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(54) **Latch arrangement**

Verriegelungsvorrichtung

Dispositif de verrouillage

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## 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]** US4995654 shows a latch arrangement which is normally lockable by operation of an internal sill button or an external key barrel arrangement. The lock mechanism includes various levers, one of which has an extension arm situated on the inside of the external door skin. Deformation inwardly of the door skin causes the extension arm to move the latch mechanism to its normal locked position.

**[0004]** It is generally recognised that passengers within a vehicle which is involved in an accident are safer if they remain inside the vehicle.

**[0005]** 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.

**[0006]** It is an object of the present invention to provide a latch arrangement which is less likely to unlatch during an accident.

**[0007]** Thus according to the present invention there is provided a latch arrangement as defined in claim 1. According to a further aspect of the present invention there is provided latch arrangement as defined in claim 9.

**[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 that 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 deflation 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 missaligned 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 missaligned 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 in-

cludes 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 (100) including a latch bolt connected to release means by a transmission path (114), normal actuation of the release means causing unlatching of the latch arrangement, **characterised in that** the transmission path (114) is 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, wherein the transmission path (114) includes a plurality of transmission elements (122, 122A, 144) in which the break is provided for by misalignment of adjacent transmission elements (122a, 144) which is allowed for by resilient movement of a resilient means (132).
2. A latch arrangement as defined in Claim 1 in which the latch arrangement is lockable by provision of a normal break in the transmission path and the initial deformation causes locking via the normal break.

3. A latch arrangement as defined in Claim 2 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.
4. A latch arrangement as defined in any preceding claim in which the transmission element is a rod (122).
5. A latch arrangement as defined in Claim 4 in which the rod is connected between a latch mechanism (112) including the latch bolt and a handle of a door.
6. A latch arrangement as defined in any preceding Claim in which one of the adjacent transmission elements is a transmission lever (140) directly connected at a first end of a rod (122), a second end of the rod being connected to a handle of a door.
7. 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 further break in the further transmission path such that said further abnormal deformation of that part of the latch arrangement on the further release means side of the further break does not release the latch.
8. A latch arrangement as defined in Claim 7 in which the transmission path and further transmission path have a common portion and the break is operably situated within the common portion.
9. A latch arrangement (10) including a latch bolt connected to release means by a transmission path (14), 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 or a block in the transmission path such that further abnormal deformation of that part of the latch arrangement on the release means side of the break or the block does not release the latch, the latch arrangement being normally lockable via movement of a lock element (34) from an unlocked position to a locked position, so as to provide a normal break or normal block in the transmission path, said abnormal initial deformation causing locking via the normal break or normal block by causing a transmission element of the transmission path (14) to move the lock element (34) to its locked position and wherein the abnormal movement of the trans-

mission element is allowed for by resilient movement of a resilient means (32).

10. A door (50) defining a door plane (146), the door including a latch arrangement (10; 1 10) 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.
11. A latch arrangement as defined at any one of Claims 1 to 9 for inclusion in a side door of a car.
12. A door as defined in Claim 10 in which the door is a side door of a car.

## 20 Patentansprüche

1. Schließanordnung (100) mit einem Schließbolzen, der durch einen Übertragungsweg (114) mit einer Entriegelungseinrichtung verbunden ist, wobei eine normale Betätigung der Entriegelungseinrichtung das Entriegeln der Schließanordnung bewirkt, **dadurch gekennzeichnet, dass** der Übertragungsweg (114) so ausgelegt ist, dass eine abnormale Anfangsverformung eines Teils des Übertragungswegs zu einer Unterbrechung in dem Übertragungsweg führt dergestalt, dass eine weitere abnormale Verformung jenes Teils der Schließanordnung auf der Seite der Unterbrechung, wo sich die Entriegelungseinrichtung befindet, das Schloss nicht entriegelt, wobei der Übertragungsweg (114) mehrere Übertragungselemente (122, 122A, 144) umfasst, bei denen die Unterbrechung durch einen Versatz benachbarter Übertragungselemente (122A, 144) möglich wird, den eine elastische Bewegung einer elastischen Einrichtung (132) zulässt.
2. Schließanordnung nach Anspruch 1, bei der die Schließanordnung verriegelbar ist durch Bereitstellung einer normalen Unterbrechung in dem Übertragungsweg und die Anfangsverformung eine Verriegelung über die normale Unterbrechung bewirkt.
3. Schließanordnung nach Anspruch 2, die normalerweise verriegelbar ist durch die Bewegung eines Verriegelungselements von einer entriegelten Position in eine verriegelte Position, wobei eine abnormale Anfangsverformung der Schließanordnung bewirkt, dass ein Übertragungselement des Übertragungsweges das Verriegelungselement in seine verriegelte Position bewegt.
4. Schließanordnung nach einem der vorhergehenden

den Ansprüche, bei der das Übertragungselement eine Stange (122) ist.

