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(54) VEHICLE DOOR HANDLE ASSEMBLY

(57) The present invention refers to a vehicle door handle assembly comprising:
- a bracket (3) and,
- a movable handle (5) configured for moving between a retracted position wherein the handle (5) flushes with an outer side of a door panel skin (4) and a deployed position wherein the bracket (3) is arranged directly on an inner side of a door panel skin (4) and wherein the handle (5) is arranged on the outer side of the door panel skin (4) and is fastened to the bracket (3).

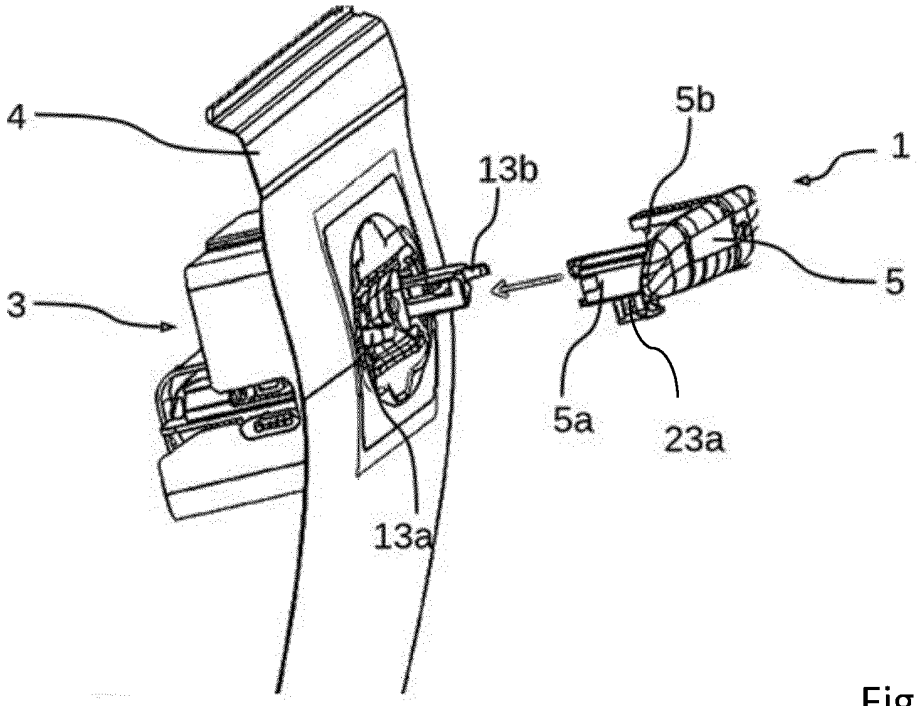

Fig. 7

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of vehicle door handles to control the opening of vehicle doors and in particular to retractable vehicle door handles configured for moving from a retractable position wherein the handle flushes with the outer side of the door panel to reduce drag when the vehicle is moving and a deployed position wherein the handle can be grabbed by a user to open the door.

BACKGROUND OF THE INVENTION

[0002] In the vehicle door handles of the state of the art, a support plate is glued on a inner side of the door panel skin around a central opening, then the handle assembly is fixed to the inner side of the support plate with the handle being located within the central opening. During the assembly, an external removable part is used to ensure the centering of the handle within the opening. Furthermore, spacers may be needed to ensure the flush position of the handle with respect to the outer side of the panel skin. Thus, the assembly of the handle on the door panel may be cumbersome to obtain the right positioning of the handle which has to flush with the outer side of the door panel notably because of the tolerances of the glued part with respect to the door panel.

SUMMARY OF THE INVENTION

[0003] It is therefore a goal of the present invention to provide a solution to simplify the assembly of the handle on the door panel and to reduce the overall cost by limiting the number of parts and the number of steps required for the assembly.

[0004] Thus, the present invention refers to a vehicle door handle assembly comprising:

- a bracket and,
- a movable handle configured for moving between a retracted position wherein the handle flushes with an outer side of a door panel and a deployed position

wherein the bracket is arranged directly on an inner side of a door panel skin and wherein the handle is arranged on the outer side of the door panel skin and is fastened to the bracket.

[0005] Such configuration wherein the bracket is arranged directly on an inner side of the door panel skin while the handle is arranged on an outer side of the door panel skin and is fastened to the bracket enables simplifying the assembly and getting rid of the support plate and the associated glueing step.

[0006] According to another aspect of the present invention, the bracket is fixed on the door panel skin by screws.

[0007] According to another aspect of the present invention, the bracket comprises a first and a second screws configured to be positioned respectively in a first and a second horizontal slots of the door panel skin for tightening the bracket to the door panel skin.

[0008] According to another aspect of the present invention, the bracket comprises a first and a second levers configured for protruding through at least one opening of the door panel skin towards the outer side of the door panel skin and wherein the handle comprises a first and a second sleeves configured to be fastened respectively to the first and the second levers.

[0009] According to another aspect of the present invention, the bracket comprises a deformable parallelogram mechanism, the first and the second levers of the bracket corresponding to two opposite branches of the deformable parallelogram.

[0010] According to another aspect of the present invention, the bracket comprises an actionable arm configured for displacing the deformable parallelogram from a retracted position to a deployed position wherein the first and second levers protrude through the at least one opening of the door panel skin to allow a fastening of the handle to the said first and second levers.

[0011] According to another aspect of the present invention, the bracket comprises a screw linked to the actionable arm and configured such that a rotation of the screw in a first rotating direction leads to a deployment of the deformable parallelogram and a rotation of the screw in the opposite direction leads to a retraction of the deformable parallelogram.

[0012] According to another aspect of the present invention, the handle is clipped to the bracket.

[0013] According to another aspect of the present invention, the vehicle door handle assembly comprises a first clip for fastening the first sleeve of the handle to the first lever of the bracket and a second clip for fastening the second sleeve of the handle to the second lever of the bracket.

[0014] According to another aspect of the present invention, the bracket also comprises an electrical actuator configured for displacing the deformable parallelogram between a retracted position associated with a flush position of the handle and a deployed position associated with a grabbable position of the handle.

[0015] According to another aspect of the present invention, the handle comprises a command button linked to the electrical actuator and configured to send a command signal to the electrical actuator to deploy or retract the handle.

[0016] The present invention also refers to a method for assembling a vehicle door handle assembly on a door panel, the door panel comprising a skin with at least one opening, the vehicle door handle assembly comprising a bracket comprising movable levers and a handle configured to be arranged on an outer side of the door panel skin and to be fastened to the bracket, wherein the method comprises the following steps:

- fixing the bracket directly on an inner side of the door panel skin,
- deploying a first and a second levers of the bracket through at least one opening of the door panel skin,
- fastening the handle to the first and second levers,
- retracting the handle in a flush position.

