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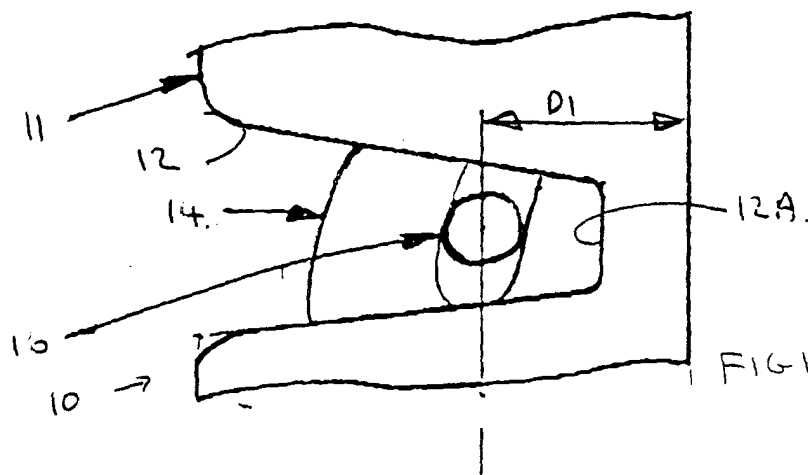
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(54) **Latch mechanism**

(57) A latch mechanism (10) being lockable and having a latch bolt (14) for engagement with a striker (16), the bolt having at least an open condition for releasing the striker and a closed condition for retaining

the striker, the latch mechanism also having an impact over travel closed condition in which a detection means is capable of detecting the impact over travel closed condition of the latch mechanism and then effecting locking of the latch mechanism.



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Description

[0001] The present invention relates to latch assemblies and in particular latch assemblies for releasably securing vehicle doors such as car doors in a closed position.

[0002] When known latch assemblies are used on car doors, and the car has subsequently been involved in a road accident where the door has been deformed, the very act of deforming the door has been known to cause the latch assembly to unlatch and allow the door to open.

[0003] It is generally recognised that passengers within a vehicle which is involved in an accident are safer if they remain inside the vehicle. Thus an open door allows a passenger to fall out increasing the chance of injury. Furthermore the structural rigidity of a passenger cell of a vehicle is enhanced if all doors remain shut.

[0004] It is an object of the present invention to provide a latch assembly which is less likely to unlatch during an accident.

[0005] Thus according to the present invention there is provided a latch mechanism being lockable and having a latch bolt for engagement with a striker, the bolt having at least an open condition for releasing the striker and a closed condition for retaining the striker, the latch mechanism also having an impact over travel closed condition in which a detection means is capable of detecting the impact over travel closed condition of the latch mechanism and then effecting locking of the latch mechanism.

[0006] The invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Figures 1, 2 and 3 are successive views of a latch mechanism according to the present invention shown in a closed position, a slam over travel position and a impact over travel position respectively; and

Figures 4 and 5 are views equivalent to figures 1 and 3 with the retention plate of the latch mechanism removed for clarity.

[0007] With reference to the drawings there is shown a latch mechanism 10 mounted on a car door (not shown) the latch mechanism includes a retention plate 11 having a mouth 12 with a mouth end 12A. Pivotaly mounted via pivot 15 situated on the retention plate 11, is a latch bolt in the form of a rotating claw 14.

[0008] Claw 14 can be retained in a closed position as shown in figures 1 and 4 by a pawl (not shown) thus securing a striker 16 which is mounted on fixed structure of a vehicle, such as a B post or C post of a car.

[0009] Actuation of the pawl allows the claw to rotate anticlockwise when viewing figures 1 and 4 thus releasing the striker and allowing the door to open.

[0010] Typically the door includes weather seals which are compressed when the door is in the closed position to exclude rain water, dirt and the like from the interior of the vehicle.

[0011] When the door is slammed shut it momentarily travels past its closed position to a slam over travel position as shown in figure 2 causing the bolt to rotate to its slam over travel position. Under these circumstances the pawl engages with the claw and the weather seals return the door to its closed position (note that slam datum distance D2, showing the relative position of the door and striker, is smaller than datum distance D1).

[0012] Depending on how hard the door is slammed depends upon how much the door over travels its closed position, but there is a slam limit beyond which the door cannot pass simply by slamming alone.

[0013] However in the event of a side impact on the door, the forces involved are far greater than those associated with heavy slamming and the door achieves a impact over travel position as best shown in Figure 3 which in this case is when the striker 16 contacts mouth end 12A of the retention plate (note impact datum distance D3 is smaller than slam datum distance D1).

