Safety device comprising an inertial mass (1) pivoted to a frame (2) for rotating around an axis (4), wherein elastic means (6) act on the inertial mass (1) for opposing its rotation, a wedge (12) being arranged in the frame (2) so that the inertial mass (1), when it rotates around this axis (4), slides along the inclined wall of the wedge (12), so as to axially move the inertial mass (1) along this axis (4).
SAFETY DEVICE FOR VEHICLE HANDLES AND VEHICLE HANDLE
COMPRISING THIS SAFETY DEVICE

The present invention relates to a safety device for vehicle handles, and in particular to a safety device which can be applied to a door handle of a motor vehicle for preventing the accidental opening of this door in case of accident. The present invention also relates to a vehicle handle comprising this safety device.

Italian patent application MI2007 A001748 discloses a safety device comprising an inertial mass pivoted to the frame of a handle, wherein elastic means act on the incital mass for opposing its rotation in a direction substantially equal to the direction of the lever of said handle when it is pulled outwards for opening the door. Said device comprises a flexible plate which is fixed to the frame and is elastically bent by a tooth of the inertial mass during the normal use of the handle. In case of impact, the inertial mass rotates if it undergoes an acceleration suitable for overcoming the opposition of the elastic means. During this rotation, the tooth falls into an opening made in flexible plate, so as to lock the inertial mass in an impact position in which a stop member protruding from the inertial mass can intercept a protrusion protruding from a rocker mechanically connected to the handle lever, so as to prevent the rotation of this lever after the impact.

Said known device is relatively complex and further it is difficult to be unlocked after an impact or more simply after an accidental activation during the assembling or the carriage of the handle.

It is therefore an object of the present invention to provide a device which is free from said disadvantages. Said object is achieved with a device and a handle whose main features are disclosed in claims 1 and 10, while other features are disclosed in the remaining claims.

Thanks to the wedge arranged in the frame, the inertial mass is moved axially during its rotation around its own axis, so as to reach a locking position wherein the inertial mass is locked by the transversal wall of the wedge. With this arrangement, not only the inertial mass can be easily unlocked but also the manufacturing times and costs of the device are decreased, especially if the wedge is made in a single piece with the
According to a particular aspect of the invention, the elastic means acting on the inertia! mass for opposing said axial moving are the same elastic means opposing its rotation, preferably a helical spring arranged around the rotation axis of the inertial mass, so as to further reduce the manufacturing costs and increasing the reliability of the device.

Further advantages and features of the device according to the present invention will become clear to those skilled in the art from the following detailed and non-limiting description of an embodiment thereof with reference to the attached drawings, wherein:

- figure 1 shows a partial rear view of a handle comprising the device in the rest position;
- figure 2 shows section TI-II of figure 1;
- figure 3 shows section III-III of figure 1;
- figure 4 shows the device of figure 1 during an impact;
- figure 5 shows section V-V of figure 4;
- figure 6 shows section VI-VI of figure 4;
- figure 7 shows the device of figure 1 after an impact;
- figure 8 shows section VIII-VIII of figure 7; and
- figure 9 shows section TX-IX of figure 7.

Referring to figures 1 to 3, it is seen that the device according to the present invention comprises in a known way an inertial mass 1 pivoted to a frame 2 by means of at least one pin 3 for rotating around a first axis 4. Frame 2 is in particular the frame of a handle of a door for vehicles. Elastic means act on inertial mass 1 for opposing its rotation in a first direction 5 which is substantially the same direction of the lever (not shown in the figures) of said handle when it is pulled outwards for opening the door. In particular, said elastic means comprise a helical spring 6 which is arranged around first axis 4 and has an end in contact with a support 7 of frame 2 and the other end in contact with inertial mass 1. A stop member 8 protrudes from inertial mass 1 for intercepting during its rotation around first axis 4 a protrusion 9 protruding from a rocker 10 which can rotate around a second axis 11 and is mechanically connected to said lever. Second axis 11 is substantially parallel to first axis 4 but in other embodiments can be also
perpendicular or arranged in another way with respect to first axis 4. Referring also to figures 4 to 6, it is seen that a wedge 12 is arranged beside initial mass 1 in frame 2, in particular it is made in a single piece with frame 2, so that inertial mass 1, when it rotates around first axis 4, also slides along the inclined wall of wedge 12, which moves axially inertial mass 1 along first axis 4 in a second direction substantially perpendicular to first direction 5. Elastic means act on inertial mass 1 for opposing the axial movement in second direction 13 of inertial mass 1 when the latter rotates around first axis 4, in particular, said elastic means preferably consists of the same helical spring 6, which is compressed axially when inertial mass 1 moves in second direction 13.

