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## (54) Latch arrangement

(57) A latch arrangement (10) including a latch bolt (12) connected to release means (14) by a transmission path (16), normal actuation of the release means causing unlatching of the latch arrangement, the latch arrangement further including an actuator (28) operable to provide a break in the transmission path following the occurrence of a predetermined normal condition of an associated vehicle, the transmission path being re-established by operator indication of an unlatching requirement following the predetermined condition ceasing to exist.

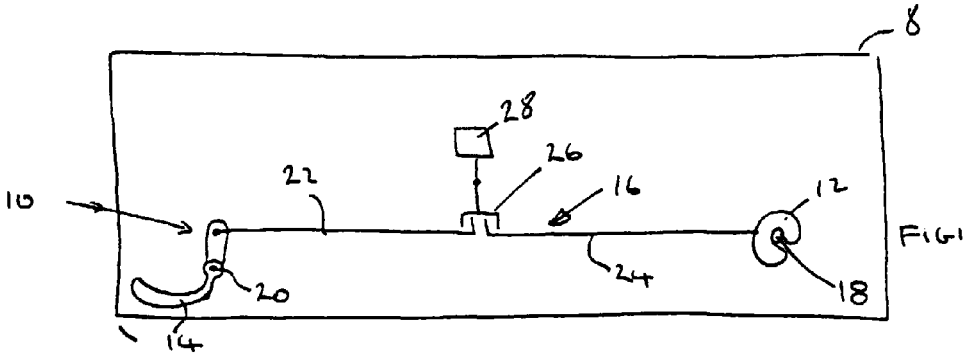


FIG1

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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, the accident itself 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 the 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 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 latch arrangement further including an actuator operable to provide a break in the transmission path following the occurrence of a predetermined normal condition of an associated vehicle, the transmission path being re-established by operator indication of an unlatching requirement following the predetermined condition ceasing to exist.

**[0006]** 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 latch arrangement further including an actuator operable to provide a block in the transmission path following the occurrence of a predetermined normal condition of an associated vehicle, the transmission path being unblocked by operator indication of an unlatching requirement following the predetermined condition ceasing to exist.

**[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 latch arrangement further including an actuator which in use automatically operates to provide a break in the transmission path when an associated vehicle is moving above a predetermined speed, the transmission path being re-established by operator indication of an unlatching requirement.

**[0008]** 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 latch arrangement further including an actuator which in use automatically operates to provide a block in the transmission path when an associated vehicle is moving above a predetermined speed, the transmission path being unblocked by operator indication of an unlatching requirement.

**[0009]** The invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

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

Figures 2 and 3 are views of the latch arrangement of figure 1 shown in different conditions; and

Figure 4 is a second embodiment of a latch arrangement according to the present invention.

**[0010]** With reference to figures 1 to 3 there is shown a latch arrangement 10 having a latch bolt in the form of a rotating claw 12 connected to a release means in the form of an inside door handle 14 via a transmission path 16.

**[0011]** The rotating claw releasably secures a striker pin 18, allowing the latch arrangement to releasably secure an associated door (not shown).

**[0012]** Inside door handle 14 is pivotally mounted about pivot 20 and can move between a latched position as shown in figures 1 and 2 and an unlatched position as shown in figure 3 and 4.

**[0013]** The transmission path is shown schematically as three distinct portions. An input portion 22, an output portion 24 and a break portion 26. Break portion 26 is connected to actuator 28 which is capable of moving break portion 26 between an engaged position as shown in figures 1 and 4 where the transmission path 16 is complete and a disengaged position as shown in figures 2 and 3 where the transmission path is broken. Operation of the latch arrangement is as follows:-

**[0014]** A drive enters the vehicle 8 associated with the latch arrangement and once inside the vehicle closes the door. Under these circumstances the latch arrangement would be as shown in figure 1 with striker pin 18 retained by the rotating claw 12 and with the break portion in the engaged position and the inside door handle in the latched position.