[0017] According to another aspect of the present invention, the bracket comprises:

- a deformable parallelogram mechanism, the levers of the bracket corresponding to two parallel branches of the deformable parallelogram,
- an actionable arm linked to the deformable parallelogram and configured for displacing the deformable parallelogram between a retracted position and a deployed position wherein the first and second levers protrude through the at least one opening of the door panel skin and,
- a screw linked to the actionable arm wherein the deploying step is achieved by rotating the screw in a first direction and the retracting step is achieved by rotating the screw in a second direction opposite to the first direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

FIG.1a is a perspective view of a piece of door panel skin and a bracket of a vehicle door handle according to an embodiment of the present invention;
FIG.1b is a perspective view of a door panel skin comprising two openings and two slots;
FIG.2 is a perspective view of the outer side of a door panel skin and the levers of a bracket protruding through openings of the door panel skin;
FIG.3 is a perspective and cut view of a bracket fixed to the door panel skin;
FIG.4 is a perspective view of a bracket and a gasket;
FIG.5 is a perspective and cut view of a bracket fixed on a door panel skin;
FIG.6 is a perspective view of a an inner side of a bracket according to the invention;
FIG.7 is a perspective of a door handle assembly partially arranged on a door panel skin;
FIG.8a is a perspective view of a handle during its clipping on the bracket;
FIG.8b is a perspective view of a handle clipped on the bracket;
FIG.9a is a perspective view of a first clip in a first position;
FIG.9b is a perspective view of a first clip in a second position;
FIG.9c is a perspective and cut view of a first clip clipped in the handle;
FIG.10 is a perspective view of a second clip;
FIG.11 is a flowchart of the different steps of a method for assembling a vehicle door handle assembly.

DETAILED DESCRIPTION OF THE INVENTION

[0019] The following achievements are examples. Although, the specification refers to one or several embodiments, it does not imply that each reference refers to the same embodiment or that the features apply only to a single embodiment. Simple features of different embodiments can also be combined to provide other embodiments.

[0020] In the following of the description, the terms up, upper, low, lower, vertical, horizontal refers to relative positions or directions when the door handle is assembled to a vehicle.

[0021] The present invention refers to a vehicle door handle assembly 1 comprising a bracket 3 configured to be fixed to a door panel skin 4 and a handle 5 configured to be fastened to the bracket 3. Fig.1a represents a perspective view of a door panel skin 4 and a bracket 3 configured to be fixed to the inner side of the door panel skin 4. As can be seen in Fig.1b, the door panel skin comprises a first 4a and a second 4b openings as well as a first 4c and a second 4d slots arranged respectively next to the first 4a and the second 4b openings. The slots 4c, 4d are directed towards a horizontal direction when the door panel skin 4 is assembled onto a vehicle and are configured for receiving screws 7 attached to the bracket 3 to enable the fixation of the bracket 3 to the door panel skin 4. Fig.2 represents the positioning of the screws 7 (pre-assembled to the bracket 3 on the side destined to be facing the door panel skin 4) in the openings 4a, 4b, next to the slots 4c, 4d. The screws 7 are then inserted into the slots 4c, 4d by displacing the bracket 3 laterally until the bracket 3 or the screws 7 come to a rest. As represented in Fig.3, the bracket 3 may comprise a pin 9 (or several) configured to come in contact with the door panel skin 4 to ensure the right lateral position of the bracket 3 when tightening the screws 7. Such pre-assembly of the screws 7 on the bracket 3 enables avoiding interferences between the bracket 3 and a gasket 11 arranged between the bracket 3 and the door panel skin 4 as represented in Fig.4. The bracket 3 also comprises a deformable parallelogram mechanism 13 configured for moving between a retracted and a deployed position. Two opposite branches 13a, 13b of the parallelogram correspond to a first 13a and a second 13b levers configured for protruding through the first 4a and second 4b openings in the deployed position of the deformable parallelogram mechanism 13 as represented in Fig.2 and Fig.5. Other parts of the deformable parallelogram mechanism 13 are more visible in Fig.6. The first lever 13a is configured to rotate around a first axis 15a and the second lever 13b is configured to rotate around a second axis 15b. Furthermore, the first 13a and the second 13b levers are linked by rods 13c corresponding to a branch of the deformable parallelogram mechanism 13.

[0022] The bracket 3 also comprises an actionable arm 17 (visible in Fig.6) configured for displacing the deformable parallelogram mechanism 13 from the retracted position to the deployed position. The actionable arm 17 is linked on its first end 17a to a mechanical actuator, a screw 19 in the present case, which is configured to displace the actionable arm in a first direction when the screw 19 is rotated in a first rotating direction and in a second direction opposite to the first direction when the screw 19 is rotated in a second rotating direction opposite to the first rotating direction. The actionable arm 17 is also configured to come in contact with the first lever 13a of the deformable parallelogram mechanism 13 at its second end 17b to push or pull on the said first lever 13a in order to displace the deformable parallelogram mechanism 13 from a retracted position to a deployed position. When the actionable arm 17 is moved in the opposite direction (through the rotation of the screw in the opposite rotating direction), the deformable parallelogram mechanism 13 is moved from its deployed position to its retracted position by the action of a return spring 21.

[0023] Furthermore, when the deformable parallelogram mechanism 13 is in the deployed position, the first 13a and the second 13b levers protrude on the outer side of the door panel skin 4 so that a handle 5 can be fastened to the said first 13a and second 13b levers as represented in fig.7. The handle 5 comprises a first sleeve 5a configured for coming around the first lever 13a and a second sleeve 5b configured for coming around the second lever 13b.

[0024] As represented in Fig.8a and 8b, the handle 5 may be clipped to the first 13a and second 113b levers by a first 23a and a second 23b clips. The first clip 23a is configured to be positioned in a recess located in the first sleeve 5a on the side facing the ground when assembled to the vehicle. In the same way, the second clip 23b is configured to be positioned in a recess located in the second sleeve 5b on the side facing the ground when assembled to the vehicle.

[0025] The first clip 23a, represented in Fig.9a and 9b, comprises an axis 231 configured to enable the rotation of the handle 5 with respect to the first lever 13a and the second clip 23b, represented in fig. 10, comprises an axis 231' configured to enable the rotation of the handle 5 with respect to the second lever 13b. The first and second clips 23a and 23b also comprise clipping means 232 configured to cooperate respectively with the first and second sleeve 5a, 5b to prevent an axial displacement of the clips 23a, 23b and the associated axis 231, 231'. The first clip 23a is configured for blocking the relative displacement in the lateral direction (with respect to the vehicle direction) of respectively the first handle sleeve 5a with respect to the first lever 13a and the second clip 23b is configured for blocking the relative displacement in the lateral direction of respectively the second handle sleeve 5b with respect to the second lever 13b. The clipping means 232 may be made of a flexible rod with a hook at its extremal end.

