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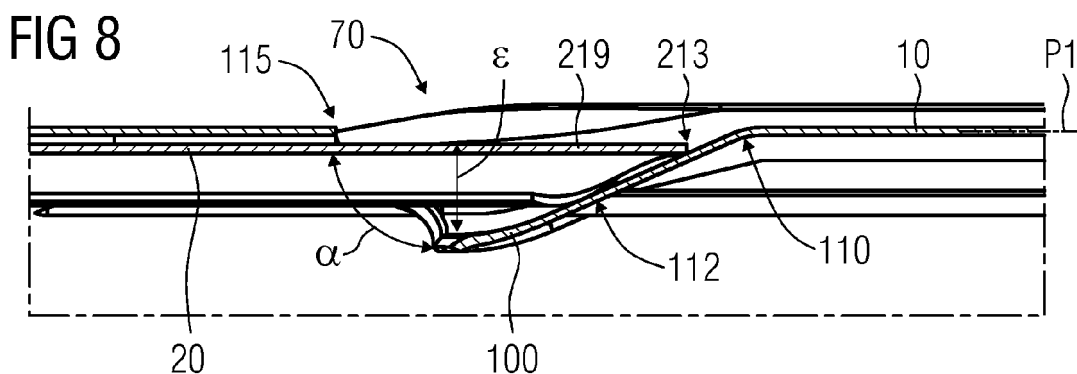
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(54) **Encasing for household appliances**

(57) The invention relates to an encasing for household appliances, especially household cooking appliances or household laundry washing and/or drying appliances or household dish washing appliances,
 - comprising wall elements (10, 20) connectable at corresponding connection points to each other and/or to a frame,
 - wherein at least some of the connection points are implemented by one or more corresponding lugs (100) and receiving portions (200) for receiving a corresponding lug (100) at or in the wall elements (10, 20) and/or frame,

- wherein at least one, preferably each, lug (100) has at most two free edges (112, 113) and/or a single free corner edge (125), whereas at all other sides of the lug a continuous transition to the wall element or frame is formed,
 - wherein the free edge(s) (112, 113) and/or the single free corner edge (125) of the or each lug (100) at least partially engage or engages with the corresponding receiving portion (200) and
 - wherein the least one, preferably each, lug (100) protrudes from a first plane (P1) of the wall element (10) or frame.



Description

[0001] The invention relates to an encasing for a household appliance.

[0002] Encasings are known, which use multiple sheet metal walls, surrounding and protecting the functional elements of the appliance on several or all sides. These wall elements are attached to each other or to one or multiple frame elements with different techniques, preferably screw joints, which allow for a later reopening of the appliance. This is on one hand important for maintenance, repair and recycling, but on the other hand creates difficulties during the assembly. Every screw requires a certain time during the assembly and almost always additionally requires a pre-cut thread in the wall or frame. Some screws even need a nut and screw retention.

[0003] EP 1 643 189 A2 shows an encasing for household ovens, which is pre-assemblable without screws as it makes use of insertion tongues and corresponding terminal openings. However these elements are easily bent and rendered useless, especially in the rough environment of manual continuous-strip production.

[0004] Therefore, it is an object of the invention to create an encasing which comprises wall elements that are easily and quickly fastened to one another and/or a frame

[0005] This object is achieved by the features of claim 1. Preferred embodiments are claimed in the dependent claims.

[0006] The encasing (or: housing, protection box) according to claim 1 is provided and meant for household appliances, especially household cooking appliances or household laundry washing and/or drying appliances or household dish washing appliances, and comprises wall elements connectable at corresponding connection points to each other and/or to a frame. Furthermore, according to claim 1, at least some of the connection points are implemented or formed by one or more corresponding lugs and receiving portion(s) for receiving a corresponding lug at or in the wall elements and/or frame. At least one, preferably each, lug has at most two free edges and/or a single free corner edge, whereas at all other sides of the lug a continuous transition to the wall element or frame is formed, i.e. no free edges can be found or are formed. For connection, the free edge(s) and/or the single free corner edge of the or each lug at least partially engage or engages with the corresponding receiving portion. The least one, preferably each, lug protrudes from a first plane of the wall element or frame.

[0007] This specific design and construction of the connecting points allows for an efficient and quick coupling of encasing parts with each other or a frame and is easy to manufacture.

[0008] In a preferred embodiment the at least one or each lug is formed by a, preferably L-shaped, recess or cut-out in the wall element or frame, this recess or cut-out extending inwardly from an outer edge of the wall element or frame along the first plane, wherein the at most two free edges and/or the corner edge of the lug are in each case inner edges of the recess or cut out and are arranged at a minimum distance from the outer edge of the wall element or frame.