**[0015]** Thus in the event that the driver wishes to immediately exit the vehicle without having say started the engine, movement of the inside door handle 14 from the latched position to the unlatched position causes input portion 22 to move leftward when viewing figure 1, and this leftward movement is transmitted via break portion 26 and output portion 24 to the rotating claw, allowing the rotating claw to move to its released position as shown in figure 4 and release the striker pin 18. Figure

4 shows schematically the actuator 28 and break portion 26 rotating about pin 29 to allow for movement of the input and output portions. However, any arrangement that allows movement of the input and output portions is acceptable and such arrangements would generally not require the actuator to move.

**[0016]** Typically the break portion 26, output portion 24 and rotating claw 12 would all be located within a single latch assembly. Furthermore typically output portion 24 would ultimately terminate in a pawl which engages the rotating claw and can retain the rotating claw in a latched and also a first safety position, disengagement of the pawl from the claw allowing the claw to move to its unlatched position.

**[0017]** As is normally the case, once a driver has entered a vehicle he or she would usually perform operations associated with driving the vehicle such as turning the ignition on, starting the engine, moving a parking brake to an off position, depressing a clutch pedal, moving an automatic transmission selector lever out of a park position, or moving a gear lever to a gear select position. Ultimately the vehicle will be caused to move as the ground engaging means, such as wheels, starts to rotate. As one or more of these predetermined conditions arises the actuator 28 causes the break portion 26 to move from its engaged position as shown in figure 1 to its disengaged position as shown in figure 2.

**[0018]** Note that one of the predetermined conditions can be that the vehicle is moving faster than a predetermined speed such as 0 kph, 5 kph, 10 kph, 15 kph.

**[0019]** It is assumed that the vehicle 8 associated with the latch arrangement 10 travels in the direction of arrow A of figure 2, and thus inherently the latch arrangement 10 itself also travels in the direction of arrow A of figure 2.

**[0020]** In the event that the associated vehicle 8 is involved in a head-on collision, inertia forces will tend to cause the various components of the latch arrangement to move in the direction of arrow A relative to the vehicle 8. In particular input portion 22 might typically be a rod running in a fore and aft direction of the vehicle and inside door handle 14 might be a relatively light component thus the total inertia forces acting on the input portion and inside door handle typically might result in these components moving to the position as shown in figure 3. However, under such circumstances the latch arrangement remains latched since there is a break in the transmission path between input portion 22 and output portion 24.

**[0021]** Typically output portion 24 can be made relatively light since, in practice, break portion 26 is very close to the rotating claw thus the output portion 24 can be arranged to have low inertia, so low in fact that it will not, by itself, cause the door to become unlatched.

**[0022]** When the driver comes to the end of his journey the predetermined condition will cease to exist eg. the vehicle will be stationary or the ignition will be turned off or the engine will be turned off or the parking brake will be applied. Under theses conditions the actuator 28 is not caused to re-establish the transmission path but ensures that the break portion 26 remains in its disengaged position.

**[0023]** Only when the driver performs a function indicating that unlatching is required does the actuator 28 move the break portion 26 to its engaged position. The unlatching requirement would be indicated by the operator by for example lifting a sill button, or operating the inside door handle. In the event of a crash, following which the driver is incapable of indicating an unlatching requirement, for example he or she is unconscious, an unlatching requirement can nevertheless be indicated by a third party such as a member of a rescue service operating the outside door handle.

**[0024]** Some vehicles have a three position inside door handle, the three positions being a locked position, a latched position and an unlatched position. Under such circumstances the unlatching requirement could be indicated by the operator moving the inside handle from the locked to the unlocked position, or by moving the inside handle from the locked to the unlatched position, or by moving the inside handle from the latched to the unlatched position.

**[0025]** With reference to figure 5 there is shown a further schematic view of a latch arrangement 30 according to the present invention differing from the first embodiment only by the fact that the transmission path 32 does not have the capability of being broken but does have the capability of being blocked by block portion 34 of the transmission path 32 being engageable with block portion 36 of actuator 38. Thus in the position shown in figure 5 movement of the inside door handle 14 to the release position is blocked by contact between block portions 34 and 36 and similarly in the event of a head on collision of the vehicle 8 the latch is prevented from unlatching due to inertia forces again by contact between block portions 34 and 36. Note that in this case actuator 38 is secured rigidly to fixed structure of the door and thus cannot rotate, unlike actuator 28.

