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(54) VEHICLE DOOR HANDLE ASSEMBLY

(57) The present invention relates to a vehicle door handle assembly (1) comprising a handle (2) comprising a first extremity (22) and a second extremity (23) opposed to the first extremity (22), the first extremity (22) being connected to a first lever (3) connected to an opening lever, said first lever (3) rotating between a rest position where the first extremity (22) is in a rest position, a deployed position where the first extremity (22) is in a deployed position outside the bracket (10) and an opening position where the first lever (3) actuates the opening lever, the second extremity (23) being connected to a second lever (4) rotating between a rest position where the second extremity (23) is a rest position, an activation position where the second extremity (23) is pushed into the bracket (10), and a deployed position where the second extremity (23) is in a deployed position outside the bracket (10), the vehicle door handle assembly (1) also comprising a return lever (5) connected to the second lever (4), said return lever (5) rotating between a first position and a second position, the return lever (5) comprising an elastic means (56) passively bringing back said return lever (5) to its first position, the rotation of the second lever (4) to its activation position actuates the rotation of the return lever (5) from its first to its second position, and the passive rotation of the return lever (5) from its second to its first position actuates the rotation of the second lever (4) from its deployed position to its rest position. The second extremity (23) of the handle (2) is provided with guiding means (25, 104) configured so as to reduce the degrees of freedom of the handle (2) with respect to the bracket (10) when moving from the rest position to the activation position, the remaining degrees of freedom being translation and rotation about an axis parallel to a fixed direction.

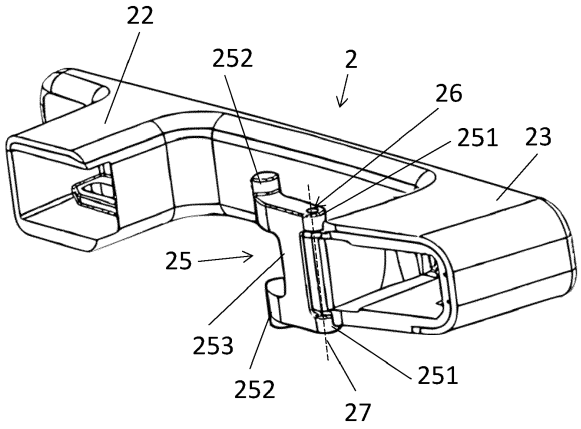

Fig. 10

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Description

TECHNICAL FIELD:

[0001] The present invention relates to a vehicle door assembly, of the type with a handle translating from a rest position where the handle is retracted to a deployed position where the handle is deployed and can be taken in hand and opened.

BACKGROUND:

[0002] Such vehicle door handle assemblies with a handle translating between a rest position and a deployed position are becoming more common and requested by car manufacturers.

[0003] To translate between these two positions, such vehicle door handle assemblies are often motorized by an electric actuator. Such electric vehicle door handle assemblies are expensive and are not suitable for entry-level vehicles due to their costs. Furthermore, these vehicle door handle assemblies may be blocked or unusable in case of electrical power supply failure.

[0004] A mechanical alternative for vehicle door handle assemblies having a translative movement has been suggested. Such assemblies are less expensive and never suffer from electric power failure. However, their operation relies on spring means which cannot overcome strong motion resistance, such as freezing at very low temperatures.

[0005] One aim of the present invention is a handle door assembly which would not stay locked by an internal part prevented from moving by an external factor.

[0006] To this purpose, the invention relates to a vehicle door handle assembly comprising a bracket and a handle, said handle comprising a first extremity and a second extremity opposed to the first extremity,

the first extremity being connected to a first lever, said first lever being designed to be connected to an opening lever to open a latch of the vehicle door, said first lever being designed to rotate with respect to the bracket about an axis of rotation which is parallel to a predetermined fixed direction between a rest position where the first extremity of the handle is in a rest position, a deployed position where the first extremity of the handle is in a deployed position outside the bracket and an opening position where the first lever actuates the opening lever,

the second extremity being connected to a second lever, said second lever being designed to rotate with respect to the bracket about the same axis of rotation between a rest position where the second extremity of the handle is in a rest position, an activation position where the second extremity of the handle is pushed into the bracket, and a deployed position where the second extremity of the handle is in a deployed position outside the bracket,

the vehicle door handle assembly also comprising a return lever having a first extremity connected to the second lever, said return lever being designed to rotate between a first position and a second position, the return lever comprising an elastic means passively bringing back said return lever to its first position,

the rotation of the second lever to its activation position actuates the rotation of the return lever from its first to its second position, and the passive rotation of the return lever from its second to its first position actuates the rotation of the second lever from its deployed position to its rest position,

the second extremity of the handle is provided with guiding means configured so as to reduce the degrees of freedom of the handle with respect to the bracket when moving from the rest position to the activation position, the remaining degrees of freedom being translation and rotation about an axis parallel to the fixed direction.

[0007] The guiding means may comprise a rotating slider mounted rotational on the handle and a bracket cover of the bracket against which the rotating slider rests in a stable way when the handle moves from its rest position to its activation position.

[0008] The bracket may comprise side walls with slots for guiding the rotating slider when the handle moves.

[0009] The return lever may be connected to a delay element which slows down the passive rotation of the return lever from its second to its first position.

[0010] The delay element may comprise at least one damper.

[0011] The at least one damper may comprise a gearwheel and the extremity of the return lever connected to the at least one damper may comprise an arc portion with teeth engaged with said gearwheel.

[0012] The first lever may comprise an elastic means passively bringing back said first lever from its deployed position to its rest position.

[0013] The second lever may comprise an elastic means passively rotating said second lever toward its deployed position.

[0014] The connection between the first lever and the first extremity of the handle may be a pivot-slide connection.

[0015] Further features and advantages of the invention will become apparent from the following description, given by way of non-limiting examples, with reference to the appended drawings, in which:

- Figure 1 is a top view of a schematic representation of a first side of the internal components of a vehicle door handle assembly in a rest position,

- Figure 2 is a bottom view of a schematic representation of a second side of the internal components of the vehicle door handle assembly in a rest position,
- Figure 3 is a top view of a schematic representation of a first side of the internal components of the vehicle door handle assembly in an activation position,
- Figure 4 is a bottom view of a schematic representation of a second side of the internal components of the vehicle door handle assembly in an activation position,
- Figure 5 is a top view of a schematic representation of a first side of the internal components of the vehicle door handle assembly in a deployed position,
- Figure 6 is a bottom view of a schematic representation of a second side of the internal components of the vehicle door handle assembly in a deployed position,
- Figure 7 is a top view of a schematic representation of a first side of the internal components of the vehicle door handle assembly in an opening position,
- Figure 8 is a bottom view of a schematic representation of a second side of the internal components of the vehicle door handle assembly in an opening position,
- Figure 9 is a schematic representation of a second lever according to a particular embodiment,
- Figure 10 is a perspective view of a handle provided with a rotating slider,
- Figure 11 is a perspective view of a bracket encompassing the internal components of the vehicle door handle,
- Figure 12 is a close-up view of a detail XII of figure 11,
- Figure 13 is a top view of a schematic representation of the second side of the vehicle door assembly with its encompassing bracket in a rest position,
- Figures 14 and 15 are top views of a schematic representation of the second side of the vehicle door assembly with its encompassing bracket in an activation position,
- Figure 16 is a top view of a schematic representation of the second side of the vehicle door assembly with its encompassing bracket in a deployed position,
- Figure 17 is a top view of a schematic representation of the second side of the vehicle door assembly with its encompassing bracket in an opening position,
- Figure 18 is a top view of a schematic representation of the second side of the vehicle door assembly with its encompassing bracket in a rest position,
- Figure 19 is a perspective view of a rotating slider according to another embodiment,
- Figure 20 is a top view of the rotating slider of figure 19,
- Figure 21 is a side view of the rotating slider of figure 19,
- Figure 22 is a sectional view of an embodiment of the bracket in the vicinity of the rotating slider.

[0016] In the figures, identical elements bear the same reference numbers. The following implementations are examples. Although the description refers to one or more embodiments, this does not necessarily mean that each reference relates to the same embodiment or that the features apply only to a single embodiment. Individual features of different embodiments can also be combined or interchanged to provide other embodiments.

SUMMARY OF INVENTION

[0017] Figures 1 and 2 show the internal components of a vehicle door handle assembly 1 in a rest position. The vehicle door handle assembly 1 comprises a bracket 10 and a handle 2. The bracket 10 is designed to be fixed on the vehicle door (not represented). The handle 2, shown in perspective on figure 14, has a rotating slider 25 mounted thereon.

[0018] In figures 1-8, the handle 2 is represented without the rotating slider 25 and the bracket 10 is represented in a symbolic way by a line.

[0019] In figures 10-18, the bracket 10 is represented as a box encompassing the internal components of the handle assembly. The bracket 10 is box-shaped by an upper wall 101 and a lower wall 102, mainly parallel to each other, a back wall 103 and a bracket cover (not shown). The walls 101, 102, 103 and bracket cover assembled thereon define an internal chamber able to accommodate the handle 2 and other internal components of the handle assembly.

[0020] The internal components will be described with reference to figures 1-8.

[0021] In this rest position, the handle 2 is retracted into the bracket 10 in order to be flush with the door body when installed.

[0022] The handle 2 comprises a first extremity 22 and a second extremity 23 opposed to the first extremity 22. The first extremity 22 of the handle 2 is connected to a first lever 3 and the second extremity 23 of the handle 2 is connected to a second lever 4.

[0023] The first lever 3 is also designed to be connected to an opening lever (not represented) to open a latch of the vehicle door. The first lever 3 is designed to rotate with respect to the bracket about an axis of rotation which is parallel to a predetermined fixed direction, between a rest position (represented in figures 1, 2 and 13) where the first extremity 22 of the handle 2 is in a rest position, a deployed position (represented in figures 3 , 4, 14 and 15) where the first extremity 22 of the handle 2 is in a deployed position outside the bracket 10 and an opening position (represented in figures 7, 8 and 16) where the first lever 3 actuates the opening lever.

