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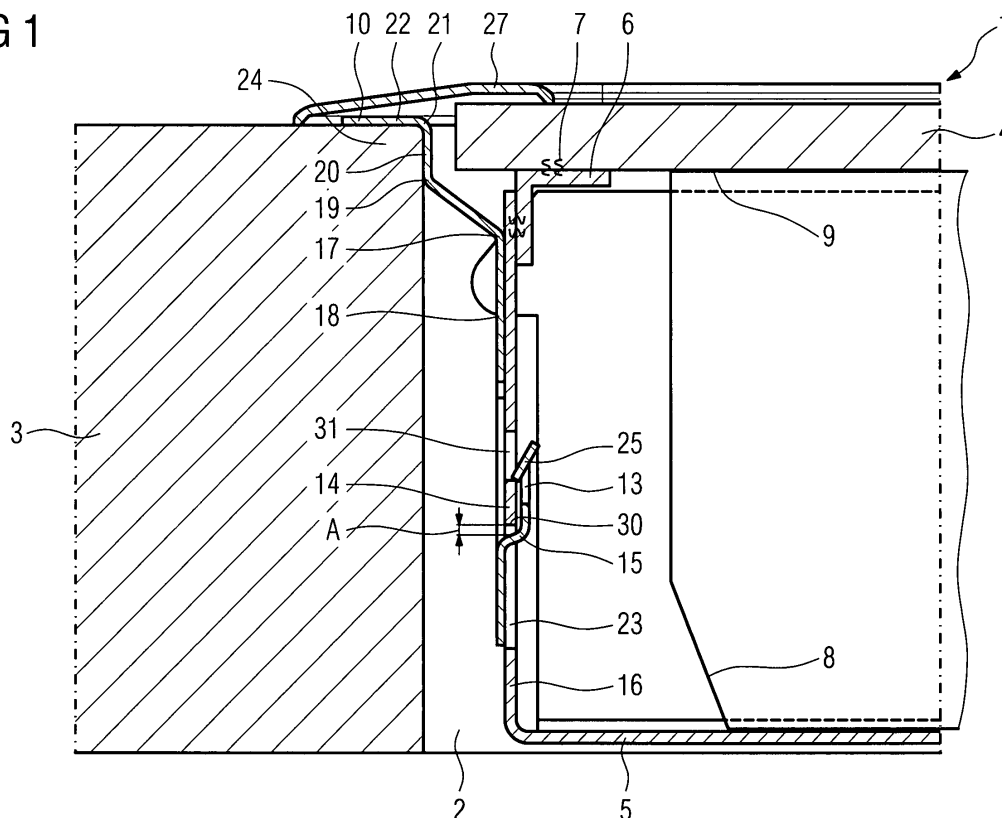
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(54) **Cooking hob with protection element**

(57) Cooking hob for installation within a cutout (2) of a worktop (3) comprising a cooking hob plate (4) and a housing (5) for accommodation of electrical components and/or heating elements (8), wherein the housing (5) is fixed to the cooking hob plate (4) and/or to a cooking hob frame (27) surrounding the

cooking hob plate (4), wherein the cooking hob (1) is provided with at least one protection element (10), which protects the housing (5) against descending, when the fixation of the housing (5) to the cooking hob plate (4) and/or to the cooking hob frame (27) is at least partially loosened intentionally or unintentionally.

FIG 1



Description

[0001] The present invention relates to a cooking hob for installation within a cutout of a worktop comprising a cooking hob plate and a housing for accommodation of electrical components and/or heating elements, wherein the housing is fixed to the cooking hob plate and/or to a cooking hob frame surrounding the cooking hob plate.

[0002] DE 198 35 140 A1 describes a cooking hob, comprising a glass-ceramic-cooking area for installation within a cutout of a worktop of a kitchen cabinet, wherein below the cooking area a tray with cooking plate-heatings is arranged and the cooking area provides a detachable fastening frame, which is connected to the tray. The connection of the cooking hob-fastening frame to the tray is carried out by resilient connection elements, to be hung to the fastening frame on one side and to be engageable to a support with the tray on the other side.

[0003] Such an arrangement has to keep the specified tolerances of its single components precisely, no play is tolerable in order to get a tight connection between the elements, in particular for the cooking hob-fastening frame, the tray and the resilient connection elements.

[0004] DE 103 41 847 B4 comprises a built-in cooking recess, the upper part of which is formed substantially by a cooking area, more especially a glass ceramic plate, and the base of which is formed substantially by a lower part, which downwardly terminates the built-in cooking recess, the cooking area and the lower part being interconnected by means of a frame substantially forming the lateral walls of the built-in cooking recess.

