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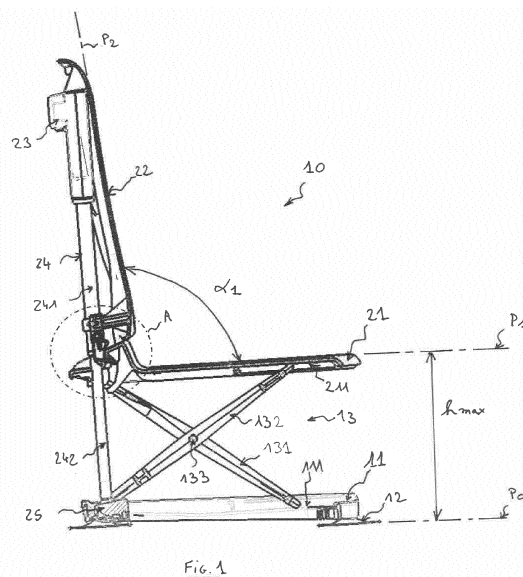
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(54) **BATH LIFT DEVICE**

(57) The invention concerns a bath lift device (10) for raising and lowering persons into or out of a bathtub comprising:

- a chassis (11) to rest on a portion of the bath tub;
- a seat plate (21) and a backrest (22) pivotally connected thereto, said backrest being pivotally movable relative to said seat plate between three rest positions, i.e. an upright rest position, corresponding to the normal position of use, a rear rest position, in which the backrest is positioned rearward relative to the upright rest position, and a front rest position, in which the backrest is positioned forward relative to the upright position;
- a lifting means for adjusting the height of the seat plate (21) between a lowermost end position and an uppermost end position, the lifting means comprising a driving means (23) mounted to the backrest (22) and a lifting member (24) to be actuated by the driving means (23);
- a bearing support (25) secured to the chassis (11) and provided with a cam profile (253) in which a lower end of the lifting member (24) is engaged so as to permit the movement of the backrest (22) between the rear rest position and the upright rest position;
- at least one locking lever (31), that is pivotally connected to the backrest (22), said locking lever being adapted to define at least one first locking position, in which the locking lever (31) prevents a pivoting movement of the backrest (22) relative to the seat plate (21) in the upright rest position of the backrest (22) when the lifting member (24) extends over a specific extension length and permits said pivoting movement when the lifting member (24) is retracted under said specific extension length.



Description

FIELD OF THE INVENTION

[0001] The present invention relates to a bath lift device for raising and lowering persons into or out of a bathtub, said device including a chassis adapted to rest, in use, on a floor of the bathtub and a supported seat adapted to be movable between a raised position, in which the seat is correctly positioned to permit a person standing outside the bathtub to sit inside said seat, and a lowered position, in which said seat is positioned at the bottom of the bathtub.

BACKGROUND OF THE INVENTION

[0002] Bath lift devices have been widely used for aged or disabled people as a convenient means for entering or leaving a bathtub. Generally, a conventional bath lift device comprises two main parts, a fixed part resting, in use, on a floor of the bathtub and a movable part including the seat plate and the backrest.

[0003] However, in these conventional bath lift devices, the backrest and the seat plate can not be separated or only separated with some efforts. These bath lift devices are therefore often transported or removed from the bath tub as a whole with great physical efforts.

[0004] EP 1 743 615 B1 provides a solution to this problem. In this prior solution, a lock releasing device couples the backrest and the seat plate above a lowest end position. The device has a locking bolt that is movable between a locking position and a releasing position, where the bolt releases the backrest and the seat plate from each other in the releasing position. This solution permits to fix the backrest against the seat plate in order to protect the actuator from horizontal forces and therefore from side loads. However, this solution requires using extra bolts which are included in the backrest, leading to higher cost for the bath lift. Furthermore, this solution is not easily adaptable to already marketed bath lifts.

[0005] The aim of the present invention is therefore to provide a bath lift device that overcomes the deficiencies of the above mentioned solution.

SUMMARY OF THE INVENTION

[0006] In this view the present invention is concerned with a bath lift device as claimed in claim 1.

[0007] Important features of the device are defined in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Other features and advantages of the present invention will appear more clearly from the detailed description of embodiments of the invention which are presented solely by way of a non-restricted example and illustrated by the attached drawings in which:

Figure 1 shows a partially sectional side view of a bath lift device according to the invention in the uppermost end position of the seat plate;

Figure 2 shows a side view similar to Figure 1, but in the lowermost end position of the seat plate, the backrest being in its upright rest position;

Figure 3 shows a side view similar to Figure 2, but in the rear rest position of the backrest;

Figure 4 shows a side view similar to Figure 2, but in the front rest position of the backrest;

Figure 5a shows a perspective view of the bath lift device shown in Figure 1;

Figure 5b shows an exploded perspective view of the bath lift device shown in Figure 4;

Figure 6a shows a partially sectional view of an enlarged detail A of Figure 1 along the section plane XX' shown in Figure 10;

Figure 6b shows a view similar to Figure 6a, but in the rear rest position of the backrest;

Figure 6c shows a view similar to Figure 6a, but in the front rest position of the backrest;

Figure 7 shows a partially sectional view of the enlarged detail A of Figure 1 along the section plane YY' shown in Figure 10;

Figure 8a shows a perspective view of a clamp element supporting two locking levers.

Figure 8b shows an exploded perspective view of the clamp element illustrated in Figure 8a;

Figure 8c shows a front view of the clamp element illustrated in Figure 8a;

Figure 8d shows a sectional view taken along the direction indicated by a line A as shown in Figure 8c, the locking levers being positioned in the first locking position;

Figure 8e shows a sectional view similar to Figure 8d, but in the second locking position of the locking levers;

Figures 9a to 9i show enlarged, fragmentary side views of the bath lift device illustrated in Figures 1-4 during the successive manoeuvring steps permitting to transfer the backrest from its front rest position to its upright rest position via its rear rest position;

Figure 10 shows a rear view of the bath lift device shown in Figure 1.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0009] For the purpose of the present specification, situations and directions of elements of the bath lift device of the present invention are determined by the perspective of a user seated in the bath lift device. Accordingly, the left, respectively the right, side of the bath lift device corresponds to the left, respectively the right, side of Figures 5a and 10. The terms "upward", "downward", "rearward", "forward", "up" or "top", "down" or "bottom", "rear", "front" follow the same rule.

[0010] In reference to Figures 1, 5a and 10, a bath lift

device according the present invention is shown.

[0011] The bath lift device 10 of the present invention mainly includes a fixed part including chassis 11 adapted to rest, in use, on a floor of the bathtub and a moveable part including a seat plate 21 and a backrest 22 pivotally connected thereto, the movable part being moveable upward and downward relative to the fixed part via a lifting means. The chassis 11 is temporarily connected to the floor of the bathtub through suction cups 12 disposed underneath the chassis. The seat plate 21 is connected to the chassis 11 via a scissor-type guide mechanism 13, said mechanism comprising two pairs of support legs 131, 132, each leg being pivotally connected at a first end thereof to the chassis 11 and being slidably mounted at a second end thereof to the seat plate 22 inside a guide rail 111 of the chassis or, respectively, a guide rail 211 of the seat plate, said legs being pivotally connected at a mid-point to a pivot joint 133.

[0012] The lifting means comprises a driving means 23 arranged on the rear of the backrest 22 and a lifting member 24 that is actuated by the driving means. Without be bound by this specific solution, it will be advantageous to use a lifting means as described in the Canadian patent application CA 2 397 503. Accordingly, the lifting member 24 may advantageously be a telescopic tube including an outer tube 241 within which is received a linearly extendable inner tube 242, said outer tube 241 being fixedly connected to the backrest and said inner tube 242 being supported at its lower end by a bearing support 25 secured to the chassis. In a further embodiment of the present invention, the lifting member may be a toothed rack or a plurality of individual toothed rack segments articulated to one another. Such a lifting member has been described in the European patent EP 1 787 615 B1. Considering that the term "lifting member" used in the claims encompasses both above mentioned embodiments of the present invention, the meaning of the term "extension length of the lifting member" used in the claims may vary according to the embodiment. Therefore, when the lifting member is a telescopic tube, the term "extension length of the lifting member" corresponds to the difference between the length of the lifting member measured in the minimal extension thereof, as illustrated in Figure 2, and the length of the lifting member measured in the current extension thereof, as illustrated in Figure 1 for instance. On the other hand, when the lifting member is a toothed rack, the term "extension length of the lifting member" corresponds to the circumferential distance covered by the pinion, the teeth of which mesh with the teeth of the toothed rack, between the minimal extension of the toothed rack, as illustrated in Figure 2 of EP 1 787 615 B1, and the current extension of the toothed rack.

[0013] As shown in Figure 5a, the bath lift device 10 advantageously comprises two extension plates, respectively a left extension plate 21 a and a right extension plate 21 b, that are removably and/or pivotally connected on both lateral ends of the seat plate 21, said extension plates 21 a, 21 b being configured to rest on the rim of

the bathtub when the seat plate 21 is in its uppermost end position so that the user can easily sit inside the bath lift device 10. Therefore, when the seat plate is lowered, the extension plates 21 a, 21 b are folded up or withdrawn so as to permit the movement of the seat plate.

[0014] The position illustrated in Figure 1 corresponds to the uppermost end position of the seat plate 21, in which the height h_{max} between the plane P0 defined by the floor of the bathtub and the plane P1 defined by the seat plate is the greatest possible, corresponding to the maximal extension length of the lifting member. Furthermore, in this position, the backrest is in its upright rest position, corresponding to an angle α_1 between the plane P2 defined by the backrest and the plane P1 defined by the seat plate.

[0015] The position illustrated in Figure 2 corresponds to the lowermost end position of the seat plate 21, in which the height h_{min} between the plane P0 and the plane P1 is the lowest possible, corresponding to the minimal extension of the lifting member and to an extension length of the lifting member that is substantially equal to zero. In this position, the backrest 22 is in its upright rest position.

[0016] The position illustrated in Figure 3 corresponds to the rear rest position of the backrest, in which the angle α_2 between the plane P2 and the plane P1 is greater than the above mentioned angle α_1 . In this position, the seat plate 21 is in its lowermost end position.

[0017] The folded position illustrated in Figure 4 corresponds to the front rest position of the backrest, in which the plane P2 is substantially parallel to the plane P1 and close thereto. In this position, the seat plate 21 is in its lowermost end position. As shown in Figure 5b, the backrest 22 may advantageously be disconnected from the seat plate 21 in this folded position, permitting an easy removal of the bath lift device from the bath tub.

[0018] In reference to Figures 5b and 6a, connecting means permitting the pivot connection between the backrest 22 and the seat plate 21 are illustrated. Such connecting means consist in left and right tubular parts 216 provided in an upward and rearward orientated section 212 of the seat plate 21, said tubular parts being configured to be respectively received inside left and right hemitubular grooves 223 formed in left and right bottom end portions 222 of the backrest 22. Each bottom end portion 222 is also configured to be trapped inside an opening 214 of the seat plate 21 between a front face 215 of an upward and frontward orientated section 213 of the seat plate 21 and the corresponding tubular part 216, thus preventing the upward movement of the backrest relative to the seat plate.

