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(54) **Vehicle door handle**

(57) A vehicle door handle (1) has a transmission lever (21) activated externally by means of a control lever (16) to rotate, about a hinge axis (15), between an angular rest position, and an angular work position to open a lock on the door; and an inertial member (39), which keeps the transmission lever (21) in the rest position in the event of lateral impact on the vehicle, rotates about the axis (15) with respect to the transmission lever (21), and has an inertial mass (42) located eccen-

trically with respect to the axis (15), and a one-way angular locking device (57) enabling the mass (42) to rotate, together with the transmission lever (21), in one rotation direction, so as to exert a balancing force, in the event of lateral impact, to balance the inertial forces tending to move the lever (21) into the work position, and to rotate freely with respect to the lever (21) in the opposite direction.

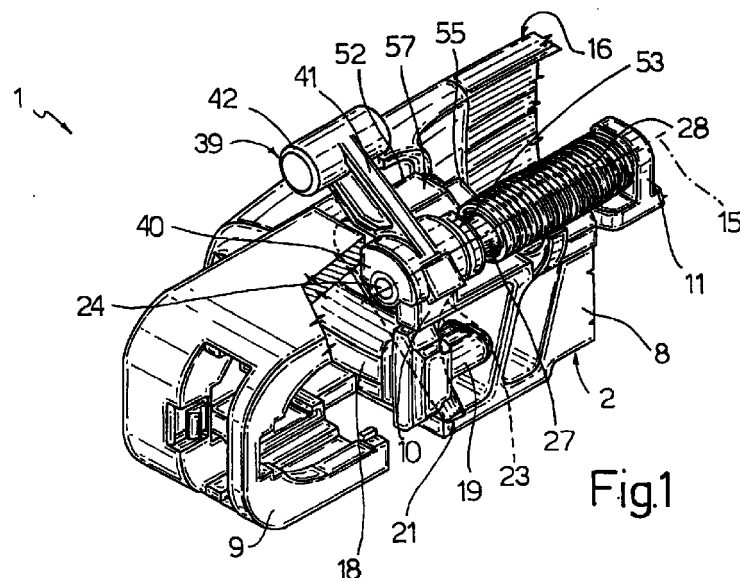


Fig.1

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Description

[0001] The present invention relates to a vehicle door handle.

[0002] Handles are known comprising a user-activated control lever rotated between a rest position maintained by a preloaded return spring, and a work position to open a lock on the door by means of a transmission lever interposed between the control lever and the lock. Known handles are normally provided with safety devices for preventing control of the lock, and so preventing the door from opening spontaneously, in the event of a side-on collision, particularly when the preload of the return spring is limited to reduce the effort required to open the lock.

[0003] In particular, inertial safety devices are used comprising a mass or counterweight connected integrally to, and eccentric with respect to the axis of rotation of, the transmission lever.

[0004] Known handles of the above type are far from satisfactory, on account of known inertial devices only providing for keeping the distressed door closed, while leaving the opposite door free to open.

[0005] That is, the mass on the distressed-door handle generates on the respective lever an inertial moment to keep the lever in the rest position, while the mass on the opposite door handle tends to rotate the respective transmission lever and so open the lock.

[0006] It is an object of the present invention to provide a vehicle door handle designed to provide a straightforward, low-cost solution to the above problem.

[0007] According to the present invention, there is provided a handle for a door of a vehicle, the handle comprising a transmission lever activated externally by means of a control member to rotate, about a first axis, between an angular rest position, and an angular work position to open a lock on said door; and retaining means for retaining said lever in said rest position in the event of lateral impact on said vehicle; said retaining means comprising an inertial mass associated with said lever and located eccentrically with respect to said first axis to exert a balancing force, in the event of lateral impact on the respective door, to balance the inertial forces tending to move said lever into said work position; characterized in that said mass rotates, with respect to said lever, about a second axis; and in that said retaining means comprise one-way angular locking means interposed between said mass and said lever to make said mass angularly fixed with respect to said lever and exert said balancing force in one rotation direction, and to permit said mass to rotate freely with respect to the lever in the opposite direction.