5. Schließanordnung nach Anspruch 4, bei der die Stange zwischen einem Schließmechanismus (112) mit dem Schließbolzen und einem Handgriff einer Tür angeordnet ist. 5
6. Schließanordnung nach einem der vorhergehenden Ansprüche, bei der eines der benachbarten Übertragungselemente ein Übertragungshebel (140) ist, der direkt mit einem ersten Ende einer Stange (122) verbunden ist, wobei ein zweites Ende der Stange mit einem Handgriff einer Tür verbunden ist. 10 15
7. Schließanordnung nach einem der vorhergehenden Ansprüche, die ferner eine weitere Entriegelungseinrichtung umfasst, die mit dem Schließbolzen durch einen weiteren Übertragungsweg verbunden ist, wobei die normale Betätigung der weiteren Entriegelungseinrichtung bewirkt, dass die Schließanordnung entriegelt wird, wobei der weitere Übertragungsweg so ausgelegt ist, dass eine abnormale Anfangsverformung eines Teils des weiteren Übertragungswegs eine weitere Unterbrechung in dem weiteren Übertragungsweg bewirkt, so dass die weitere abnormale Verformung jenes Teils der Schließanordnung auf der Seite der weiteren Unterbrechung, wo sich die weitere Entriegelungseinrichtung befindet, das Schloss nicht entriegelt. 20 25 30
8. Schließanordnung nach Anspruch 7, bei welcher der Übertragungsweg und der weitere Übertragungsweg einen gemeinsamen Abschnitt haben und die Unterbrechung funktionsmäßig innerhalb des gemeinsamen Abschnitts liegt. 35
9. Schließanordnung (10) mit einem Schließbolzen, der durch einen Übertragungsweg (14) mit einer Entriegelungseinrichtung verbunden ist, wobei die normale Betätigung der Entriegelungseinrichtung bewirkt, dass die Schließanordnung entriegelt wird, wobei der Übertragungsweg so ausgelegt ist, dass eine abnormale Anfangsverformung eines Teils des Übertragungswegs eine Unterbrechung bzw. Blockierung in dem Übertragungsweg bewirkt, so dass eine weitere abnormale Verformung jenes Teils der Schließanordnung auf der Seite der Unterbrechung oder Blockierung, wo sich die Entriegelungseinrichtung befindet, das Schloss nicht entriegelt, wobei die Schließanordnung normalerweise über die Bewegung eines Verriegelungselements (34) von einer entriegelten Position in eine verriegelte Position verriegelbar ist, um eine normale Unterbrechung bzw. normale Blockierung in dem Übertragungsweg bereitzustellen, wobei die abnormale Anfangsverformung über die normale Unterbrechung bzw. nor-

male Blockierung eine Verriegelung bewirkt, indem sie veranlasst, dass ein Übertragungselement des Übertragungsweges (14) das Verriegelungselement (34) in seine verriegelte Position bewegt, und wobei die abnormale Bewegung des Übertragungselements durch die elastische Bewegung einer elastischen Einrichtung (32) möglich wird.

10. Tür (50), die eine Türebene (146) bildet, wobei die Tür eine Schließanordnung (10; 110) nach einem der vorhergehenden Ansprüche aufweist, bei der sich ein Übertragungselement des Übertragungsweges normalerweise in einer Bewegungsebene bewegt, die im Wesentlichen parallel ist zur Türebene, wobei eine abnormale Verformung der Schließanordnung dazu führen kann, dass das Übertragungselement seine Bewegungsebene verlässt. 15
11. Schließanordnung nach einem der Ansprüche 1 bis 9 zum Einbau in eine Seitentür eines Autos. 20
12. Tür nach Anspruch 10, bei der die Tür eine Seitentür eines Autos ist. 25