[0026] The first lever 13a comprises a hole 131 at its extremal end for receiving the axis 231 of the first clip 23a and the second lever 13b comprises a hole 131' at its extremal end for receiving the axis 231' of the second clip 23b. Furthermore, as the length of the first 13a and second 13b levers are different and the distance between the first axis 231 and the second 231' vary when the handle 5 is moved from a retracted position (corresponding to the retracted position of the deformable parallelogram mechanism 13) to the deployed position (which may correspond to the deployed position of the deformable parallelogram mechanism 13), the first clip 23a comprise an oblong aperture 233 for receiving the first axis 231 of the first clip 23a so that the first axis may be displaced within the oblong aperture 233 as represented in fig.9a and 9b. In the present embodiment, the first axis 231 comprises a peripheral groove 231a with a reduced diameter and the oblong aperture 233 comprises a slot of reduced height where only the reduced diameter of the peripheral groove 231 can be introduced. The axis 231 is therefore introduced in the portion of the oblong aperture 233 having a large height and its peripheral groove is then slid in the slot. The axis 231 can then move laterally within the slot but cannot move axially. Furthermore, the end of the slot next to the portion of large height of the oblong aperture 233 may have an even smaller height to prevent the axis from getting out of the slot so that a predetermined force needs to be apply to the axis 231 to slide it into the slot. The axis 231 may be made in a different material than the rest of the first clip 23a. The axis 231 may be metallic, for example made of aluminium, whereas the rest of the clip may be made of plastics. During assembly, the axis 231 is first positioned in the slot of the oblong aperture 233 of the first clip 23a and the first clip 23a is then positioned in the recess below the first sleeve 5a surrounding the first lever 13a, the axis 231 being configured to be positioned in the hole 131 of the first lever 13a as represented in Fig.9c.

[0027] The axis 231' of the second clip 23b may be formed from the second clip 23b or may be made of a different material, for example, the axis 231' may be metallic and the rest of the second clip 23b may be made of plastics. The second clip 23b is for example overmolded. The second clip 23b also comprises clipping means 232.

[0028] The first and the second lever 13a, 13b are configured so that the axis 231 and 231'of the first and the second clip 23a, 23b are parallel with each other. Furthermore, the axis 231, 231' are configured to be in a range of 20° around the vertical position, for example in the vertical position when assembled to the vehicle so that the handle 5 is displaced in a range of 20° around the horizontal direction when the handle 5 is moved from the retracted position to the deployed position.

[0029] The vehicle door handle assembly 1 may also comprise an electrical actuator 29 (visible in Fig.6) such as an electrical motor 29 (visible in Fig.6) linked to the deformable parallelogram mechanism 13 in order to dis-

place the handle 5 between the retracted position and the deployed position (the deployed and retracted position of the handle 5 may correspond to the deployed and retracted position of the deformable parallelogram mechanism 13). The handle 5 comprises for example a command button 50 on its outer side and a push on the said command button 50 by a user leads to the transmission of a command signal towards the electrical actuator 29 to deploy or retract the handle 5.

[0030] The present invention also refers to a method for assembling a vehicle door handle assembly 1 on a door panel. Fig.11 is a flowchart of the different steps of the method.

[0031] The first step 101 refers to the fixation of the bracket 3 on the inner side of the door panel skin 4. The door panel skin 4 may comprise two openings 4a, 4b through which the first 13a and second 13b levers of the bracket 3 may protrude. The fixation of the bracket 3 is for example achieved by two screws 7 pre-mounted on the bracket 3 and configured to be inserted respectively in a first 4c and a second 4d slots of the door panel skin 4. The first and second slots 4c, 4d are positioned respectively next to the two openings 4a, 4b. When the bracket 3 is in the right position, the screws 7 are tightened to ensure the fixation of the bracket 3 to the door panel skin 4.

[0032] The second step 102 refers to the deployment of the first 13a and the second 13b levers of the bracket 4 through the first 4a and the second 4b openings of the door panel skin 4. Such deployment is achieved manually by rotating the screw 19 associated with the actionable arm 17 of the bracket 4 in a first rotating direction. Such rotation produces a displacement of the actionable arm 17. The deformable parallelogram mechanism 13 linked to the actionable arm 17 is then led towards the deployed position so that the first 13a and second 13b levers are displaced towards the outer side of the door panel skin 4 through the openings 4a, 4b. The screw 19 is rotated until it comes to a rest corresponding to the deployed position.

[0033] The third step 103 refers to the positioning of the handle 5 on the first 13a and second 13b levers. The handle 5 is arranged so that the first sleeve 5a comes around the first lever 13a, the recess of the first sleeve 5a facing the hole 131 of the first lever 13a and so that the second sleeve 5b comes around the second lever 13b, the recess of the second sleeve 5b facing the hole 131' of the second lever 13b.

[0034] The fourth step 104 refers to the clipping of the handle 5 to the first 13a and the second 13b levers. This step 104 comprises a first sub-step of introducing the axis 231 within the first clip 23a and more specifically the groove of the axis 231 within the slot of the first clip 23a. The second sub-step refers to the introduction of the first clip 23a in the recess of the first sleeve 5a and the insertion of the axis 231 in the hole 131 arranged in the first lever 5a. The third sub-step refers to the introduction of the second clip 23b in the recess of the second sleeve 5b and the insertion of the axis 231 in the hole 131' arranged in the second lever 13b. Furthermore, the first 13a and second 13b levers and the handle 5 may comprise electrical contacts so that the command button 50 is linked electrically to the electrical actuator 29 when the handle 5 is clipped to the bracket 3.

[0035] The fifth step 105 refers to the positioning of the handle 5 back in the retracted position. Such positioning is obtained by rotating the screw 19 associated with the actionable arm 17 in the opposite direction. The deformable parallelogram mechanism 13 is brought back to the retracted position thanks to one or several return springs. In the retracted position, the handle 5 flushes with the outer side of the door panel skin 4.

[0036] Thus, the use of a bracket 3 fixed directly on the door panel skin 4 and a handle 5 which is fastened to the bracket 3 from the outer side of the door panel skin 4 allow an easy and fast assembly and positioning of the door handle assembly 1. The clipping of the handle 5 allows a fast and secured fastening of the handle 5 to the bracket 3. Furthermore, the use of a deformable parallelogram mechanism 1 which can be displaced manually from a retracted position to a deployed position allowing the fixation of the handle 5 on the first 13a and second 13b levers of the bracket 3 corresponding to opposite branches of the deformable parallelogram mechanism 1 enables the fastening of the handle 5 on the bracket 3 without requiring the use of a electrical actuator which has to be supplied.

Claims

1. Vehicle door handle assembly (1) comprising:

   - a bracket (3) and,
   - a movable handle (5) configured for moving between a retracted position wherein the handle (5) flushes with an outer side of a door panel skin (4) and a deployed position

   wherein the bracket (3) is arranged directly on an inner side of a door panel skin (4) and wherein the handle (5) is arranged on the outer side of the door panel skin (4) and is fastened to the bracket (3).

2. Vehicle door handle assembly (1) in accordance with the previous claim wherein the bracket (3) is fixed on the door panel skin (4) by screws (7).

3. Vehicle door handle assembly (1) in accordance with the previous claim wherein the bracket (3) comprises a first and a second screws (7) configured to be positioned respectively in a first (4c) and a second (4d) horizontal slots of the door panel skin (4) for tightening the bracket (3) to the door panel skin (4).

4. Vehicle door handle assembly (1) in accordance with

the previous claim wherein the bracket (3) comprises a first (13a) and a second (13b) levers configured for protruding through at least one opening (4a, 4b) of the door panel skin (4) towards the outer side of the door panel skin (4) and wherein the handle (5) comprises a first (5a) and a second (5b) sleeves configured to be fastened respectively to the first (13a) and the second (13b) levers.