[0014] Thus when the door is in its impact over travel position the latch is similarly in its impact over travel position and the claw is similarly in its impact over travel position.

[0015] The latch mechanism 10 is electrically lockable via central door locking system.

[0016] The latch mechanism further includes detection means in the form of a switch 18 (see figures 4 and 5). The switch engages a cam surface 20 of the claw 14. The cam surface includes an impact over travel portion 24 and a door ajar portion 26 between which is situated a door closed portion 22.

[0017] With the claw in its open position the switch 18 engages a door ajar portion 26 putting the switch into condition 1. Normal slamming of the door causes the claw to rotate initially to the position shown in figure 2 and then spring back to the position shown in figures 1 and 4 whereby the switch achieves condition zero. Even when the door is in its slam over travel position the switch 18 does not contact the impact over travel portion 24 of the cam surface 20 and thus does not go into condition 1.

[0018] Under crash conditions when the door achieves an impact over travel condition the claw 14 moves to the position as shown in figure 5 putting the switch into condition zero. This change of condition of the switch provides a

signal such that the control system of the central door locking system effects locking of the latch mechanism via the central door locking system.

[0019] Depending on the particular installation, the control system may effect locking of some or all other doors of the central door locking system.

[0020] It should be noted that normal opening of the door changes the condition of switch 18 from 0 to 1 but this change of condition only occurs following opening of the inside door release handle or the outside door release handle. Thus by providing the inside and outside door release handles with their own detection means, such as switches, it is possible to ensure that the latch mechanism does not attempt to lock when the door is being opened.

[0021] Table 1 shows the various permutations of switch conditions.

[0022] With all the switches in their zero condition, the door is closed and latched.

[0023] When the door is opened by the inside handle, the inside handle switch and ajar switch both change to condition 1 whilst the door is being opened. Under these circumstances a short time delay of say half a second or one second is built into the system which prevents the door locking. This time delay allows the claw to move from its closed position to its open position and the latch mechanism is arranged such that it cannot lock with the claw in the open position. Thus when the inside handle is released, the ajar switch remains at condition 1 whilst the inside handle switch returns to condition zero (the outside handle having remained at condition zero) but the claw is in its open position thus preventing locking of the door.

[0024] A similar sequence of events occurs when the door is opened by the outside door handle.

[0025] It is only when the ajar switch achieves condition 1 whilst the inside and outside door handles remain in condition zero and the door is closed that locking of the door is triggered, since this is the set of circumstances that indicates that side impact is occurring.

[0026] It is also possible to arrange for the central door locking control system to not lock the door or doors under certain circumstances such as when the ignition switch is off (and the vehicle is therefore stationary).

[0027] It should be noted that the invention is not limited to latch bolts in the form of rotating claws.

[0028] It should also be noted that a car door can be locked whereby operation of an outside door handle does not open the latch, or whereby operation of an inside door handle does not operate the latch (also known as a child safety condition) or the door can be locked such that operation of either the outside or inside door handle does not operate the latch (known as a super locked or dead locked condition) and the present invention is applicable to all these types of locking.

[0029] Furthermore locking can be effected by providing a break between a door handle and the claw such that the door handle 'free wheels' without opening the latch, or locking can be provided by creating a block between the door handle and claw such that the block prevents movement of the door handle and the present invention is applicable to 'break' or 'block' type locking.

Table 1

Event	Ajar switch condition	Inside Handle Switch Condition	Outside Handle Switch Condition	Result
Crash	1	0	0	Door locks
Open inside handle	1	1	0	Claw moves to open position
Open outside handle	1	0	1	Claw moves to open position
Door closed	0	0	0	No change

Claims

1. A latch mechanism being lockable and having a latch bolt for engagement with a striker, the bolt having at least an open condition for releasing the striker and a closed condition for retaining the striker, the latch mechanism also having an impact over travel closed condition in which a detection means is capable of detecting the impact over travel closed condition of the latch mechanism and then effecting locking of the latch mechanism.

2. A latch mechanism as defined in claim 1 in which the detection means is capable of detecting an impact over travel closed condition of the latch bolt.

3. A latch mechanism as defined in claim 1 or 2 in which the detection means is also capable of detecting a door ajar

condition of the latch mechanism.

4. A latch mechanism as defined in claim 3 in which following a pre determined event, actuation of the detection means does not effect locking of the latch mechanism.

5. A latch mechanism as defined in claim 4 in which the pre determined event is the ignition of an associated vehicle remaining in an off condition or the latch bolt being in an open condition.

