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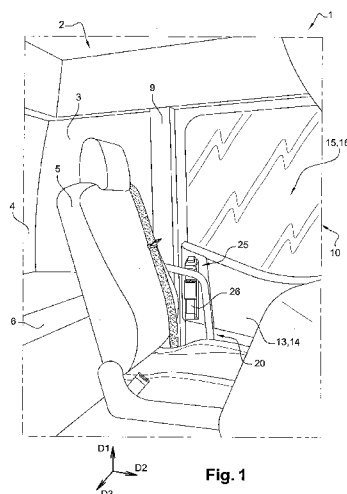
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(54) Title: LOCKING SYSTEM FOR LOCKING A DOOR OF A VEHICLE CABIN, AND CABIN EQUIPPED WITH SUCH A LOCKING SYSTEM



(57) Abstract: A solid element (20) is fastened to the cabin body (2) and protrudes inside the cabin (1). The locking system (25) comprises: - a fastening interface for fastening the locking system to the door, inside the cabin; a receiving portion which is opened towards a first direction opposite the fastening interface and which cooperates with a locking member (26) so that, in the unlocked position of the locking member, the receiving portion remains open towards said first direction and, in the locked position of the locking member, the receiving portion and the locking member form a retaining loop having a through opening (27) according to a second direction.

LOCKING SYSTEM FOR LOCKING A DOOR OF A VEHICLE CABIN, AND CABIN EQUIPPED WITH SUCH A LOCKING SYSTEM

Field of the invention

The present invention relates to locking system for locking a door of a vehicle cabin relative to a cabin body in a closed position. The invention also concerns a cabin of a vehicle, especially an industrial vehicle, equipped with such a locking system.

Technological background

Industrial vehicles can be used to carry freight between places located far from each other. As a consequence, the driver of such a vehicle can spend several days on the road and may sleep in the vehicle cabin.

For security reasons, the driver generally locks the cabin door during the night, using the conventional remotely controlled locking/unlocking system of the cabin. However, it turned out that such systems can be disabled from the outside by a person holding an electronic device capable of generating a signal having the same frequency as the one making it possible to remotely control the locking / unlocking system. As a result, this person can open the door of the cabin even if it has been locked, and can attack or rob the driver while he is sleeping.

In order to improve the security conditions for the driver, some cabins are equipped with an additional locking device which is purely mechanical and therefore cannot be deactivated from the outside by an electronic device. Nevertheless, such mechanical systems require specific arrangements both on the cabin body and on the door. Indeed, changes have to be made to install:

- the lock bolt on one of the cabin body and the door frame;
- and the strike plate receiving the bolt lock, on the other one of the cabin body and the door frame.

As a result, the implementation of such an additional locking device is expensive and can be fairly complicated.

It therefore appears that, from several standpoints, there is room for improvement in locking systems for the cabin doors.

Summary

It is an object of the present invention to provide an improved locking system and cabin equipped with a locking system which can overcome the drawbacks of the prior art.

It is another object of the invention to provide such a locking system which is easy and relatively cheap to install.

According to a first aspect, the invention concerns a locking system for locking a door of a vehicle cabin, the locking system comprising a locking member movable between an unlocked position and a locked position, wherein the locking system further comprises:

- a fastening interface designed to allow fastening the locking system to a door of the cabin;
- a receiving portion which is opened towards a first direction opposite the fastening interface and which cooperates with the locking member so that, in the unlocked position of the locking member, the receiving portion remains open towards said first direction and, in the locked position of the locking member, the receiving portion and the locking member form a retaining loop having a through opening according to a second direction.

In a preferred embodiment, the second direction is substantially perpendicular to the first direction.

Thus, with the locking system according to the invention, it is not necessary to bring significant changes to the cabin body since it is sufficient to secure the locking system to the cabin door, inside the cabin. The retaining loop of the locking system is adapted to retain a suitable element secured to the cabin body, to ensure the locking of the cabin door, relative to the cabin body, in the closed position.