[0024] More precisely, the first lever 3 comprises a pivot connection 33 with the bracket 10. Said pivot connection 33 is parallel to the predetermined fixed direction. When the vehicle door handle assembly 1 is mounted on a car, said predetermined direction is vertical or almost vertical. Said fixed direction is perpendicular to the view on Figs. 1-9 and 13-18. The first lever 3 rotates around

the pivot connection between its different positions. A first extremity of the first lever 3 is connected to the first extremity 22 of the handle 2 and a second extremity of the first lever 3, is connected to the opening lever, in particular, thanks to a pivot connection 31 and the shape of the first lever 3, the first lever 3 can touch the opening lever during the movement.

[0025] The connection between the first lever 3 and the first extremity 22 of the handle is preferably a pivot-slide connection. In the examples represented figures 1, 3, 5, and 7, the first extremity 22 of the handle 2 comprises a slide opening 21 and the first lever 3 comprises a recess 31 for example to receive a pin (not represented). The first lever 3 may also comprise an elastic means 34 passively bringing back said first lever 3 from its deployed position to its rest position. This elastic means 34 may be a spring positioned for example on the pivot connection 33 between the first lever 3 and the bracket 10. The torque applied by this elastic means 34 is represented by a grey arrow in figures 1 to 8.

[0026] As shown in figure 10, the second extremity 23 of the handle 2 is provided with the rotating slider 25 (not shown in figures 1-8) which is mounted rotational around a pair of aligned pins 26 protruding on the upper and lower sides of the handle 2. The pins 26 together form a swivel axis parallel to the fixed predetermined direction when the handle 2 is mounted on the bracket 10. The pins 26 can be opposite ends of an axis 27 inserted in a corner of the handle 2, or protruding spindles (not shown) integral with the handle 2.

[0027] The rotating slider 25 is H-shaped with ears 251 and legs 252, and a middle part 253 in between. It may have another shape as shown in figures 19 to 21.

[0028] The ears 251 can rotate around the pins 26 of the handle 2. Assembling the rotating slider 25 to the handle 2 requires either to remove the inserted axis 27, where applicable, or to provide for a specific clipping-shape on the ears 251 to engage them around the integral spindles, when applicable.

[0029] The middle part 253 of the rotating slider 25 has a back face 2531 opposite to the handle 10 which can rest in a stable way and slide smoothly against the bracket cover 103 of the bracket 20. Said back face 2531 has a flat surface allowing the movement of the handle in actuation position. The bracket cover (not shown) has a hole of an appropriate size around the rotating slider 25 to avoid any contact between the rotating slider and the bracket cover. Alternatively, the back face 2531 has protruding ribs (not shown) ending in co-planar surfaces which can rest and slide against the bracket cover 103 and maintain the rotating slider in a stable way.

[0030] Opposite to the ears 251, the legs 252 end in aligned tubular feet 2521. The tubular feet 2521 have a cylindrical shape with an external diameter. They extend outwardly, parallel to the inserted axis 27 (or parallel to the spindles). Both tubular feet 2521 have at least one part extending beyond the overall volume of the handle 2. In other words, the height of the handle 2, i.e. its overall dimension from top side to bottom side, is smaller than the distance between the ends of the tubular feet 2521.

[0031] Figures 13-18 show the bracket 10 has curved slots 104 on each of its internal walls 101 and 102, in the vicinity of the second extremity 23 of the handle 2. The slots 104 can go through the whole thickness of the bracket or can be dug on half of its thickness. The curved slots 104 are parallel to one another. The parts of the walls 101, 102 around the curved slots 104 are parallel to one another. The slots 104 are delimited by opposite borders, i.e. one internal border 1041, one external border 1042, parallel to one another. The width of each slot 104 is slightly greater than the external diameter of the tubular feet 2521, so that the tubular feet can slide in the slots while keeping a close contact with the borders of the slots. Alternatively, the slots 104 are delimited only by the external borders 1042 (the internal borders 1041 do not exist).

[0032] The rotating slider 25 and bracket cover 103 act as a guiding means configured so as to limit the freedom of movement of the handle 2, with respect to the bracket 10, when the rotating slider 25 rests against the bracket cover 103. Movements allowed by said guiding means are translation and rotation about axes parallel to the fixed direction, only.

[0033] Indeed, the tubular feet 2521 sliding along the external borders 1042 of the slots 104, plus the curved shape of the slots, position the rotating slider 25 with its back face 2531 resting against the bracket cover 103 of the bracket 20. Thanks to the pivot link provided by the pins 26 between the rotating slider 25 and the handle 10, it makes it impossible for the handle 2 to rotate about an axis not parallel to the fixed predetermined direction with respect to the bracket 10: the handle 10 can only translate or rotate about the fixed predetermined direction.

[0034] Each one of the curved slots 104 extends from a bottom 1043 to an opening 1044. Their curved shape is such that when the rotating slider 25 is close to the bracket cover 103, it is guided to rest against said bracket cover 103 and when the rotating slider is pulled out with the handle 2, as will be disclosed later on, the tubular feet 2521 are in abutment with the bottoms 1043.

[0035] The second extremity 23 of the handle 2 is connected to a second lever 4. The second lever 4 is designed to rotate between a rest position (represented in figures 1, 2 and 13) where the second extremity 23 of the handle 2 is in a rest position, an activation position (represented in figures 3, 4 and 14) where the second extremity 23 of the handle 2 is pushed into the bracket 10, and a deployed position (represented in figures 5, 6 to 16) where the second extremity 23 of the handle 2 is in a deployed position outside the bracket 10.

[0036] More precisely, the second lever 4 comprises a pivot connection 41 with the bracket 10 around which the second lever 4 rotates between its different positions. A first extremity of the second lever 4 is connected to the second extremity 23 of the handle 2. This connection is preferably a pivot connection 24. The second lever 4 may

also comprise an elastic means (not represented) passively rotating said second lever 4 to its deployed position. This elastic means may be a spring positioned for example on the pivot connection 41 between the second lever 4 and the bracket 10. The torque applied by this elastic means is represented by a grey arrow in figures 1 to 8.

[0037] The first 3 and second 4 levers may be connected together with at least one first rod 7 in order to synchronize the movements of the two levers 3, 4. More precisely, the first rod 7 transmits the rotation of the second lever 4 from its activation position to its deployed position to the first lever 3, rotating said first lever 3 from its rest position to its deployed position. The first rod 7 may comprise a pivot-slide connection with anyone of the first 3 or second lever 4 so that the first lever 3 can rotate from its rest position to its deployed position or from its deployed position to its opening position without rotating the second lever 4. In the example illustrated in figures 1 to 8, the first rod 7 comprises a first extremity connected to a second extremity of the first lever 3 by a pivot connection 32. The first rod 7 comprises a second extremity connected to the second lever 4 by pivot-slide connection. The second extremity of the first rod 7 comprises a slide 71 and the second extremity of the second lever 4 comprises a pin 42 inserted into said slide 71. The handle 2, the first lever 3, the second 4 lever and the first rod 7 are designed and connected like a parallelogram and move together synchronously. The other connection of the first rod 7 with anyone of the first 3 or second lever 4 is preferably a pivot connection.

[0038] The vehicle door handle assembly 1 also comprises a return lever 5 having a first extremity connected to a second extremity of the second lever 4, said return lever 5 being designed to rotate between a first position (represented in figures 1 and 2) and a second position (represented in figures 3 to 8). More precisely, the return lever 5 comprises a pivot connection 55 with the bracket 10 around which the return lever 5 rotates between its different positions. The return lever 5 also comprises an elastic means 56 passively bringing back said return lever 5 to its first position. This elastic means 56 may be a spring positioned for example on the pivot connection 55 between the return lever 5 and the bracket 10. The torque applied by this elastic means 56 is represented by a grey arrow on figures 1 to 8.

[0039] The rotation of the second lever 4 to its activation position actuates the rotation of the return lever 5 from its first to its second position. The passive rotation of the return lever 5 from its second to its first position actuates the rotation of the second lever 4 from its deployed position to its rest position.

[0040] The second 4 and the return 5 levers are connected by a second 8 and a third 9 rods. The second rod 8 transmits the rotation of the second lever 4 from its rest position to its activation position to the return lever 5, rotating said return lever 5 from its first position to its second position. The third rod 9 transmits the rotation of the return lever 5 from its second position to its first position to the second lever 4, rotating said second lever 4 from its deployed position to its rest position. The second 8 and the third 9 rods are placed on the return lever 5 on either side of the pivot connection 55 of the return lever 5 with the bracket 10. The second 8 and the third 9 rods are placed on the second extremity of second lever 5 on the same side of the pivot connection 41 of the second lever 4 with the bracket 10.

[0041] The second rod 8 may comprise a pivot-slide connection 52 with anyone of the second lever 4 or return lever 5. In the example illustrated in figures 1-8 and 10-18, the pivot-slide connection 52 is placed between the return lever 5 and the second rod 8. The return lever 5 comprises the slide of said pivot-slide connection 52 and the second rod 8 comprises a pin inserted in the slide. Still according to the example illustrated in figures 1 to 8, the connection between the second rod 8 and the second lever 4 is a pivot connection 44. The other connection of the second rod 8 with any of the second lever 4 or return lever 5 is preferably a pivot connection.

[0042] The third rod 9 may comprise a pivot-slide connection 45 with any of the second lever 4 or return lever 5. In the example illustrated in figures 1-8 and 10-18, the pivot-slide connection 45 is placed between the second lever 4 and the third rod 9. The second lever 4 comprises the slide of said pivot-slide connection 45 and the third rod 9 comprises a pin inserted in the slide. Still according to the example illustrated in the same figures, the connection between the third rod 9 and the return lever 5 is a pivot connection 53. The other connection of the third rod 9 with any of the second lever 4 or return lever 5 is preferably a pivot connection.

[0043] The return lever 5, more exactly its second extremity, is connected to a delay element 6 which slows down the passive rotation of the return lever 5 from its second to its first position. This delay element 6 may comprise at least one damper. The at least one damper 6 may comprise a gearwheel 61 and the extremity of the return lever 5, connected to the at least one damper 6, may comprise an arc portion with teeth 54 engaged with said gearwheel 61. The torque applied by this at least one damper 6 is represented by a grey arrow on figures 1 to 8.

