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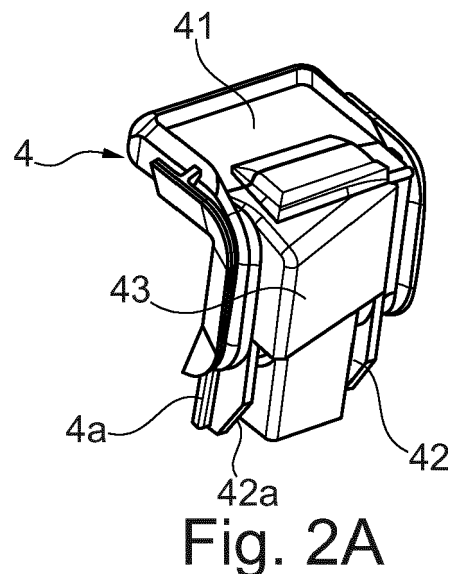
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(54) **VEHICLE DOOR LATCH DEVICE**

(57) The invention relates to a vehicle latch device comprising:

- a latch release lever (3) of a latch mechanism, movably mounted between an active position for actuating the latch mechanism so as to unlatch the door, and a rest position for releasing the latch mechanism,
- a latch casing (5) receiving the latch release lever (3), and
- a safety device (4) for closing the latch casing (5), and comprising
 - a sealing part (4a) closing of the latch,
 - a shock receiving part (43; 143; 243; 343) receiving a shock from outside the latch casing (5),
 - a blocking part (40; 140; 240; 340) blocking the latch release lever (3) at an intermediate position when the shock is received by the shock receiving part (43; 143; 243; 343), so as to prevent the latch release lever (3) from reaching the active position.

The invention further relates to the corresponding vehicle door.



Description

[0001] The present invention relates to a vehicle door latch device with a safety system against car crashes. Such a safety system is configured to prevent the opening of the door in case of shock on a panel of the door.

[0002] Such a device generally comprises

- a latch release lever being a part of a latch mechanism enabling the release of the door, the latch release lever being movably mounted between an active position in which the latch release lever actuates the latch mechanism so as to unlatch the door, and
- a rest position in which the latch mechanism is released,
- a latch casing receiving the latch release lever.

[0003] The device cooperates with a blocking member of the door panel, such as a stiffener, placed near the latch release lever, the blocking member being configured such that in case of a deformation of the door panel due to a shock applied in a lateral direction of the door panel, the blocking member is moved to block the latch release lever.

[0004] In order for the blocking member to block the latch release lever, a window is generally provided in the latch casing.

[0005] Such a window causes a water ingress and the deterioration of the latch mechanism due to external conditions such as cold, moisture and dust.

[0006] An object of the invention is to provide a vehicle door latch device with a safety system efficient, not costly and, which prevents the deterioration of the latch mechanism due to external conditions.

[0007] To this end, the invention relates to a vehicle door latch device comprising:

- a latch release lever being a part of a latch mechanism enabling the release of the door, the latch release lever being movably mounted between an active position in which the latch release lever actuates the latch mechanism so as to unlatch the door, and
- a rest position in which the latch mechanism is released,
- a latch casing receiving the latch release lever, and
- a safety device configured to close the latch casing, the safety device comprising
 - a sealing part configured for participating of the closing of the latch casing,
 - a shock receiving part configured to receive a shock from outside the latch casing,
 - a blocking part configured to block the latch release lever at an intermediate position between the rest position and the active position when the shock is received by the shock receiving part, so as to prevent the latch release lever from reaching the active po-

sition,

the sealing part permanently ensuring the sealing of the latch casing.

[0008] Advantageously, the vehicle door latch device of the invention comprises a latch casing which is sealed by the safety device without any water ingress, and in which the inside of the latch casing is protected against external aggression, such as water or dust.

[0009] In addition, the safety device implements an efficient blocking of the latch release lever in case of a shock made on the shock receiving part.