In an implementation of the invention:

- the fastening interface is designed to cooperate with an inner face of a door to allow fastening the locking system to the door, inside a cabin;
- and, when the locking member is in the unlocked position, the receiving portion is adapted to receive, when the door is closed, a solid element fixed to the cabin body and protruding inside the cabin and, when the locking member is in the locked position, the retaining loop is adapted to retain said solid element.

Thus, only a solid element fastened inside the cabin body is required to achieve the locking function, in cooperation with the locking system secured to the cabin door. Preferably, the invention can take advantage of a solid member which is already present in the cabin. As a result, only the door needs to be modified to receive the locking system.

For example, the solid element can be a grab handle generally provided in the cabin to help a user to get in the cabin.

However, the solid element is not necessarily rigid. Here, the term "solid" means that this element has a sufficient mechanical strength to be capable of withstanding a traction force exerted through the locking system by a person trying to open the cabin door. Flexible elements, such as for example the safety belt, can be solid enough to perform this function.

As regards the retaining loop, it can be a closed loop, i.e. a line which intersects itself, for example a curved line such as a ring, or a broken line.

Alternatively, the retaining loop can be an open loop having free ends which are not connected but separated by an aperture, provided said aperture is small enough and/or positioned so as to prevent the solid element from getting out of the retaining loop when the locking member is in the locked position. Such an open loop can be a "C" or a "U" for instance.

This retaining loop can be formed by the locking member alone, or in combination with another component of the locking system. The retaining loop is preferably located close to a door edge, while the solid element is located close to said door edge, when the door is closed.

According to a preferred but non limiting embodiment of the invention, the retaining loop is dimensioned so that it is adapted to receive and retain a handle as the solid element, such as a grab handle. For example, the smallest dimension of the through opening of the retaining loop can be greater than 2,5 cm, preferably greater than 3 cm.

For example, the receiving portion can have a substantially U-shaped cross section in a plane orthogonal to the second direction.

In an implementation, the locking system can comprise a housing, the locking member being movable relative to the housing, the retaining loop being formed by the housing and the locking member.

For example, the locking system can comprise a housing having a recessed portion which forms the receiving portion.

More precisely, the housing can have a recessed portion having a bottom wall which faces the inside of the cabin when the locking system is fastened on the door, the locking system being arranged so that, when the locking member is in the unlocked position, access to the recessed portion is substantially unobstructed, and when the locking member is in the locked position, part of the locking member faces the bottom wall and is located at a distance from said bottom wall, so that the retaining loop is formed by the recessed portion and the locking member.

In an implementation, the locking member is arranged to move according to a translation. For example, the locking member can slide relative to a housing of the locking system.

The locking system can comprise a housing having a rear plate forming at least part of the fastening interface, and a cover secured to the rear plate.

According to an embodiment, the locking system can comprise first elastic return means urging the locking member towards its unlocked position. Such first elastic return means can comprise a helical spring having a first end connected to the locking member and a second end connected to the housing. In an advantageous embodiment, the second end of the helical spring can be connected to a piece of the housing, for example a piece of the cover, designed for securing the cover to the rear plate.

Besides, the locking system can comprise:

- an absorbing pad located close to the helical spring and designed to limit the radial movement of said spring. Such an absorbing pad can be secured to a side wall of the housing. Owing to this pad, the radial vibration of the spring, as well as the corresponding unpleasant noise, can be avoided;
- and/or a device for slowing down at least the end of the movement of the locking member towards its unlocked position, to avoid the generation of fairly strong vibrations which are generally uncomfortable for the cabin occupant and generate an unpleasant noise. This device can typically comprise a small hydraulic or pneumatic cylinder.

It is all the more advantageous to limit the noise generated by the components of the locking system as the housing can form a sound box that amplifies said noise.