5. Vehicle door handle assembly (1) in accordance with the previous claim wherein the bracket (3) comprises a deformable parallelogram mechanism (13), the first (13a) and the second (13b) levers of the bracket (3) corresponding to two opposite branches of the deformable parallelogram mechanism (1).

6. Vehicle door handle assembly (1) in accordance with the previous claim wherein the bracket (3) comprises an actionable arm (17) configured for displacing the deformable parallelogram mechanism (13) from a retracted position to a deployed position wherein the first (13a) and second (13b) levers protrude through the at least one opening (4a, 4b) of the door panel skin (4) to allow a fastening of the handle (5) to the said first (13a) and second (13b) levers.

7. Vehicle door handle assembly (1) in accordance with the previous claim wherein the bracket (3) comprises a screw (19) linked to the actionable arm (17) and configured such that a rotation of the screw (19) in a first rotating direction leads to a deployment of the deformable parallelogram mechanism (1) and a rotation of the screw (19) in the opposite direction leads to a retraction of the deformable parallelogram mechanism (1).

8. Vehicle door handle assembly (1) in accordance with one of the previous claims wherein the handle (5) is clipped to the bracket (3).

9. Vehicle door handle assembly (1) in accordance with the previous claim comprising a first clip (23a) for fastening the first sleeve (5a) of the handle (5) to the first lever (13a) of the bracket (3) and a second clip (23b) for fastening the second sleeve (5b) of the handle (5) to the second lever (13b) of the bracket (3).

10. Vehicle door handle assembly (1) in accordance with one of the previous claims in combination with claim 5 wherein the bracket (3) also comprises an electrical actuator (29) configured for displacing the deformable parallelogram mechanism (13) between a retracted position associated with a flush position of the handle (5) with the outer side of the door panel skin (4) and a deployed position associated with a grabbable position of the handle (5).

11. Vehicle door handle assembly (1) in accordance with the previous claim wherein the handle (5) comprises a command button (50) connected to the electrical actuator (29) and configured to send a command signal to the electrical actuator (29) to deploy or to retract the handle (5).

12. Method for assembling a vehicle door handle assembly (1) on a door panel skin (4), the door panel skin (4) comprising at least one opening (4a, 4b), the vehicle door handle assembly (1) comprising a bracket (3) and a handle (5) configured to be arranged on an outer side of the door panel skin (4) and to be fastened to the bracket (3), the said bracket (3) comprising a first (13a) and a second (13b) movable levers wherein the method comprises the following steps:

- fixing the bracket (3) directly on an inner side of the door panel skin (4),
- deploying the first (13a) and the second (13b) levers of the bracket (3) through at least one opening (4a, 4b) of the door panel skin (4),
- fastening the handle (5) to the first (13a) and second (13b) levers,
- retracting the handle (5) in a flush position with the outer side of the door panel skin (4).

13. Method for assembling a vehicle door handle assembly (1) on a door panel skin (4) in accordance with the previous claim wherein the bracket (3) comprises:

- a deformable parallelogram mechanism (13), the levers (13a, 13b) of the bracket (3) corresponding to two parallel branches of the deformable parallelogram mechanism (1),
- an actionable arm (17) linked to the deformable parallelogram mechanism (13) and configured for displacing the deformable parallelogram mechanism (13) between a retracted position and a deployed position wherein the first (13a) and second (13b) levers protrude through the at least one opening (4a, 4b) of the door panel skin (4) and,
- a screw (19) linked to the actionable arm (17) wherein the deploying step is achieved by rotating the screw (19) in a first direction and the retracting step is achieved by rotating the screw (19) in a second direction opposite to the first direction.

