(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 534 784 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.04.2025 Bulletin 2025/15

(21) Application number: **23315380.8**

(22) Date of filing: **06.10.2023**

(51) International Patent Classification (IPC):
E05B 77/38 *(2014.01)*

(52) Cooperative Patent Classification (CPC):
E05B 77/38; E05B 85/045; E05B 85/243; E05B 2015/0468; E05B 2015/0472

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **Minebea AccessSolutions France**
94140 Alfortville (FR)

(72) Inventors:
- **Verbrugghe, Jean-Marc**
  94140 ALFORTVILLE (FR)
- **Debroucke, François**
  94140 ALFORTVILLE (FR)

(74) Representative: **Innovincia**
11, avenue des Tilleuls
74200 Thonon-Les-Bains (FR)

(54) LATCH FOR AUTOMOTIVE VEHICLE WITH IMPROVED CLAW STROKE

(57) This latch (14) for an automotive vehicle door comprises a housing (16) in which a claw (18) is pivotally mounted between different functional angular positions including a predetermined exceptional overtravel position. The latch (14) comprises an elastic abutment (22) deformable between a rest position and a retracted position. The claw (18) is intended to cooperate with the elastic abutment (22), against an elastic return force of this elastic abutment (22), so as to place the elastic abutment (22) in the retracted position when the claw (18) reaches its predetermined exceptional overtravel position.

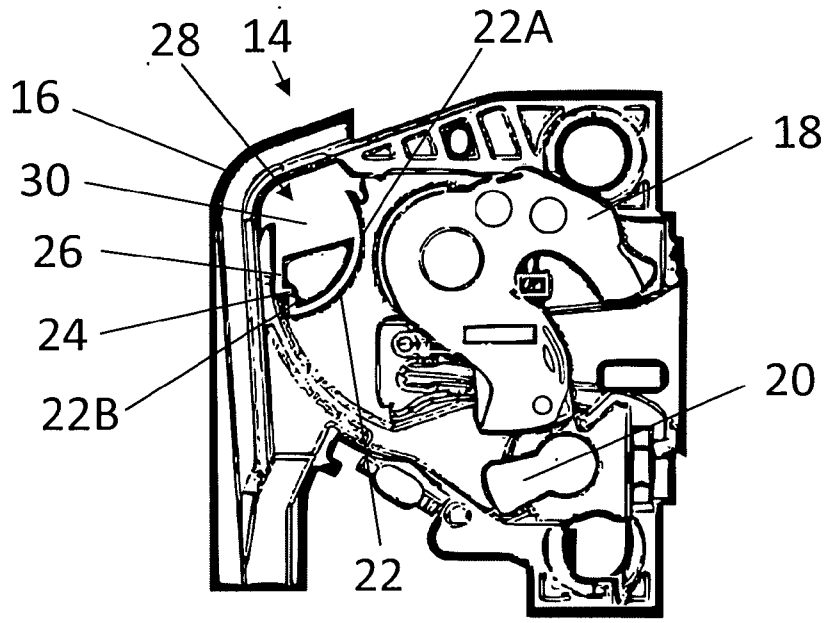

Fig. 2

EP 4 534 784 A1

Description

[0001] The present invention relates to a latch for automotive vehicle with improved claw stroke.

[0002] A latch for a motor vehicle door usually comprises a housing in which a claw is pivotally mounted between different functional angular positions. In the closed position of the door, the claw cooperates with a striker carried by a vehicle body, for example a pillar of the vehicle body.

[0003] For safety reasons, it is important, when a vehicle is in motion, that each vehicle door can be held in the closed position with no risk of accidental opening, particularly in the event of a vehicle accident or strong vehicle vibrations.

[0004] The quality of the cooperation between the strike and the claw is therefore essential to ensure that a vehicle door is held securely in the closed position both in normal conditions of use of the vehicle and in exceptional conditions of use of the vehicle.

[0005] However, the operating conditions of an automotive vehicle door latch must be adapted to certain temporary or exceptional circumstances of use subjecting the lock to particular constraints.

