



## Description

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

**[0002]** When known latch arrangements 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 arrangement 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.

**[0004]** 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.

**[0005]** It is an object of the present invention to provide a latch arrangement which is less likely to unlatch during an accident.

**[0006]** Thus according to the present invention there is provided a latch arrangement including a latch bolt connected to release means by a transmission path, normal actuation of the release means causing unlatching of the latch arrangement, the transmission path being adapted such that abnormal initial deformation of part of the transmission path causes a break in the transmission path such that further abnormal deformation of that part of the latch arrangement on the release means side of the break does not release the latch.

**[0007]** According to a further aspect of the present invention there is provided a latch arrangement including a latch bolt connected to release means by a transmission path, normal actuation of the release means causing unlatching of the latch arrangement, the transmission path being adapted such that abnormal initial deformation of part of the transmission path causes a block in the transmission path such that further abnormal deformation of that part of the latch arrangement on the release means side of block does not release the latch.

**[0008]** The invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a view of various components of a latch arrangement according to the present invention;

Figure 2 is a view similar to figure 1 showing part of the latch arrangement in an abnormally deformed position;

Figure 3 is a view of various components of a second embodiment of a latch arrangement according to the present invention;

Figure 4 is a view taken in the direction of arrow A

of figure 3; and

Figure 5 is a view similar to figure 4 including a door and with some of the components of the latch arrangement shown in an abnormally deformed position.

**[0009]** With reference to figures 1 and 2 there is shown a latch arrangement 10 for use with a car side door the latch arrangement 10 including a latch mechanism 12 (only part of which is shown), a transmission path 14 and a release means in the form of an inside door handle 16 (shown schematically).

**[0010]** Typically the door would be hinged at a front edge, though in further embodiments this need not be the case.

**[0011]** The latch mechanism 12 includes a housing 18 on which is pivoted latch mechanism inside release lever 20

**[0012]** The housing 18 further includes a latch bolt (not shown) for engagement with a striker pin secured to fixed structure of the car such as a B post or a C post. The latch bolt is retained in a close position by a pawl (not shown), thus allowing the latch arrangement to secure the door in a closed position. The pawl is operably connected to the latch mechanism inside release lever 20 via transmission elements (not shown) of the transmission path 14.

**[0013]** A rod 22 is pivotally connected at end 22A via pivot 24 to inside door handle 16.

**[0014]** At end 22B, the rod 22 is bent at 90° and includes first abutment 26, second abutment 28 and third abutment 30 all being provided on the bent portion of the rod 22. End 22B passes through a hole in latch mechanism inside release lever 20.

**[0015]** A resilient means in the form of a spring 32 is mounted on end 22B and abuts third abutment 30 and the edge of the hole in the latch mechanism inside release lever 20.

**[0016]** When installed, the spring 32 is under compression such that second abutment 28 is biased into engagement with latch mechanism inside release lever 20 as shown in figure 1.

**[0017]** The latch mechanism 12 can be locked and unlocked by actuation of lock lever 34. When lock lever 34 is in position U, as shown in figure 1, the latch mechanism 12 is unlocked and when lock lever 34 is in position L, as shown in figure 1, the latch mechanism is locked. Locking can be effected by lock lever 34 providing a break in the transmission path whereby operation of inside door handle 16 is possible but has no effect or by lock lever 34 providing a block in the transmission path whereby operation of inside door handle 16 is prevented thus similarly leaving the door in a locked condition.

**[0018]** Normal operation of inside door handle 16, when the latch mechanism is unlocked causes movement of rod 22 in the direction of arrow B resulting in unlatching of the latch mechanism.

**[0019]** It should be noted that transmission elements of the transmission path include rod 22, inside release lever 20, the pawl and the blocking or breaking element (not shown) connected to lock lever 34. It is the various elements of the transmission path which connect the inside door handle ultimately to the latch bolt.

**[0020]** The latch assembly 10 is contained within a door 50, having a door outer skin 51. Connected to an inner portion of the door skin 51 is a deformation abutment 52. In this case deformation 52 is solely provided for transmitting an impact on the door skin 51 to the transmission path. However, in further embodiment the deformation abutment can form part of further components, for example, window regulator rails.

