



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.03.2021 Bulletin 2021/12

(51) Int Cl.:
E05B 17/00 ^(2006.01) **E05B 77/04** ^(2014.01)
E05B 85/10 ^(2014.01)

(21) Application number: **20382830.6**

(22) Date of filing: **21.09.2020**

(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 MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **19.09.2019 ES 201930813**

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(54) **OPENING LOCK SYSTEM FOR A VEHICLE DOOR**

(57) Opening blocking system for a vehicle door comprising: a lever (1), pivotable with respect to a reinforcement element (2), wherein the lever (1) comprises an actuation cam (5), such that an actuation on the lever (1) causes movement of the cam (5) which in turn causes the unlocking of the door; a blocking device (6) comprising fixing means (12) for fixing to the reinforcement element (2) and can be moved to prevent the unlocking of

the door; wherein the blocking device (6) comprises a first section (7) attached to a second section (8) through a break area (9), wherein the first section (7) comprises a projection (10) extending away from the reinforcement element (2), wherein the blocking device (6) is configured such that, when the projection (10) receives pressure, the break area (9) breaks, with the first section (7) moving such that the actuation path of the cam (5) is blocked.

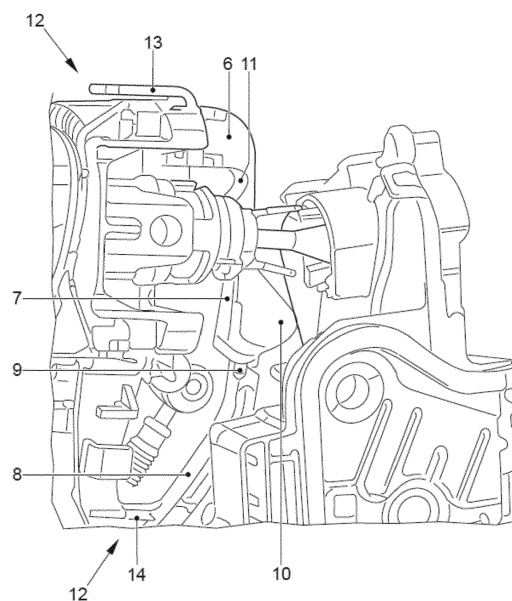


FIG. 2

Description

Object of the Invention

[0001] The object of the present invention is a blocking system for blocking the opening of a vehicle door in situations involving lateral impact against said vehicle door.

[0002] By means of the system object of the present invention, in the event of an accident involving a strong lateral impact against the vehicle door, the accidental opening of said door is prevented.

[0003] The door opening blocking system object of the present invention is particularly applicable in the field of automotive industry, and more specifically in the field of passive safety devices for a vehicle.

[0004] According to a second aspect, the object of the present invention is a vehicle door incorporating the mentioned opening blocking system.

Background of the Invention and Technical Problem to Solve

[0005] Lateral impacts against the side doors of a vehicle may occur both in a situation involving a moving vehicle and in a situation involving a non-moving vehicle. Said impacts cause the deformation of the different structural elements forming the door, leading to their compression. These deformations may cause a structural element of the door to contact and push the cam which accidentally actuates the door unlocking mechanism, causing the undesirable opening of the door.

[0006] Today, as a standardisation requirement for a vehicle to be suitable for circulation, the vehicle door must be able to remain closed in the event of a lateral impact.

[0007] In order to be able to comply with said requirement, the device described in document DE 102016223505 A1 is known in the state of the art. This document describes two different variants or embodiments of a door opening blocking device.

[0008] In a first variant of the device described in the aforementioned document, the device comprises a rigid frame with three supporting points with respect to the internal structure of the door. Said supporting points are in the form of lugs or rods. Each of said supporting points comprises a weakened area (an annular flange or rib) allowing the collapse or axial movement of the supporting point, and thereby the movement of the entire frame of the device. In the event of a lateral impact on the vehicle door, the force of the impact may be sufficient to deform the vehicle door, and thereby push the blocking device, which deforms or breaks in the weakened area, causing the device to collapse. As a result of the movement or collapse of said blocking device, it gets in the way of the provided path of the mechanism of the lock, such that said mechanism cannot complete its travel, the opening of the door thereby being prevented.