[0019] As shown in Figure 6b, each bottom end portion 222 advantageously comprises a front bottom end 225 which is configured to abut against the section 212 of the seat plate when the backrest is in its rear rest position. In this position, a rear face 224 of the bottom end portion 222 is substantially parallel to the front face 215 of the section 213 of the seat plate and in contact therewith,

thus maintaining the backrest in a relatively stable position.

[0020] As shown in Figure 6c, when the backrest 22 is in its front rest position, the bottom end portions are positioned substantially outside the opening 214, thus permitting the upward movement of the backrest relative to the seat plate.

[0021] Figure 7 illustrates a locking/release means 31 permitting to fixedly couple the backrest and the seat plate to one another when the seat plate is positioned at or above a specific height, thus preventing a pivoting movement of the backrest, and to release the backrest and the seat plate when the seat plate is positioned under said specific height, thus permitting a pivoting movement of the backrest. As explained in greater details in the following paragraphs, this specific height is reached when the lifting member 24 extends at a specific extension length. In the position shown in Figure 7, the lifting member 24 has been extended over said specific extension length. Therefore, the locking/release means 31 is positioned in a first locking position in which it prevents any pivoting movement between the backrest and the seat plate. To that end, the locking/release means 31 is configured as a locking lever pivotally connected to the backrest 22. The locking lever 31 comprises a hook portion 312 at a front bottom end thereof, said hook portion snapping into the seat plate 21, thus trapping a vertically orientated end 217 of the seat plate between a front vertical face 314 of the locking lever and a top end 315 of the hook portion 312. Thus positioned, the locking lever 31 immediately abuts against said vertically orientated end 217 when it pivots in the clockwise and counter-clockwise directions. As illustrated in Figure 7, the locking lever 31 comprises also a spring tongue 311 forward extended from a rear bottom end thereof, said spring tongue being adapted to slightly buckle when submitted to vertical constraints so as to move around the position shown in Figure 7. The function of this spring tongue 311 will be explained later. The locking lever 31 comprises also a bulged portion 313 protruding from the front vertical face 314 and positioned just above the vertically orientated end 217 in the first locking position thereof. The function of this bulged portion 313 will be explained later. Finally, the locking lever 31 comprises a nose-shaped end 316 which is positioned forward and below the vertically orientated end 217 in the first locking position thereof. The function of this nose-shaped end 316 will be explained later.

[0022] In the embodiment shown in Figures 8a to 8e, the locking/release means is configured as two locking levers 31 a, 31 b, respectively a left locking lever 31 a and a right locking lever 31 b, each locking lever being pivotally connected to a clamp element 32 which is fixedly connected to the backrest 22. The locking levers 31 a, 31 b have the same structure as the locking lever shown in Figure 7 and are positioned at both sides of the lifting member 24 in their normal position of use as illustrated in Figures 5a and 5b. The upper end 317 of each locking

lever 31 a, 31 b is respectively received inside a left or right U-shaped portion 32a, 32b of the clamp element 32, said U-shaped portion being provided with a through-hole 321 that is aligned with a corresponding through-hole 318 formed in said upper end 317 so as to lodge a bolt 33 inside said through-holes 318, 321, thus permitting the pivot connection between the locking levers 31 a, 31 b and the clamp element 32. Each locking lever 31 a, 31 b is provided with an housing 319 internally formed therein, the housing 319 being configured to partially receive a V-shaped leaf spring 34 such that said V-shaped leaf spring 34 is also partially received inside the central cavity 322 separating the two branches of the left or right U-shaped portion 32a, 32b. Thus, when the locking lever 31 a or 31 b is at rest, corresponding to the position illustrated in Figure 8e, a rear leg 34i and a front leg 34j thereof abut respectively against a rear end 319i and a front end 319j of the internal housing 319. As better explained in the following paragraphs, this rest position corresponds to the first locking position of the locking lever 31 a or 31 b. When the locking lever 31 a or 31 b pivots in the clockwise direction, as illustrated in Figure 8d, the front leg 34j still abuts against the front end 319j of the internal housing 319 but the rear leg 34i is pushed forward due to the contact between said rear leg 34i and an abutment 323 provided in the clamp element 32, said abutment 323 being now positioned forward with respect to the rear end 319i of the internal housing 319. Thus compressed, the leaf spring 34 tends to pivot the locking lever 31 a or 31 b in the counter-clockwise direction back to the rest position shown in Figure 8e. As better explained in the following paragraphs, the compressed position shown in Figure 8d may correspond to a second locking position of the locking levers 31 a and 31 b, in which the locking levers can not move forward relative to the backrest.

[0023] In reference Figures 9a to 9i, the successive manoeuvring steps permitting to transfer the backrest from its front rest position to its rear rest position and from its rear rest position to its upright rest position are shown.

[0024] In Figure 9a, the bath lift device 10 is in its folded position, the backrest 22 being in the front rest position thereof and the locking lever(s) 31 being in the rest position shown in Figure 8e. The bath lift device has been fixed to the floor of the bathtub through the suction cups 12. The lifting member 24 is positioned in its completely retracted state. In this configuration, a piston rod 243, which is fixedly connected at the lower end of the inner tube 242 of the lifting member 24, as shown in Figure 5b and 9a, is close to the spring tongue 311 of the locking lever(s) 31. This piston rod 243 is provided with a rib 244 protruding from a top face thereof, said rib being in close proximity to the spring tongue 311.

[0025] In Figure 9b, the backrest 22 has been manually moved rearward till the nose-shaped end 316 of the locking lever(s) 31 abuts against a top face 218 of the upward and frontward orientated section 213 of the seat plate 21. Thus, the locking lever(s) 31 progressively pivots in

the clockwise direction, which causes the compression of the leaf spring 34. Therefore, the movement of the backrest is relatively smooth from the position shown in Figure 9b to the position shown in Figure 9c, in which the nose-shaped end 316 reaches the junction between the top face 218 and the vertically orientated end 217. During this movement, the spring tongue 311 of the locking lever(s) 31 elastically deforms under the effect of compression caused by the rib 244 of the piston rod 243.

[0026] In Figure 9d, the backrest 22 has been further moved rearward till the nose-shaped end 316 abuts against the lower end of the vertically orientated end 217. During this movement, the spring tongue 311 elastically returns to a non-compressed state as soon as it is positioned behind the rib 244. As previously explained, the locking lever(s) 31 being forced to move forward under the action of the V-shaped leaf spring 34, the spring tongue 311 abuts against the rib 244, thus maintaining the locking lever(s) in the second locking position thereof.

[0027] In Figure 9e, the backrest 22 has been further moved rearward till the lower end of the inner tube 242 abuts against the bottom 253 of a central cavity formed inside the bearing support 25. As shown in Figure 9f, this bottom 253 defines a cam profile extending between a front face 251 and a rear face 252, said front and rear faces 251, 252 defining respectively a front and a rear abutments against which abuts the lower end of the inner tube 242 respectively in the rear rest position of the backrest and in the upright rest position thereof. Thus, in the position shown in Figure 9e, the lower end of the inner tube abutting against the front face 251, the backrest 22 is in its rear rest position. From this position, it is possible to manually tilt the backrest forward so that the backrest returns to its front rest position. Figure 9f illustrates an intermediate position of the backrest during the transfer of the backrest from its rear rest position and its front rest position. As shown, this transfer may be done because the locking lever(s) 31 is locked in its second locking position. Indeed, if the locking lever(s) was configured as in Figure 8e, the top end 315 of the hook portion 312 would abut against the seat plate 21, thus preventing the forward movement of the backrest.

[0028] In Figure 9g, the lifting member 24 extends under the action of the driving means. During this extension, the lower end of the inner tube 242 follows the cam profile defined by the bearing support 25, thus leading to a forward movement of the backrest 22. Furthermore, the locking lever(s) 31 being secured on the outer tube 241, the spring tongue 311 starts to move upward relative to the piston rod 243. Therefore, this spring tongue does not abut anymore against the rib 244 and the locking lever(s) 31 pivots counter-clockwise under the action of the leaf spring 34. In the position shown in Figure 9g, the bulged portion 313 of the locking lever(s) abuts against the vertically orientated end 217 of the seat plate 21.

[0029] In Figure 9h, the lifting member 24 has been further extended until the lower end of the inner tube 242 abuts against the rear face 252 of the bearing support

25, thus configuring the backrest 22 in the upright rest position thereof. The front vertical face 314 of the locking lever(s) abuts against the vertically orientated end 217 of the seat plate 21 under the action of the leaf spring 34, which is substantially configured as in Figure 8e. Furthermore, the seat plate 21 starts to lift up.

[0030] In Figure 9i, the lifting member 24 has been further extended until the locking lever(s) 31 reaches the first locking position illustrated in Figure 7. In this position, the leaf spring 34 is configured as in Figure 8e. Advantageously, the specific extension length of the lifting member from which the locking lever(s) is in its first locking position may correspond substantially to a third of the maximal extension length of said lifting member. Any further extension of the lifting member 24 from this specific extension length leads to a concomitant lifting of the backrest 22 and the seat plate 21 and the impossibility to tilt the backrest 22 relative to the seat plate 21. Furthermore, in this first locking position, the locking lever(s) 31 prevents the lifting member 24 from being damaged by the bending constraints applied by the user. Indeed, the user load applied to the seat plate 21 causes bending constraints on the lifting member 24 that may be very problematic as the lifting member 24 extends, the overlap between the outer tube 241 and the inner tube 242 getting smaller and smaller. By blocking the movement of the backrest, the locking lever(s) relieves the lifting member from the load applied by the user, thus reducing the risk of breakage of the lifting member.