[0009] Preferably the lug comprises a free front edge, being perpendicular or slightly inclined to a perpendicular direction to the outer edge of the wall element or frame and a free side edge being parallel or slightly inclined to a direction which is parallel to the outer edge of the wall element or frame at a minimal distance from this outer edge. In particular the front edge of the lug is shorter than the side edge. Furthermore, preferably, the front edge and/or the side edge are or is at least mostly straight or linear. In case there is a single free corner edge of the lug this is preferably formed or arranged where the front edge and the side edge meet.

[0010] In a further embodiment the front edge of the lug ends at an inner edge of the recess or cut-out which is spaced at a minimal distance from the outer edge of the wall element or frame and/or the side edge of the lug is spaced at a minimal distance from the outer edge of the wall element or frame, which minimal distance is preferably smaller than the minimal distance of the inner edge of the recess or cut-out from the outer edge of the wall element or frame. Preferably a front edge of the recess or cut-out runs from the inner edge perpendicular to the outer edge of the wall element or frame and/or preferably a rear edge of the recess or cut-out which is preferably curved concavely, connects the side edge of the lug with the outer edge of the wall element or frame.

[0011] In an advantageous embodiment the at least one or each lug has a bent or curved and/or twisted shape which is preferably generated by an embossment having slopes sloping downwards to an indentation of the embossment from the first plane.

[0012] In a further embodiment of the encasing a first wall element extends substantially along a first plane and has at its outer edge a flange bent or arranged perpendicularly to the first plane and a second wall element extends substantially along a second plane which is perpendicular to the first plane and has at its outer edge a flange bent or arranged perpendicularly to the second plane, wherein the lugs are at one of these wall elements and the receiving portions are at the other wall element, in particular the flange thereof. Preferably in the connected state the first wall element rests on or is in contact with the flange of the second wall element along the first plane and the flange of the first wall element is in contact with the second wall element along the second plane respectively.

[0013] In an advantageous and preferred embodiment the lug and/or receiving portion are or is formed integrally with the corresponding wall element or frame, wherein preferably the wall element(s) and/or frame are made from sheet metal and the lug and/or receiving portion are made integrally from said sheet metal by cutting and/or bending and/or punching or embossing the sheet metal material.

[0014] Preferably the receiving portion(s) is/are formed on one hand by a cut-out or recess in in the wall element or frame at its outer edge, preferably in the flange at this edge, and by a neighbouring section of the wall element or frame, in particular of the flange, on the other hand, wherein the lug is inserted into the cut-out or recess of the receiving portion and then moved below the neighbouring section or flange in an engaging or connecting movement, in particular thereby

5 forming a bayonet coupling,

[0015] Preferably the lug abuts or stops at a front edge of the cut-out or neighbouring flange of the receiving portion.

[0016] The recess or cut-out of the receiving portion is in particular formed rectangular and/or is in particular formed by cutting or die-cutting the sheet metal of the corresponding wall element or frame.

[0017] In addition to the connection points with the lugs at some further connection points screw connections can be provided.

[0018] Also claimed according to the invention is a household appliance, especially a household cooking appliance or household laundry washing and/or drying appliance or household dish washing appliance, having an encasing according to the invention.

[0019] The invention is hereinafter further explained by means of exemplary embodiments and reference to the attached drawings.

FIG 1 shows a perspective view of an appliance according to the state of the art,

FIG 2 shows a perspective view of an appliance according to the invention,

20 FIG 3 shows a detailed slightly downwards perspective view of the connection points in an unmounted state,

FIG 4 and FIG 5 depict an assembly process of a first vertical alignment step and a second horizontal engaging step,

25 FIG 6 shows a detailed perspective downwards view of two connection points

FIG 7 shows a detailed view of a mounting lug from above,

FIG 8 depicts in a sectional view a connected or engaged state of a mounting lug and a receiving portion and

30 FIG 9 and FIG 10 show a detailed lateral and (partially) sectioned view of a latching element

[0020] In FIG 1 a household appliance according to the prior art is shown having an encasing 1 which relies heavily on the usage of screws 60 at connection points to fix the upper wall 10 to the side walls 20, component carrier 50 and a possible inner frame (not depicted). In this embodiment at least six screws 60 are necessary, of which each takes a certain time and certain preparations during the assembly. Additional screws might be needed, to fix the other wall elements onto each other or onto a frame.