According to an embodiment, the locking system can comprise a securing mechanism for maintaining the locking member in the locked position and an actuating member which can be actuated by a user in order to deactivate the securing mechanism.

The securing mechanism can comprise a retaining element movable between:

- an active position, in which the retaining element cooperates with the locking member, when said locking member is in the locked position, in order to keep it in the locked position;
- and an inactive position, in which the retaining element allows the locking member to move towards its unlocked position.

The securing mechanism can also comprise second elastic return means urging the retaining element towards its active position, the retaining element being designed so that the movement of the locking member towards its locked position causes a movement of the retaining element towards its inactive position, against said second elastic return means, to allow the movement of the locking member up to its locked position.

In an implementation, the retaining element comprises a protrusion capable of engaging a hole arranged in the locking member, in the locked position.

The locking member can be arranged to move according to a translation in a first direction, the retaining element being arranged to move according to a translation in a second direction substantially orthogonal to the first direction, and the retaining element comprising an inclined surface forming a ramp capable of cooperating with the locking member.

The actuating member may comprise a button having a leg bearing on a wall of the retaining element which forms an inclined ramp, such that moving the button causes a translation of the retaining element towards its inactive position.

Besides, the locking member can comprise a rigid plate.

According to a second aspect, the invention concerns a cabin of a vehicle, comprising:

- a cabin body;
- a solid element fastened to the cabin body and protruding inside the cabin;
- a door mounted on the cabin body;

- a locking system located inside the cabin, for locking the door relative to the cabin body in the closed position, the locking system comprising a locking member movable between an unlocked position and a locked position;

wherein the locking system is fastened to the inner face of the door and in that, when the locking member is in the locked position, the locking system is arranged to retain the solid element.

In an implementation of the invention, the locking system comprises a receiving portion which is opened towards the inside of the cabin and which cooperates with the locking member so that:

- in the unlocked position of the locking member, the receiving portion remains open towards the inside of the cabin and receives the solid element, when the door is closed;

- and, in the locked position of the locking member, the receiving portion and the locking member form a retaining loop having a through opening and retaining said solid element.

The locking system can have one or several of the previously described features.

In an implementation, the solid element can form at least part of a loop extending from the cabin body. It can for example be a grab handle designed to help a user to get in the cabin.

The solid element can be located near a pillar of the cabin body adjacent to a door edge, and preferably adjacent to the door edge which is opposite the door hinge. Typically, the solid element can be located near the cabin B pillar or can be fixed to the cabin B pillar.

According to an embodiment, the locking system can be secured to at least one structural beam of the door, for example to a vertical post and/or to a transverse beam. Preferably, the locking system can be secured to a pre existing structural beam of the door, in order to limit specific arrangements on the door for the implementation of the invention.

The locking system may comprise:

- a housing having a rear plate;
- a support plate which is fastened to the inner side of the door, and on which the rear plate is secured, an internal covering of the door being sandwiched between the support plate and the rear plate of the housing.

With such a disposition, the invention can take benefit from pre-existing mounting holes, used for example to secure an internal covering support to the door frame, to secure the locking system.

When the locking system comprises an actuating member which can be actuated by a user in order to cause the locking member to move towards its unlocked position, the actuating member can be positioned and arranged so that it can be actuated by a downward push of the user. This movement is both easy to make and intuitive, making the locking system particularly simple to actuate and safe for the driver.

Similarly, locking the system can be achieved by an upward movement on the locking member.

In an implementation of the invention, the locking member can be positioned substantially vertically, the retaining loop of the locking system being designed to receive and retain a substantially horizontal portion of the solid element.

These and other features and advantages will become apparent upon reading the following description in view of the drawing attached hereto representing, as a non-limiting example, an embodiment of a vehicle according to the invention.

Brief description of the drawings

The following detailed description of an embodiment of the invention is better understood when read in conjunction with the appended drawings, it being however understood that the invention is not limited to the specific embodiment disclosed.