Claims

1. Bath lift device (10) for raising and lowering persons into or out of a bathtub comprising:

- a chassis (11) to rest on a portion of the bath tub;
- a seat plate (21) and a backrest (22) pivotally connected thereto, said backrest being pivotally movable relative to said seat plate between three rest positions, i.e. an upright rest position, corresponding to the normal position of use, a rear rest position, in which the backrest is positioned rearward relative to the upright rest position, and a front rest position, in which the backrest is positioned forward relative to the upright position;
- a lifting means for adjusting the height of the seat plate (21) between a lowermost end position and an uppermost end position, the lifting means comprising a driving means (23) mounted to the backrest (22) and a lifting member (24) to be actuated by the driving means (23);
- a bearing support (25) secured to the chassis (11) and provided with a cam profile (253) in which a lower end of the lifting member (24) is engaged so as to permit the movement of the

backrest (22) between the rear rest position and the upright rest position;

- at least one locking lever (31), that is pivotally connected to the backrest (22), said locking lever being adapted to define at least one first locking position, in which the locking lever (31) prevents a pivoting movement of the backrest (22) relative to the seat plate (21) in the upright rest position of the backrest (22) when the lifting member (24) extends over a specific extension length and permits said pivoting movement when the lifting member (24) is retracted under said specific extension length.
2. Bath lift device (10) according to claim 1, wherein the locking lever (31) is adapted to define at least one second locking position, in which the locking lever (31) can not move forward relative to the backrest (22).
 3. Bath lift device (10) according to claim 2, wherein the locking lever (31) comprises a spring tongue (311) that is adapted to abut against a rib (244) of a piston rod (243) which is fixedly connected at the lower end of the lifting member (24) when the locking lever (31) is in the second locking position.
 4. Bath lift device (10) according to any one of the preceding claims, wherein the locking lever (31) comprises a hook portion (312) that can snap into the seat plate (21) in the first locking position of the locking lever.
 5. Bath lift device (10) according to claim 4, wherein the hook portion (312) comprises a nose-shaped end (316), which temporarily abuts against the seat plate (21) during the movement of the backrest (22) between the front rest position and the rear rest position, thus permitting a smooth transfer of the backrest.
 6. Bath lift device (10) according to any one of the preceding claims, wherein the locking lever (31) comprises a bulged portion (313), which temporarily abuts against the seat plate (21) during the movement of the backrest between the rear rest position and the upright rest position, thus gradually transferring the locking lever (31) from the second locking position thereof to the first locking position thereof.
 7. Bath lift device (10) according to any one of the preceding claims, wherein the locking lever (31) is forced moving toward the first locking position under the action of a V-shaped leaf spring (34) that is partially lodged inside an internal housing (319) of the locking lever (31).