[0021] In FIG 2 a household appliance, in particular a household cooking oven or laundry washing and/or drying machine or dishwasher, having an encasing (or: housing, protection box) 1 according to an embodiment of the invention is shown. Here only two screws 60 are used at each side to fix the upper wall 10 as a first wall element to the side wall(s) 20 as second wall element(s) and the component carrier 50. Further screws between the upper wall 10 and the side walls 20 have been replaced with connection points 70 according to the invention.

[0022] The upper wall 10 extends substantially along a first plane P1 and has at its wall edge 110, being an outer edge of the wall element 10, a flange 119 bent or arranged perpendicularly to the first plane P1. Each side wall 20 extends substantially along a second plane P2 which is perpendicular to the first plane P1 and each side wall 20 has at its wall edge 210, being an outer edge of the wall element 20, a flange 219 bent or arranged perpendicularly to the second plane P2.

[0023] In the connected or engaged or mounted state preferably the upper wall 10 rests on the flanges 219 of the side walls 20 along the first plane P1 and the flanges 119 of the upper wall 10 are in contact with the side walls 20 along the second planes P2 respectively, thereby realizing a hooking function between the walls.

[0024] The walls are preferably made from sheet metal and have shapes according to their function including for instance reinforcing embossed or indented portions.

[0025] In FIG 3 and the following figures the connection points 70 according to this embodiment are shown in a more detailed view.

[0026] In the shown embodiments the connection points 70 for connecting two walls each comprise a mounting lug 100 which is at one of the walls, in this case the upper wall 10, and a corresponding co-acting or corresponding receiving portion 200 which is at the other wall, in this case the side wall 10.

[0027] The lugs 100 as well as the receiving portions 200 are preferably made or formed or shaped solely from the

sheet metal of the corresponding walls 10 and 20 by cutting and/or bending and/or punching or embossing the sheet metal material.

[0028] In the pre-assembly phase depicted in FIG 3, the upper wall 10 and the side walls 20 are not in contact yet, but already aligned to each other.

[0029] In FIG 4 and FIG 5 the assembly process is shown. In FIG 4 the upper wall 10 is moved downwards in a vertical movement along the vertical arrow shown and the lugs 100 are introduced from above into the receiving portions 200. FIG 5 shows the following forward movement of the upper wall 10 in the engaging direction towards the front along the horizontal arrow shown. During this horizontal engaging movement, a hooking connection or bayonet coupling between the lugs 100 and the receiving portions 200 takes place.

[0030] FIG 6 and 7 show the connection points 70 in further detail. In FIG 8 the connected state is shown in a sectional view.

[0031] The receiving portions 200 are formed by simple cut-outs in the flange 219 at the wall edge 210 of the respective side wall 20, preferably formed by cutting or die-cutting the sheet metal preferably before bending the flange 219, and comprise also a neighbouring section of the flange 219. As seen best in FIG 6 the cut-outs of the receiving portions 200 are preferably formed rectangular and comprise a front edge 213 and a rear edge 211 each running perpendicularly towards the wall edge 210 and a long inner edge 212 being distanced from the wall edge 210 and running parallel to this wall edge 210. The distance between the wall edge 210 and the inner edge 212 leaves enough space for the lug 100 to enter the receiving portion 200.

[0032] The mounting lugs 100 are formed by an approximately L-shaped cut-out 105 in the upper wall 10 extending from the wall edge 110 inwardly along the first plane P1 and are, thus, cut free at two edges only or only have two free edges 112 and 113. Each lug 100 comprises a shorter front edge 113 being perpendicular or slightly inclined to a perpendicular direction to the wall edge 110 and a longer side edge 112 being parallel or slightly inclined to a parallel direction to the wall edge 110 at a distance a from the wall edge 110. FIG 10 shows that the side edge 112 is inclined under the angle $\beta-90^\circ$, in this embodiment roughly 5° , with regard to the wall edge 110. This allows for an automatic alignment during the assembly. Furthermore the lug 100 has a free corner edge 125 in between the two free edges 112 and 113, which corner edge 125 is the only free corner of the lug 100. At all other sides of the lug 100 it is still connected to the wall 10, thus forming a continuous transition to the rest of the wall element 10.

[0033] The front edge 113 of the lug 100 ends at an inner edge 114 of the cut-out 105 which is spaced at a distance $b > a$ from the wall edge 105, which is also the length of a front edge 115 of the cut-out 105 running perpendicular to the wall edge 110. A rear edge 111 of the cut-out 105 which is preferably curved concavely connects the side edge 112 of the lug 100 with the wall edge 110.

