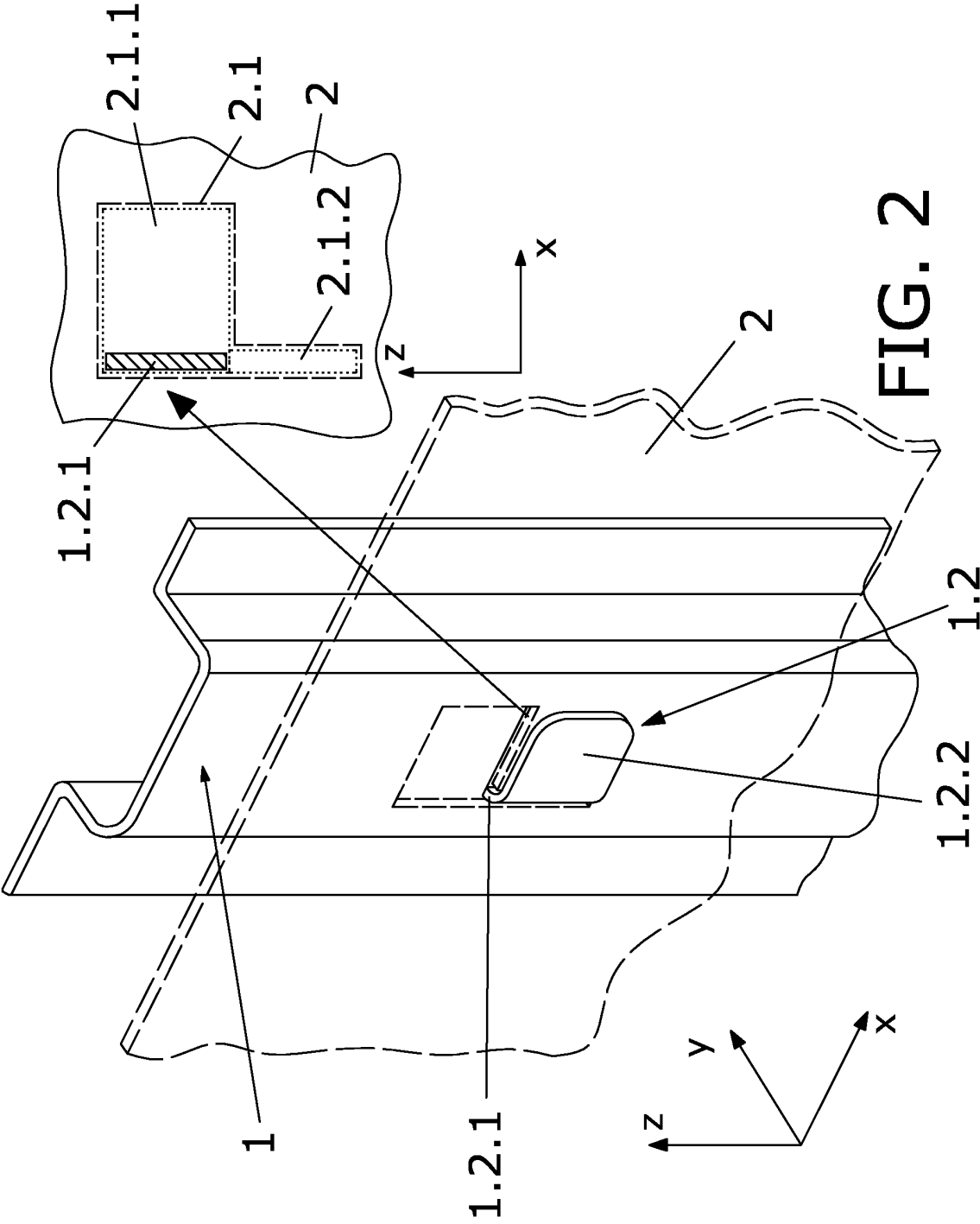
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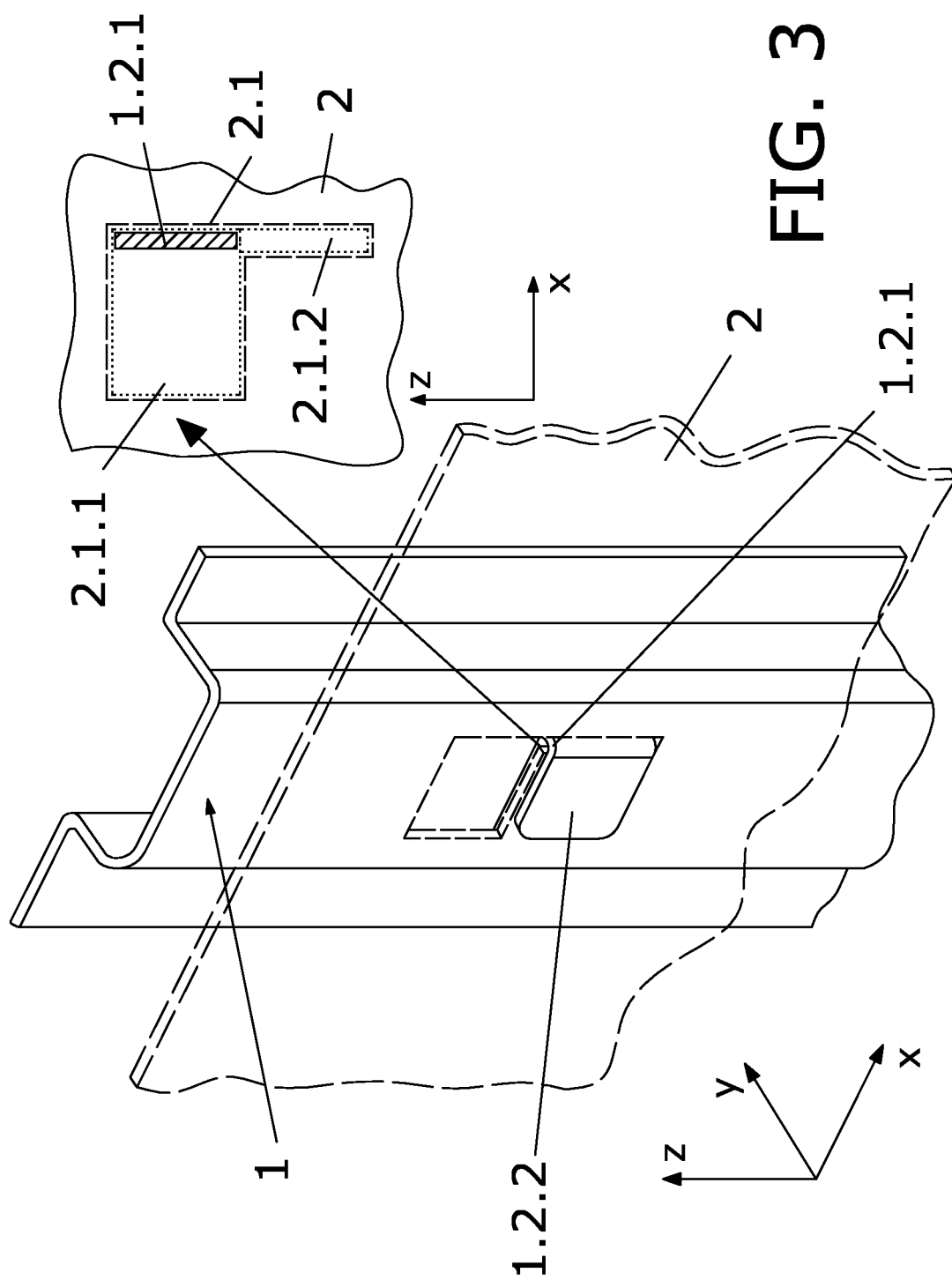