[0044] The figures 1 to 8 and 10 to 18 represent different positions and cinematic steps of the deployment, opening and retractation of the handle 2.

[0045] As described above, figures 1, 2 and 13 are a representation of a rest position where the handle 2 is retracted into the bracket 10 in order to be at the same level as the door body when installed. The rotating slider 25 is close to the bracket cover 103. Its rods 253 are trapped in the curved slots 104, not far from the openings 1044. The first lever 3 is in its rest position and maintained in this rest position by the elastic means 34. The second lever 4 is in its rest position and the return lever 5 is in its first position. The return lever 5 is maintained in its first position by the elastic means 56. The elastic means

56 of the return lever 5 is stronger than the elastic mean of the second lever 4 in order that the return lever 5 in its first position maintained the second lever 4 in its rest position. The elastic means 56 of the return lever 5 is also stronger than the delay element 6 in order to maintain the return lever 5 in its first position. In this rest position, the inside of the handle 2 may also rests on a rest portion 11 of the bracket 10 placed between the first 22 and second 23 extremities of the handle 2.

[0046] Figures 3, 4 and 14 represent an activation position of the handle 2 where the user activates the handle 2 by pushing the second extremity 23 of the handle 2 into the bracket 10. Due to this push, the second extremity 23 moves towards the bracket cover 103 of the bracket 10. The tubular feet 2521 of the rotating slider 25 slide in the slots 104 towards the openings 1044. The back face 2531 of the rotating slider 25 abuts against the bracket cover 103 and rests against it in a stable way, keeping the rotating slider parallel to the bracket cover 103 even if the latter slides against the bracket cover 103.

[0047] The handle 2 rotates taking support on the rest portion 11 of the bracket 10 and pivoting around the swivel axis connecting the handle 2 with the rotating slider 25.

[0048] Thanks to the limited motion authorized by the rotating slider, i.e. either translation parallel to the bracket cover 103 or pivot around the swivel axis, the handle can only rotate about an axis parallel to the fixed predetermined position.

[0049] Since all the pivots used in the handle assembly are parallel to the fixed direction, when the user pushes the handle 2, he cannot force the mechanism of the door handle assembly 1 in a position where one of the axes, in particular 33, 41, would be distorted, causing the handle assembly 1 to jam.

[0050] The first extremity 22 of the handle 2 protrudes from the bracket 10 and rotates the first lever 3 around its pivot connection 33 with the bracket 10 from its rest position to an intermediate. The rotation of the first lever 3 is not transmitted to the second lever 4 by the first rod 7 due to the pivot-slide connection of the first rod 7 with anyone of the first 3 or second lever 4.

[0051] The push of the second extremity 23 of the handle 2 rotates the second lever 4 around its pivot connection 41 with the bracket 10 from its rest position to its activation position. The rotation of the second lever 4 causes the rotation of the return lever 5 around its pivot connection 55 with the bracket 10 from its first to its second position. In the example illustrated in figures 3, 4 and 14, the transmission of the rotation of the second lever 4 to the return lever 5 is made by the second rod 8 which pushes one side of the return lever 5 causing its rotation. Indeed, the rotation of the second lever 4 to its activation position makes the second rod 8 slid in its slide-pivot connection with anyone of the second 4 or return lever 5 bringing the second rod 8 to abutment pushing the return lever 5. The third rod 9 slides in its slide-pivot connection with anyone of the second lever 4 or return lever 5 without affecting the rotation of anyone of these levers 4, 5. The rotation of the second lever 4 is made against the torque of its elastic means and the rotation of the return lever 5 is made against the torque of its elastic means 56.

[0052] As shown in figure 15, the user can grab and pull the handle 2.

[0053] Figures 5, 6 and 16 represent a deployed position of the handle 2 where the first lever 3 is still in its deployed position and where the second lever 4 has rotated from its activation position to its deployed position, bringing the second extremity 23 of the handle 2 in its deployed position outside the bracket 10. When the user removes his push on the second extremity 23 of the handle 2, the elastic means of the second lever 4 allows the passive rotation of the second lever 4 to its deployed position. The rotation of the second lever 4 is not transmitted to the return lever 5 by any of the second 8 or third rod 9 which slide with their pivot-slide connections. The first lever 3 is maintained in its deployed position due to the first rod 7 which is in abutment with its pivot-slide connection. The return lever 5 is still on its second position due to the delay element 6. The third rod 9 is in abutment in order to stop the rotation of the second lever 4 in its deployed position against the torque of its elastic means 34. The rods 2531 of the rotating slider 25 abut the bottom of the slots 104. It prevents the mechanism from bearing the tensile force exerted by the user.

[0054] Figures 7, 8 and 17 represent an opening position of the handle where the user pulls the handle to open the vehicle door. When the user pulls the handle 2, it rotates around the pivot connection 24 between the second extremity 23 of the handle 2 and the second lever 4. The first extremity 22 of the handle 2 is pulled in an opening position rotating the first lever 3 from its deployed position to its opening position. The rotation of the first lever 3 is not transmitted to the second lever 4 by the first rod 7 due to its pivot-slide connection and thanks to the retention provided by the rotating slider 25 and the stops between the bracket and the lever 4 in deploy position. It can be helped also thanks to an additional retention provided by the rotating slider.

[0055] When the user releases the handle 2, the first lever 3 rotates back to its deployed position due to its elastic means 34.

[0056] The delay element 6 slows down the passive return rotation of the return lever 5 from its second position to its first position. When the return lever 5 rotates from its second to its first position, it also transmits its rotation to the second lever 4 to rotate the second lever 4 from its deployed position to its rest position, as shown in figure 18. In the example illustrated in figures 7 and 8, when the return lever 5 rotates to its first position, the third rod 9 is in abutment in order to pull back the second lever 4 in its rest position against the torque of the elastic means of the second lever4. The rotation of the second 4 and the first 3 levers to their rest position are synchronous due to the first rod 7. Thus, the handle 2 translates from its deployed position (figures 5 and 6) to its rest

position (figures 1 and 2). This translation is slowed down and progressive thanks to the delay element 6.

[0057] In a particular embodiment illustrated in figure 9, the extremity of the return lever 5 connected to the at least one damper 6 may comprises a portion without teeth 54 in order to disconnect the return lever 5 of the at least one damper 6 before said return lever 5 reaches its first position. This embodiment allows accelerating the return of the return lever 5 at the end and so accelerating the translation of the handle 2 from its deployed position to its rest position when the handle 2 is near its rest position.

[0058] Figures 19-22 show alternative embodiments of the rotating slider and bracket.

[0059] The rotative slider 25', compared to the one of previous figures, does not have ears, but a central part 251'. The complementary ears are on the handle. The link between handle and slider is still obtained by an axis passing through the ears of the handle and the central part 251' of the slider.

[0060] The tubular feet are identical.

[0061] The back face 2531' of the slider has reinforcing ribs 25311'. Said ribs 25311' end with faces which are co-planar, to provide a stable resting surface against the back face 103 of the bracket.

[0062] The upper 101' and lower 102' wall of the bracket 10 have curved slots 104'. Each slot goes through only half of the thickness of the wall 102'. Each slot 104' has only its external border 1042' along the curved shape of the slots 104 of previous figures. The internal border is missing. The tubular feet 2521 are guided only by the external border 1042', when the handle moves from its activation position to its deployed and opening positions.

LIST OF REFERENCES

[0063]

1: vehicle door handle
10: bracket
101: upper wall
102: lower wall
103: back wall
104: curved slots
1041: internal border of a curved slot
1042: external border of a curved slot
1043: bottom of the slots
1044: opening of the slots
11: rest bracket
2: handle
21: slide of the first extremity of the handle
22: first extremity of the handle
23: second extremity of the handle
24: second extremity pivot connection
25: rotating slider
26: pins
27: inserted axis
251: ears
252: legs
253: middle part
2531: back face of the middle part
2521: tubular feet
3: first lever
31: recess at the first extremity of the first lever
32: pivot connection of the first lever with first rod
33: pivot connection of the first lever with bracket
34: elastic means
4: second lever
41: pivot connection of the second lever with the bracket
42: pivot connection of the second lever with first rod
44: pivot connection of the of the second lever with the second rod
45: slide-pivot connection of the second lever with the third rod
5: return lever
52: slide-pivot connection of the return lever with the second rod
53: pivot connection of the return lever with the third rod
54: teeth of the return lever
55: pivot connection of the return lever with the bracket
56: elastic means
6: damper
61: gear
62: fixing mean
7: first rod
71: extremity slide of the first rod
8: second rod
9: third rod

Claims

1. Vehicle door handle assembly (1) comprising a bracket (10) and a handle (2), said handle (2) comprising a first extremity (22) and a second extremity (23) opposed to the first extremity (22),

the first extremity (22) being connected to a first lever (3), said first lever (3) being designed to be connected to an opening lever to open a latch of the vehicle door, said first lever (3) being designed to rotate with respect to the bracket (10) about an axis of rotation which is parallel to a predetermined fixed direction between a rest position where the first extremity (22) of the handle (2) is in a rest position, a deployed position where the first extremity (22) of the handle (2) is in a deployed position outside the bracket (10) and an opening position where the first lever (3) actuates the opening lever,
the second extremity (23) being connected to a second lever (4), said second lever (4) being designed to rotate with respect to the bracket (10) about the same axis of rotation between a

rest position where the second extremity (23) of the handle (2) is in a rest position, an activation position where the second extremity (23) of the handle (2) is pushed into the bracket (10), and a deployed position where the second extremity (23) of the handle (2) is in a deployed position outside the bracket (10),
the vehicle door handle assembly (1) also comprising a return lever (5) having a first extremity connected to the second lever (4), said return lever (5) being designed to rotate between a first position and a second position, the return lever (5) comprising an elastic means (56) passively bringing back said return lever (5) to its first position,
the rotation of the second lever (4) to its activation position actuates the rotation of the return lever (5) from its first to its second position, and the passive rotation of the return lever (5) from its second to its first position actuates the rotation of the second lever (4) from its deployed position to its rest position,
the second extremity (23) of the handle (2) is provided with guiding means (25, 104) configured so as to reduce the degrees of freedom of the handle (2) with respect to the bracket (10) when moving from the rest position to the activation position, the remaining degrees of freedom being translation and rotation about an axis parallel to the fixed direction.