Figure 1 is a perspective view of the interior of a vehicle cabin, showing a locking system according to an embodiment of the invention;

Figure 2 is a detailed view of Figure 1, around the locking system, the locking member being in the locked position;

Figure 3 is a view similar to Figure 2, the locking member being in the unlocked position;

Figure 4 is an exploded view of the locking system illustrated in Figure 1;

Figures 5, 6 and 7 are respectively a front view, a rear view and a side view of this locking system;

Figure 8 is a longitudinal cross section of the locking system;

Figure 9 is a perspective view partially showing the inside of the locking system;

Figure 10 shows the inner face of a side wall of a vehicle cabin as well as the frame of a cabin door;

Figure 11 is a detailed view of Figure 10, showing a support plate secured to the door frame;

Figure 12 is a detailed view of Figure 10, showing a grab handle, and a locking system according to the invention secured to the door frame by means of the support plate of Figure 11.

Detailed description of the invention

Figure 1 shows the interior of a cabin 1 of a vehicle such as a truck.

D1 is defined as the vertical direction, D2 is defined as the longitudinal direction of the vehicle, and D3 is defined as the transversal direction of the vehicle.

The cabin 1 comprises a cabin body 2 having a front wall, two side walls, namely a right side wall and a left side wall 3, and a rear wall 4, which form a driver compartment. The cabin 1 also comprises at least one seat 5 for the driver, and can comprise an additional seat (not shown) for a possible passenger. Behind the seat 5, i.e. between this seat 5 and the rear wall 4, there is provided a space which the driver generally uses to store various objects, but also to sleep during the night. To this end, a bunk 6 is provided in this area of the cabin 1.

As illustrated in Figure 10, each side wall 3 of the cabin body 2 has an aperture 7 which is arranged between a front pillar 8 (or "A pillar") of the cabin body 2 and another pillar 9 (or "B pillar") of the cabin body 2 located rearward from the front pillar 8. The aperture 7 can be closed by a door 10. The door 10 can be mounted on the cabin body 2 by means of a hinge, located near a door vertical edge. In the illustrated embodiment, the hinge is located between the front edge of the door 10 and the A pillar 8, but this embodiment shall not be considered as limitative.

The door 10 may comprise several structural beams, in particular at least one substantially vertical post 11 located near the edge of the door 10 opposite the hinge – here the rear edge – and one transverse beam 12

substantially joining the rear and front edges of the door 10. The lower part 13 of the door 10, below the transverse beam 12, includes an outer panel (not shown) generally made of metal, as well as an internal covering 14 generally made of plastic. The upper part 15 of the door 10, above the transverse beam 12, comprises a glass panel 16 and forms a window.

In the cabin 1 is provided a grab handle 20 designed to help a user to get in the cabin 1. The grab handle 20 is fastened to the cabin body 2 and protrudes inside the cabin 1. In the illustrated embodiment, the grab handle 20 is substantially L-shaped. It comprises a substantially horizontal portion 21 which has a rear end secured to the B pillar 9 and which extends frontward, facing the aperture 7, and a substantially vertical portion 22 extending from the front end of the substantially horizontal portion 21 up to the lower portion of the side wall 3. Therefore, the grab handle 20, together with the cabin body 2, forms a closed loop.

According to a different embodiment, the grab handle 20 can be secured to the cabin body 2 only via one of its ends, the other end being free. In this case the grab handle 20 forms together with the cabin body 2 an open loop.

The door 10 can be locked relative to the cabin body 2 in its closed position by means of a conventional electronic locking/unlocking system, which can be actuated both from the inside and the from outside of the cabin 1, generally by means of a remote control device.

According to the invention, there is provided a locking system 25 located inside the cabin 1 and allowing the driver to lock the door 10, relative to the cabin body 2, in its closed position, from the inside of the cabin 1.