[0010] According to further embodiments which can be considered alone or in combination:

- the sealing part ensures the sealing of the latch casing during the shock; and/or
- the sealing part is supported by the shock receiving part; and/or
- the sealing part is fitted onto or aside of the blocking part; and/or
- when the shock is received by the shock receiving part, the shock receiving part pushes the blocking part such that the blocking part blocks the latch release lever; and/or
- the blocking part comprises a transfer lever configured to block the latch release lever; and/or
- the shock receiving part is overmolded on the transfer lever; and/or
- when the shock is received by the shock receiving part, the blocking part is broken such that the blocking part blocks the latch release lever; and/or
- when the shock is received by the shock receiving part, the blocking part is deformed so as to block the latch release lever; and/or
- the blocking part and the shock receiving part form a single element; and/or
- the shock receiving part comprises a ramp receiving said shock; and/or
- the safety device comprises at least one distortion element configured to make the blocking part reach an irreversible blocking position when the shock receiving part is hit beyond a breaking force threshold; and/or
- the distortion elements comprise a snap fuse part configured to be broken beyond said breaking force threshold; and/or
- the safety device comprises a return means configured to urge the safety device, specifically the blocking part, in a direction opposite to the direction of the shock received by the shock receiving part when the shock receiving part is hit below a force threshold; and/or
- the latch casing comprises a casing distortion part configured to cooperate with the shock receiving part and the blocking part such that when the shock receiving part is hit beyond a casing force threshold, the shock is transmitted to the latch casing driving

the blocking part, and the latch casing reaches an irreversible blocking position and causes the blocking part to block the latch release lever; and/or

- the safety device has a curved shape configured to close a corner of the latch casing.

[0011] The invention further relates to a vehicle door comprising:

a door panel,
 a vehicle door latch device according to the invention comprising a safety device,
 a shock transmitting member at least partially connected to the door panel and placed near to the safety device, the shock transmitting member being configured such that in case of a deformation of the door panel due to a shock in a direction lateral relatively to the door, the shock transmitting member transmits said lateral shock to the safety device such that the blocking part is moved to block the latch release lever, the sealing part ensuring the sealing of the latch casing.

[0012] According to an embodiment the sealing part ensures the sealing of the latch casing during the shock.

[0013] Other features and advantages of the present invention will become apparent from the following description of non-limitative embodiments, with reference to the attached drawings in which:

- figure 1 is a space view of a vehicle door latch device according to a first embodiment of the invention;
- figures 2A and 2B are a space views of a safety device of the vehicle door latch device of figure 1;
- figure 3 is a cross section view of the safety device of figures 2A and 2B;
- figure 4 is longitudinal section view of the safety device of figures 2A and 2B when a shock is received;
- figure 5A is longitudinal section view of a safety device of a vehicle door latch device according to a second embodiment of the invention;
- figure 5B is longitudinal section view of a safety device of figure 5A when a shock is received,
- figure 5C is a cross section view according to CC of figure 5B;
- figure 6A is a top view of a vehicle door latch device according to a third embodiment of the invention;
- figure 6B is a space view of a vehicle door latch device of figure 6A.
- figure 7 is a top view of a vehicle door latch device according to a fourth embodiment of the invention;
- figures 8 and 9 are cross section views of a safety device similar to the first and second embodiment with a distortion element;

[0014] Referring to figures 1 to 4, the vehicle door latch device of the first embodiment of the invention comprises a latch release lever 3.

[0015] The latch release lever 3 is a part of a latch mechanism of the vehicle door. The latch release lever 3 enables to unlatch the door, such that the door may be opened.

5 **[0016]** In particular, the latch release lever 3 is movably mounted between an active position and a rest position.

[0017] In the active position, the latch release lever 3 actuates the latch mechanism so as to unlatch the door, in particular through a Bowden cable. More particularly, 10 the latch release lever 3 is connected to a handle lever configured to be actuated by a user to move the latch release lever 3 in order to unlatch the door.

[0018] In the rest position, the latch mechanism is released. More particularly, the handle lever is released by 15 the user such that the latch release lever 3 may come back from the active position to the rest position, or remain at the rest position. The device preferably comprises return means (not represented) urging the latch release lever 3 towards the rest position.

20 **[0019]** The vehicle door latch device further comprises a latch casing 5 receiving the latch release lever 3. In particular, the latch casing 5 comprises a part of the latch mechanism connected to the latch release lever 3 such as the Bowden cable. The latch casing 5 preferably comprises a cover 51 and a housing 52 cooperating together 25 to form a space in which the latch release lever 3 is received.