[0009] The variant described in the preceding paragraph has two significant drawbacks. Moreover, it takes

up a large volume within the internal structure of the door. The internal structure of the vehicle door usually comprises two sheet metal elements (outer sheet metal and inner sheet metal), an inner plastic lining, an outer lever allowing the door to be actuated by a user from outside the vehicle, a structural support for said lever (which provides rigidity to the lever assembly), and a mechanical transmission element between the lever and the lock (where the lock allows unlocking the movement of the door upon the actuation of the lever). The mechanical transmission element is typically a "Bowden cable" which transmits the movement of the lever directly to the lock. Other elements such as window, window movement mechanism, loudspeakers, actuators, sealing elements, etc. can also be found within the door structure. As can be seen, many elements are found in the internal structure of the door, so introducing a device like the one described in the mentioned document may constitute a design obstacle that is not feasible in many vehicle models.

[0010] There is another technical problem associated with the first variant of the device described in the mentioned document. Since the rigid frame is fixed at three different points and the weakened areas thereof are in correspondence with each of the three fixing points, said device behaves in an ideal manner in those situations involving impact in which the impact is perpendicular to the plane formed by the three fixing or anchoring points, i.e., when the impact is in the same direction of the lugs or rods. However, if the impact on the vehicle door is not perpendicular to said plane (there is a need to take into account that significant rotations occasionally occur in the lateral impacts on the vehicle door), the behaviour of the device might not be ideal, where none of the fixing points of the device may end up collapsing. In this case, the device may not be able to block the opening of the door.

[0011] In a second variant of the device described in the aforementioned document, the device comprises a flexible frame which deforms when the sheet metal of the door deforms, getting in the way of the path of the mechanism for opening the lock of the door, so said mechanism cannot complete its travel, and the opening of the door is therefore blocked. This variant also has the drawback of taking up a large volume within the structure of the door. Moreover, if the reinforcement of the lever breaks into pieces during lateral impact, this variant may not behave in an ideal manner as the device does not get in the way of the path of the door opening mechanism.

Description of the invention

[0012] In order to solve the aforementioned drawbacks, the present invention relates to an opening blocking system for a vehicle door.

[0013] The opening blocking system for a vehicle door comprises a lever, pivotable with respect to a reinforcement element of said lever; this lever reinforcement element is the element which allows fixing the lever to the

structure of the door and provides rigidity to withstand the forces a user exerts on the lever, among others.

[0014] The lever comprises an actuation cam, such that an actuation on the lever causes movement of the actuation cam which in turn causes the unlocking of the door.

[0015] The opening blocking system for a vehicle door comprises a blocking device which in turn comprises fixing means for fixing to the reinforcement element.

[0016] The blocking device can be moved to prevent the accidental unlocking of the door.

[0017] The blocking device comprises a first section, a second section, and a break area. The first section is attached to the second section through the break area.

[0018] The first section comprises a projection extending away from the reinforcement element.

[0019] The blocking device is configured such that, when the projection receives pressure (pressure exerted by any element on the projection), the break area breaks, releasing a movement of the first section of the blocking device to a blocking position.

[0020] Therefore, in a standby position with the blocking system being fixed to the reinforcement element (in which the break area has yet to break), the blocking device allows free movement of the actuation cam. In contrast, when forces act on the blocking device, the first section of the blocking device will be caused to move to the blocking position, hindering the movement of the actuation cam.

[0021] By means of the system described above, the accidental or involuntary opening of the vehicle door when a lateral impact occurs on said door is prevented, given that the cam of the lever is prevented from completing its travel which releases the opening of the door.

[0022] Preferably, the break area is configured to break if the pressure on the projection of the blocking device exceeds a specific value. The projection is configured as the first component of the blocking system which receives the pressures of another component of the vehicle door as it compresses during the impact. Arranging the first contact point of the blocking device away from the actuation cam allows anticipating breakage and preventing other components from hindering the movement of the blocking device, preventing the blocking device from performing its function.

[0023] According to a possible embodiment of the invention, the break area is a weakened area.

[0024] According to a possible embodiment, the break area can be a narrowing of the first section, and can be obtained with a material cutting process.