 8. Bath lift device (10) according to claim 7, wherein the leaf spring (34) has a front leg (34j) and a rear leg (34i), said front leg, respectively said rear leg, abutting against a front end (319j), respectively a rear end (319i), of the internal housing (319) when the locking lever (31) is configured as in the first locking position thereof and said rear leg (319i) abutting against an abutment (323) provided in a clamp element (32), which is fixedly connected to the backrest (22) and to which is pivotally connected the locking lever (31), when the locking lever (31) is configured differently as in the first locking position thereof.
 9. Bath lift device (10) according to any one of the preceding claims, wherein the lifting member (24) is a telescopic tube including an outer tube (241) within which is received a linearly extendable inner tube (242), said outer tube (241) being fixedly connected to the backrest (22) and said inner tube (242) being supported at its lower end by the bearing support (25).
 10. Bath lift device (10) according to any one of claims 1 to 8, wherein the lifting member (24) is a toothed rack or a plurality of individual toothed rack segments articulated to one another.
 11. Bath lift device (10) according to any one of the preceding claims, wherein suction cups (12) are disposed underneath the chassis (11) so as to temporarily connect the chassis to the floor of the bathtub.
 12. Bath lift device (10) according to any one of the preceding claims, wherein the seat plate (21) is connected to the chassis (11) via two pairs of support legs (131, 132), each leg being pivotally connected at a first end thereof to the chassis (11) and being slidably mounted at a second end thereof to the seat plate (21), said legs being pivotally connected at a mid-point to a pivot joint (133).
 13. Bath lift device (10) according to any one of the preceding claims, comprising two locking levers (31 a, 31 b), respectively a left locking lever (31 a) and a right locking lever (31 b), an upper end (317) of the left, respectively the right, locking lever (31 a, 31 b) being received inside a left, respectively a right, U-shaped portion (32a, 32b) of a clamp element (32) which is fixedly connected to the backrest (22), said left, respectively said right, U-shaped portion (32a, 32b) being provided with a through-hole (321) that is aligned with a corresponding through-hole (318) formed in said upper end (317) so as to lodge a bolt (33) inside said through-holes (318, 321), thus permitting the pivot connection between the locking levers and the clamp element.
 14. Bath lift device (10) according to any one of the preceding claims, wherein the cam profile (253) of the

bearing support (25) extends between a front face (251) and a rear face (252), said front face (251) defining a front abutment against which abuts the lower end of the lifting member (24) when the backrest (22) is in its rear rest position and said rear face (252) defining a rear abutment against which abuts said lower end when the backrest (22) is in its upright rest position. 5

15. Bath lift device (10) according to any one of the preceding claims, wherein the specific extension length of the lifting member (24) above which the pivot movement of the backrest (22) relative to the seat plate (21) is prevented corresponds substantially to a third of the maximal extension length of said lifting member (24). 10 15

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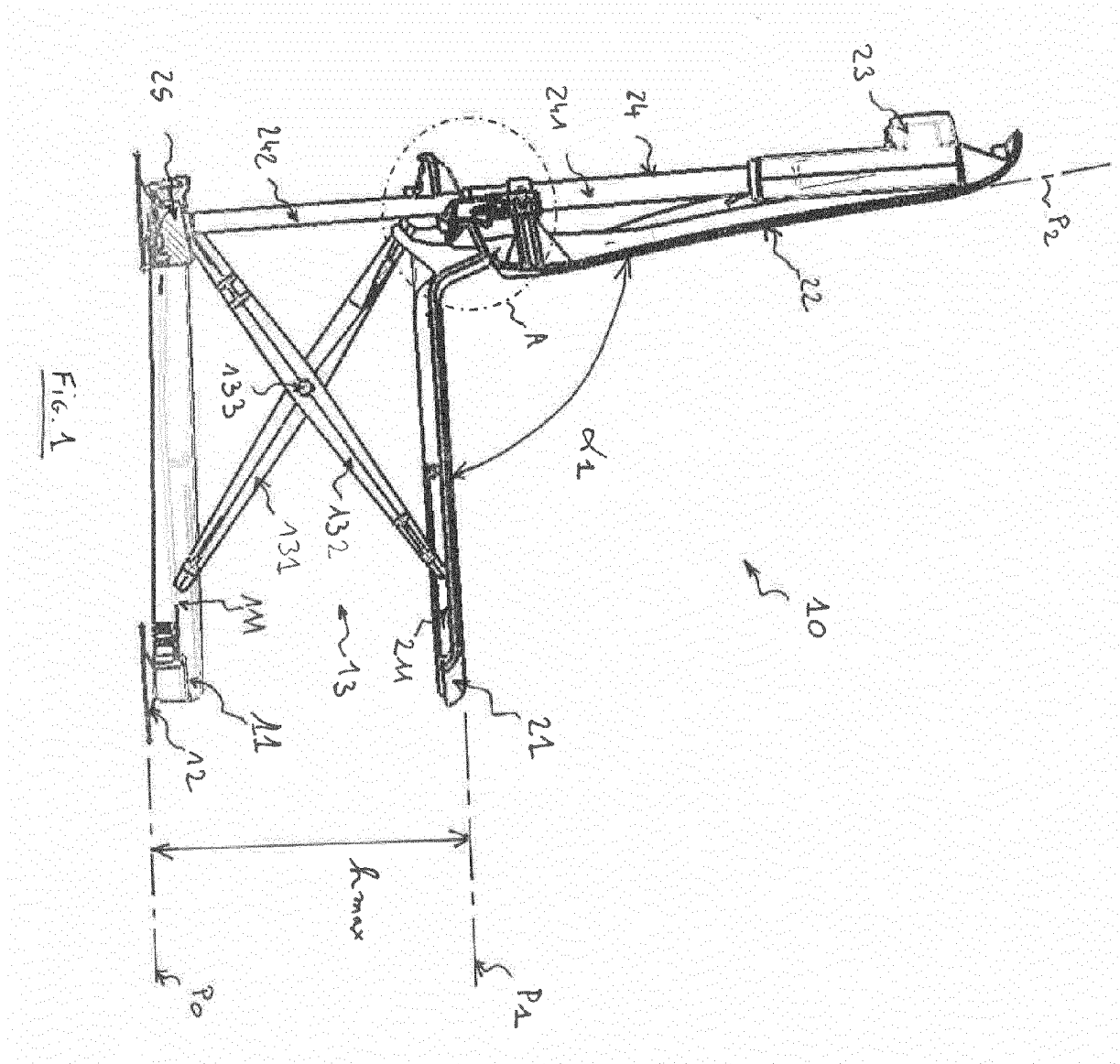
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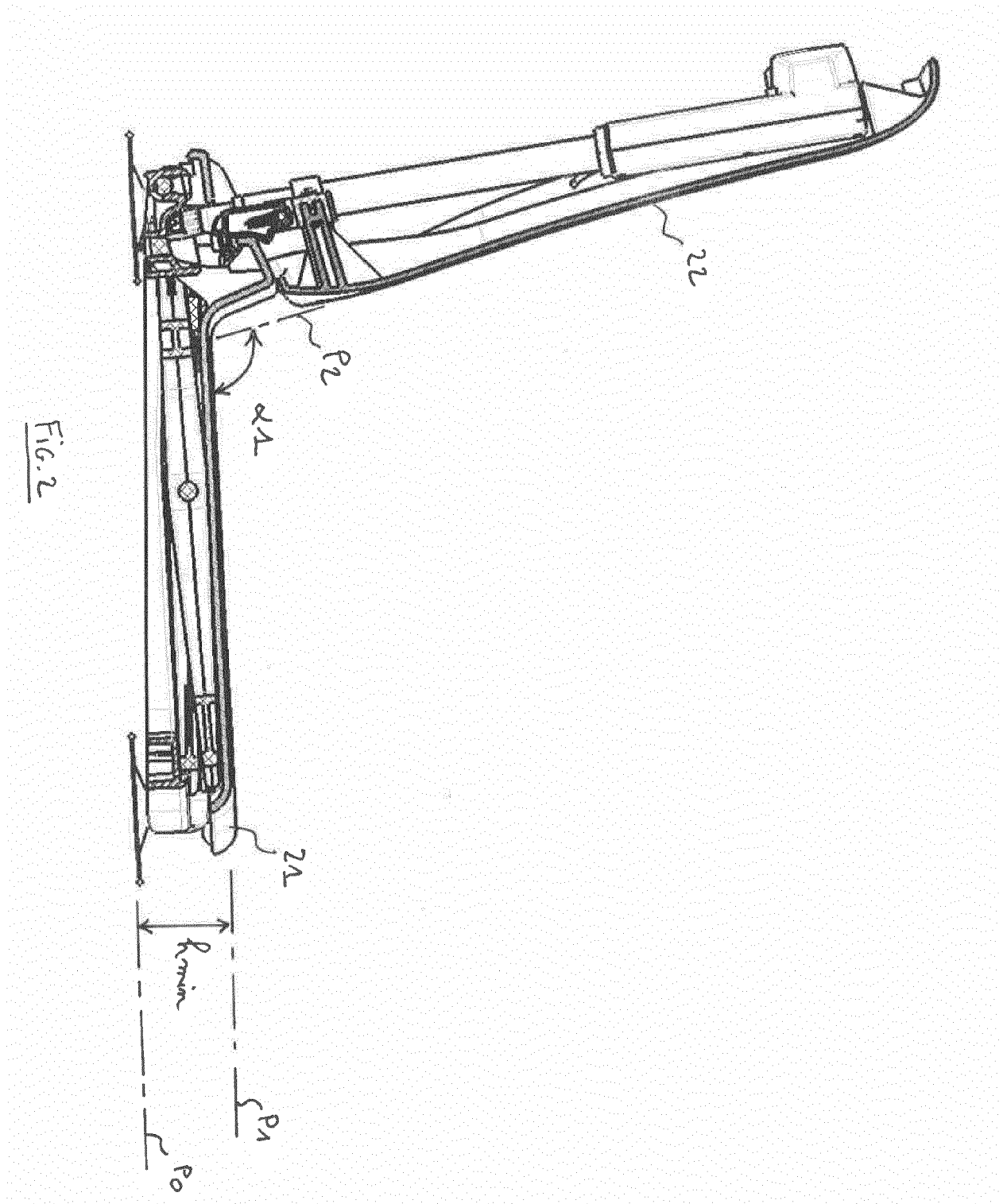
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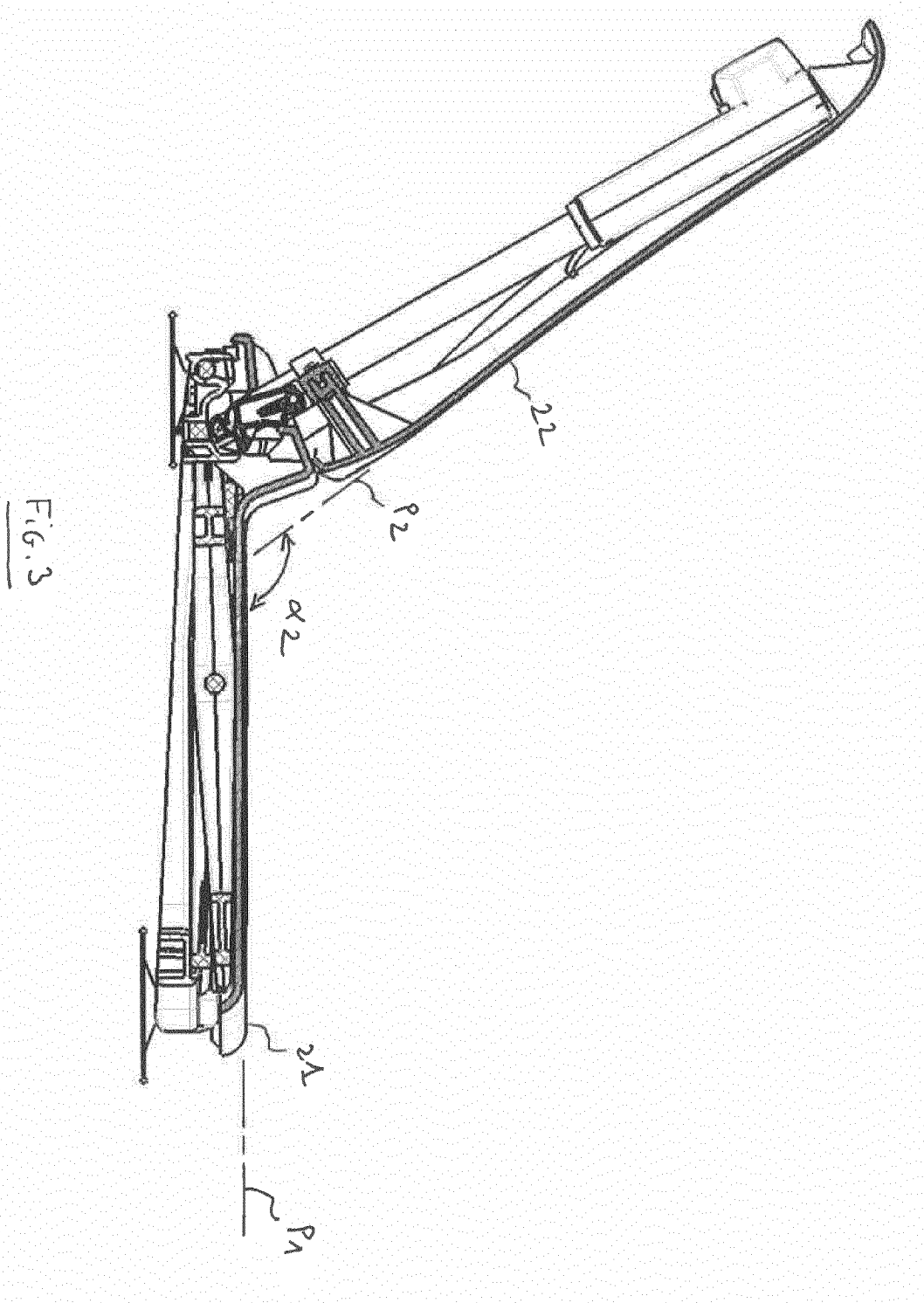
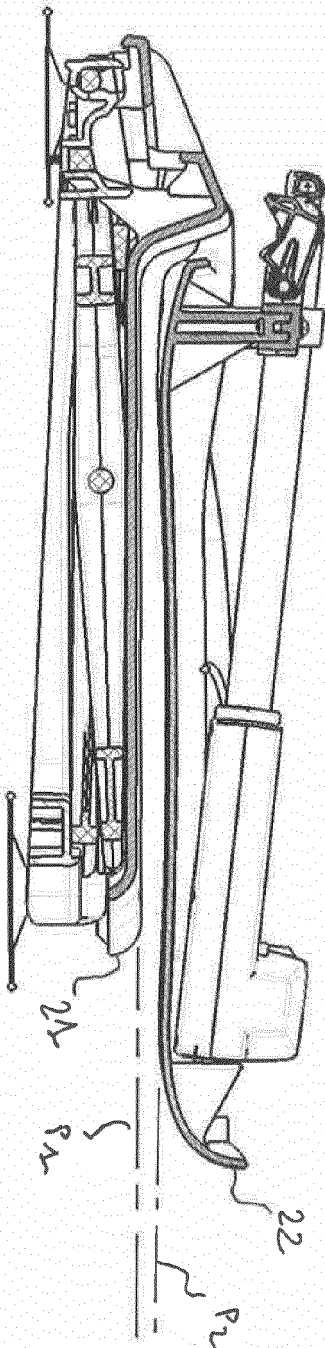