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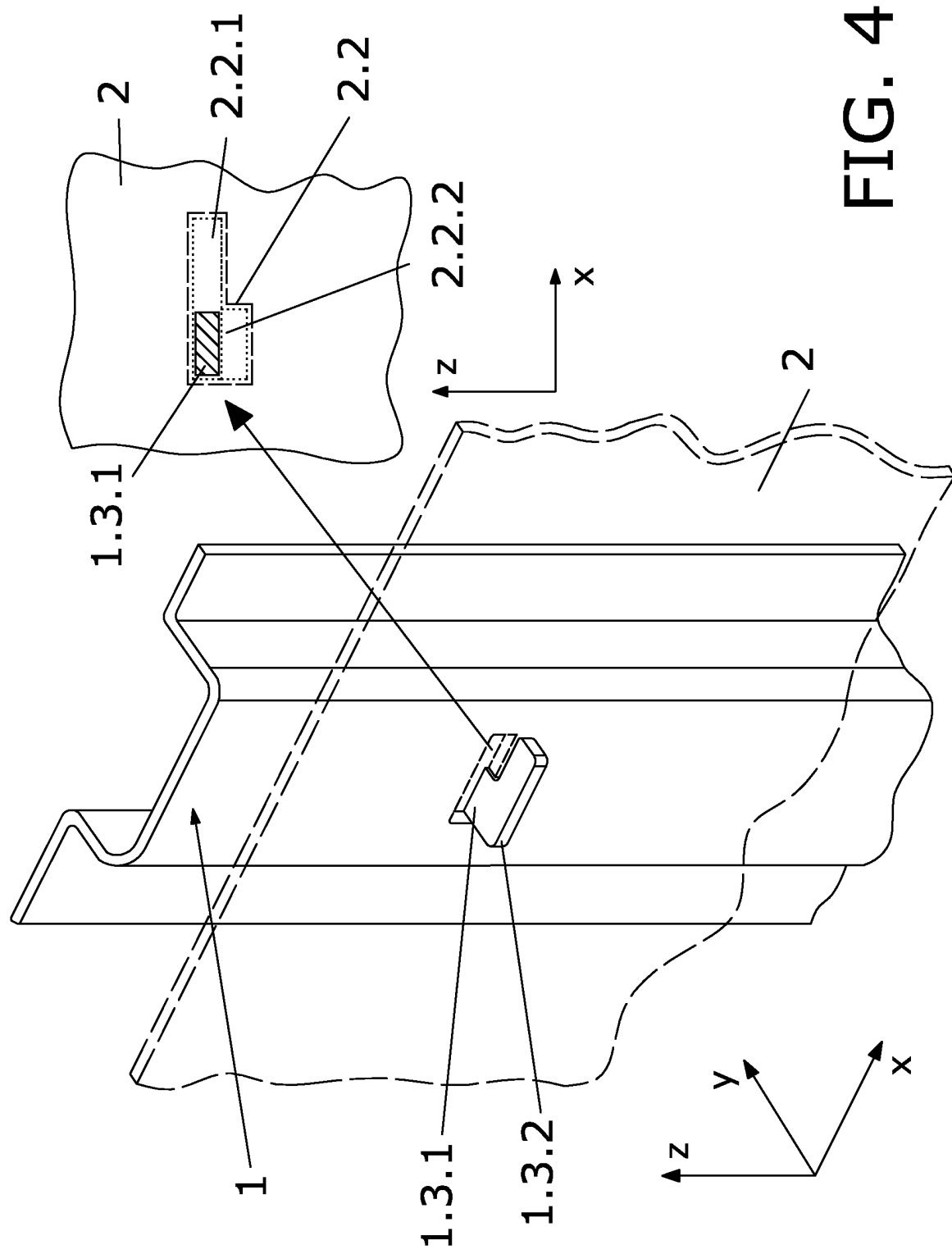
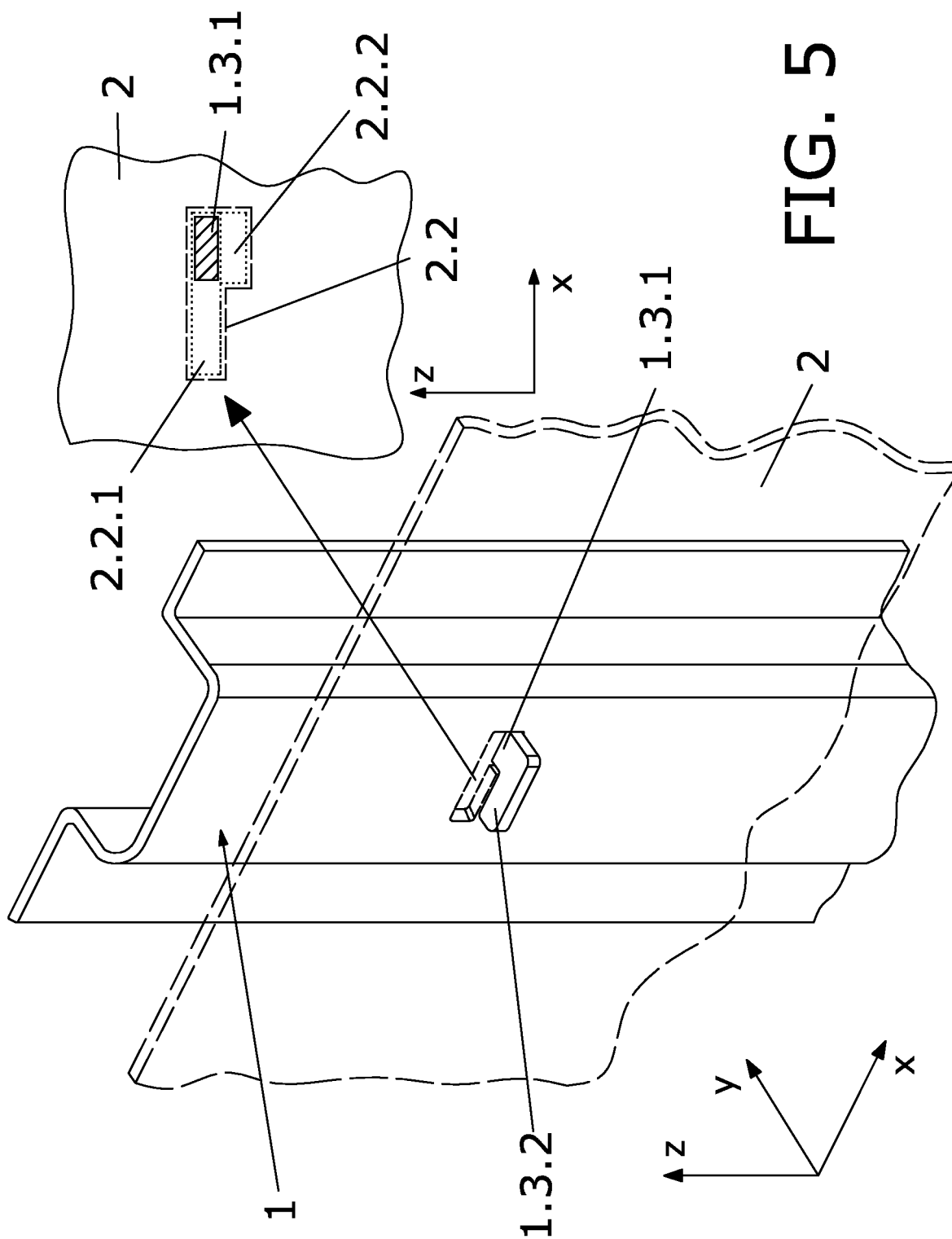