More precisely, the locking system 25 is fastened to the inner face of the door 10. It comprises a locking member 26 which is movable between an unlocked position and a locked position. When the locking member 26 is in the locked position, the locking system 25 forms a retaining loop having a through opening 27 according to D2. When the door 10 is closed, a portion of the grab handle 20 can be received and retained in said through opening 27.

Although in what follows the locking system 25 is described as cooperating with the grab handle 20, it has to be noted that the invention is not limited to this embodiment. More generally, the locking system 25 is designed to receive and retain in the retaining loop that it forms any appropriate solid element fastened to the cabin body 2 and protruding inside the cabin 1. Said

solid element could be another type of handle provided in the cabin. It can be a rigid element or a flexible element, such as a belt, provided it has a sufficient mechanical strength to resist a traction force exerted by a person trying to open the door 10 from the outside, while the locking system 25 is locked. Preferably, said solid element can form at least part of a loop. Besides, it can be located near a pillar of the cabin body adjacent to a door edge, preferably opposite the door hinge, the locking system 25 also being located close to the same pillar.

Whatever the embodiment, the retaining loop formed by the locking system 25 has to be dimensioned according to the solid element it has to receive and retain. For example, when this solid element is a handle, such as but not limited to a grab handle 20, the solid element has a dimension allowing it to be held by a person, and the retaining loop must have an appropriate dimension to receive said solid element. In this case, in concrete terms, the smallest dimension of the through opening 27 of the retaining loop generally has to be greater than 2,5 cm.

Basically, the locking system 25 comprises:

- a fastening interface arranged to cooperate with the inner face of the door 10 to allow fastening the locking system 25 to the door 10, inside the cabin 1;

- and a receiving portion, here opposite the fastening interface. The receiving portion is opened towards the inside of the cabin 1. This receiving portion cooperates with the locking member 26 so that, in the unlocked position of the locking member 26, the receiving portion remains open towards the inside of the cabin 1 and, in the locked position of the locking member 26, the receiving portion and the locking member 26 form the retaining loop capable of receiving and retaining said solid element. In the following embodiments the receiving portion if, for instance, formed by a recessed portion that is open in a direction opposite the fastening interface.

In the illustrated embodiment, the locking system 25 comprises a housing 24 having a rear plate 28 and a cover 29 secured to the rear plate 28, for example by means of fasteners 30, such as screws. Said fasteners 30 can engage holes 31 provided in the rear plate 28 and sleeves 32 protruding from the inner side of the cover 29.

The rear plate 28 forms at least part of the fastening interface arranged to cooperate with the inner face of the door 10 to allow fastening the locking system 25 to the door 10, inside the cabin 1. Preferably, in order to take

advantage of existing elements of the cabin 1, the locking system 25 can be secured to at least one structural beam of the door 10.

The fastening interface of the locking system 25 can further comprise a support plate 33 which is fastened to the inner side of the door 10 and on which the rear plate 28 is secured.

According to an embodiment shown in Figures 11 and 12, the support plate 33 can be secured to the vertical post 11 and the transverse beam 12 of the door 10, and the rear plate 28 can be fastened to the support plate 33 through the internal covering 14 of the door 10. In other words, the internal covering 14 of the door 10 is sandwiched between the support plate 33 and the rear plate 28 of the housing 24. The internal covering 14 is not illustrated on Figure 12 so that the support plate 33 can be seen.

The mounting of the locking system 25 on the door 10 can comprise the following steps. First of all, the internal covering 14 of the door 10 is removed. There is generally further provided a holder of the internal covering (not depicted) which is secured to the lower part 13 of the door 10, on the inner face of the door 10. This holder is removed too, and its rear part is cut to form a notch having substantially the form of the support plate 33. The support plate 33 is then secured to the door 10, preferably by means of the bolts 34 that are used to secure the transverse beam 12 to the vertical post 11 (see Figure 10). This is advantageous in that it makes it possible to benefit from existing fastening means.