2. Vehicle door assembly (1) according to claim 1, wherein the guiding means comprise a rotating slider (25) mounted rotational on the handle (2) and a bracket cover (103) of the bracket (10) against which the rotating slider (25) rests in a stable way when the handle (2) moves from its rest position to its activation position.

3. Vehicle door assembly (1) according to claim 2, wherein the bracket (10) comprises side walls (101, 102) with slots (104) for guiding the rotating slider (25) when the handle (2) moves.

4. Vehicle door handle assembly (1) according to the previous claims, wherein the return lever (5) is connected to a delay element (6) which slows down the passive rotation of the return lever (5) from its second to its first position.

5. Vehicle door handle assembly (1) according to the previous claim, wherein the delay element (6) comprises at least one damper.

6. Vehicle door handle assembly (1) according to the previous claim, wherein the at least one damper (6) comprises a gearwheel (61) and wherein the extremity of the return lever (5) connected to the at least one damper (6) comprises an arc portion with teeth (54) engaged with said gearwheel (61).

7. Vehicle door handle assembly (1) according to anyone of the previous claims, wherein the first lever (3) comprises an elastic means (34) passively bringing back said first lever (3) from its deployed position to its rest position.

8. Vehicle door handle assembly (1) according to anyone of the previous claims, wherein the second lever (4) comprises an elastic means passively rotating said second lever (4) toward its deployed position.

9. Vehicle door handle assembly (1) according to anyone of the previous claims, wherein the connection between the first lever (3) and the first extremity (22) of the handle is a pivot-slide connection.

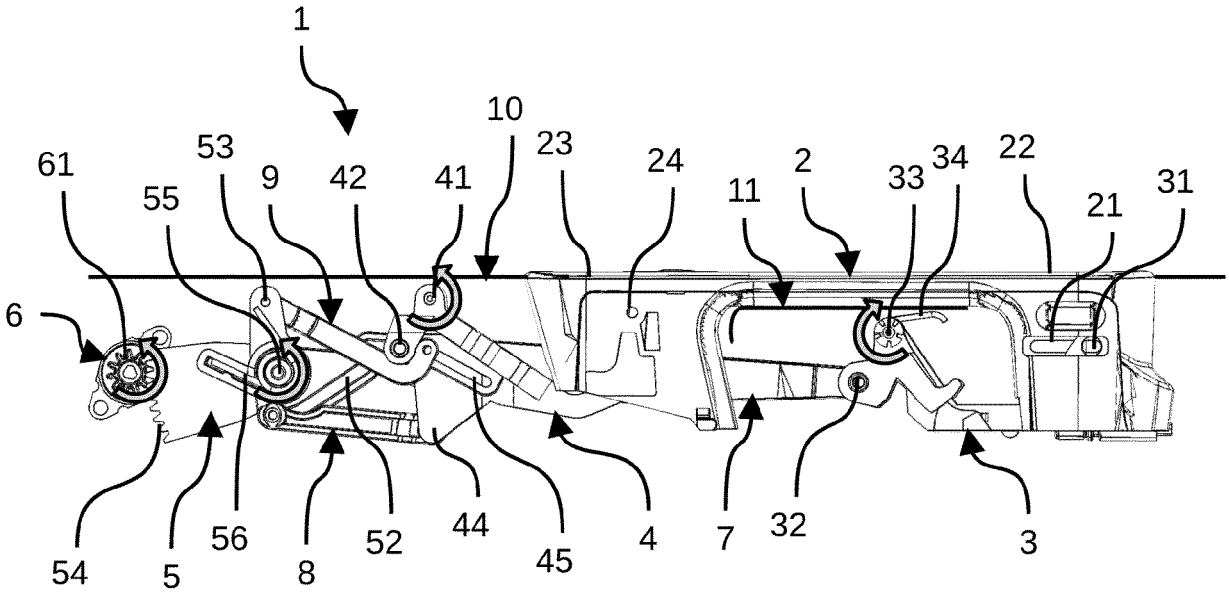
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Fig. 1

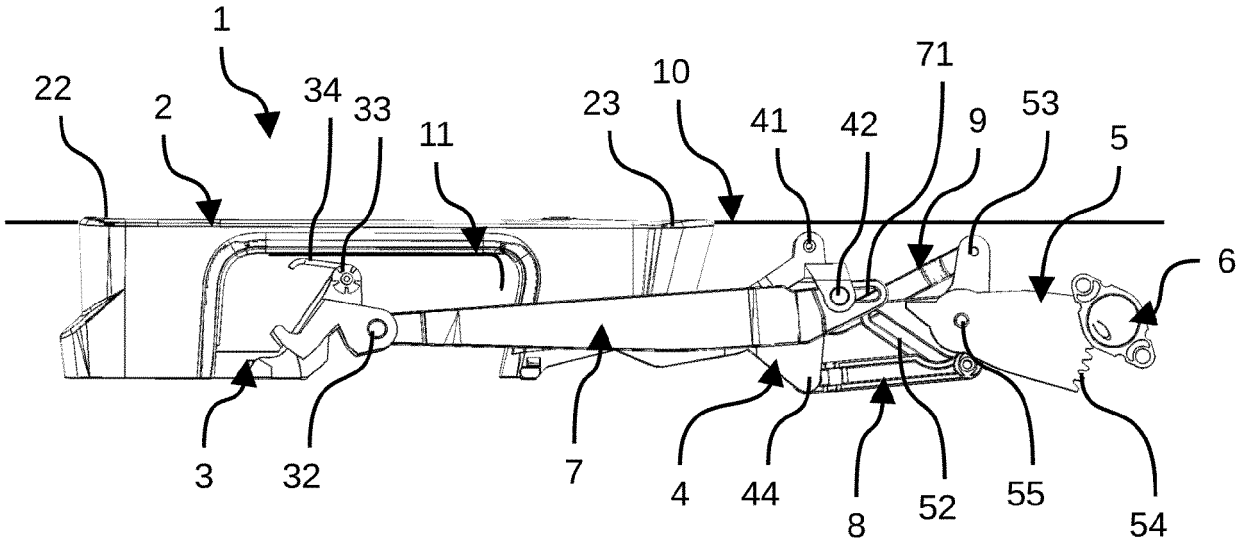
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Fig. 2

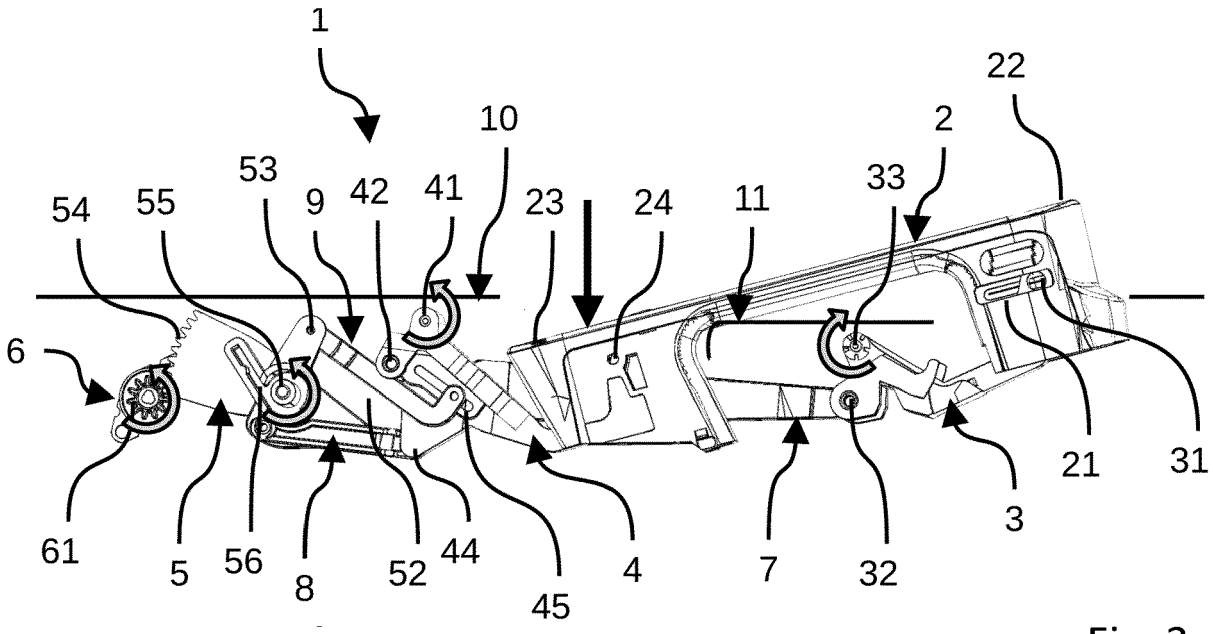
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Fig. 3