[0020] The vehicle door latch device further comprises a safety device 4 configured to close the latch casing 5. 30 In particular, the safety device is fitted between the cover 51 and the housing 52.

[0021] Advantageously, the latch casing 5 and the safety device 4 enable an improved protection of the latch release lever 3 from water ingress and external conditions such as cold, moisture and dust. 35

[0022] The safety device 4 comprises a sealing part 4a configured for participating of the closing of the latch casing. In particular, the sealing part 4a has a form complementarity with the corresponding part of the latch casing 5. 40

[0023] According to an embodiment, the sealing part 4a comprise two extremities 41 and 42a configured to cooperate with the cover 51 and the housing 52, respectively. 45

[0024] The safety device 4 further comprises a shock receiving part 43 and a blocking part 40.

[0025] The shock receiving part 43 is configured to receive a shock from outside the latch casing 5. In particular, such a shock is transferred to the safety device 4 50 such that the safety device may move towards the inside of the latch casing.

[0026] The blocking part 40 is configured to block the latch release lever 3 at an intermediate position between the rest position and the active position when the shock is received by the shock receiving part 43. The blocking part 40 thereby prevents the latch release lever 3 from 55 reaching the active position. More particularly, the shock transferred to the safety device 4 enables to move the

blocking part 40 towards the latch release lever 3 so as to block the latch release lever 3.

[0027] The blocking part 40 may preferably comprise rubber.

[0028] Advantageously, the shock receiving part 43 and the blocking part 40 improve the safety of the vehicle because in case of a shock on the door received by the shock receiving part 43, the blocking part 40 in turns blocks the latch release lever 3 to prevent unwanted openings of the door.

[0029] The sealing part 4a permanently ensures the sealing of the latch casing 5, in particular, at least before the shock.

[0030] According to an embodiment, the sealing part 4a is configured to ensure the sealing of the latch casing 5 during the shock. For example, the sealing part 4a comprises an extensible resilient sealing material to this end.

[0031] According to an embodiment, the sealing part 4a is supported by the shock receiving part 43 as shown in figures 2A and 2B. Such a sealing part 4a may be overmolded on the shock receiving part 43. Alternatively, the sealing part 4a and the shock receiving part 43 may be made as a one piece element.

[0032] According to an embodiment, the sealing part may also be fitted onto or aside of the blocking part.

[0033] According to an embodiment, when the shock is received by the shock receiving part 43, the shock receiving part 43 pushes the blocking part 40 such that the blocking part 40 blocks the latch release lever 3, as shown in figure 4. One extremity 42 may remain connected to the housing 52 and the other extremity 41 is moved within, for example by sliding within the cover 51 as shown in figure 4.

[0034] Preferably, the safety device 4 comprises a return means 46 configured to urge the safety device 4, specifically the blocking part 40, in a direction opposite to the direction of the shock received by the shock receiving part 43 when the shock receiving part 43 is hit below a force threshold. Advantageously, the return means 46, in particular a spring plate, enables to restore the sealing of the latch casing.

[0035] According to an embodiment, the blocking part 40 and the shock receiving part 43 form a single element. This enables to make these parts by molding them in a single step.

[0036] According to an embodiment, the shock receiving part 43 comprises a ramp receiving said shock. Such a ramp enables to have a constant distance between the shock receiving part and the part of the handle transferring the shock to the safety device. The shock receiving part 43 is thus sensitive to shocks made with different angles.

[0037] According to an embodiment, the safety device 4 comprises at least one distortion element configured to make the blocking part 40 reach an irreversible blocking position when the shock receiving part 43 is hit beyond a breaking force threshold.

[0038] As shown in figures 2B and 3, a first distortion

element 42 and a second distortion element 45 are provided. The first distortion element 42 is at a zone of contact between the safety device 4 and the latch casing 5. The second distortion element 45 comprises a snap fuse part configured to be broken beyond said breaking force threshold from the right part of figure 3.

[0039] After the shock, the first distortion element 42 is configured to remain oriented towards the interior of the latch casing 5 as shown in figure 2. In this situation, the blocking part 40 keeps blocking the latch release lever 3 even if the shock is transient.