[0025] Preferably, the fixing means comprise at least one first attachment element for attaching the first section to the reinforcement element of the lever and at least one second attachment element for attaching the second section to the reinforcement element of the lever.

[0026] According to a possible embodiment of the invention, the at least one first attachment element is arranged at the end farthest away from the first section with

respect to the break area.

[0027] Also according to a possible embodiment, the at least one second attachment element is arranged at the end farthest away from the second section with respect to the break area.

[0028] This allows an optimal operation of the opening blocking system object of the present invention.

[0029] The farther the first attachment element and the second attachment element are from the break area, the lower is the force necessary to cause the break area to break.

[0030] According to a possible embodiment of the invention, the first section comprises an articulation segment arranged between the at least one first attachment element and the projection. This articulation segment is configured for causing an articulation (which can be a rotational movement or a pivoting movement) of the first section of the device around the articulation segment thereof when the break area breaks.

[0031] This feature facilitates the dynamics or modus operandi of the blocking device, favouring the occupation of the blocking position by the first section after the break area breaks, guiding the movement of the first section from the standby position to the blocking position. Similarly, the movement being towards other directions is limited, ensuring the proper operation of the blocking device.

[0032] According to a possible embodiment, the articulation segment is a weakened area. This feature simplifies the construction of the blocking device.

[0033] Also according to a possible embodiment of the invention, the articulation segment is arranged in a vertex of the first section (for example, forming an angle of about 90°). This feature favours the articulation, pivoting, or rotational movement of the articulation segment, particularly in the case where the articulation segment is a weakened area.

[0034] According to a possible embodiment, the articulation segment is located close to the at least one first attachment element. This feature also favours the articulation, pivoting, or rotational movement of the articulation segment, particularly in the case where the articulation segment is a weakened area.

[0035] Preferably, the projection is located close to the break area. This feature favours the breakage of the break area when there is a specific pressure on the projection, thereby ensuring the proper operation of the opening blocking system object of the present invention.

[0036] According to a possible embodiment of the invention, the projection incorporates a contact surface, wherein said contact surface is substantially perpendicular to the actuation path of the actuation cam, with the first section being in the blocking position. In the blocking position, this feature favours achieving a more stable blocking action by the projection with respect to the movement of the actuation cam.

[0037] According to a possible embodiment of the opening blocking system, the blocking device is made from a plastic material. This feature simplifies the con-

struction of the system, and specifically of the blocking device.

[0038] Preferably, the blocking device comprises a substantially longitudinal geometry. This feature favours optimal space saving inside the vehicle door.

[0039] The present invention also relates to a vehicle door comprising an opening blocking system as described above.

[0040] Preferably, in the vehicle door mentioned in the preceding paragraph, the blocking device is arranged between the reinforcement element of the lever and a lock of the vehicle door.

[0041] As mentioned in the preceding paragraph, in the event of a lateral impact on the vehicle door, the lock will apply pressure on the projection when the elements of the door collapse. Therefore, the projection is prolonged towards a direction contrary to the direction of the reinforcement element of the lever, approaching the lock, so as to anticipate the start of the movement of the blocking device from the standby position thereof to the blocking position thereof.

[0042] Nevertheless, alternatively, another element of the door structure could be arranged opposite and superimposed on the reinforcement element of the lever, in the area of the actuation cam.

Brief description of the figures

[0043] The following figures have been included as part of the description of at least one embodiment of the invention.

Figure 1 shows a detailed view of the vehicle door opening mechanism.

Figure 2 shows a schematic representation of an embodiment of the opening blocking system for a vehicle door, in which the blocking device gets in the way between the reinforcement element of the lever and the lock of the door.

Figure 3 shows a schematic representation of the blocking system of Figure 2, in which the blocking device is shown broken such that the first section is in the blocking position, getting in the way of the path of the cam which actuates the lock of the door.

Detailed description

[0044] As mentioned above, the present invention relates to an opening blocking system for a vehicle door.

[0045] Figure 1 shows the arrangement of the lever (1) and the reinforcement element (2) of the lever (1) of the vehicle door. The lever (1) is attached to the reinforcement element (2) of the lever (1). In turn, the reinforcement element (2) is fixed to the structure of the door, for example, to an outer sheet metal of the side door of the vehicle. It is noted that the present invention relates to an outer lever (1) of the vehicle, which enables a user, located outside the cabin of the vehicle, to open the door.