[0005] In a built-in cooking recess of this kind a complex profile is necessary for the frame forming the lateral walls of the built-in cooking recess.

[0006] DE 44 46 549 C2 comprises a support for a cooking hob within a worktop with a angle bracket and a counter bracket for a cooking hob within an adapted cutout of a worktop, wherein the angle bracket is mountable within the cutout and to be fixed at the worktop and provides a snap-in lug disposed aslant into the cutout, which is engageable with the counter bracket fastened to the cooking hob in a detachable snap-in connection and wherein the angle bracket with its angle leg formed at a connection bar has to be borne on the upper side of the worktop, wherein the cooking hob is insertable into the cutout.

[0007] In such an arrangement the usability is restricted, in particular the worktop has to provide a minimum thickness.

[0008] In all known cooking hobs described in the aforementioned documents a mechanical failure of the cooking hob frame or the connection elements would cause a descent or a downfall of the tray and therefore endanger kitchen furniture arranged below the cooking hob by eventually activated heating elements, in the worst case enflame the furniture.

[0009] An object of the present invention is to create an improved cooking hob of the said kind.

[0010] A solution of this object according to the invention is defined and characterized by independent claim 1. The dependent claims refer to further embodiments of the present invention.

[0011] According to the present invention the cooking hob is provided with at least one protection element (or: securing element), which protects (or: secures) the housing against descending (or: falling down), when the fixation of the housing to the cooking hob plate and/or the cooking hob frame is at least partially loosened (or: detached or: released or: disengaged) intentionally or unintentionally. Thus, descending of the housing is avoided and consequent endangerment of furniture arranged below the cooking hob by hot heating elements is excluded.

[0012] According to an advantageous embodiment of the invention the housing is provided with at least one recess and the protection element engages into this at least one recess or, in addition or alternatively the protection element is provided with at least one recess and the housing engages into this at least one recess. Hereby a secure connection between protection element and housing is established.

[0013] According to a further advantageous embodiment of the invention the position and dimensions of the at least one recess are designed and correspond with the position and dimensions of the engaging element (or: engaging part) in such a manner, that the protection element is not loaded by a force or put under mechanical tension when the fixation of the cooking hob plate and housing and/or cooking hob frame is not loosened and that when the fixation between cooking hob plate and housing and/or cooking hob frame is loosened, the protection element prevents descending of the housing at least in those areas of the cooking hob, where the fixation is loosened. Consequently and advantageously the protection element works as a back up element that comes to effect only when a failure of the fixation occurs.

[0014] According to another advantageous embodiment of the invention the protection element comprises a gap for accommodation (or: accommodating or: receiving) of the housing wall and the gap is directed upwards or the housing comprises a gap for accommodation of the protection element and the gap is directed downwards. Such gaps can easily be manufactured by various methods.

[0015] According to further advantageous embodiment of the invention a stopping surface is provided within the gap, wherein the housing wall stops or rests against the stopping surface or the stopping surface stops or rests against the protection element respectively, when the fixation of the housing to the cooking hob plate and/or the cooking hob frame is loosened and the housing wall or the protection element is spaced apart from the stopping surface at a distance when the fixation is not loosened. Such a stopping surface is provided as a defined stopping point, i.e. the magnitude of displacement of the housing relative to the cooking hob plate in a failure case can be determined by the vertical position of the stopping

surface.

[0016] According to another advantageous embodiment of the invention the protection element comprises a fastening portion, that is provided with a hook-shaped element and the gap is formed between the fastening portion and the hook-shaped element and/or that the housing comprises a hook-shaped element and the gap is formed between the hook-shaped element and the housing wall. In such a manner the gap can be manufactured easily, wherein form-closure (or: shape-locking or: positive locking) ensures a stable connection of both elements.

[0017] According to a further advantageous embodiment of the invention the hook-shaped element provides a structure on its one end, that at least partially projects into the gap, so that the width of the gap is smaller in that place than the material thickness of the housing wall and that the housing wall receives a clamping effect between the hook-shaped element and the fastening portion. This structure is a further advantageous fixation for the housing and also prevents lateral displacement of the housing.

[0018] According to another advantageous embodiment of the invention the protection element is provided with at least one bearing portion and bears with its bearing portion on the worktop. Thus, the protection element is supported by the worktop in a stable way, while easy installation is enabled.

[0019] According to another advantageous embodiment of the invention the protection element is provided with at least one connective portion, which is connecting the bearing portion with the fastening portion, in particular that the connective portion has such a shape, that the connection of bearing portion and fastening portion is provided resiliently. In such an embodiment the protection element is adapted advantageously to most loading cases that can emerge.