[0034] Furthermore, each lug 100 has preferably a bent and/or twisted shape which is preferably generated by an embossment 120 having slopes 116 and 117 sloping downwards to an indentation 118 of the embossment 120 from the plane P1. As best seen in FIG 8, the mounting lug 100 is thus bent downwards from the plane P1 of the substantially plane upper wall 10 and follows in its larger part an inclination α of, in this embodiment, for example approximately 25° . It is also slightly twisted in an angle ε along its extension from the rear edge 111 towards the front edge 113.

[0035] The lug 100 is moved, as can be seen in FIG 8, in the engaging movement with its corner edge 125 and front free edge 113 first or ahead within the cut-out of the receiving portion 200 towards the front edge 213 of the flange 219, as is shown also in FIG 5, and, in the connected state, is then arranged with its corner edge 125 and partially with the free edge 112 and 113 below the flange 219 of the receiving portion 200 at each connection point 70, preferably until the lug 100 abuts or stops at the front edge 213 of the cut-out or neighbouring flange 219 of the receiving portion 200. This way a bayonet connection or coupling is achieved.

[0036] Regularly the fit between the embossment and the inclination is a sliding or interference or shape locking fit, it might however also be a location or transition or force fit, depending on the appliance. Some appliances might expand due to the heat generated inside during usage or might be under strong vibrations due to mechanical functions and thus be improved by a force-locking fit.

[0037] In FIG 9 and FIG 10 a detailed view of an exemplary latching mechanism is shown. In this embodiment, it simply consists of a relatively deep indentation 310, which fits in a corresponding hole 320, which in itself is at the bottom of a smaller indentation. The indentation 310 is formed on the edge of the upper wall 20 and reaches downwards onto the edge of the side wall 30. This edge is formed perpendicular to the substantially flat side wall and reaches in the direction of the inner parts of the appliance. This edge is a narrow plane, preferably of a width between five and fifteen millimetres, which is parallel to the upper wall 20. To enhance the stability, this edge is also folded inwards once. The sheet metal itself is preferably one to three Millimetres thick. Depending on this thickness of the material, such a connection point might be stronger than a comparable screw.

List of reference numerals

1 Encasing

(continued)

	10	Upper wall
	20	Side wall
5	40	Back wall
	50	Component carrier
	60	Screws
	70	Connection point
10	100	mounting lug
	105	recess
	110	wall edge
	111	rear edge
	112	side edge
15	113	front edge
	114	inner edge
	115	front edge
	116, 117	slope
20	118	indentation
	119	flange
	120	embossment
	125	corner edge
	α	inclination with regard to the substantially plane wall element
25	β	inclination with regard to the side edge of the plane wall element
	ε	twisted angle along the extension of the embossment
	P1	first plane
	P2	second plane
	a, b	distance
30	200	Receiving portion
	210	wall edge
	211	rear edge
	212	inner edge
35	213	front edge
	219	flange
	300	Latching element
	310	Latching indentation
40	320	Latching hole

Claims

1. Encasing for household appliances, especially household cooking appliances or household laundry washing and/or drying appliances or household dish washing appliances,
- comprising wall elements (10, 20) connectable at corresponding connection points to each other and/or to a frame,
 - wherein at least some of the connection points are implemented by one or more corresponding lugs (100) and receiving portions (200) for receiving a corresponding lug (100) at or in the wall elements (10, 20) and/or frame,
 - wherein at least one, preferably each, lug (100) has at most two free edges (112, 113) and/or a single free corner edge (125), whereas at all other sides of the lug a continuous transition to the wall element or frame is formed,
 - wherein the free edge(s) (112, 113) and/or the single free corner edge (125) of the or each lug (100) at least partially engage or engages with the corresponding receiving portion (200) and
 - wherein the least one, preferably each, lug (100) protrudes from a first plane (P1) of the wall element (10) or frame.