[0040] Referring to figures 5A to 5C, the vehicle door latch device of the second embodiment of the invention is similar to the one of the first embodiment. However, the blocking part 140 comprises a transfer lever 144 configured to block the latch release lever 3. In particular, the transfer lever 144 is separate from the shock receiving part 143. Advantageously, this embodiment enables to have a blocking part 140 with a specific material, for example a more rigid material, with respect to the shock receiving part 143 or the sealing part 4a.

[0041] In other words, according to an embodiment, an element distinct from the sealing part 4a, in particular the blocking part 140 comprising a transfer lever 144, is used to block the latch mechanism, in particular the latch release lever 13.

[0042] The blocking part 140 may preferably comprise steel.

[0043] Preferably, the shock receiving part 4a is overmolded on the transfer lever 144.

[0044] As shown in figures 5A and 5B, an alternative distortion element 142 comprises an internal leg and an external leg, with respect to the interior of the latch casing 15. The internal leg is fitted on the latch casing 5. When a shock beyond a predetermined threshold is received by the shock receiving part 143, the internal leg is pushed inwardly and remains in the latch casing 15 as shown in figure 5B such that the blocking part 140 keeps blocking the latch release lever 13 even if the shock is transient.

[0045] For example, the predetermined threshold is/corresponds to a shock of 90N.

[0046] Referring to figures 6A and 6B, the vehicle door latch device of the third embodiment of the invention is similar to the ones of the first and second embodiment. However, the safety device is configured such that when the shock is received by the shock receiving part 343, the blocking part 340 is broken such that the blocking part 340 blocks the latch release lever 33.

[0047] The shock receiving part 343 comprises a fusible zone configured to break off when the shock is received.

[0048] Referring to figure 7, the vehicle door latch device of the fourth embodiment of the invention is similar to the ones of the first and second embodiment. However, the safety device is configured such that when the shock is received by the shock receiving part 243, the blocking part 240 is deformed so as to block the latch release lever 3.

[0049] Figure 7 details further an example of latch mechanism 6 comprising a Bowden cable 62, and a lever connection 61 connecting the Bowden cable to the latch lever 23 so as to be pulled in the illustrated positions 23A, 23B and 23C.

[0050] As shown in figures 8 and 9, an alternative set of distortion elements comprises a first distortion element 242 and a second distortion element 242a partially overlapping each other. For example, the first distortion element 242 is on the shock receiving part and the second distortion element 242a is on the transfer lever. One or both of the distortion elements 242, 242a are at least partially resilient. The first distortion element 242 may be external to the second distortion element 242a as shown in figure 8, or the opposite arrangement may be implemented.

[0051] When a shock beyond a predetermined threshold is received by the shock receiving part, the internal distortion element 242a is pushed inwardly and remains in inwardly with respect to the other distortion element 242 as shown in figure 9 such that the blocking part keeps blocking the latch release lever 13 even if the shock is transient.

[0052] According to an embodiment (not represented), the latch casing 5 comprises a casing distortion part configured to cooperate with the shock receiving part and the blocking part such that when the shock receiving part is hit beyond a casing force threshold, the shock is transmitted to the latch casing 5 driving the blocking part, and the latch casing 5 reaches an irreversible blocking position and causes the blocking part to block the latch release lever 3. Such a casing distortion part comprises one or more of the above distortion element on the latch casing 5 instead of on the safety device.

[0053] According to an embodiment, the safety device 4 has a curved shape configured to close a corner of the latch casing 5. This embodiment improves the degrees of freedom of the movement of the safety device.

[0054] More generally, the vehicle door latch device of the invention is part of a vehicle door. The vehicle door further comprises a door panel 1, and a shock transmitting member 2, 22 or 32.

[0055] The shock transmitting member 2 is at least partially connected to the door panel 1 and is placed near to the safety device 4.

[0056] The shock transmitting member 2 is configured such that in case of a deformation of the door panel 1 due to a shock in a direction lateral relatively to the door, the shock transmitting member 2 transmits said lateral shock to the safety device 4 such that the blocking part is moved to block the latch release lever 3.

[0057] Many modifications and variations will suggest themselves to those skilled in the art upon making reference to the foregoing illustrative embodiments, which are given by way of example only and which are not intended to limit the scope of the invention, that being determined solely by the appended claims.