[0020] According to another advantageous embodiment of the invention the housing or the protection element is provided with recesses in at least two different heights (or: vertical positions or: vertical levels). These can be used according to the respective installation situation. No further additional measures (or: versions of components) are needed for realizing different designs or installation heights.

[0021] According to a further advantageous embodiment of the invention the housing is fixed to the cooking hob plate and/or the cooking hob frame by a glue or an adhesive connection and/or by adhered (or: glued) connection elements. In such a manner a simple and permanent fixation is established.

[0022] According to a further advantageous embodiment of the invention position and dimensions of the at least one recess are designed and correspond with the dimensions of the engaging element, so that electrical components and/or heating elements that are arranged within the housing are still in contact with the lower side of the cooking hob plate, even when the fixation of the cooking hob plate and/or cooking hob frame is at least

partially loosened. In such a manner the cooking hob is ready to operate and can be used even when the fixation between cooking hob plate and housing frame is detached. Furthermore it is ensured that the heat generated by the heating elements is transferred mainly to the cooking hob plate and not to environment beyond the housing.

[0023] According to a further advantageous embodiment of the invention the housing is provided with at least one slot (31) and the structure (25) engages into this at least one slot (31).

FIG 1 is a partial section view of a cooking hob embodying the invention mounted in a cutout of a worktop, wherein the housing is attached or fixed to the cooking hob plate;

FIG 2 is a partial section view of a cooking hob embodying the invention mounted in a cutout of a worktop, wherein the connection between cooking hob plate and housing is loosened;

FIG 3 is a perspective view illustrating a cooking hob with a protection element;

FIG 4 is a partial section view of a cooking hob with self-supporting cooking hob plate embodying the invention.

[0024] In FIG 1 to FIG 3 a cooking hob 1 is shown, that is arranged within a cutout 2 of a worktop 3. The cooking hob 1 comprises a cooking hob plate 4 and a housing 5, that are attached or fixed to each other by adhered or glued connection elements 6 non-detachably. Cooking hob plate 4 and housing 5 comprise such dimensions, that they can be inserted into the cutout 2 of the worktop 3. The gap or opening formed thereby is covered by a cooking hob frame 27, whereas the cooking hob plate 4 is supported by the cooking hob frame 27 onto the worktop 3. Typically electrical components and/or heating elements 8 are arranged within the housing 5, that can furthermore be pressed against the lower side 9 of the cooking hob plate 4 by the housing 5 or components arranged therein.

[0025] For avoiding an undesired descent of the housing 5 and the electrical components/heating elements 8 comprised therein, when a failure of the connection element 6 or the adhesive connection 7 occurs, a protection element 10 having a fastening portion 18, a connective portion 20 and a bearing portion 22 is provided. The protection element 10 can be manufactured in particular from sheet metal or sheet steel by punching and bending operations or made of a plastics material by injection moulding.

[0026] The fastening portion 18 provides a hook-shaped element 13, which is bent out in a first bending direction and again bent reversely, so that the hook-shaped element 13 then continues substantially parallel to the fastening portion 18 forming a gap 14, which pro-

vides such a width, that a housing wall 16 can be accommodated therein. The hook-shaped element 13 is connected to the fastening portion 18, whereby the connection forms a stopping surface 15. The protection element 10 engages into a recess 23 of the housing within the housing wall 16. Position and dimensions of the recess 23 are defined so that the upper edge 30 of the recess 23 does not bear on the stopping surface 15, when the glued or adhesive connection 7 between cooking hob plate 4 and housing 5 is in regular conditions and therefore the housing 5 is not supported by the protection element 10, thus the protection element 10 is not loaded by a force or is free of mechanical tension.

[0027] The distance A between the stopping surface 15 and the upper edge 30 of the recess 23 is therefore typically larger than 0.1 mm, preferably between 0.3 mm and 1.3 mm. A structure 25 is arranged at the end of the hook-shaped element 13 aslant to the hook-shaped element 13 and projects at least partly into the gap 14, so that in this region the width of the gap 14 is smaller than the material thickness of the housing wall 16. A slot 31 is arranged within the housing wall 16 in a position vertically displaced from the recess 23, so that the structure 25 engages at least partially into the slot 31. Thus a form-closure is established providing a play determined by the distance A.