[0006] Such particular constraints are observed in particular during the closing of the door. Indeed, in this case, the kinetic energy of the door which is moved towards its closed position will be dissipated in the elements of the door and the vehicle body, in particular the latch of the door and the seals carried by the vehicle body and the door. Frictional forces between different elements of the latch and the vehicle body also dissipate the kinetic energy of the door. In addition, the latch usually comprises elastic masses which contribute significantly to the dissipation of the kinetic energy of the door.

[0007] The control of the dissipation of kinetic energy of a door moved towards its closed position must be done in particular in good conditions of limitation of wear of the latch and comfort for the user, that is to say without causing shocks and undesirable noises. In particular, the latch must satisfy these conditions while allowing a relatively unavoidable overtravel of the claw when closing the door, this overtravel having to be able to be completed without strong resistance from the claw to avoid causing a shock or an undesirable noise of the claw against the striker.

[0008] As the precision of the relative position of a latch and a striker is essential for the correct operating of a vehicle door latch, it has been proposed in the state of the art, in particular in EP 4 219 872 A1, means which make it possible to precisely adjust the relative position of a latch and a striker when the door is closed specifically for this adjustment operation.

[0009] When the door is closed for adjustment and before the striker pad is finally fixed to the vehicle body, the means disclosed in EP 4 219 872 A1 allow a relative movement of the striker pad by cooperation with the claw. This relative movement enables the striker to be placed in an optimised position for cooperation with the claw.

[0010] For this adjustment to be effective, the claw must offer some resistance to the striker. This means that, unlike when the door is normally closed, the claw must be able to overtravel when the door is closed in order to adjust the striker position while offering relative resistance to the striker.

[0011] It is therefore observed that, when closing the door, in certain relatively usual operating circumstances of the latch, the claw should be able to complete an overtravel without strong resistance from the claw, in particular to avoid causing an impact or an undesirable noise of the claw against the striker, whereas in other, more exceptional operating circumstances of this latch, the claw should be able to complete this overtravel by opposing a relative resistance to the striker.

[0012] The aim of the invention is in particular to offer a latch for an automotive vehicle door which, depending on the operating circumstances of the latch, allows the claw to be over-travelled, sometimes with less resistance and sometimes with greater resistance.

[0013] To that end, the invention relates to a latch for an automotive vehicle door of the type comprising a housing in which a claw is pivotally mounted between different functional angular positions including a predetermined exceptional overtravel position, **characterized in that** it comprises an elastic abutment deformable between a rest position and a retracted position, the claw being intended to cooperate with the elastic abutment, against an elastic return force of this elastic abutment, so as to place the elastic abutment in the retracted position when the claw reaches its predetermined exceptional overtravel position.

[0014] Thus, as long as the elastic abutment is not retracted and the claw is in operating circumstances of the latch causing the claw to cooperate with the elastic abutment, the claw will be able to complete an overtravel by opposing a relative resistance to a striker, proportional to the stiffness of the elastic abutment. These operating circumstances of the latch may correspond, for example, to circumstances of adjustment of the relative position of a striker intended to cooperate with the claw.

[0015] Furthermore, when operating circumstances of the latch cause the claw to reach its predetermined exceptional overtravel position, the elastic abutment will be retracted and will therefore no longer have any resistance effect to an overtravel of the claw smaller than the exceptional overtravel. Thus, when closing the door under normal operating circumstances of the latch, the claw will be able to complete an overtravel without strong resistance from the claw.

[0016] Other optional features of the invention, which may be taken separately or in combination, are recited below.

[0017] The elastic abutment is formed by an elastic blade, forming a lever of the third class, a first end of this elastic blade forming the fulcrum of the lever and a second end of this elastic blade being intended to oppose

the load force of a locking element intended to retain the elastic abutment in its retracted position.

[0018] It should be recalled that a lever is a simple machine. The way a lever operates is by an effort applied at a point, which moves a load at another point through a balance point called the fulcrum. It is the relative position of the effort, the load and the fulcrum that distinguishes the class of the lever. In a third class lever, the effort is between the load and the fulcrum.

[0019] Preferably, the elastic blade has a generally curved shape such that its centre of curvature is opposite the claw with respect to this elastic blade. Such a curved shape of the elastic blade participates to a spring effect of the elastic blade.