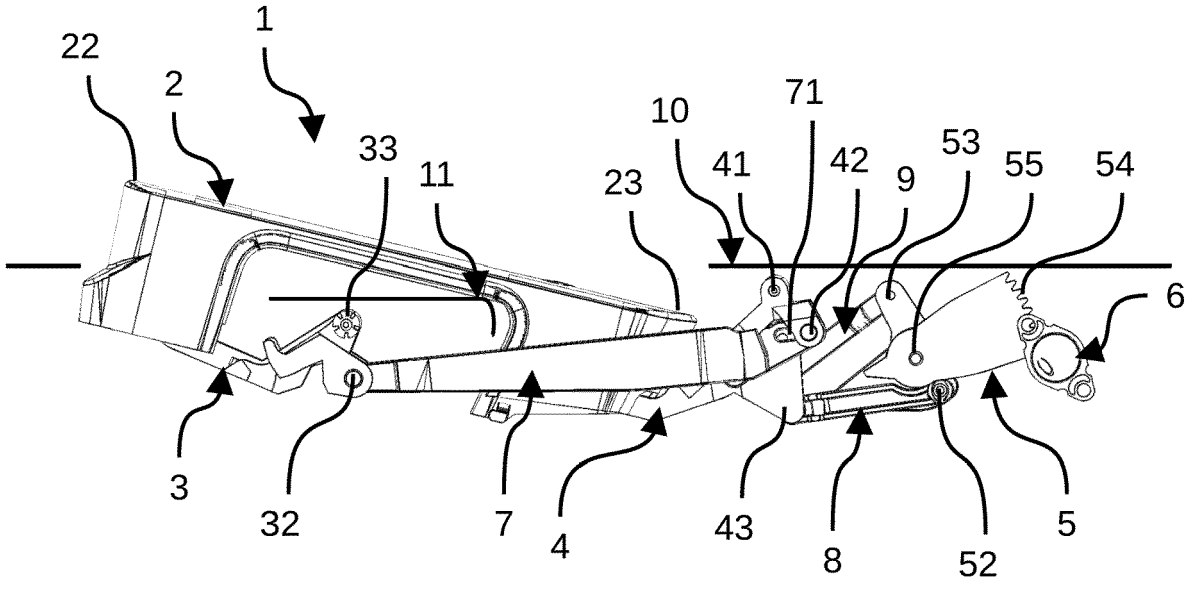
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Fig. 4

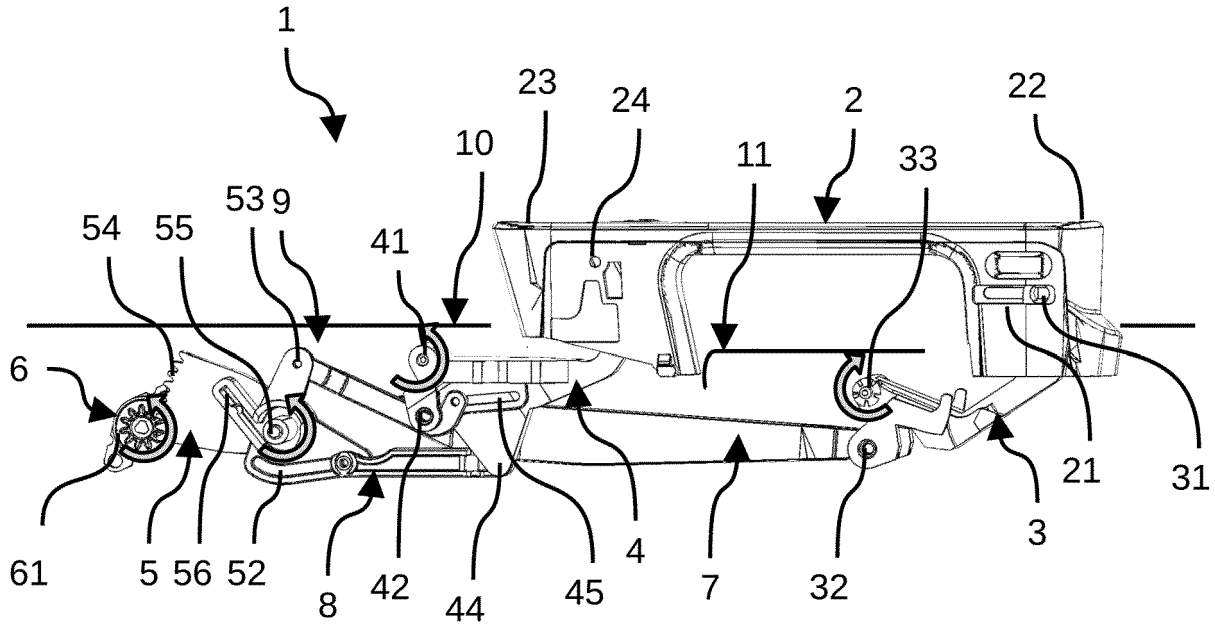
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Fig. 5

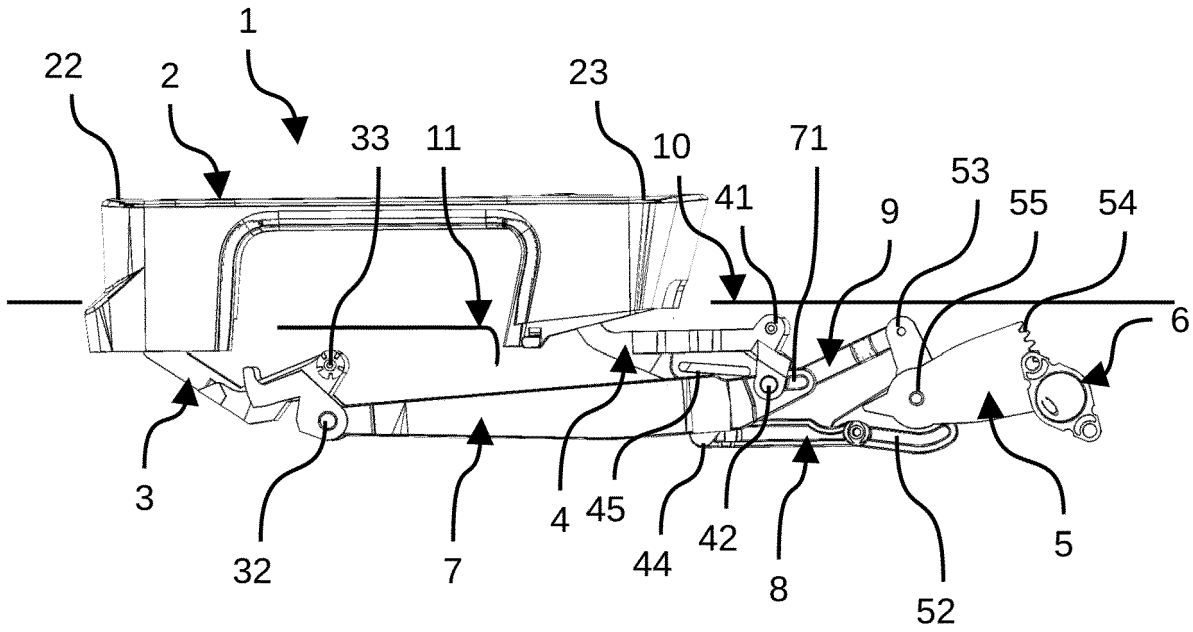
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Fig. 6

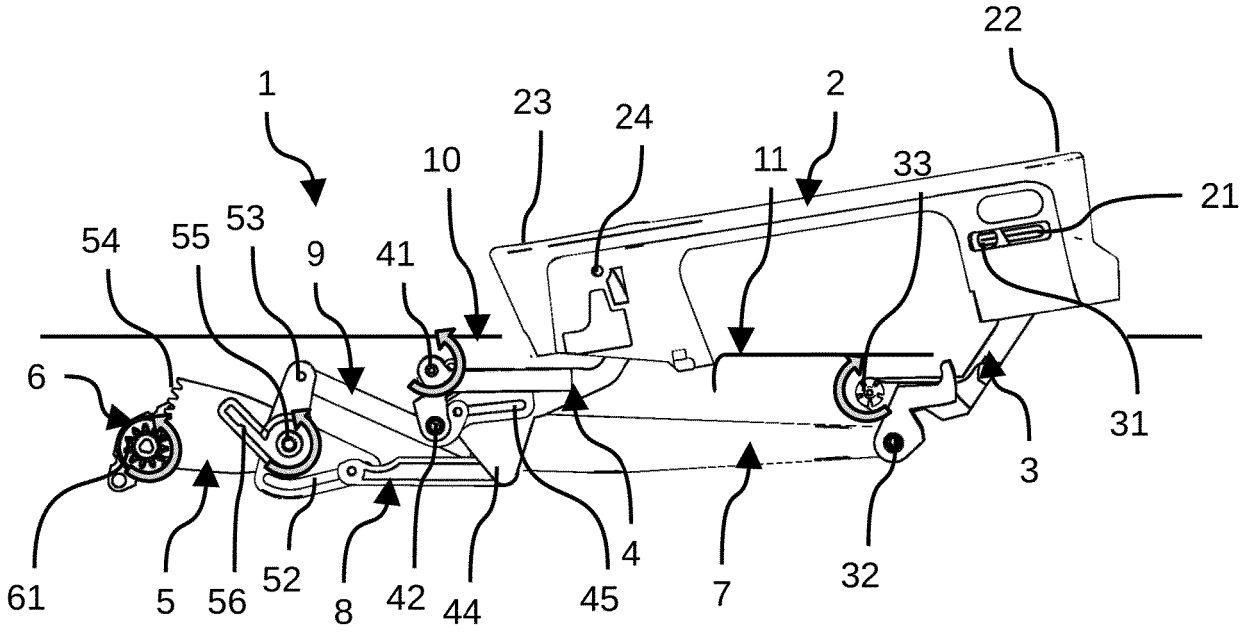
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Fig. 7