6. A latch mechanism as defined in 4 in which the pre determined event is the duration of a pre determined time delay following actuation of an inside or outside handle of an associated vehicle door

7. A latch mechanism as defined in any preceding claim in which the detection means act directly on a cam surface of the bolt.

8. A latch mechanism as defined in any preceding claim in which the detection means is a switch.

9. A latch mechanism as defined in any preceding claim in which locking is effected by the control system of a central door locking system.

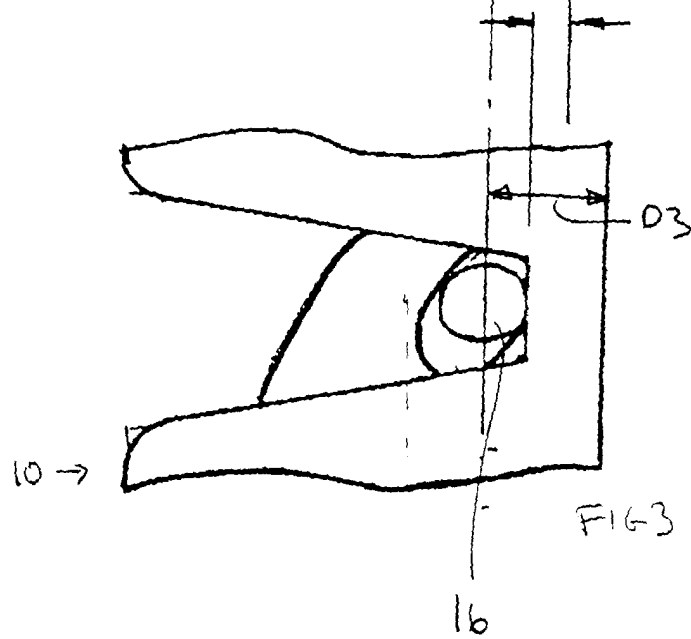
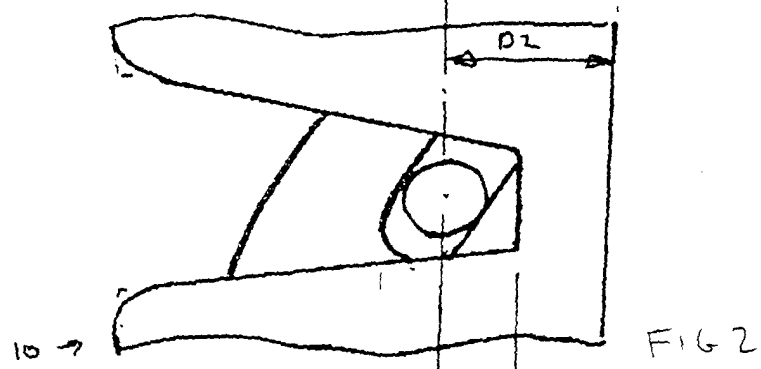
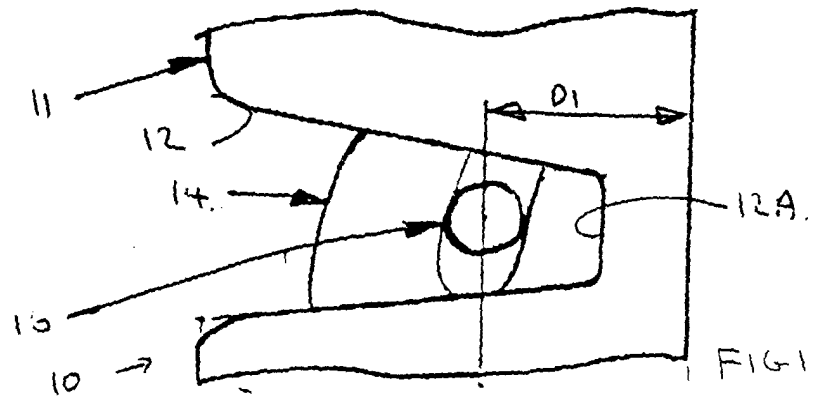
10. A vehicle including a central door locking system operable to lock a plurality of latches, at least one of the latches being as defined in any preceding claim, in which detection of the impact over travel closed condition of the latch mechanism effects locking of at least two of the plurality of latches.