[0058] In the claims, the word "comprising" does not

exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that different features are recited in mutually different dependent claims does not indicate that a combination of these features cannot be advantageously used. Any reference signs in the claims should not be construed as limiting the scope of the invention.

10 Claims

1. Vehicle door latch device comprising:

- a latch release lever (3; 13; 23; 33) being a part of a latch mechanism enabling the release of the door, the latch release lever (3) being movably mounted between an active position in which the latch release lever (3; 13; 23; 33) actuates the latch mechanism so as to unlatch the door, and
- a rest position in which the latch mechanism is released,
- a latch casing (5) receiving the latch release lever (3; 13; 23; 33), and
- a safety device (4) configured to close the latch casing (5), the safety device (4) comprising a sealing part (4a) configured for participating of the closing of the latch casing,
- a shock receiving part (43; 143; 243; 343) configured to receive a shock from outside the latch casing (5),
- a blocking part (40; 140; 240; 340) configured to block the latch release lever (3; 13; 23; 33) at an intermediate position between the rest position and the active position when the shock is received by the shock receiving part (43; 143; 243; 343), so as to prevent the latch release lever (3; 13; 23; 33) from reaching the active position,
- the sealing part (4a) permanently ensuring the sealing of the latch casing.

2. Vehicle door latch device according to the preceding claim, wherein the sealing part (4a) ensures the sealing of the latch casing during the shock.

3. Vehicle door latch device according to any of the preceding claims, wherein the sealing part (4a) is supported by the shock receiving part.

4. Vehicle door latch device according to any of the preceding claims, wherein the sealing part (4a) is fitted onto or aside of the blocking part (140).

5. Vehicle door latch device according to the preceding claim, wherein when the shock is received by the shock receiving part (43; 143), the shock receiving part (43; 143) pushes the blocking part (40; 140) such

that the blocking part (40; 140) blocks the latch release lever (3; 13).

6. Vehicle door latch device according to any of the preceding claims, wherein the blocking part (140) comprises a transfer lever (144) configured to block the latch release lever (13). 5
7. Vehicle door latch device according to the preceding claim, wherein the shock receiving part (4a) is overmolded on the transfer lever (144). 10
8. Vehicle door latch device according to any of the preceding claims, wherein when the shock is received by the shock receiving part (343), the blocking part (340) is broken such that the blocking part (340) blocks the latch release lever (33). 15
9. Vehicle door latch device according to any of the preceding claims, wherein when the shock is received by the shock receiving part (243), the blocking part (240) is deformed so as to block the latch release lever (23). 20
10. Vehicle door latch device according to any of the preceding claims, wherein the blocking part (40) and the shock receiving part (43) form a single element. 25
11. Vehicle door latch device according to any of the preceding claims, wherein the safety device (4) comprises at least one distortion element (42, 45; 142; 242, 242a) configured to make the blocking part (40) reach an irreversible blocking position when the shock receiving part (43) is hit beyond a breaking force threshold. 30 35
12. Vehicle door latch device according to the preceding claim, wherein the distortion elements (45) comprise a snap fuse part configured to be broken beyond said breaking force threshold. 40
13. Vehicle door latch device according to any of the preceding claims, wherein the safety device (4) comprises a return means (46) configured to urge the safety device (4), specifically the blocking part, in a direction opposite to the direction of the shock received by the shock receiving part (43) when the shock receiving part (43) is hit below a force threshold. 45 50
14. Vehicle door latch device according to any of the preceding claims, wherein the latch casing (5) comprises a casing distortion part configured to cooperate with the shock receiving part and the blocking part such that when the shock receiving part is hit beyond a casing force threshold, the shock is transmitted to the latch casing (5) driving the blocking part, and the latch casing (5) reaches an irreversible 55

blocking position and causes the blocking part to block the latch release lever (3).

15. Vehicle door comprising:

a door panel (1),
 a vehicle door latch device according to any of the preceding claims comprising a safety device,
 a shock transmitting member (2) at least partially connected to the door panel (1) and placed near to the safety device (4), the shock transmitting member (2) being configured such that in case of a deformation of the door panel (1) due to a shock in a direction lateral relatively to the door, the shock transmitting member (2) transmits said lateral shock to the safety device (4) such that the blocking part is moved to block the latch release lever, the sealing part ensuring the sealing of the latch casing.