[0008] A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective, with parts removed for clarity, of a preferred embodiment of

the handle according to the present invention;

Figure 2 shows an exploded view in perspective, with parts removed for clarity, of the Figure 1 handle.

[0009] Number 1 in Figure 1 indicates a handle (shown partly) for controlling a vehicle door lock. Handle 1 comprises a structure 2, which is connected integrally, in known manner not described in detail, to a side door (not shown) of the vehicle.

[0010] Structure 2, when fitted to the respective door, extends in a longitudinal direction, and comprises an intermediate portion 8 and a hollow end portion 9 adjacent to each other. Portions 9 and 8 carry respective lateral appendixes 10 and 11 having respective through holes 12 and 13 extending coaxially with each other along a longitudinal axis 15.

[0011] With reference to Figure 1, handle 1 also comprises an external control lever 16, which is gripped by the user to open the respective lock (not shown), is hinged in known manner (not shown) to structure 2, and carries an end arm 18. Arm 18 engages portion 9 and supports, on the end, a tooth 19 extending, parallel to axis 15, towards portion 8.

[0012] As shown in Figure 1 and particularly in Figure 2, handle 1 also comprises a substantially C-shaped transmission lever 21, which is housed partly in portion 9, in turn comprises a portion 23 cooperating in sliding manner with tooth 19, and has one end hinged to appendixes 10 and 11 by a pin 24 engaging holes 12 and 13 and extending through a tubular body 27 located between appendixes 10 and 11 and integral with lever 21.

[0013] Pin 24 enables lever 21 to rotate, about axis 15, between an angular rest position (shown in Figure 1), and an angular work position to open the lock on the respective door when lever 16 is activated by the user.

[0014] Tubular body 27 is surrounded by a preloaded torsion spring 28 interposed between lever 21 and structure 2 to elastically restore lever 21 to the rest position.

[0015] As shown in the accompanying drawings, handle 1 also comprises a safety retaining member 39 associated with lever 21 to retain lever 21 in the angular rest position and so prevent the lock from being released and the door from being opened spontaneously in the event of a collision in which the vehicle is struck side-on.

[0016] Member 39 is formed in one piece, and comprises a hollow base portion 40 housing appendix 10 and part of lever 21, and which is hinged to appendix 10 by pin 24 to rotate about axis 15 with respect to lever 21. A platelike arm 41 extends radially outwards from base portion 40, is substantially parallel to and shifted axially with respect to lever 21, and carries, on the free end, a cylindrical mass or counterweight 42 extending longitudinally on opposite sides of arm 41.

[0017] Member 39 also comprises a stop portion

52, which is located between axis 15 and mass 42 and, in particular, is integral with arm 41 and base portion 40, projects from arm 41 in a direction parallel to axis 15 and in a position facing a lateral surface 53 of lever 21, and terminates with an appendix 55 defining a support for an arm 56 of spring 28 (Figure 2).

[0018] In actual use, in the absence of lateral impact, spring 28 keeps lever 21 in the rest position, and stop portion 52 resting against a corresponding intermediate portion of lateral surface 53 of lever 21.

[0019] Conversely, when the vehicle is struck from the side, control lever 16 of handle 1 on the distressed door exerts on transmission lever 21 an inertial opening moment to rotate lever 21 clockwise in Figure 1; and the respective mass 42, being located eccentrically with respect to axis 15 and on the opposite side of axis 15 with respect to tooth 19, exerts on transmission lever 21 an inertial balancing moment to balance the inertial forces tending to move transmission lever 21 into the work position. More specifically, the inertial balancing moment is opposite in direction to at least the force exerted by control lever 16, and in the same direction as the elastic moment exerted by spring 28, and is such that transmission lever 21 remains substantially static and the door closed.