[0028] The geometrical shape of the protection element 10 is determined by the three bendings 17, 19, 21. The protection element 10 is bent off at its first bending 17 in an angle smaller than 90°, and continues aslant away from the housing wall 16 in a connective portion 20. At the second bending 19 the protection element 10 is bent reversely in a second bending direction substantially opposite to the first bending direction, so that the connective portion 20 continues further substantially parallel to the fastening portion 18. Thus, the connective portion 20 has a slightly resilient property for the protection element 10. At the third bending 21 the protection element 10 is bent off, so that the protection element 10 continues in a bearing portion 22 substantially rectangular to the fastening portion 18. The protection element 10 bears on a boundary section 24 on the top surface of the worktop 3 by its bearing portion 22 that continues rectangular to the fastening portion 18. It is also possible that the bearing portion 22 bears on elements or recesses that are provided on the top surface of the worktop 3 or upon the side wall of the worktop 3 surrounding the cutout 2.

[0029] While FIG 1 shows a regular and intact adhesive connection 7 between housing 5 and cooking hob plate 4, FIG 2 shows a cooking hob 1 wherein the adhesive connection 7 is detached or loosened on one side of the connection element 6. The housing 5 has descended downwards and is no more fixed to the cooking hob plate 4. The protection element 10 restricts now the movement of the housing 5 in vertical direction and keeps it from further falling downwards. The upper edge 30 of the recess 23 of the housing now bears on the stopping

surface 15 of the protection element 10. The distance A now is 0 mm, the housing 5 is supported by the protection element 10 and further descending is prevented.

[0030] According to FIG 3 a protection element 10 is shown in perspective view. The protection element 10 has the already described bendings 17, 19, 21 and the portions 18, 20, 22. Within one wall of the housing 5 a recess 23 of the housing is provided, which accommodates a hook-shaped element 13 of the protection element 10. The shape of the protection element 10 is adapted to the design of the cooking hob 1 with a cooking hob plate 4, a housing 5 and a cooking hob frame 27 and corresponds to what was already described with regard to FIG 1 and 2. According to FIG 4 a cooking hob 1 is shown, providing a cooking hob plate 4 and a housing 5, whereas, different to what is shown in FIG 1 to FIG 3, the cooking hob plate 4 exceeds at least partly the dimensions of the cutout 2 of the worktop 3. The cooking hob plate 4 projects beyond the boundary section 24 at least partly on the worktop 3. A gasket 26 is provided in the boundary section 28 of the cooking hob plate 4 that projects above the boundary section 24 of the worktop 3, whereas the cooking hob plate 4 bears on the worktop 3 by means of the gasket 26. The gasket 26 also forms a joint 29 between cooking hob plate 4 and worktop 3. In particular the gasket 26 can be made of silicone or an adhesive, whereas the cooking hob plate 4 can be glued to the worktop 3 by its gasket 26. The material thickness of the protection element 10 is adapted to the joint 29 so that its bearing portion 22 is arrangeable or arranged and fits within the remaining space or gap between cooking hob plate 4 and worktop 3.

The elements shown in the figures are designated as follows

[0031]

- | | |
|----|-------------------------------------|
| 1 | Cooking hob |
| 2 | Cutout |
| 3 | Worktop |
| 4 | Cooking hob plate |
| 5 | Housing |
| 6 | Connection element |
| 7 | Adhesive connection |
| 8 | Heating element |
| 9 | Lower side of the cooking hob plate |
| 10 | Protection element |
| 13 | Hook-shaped element |
| 14 | Gap |
| 15 | Stopping surface |
| 16 | Housing wall |
| 17 | First bending |
| 18 | Fastening portion |
| 19 | Second bending |
| 20 | Connective portion |
| 21 | Third bending |

- 22 Bearing portion
- 23 Recess
- 24 Boundary section of the worktop
- 25 Structure
- 26 Gasket
- 27 Cooking hob frame
- 28 Boundary section of cooking hob plate
- 29 Joint
- 30 Upper edge of the recess
- 31 Slot
- A Distance between stopping surface and upper edge of the recess of housing