2. Encasing according to claim 1, wherein the at least one or each lug (100) is formed by a, preferably L-shaped, recess or cut-out (105) in the wall element (10) or frame, the recess or cut-out (105) extending inwardly from an outer edge (110) of the wall element (10) or frame along the first plane (P1), wherein the at most two free edges (112, 113) and/or the corner edge (125) of the lug (100) are in each case inner edges of the recess or cut out (105) and are arranged at a minimum distance (a, b) from the outer edge (110) of the wall element (10) or frame.
3. Encasing according to claim 1 or claim 2, wherein the lug (100) comprises a free front edge (113), being perpendicular or slightly inclined to a perpendicular direction to the outer edge (110) of the wall element (10) or frame and a free side edge (112) being parallel or slightly inclined to a direction which is parallel to the outer edge (110) of the wall element (10) or frame at a distance (a) from this outer edge (110), wherein in particular the front edge (113) of the lug (100) is shorter than the side edge (112) and/or wherein in particular the front edge (113) and/or the side edge (112) are or is at least mostly straight or linear.
4. Encasing according to claim 3, wherein the single free corner edge (126) of the lug (100) is formed or arranged where the front edge (113) and the side edge (12) meet.
5. Encasing according to claim 3 or 4, wherein the front edge (113) of the lug (100) ends at an inner edge (114) of the recess or cut-out (105) which is spaced at a minimal distance (b) from the outer edge (110) of the wall element (10) or frame and/or wherein the side edge (112) of the lug (100) is spaced at a minimal distance (a) from the outer edge (110) of the wall element (10) or frame, which minimal distance (a) is preferably smaller than the minimal distance (b) or the inner edge (114) of the recess or cut-out (105) from the outer edge (110) of the wall element (10) or frame.
6. Encasing according to claim 5, wherein a front edge (115) of the recess or cut-out (105) runs from the inner edge (114) perpendicular to the edge (110) of the wall element (10) or frame and/or wherein preferably a rear edge (111) of the recess or cut-out (105) which is preferably curved concavely, connects the side edge (112) of the lug (100) with the outer edge (110) of the wall element (10) or frame.
7. Encasing according to any of the preceding claims, wherein the at least one or each lug (100) has a curved or bent and/or twisted shape which is preferably generated by an embossment (120) having slopes (116 and 117) sloping downwards to an indentation (118) of the embossment (120) from the first plane (P1).
8. Encasing according to any of the preceding claims, wherein a first wall element (10) extends substantially along a first plane (P1) and has at its outer edge (110) a flange (119) bent or arranged perpendicularly to the first plane (P1) and a second wall element (20) extends substantially along a second plane (P2) which is perpendicular to the first plane (P1) and has at its outer edge (210) a flange (219) bent or arranged perpendicularly to the second plane (P2), wherein preferably in the connected state the first wall element (10) rests on the flange (219) of the second wall element (20) along the first plane (P1) and the flange (119) of the first wall element (10) is in contact with the second wall element (20) along the second plane (P2) respectively, wherein the lugs (100) are at one of these wall elements (10) and the receiving portions are at the other wall element (20), in particular the flange (119, 219) thereof.
9. Encasing according to any of the preceding claims, wherein the lug (100) and/or receiving portion (200) is formed integrally with the corresponding wall element (10, 20) or frame, wherein preferably the wall element(s) and/or frame are made from sheet metal and the lug and/or receiving portion are made integrally from said sheet metal by cutting and/or bending and/or punching or embossing the sheet metal material.
10. Encasing according to any of the preceding claims, wherein the receiving portion(s) is/are formed on one hand by a cut-out or recess in in the wall element or frame at its outer edge, preferably in the flange (219) at the edge (210), and by a neighbouring section of the wall element or frame, in particular of the flange (219), on the other hand, wherein the lug is inserted into the cut-out or recess of the receiving portion and then moved below the neighbouring section or flange (219) in an engaging or connecting movement, in particular thereby forming a bayonet coupling, wherein preferably the lug (100) abuts or stops at a front edge (213) of the cut-out or neighbouring flange 219 of the receiving portion 200
11. Encasing according to claim 10, wherein the recess or cut-out of the receiving portion (200) is formed rectangular and/or wherein the cut-out or recess of the receiving portion (200) is formed by cutting or die-cutting the sheet metal of the corresponding wall element (20) or frame.

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12. Encasing according to any of the preceding claims, wherein at some further connection points screw connections are provided.

5 **13.** A household appliance, especially a household cooking appliance or household laundry washing and/or drying appliance or household dish washing appliance, having an encasing according to any of the preceding claims.