[0020] Preferably, the locking element is carried by an elastically deformable detent arm, this locking element forming a hard point that can be passed by the second end of the elastic blade when the claw travels a cooperating stroke with the elastic abutment between a position in which the elastic abutment is active and its retracted position.

[0021] According to one embodiment, the elastic blade and the detent arm are integral with the same common member, called the temporary elastic abutment member, arranged in the housing.

[0022] Preferably, the temporary elastic abutment member comprises a mass forming a shock or vibration absorber for the latch.

[0023] Preferably, the temporary elastic abutment member is formed from at least one material selected from a polymer and a metallic material, for example spring steel.

[0024] According to one embodiment, the locking element is integral with an operating surface intended to be actuated, for example by an operating tool having access to the inside of the housing, against an elastic return force of the detent arm so as to deactivate the locking element and release the elastic abutment from its retracted position.

Brief description of the Figures

[0025] The invention will be better understood on reading the following description, which is given by way of example only and with reference to the attached drawings in which:

- Figure 1 is a perspective view of an automotive vehicle body comprising a striker intended to cooperate with a latch according to the invention as shown in the following figures;
- Figure 2 is a front view of a latch according to the invention, for an automotive vehicle door, showing a housing of this latch, part of which has been removed to allow visual access to a claw of this latch and to a temporary elastic abutment member, the claw being in an initial position separated from the striker;
- Figure 3 is a similar view to Figure 2, in which the claw is in a first position of cooperation with the striker;
- Figure 4 is a similar view to Figure 2, in which the claw is in a second position of cooperation with the striker, succeeding the first position of the figure 3;
- Figure 5 is a similar view to Figure 2, in which the claw is in a third position of cooperation with the striker, succeeding the second position of the figure 4;
- Figure 6 is a similar view to Figure 2 showing a first variant of the temporary elastic abutment member;
- Figure 7 is a front view of a second variant of the temporary elastic abutment member.

Detailed description

[0026] There is shown in Figure 1 an automotive vehicle body, designated by the general reference 10, comprising a striker 12 known per se. The striker 12 is, for example, mounted on a pillar of the vehicle body 10.

[0027] According to the example shown in Figure 1, the striker 12 is an adjustable striker, more precisely an auto-adjustable striker.

[0028] The striker 12 is intended to cooperate with a latch 14, shown in Figures 2-5, mounted on a door (not shown) of the automotive vehicle.

[0029] Referring to Figures 2 to 5, it can be seen that the latch 14 comprises a housing 16 in which a claw 18 is pivotally mounted. The latch 14 further comprises a pawl 20 pivotally mounted in the housing 16. The pawl 20 is intended to cooperate with the claw 18 in order to close the claw 18 in a position corresponding to a closed position of the door.

[0030] The latch 14 further comprises an elastic abutment, formed by an elastic blade 22, which is deformable between a rest position, as shown in Figures 2 and 3, and a retracted position, as shown in Figure 5.

[0031] In the example shown in the Figures 2-5, the elastic blade 22 forms a lever of the third class. A first end 22F of the elastic blade 22 forms the fulcrum of the lever. In the example shown in the Figures 2-5, the elastic blade 22 has a generally curved shape such that its centre of curvature is opposite the claw 18 with respect to this elastic blade 22. Such a curved shape of the elastic blade 22 allows a soft contact with the claw 18 and participates to a spring effect of the elastic blade 22.

[0032] Furthermore, a locking element 24 is carried by an elastically deformable detent arm 26.

[0033] In the example shown in the Figures 2-5, the elastic blade 22 and the detent arm 26 are integral with the same common member, called the temporary elastic abutment member 28, arranged in the housing 16.

[0034] The temporary elastic abutment member 28 is mounted in the housing 16 by means known in the art, for example snap-fastening or screwing means.

[0035] Preferably, the temporary elastic abutment member 28 comprises a mass 30 forming a shock or vibration absorber for the latch 14. If need be, such a mass 30 may comprise EPDM rubber (ethylene propylene diene monomer rubber).

[0036] Also, preferably, the temporary elastic abutment member 28 is formed from at least one material selected from a polymer and a metallic material, for example spring steel.