Claims

1. Cooking hob for installation within a cutout (2) of a worktop (3) comprising a cooking hob plate (4) and a housing (5) for accommodation of electrical components and/or heating elements (8), wherein the housing (5) is fixed to the cooking hob plate (4) and/or to a cooking hob frame (27) surrounding the cooking hob plate (4), wherein the cooking hob (1) is provided with at least one protection element (10), which protects the housing (5) against descending, when the fixation of the housing (5) to the cooking hob plate (4) and/or to the cooking hob frame (27) is at least partially loosened intentionally or unintentionally.
2. Cooking hob according to claim 1, wherein the housing (5) is provided with at least one recess (23) and the protection element (10) engages into this at least one recess (23) and/or wherein the protection element (10) is provided with at least one recess (23) and the housing (5) engages into this at least one recess (23).
3. Cooking hob according to claim 2, wherein position and dimensions of the at least one recess (23) are designed and correspond with the position and dimensions of the engaging element in such a manner, that the protection element (10) is not loaded by a force when the fixation of the cooking hob plate (4) and housing (5) and/or cooking hob frame (27) is not loosened and that when the fixation between cooking hob plate (4) and housing (5) and/or cooking hob frame (27) is loosened, the protection element (10) prevents descending of the housing (5) at least in that area of the cooking hob (1), where the fixation is loosened.
4. Cooking hob according to one of the preceding claims, wherein the protection element (10) comprises a gap (14) for accommodation of the housing wall (16) and the gap (14) is directed upwards or the housing (5) comprises a gap (14) for accom-

modation of the protection element (10) and the gap (14) is directed downwards.

5. Cooking hob according to claim 4, wherein a stopping surface (15) is provided within the gap (14), and wherein the housing wall (16) rests against the stopping surface (15) or the stopping surface (15) rest against the protection element (10) respectively, when the fixation of the housing (5) to the cooking hob plate (4) and/or the cooking hob frame (27) is loosened and the housing wall (16) or the protection element (10) is spaced apart from the stopping surface (15) at a distance when the fixation is not loosened.
6. Cooking hob according to claims 4 or 5, wherein the protection element (10) comprises a fastening portion (18), that is provided with a hook-shaped element (13) and the gap (14) is formed between the fastening portion (18) and the hook-shaped element (13) or wherein the housing (5) comprises a hook-shaped element (13) and the gap (14) is formed between the hook-shaped element (13) and the housing wall (16).
7. Cooking hob according to claim 6, wherein the hook-shaped element (13) provides a structure (25) on its one end, that at least partially projects into the gap (14), so that the width of the gap (14) is smaller in that region than the material thickness of the housing wall (16) and that the housing wall (16) is subject to a clamping effect between the hook-shaped element (13) and the fastening portion (18).
8. Cooking hob according to one of the preceding claims, wherein the protection element (10) is provided with at least one bearing portion (22) and bears with its bearing portion (22) on the worktop (3).
9. Cooking hob according to claims 6 and 8, wherein the protection element (10) is provided with at least one connective portion (20), which is connecting the bearing portion (22) with the fastening portion (18), in particular that the connective portion (20) has such a shape, that the connection of bearing portion (22) and fastening portion (18) is resilient.
10. Cooking hob according to claim 2 or one of the claims referring back to claim 2, wherein the housing (5) or the protection element (10) is provided with recesses (23) in at least two different heights.
11. Cooking hob according to one of the preceding claims, wherein the housing (5) is fixed to the cooking hob plate (4) and/or the cooking hob frame (27) by an

adhesive connection (7) and/or by adhered or glued connection elements (6).

- 12.** Cooking hob according to claim 2 or one of the claims referring back to claim 2, wherein position and dimensions of the at least one recess (23) are designed and correspond with the dimensions of the engaging element, i.e. the protection element or the housing, so that electrical components and/or heating elements (8) that are arranged within the housing (5) still be in contact with the lower side (9) of the cooking hob plate (4), even when the fixation of the cooking hob plate (4) and/or cooking hob frame (27) is at least partially loosened.

- 13.** Cooking hob according to claim 2 or one of the claims referring back to claim 2, wherein the housing 5 is provided with at least one slot (31) and the structure (25) engages into this at least one slot (31).