Fig. 4



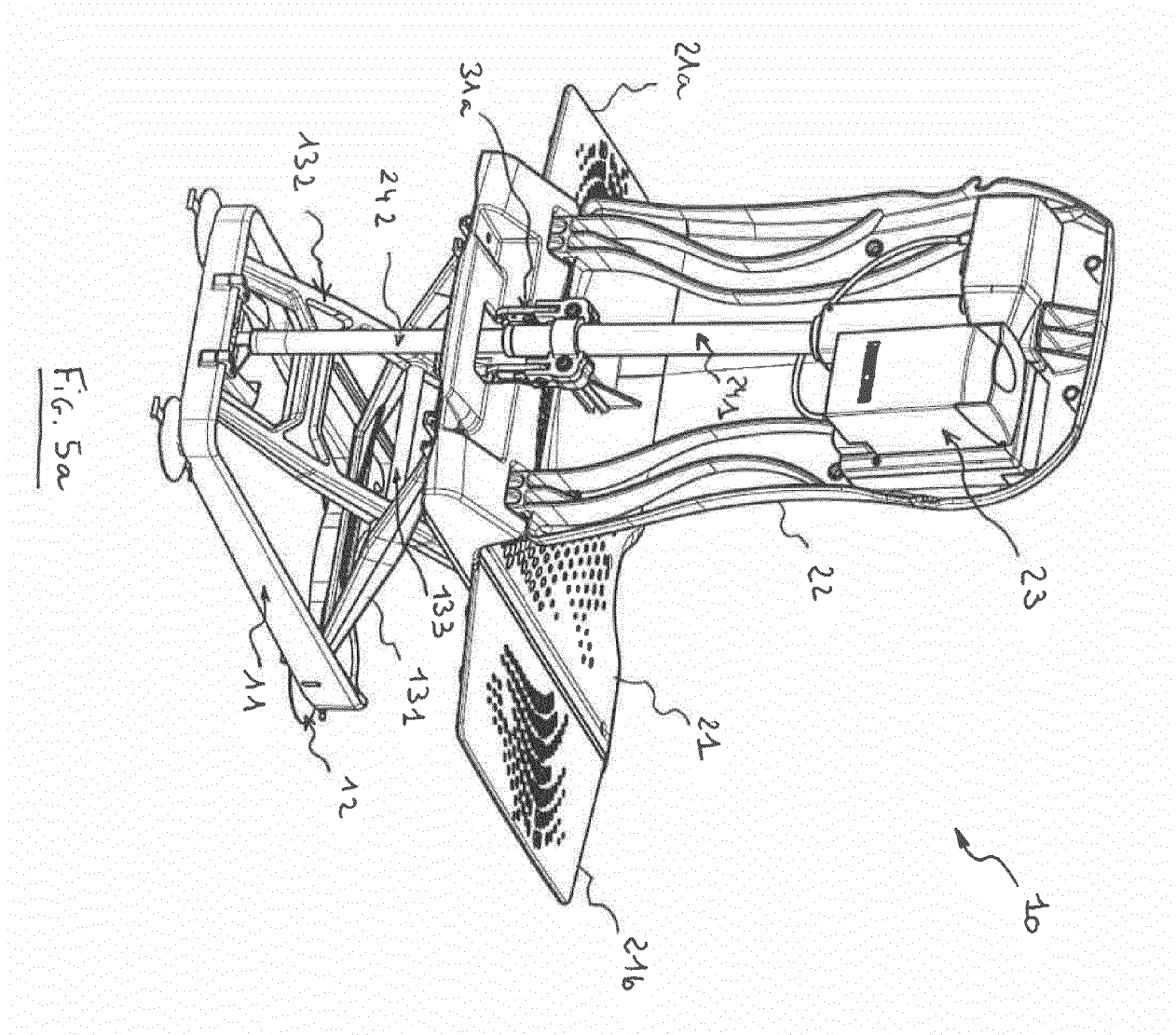
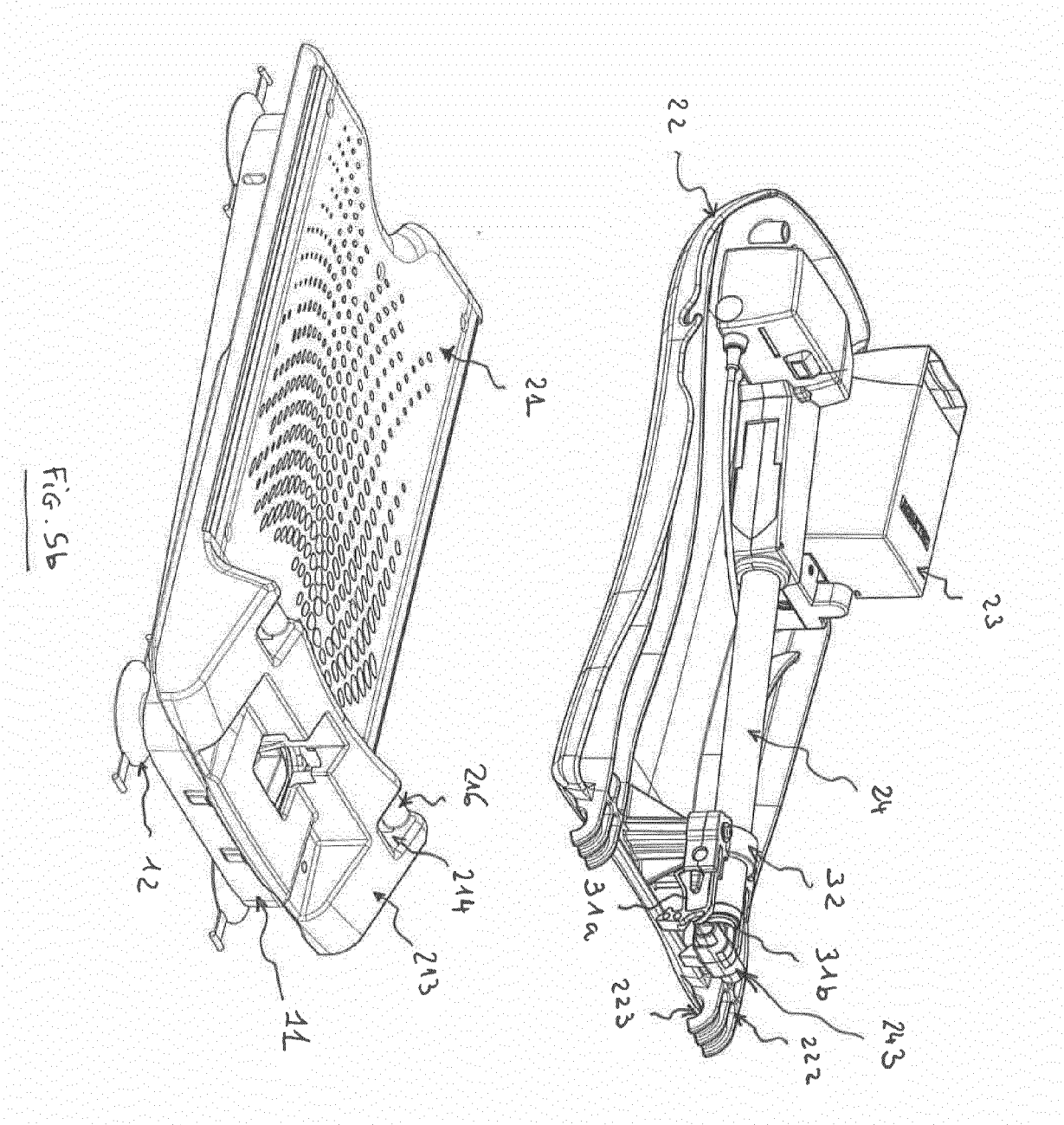
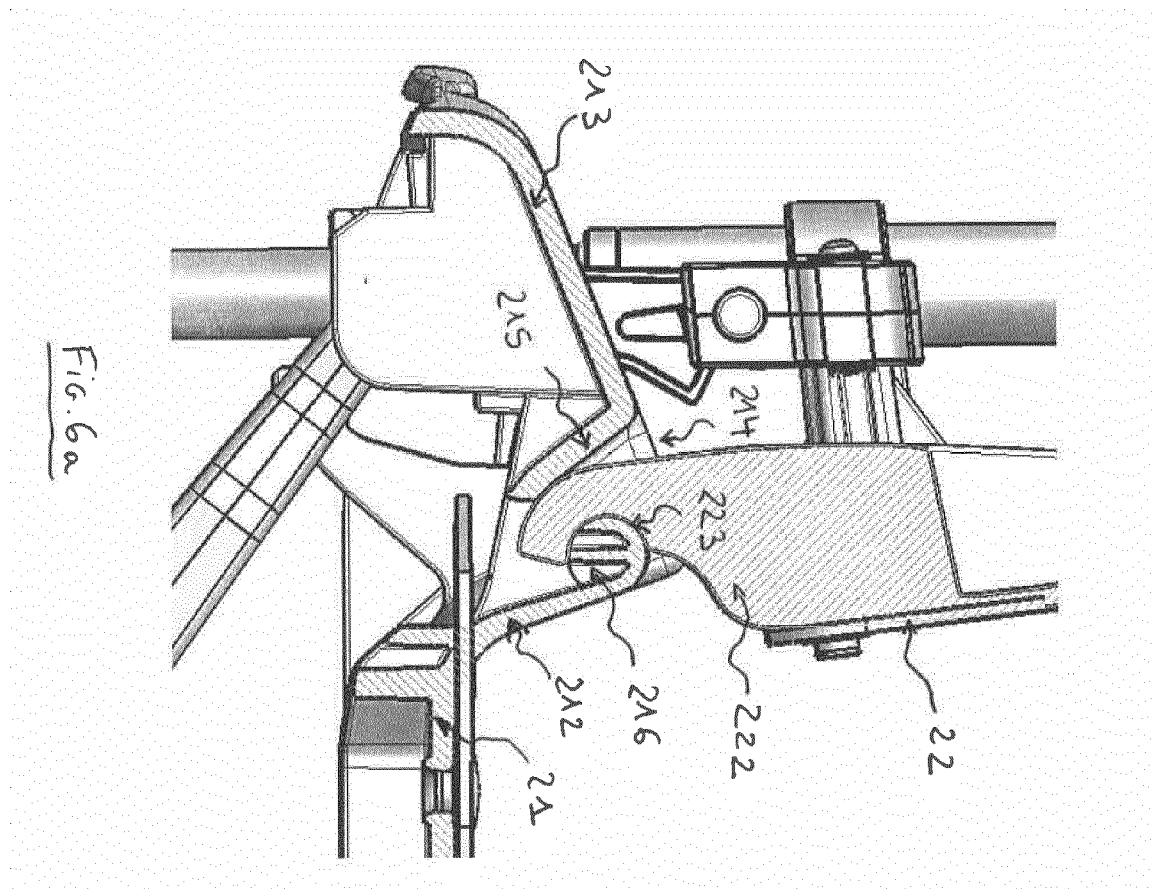


Fig. 5a





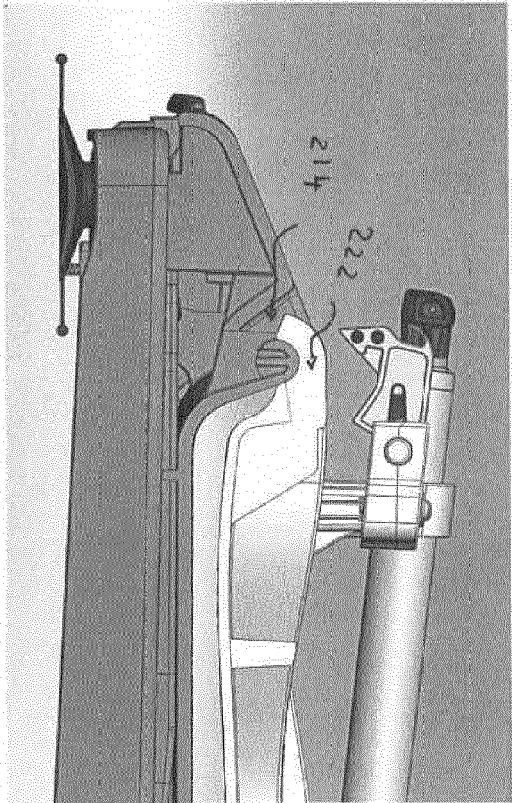


Fig. 6c

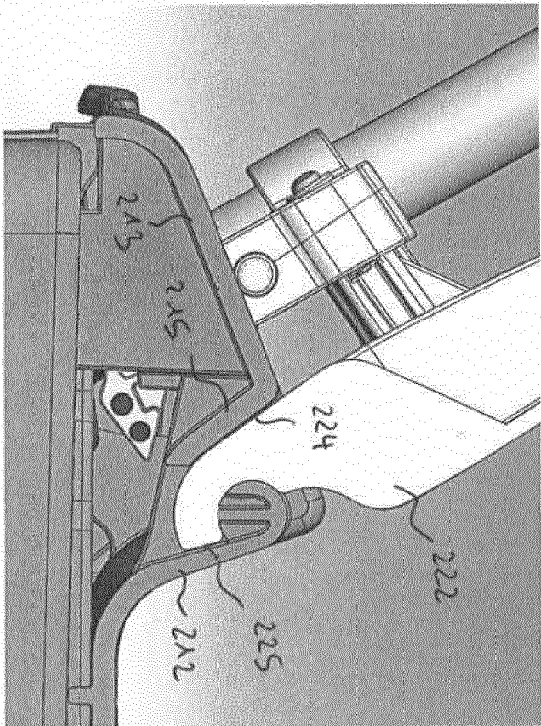
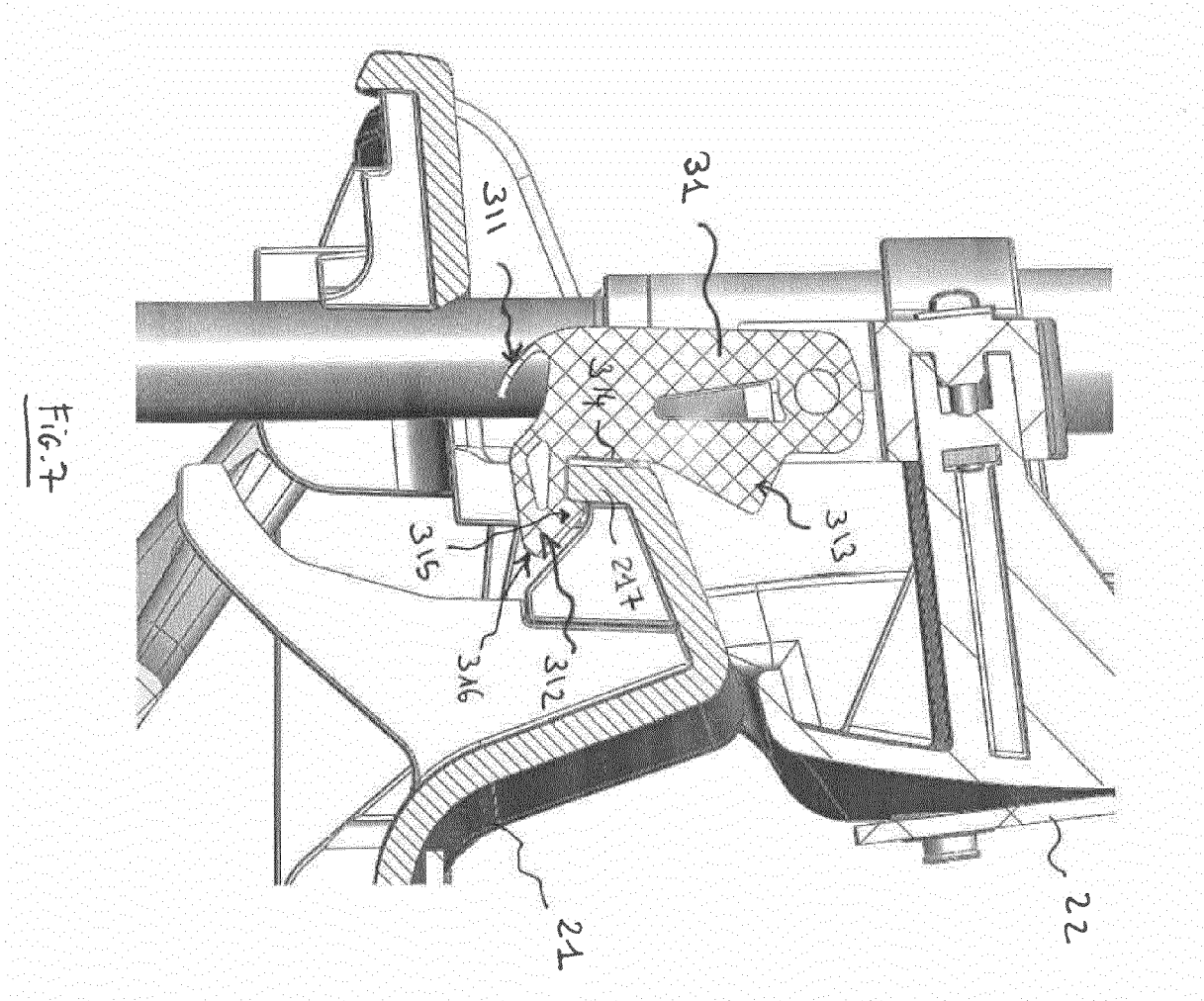