The holder of the internal covering 14 can then be put back on the door frame, with the cut notch receiving the support plate 33. After holes have been made in the internal covering 14, for allowing the fastening of the locking system 25, said internal covering 14 is secured back to the door 10, over the support plate 33. Finally, the locking system 25 can be secured to the support plate 33, fastening means (not shown) such as screws being inserted through holes 35 arranged in the rear plate 28 and the above mentioned holes made in the internal covering 14. As shown in Figure 4, openings 36 can be arranged in the cover 29, substantially facing the holes 35 of the rear plate 28, to allow a user to introduce a tool such as a screwdriver in order to secure the rear plate 28 to the support plate 33. Furthermore, a plug 37 may be provided to close the openings 36 when the locking system 25 has been secured to the door 10.

The locking system 25 is secured to the door 10 in a position ensuring it can receive and retain the solid element. More precisely, in the

embodiment shown, the locking member 26 is positioned substantially vertically, and the retaining loop of the locking system 25 is designed to receive and retain the substantially horizontal portion 21 of the grab handle 20 which in particular means that the locking system 25 is located near the door edge adjacent the B pillar.

The components and operation of the locking system 25 will now be described.

When the locking system 25 is secured on the cabin door 10, the rear plate 28 is substantially located in a plane (D1, D2). The cover 29 of the housing 24 forms with the rear plate 28 an inner space in which is located the locking mechanism.

The locking member 26 is movable relative to the housing 24 according to a translation along the direction D1, between an unlocked position – preferably corresponding to a low position – and a locked position – therefore corresponding to a high position.

In the illustrated embodiment, the locking member 26 comprises a rigid plate, for example made of metal, which is located in a plane (D1, D2). It has a lower rectangular portion 38 and an upper rectangular portion 39 of smaller width (along D2); therefore forming at least one shoulder 40. The locking member 26 can further comprise a hole 41 arranged at its upper end portion.

The cover 29 has a raised portion 42, which in the embodiment shown is located substantially centrally along D1, and the cover 29 forms the recessed portion 43 located above the raised portion 42.

The recessed portion 43 is open in a direction opposite the fastening interface, and has a bottom wall 44 which faces the inside of the cabin 1, when the locking system 25 is fastened on the door 10. Besides, the raised portion 42 includes a lower slot 17 and an upper slot 18 which extends substantially along D2 and through which the locking member 26 is inserted and can slide while being guided.

When the locking member 26 is in the unlocked position, i.e. the low position, access to the recessed portion 43 is substantially unobstructed: the grab handle 20 can enter the recessed portion 43 or go out of said recessed portion 43 when the door 10 is closed, respectively opened (see Figure 3). When the locking member 26 is in the locked position, i.e. the high position, the upper rectangular portion 39 of the locking member 26 faces the

bottom wall 44 and is located at a distance from said bottom wall 44: the retaining loop is formed by the recessed portion 43 and the locking member 26 and can retain the grab handle 20 previously engaged in the recessed portion 43, therefore preventing the door 10 from being opened (see Figure 2).

First elastic return means are provided to urge the locking member 26 towards its unlocked position. In the illustrated embodiment, said first elastic return means comprise a helical spring 45 having a substantially vertical axis. A first end 46 of the helical spring 45 is connected to the locking member 26. For example, the first end 46 can comprise a hook engaging a rod 47 extending along D3 and secured to the locking member 26. Moreover, the second end 48 of the helical spring 45 is connected to the housing 24. For example, the second end 48 can comprise a hook engaging one of the sleeves 32 designed for securing the cover 29 to the rear plate 28.

To lock the locking system 25, a user has to push upwards the locking member 26 against the first elastic return means. To that end, a lower button 49 can be fastened to the lower end of the locking member 26, outside the housing 24, and can be handled by the user. Insofar as moving the locking member 26 towards its locked position is made by an upwards movement, the risk of the door 10 being accidentally locked is fairly low.