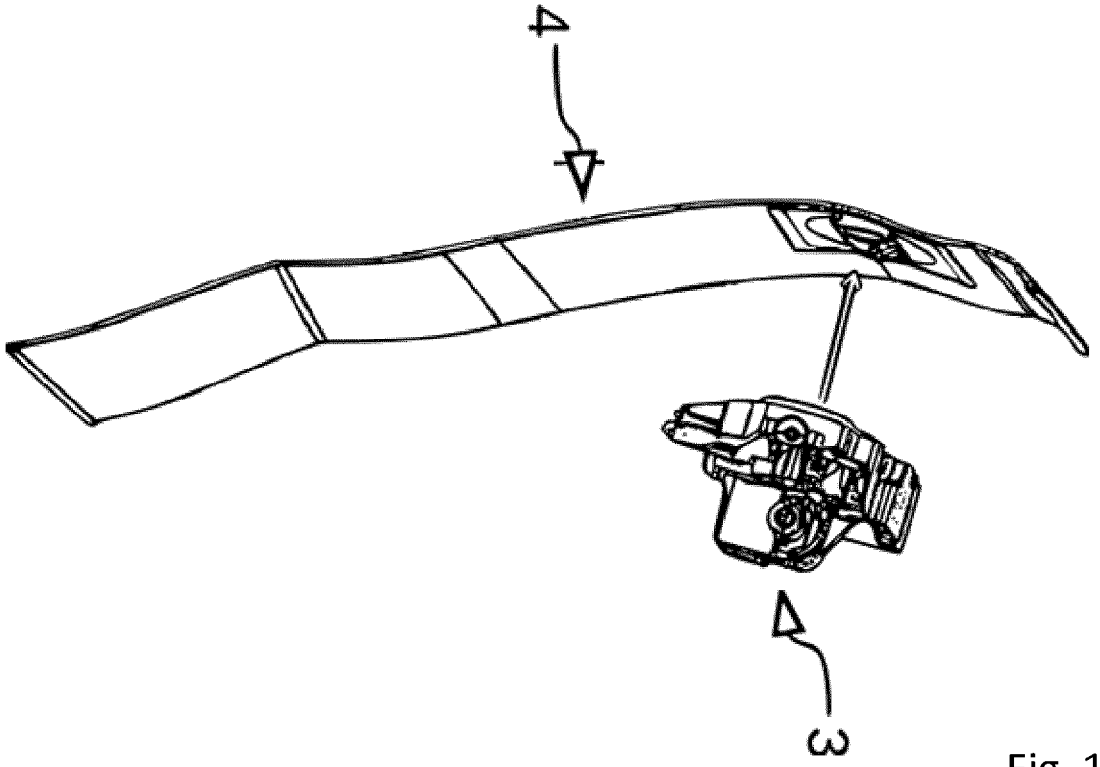


Fig. 1a

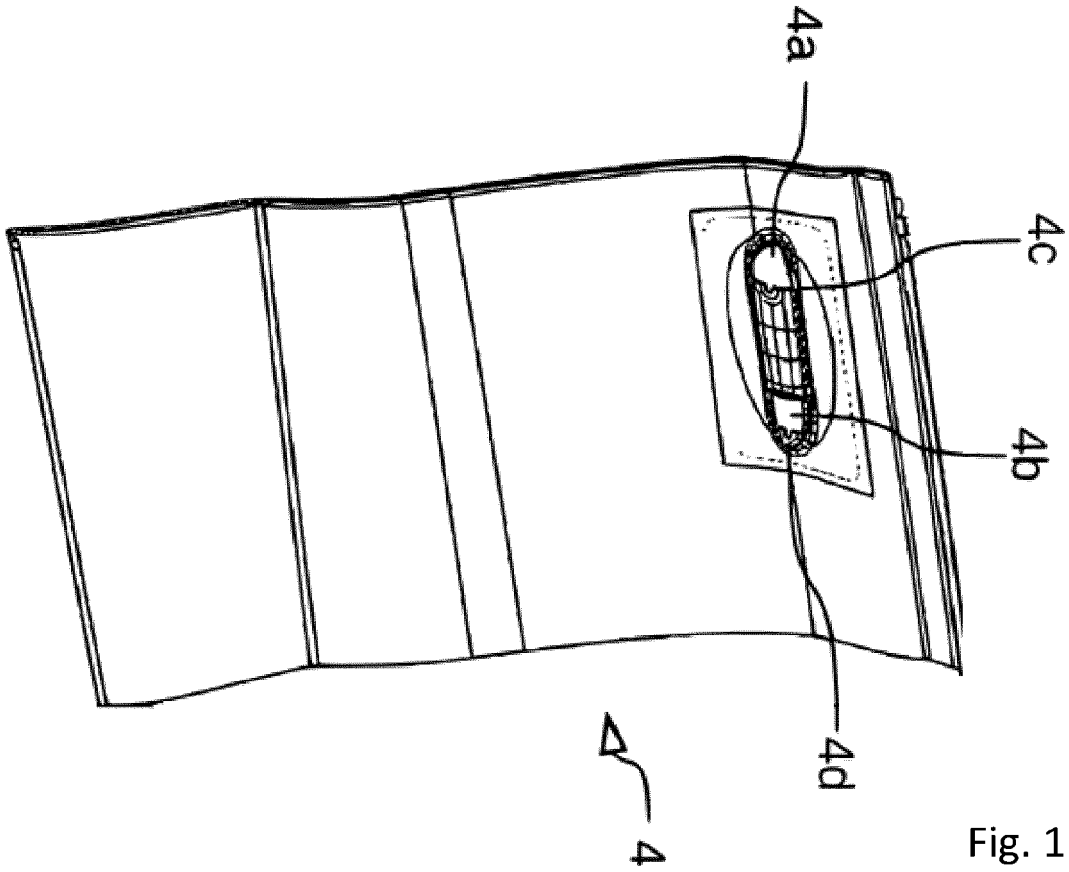


Fig. 1b

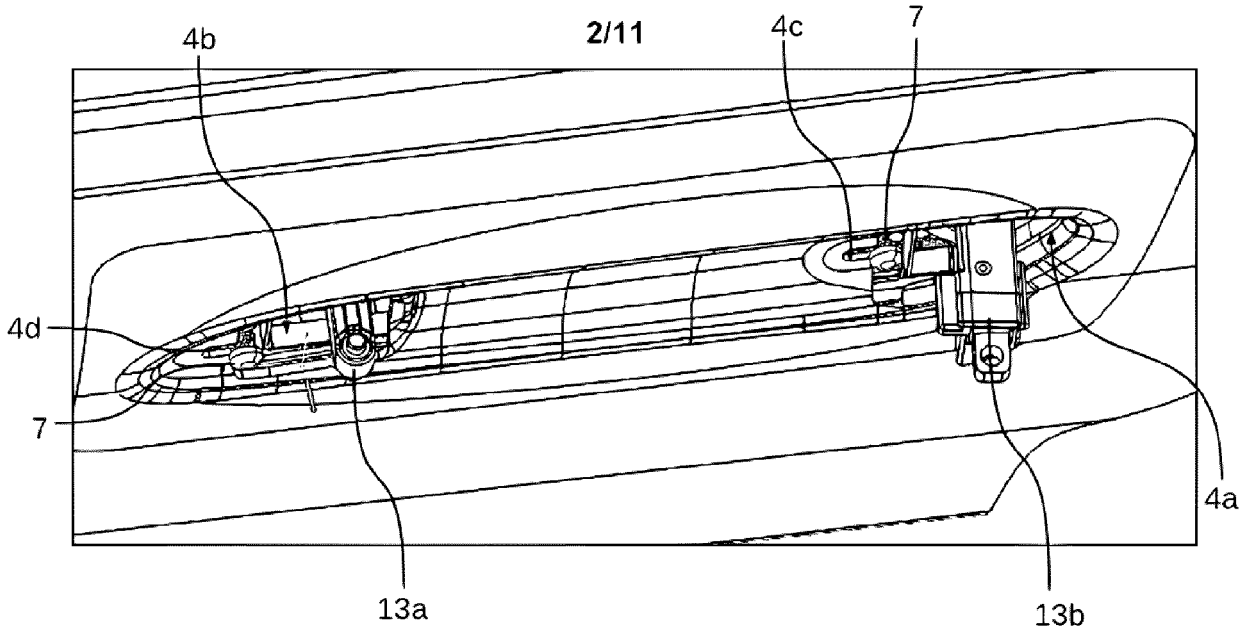


Fig. 2

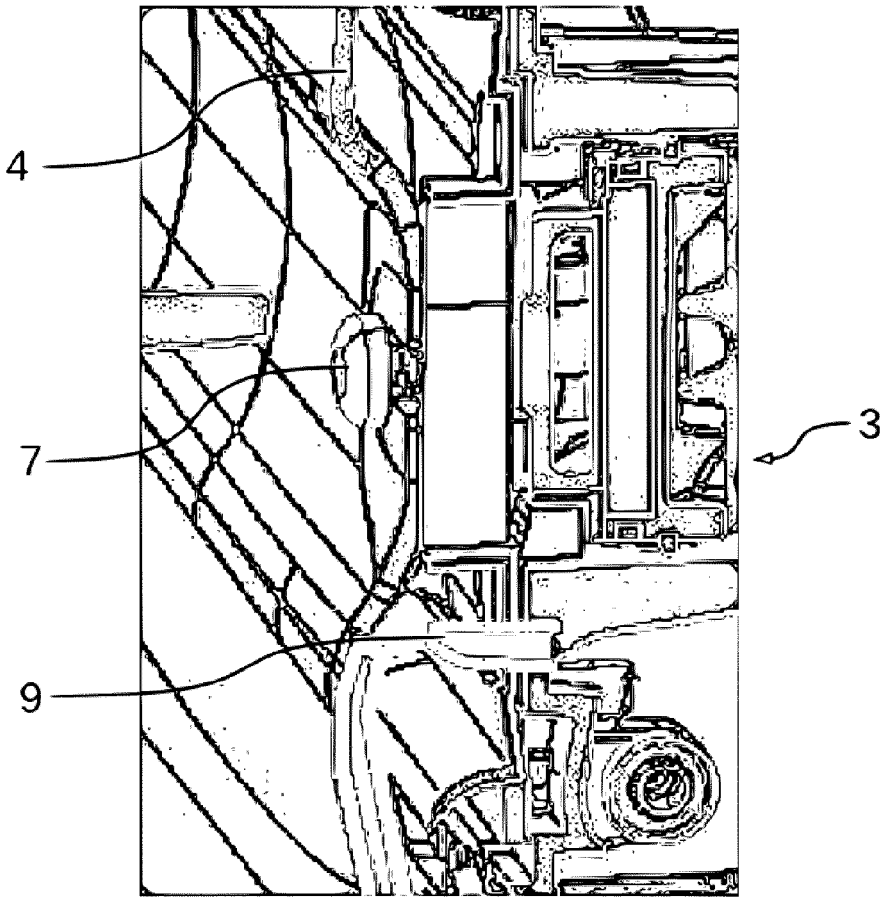
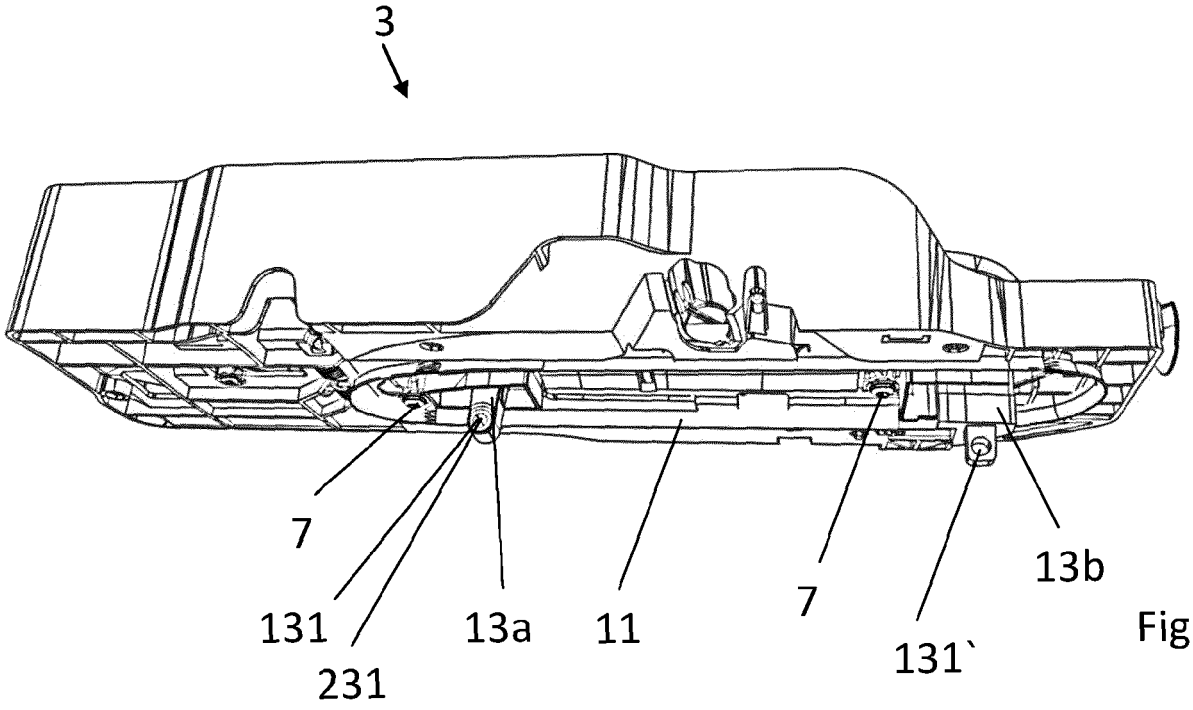