Fig. 6b



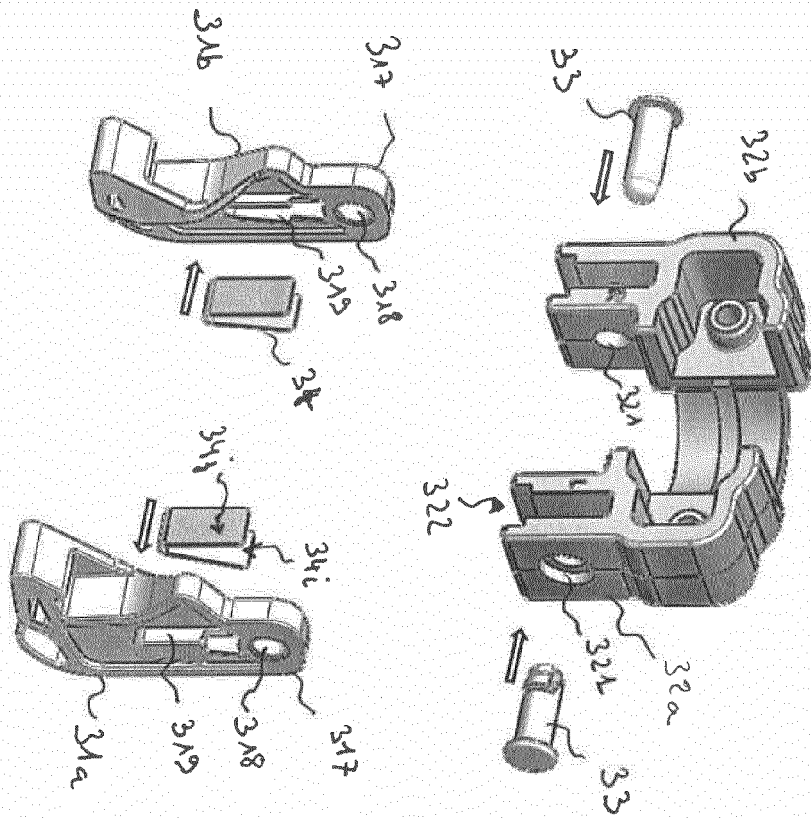


Fig. 8b

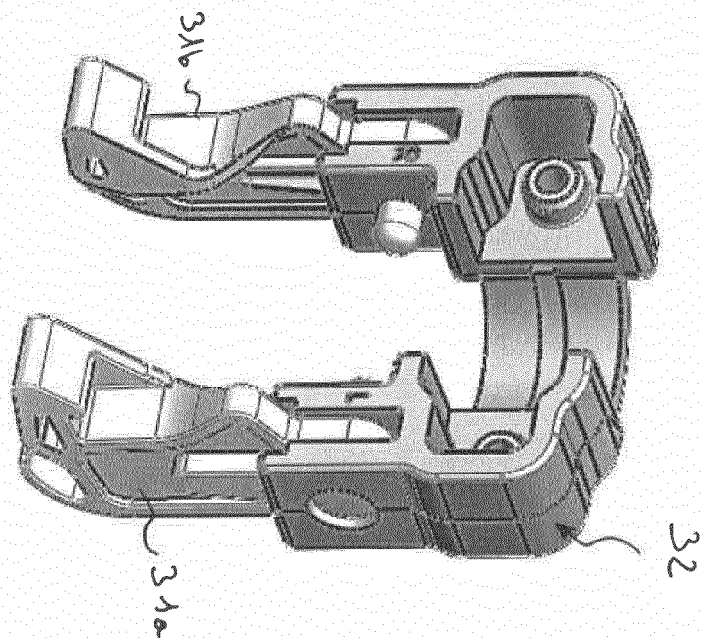
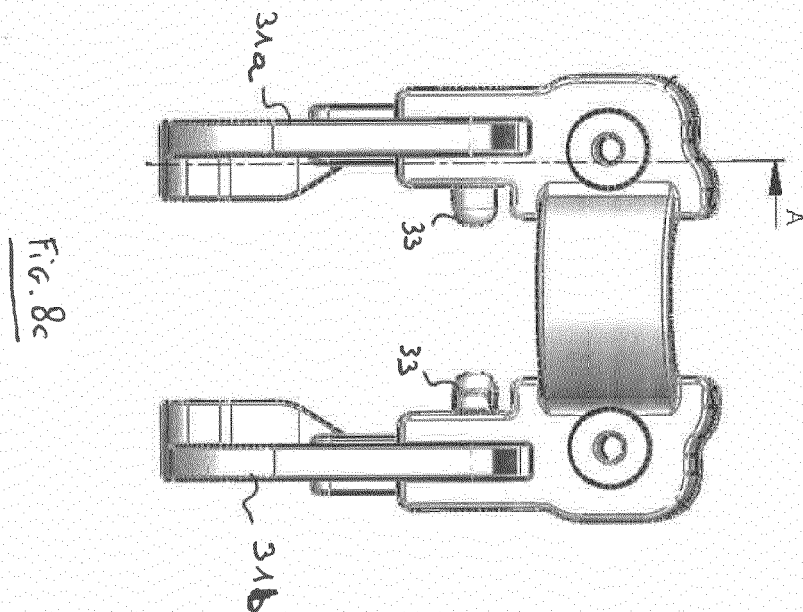
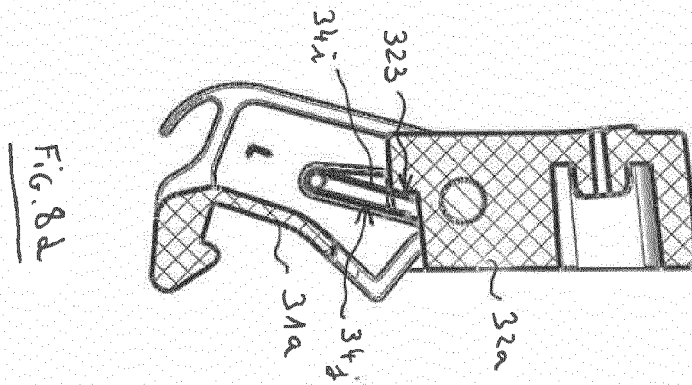
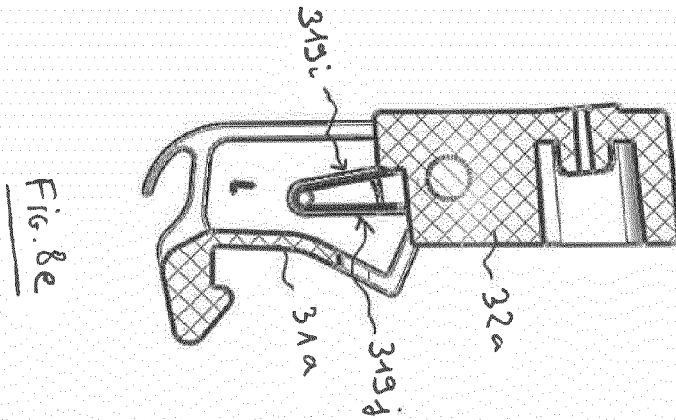
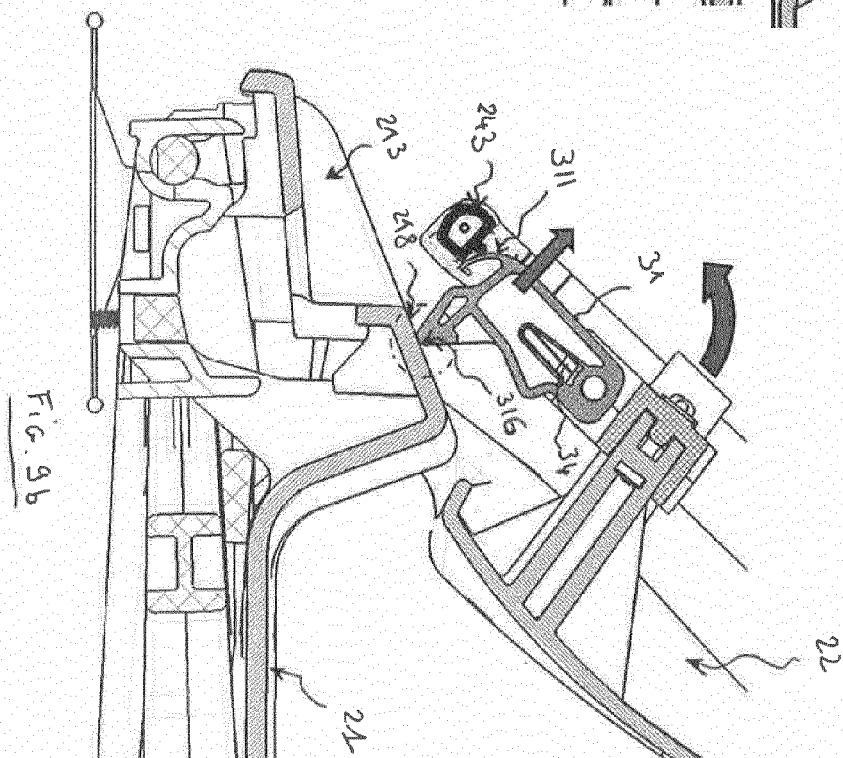
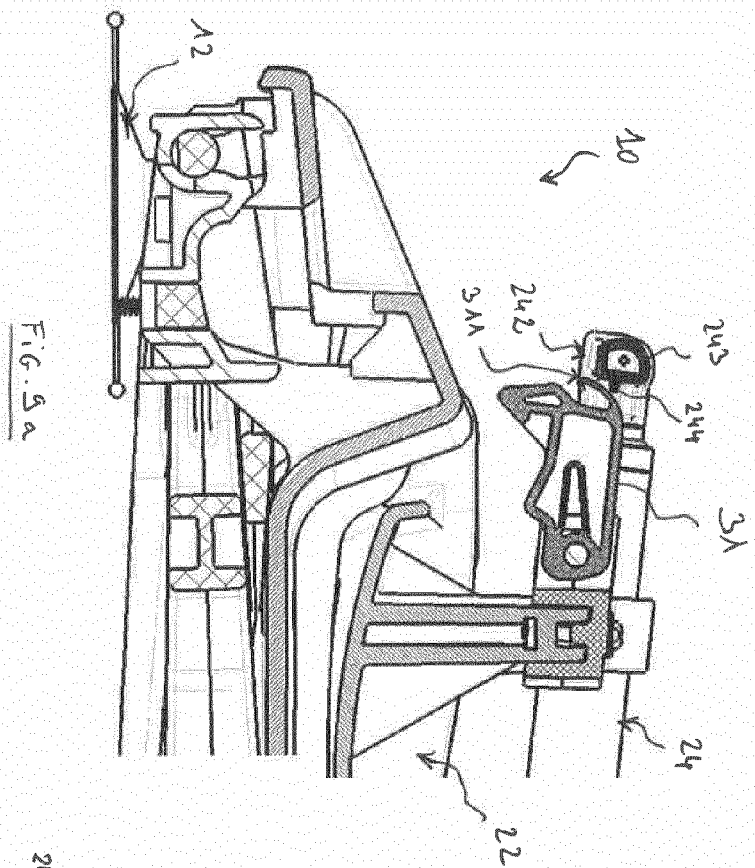