**[0026]** Whilst the invention has been described in relation to inside door handles and head on collisions of vehicles, inertia forces can arise in any direction of the vehicle since the vehicle can be involved in a side impact or the vehicle can roll. Thus the invention is applicable to transmission paths orientated in any direction on the vehicle and in particular it is applicable to transmission paths connecting a latch bolt with an external release means such as an outside door handle.

**[0027]** Furthermore where the latch arrangement is capable of being locked (ie. operation of an outside door handle does not unlatch the latch bolt), or superlocked (ie. operation of an outside or inside door handle does not unlatch the latch arrangement) or capable of achieving a child safety condition (ie. operation of an inside door handle does not unlatch the latch bolt independently of whether or not the latch is locked) the actuator can be that actuator associated with normal locking,

normal superlocking, or normal child safety operation.

**[0028]** In an alternative mode of operation the break (or block) in the transmission path can be automatically provided when the vehicle is moving above a predetermined speed with the transmission path only being re-established (or unblocked) via operator indication of an unlatching requirement. Such a mode of re-establishing (or unblocking) the transmission path is applicable when the vehicle is either travelling above the predetermined speed or below the predetermined speed.

**[0029]** Advantageously the actuator of the present invention typically is only required to perform one cycle during a journey, ie. the actuator provides the break (or block) when the predetermined condition arises and only re-establishes the transmission path (or unblocks it) when the driver exits the vehicle. In particular the actuator is not caused to cycle as the predetermined condition both exists and ceases to exit. For example if the predetermined condition is that of the vehicle moving above five kilometres per hour, every time the vehicle slows to below five kilometres per hour it is not necessary for the actuator to re-establish the transmission path (or unblock it) since generally no operator indication of an unlatching requirement will have been given.

**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 latch arrangement further including an actuator operable to provide a break in the transmission path following the occurrence of a predetermined normal condition of an associated vehicle, the transmission path being re-established by operator indication of an unlatching requirement following the predetermined condition ceasing to exist.

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 latch arrangement further including an actuator operable to provide a block in the transmission path following the occurrence of a predetermined normal condition of an associated vehicle, the transmission path being unblocked by operator indication of an unlatching requirement following the predetermined condition ceasing to exist.

3. A latch arrangement as defined in claim 1 or 2 in which the predetermined normal condition is any one or more of:- the ignition switch of the associated vehicle being on, the engine of the associated vehicle running, the parking brake of the associated vehicle being off, the clutch of the associated vehicle being depressed, a motion gear of the associated vehicle being engaged, the ground engaging means of the associated vehicle being moving, and the vehicle moving above a predetermined speed.

4. 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 latch arrangement further including an actuator which in use automatically operates to provide a break in the transmission path when an associated vehicle is moving above a predetermined speed, the transmission path being re-established by operator indication of an unlatching requirement.

5. 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 latch arrangement further including an actuator which in use automatically operates to provide a block in the transmission path when an associated vehicle is moving above a predetermined speed, the transmission path being unblocked by operator indication of an unlatching requirement.

6. A latch arrangement as defined in anyone of claims 3 to 5 in which the predetermined speed is 0 kilometres per hour.

7. A latch arrangement as defined in any preceding claim in which the operator indication of an unlatching requirement is by operation of the release means.

8. A latch arrangement as defined in any preceding claim in which the release means is an inside door handle.

9. A latch arrangement as defined in anyone of claims 1 to 7 in which the release means is an outside door handle.

10. A latch arrangement as defined in any preceding claim which is normally lockable, in which the actuator is capable of normally locking the latch.

11. A latch arrangement as defined in claim 10 in which operator indication of an unlatching requirement is by operation of the normal unlocking means.

12. A latch arrangement as defined in claim 11 in which the normal unlocking means is a sill button.

13. A latch arrangement as defined in claim 11 when dependent upon claim 7 in which the normal unlocking means is the release means which has a

locked position, an unlocked position, and a released position, and operator indication of an unlatching requirement is by movement of the release means from the locked position to the unlocked position or movement of the release means from the unlocked position to the released position.