FIG. 4



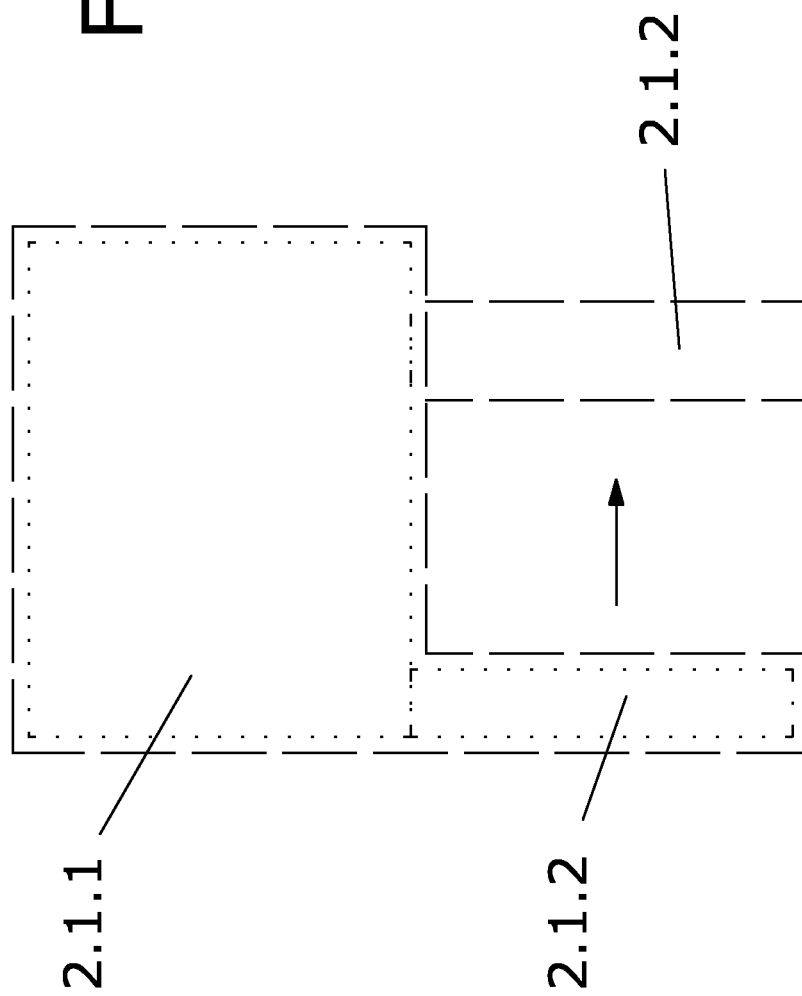


FIG. 6

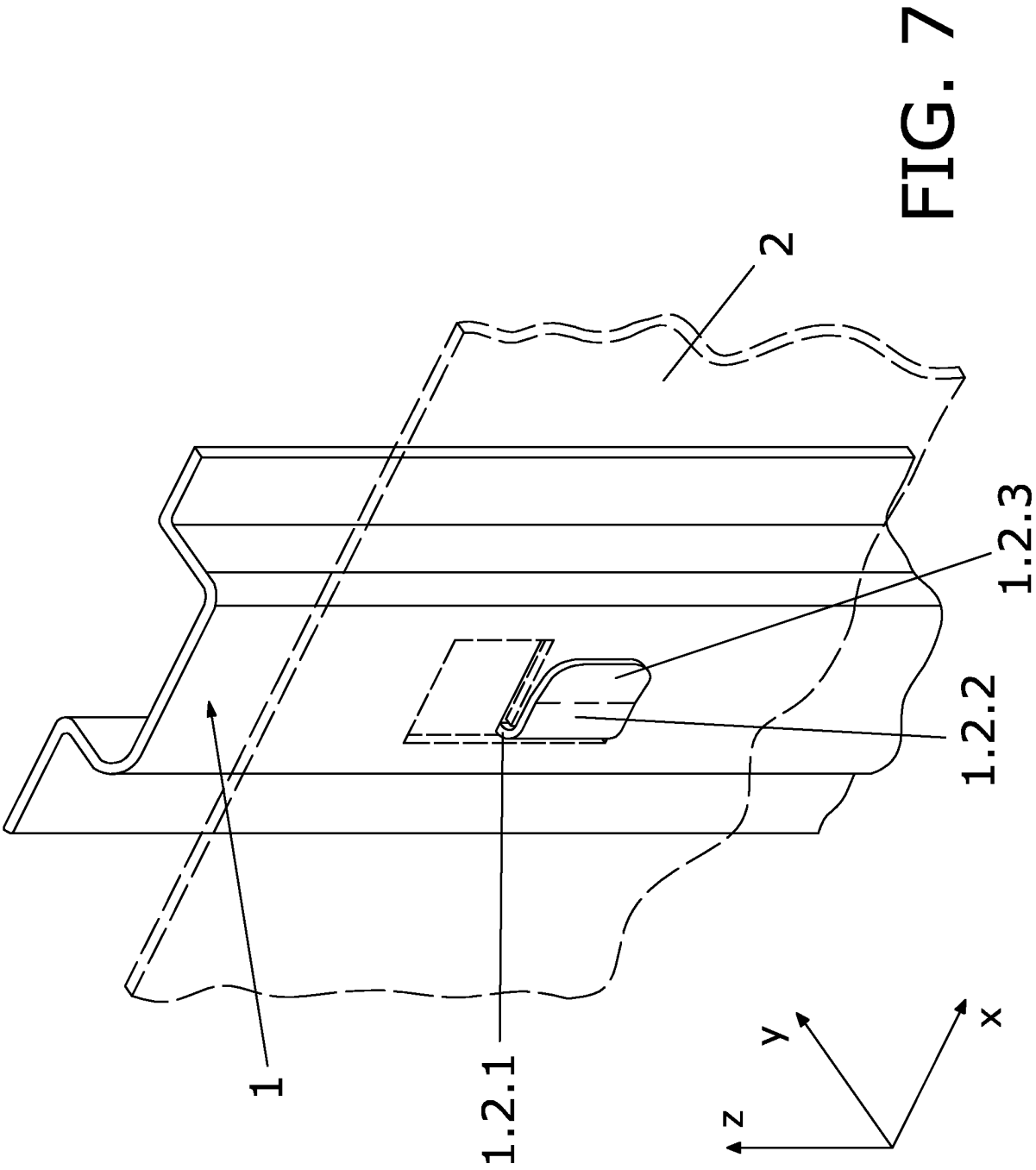