[0046] On the other hand, the lock (3), fixed to another structural element of the door, is observed. The lock (3) is suitable for locking and unlocking the vehicle door according to a position of the inner lever or the outer lever (1).

[0047] Furthermore, the actuation cam (5) of the lock (3) is shown in the reinforcement element (2) of the lever (1). When a user actuates the lever (1) of the door from the outside the vehicle, said cam (5) moves, transmitting said actuation, for example by means of a Bowden cable (4), to the lock (3), actuating the mechanism of the lock (3) and thereby causing the opening of the door.

[0048] When a lateral impact occurs against the vehicle door, the internal structure and elements of the door may deform and compression may occur, such that the reinforcement element (2) of the lever (1) may approach the lock (3) (or vice versa). In this approach, a pressure may be involuntarily exerted on the actuation cam (5) by the body of the lock (3), or any other internal component of the door, which can cause the movement of the actuation cam (5) and the accidental opening of the vehicle door.

[0049] Figure 2 shows the blocking device (6) of the system of the invention, located between the reinforcement element (2) of the lever (1) and the lock (3).

[0050] The blocking device (6) comprises a rigid or semi-rigid body (also referred to as a "protective cover") with an elongated geometry, preferably made from a plastic material.

[0051] The body of the device (6) comprises a first section (7) and a second section (8), separated by a break area (9). Said break area (9) is preferably a weakened area (a narrow area or an area with smaller material thickness).

[0052] The first section (7) of the device comprises a projection (10) and an articulation segment (11). Said articulation segment (11) can be a weakened area or a hinge.

[0053] The body of the device (6) comprises fixing means (12) for fixing to the reinforcement element (2) of the lever (1) of the vehicle door. Preferably, said fixing means (12) comprise a first attachment element (13) for attaching the first section (7) to the reinforcement element (2) and a second attachment element (14) for attaching the second section (8) to the reinforcement element (2).

[0054] When a lateral impact occurs as mentioned above, with the blocking device (6) getting in the way between the reinforcement element (2) of the lever (1) and the lock (3), the relative approximation between the reinforcement element (2) of the lever (1) and the lock (3) causes the lock (3) to collide against the projection (10) of the first section (7) of the blocking device (6).

[0055] The device (6) is caused to break in the break area (9) thereof if this collision, together with the pressure produced by the deformation and/or relative approximation of the reinforcement element (2) of the lever (1) and the lock (3), exceeds a magnitude of pressure greater

than a predefined value. When breakage occurs, the first section (7) of the device (6) bends or is articulated around the articulation segment (11) thereof. In light of the deformation and/or relative approximation of the reinforcement element (2) of the lever (1) and the lock (3), this bending allows the first section (7) of the device (6) to get in the way (see Figure 3) of the path of the actuation cam (5), and therefore said cam (5) is not able to complete its travel for actuating the lock (3).

[0056] Therefore, before the lateral impact occurs, and accordingly before the break area (9) breaks, the blocking device (6) is in its standby position, as shown in Figure 2. In this standby position, the blocking device (6) does not get in the way of the movement of the actuation cam (5), allowing the user to freely open the door. In said Figure 2, the cam (5) is shown in the non-operated position thereof. If the user actuates the lever (1), the actuation cam (5) would move in a substantially upward movement.

[0057] When the lateral impact occurs, the first section (7) of the blocking device (6) is caused to move from the standby position to the blocking position, said blocking position being shown in Figure 3. It is observed that, in this blocking position, the first section (7) gets in the way of a hypothetical upwards movement of the actuation cam (5), making it impossible for the door to be accidentally unlocked.

[0058] To ensure the proper operation of the blocking device (6), the first section (7) comprises a contact surface (15) suitable for interacting with the actuation cam (5). This contact surface (15) comprises a geometry perpendicular to the direction of movement of the actuation cam (5), thereby ensuring that the first section (7) can properly block the mentioned movement. Additionally, said contact surface (15) may comprise a geometry complementary to said actuation cam (5), thereby favouring the coupling thereof and making the movement thereof impossible.