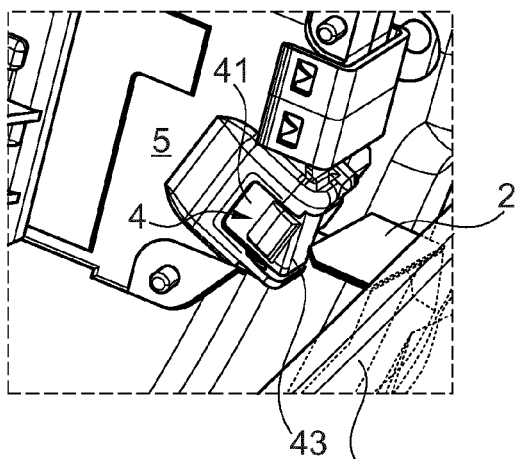


Fig. 1

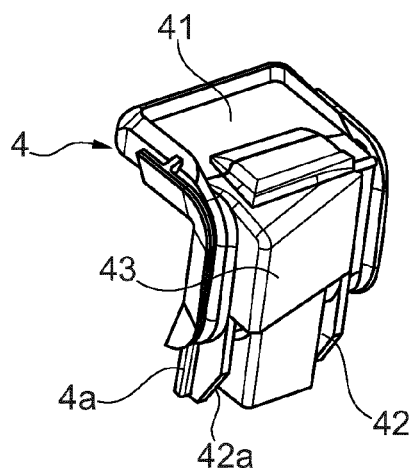


Fig. 2A

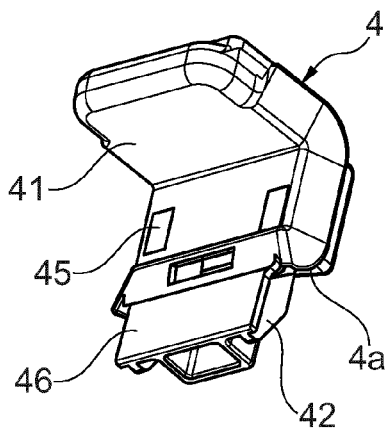


Fig. 2B

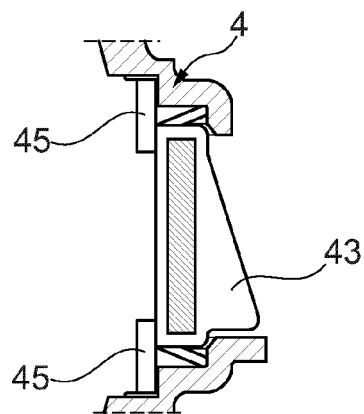


Fig. 3

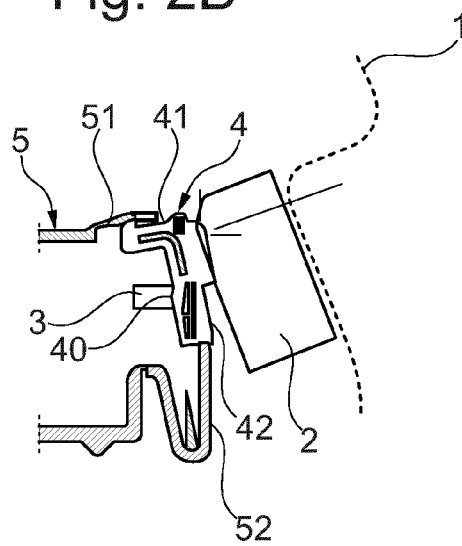


Fig. 4

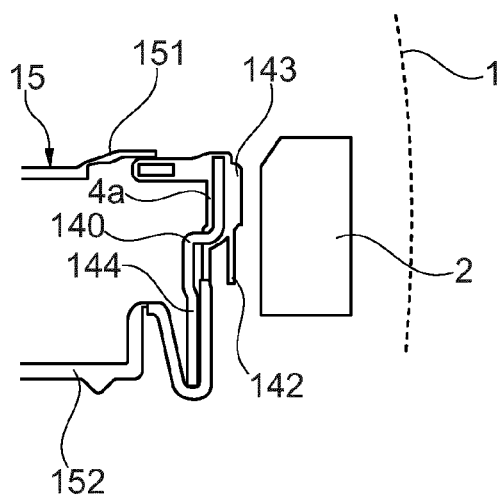


Fig. 5A

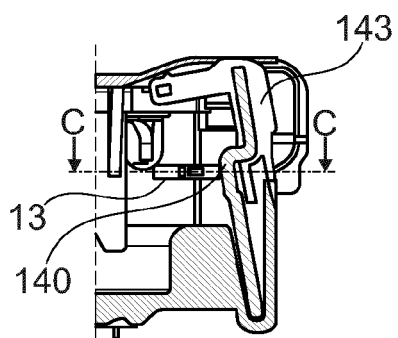


Fig. 5B

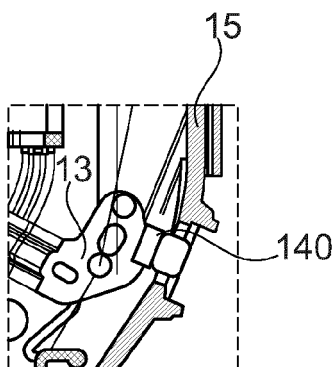


Fig. 5C

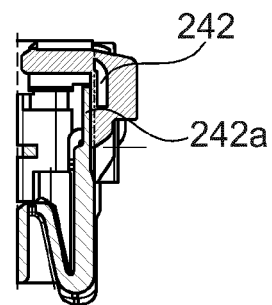


Fig. 8