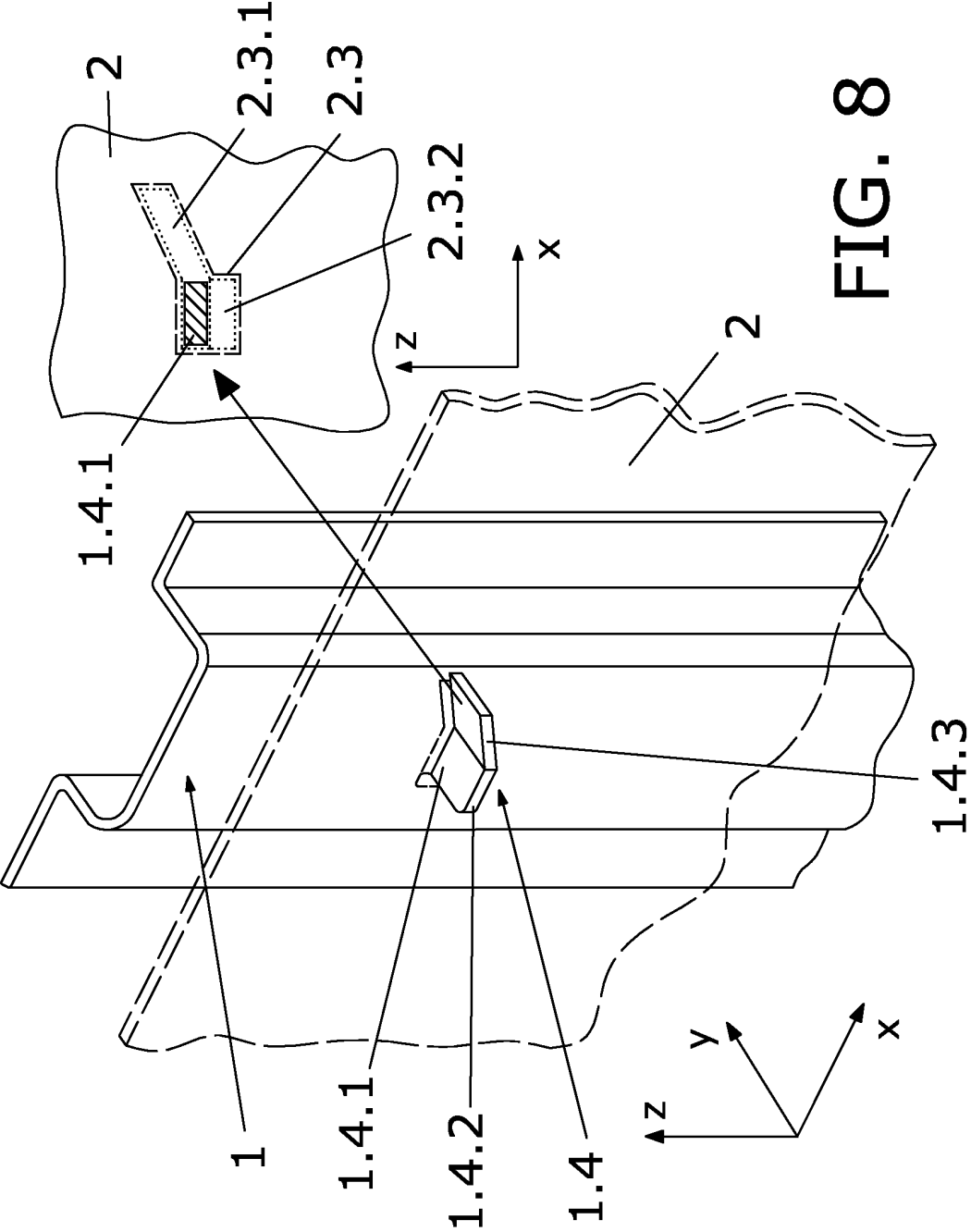


FIG. 7





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 38 1034

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 10, 10 October 2002 (2002-10-10) & JP 2002 160522 A (OI SEISAKUSHO CO LTD), 4 June 2002 (2002-06-04) * abstract; figures 2,3 *	1	B60J1/17 B60J5/04 E05F11/38
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