Fig. 8a





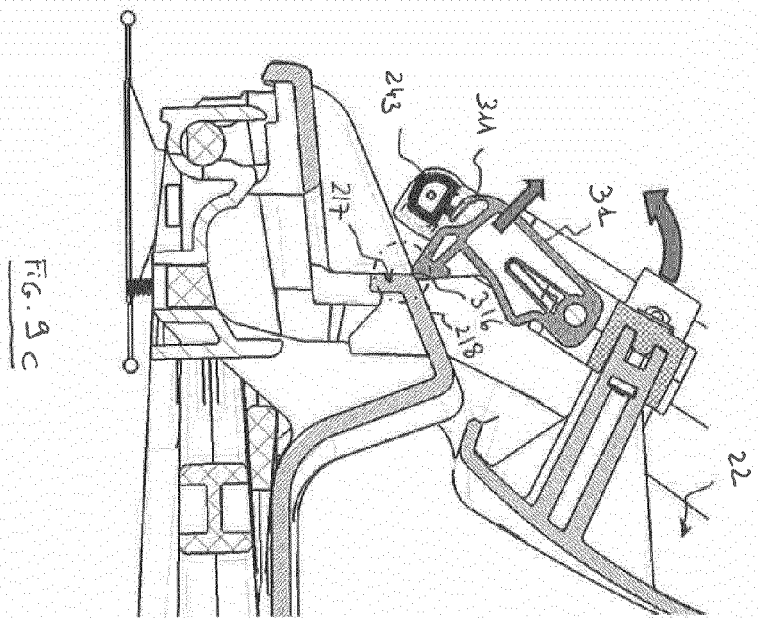


Fig. 9c

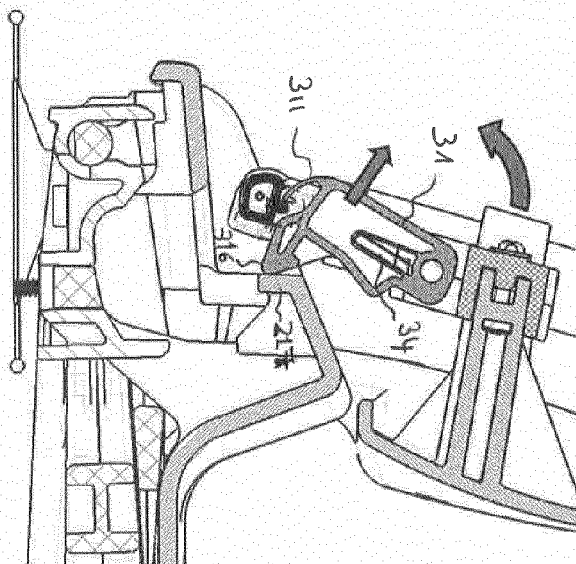
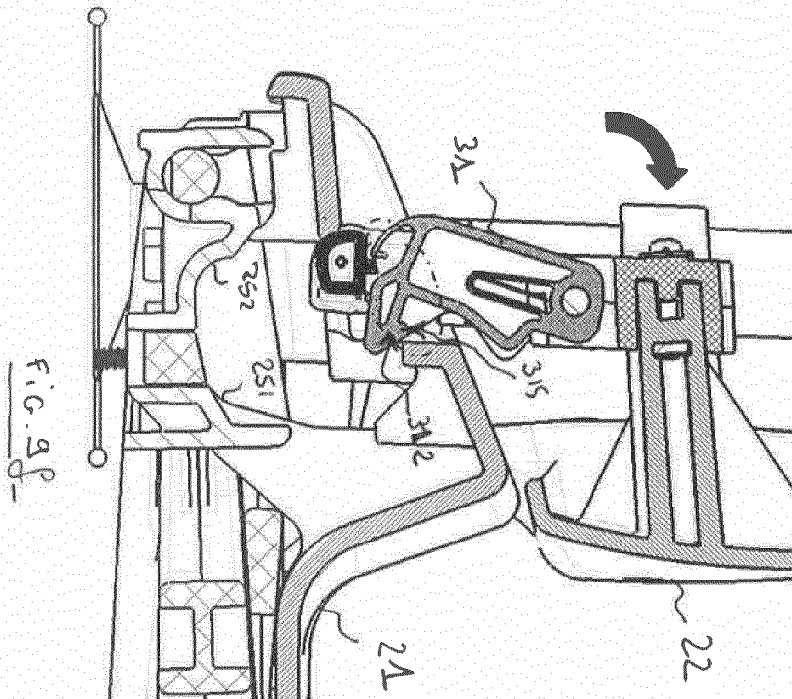
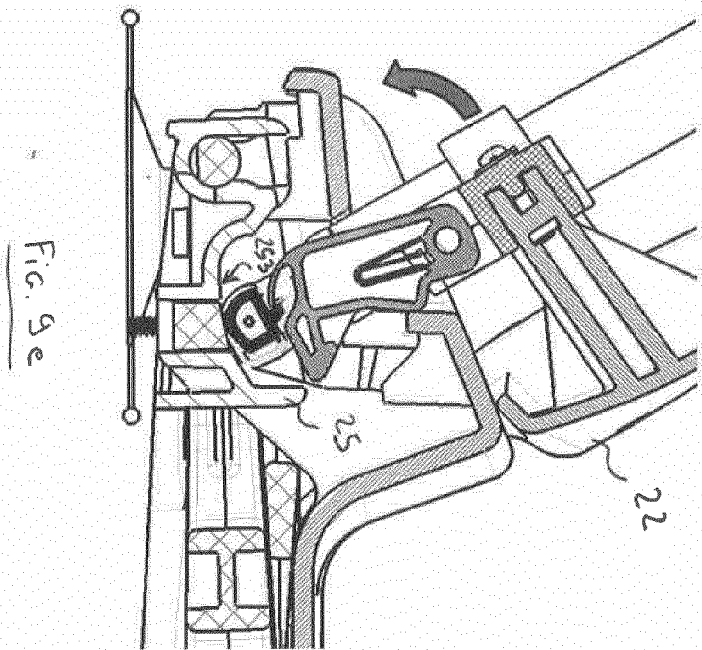
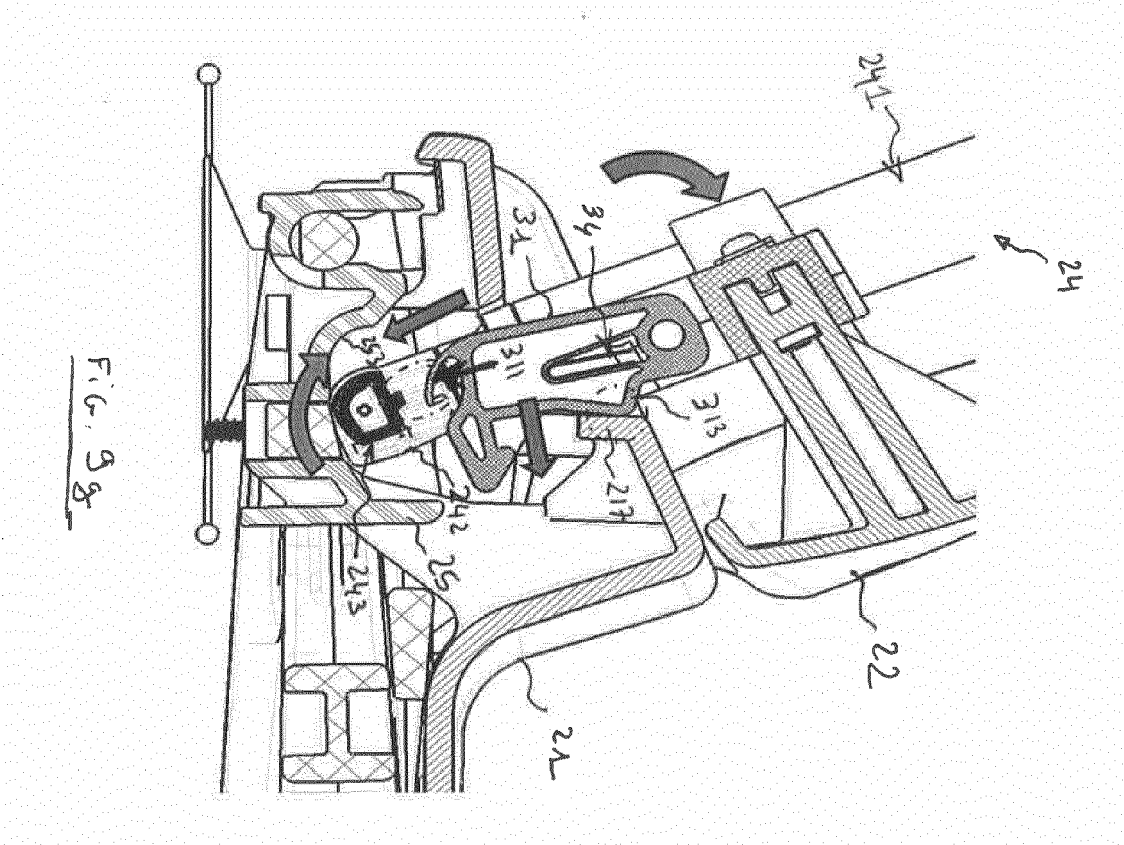
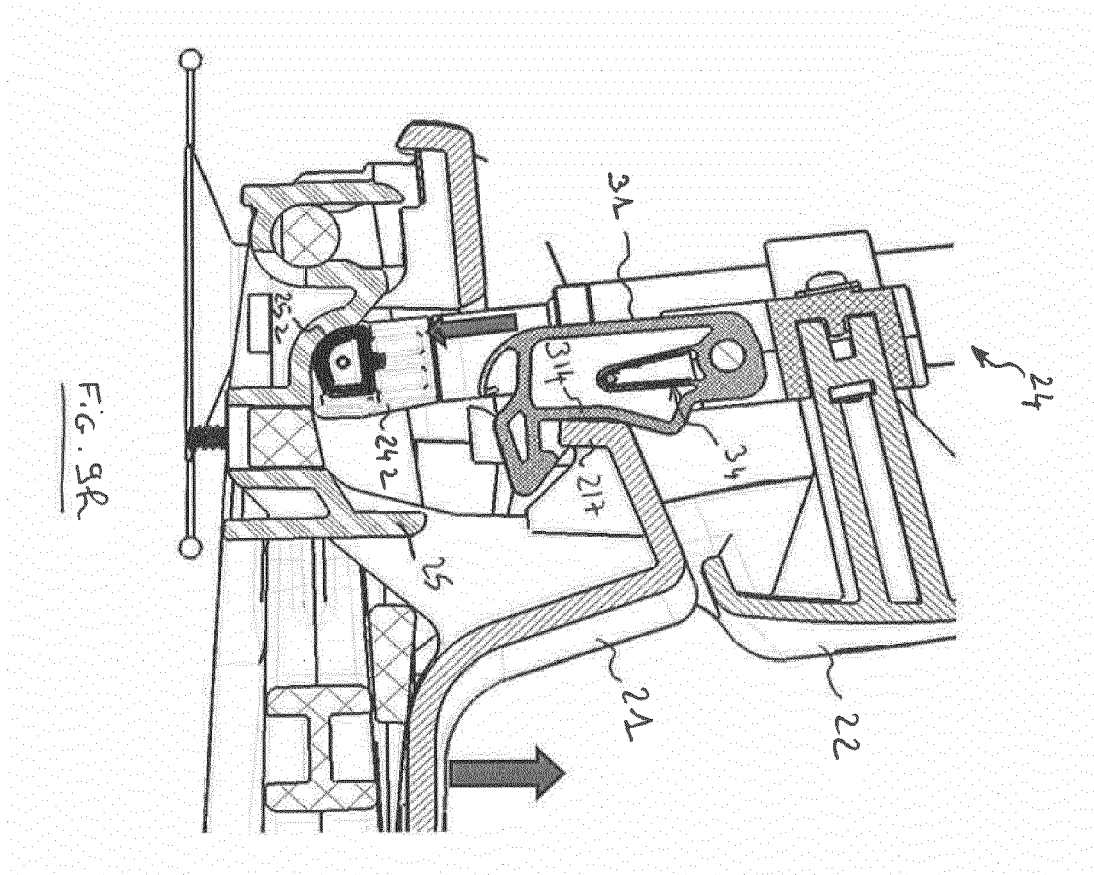
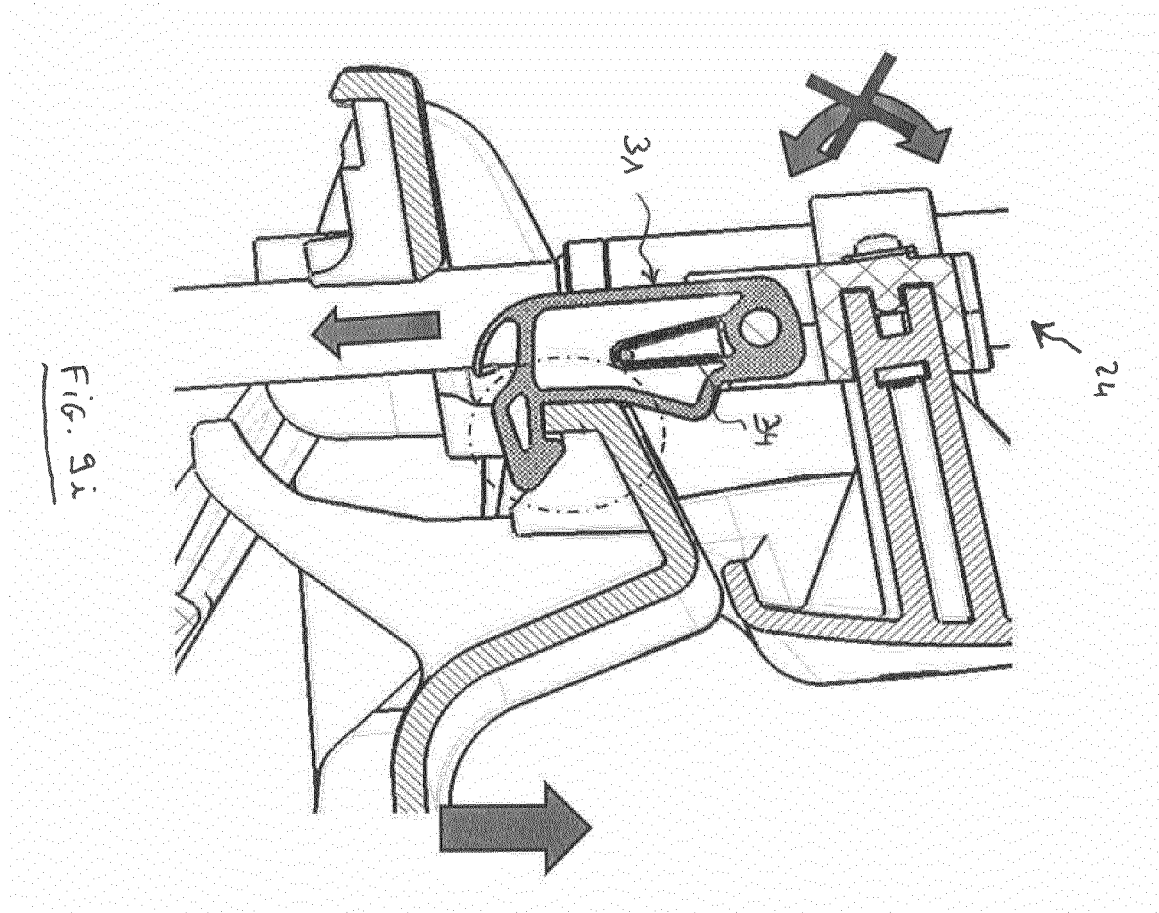