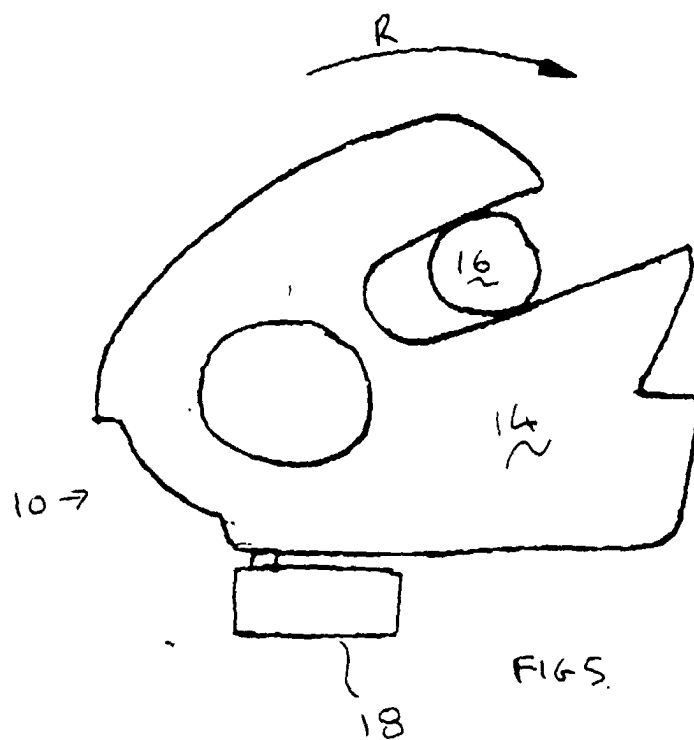
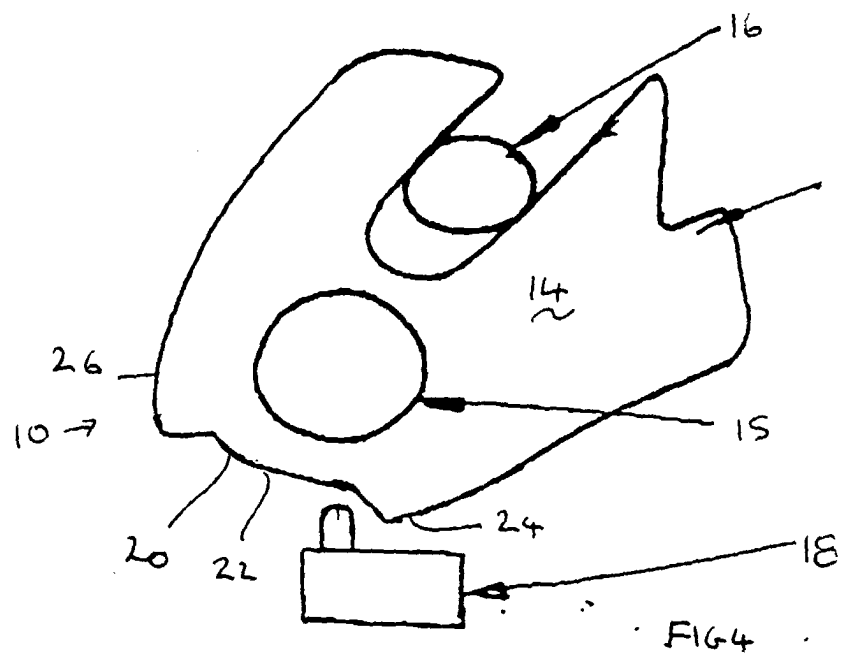
11. A latch mechanism as defined in any one of claims 1 to 9 or a vehicle as defined in claim 10 in which the locking is effected electrically.

12. A vehicle including a door, the door having an associated latch mechanism being lockable, the door having at least an open condition and a closed condition, the door also having an impact over travel closed condition in which a detection means is capable of detecting the impact over travel closed condition of the door and then effecting locking of the latch mechanism.

13. A vehicle including a door being securable in a closed position by a lockable latch mechanism having a latch bolt for engagement with a striker, the latch bolt having at least an open condition for releasing the striker, and a closed position for retaining the striker, in which the vehicle has first means (18,24) for detecting abnormal loadings applied to the vehicle, such as occurs during a road traffic accident, and second means for locking the latch mechanism.

14. A vehicle as defined in claim 13 in which the first means are situated in the door.







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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 5754

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 195 11 651 A (VOLKSWAGEN AG) 19 October 1995 (1995-10-19)	1,12-14	E05B65/12
A	* column 2, line 25 - column 2, line 43; figures *	10	

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A	* column 3, line 46 - column 4, line 50; figures *	10	

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E05B
Place of search		Date of completion of the search	Examiner
MUNICH		21 November 2000	Vacca, R
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
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EP 00 30 5754

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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