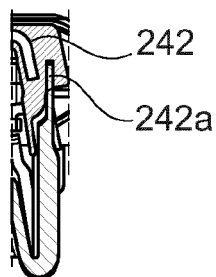


Fig. 9

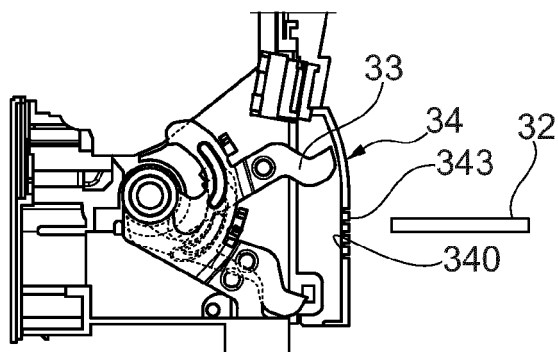


Fig. 6A

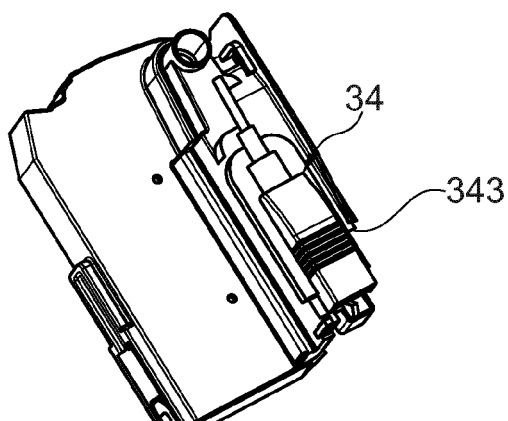


Fig. 6B

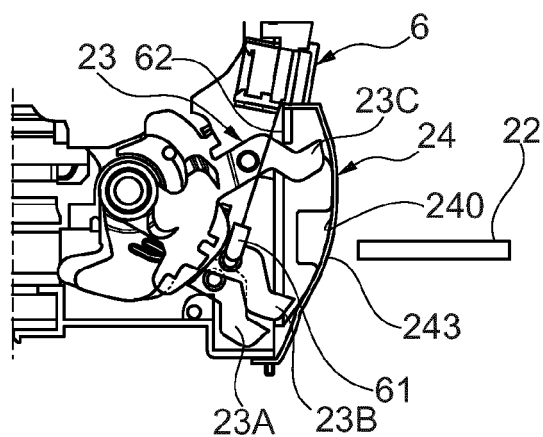


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 15 30 6376

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 February 2016	Examiner Pérez Méndez, José F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 30 6376

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82