[0020] In the event of lateral impact on one door, neither control lever 16 nor mass 42 of handle 1 on the opposite door has any effect on transmission lever 21. That is, the inertial forces acting on the opposite door handle keep control lever 16 in the rest position and rotate member 39 clockwise in Figure 1. Being permitted, however, to rotate freely in said direction with respect to transmission lever 21, member 39, as it rotates, simply loads spring 28, without exerting any opening moment on transmission lever 21, so that lever 21 remains in the rest position and the door closed.

[0021] Unlike known handles, handle 1 described therefore provides, in the event of lateral impact, for keeping all the side doors of the vehicle closed, regardless of which side of the vehicle is struck.

[0022] This is substantially due to the way in which inertial mass 42 is connected to transmission lever 21, and, in particular, to the presence of a one-way angular locking device 57 comprising stop portion 52 and lateral surface 53, and which provides for making mass 42 and transmission lever 21 angularly integral with each other in one rotation direction about axis 15, and for enabling mass 42 to rotate freely with respect to lever 21 in the opposite direction.

[0023] Despite comprising an inertial mass 42 designed to simply rest on transmission lever 21, handle 1 described is extremely silent-operating and efficient. That is, spring 28 resting on appendix 55, in normal operating conditions, holds stop portion 52 against lateral surface 53 at all times, thus preventing any annoying vibration; while the particular design of base portion 40 protects the hinge region from external agents, such as dust and water, thus preventing an increase in friction

at the hinge region and, consequently, in response time in the event of impact.

[0024] Clearly, changes may be made to handle 1 as described and illustrated herein without, however, departing from the scope of the present invention.

[0025] In particular, member 39 may differ from the one described and illustrated by way of example, and be connected to a lock transmission lever other than lever 21 described.

[0026] In particular, transmission lever 21 and member 39 may be connected to structure 2 to rotate about two separate axes, e.g. to improve intervention time; and member 39 may be held resting against transmission lever 21 by respective elastic elements separate from spring 28, so as to prevent overly stressing spring 28.

Claims

1. A handle (1) for a door of a vehicle, the handle comprising a transmission lever (21) activated externally by means of a control member (16) to rotate, about a first axis (15), between an angular rest position, and an angular work position to open a lock on said door; and retaining means (39) for retaining said lever (21) in said rest position in the event of lateral impact on said vehicle; said retaining means comprising an inertial mass (42) associated with said lever (21) and located eccentrically with respect to said first axis (15) to exert a balancing force, in the event of lateral impact on the respective door, to balance the inertial forces tending to move said lever (21) into said work position; characterized in that said mass (42) rotates, with respect to said lever (21), about a second axis (15); and in that said retaining means (39) comprise one-way angular locking means (57) interposed between said mass (42) and said lever (21) to make said mass (42) angularly fixed with respect to said lever (21) and exert said balancing force in one rotation direction, and to permit said mass (42) to rotate freely with respect to the lever (21) in the opposite direction.
2. A handle as claimed in Claim 1, characterized in that said first (15) and said second (15) axis are coincident with each other.
3. A handle as claimed in Claim 1 or 2, characterized in that said angular locking means (57) comprise a shoulder (53) carried by said lever (21); said mass (42) being positioned resting against said shoulder (53).
4. A handle as claimed in Claim 3, characterized in that said mass (42) extends on the opposite side of said second axis (15) with respect to said shoulder (53).

5. A handle as claimed in Claim 3 or 4, characterized by comprising elastic forcing means (28) for keeping said mass (42) resting against said shoulder (53).

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6. A handle as claimed in Claim 5, characterized by comprising elastic return means (28) for keeping said lever (21) in said rest position; said elastic return means (28) and said elastic forcing means (28) being defined by a single elastic element (28).

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7. A handle as claimed in any one of the foregoing Claims, characterized by comprising a hollow portion (40) hinging said mass (42) about said second axis (15); said hollow portion (40) partly housing said lever (21).

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8. A handle as claimed in Claim 7, characterized in that said mass (42) and said hollow portion (40) form part of a body (39) formed in one piece.

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