**[0021]** In the event of a side impact on the door 50 by say another vehicle, the door skin is deformed inwardly causing the deformation abutment to also move inwardly and initially contact the rod 22, following which a spring 32 is compressed allowing first abutment 26 to move lock lever 34 from the unlocked position U to the locked position L thus locking the door (see figure 2).

**[0022]** Any subsequent deformation of the latch arrangement, in particular deformation of the rod 22 which puts the rod into tension and thus potentially causes rotation of the latch mechanism inside release lever 20 will not unlatch the door since the initial deformation put the door into a locked condition. It can be seen that the initial deformation which puts the latch mechanism into a locked condition is allowed for by resilient deformation of spring 32.

**[0023]** It should be noted from figures 1 and 2 that a contact abutment 52 is located proximal end 22b of rod 22, ie proximal the latch mechanism 12.

**[0024]** With reference to figures 3 to 5 there is shown a second embodiment of a latch arrangement which includes a latch mechanism 112, a transmission path 114, a housing 118, a latch mechanism inside release lever 120, a rod 122 and a spring 132. The latch mechanism further includes a release lever 140 operably situated between the latch mechanism inside release lever 120 and the pawl (not shown). Release lever 140 is pivotally mounted about pivot 142 and includes a tab 144. The latch arrangement 110 is mounted within a door 146 which defines a door plane D.P. Normal operation of the latch arrangement causes rod 122 to move in the direction of arrow C within a movement plane M.P which is generally parallel to the door plane D.P.

**[0025]** During a side impact on the door, initial deformation causes the latch mechanism inside release lever 120 and the rod 122 to move in the direction of arrow E of figure 5 causing the spring 132 to compress. This results in end 122A becoming misaligned with tab 144 and thus any subsequent deformation which would cause the rod 122 to go into tension would cause latch mechanism inside release lever 20 to rotate about pivot 148 in the direction of arrow R of figure 1. However since end 122A is misaligned with tab 144 the latch mechanism is not caused to unlatch. This misalignment of end

122A and tab 144 provides a break in the transmission path thus locking the door from the inside of the vehicle.

**[0026]** The invention is not limited to use with a transmission path connecting a latch bolt with an inside handle of a door, in particular the invention could be used in conjunction with an outside door handle of a vehicle.

**[0027]** Furthermore, when the latch arrangement includes a first transmission path between the latch bolt and an inside door handle and a second transmission path between the latch bolt and outside door handle, initial deformation of the latch arrangement could be arranged to cause a first break or block in the in the first transmission path and a second break or block in the second transmission path.

**[0028]** When part of the first transmission path is common with a part of the second transmission path, the break or block could be provided in the common part of the transmission path thus only requiring one block or break to secure the door from opening.

**[0029]** It should be noted that the invention is not limited to latch bolts in the form of rotating claws.

**[0030]** 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 super locked or dead locked condition) and the present invention is applicable to all these types of locking.

**[0031]** 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. The lock lever 34 can either provide such a break or block directly or can act on further levers or the like which themselves provide the break or block.

## Claims

1. A latch arrangement including a latch bolt connected to release means by a transmission path, normal actuation of the release means causing unlatching of the latch arrangement, the transmission path being adapted such that abnormal initial deformation of part of the transmission path causes a break in the transmission path such that further abnormal deformation of that part of the latch arrangement on the release means side of the break does not release the latch.
2. A latch arrangement including a latch bolt connected to release means by a transmission path, normal actuation of the release means causing unlatching

of the latch arrangement, the transmission path being adapted such that abnormal initial deformation of part of the transmission path causes a block in the transmission path such that further abnormal deformation of that part of the latch arrangement on the release means side of block does not release the latch.

3. A latch arrangement as defined in claim 1 or 2 in which the latch arrangement is lockable by provision of a normal break or normal block in the transmission path and the initial deformation causes locking via the normal break or normal block.

4. A latch arrangement as defined in claim 3 which is normally lockable via movement of a lock element from an unlocked position to a locked position, abnormal initial deformation of the latch arrangement causing a transmission element of the transmission path to move the lock element to its locked position.

5. A latch arrangement as defined in claim 4 in which the abnormal movement of the transmission element is allowed for by at least resilient movement of a resilient means.

6. A latch arrangement as defined in claim 5 in which the transmission element is a rod.

7. A latch arrangement as defined in claim 6 in which the rod is connected between a latch mechanism including the latch bolt and a handle of a door.