The locking system 25 comprises a securing mechanism for maintaining the locking member 26 in the locked position. The securing mechanism can comprise a retaining element 50 movable between:

- an active position, in which the retaining element 50 cooperates with the locking member 26, when said locking member 26 is in the locked position, in order to keep it in the locked position;
- and an inactive position, in which the retaining element 50 allows the locking member 26 to move towards its unlocked position, due to the first elastic return means.

The securing mechanism can comprise second elastic return means 51, for example two helical springs, urging the retaining element 50 towards its active position.

In the exemplary embodiment shown in the figures, the retaining element 50 can move according to a translation along D3, the springs 51 having an axis substantially parallel to D3. The retaining element 50 comprises a protrusion 52 at its end arranged towards the inside of the cabin 1. The protrusion 52 has a lower inclined surface 53 acting as a ramp and a

substantially horizontal surface 54 acting as a stop. The retaining element 50, which can have substantially the form of a parallelepiped, further comprises a wall 55 (see Figure 8) which forms a ramp inclined in an opposite direction as compared to the ramp 53.

Besides, the locking system 25 can comprise an actuating member which can be actuated by a user in order to deactivate the securing mechanism. In the illustrated embodiment, the actuating member comprises a button 56 having a leg 57 engaged in a hole arranged in the upper wall of the cover 29, the leg 57 extending rearward.

When the locking member 26 is moved upwardly by a user in order to lock the locking mechanism 25, the upper edge of the locking member 26 comes into contact with the lower inclined surface 53 of the protrusion 52. Pushing the locking member 26 further upwards therefore entails a movement of the retaining element 50 towards the rear plate 28, along D3, against the springs 51, until the hole 41 of the locking member 26 faces the protrusion 52. Because the springs 51 urge the retaining element 50 towards the inside of the cabin 1, the protrusion 52 is made to engage the hole 41, thereby securing the locking member 26 in the locked position. The leg 57 of the button 56 being oriented rearward, it does not hamper the movement of the retaining element 50 towards the rear plate 28.

When the user wants to unlock the door, he acts on the button 56, by pushing it downwards, this being an easy and intuitive operation.

Because the leg 57 of the button 56 bears on the wall 55 which forms an inclined ramp, moving the button 56 downwards causes a translation of the retaining element 50 towards the rear plate 28, i.e. towards its inactive position, against the springs 51. Due to the spring 45, the locking member 26, which is no more maintained in the locked position, is moved downwards, towards its unlocked position.

In order to prevent the occurrence of too much noise and vibrations that could be uncomfortable for the user, the locking system 25 may be provided with:

- an absorbing pad 58 located close to the helical spring 45 and designed to limit the radial movement of said spring 45. This absorbing pad 58 can be secured to a lateral wall of the cover 29, near a lower portion of the spring 45;

- and/or a device 59 for slowing down at least the end of the movement of the locking member towards its unlocked position. This device 59 can comprise a hydraulic or a pneumatic cylinder secured to the housing 24 and extending substantially along D1. The device 59 can comprise a cylinder into which can slide a piston 60. For example, the upper end of the piston 60 is designed to come into contact with the rod 47 before the locking member 26 has reached its unlocked position.

The advantage of the locking system according to the invention over electronic locking systems is that it cannot be easily deactivated by a person trying to open the door from the outside. Indeed, the locking system according to the invention can only be deactivated manually, mechanically. To that end, said person has to push downward the button allowing to unlock the system. However, said button is not easily visible from the outside, which means that the person do not even see how to unlock the door. Even if this person sees the button, pushing the button requires first to break the window, which wakes the driver up and gives him time to prepare. Generally, the person trying to open the door feels a resistance and abandon his plans.

One significant advantage of the invention is that it uses a solid element preferably pre-existing in the cabin, particularly a grab handle. A grab handle is systematically provided on a truck, to help the driver to get in the cabin. This ensures that the locking system according to the invention can be mounted on any truck as an aftermarket product, not only as a product suitable only for new trucks. Moreover, as grab handles are secured to the cabin body and located around the door frame, they can be easily used as part of a system for locking the door.