[0037] The claw 18 is movable between different functional angular positions. Referring to Figures 2 to 5, it will be described below different positions of the claw 18 corresponding to different operating conditions of the latch 14. It is to be noted that in Figures 3-5, the striker 12 is schematized by a cross.

[0038] Figure 2 shows the latch 14 in operating conditions corresponding to circumstances where the door carrying the latch 14 is open, before adjustment of the relative position of the striker 12. In such conditions, the claw 18 is in an initial position separated from the striker 12 and the elastic blade 22 is in its rest position.

[0039] Figures 3 and 4 show the claw 18 cooperating with the striker 12, in operating conditions corresponding to circumstances where the door carrying the latch 14 is moved from the open position to a close position. Between the positions shown respectively in Figure 3 and in Figure 4, the claw 18 cooperates with the elastic blade 22, against the elastic return force of this elastic blade 22, in order to move it from its rest position shown in Figure 3 to its retracted position shown in Figure 4. The retracted position of the elastic blade 22 is reached when the claw 18 reaches a predetermined exceptional overtravel position.

[0040] Thus, between the positions shown respectively in Figure 3 and in Figure 4, the elastic blade 22 is in an active position in which the elastic blade 22 cooperates with the claw 18 in order to oppose a relative resistance to the striker 12, proportional to the stiffness of the elastic blade 22. This resistance allows to place the auto-adjustable striker 12 in an optimised position for cooperation with the claw 18.

[0041] However, when the elastic blade 22 is in its retracted position shown in Figure 4, the elastic blade 22 will no longer have any resistance effect to an overtravel of the claw 18 shorter than the exceptional overtravel of this claw 18.

[0042] It is to be noted that the elastic blade 22 comprises a second end 22B intended to oppose the load force of the locking element 24 which, as shown in Figure 4, retains the elastic blade 22 in its retracted position.

[0043] Thus, the locking element 24 forms a hard point that can be passed by the second end 22B of the elastic blade 22 when the claw 18 travels a cooperating stroke with the elastic blade 22 between a position in which the elastic blade 22 is active, such as the one shown in Figure 3, and its retracted position shown in Figures 4 and 5.

[0044] The predetermined exceptional overtravel position of the claw 18 could be reached in relatively exceptional operating circumstances of the latch 14, for example when the door is closed for adjustment of the position of the striker 12.

[0045] However, such operating circumstances for adjustment of the position of the striker 12 may, under certain circumstances, not cause the claw 18 to reach its predetermined exceptional overtravel position. In this case, when the automotive vehicle is provided with a cinching mechanism for power operation of the latch to assist a vehicle user in closing the door, an initial operation of the cinching mechanism will allow the claw 18 to reach the predetermined exceptional overtravel position.

[0046] Figure 5 shows the claw 18 cooperating with the striker 12 in normal conditions for holding the -door in its closed position. The elastic blade 22, which is in its retracted position, will no longer have any resistance effect to an overtravel of the claw 18 shorter than the exceptional overtravel of this claw 18, and, of course, will have no resistance effect to a normal travel of the claw. In the operating circumstances of Figure 5, the pawl 20 cooperates with the claw 18 in order to close the claw 18 in its position corresponding to the usual closed position of the door.

[0047] Alternative variants of certain latch components are described below, with reference to Figures 6 and 7. In these Figures 6 and 7, references identical to those in the preceding Figures designate elements identical or similar to those in the preceding Figures.

[0048] Figure 6 shows a first variant of the temporary elastic abutment member 28. In this variant, the locking element 24 is integral with an operating surface 32 intended to be actuated against an elastic return force of the detent arm 26 so as to deactivate the locking element 24 and release the elastic blade 22 from its retracted position.

[0049] Release of the elastic blade 22 may be required in particular following a repair carried out on the door or the latch 14 requiring the position of the striker 12 to be adjusted again.

[0050] The operating surface 32 can be actuated against the elastic return force of the detent arm 26 for example by an operating tool 34 having access to the inside of the housing, represented by an arrow in Figure 6.