8. A latch arrangement as defined in any preceding claim in which the transmission path includes a plurality of transmission elements in which the break is provided for by misalignment of adjacent transmission elements.

9. A latch arrangement as defined in claim 8 in which the misalignment movement is allowed for by at least resilient movement of a resilient means.

10. A latch arrangement as defined in claim 9 in which one of the adjacent transmission elements is a transmission lever directly connected at a first end of a rod, a second end of the rod being connected to a handle of a door.

11. A latch arrangement as defined in any preceding claim further including a further release means connected to the latch bolt by a further transmission path, normal actuation of the further release means causing unlatching of the latch arrangement, the further transmission path being adapted such that abnormal initial deformation of part of the further transmission path causes a break or block in the further transmission path such that said further ab-

normal deformation of that part of the latch arrangement on the further release means side of the further break or block does not release the latch.

12. A latch arrangement as defined in claim 11 in which the transmission path and further transmission path have a common portion and the block or break is operably situated within the common portion.

13. A door defining a door plane, the door including a latch arrangement as defined in any preceding claim in which a transmission element of the transmission path normally moves in a movement plane substantially parallel to the door plane, abnormal deformation of the latch arrangement being capable of causing the transmission element to move out of its movement plane.

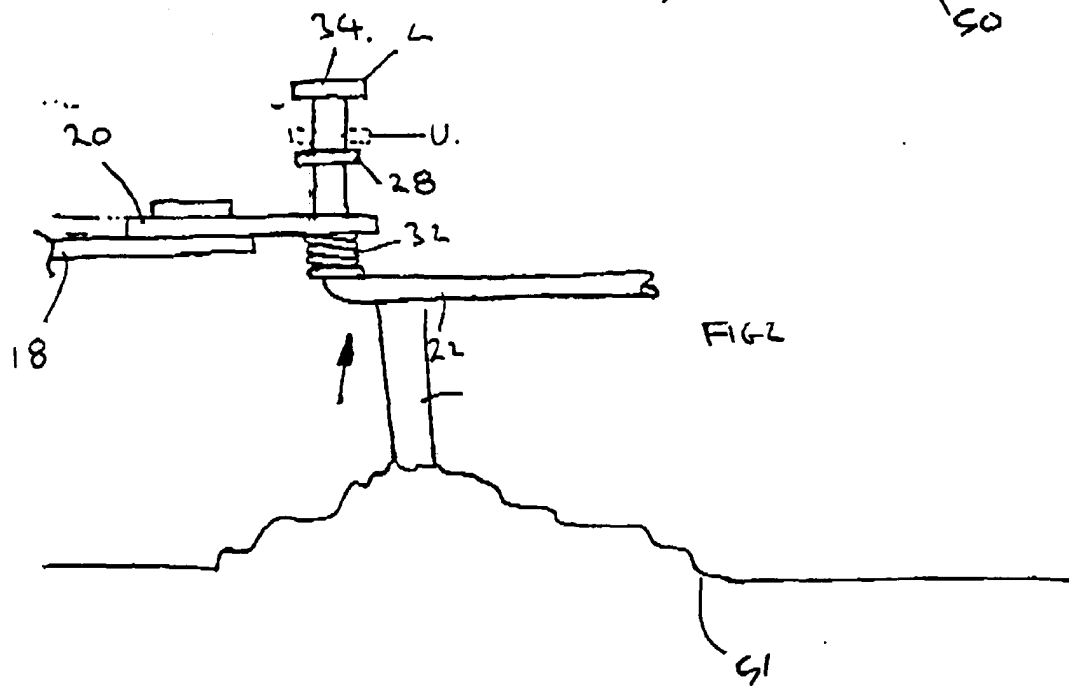
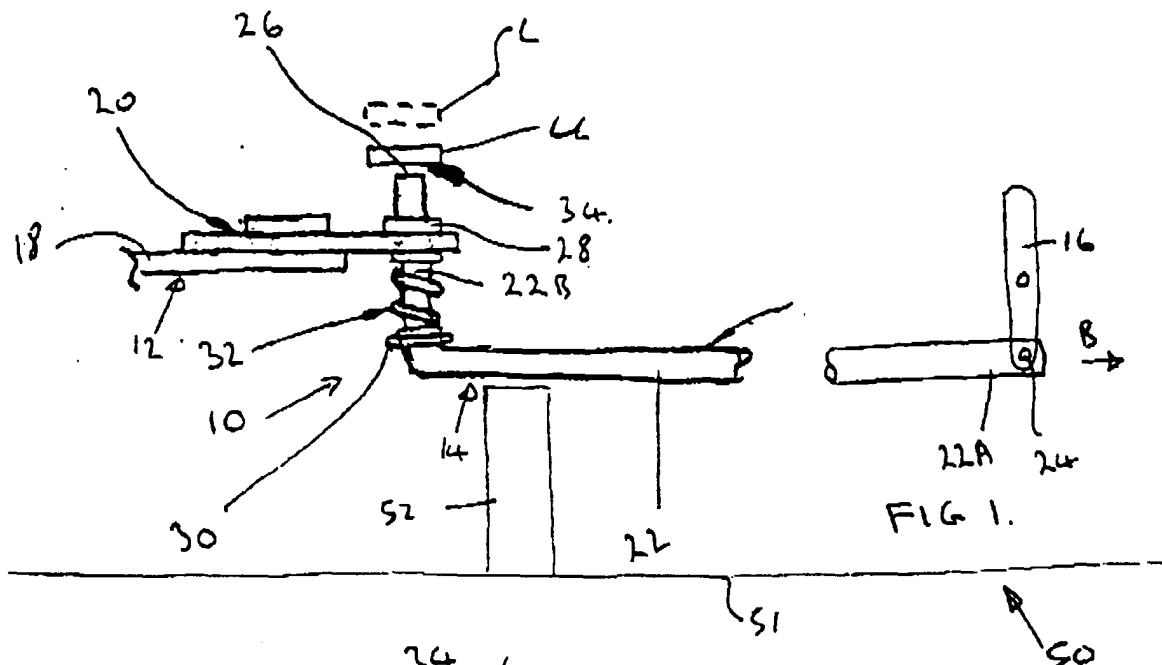
14. A vehicle including a door being securable in a closed position by a lockable latch arrangement having a latch bolt for engagement with a striker, the latch bolt having at least an open condition for releasing the striker, and a closed condition for retaining the striker, in which the vehicle has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