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FIG 1

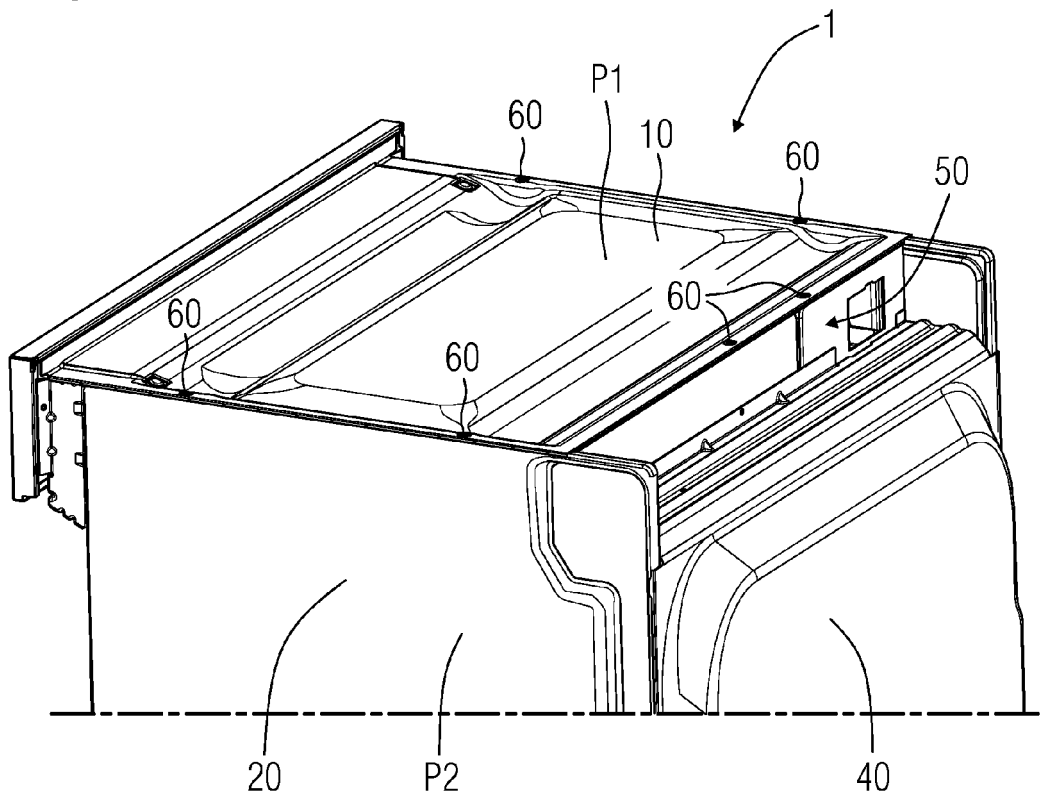


FIG 4

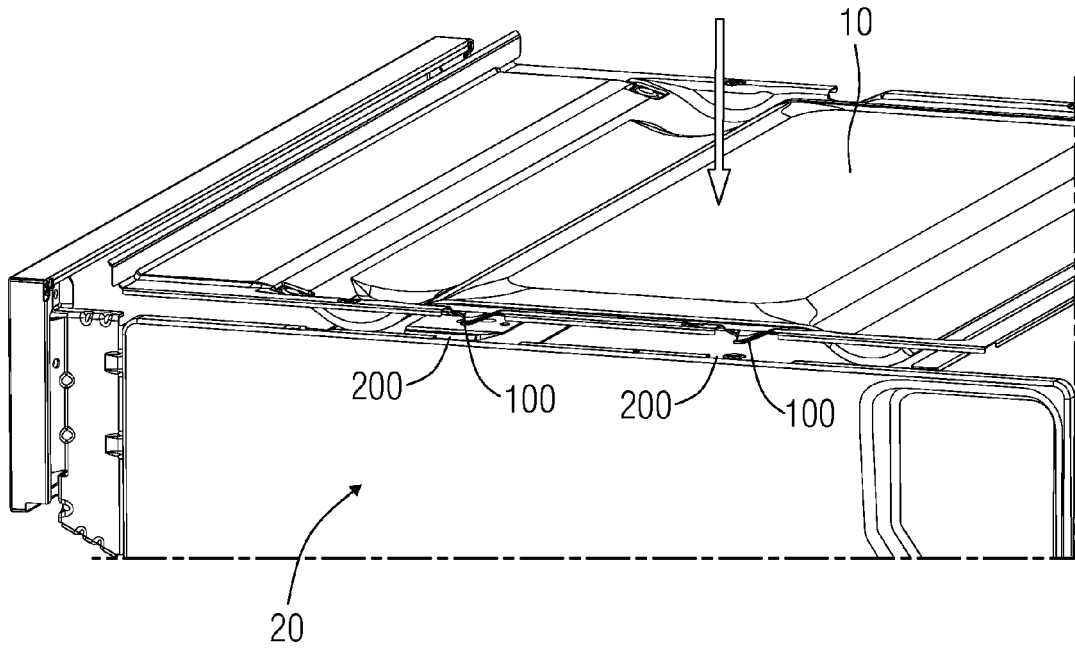


FIG 5

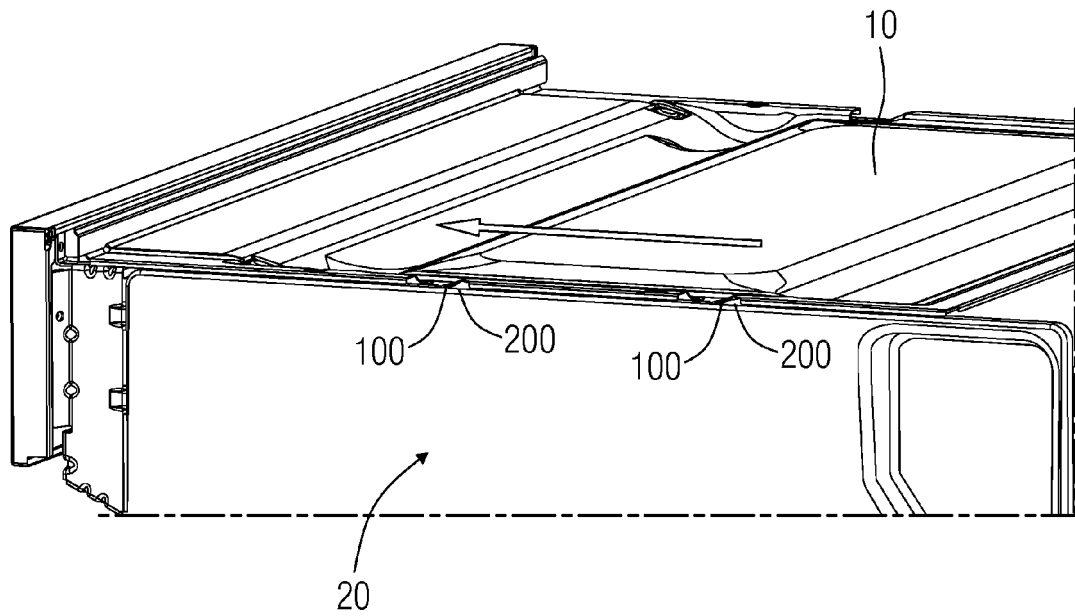


FIG 6