[0051] In order to adjust the stiffness of the elastic blade 22 and/or of the detent arm 26, the dimensions of the mass 30 may be reduced, as shown in the second variant of the temporary elastic abutment member 28 of Figure 7, or increased. Indeed, modification of the dimensions of the mass 30 will modify the length, and consequently, the stiffness of the elastic blade 22 and/or of the detent arm 26.

List of references

[0052]

10: automotive vehicle body
12: striker
14: latch
16: housing
18: claw
20: pawl

22: elastic blade
22A: first end or fulcrum of the elastic blade
22B: second end of the elastic blade
24: locking element
26: detent arm
28: temporary elastic abutment member
30: mass forming a shock or vibration absorber
32: operating surface
34: operating tool

Claims

1. Latch (14) for an automotive vehicle door of the type comprising a housing (16) in which a claw (18) is pivotally mounted between different functional angular positions including a predetermined exceptional overtravel position, **characterized in that** it comprises an elastic abutment (22) deformable between a rest position and a retracted position, the claw (18) being intended to cooperate with the elastic abutment (22), against an elastic return force of this elastic abutment (22), so as to place the elastic abutment (22) in the retracted position when the claw (18) reaches its predetermined exceptional overtravel position.

2. Latch (14) according to claim 1, wherein the elastic abutment is formed by an elastic blade (22) , forming a lever of the third class, a first end (22A) of this elastic blade (22) forming the fulcrum of the lever and a second end (22B) of this elastic blade being intended to oppose the load force of a locking element (24) intended to retain the elastic abutment (22) in its retracted position.

3. Latch (14) according to claim 2, wherein the elastic blade (22) has a generally curved shape such that its centre of curvature is opposite the claw (18) with respect to this elastic blade (22).

4. Latch (14) according to claim 2 or 3, wherein the locking element (24) is carried by an elastically deformable detent arm (26), this locking element (24) forming a hard point that can be passed by the second end of the elastic blade (22) when the claw (18) travels a cooperating stroke with the elastic abutment (22) between a position in which the elastic abutment (22) is active and its retracted position.

5. Latch (14) according to claim 4, wherein the elastic blade (22) and the detent arm (26) are integral with the same common member, called the temporary elastic abutment member (28), arranged in the housing (16).

6. Latch (14) according to claim 5, wherein the temporary elastic abutment member (28) comprises a mass (30) forming a shock or vibration absorber for the latch (14).

7. Latch (14) according to claim 5 or 6, wherein the temporary elastic abutment member (28) is formed from at least one material selected from a polymer and a metallic material, for example spring steel.

8. Latch (14) according to any one of claims 4 to 7, wherein the locking element (24) is integral with an operating surface (32) intended to be actuated, for example by an operating tool (34) having access to the inside of the housing (16), against an elastic return force of the detent arm (26) so as to deactivate the locking element (24) and release the elastic abutment (28) from its retracted position.