Fig. 3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7
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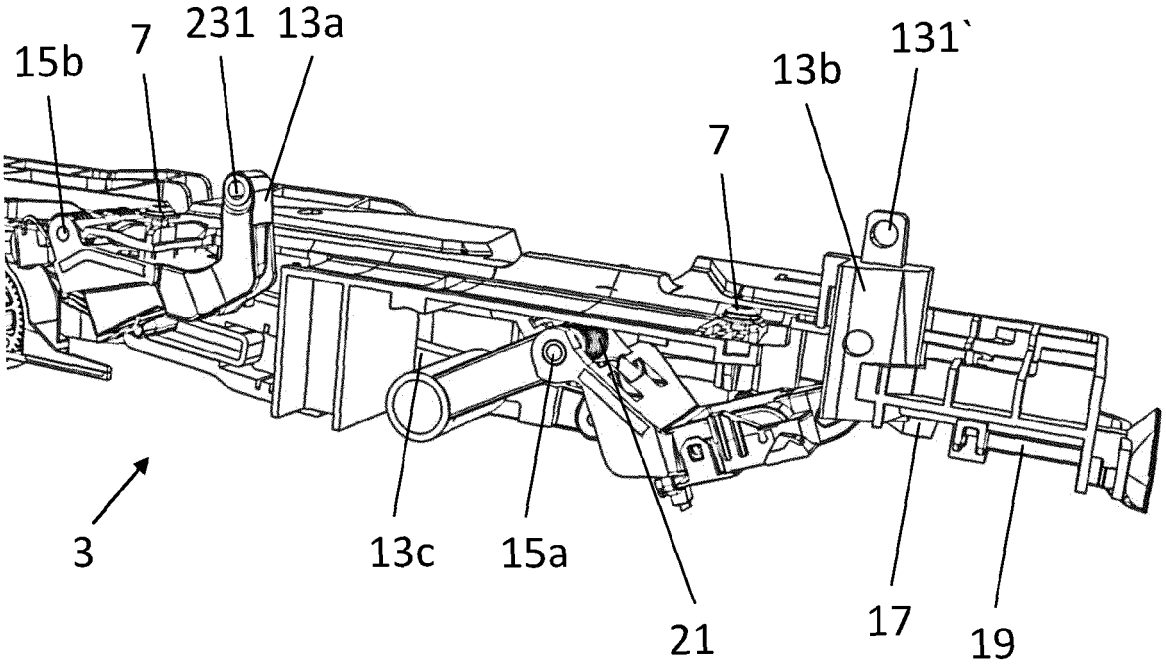
13a
11
7
131`
13b

Fig. 4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21
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19