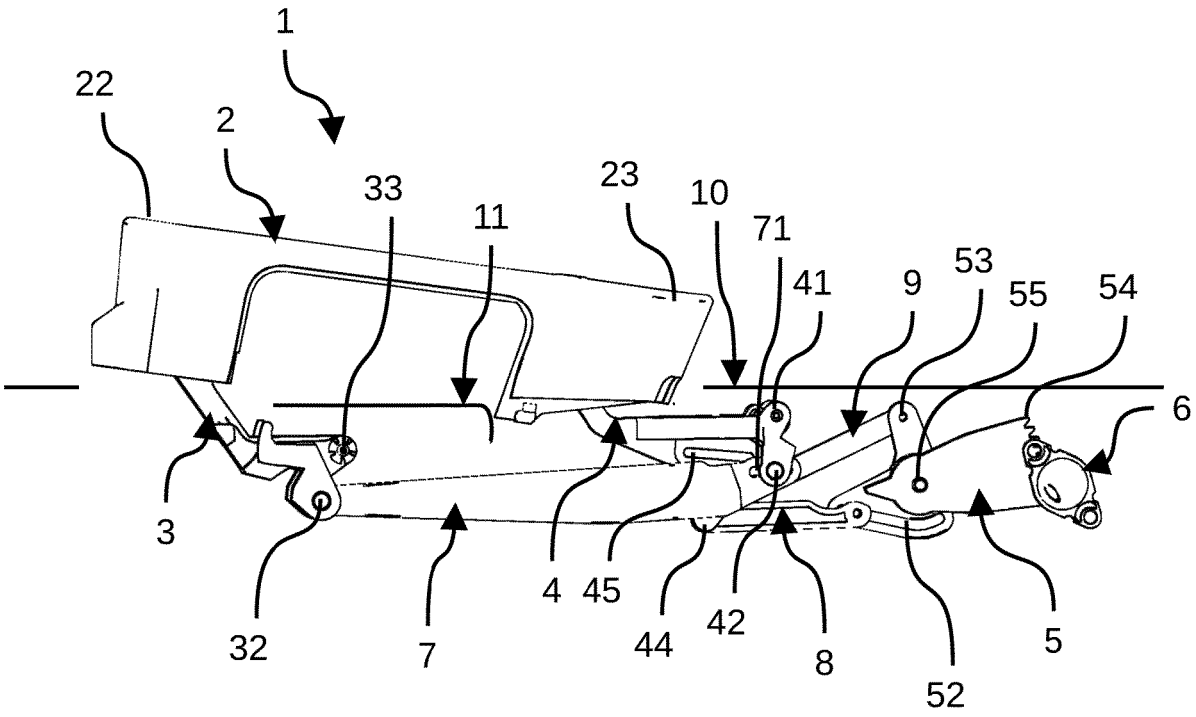
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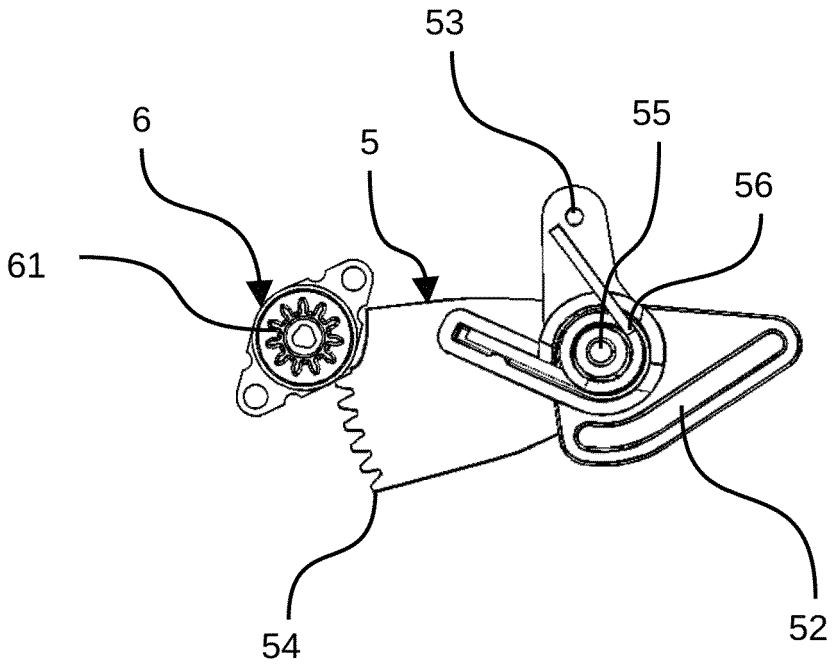
Fig. 8



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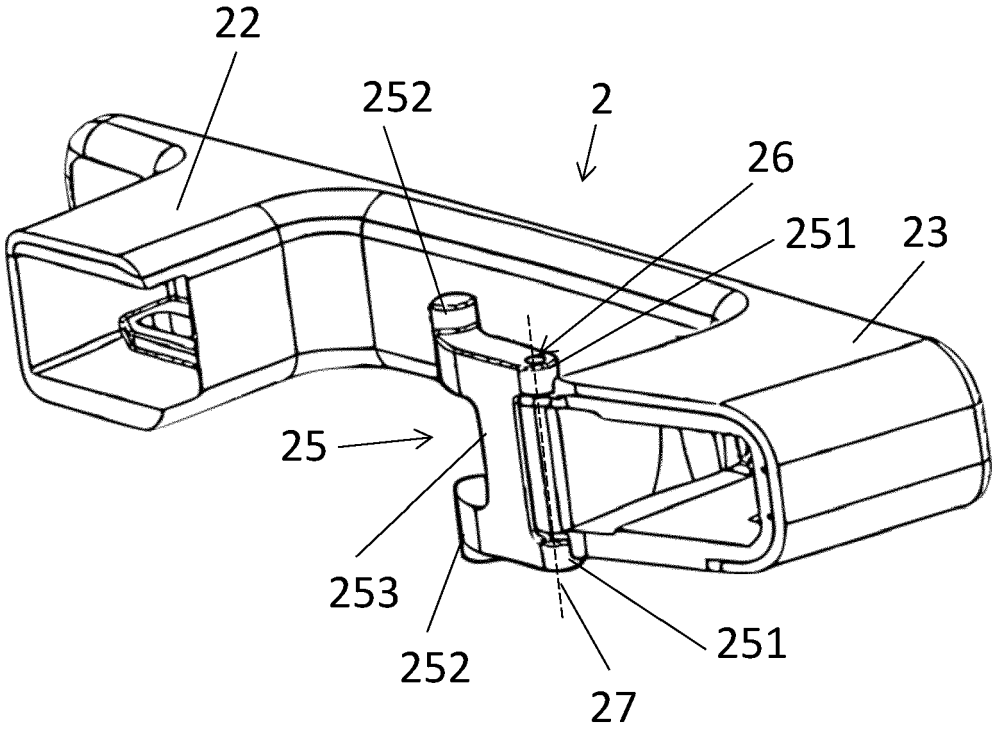
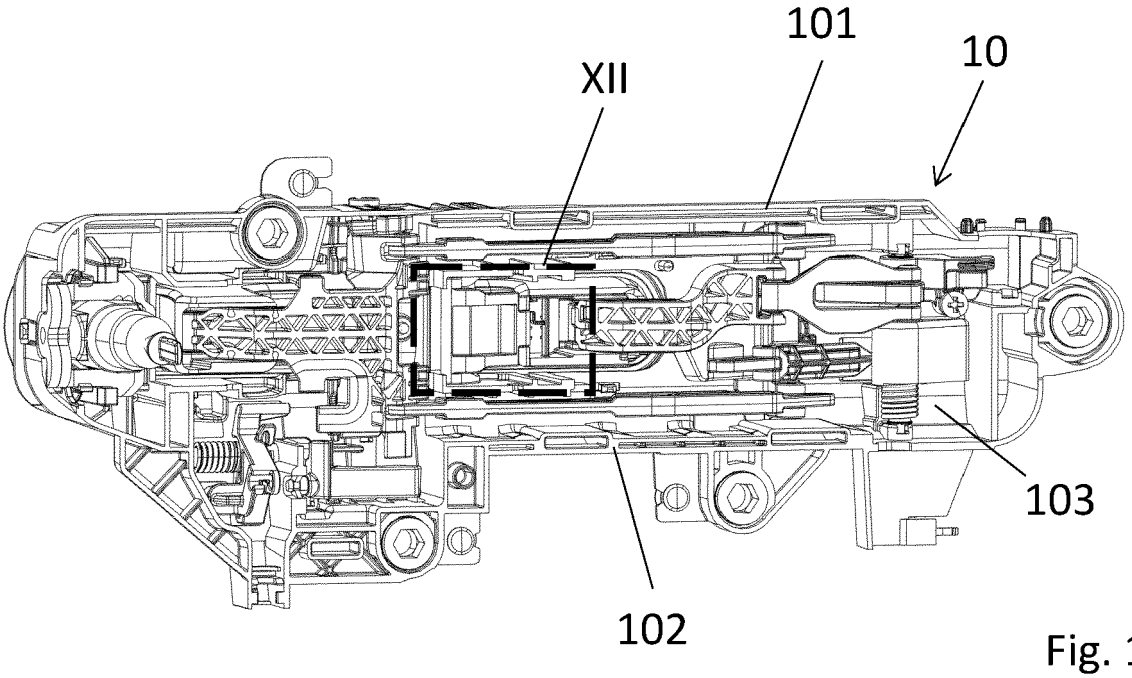


Fig. 10



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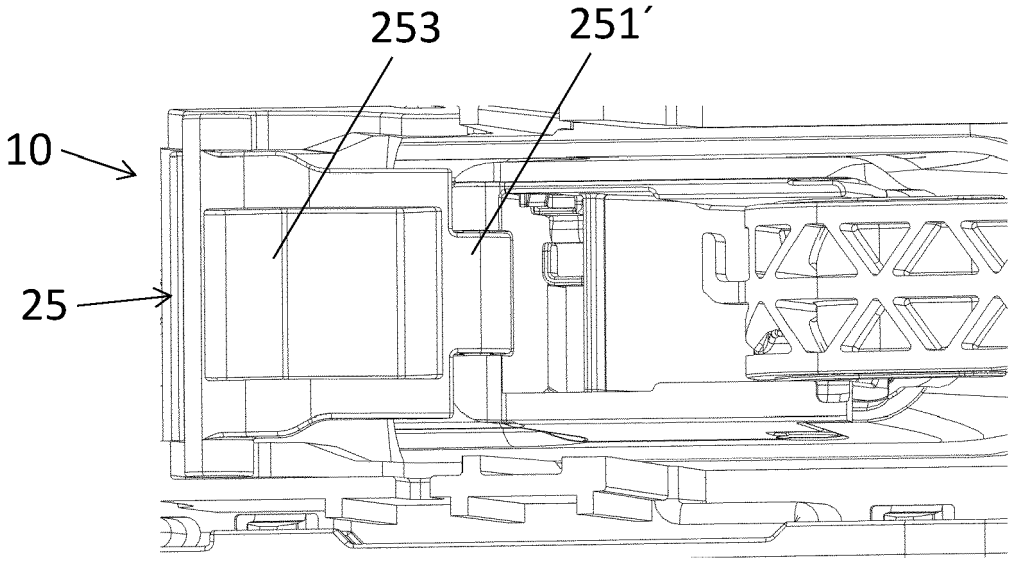