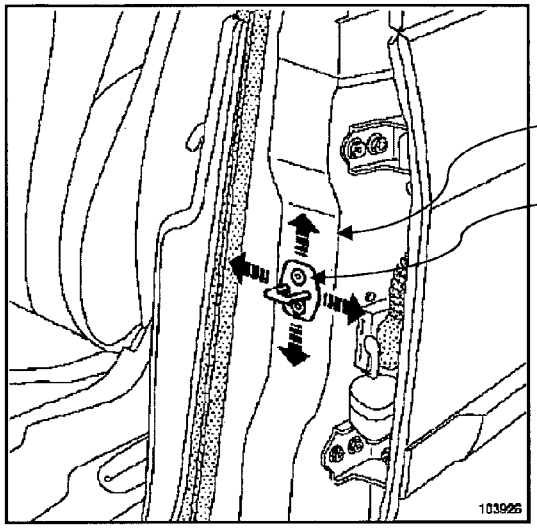

Fig. 1

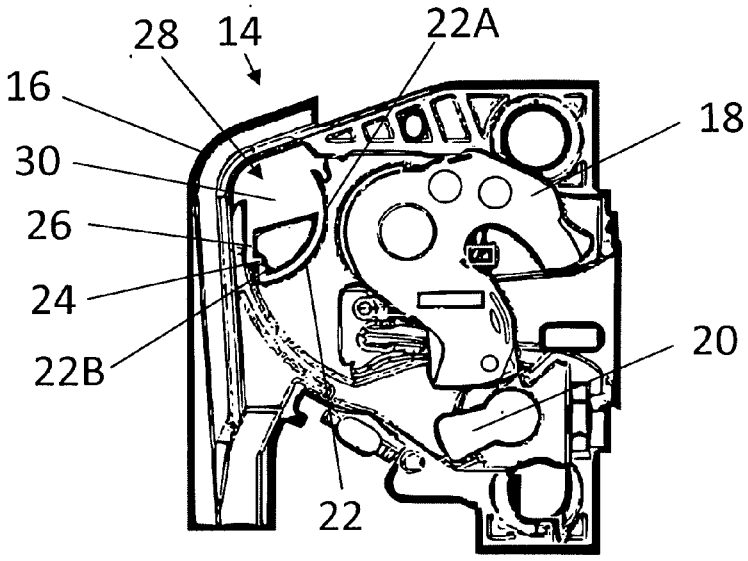

Fig. 2

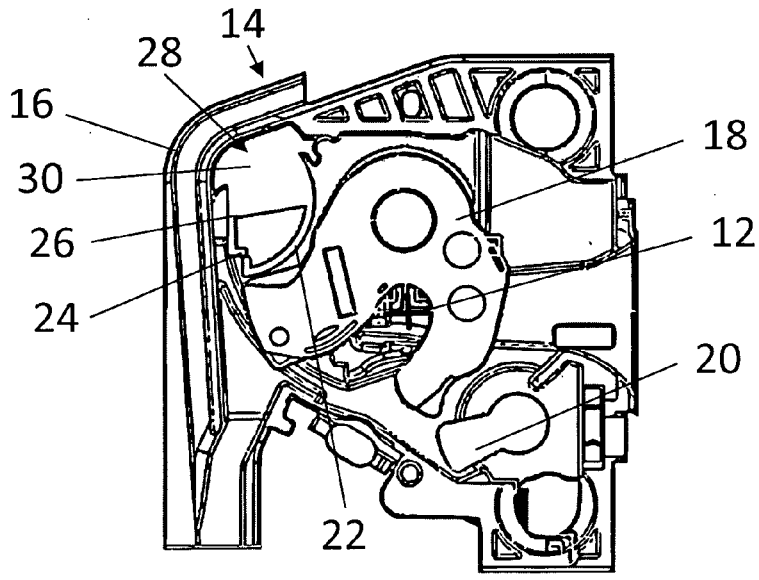

Fig. 3

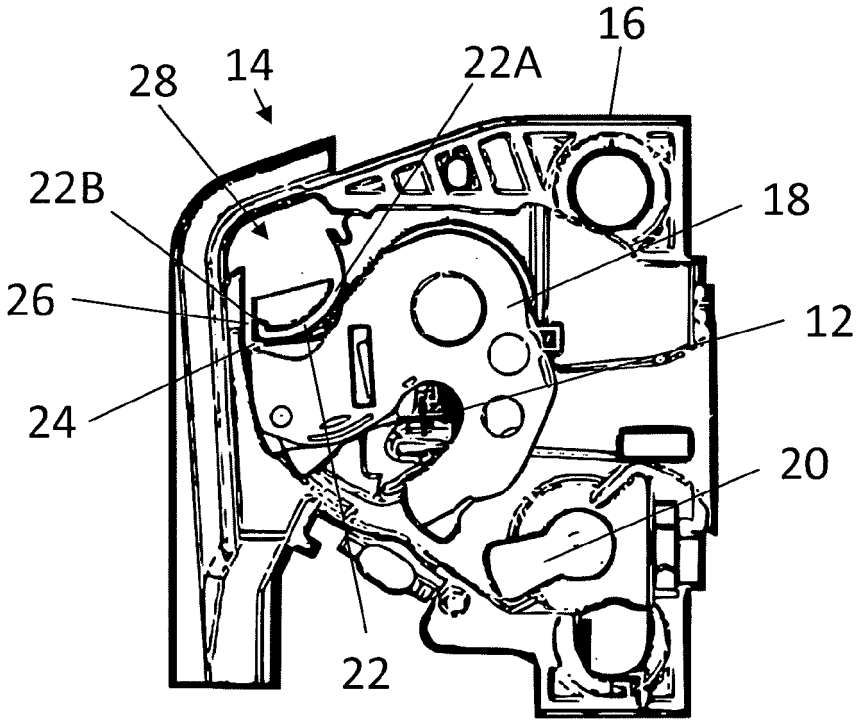

Fig. 4

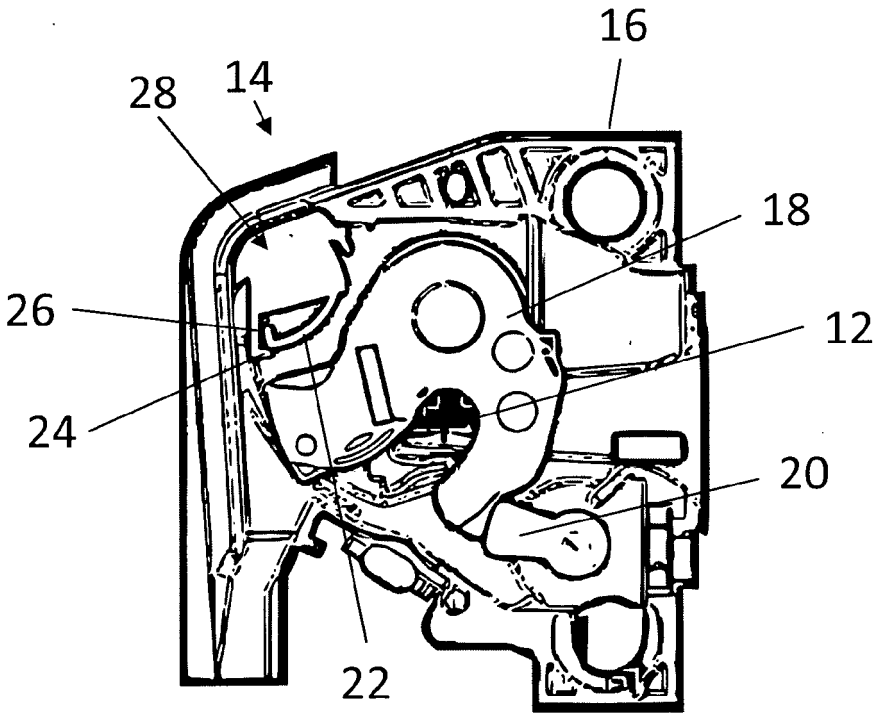

Fig. 5

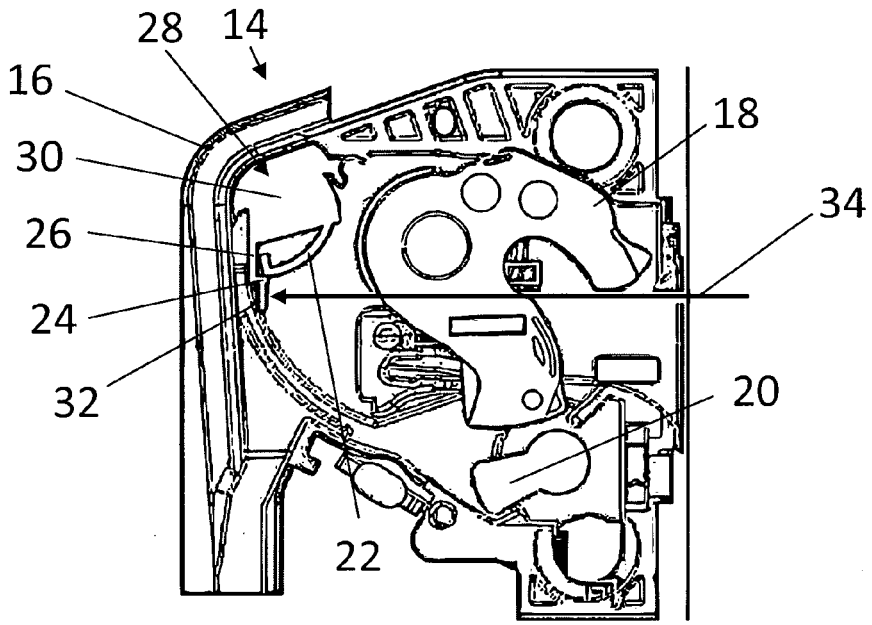

Fig. 6

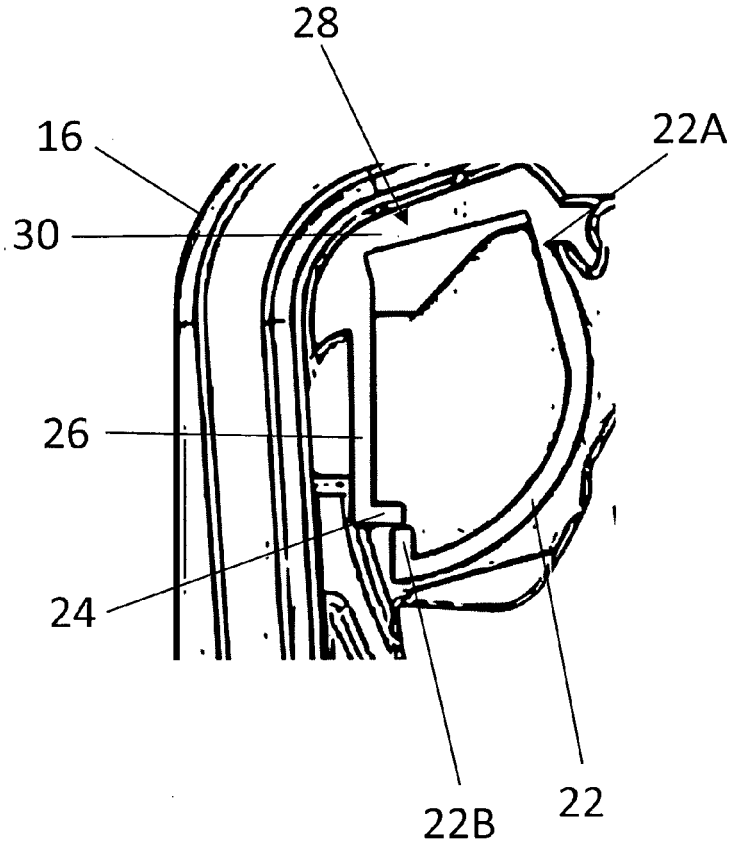

Fig. 7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 31 5380

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2015/191947 A1 (PHILIPPE PASCAL [FR] ET AL) 9 July 2015 (2015-07-09)	1	INV. E05B77/38
A	* the whole document *	2-8	
X	DE 10 2013 114301 A1 (KIEKERT AG [DE]) 18 June 2015 (2015-06-18)	1	