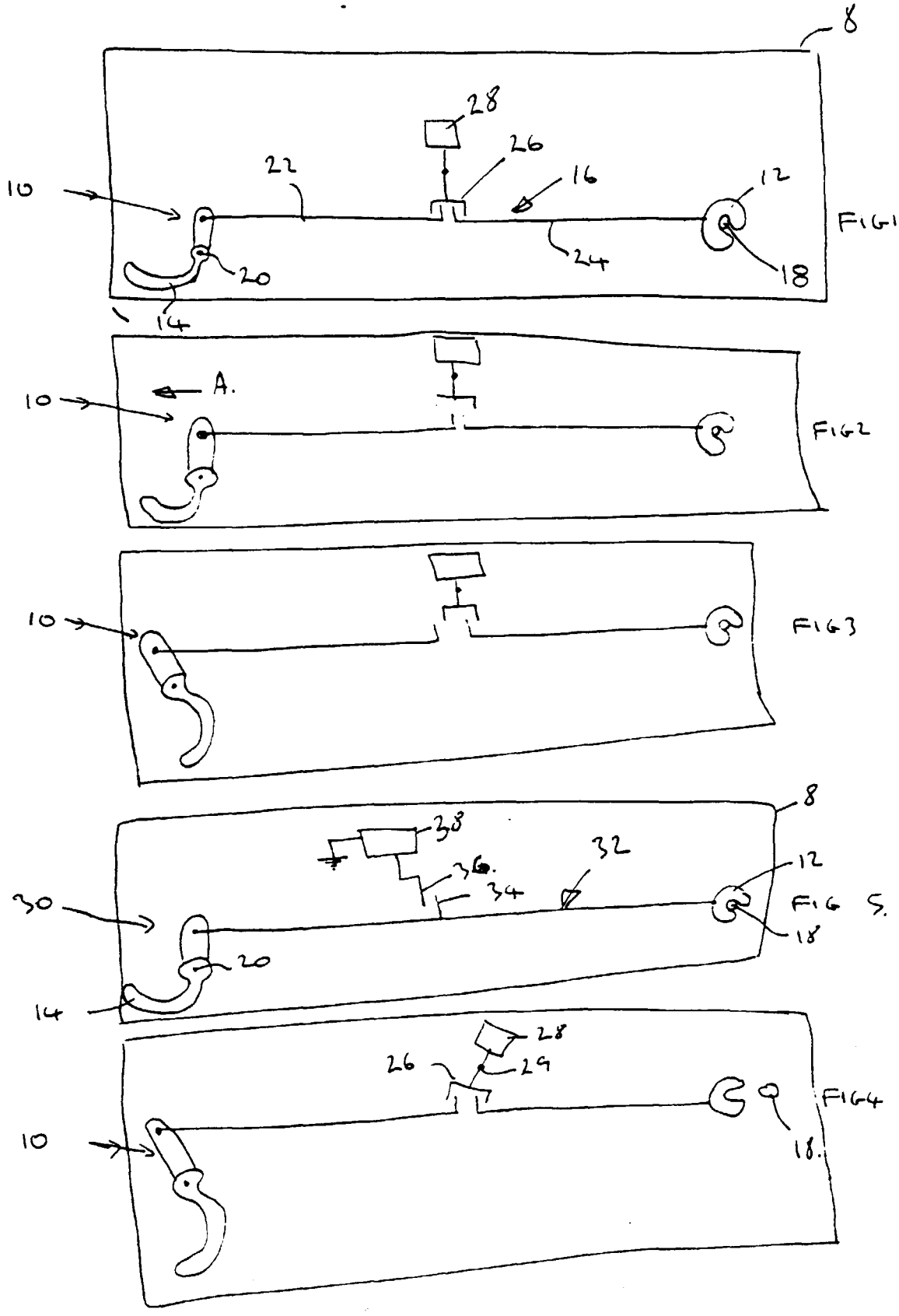
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FIG1
A.
FIG2
FIG3
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FIG 5.
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FIG4