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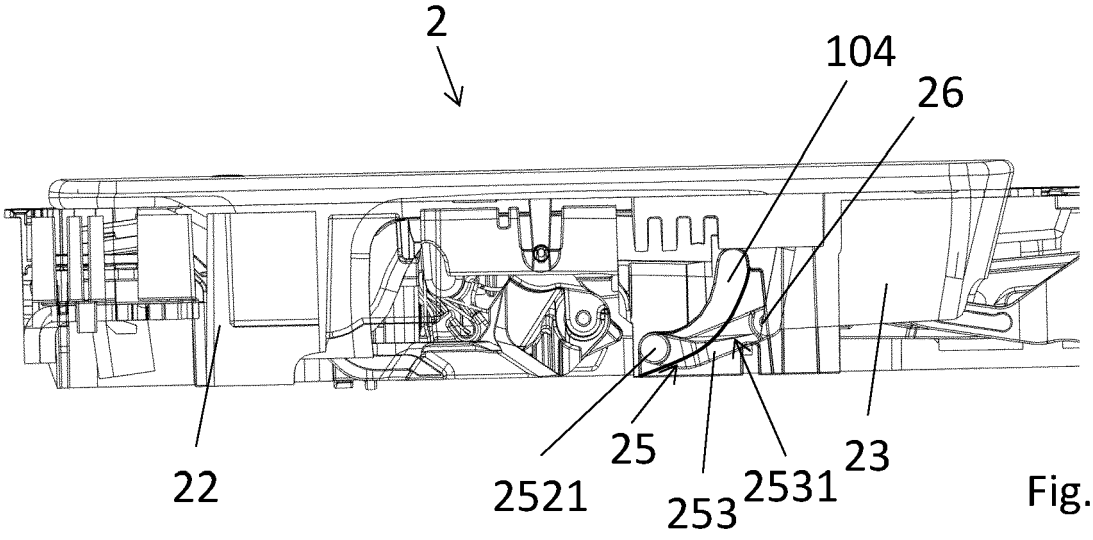
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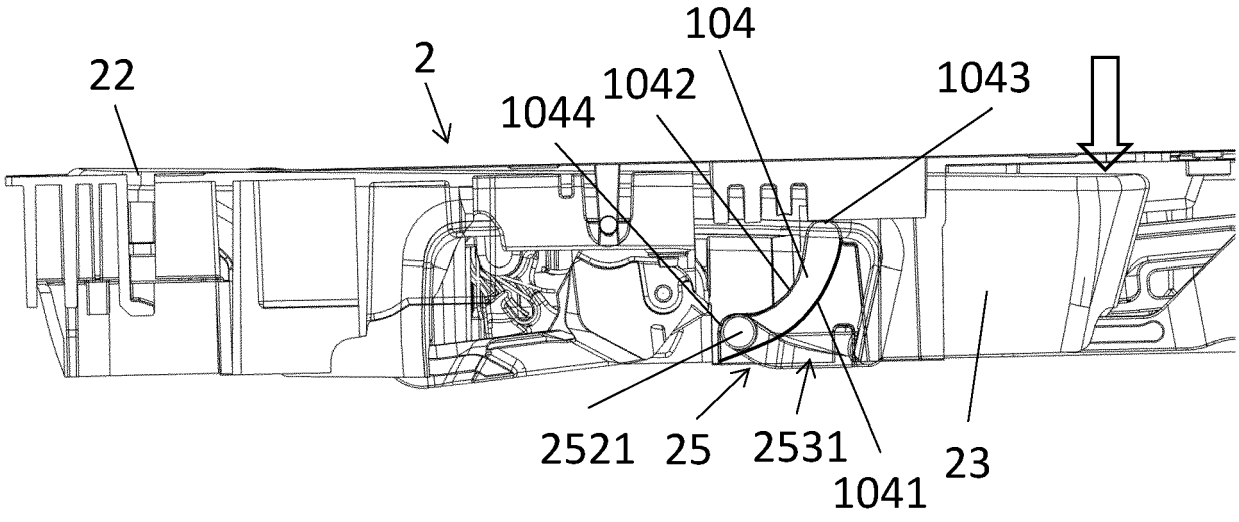
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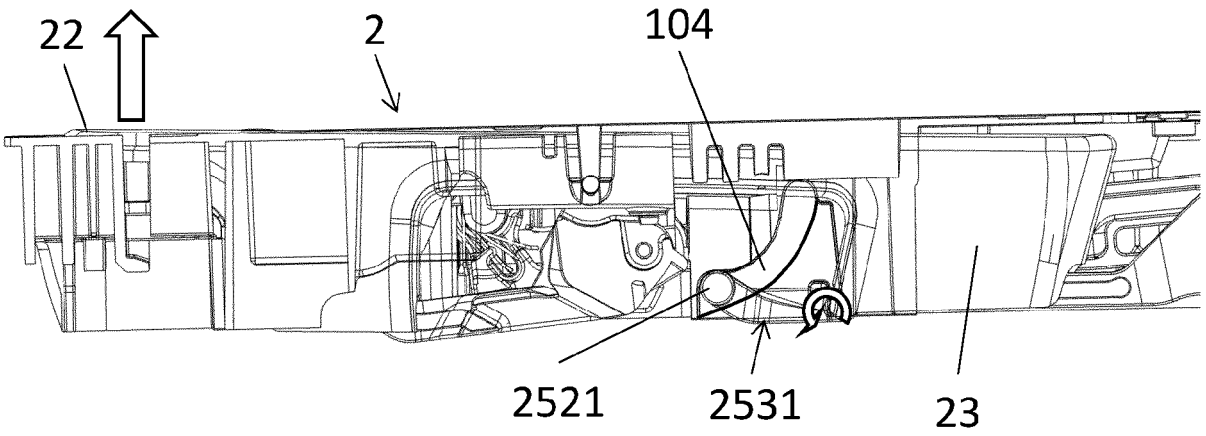
Fig. 14



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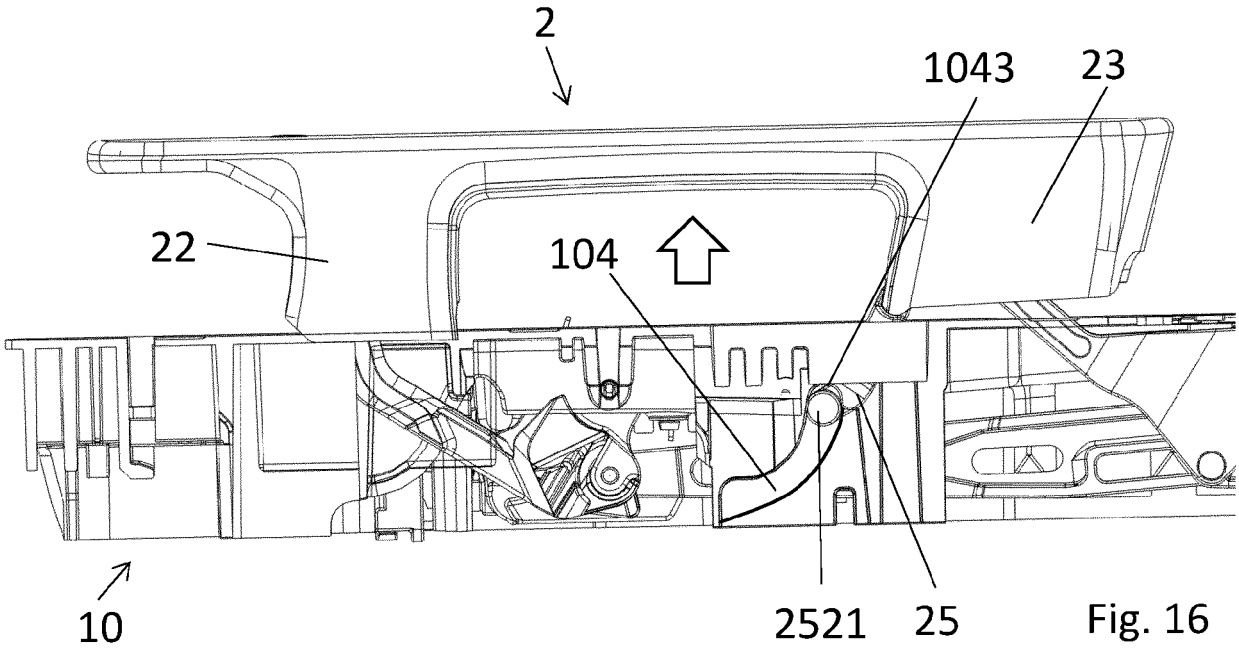