A	* the whole document *	2-8	
X	WO 2020/213199 A1 (MITSUI KINZOKU ACT CORP [JP]) 22 October 2020 (2020-10-22) * paragraph [0056] - paragraph [0067]; figures 10-12 *	1	
X	US 7 195 292 B2 (ARVINMERITOR LIGHT VEHICLE SYS [GB]) 27 March 2007 (2007-03-27) * the whole document *	1	
A	JP 2007 270573 A (AISIN KIKO CO LTD; AISIN SEIKI) 18 October 2007 (2007-10-18) * figures 3,7 *	1	
			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	23 February 2024	Ansel, Yannick

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 31 5380

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-02-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015191947 A1	09-07-2015	DE 102015100018 A1	09-07-2015
		FR 3016182 A1	10-07-2015
		US 2015191947 A1	09-07-2015
DE 102013114301 A1	18-06-2015	DE 102013114301 A1	18-06-2015
		WO 2015090274 A1	25-06-2015
WO 2020213199 A1	22-10-2020	CN 113710862 A	26-11-2021
		JP 7067704 B2	16-05-2022
		JP 2020176394 A	29-10-2020
		WO 2020213199 A1	22-10-2020
US 7195292 B2	27-03-2007	CN 1598224 A	23-03-2005
		EP 1516986 A2	23-03-2005
		US 2005062295 A1	24-03-2005
JP 2007270573 A	18-10-2007	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 4219872 A1 **[0008] [0009]**