[0059] As discussed, the articulation segment (11) can be a hinge or a weakened area. Even in the case where the articulation segment (11) is a weakened area, when a thrust is exerted on the projection (10) of the device (6), stresses usually concentrate preferably in the break area (9) (and not in the articulation segment (11)). This means that the device (6) always breaks along the break area (9) and not along the articulation segment (11). This is due to the fact that the break area (9) is located in an intermediate area of the device (6), close to the projection (10), and that in said break area (9) there is a more abrupt change in section of the device (6) in comparison with the articulation segment (11). Nevertheless, it is also possible to make the articulation segment (11) with a greater material thickness than the break area (9), which may also favour the concentration of stresses preferably in the break area (9).

[0060] Therefore, the blocking device (6) is configured to break along the break area (9), when the lock (3) presses against the projection (10) in the event deformation

due to lateral impact on the vehicle door.

Claims

1. An opening blocking system for a vehicle door, wherein the system comprises:

- a lever (1), pivotable with respect to a reinforcement element (2) of said lever (1), wherein the lever (1) comprises an actuation cam (5), such that an actuation on the lever (1) causes movement of the actuation cam (5) which in turn causes the unlocking of the door;
- a blocking device (6), wherein the blocking device (6) comprises fixing means (12) for fixing to the reinforcement element (2), wherein the blocking device (6) can be moved to prevent the accidental unlocking of the door;

characterised in that the blocking device (6) comprises a first section (7), a second section (8), and a break area (9), wherein the first section (7) is attached to the second section (8) through the break area (9), wherein the first section (7) comprises a projection (10) extending away from the reinforcement element (2), wherein the blocking device (6) is configured such that, when the projection (10) receives pressure, the break area (9) breaks, releasing a movement of the first section (7) of the blocking device (6) to a blocking position, wherein said first section (7) blocks the actuation path of the actuation cam (5).

2. The opening blocking system according to claim 1, **characterised in that** the fixing means (12) comprise at least one first attachment element (13) for attaching the first section (7) to the reinforcement element (2) of the lever (1) and at least one second attachment element (14) for attaching the second section (8) to the reinforcement element (2) of the lever (1).

3. The opening blocking system according to claim 2, **characterised in that** the at least one first attachment element (13) is arranged at the end farthest away from the first section (7) with respect to the break area (9).

4. The opening blocking system according to any of claims 2 or 3, **characterised in that** the at least one second attachment element (14) is arranged at the end farthest away from the second section (8) with respect to the break area (9).

5. The opening blocking system according to any of claims 2 to 4, **characterised in that** the first section (7) comprises an articulation segment (11) arranged

between the at least one first attachment element (13) and the projection (10), wherein the articulation segment (11) is configured for causing an articulation of the first section (7) of the device (6) around the articulation segment (11) thereof when the break area (9) breaks. 5

6. The opening blocking system according to claim 5, **characterised in that** the articulation segment (11) is a weakened area. 10
7. The opening blocking system according to any of claims 5 or 6, **characterised in that** the articulation segment (11) is arranged in a vertex of the first section (7). 15
8. The opening blocking system according to any of claims 5 to 7, **characterised in that** the articulation segment (11) is located close to the at least one first attachment element (13). 20
9. The opening blocking system according to any of the preceding claims, **characterised in that** the projection (10) is located close to the break area (9). 25
10. The opening blocking system according to claim 9, **characterised in that** the projection (10) comprises a contact surface (15), wherein said contact surface (15) is substantially perpendicular to the actuation path of the actuation cam (5), with the first section (7) being in the blocking position. 30
11. The opening blocking system according to any of the preceding claims, **characterised in that** the blocking device (6) is made from a plastic material. 35
12. The opening blocking system according to any of the preceding claims, **characterised in that** it comprises a substantially longitudinal geometry. 40
13. A vehicle door, **characterised in that** it comprises an opening blocking system according to any of claims 1 to 12. 45
14. The vehicle door according to claim 13, **characterised in that** the blocking device (6) is arranged between the reinforcement element (2) of the lever (1) and a lock (3) of the vehicle door. 50