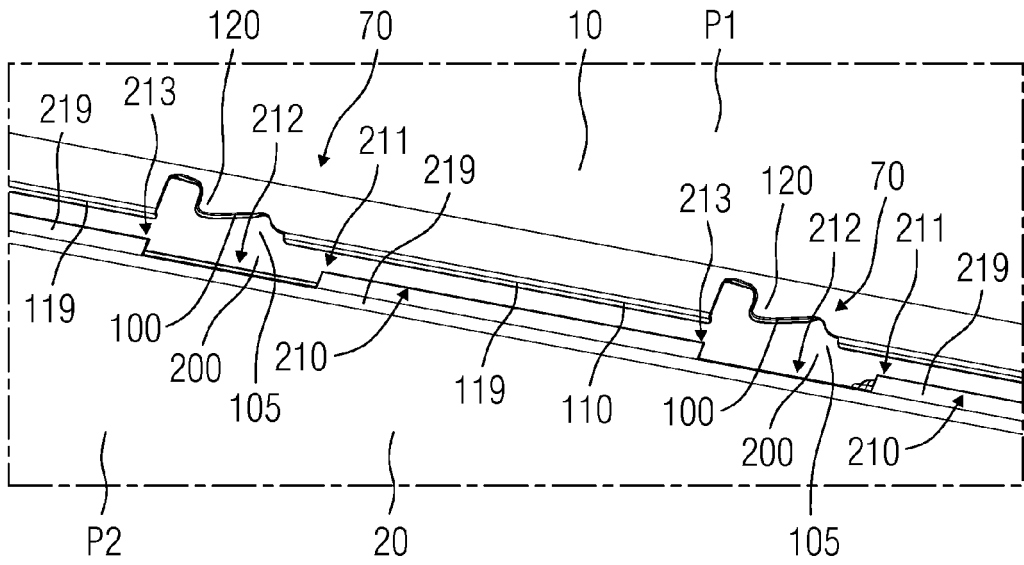


FIG 7

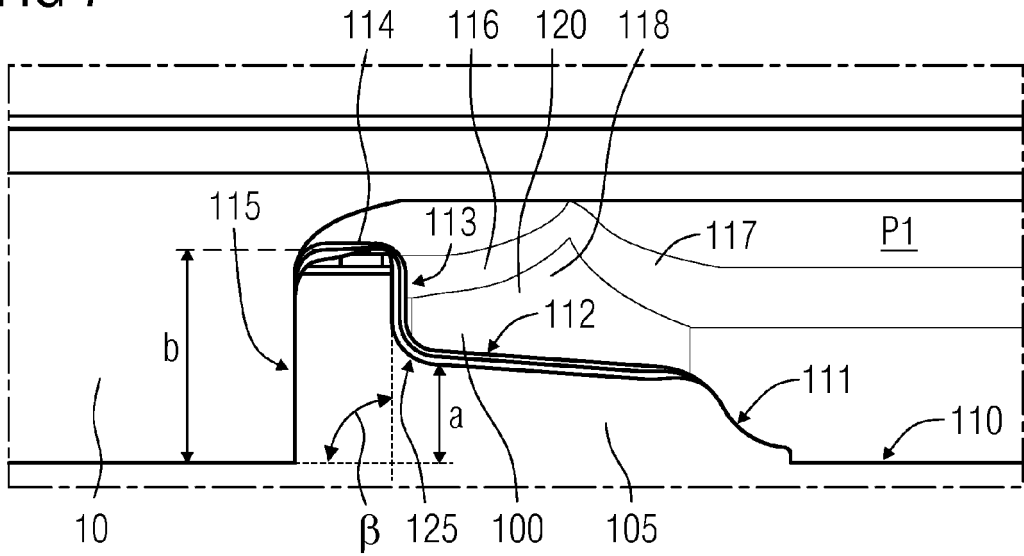


FIG 8

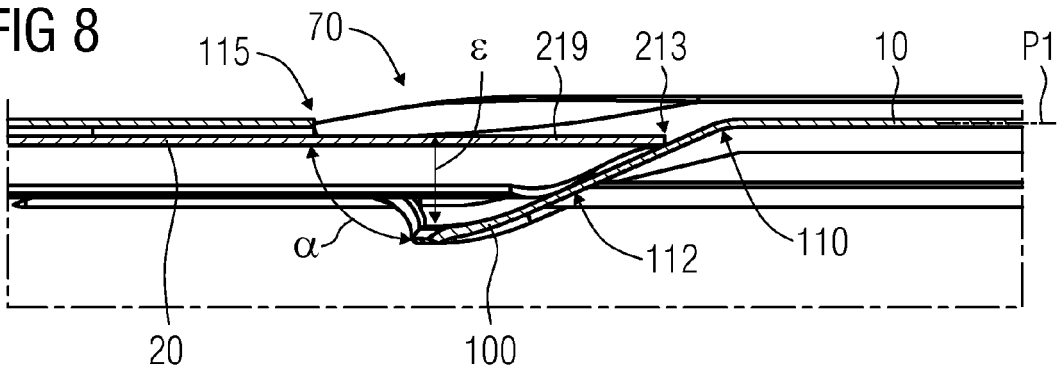


FIG 9

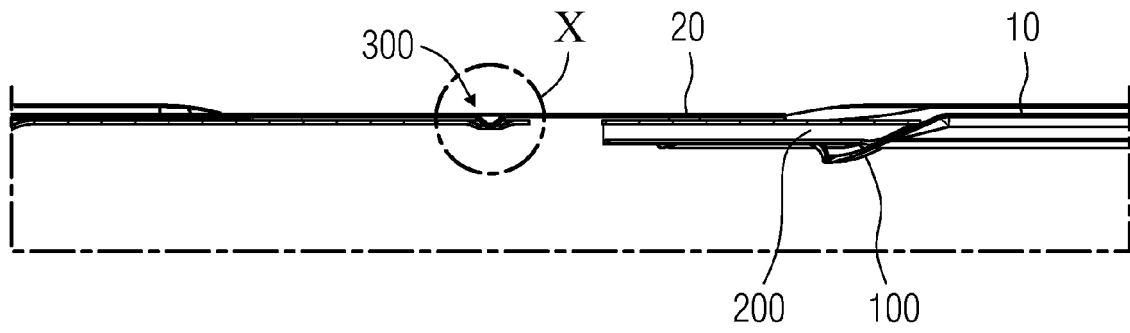
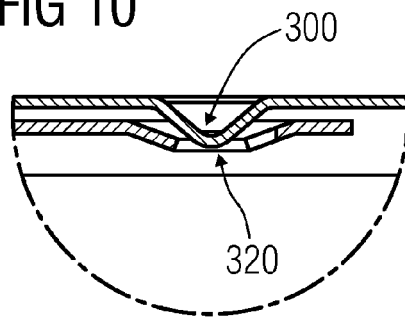


FIG 10





EUROPEAN SEARCH REPORT

Application Number
EP 13 15 7404

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
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