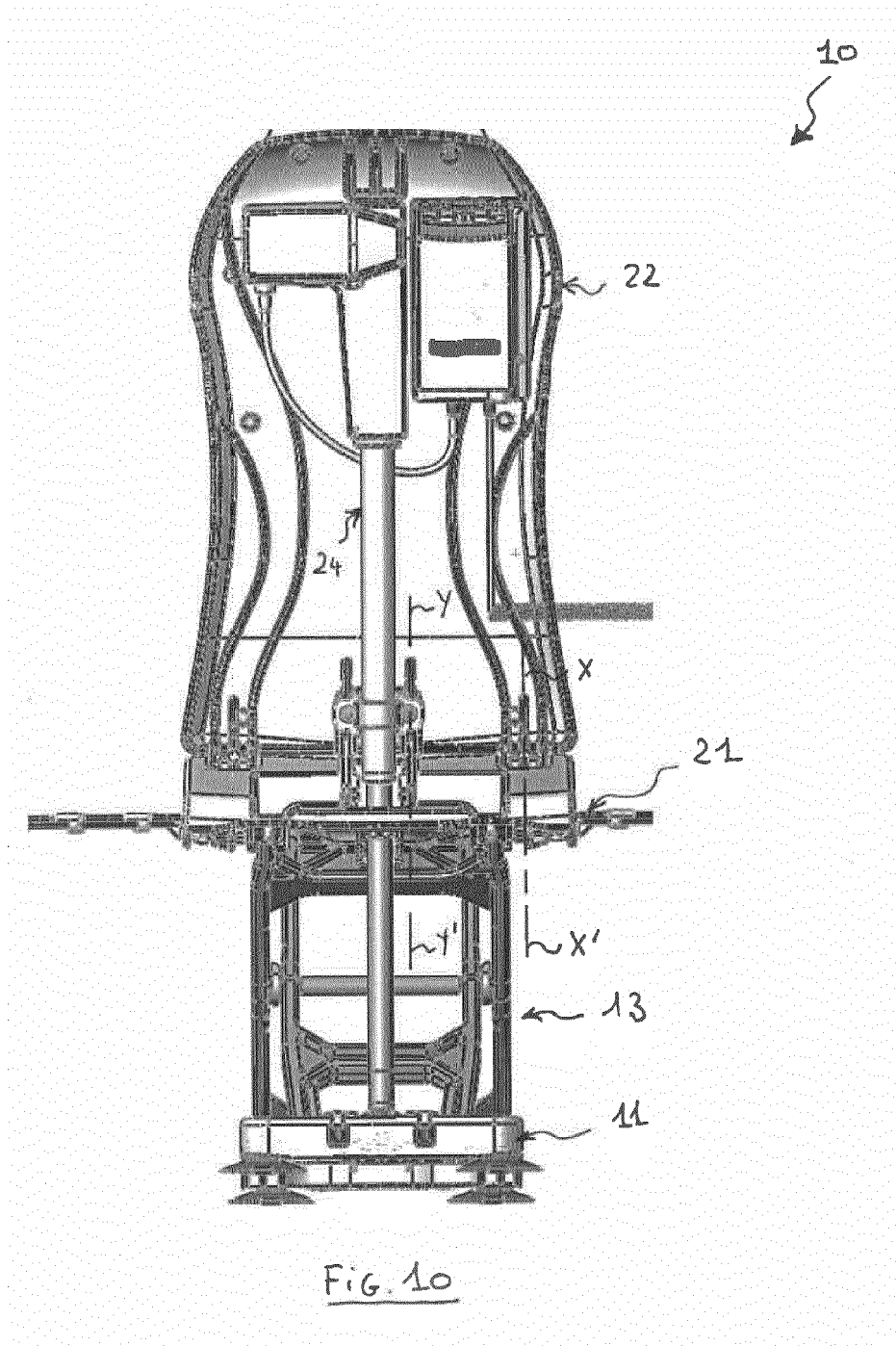
Fig. 9d













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Place of search The Hague		Date of completion of the search 18 January 2016	Examiner Kousouretas, Ioannis
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