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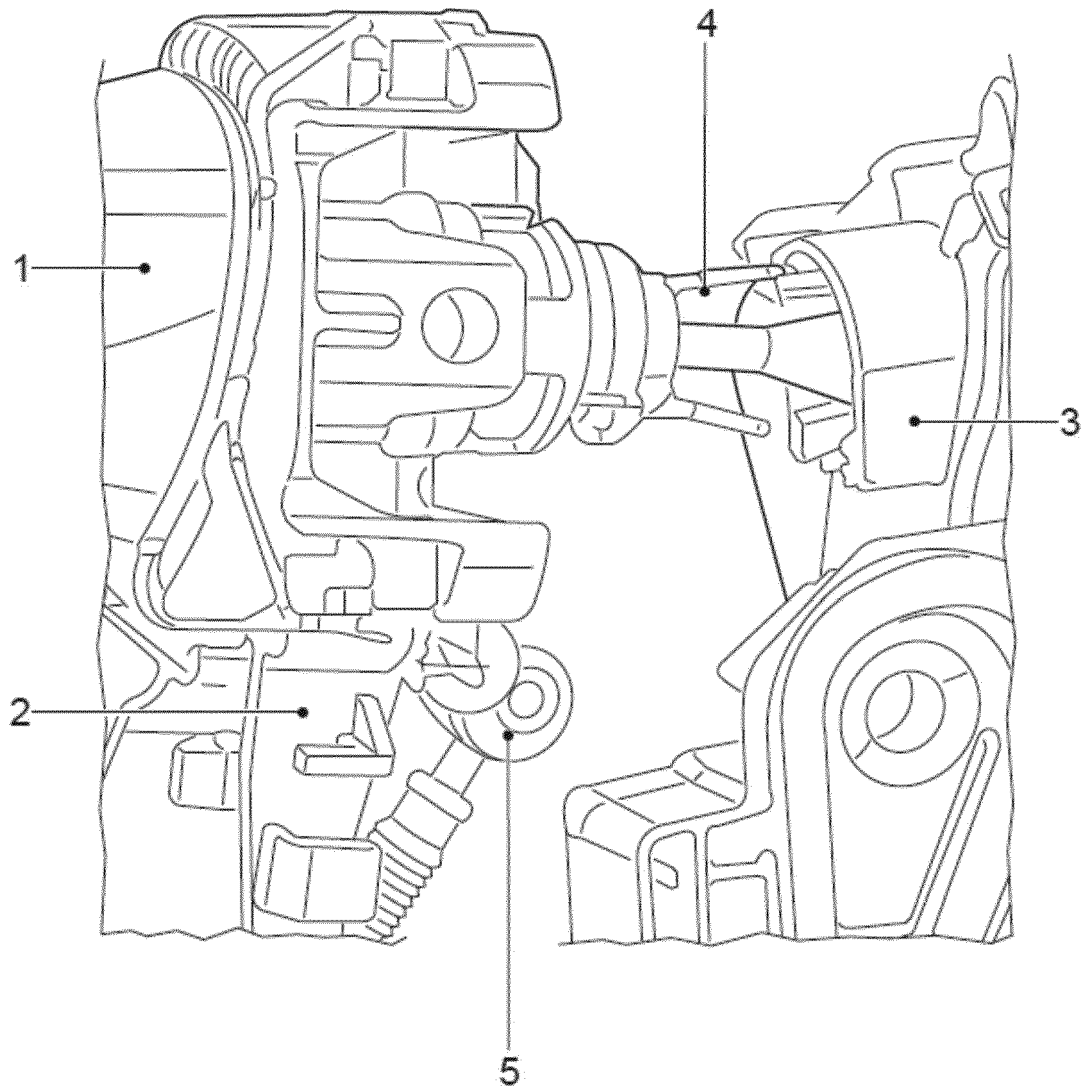