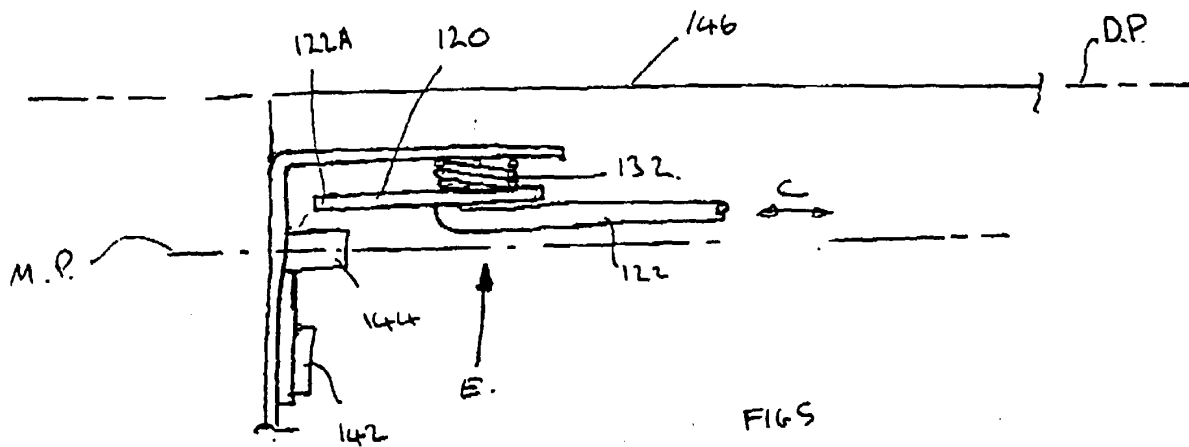
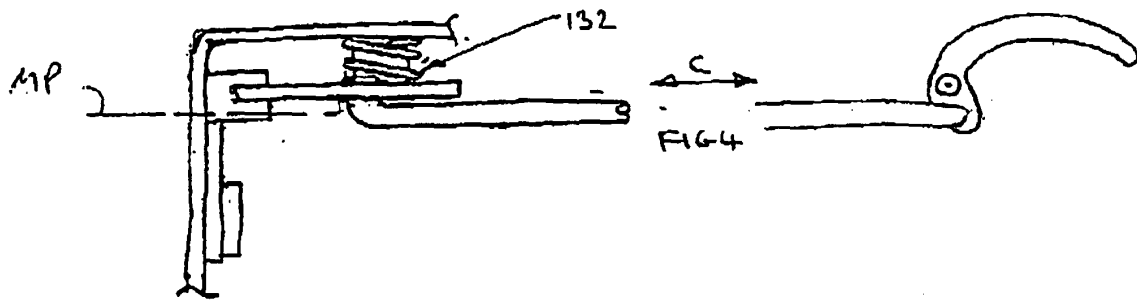
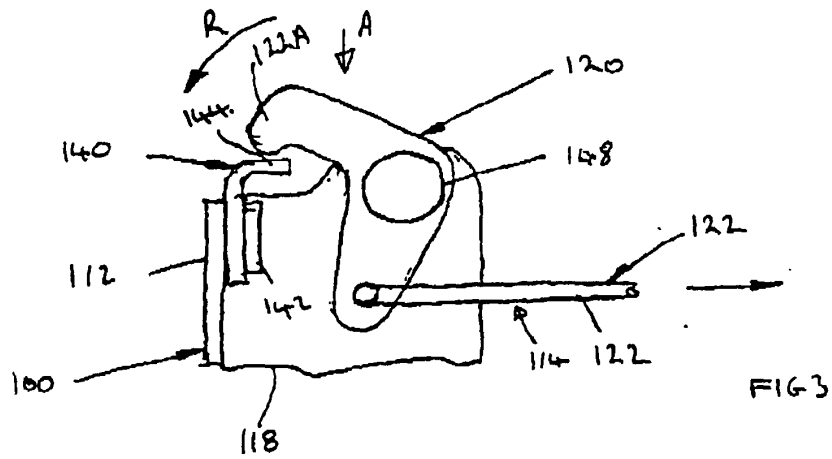
15. A vehicle as defined in claim 14 in which the first means are situated in the door.