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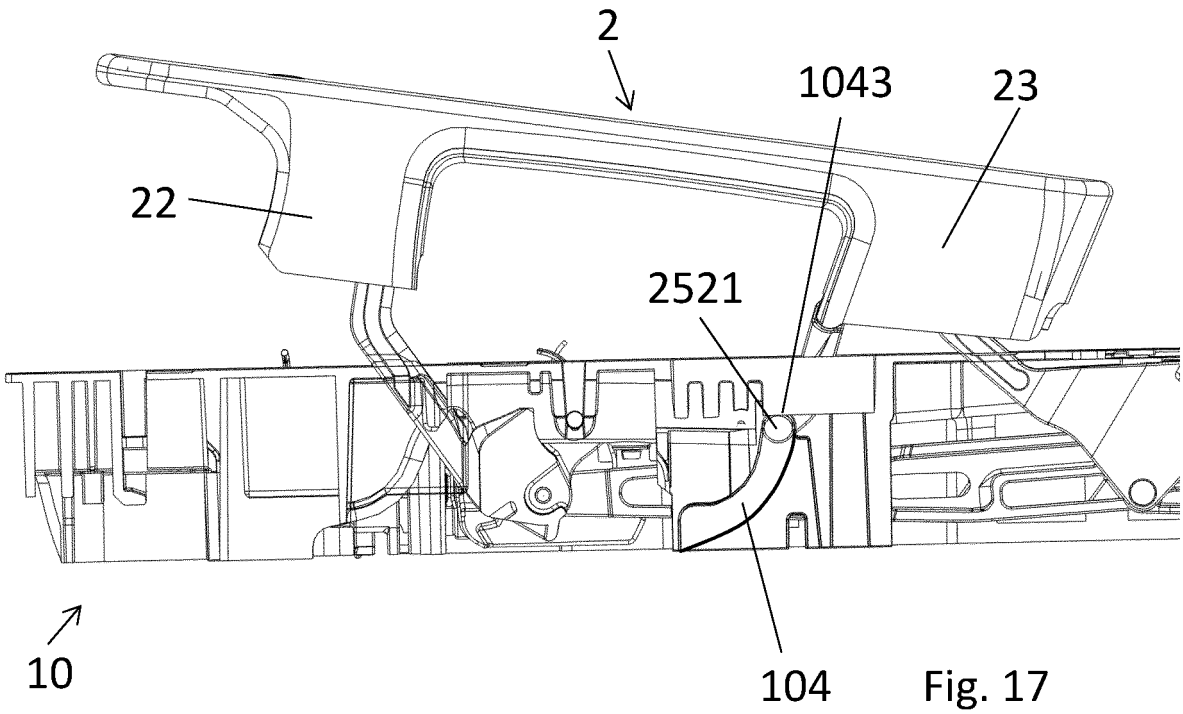

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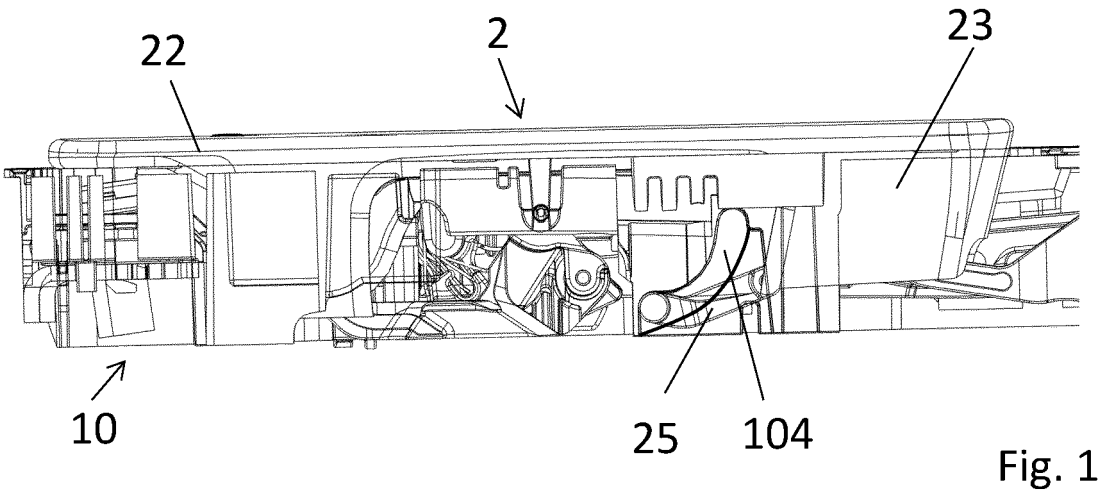

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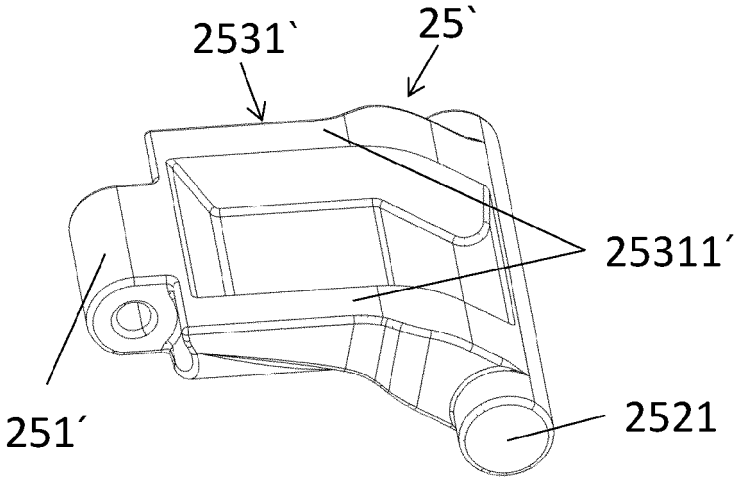

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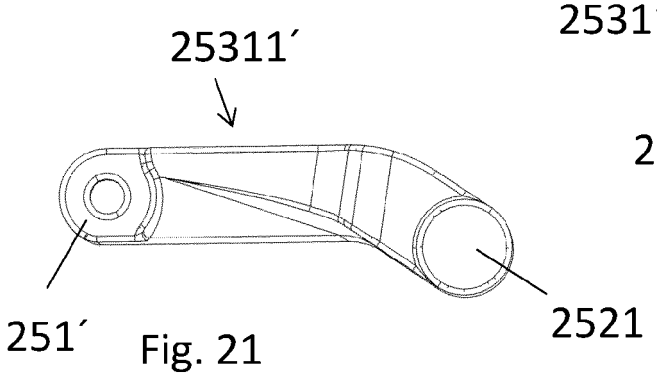

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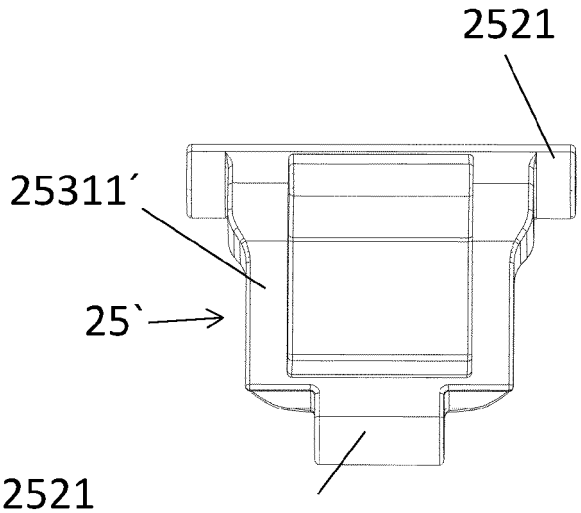

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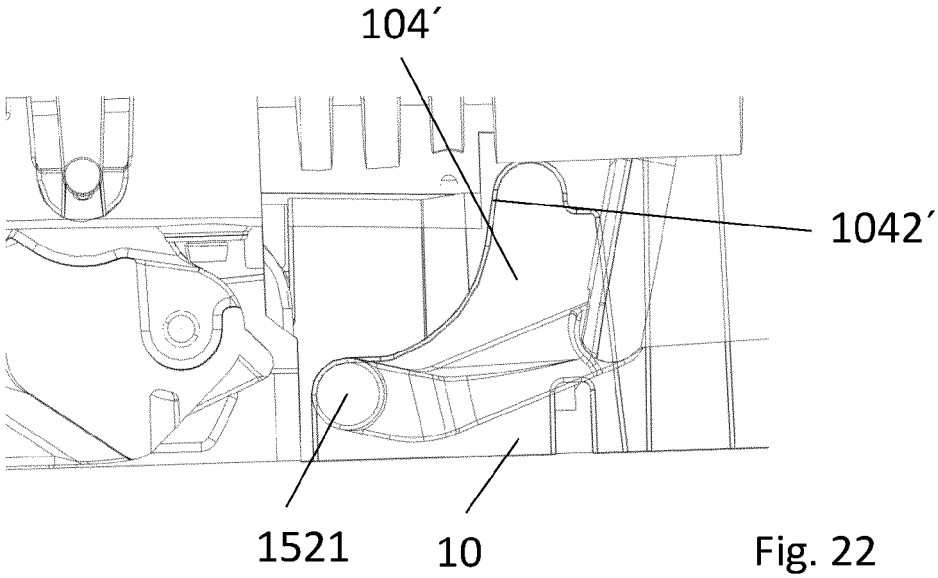

Fig. 22

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 5711

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2019/086148 A1 (DAIMLER AG) 9 May 2019 (2019-05-09) * the whole document *	1-9	INV. E05B85/10
A	WO 2015/074020 A1 (ILLINOIS TOOL WORKS INC) 21 May 2015 (2015-05-21) * figures *	1-9	
A	WO 2020/048654 A1 (HUF HÜLSBECK & FÜRST GMBH & CO KG) 12 March 2020 (2020-03-12) * the whole document *	1-9	
A	GB 2 595 913 A (JAGUAR LAND ROVER LTD) 15 December 2021 (2021-12-15) * page 1, lines 17-26 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 June 2023	Van Beurden, Jason

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19-06-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2019086148 A1	09-05-2019	CN 111295494 A	16-06-2020
		DE 102017010196 B3	25-04-2019
		US 2021156178 A1	27-05-2021
		WO 2019086148 A1	09-05-2019
WO 2015074020 A1	21-05-2015	CN 105917063 A	31-08-2016
		DE 102013112706 A1	21-05-2015
		EP 3071771 A1	28-09-2016
		JP 6629724 B2	15-01-2020
		JP 2016537532 A	01-12-2016
		KR 20160088374 A	25-07-2016
		US 2016298366 A1	13-10-2016
		US 2020115936 A1	16-04-2020
		WO 2015074020 A1	21-05-2015
WO 2020048654 A1	12-03-2020	DE 102018121433 A1	05-03-2020
		EP 3803006 A1	14-04-2021
		WO 2020048654 A1	12-03-2020
GB 2595913 A	15-12-2021	EP 4165270 A1	19-04-2023
		GB 2595913 A	15-12-2021
		WO 2021250250 A1	16-12-2021

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