#### Revendications

1. Agencement de verrouillage (100) comprenant un loquet relié à des moyens de libération par une ligne de transmission (114), l'actionnement normal des moyens de libération provoquant le déverrouillage de l'agencement de verrouillage, **caractérisé en ce que** la ligne de transmission (114) est adaptée de sorte qu'une déformation initiale anormale d'une partie de la ligne de transmission provoque une rupture de la ligne de transmission de sorte qu'une déformation anormale supplémentaire de cette partie de l'agencement de verrouillage du côté des moyens de libération de la rupture ne libère pas le verrouillage, dans lequel la ligne de transmission (114) comprend une pluralité d'éléments de transmission (122, 122A, 144) pour lesquels la rupture est assurée par un désalignement d'éléments de transmission (122A, 144) adjacents qui est permis par un déplacement élastique de moyens élastiques (132). 35 40 45
2. Agencement de verrouillage selon la revendication 1, dans lequel l'agencement de verrouillage est susceptible d'être bloqué par l'apparition d'une rupture normale de la ligne de transmission et la déformation initiale provoque le blocage par l'intermédiaire de la rupture normale. 50
3. Agencement de verrouillage selon la revendication 2, lequel est susceptible d'être normalement bloqué par le déplacement d'un élément de blocage d'une

- position non bloquée à une position bloquée, une déformation initiale anormale de l'agencement de verrouillage amenant un élément de transmission de la ligne de transmission à déplacer l'élément de blocage vers sa position bloquée. 5
4. Agencement de verrouillage selon l'une quelconque des revendications précédentes, dans lequel l'élément de transmission est une tige (122). 10
5. Agencement de verrouillage selon la revendication 4, dans lequel la tige est interposée entre un mécanisme de verrouillage (112) comprenant le loquet et une poignée d'une portière. 15
6. Agencement de verrouillage selon l'une quelconque des revendications précédentes, dans lequel l'un des éléments de transmission adjacents est un levier de transmission (140) relié directement à une première extrémité d'une tige (122), une deuxième extrémité de la tige étant reliée à une poignée d'une portière. 20
7. Agencement de verrouillage selon l'une quelconque des revendications précédentes, comprenant en outre des moyens de libération supplémentaires reliés au loquet par une ligne de transmission supplémentaire, l'actionnement normal des moyens de libération supplémentaires provoquant le déverrouillage de l'agencement de verrouillage, la ligne de transmission supplémentaire étant adaptée de sorte qu'une déformation initiale anormale d'une partie de la ligne de transmission supplémentaire provoque une rupture supplémentaire de la ligne de transmission supplémentaire de sorte que ladite déformation anormale supplémentaire de cette partie de l'agencement de verrouillage du côté des moyens de libération supplémentaires de la rupture supplémentaire ne libère pas le verrouillage. 25 30 35 40
8. Agencement de verrouillage selon la revendication 7, dans lequel la ligne de transmission et la ligne de transmission supplémentaire ont une partie commune et la rupture est située de manière fonctionnelle dans la partie commune. 45
9. Agencement de verrouillage (10) comprenant un loquet relié à des moyens de libération par une ligne de transmission (14), l'actionnement normal des moyens de libération provoquant un déverrouillage de l'agencement de verrouillage, la ligne de transmission étant adaptée de sorte qu'une déformation initiale anormale d'une partie de la ligne de transmission provoque une rupture ou un blocage de la ligne de transmission de sorte qu'une déformation anormale supplémentaire de cette partie de l'agencement de verrouillage du côté des moyens de libération de la rupture ou du blocage ne libère pas le verrouillage, l'agencement de verrouillage étant susceptible d'être normalement bloqué le déplacement d'un élément de blocage (34) d'une position non bloquée vers une position bloquée, de manière à réaliser une rupture normale ou un blocage normal dans la ligne de transmission, ladite déformation initiale anormale provoquant le blocage par l'intermédiaire de la rupture normale ou du blocage normal en amenant un élément de transmission de la ligne de transmission (14) à déplacer l'élément de blocage (34) vers sa position bloquée, et dans lequel le déplacement anormal de l'élément de transmission est permis par le déplacement élastique de moyens élastiques (32). 50 55
10. Portière (50) définissant un plan de portière (146), la portière comprenant un agencement de verrouillage (10 ; 110) tel que défini dans l'une quelconque des revendications précédentes, dans lequel un élément de transmission de la ligne de transmission se déplace normalement dans un plan de déplacement sensiblement parallèle au plan de portière, une déformation anormale de l'agencement de verrouillage étant capable de provoquer le déplacement de l'élément de transmission hors de son plan de déplacement.
11. Agencement de verrouillage selon l'une quelconque des revendications 1 à 9, destiné à être introduit dans une portière latérale d'une voiture.
12. Portière selon la revendication 10, dans laquelle la portière est une portière latérale d'une voiture.