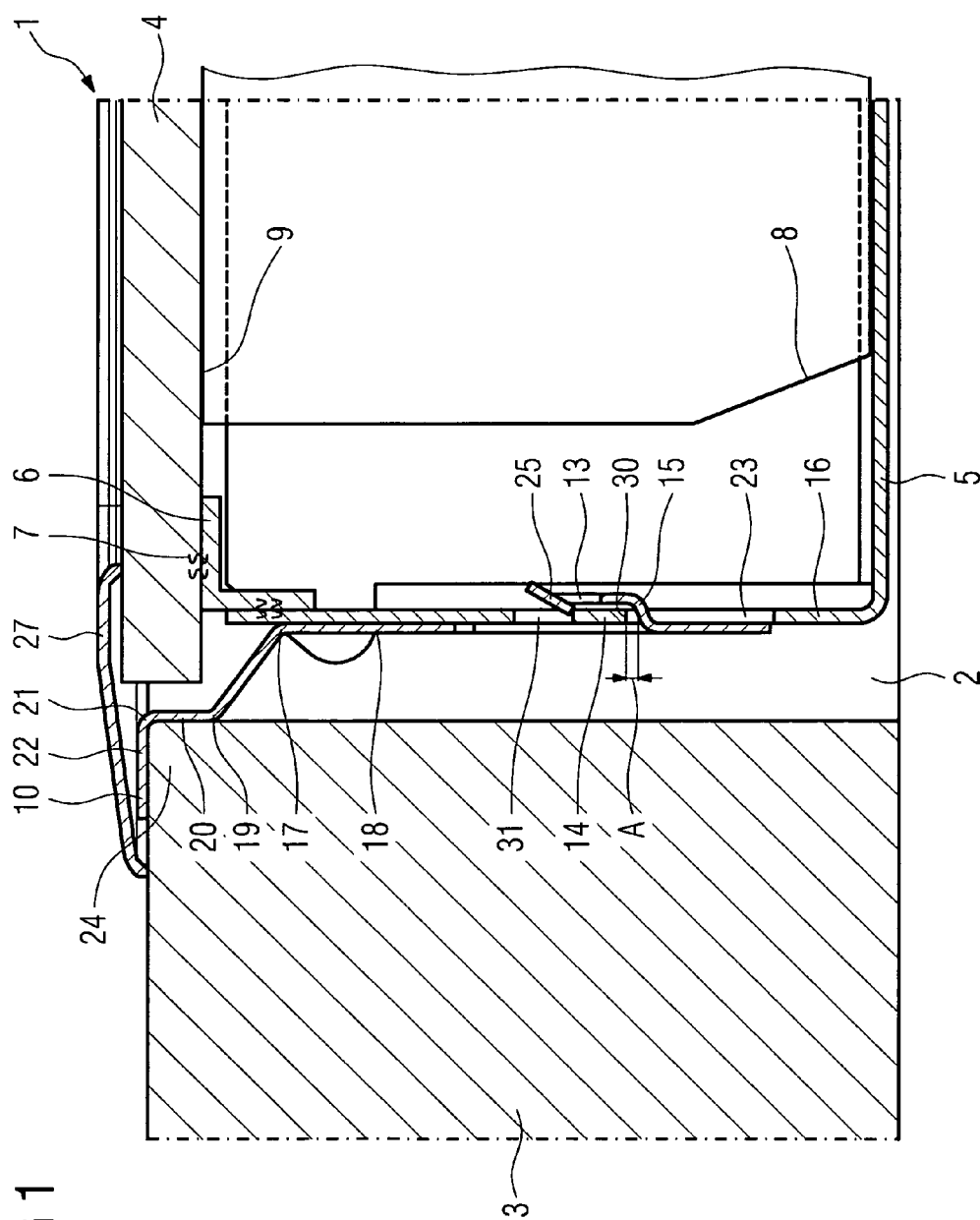


FIG 1

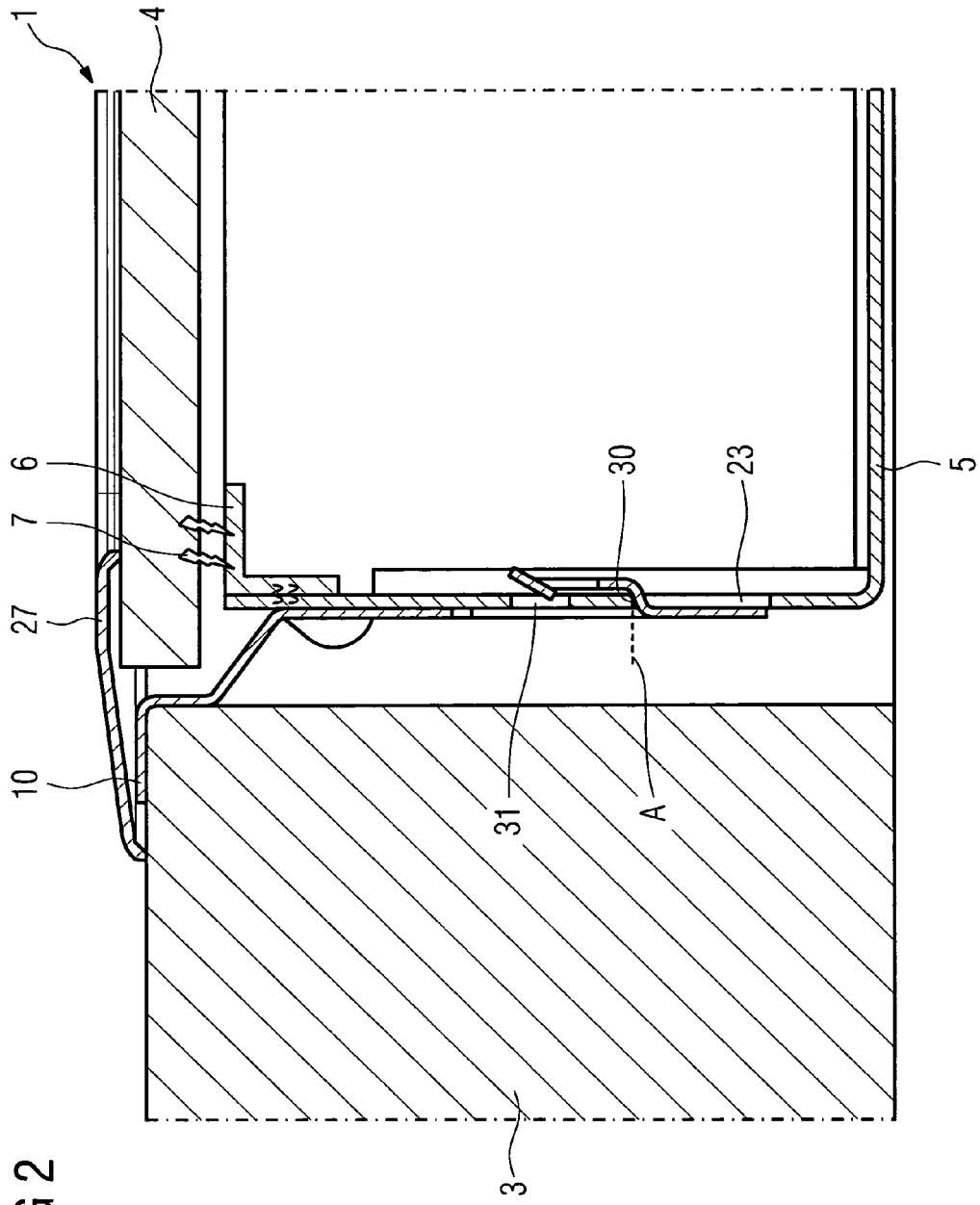
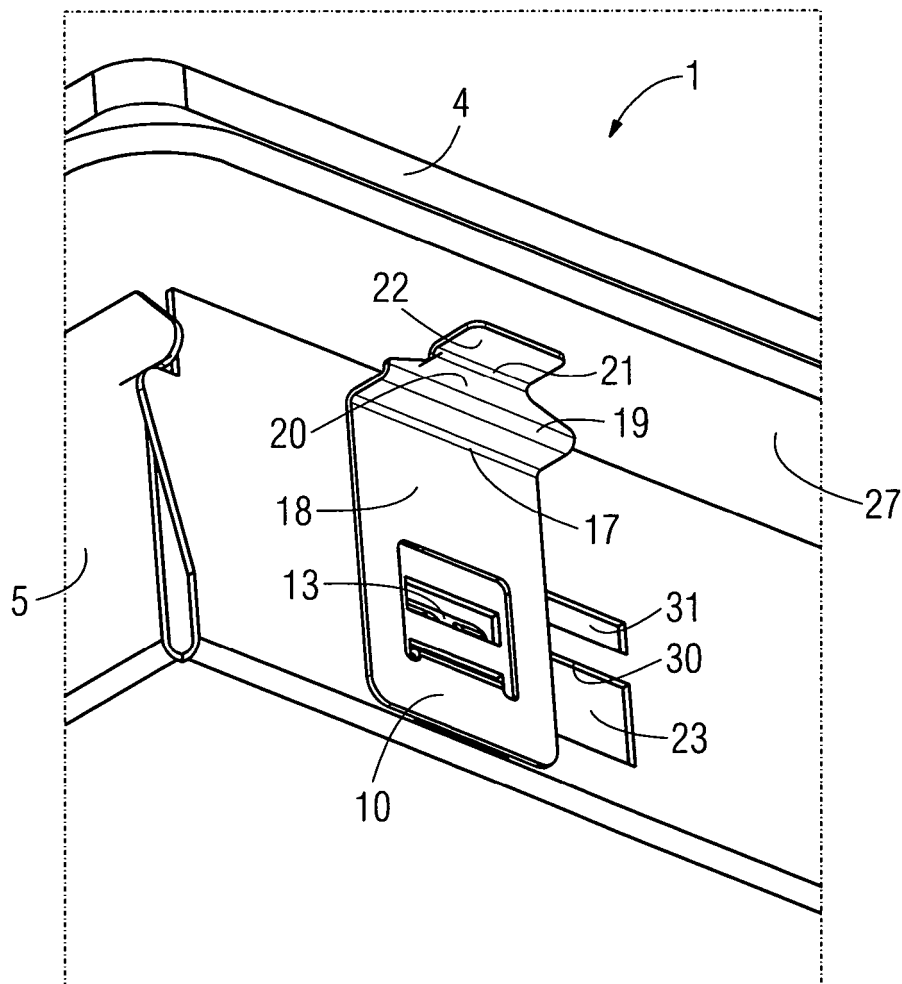
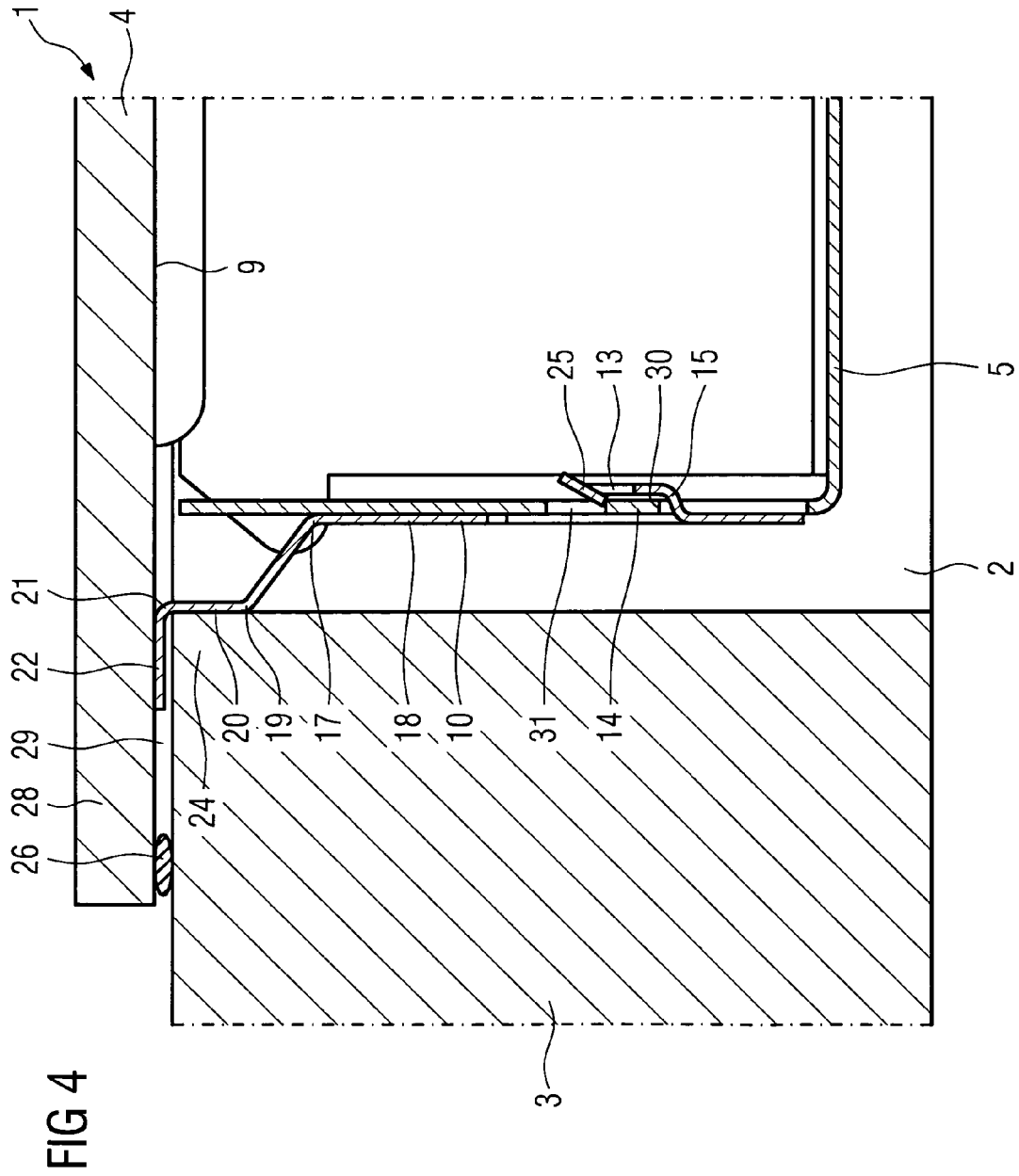


FIG 2

FIG 3







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EP 09 00 6047

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Place of search The Hague		Date of completion of the search 5 November 2009	Examiner Rodriguez, Alexander
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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