16. A latch arrangement as defined at any one of claims 1 to 12 for inclusion in a side door of a car.

17. A door as defined in Claim 13 in which the door is a side door of a car.

18. A vehicle as defined in Claim 14 or 15 in which the vehicle is a car and the door is a side door of the car.







European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 30 5756

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	US 4 995 654 A (MAZDA MOTOR CORPORATION) 26 February 1991 (1991-02-26)	1-4,6,7, 11,12, 14-18	E05B65/12
A	* column 6, line 48 - column 7, line 49; figures *	13	
X	EP 0 439 378 A (NISSAN MOTOR CO.,LTD.) 31 July 1991 (1991-07-31)	1-3,6,7, 14,15,18	
A	* column 3, line 22 - column 4, line 2; figures *	13,16,17	
X	US 4 382 622 A (AISIN SEIKI KABUSHIKI KAISHA) 10 May 1983 (1983-05-10)	14,15,18	
A	* column 3, line 46 - column 3, line 68; figures *	1-4,6,7, 13,16,17	
X	WO 95 32349 A (ATOMA INTERNATIONAL, INC.) 30 November 1995 (1995-11-30)	14,15,18	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	* page 14, line 25 - page 15, line 15; figures *	1,2,6,7, 13,16,17	
The present search report has been drawn up for all claims			E05B
Place of search		Date of completion of the search	Examiner
MUNICH		22 November 2000	Vacca, R
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p> <p>&amp; : member of the same patent family, corresponding document</p>			

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

EP 00 30 5756

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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22-11-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4995654 A	26-02-1991	JP 1896522 C	23-01-1995
		JP 2104879 A	17-04-1990
		JP 6004988 B	19-01-1994
EP 439378 A	31-07-1991	JP 3221681 A	30-09-1991
		DE 69102148 D	07-07-1994
		DE 69102148 T	05-01-1995
		US 5069493 A	03-12-1991
US 4382622 A	10-05-1983	JP 1327170 C	16-07-1986
		JP 55148877 A	19-11-1980
		JP 60055672 B	06-12-1985
		DE 3017890 A	20-11-1980
WO 9532349 A	30-11-1995	AU 2519495 A	18-12-1995
		CA 2168117 A	30-11-1995
		US 5584516 A	17-12-1996