Fig. 5

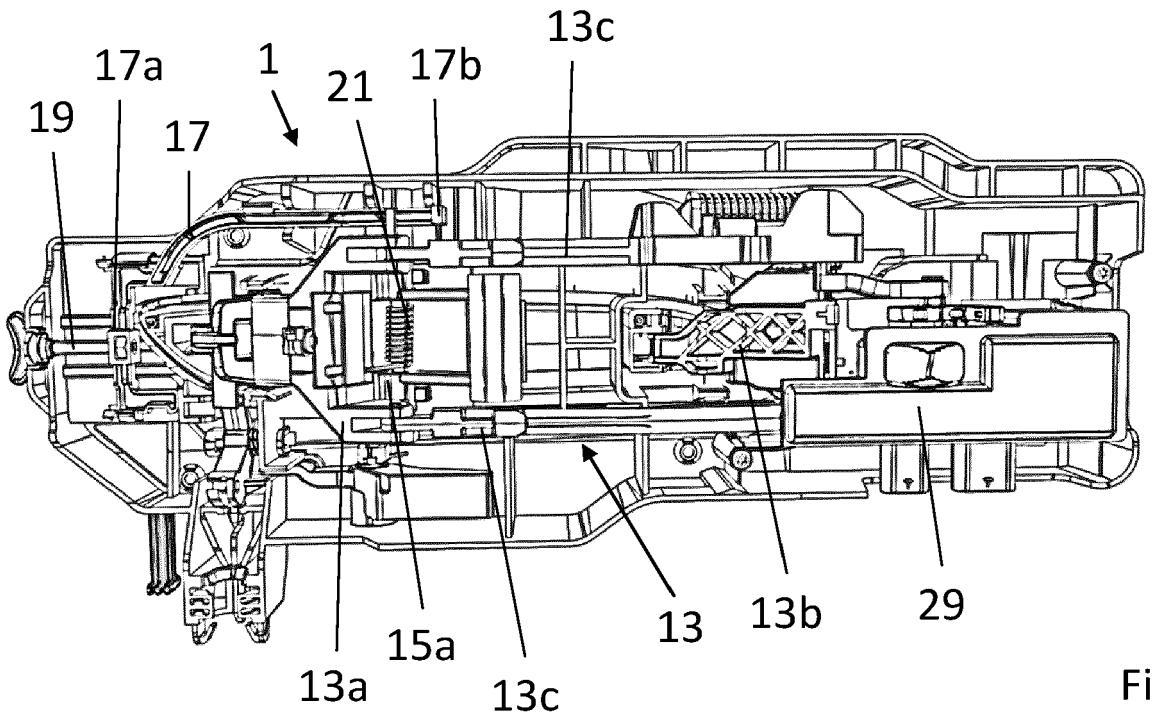

Fig. 6

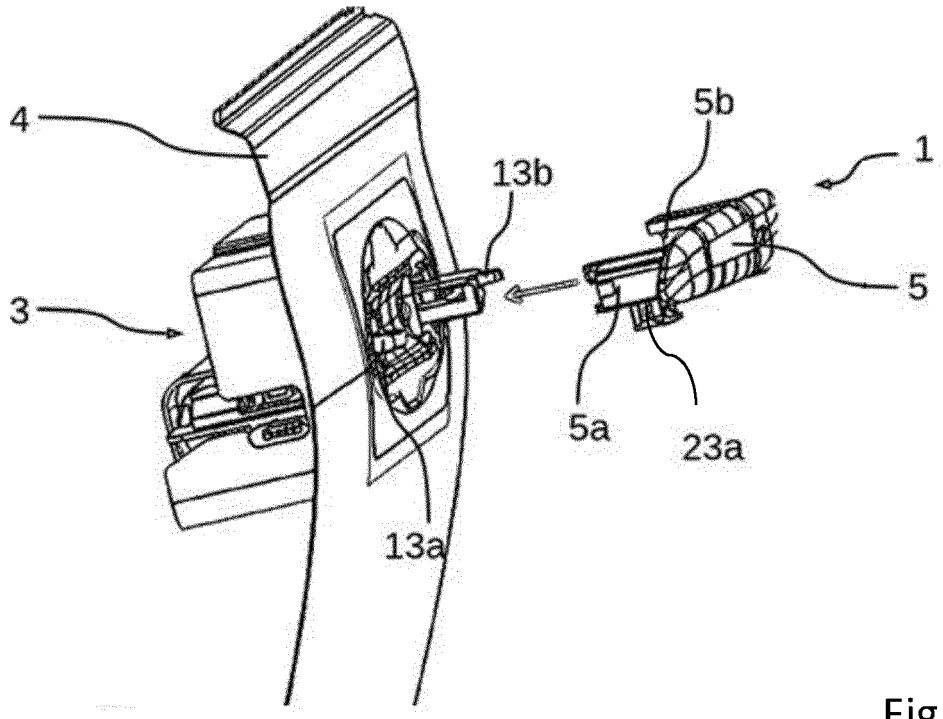

Fig. 7

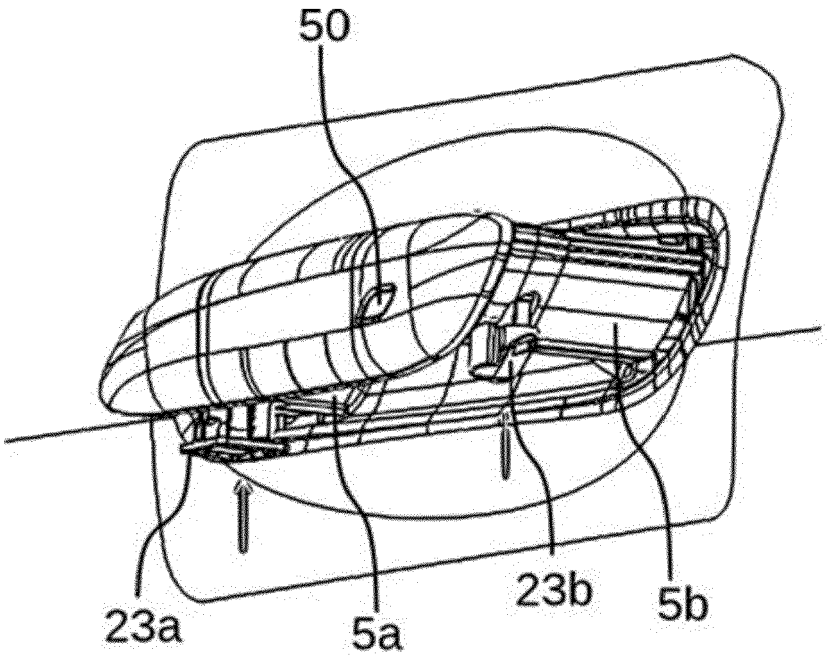

Fig. 8a

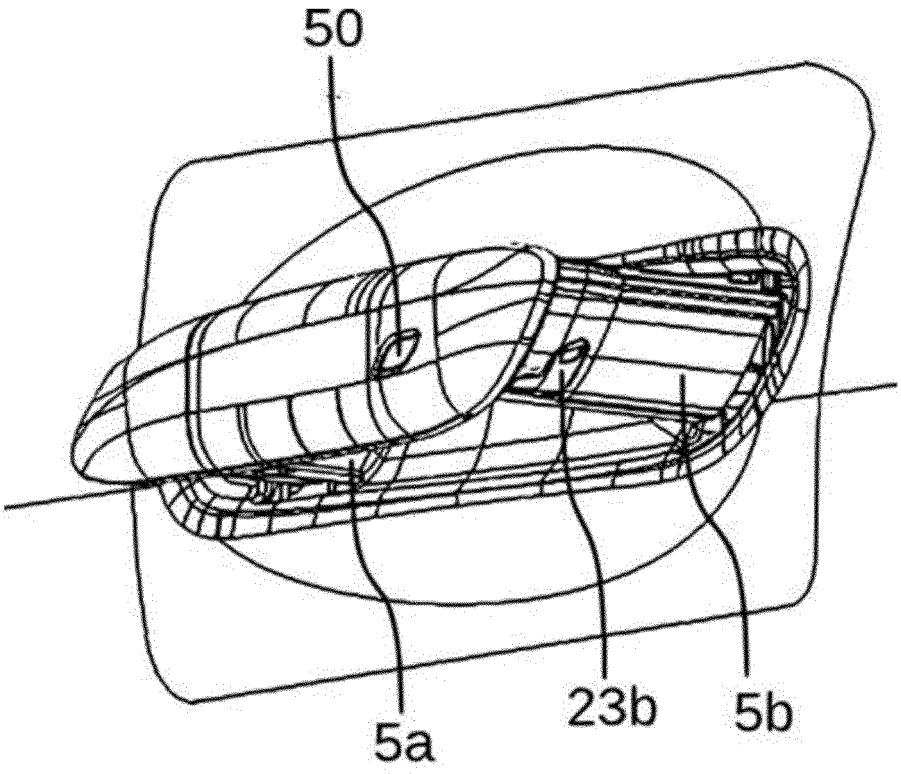

Fig. 8b

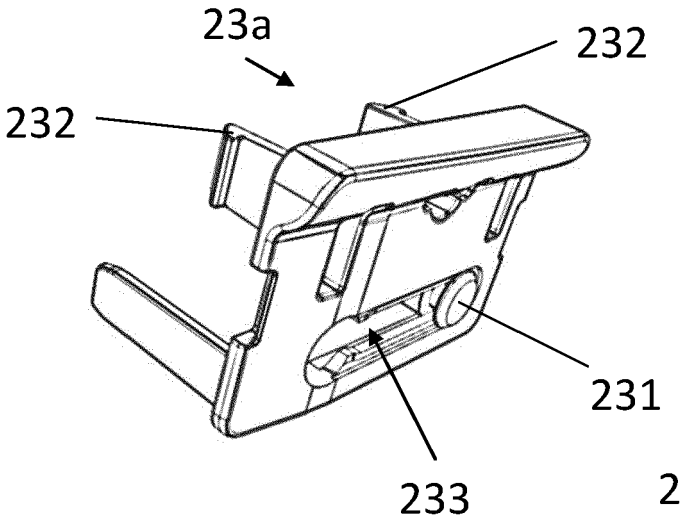

Fig. 9a

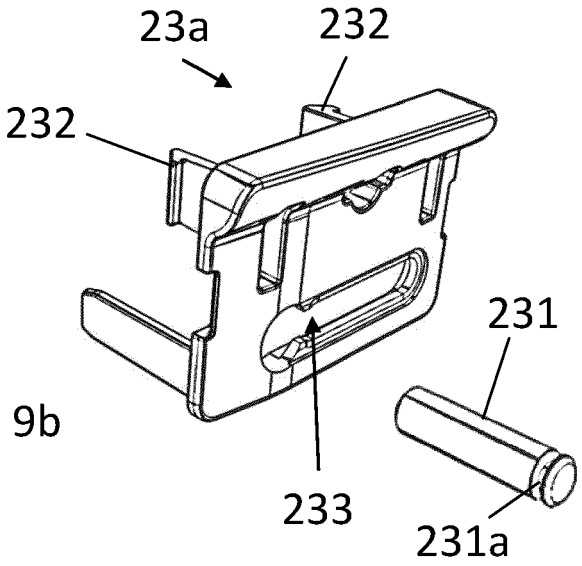

Fig. 9b

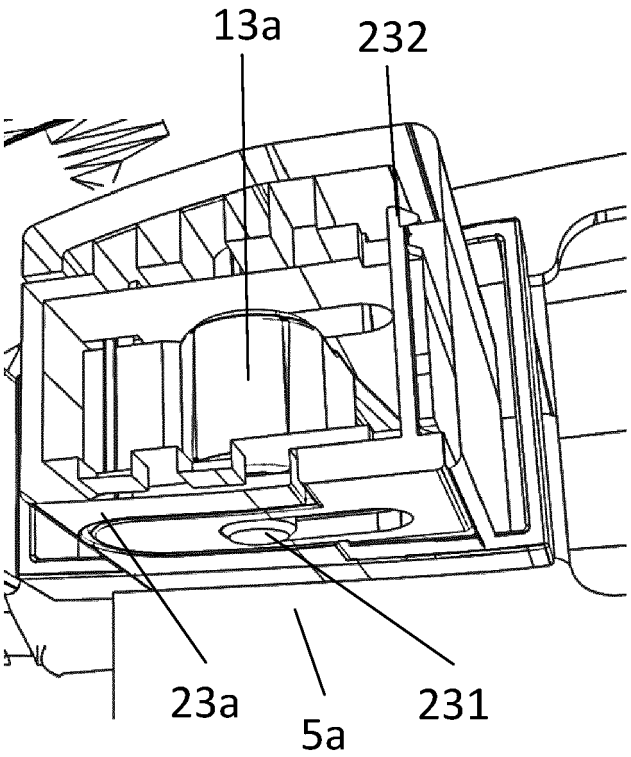

Fig. 9c

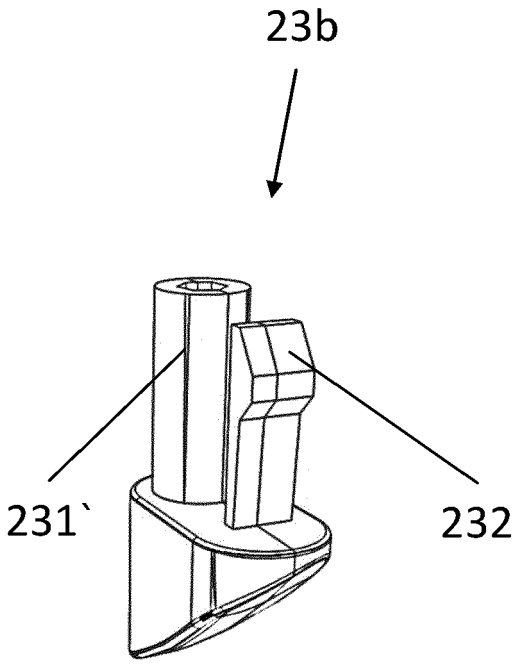

Fig. 10

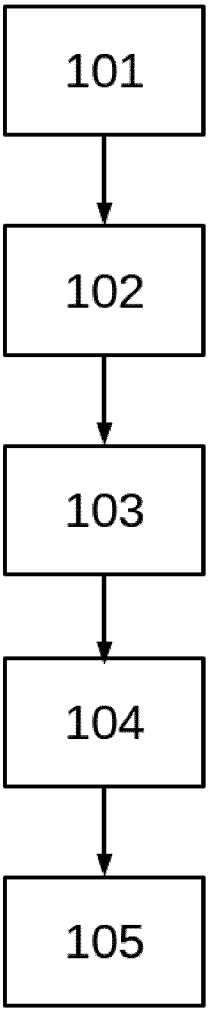

Fig. 11

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EUROPEAN SEARCH REPORT

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EP 22 16 8083

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Place of search	Date of completion of the search	Examiner
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