FIG. 1

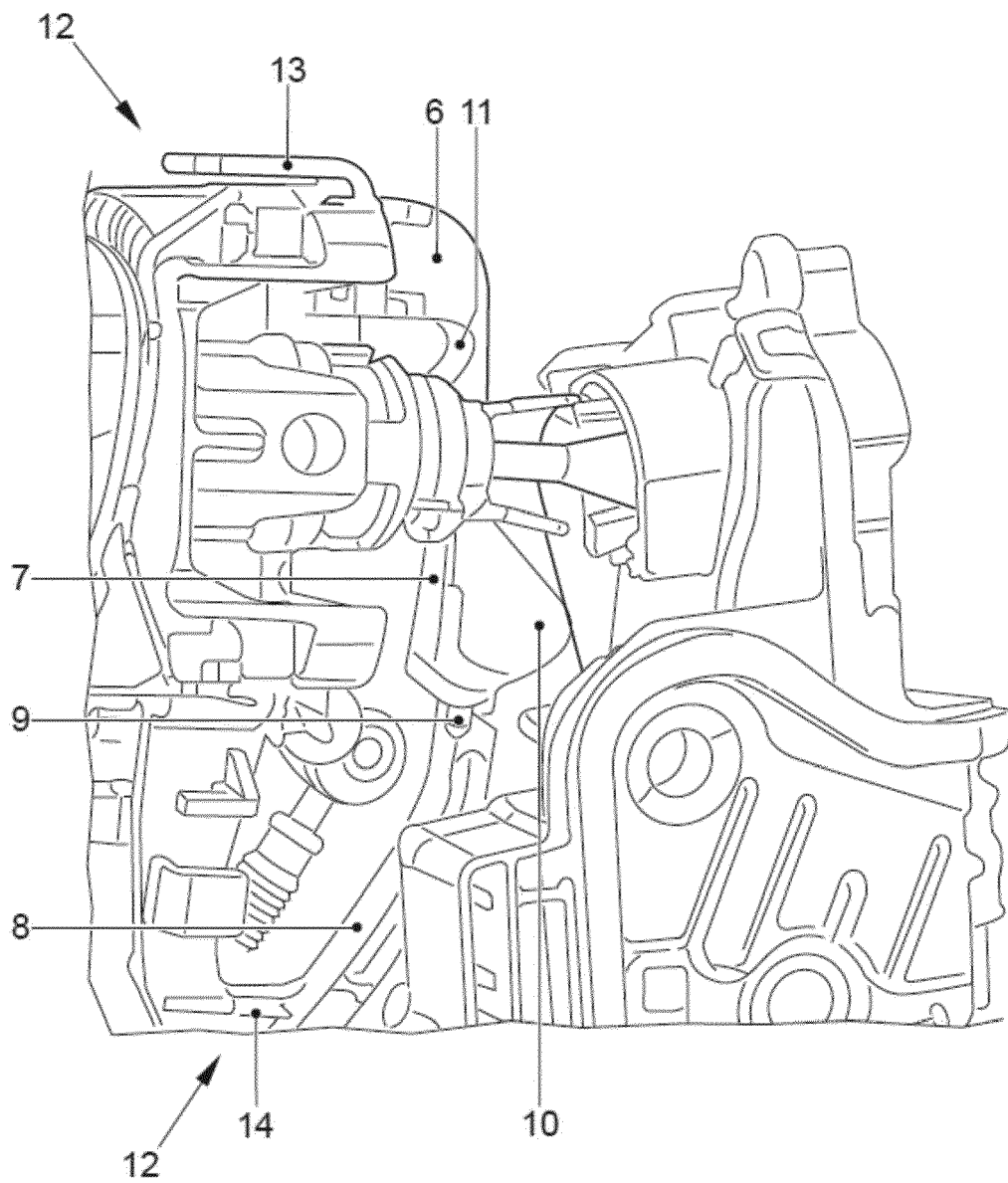


FIG. 2

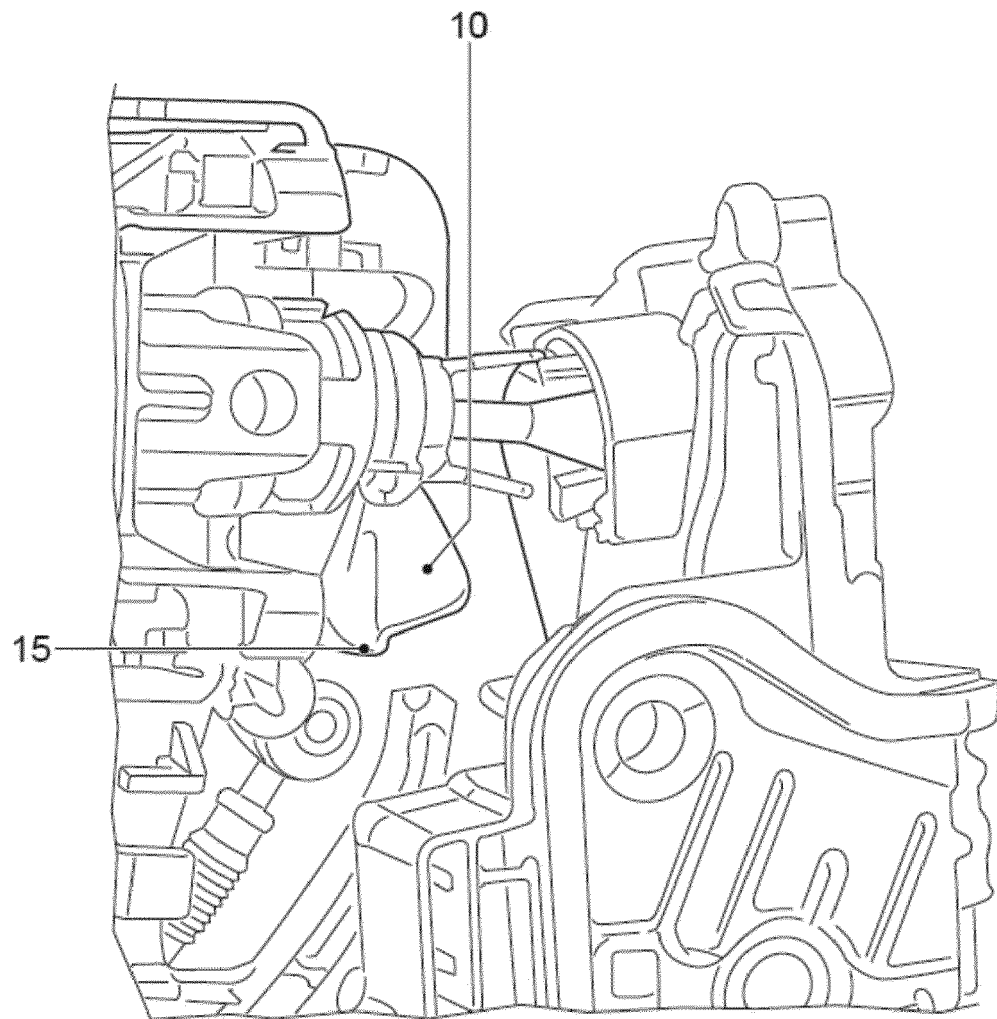


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
EP 20 38 2830

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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	DE 10 2016 223505 A1 (VOLKSWAGEN AG [DE]) 30 May 2018 (2018-05-30) * paragraphs [0021] - [0034]; figures 1-4 *	1-14	INV. E05B17/00 E05B77/04 E05B85/10
X	DE 10 2008 062214 A1 (PORSCHE AG [DE]) 8 July 2010 (2010-07-08) * the whole document *	1-14	
A	US 8 727 399 B2 (RUSSELL STEPHEN [US]; MAMPE CHRISTOPHER [US] ET AL.) 20 May 2014 (2014-05-20) * the whole document *	1-14	
A	KR 2004 0022280 A (HYUNDAI MOTOR CO LTD) 12 March 2004 (2004-03-12) * the whole document *	1-14	
			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 3 February 2021	Examiner Cruyplant, Lieve
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EPO FORM 1503 03.82 (P04C01)

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

EP 20 38 2830

5 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
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03-02-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102016223505 A1	30-05-2018	NONE	
DE 102008062214 A1	08-07-2010	CN 201581695 U DE 102008062214 A1	15-09-2010 08-07-2010
US 8727399 B2	20-05-2014	CA 2778116 A1 CN 102656035 A EP 2493713 A1 JP 2013508590 A US 2011095546 A1 WO 2011053407 A1	05-05-2011 05-09-2012 05-09-2012 07-03-2013 28-04-2011 05-05-2011
KR 20040022280 A	12-03-2004	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 102016223505 A1 [0007]