Referring also to figures 7 to 9, it is seen that when inertial mass 1 has gone beyond wedge 12 during the rotation around first axis 4, helical spring 6 can expand, so as to move axially inertial mass 1, which is then locked by the transversal wall of wedge 12 and cannot rotate around first axis 4, even if urged by helical spring 6. For improving this locking also with axial accelerations, inertial mass 1 and/or wedge 12 are provided with a tooth 14 which can penetrate into a seat 15 made in the transversal wall of wedge 12 and/or in inertial mass 1, respectively. In this position, stop member 8 intercept protrusion 9 and prevents the rotation of rocker 10.

For unlocking inertial mass 1, a point, for example of a screwdriver, can be used as a lever between inertial mass 1 and frame 2 close to wedge 12, so that inertial mass 1 goes beyond wedge 12 and is taken back in the rest position by helical spring 6.

Possible modifications and/or additions may be made by those skilled in the art to the hereinabove disclosed and illustrated embodiment while remaining within the scope of the following claims.
CLAIMS

1. Safety device comprising an inertia mass (1) pivoted to a frame (2) for rotating around an axis (4), wherein elastic means (6) act on the inertia mass (1) for opposing its rotation, characterized in that a wedge (12) is arranged in the frame (2) so that the initial mass (1), when it rotates around this axis (4), slides along the inclined wall of the wedge (12), so as to axially move the inertial mass (1) along this axis (4).

2. Device according to the previous claim, characterized in that elastic means (6) act on the inertial mass (1) for opposing said axial moving.

3. Device according to one of the previous claims, characterized in that said elastic means (6) comprise a helical spring arranged around said axis (4).

4. Device according to the previous claim, characterized in that the helical spring has an end in contact with a support (7) of the frame (2) and the other end in contact with the initial mass (1).

5. Device according to one of the previous claims, characterized in that the wedge (12) is arranged beside the inertial mass (1).

6. Device according to one of the previous claims, characterized in that the inertial mass (1), when it has gone beyond the wedge (12) during the rotation around said axis (4), is locked by the transversal wall of the wedge (12).

7. Device according to one of the previous claims, characterized in that the initial mass (1) and/or the wedge (12) are provided with a tooth (14) which can penetrate into a seat (15) made in the wedge (12) and/or in the inertial mass (1), respectively.

8. Device according to the previous claim, characterized in that said seat (15) is made in the transversal wall of the wedge (12).

9. Device according to one of the previous claims, characterized in that the wedge (12) is made in a single piece with the frame (2).

10. Vehicle handle, characterized in that it comprises a device according to one of the previous claims.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim</th>
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<tr>
<td>X</td>
<td>DE 198 58 416 A1 (BAYERISCHE MOTOREN WERKE AG [DE]) 21 June 2000 (2000-06-21) column 2, line 64 - column 3, line 52; claim 1; figures 3,4</td>
<td>1-6, 10</td>
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<td>A</td>
<td>WO 2008/068262 A (VALEO SICUREZZA ABITACOLO SPA [IT]; SAVANT FIORENZO [IT]; ILARDO SIMON) 12 June 2008 (2008-06-12) the whole document</td>
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D. Further documents are listed in the continuation of Box C

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Date of the actual completion of the international search: 4 March 2010

Date of mailing of the international search report: 12/03/2010

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Authorized officer: Bal ice, Marco
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