The locking system according to the invention is fairly simple, resulting in a low integration cost, as compared with a system that would require an additional part fastened both on the cabin body and on the door frame. The implementation of the system is simplified because it only involves the door. By its low impact on the surrounding elements, the locking system according to the invention can be integrated like an accessory on a vehicle not already provided with this facility.

The invention is of course not limited to the embodiment described above as an example, but encompasses all technical equivalents and alternatives of the means described as well as combinations thereof.

CLAIMS

1. A locking system for locking a door (10) of a vehicle cabin (1), the locking system (25) comprising a locking member (26) movable between an unlocked position and a locked position, characterized in that the locking system (25) further comprises:

- a fastening interface designed to allow fastening the locking system (25) on a door (10) of the cabin (1);
- a receiving portion which is opened towards a first direction opposite the fastening interface and which cooperates with the locking member (26) so that, in the unlocked position of the locking member (26), the receiving portion remains open towards said first direction and, in the locked position of the locking member (26), the receiving portion and the locking member (26) form a retaining loop having a through opening (27) according to a second direction.

2. A locking system according to claim 1, characterized:

- in that the fastening interface is designed to cooperate with an inner face of a door (10) to allow fastening the locking system (25) to the door (10), inside a cabin (1);
- and in that, when the locking member (26) is in the unlocked position, the receiving portion is adapted to receive, when the door (10) is closed, a solid element (20) fixed to the cabin body (2) and protruding inside the cabin (1) and, when the locking member (26) is in the locked position, the retaining loop is adapted to retain said solid element (20).

3. The locking system according to claim 2, characterized in that the retaining loop is dimensioned so that it is adapted to receive and retain a handle (20) as the solid element.

4. The locking system according to claim 3, characterized in that the smallest dimension of the through opening (27) of the retaining loop is greater than 2,5 cm.

5. The locking system according to any one of claims 1 to 4, characterized in that the second direction is substantially perpendicular to the

first direction and in that the receiving portion has a substantially U-shaped cross section in a plane orthogonal to the second direction.

6. The locking system according to any one of claims 1 to 5, characterized in that it comprises a housing (24), the locking member (26) being movable relative to the housing (24), the retaining loop being formed by the housing (24) and the locking member (26).

7. The locking system according to any one of claims 1 to 6, characterized in that it comprises a housing (24) having a recessed portion (43) which forms the receiving portion.

8. The locking system according to claim 6 or 7, characterized in that the housing (24) has a recessed portion (43) having a bottom wall (44) which faces the inside of the cabin (1) when the locking system (25) is fastened on the door (10), the locking system (25) being arranged so that, when the locking member (26) is in the unlocked position, access to the recessed portion (43) is substantially unobstructed, and when the locking member (26) is in the locked position, part of the locking member (26) faces the bottom wall (44) and is located at a distance from said bottom wall (44), so that the retaining loop is formed by the recessed portion (43) and the locking member (26).

9. The locking system according to any one of claims 1 to 8, characterized in that the locking member (26) is arranged to move according to a translation.

10. The locking system according to any one of claims 1 to 9, characterized in that it comprises a housing (24) having a rear plate (28) forming at least part of the fastening interface, and a cover (29) secured to the rear plate (28).

11. The locking system according to any one of claims 1 to 10, characterized in that it comprises first elastic return means (45) urging the locking member (26) towards its unlocked position.

12. The locking system according to claim 11, characterized in that the first elastic return means comprise a helical spring (45) having a first end (46) connected to the locking member (26) and a second end (48) connected to the housing (24).

13. The locking system according to claim 12, when depending on claim 10, characterized in that the second end (48) of the helical spring (45) is connected to a piece (32) of the housing (24), for example a piece of the cover (29), designed for securing the cover (29) to the rear plate (28).

14. The locking system according to claim 12 or 13, characterized in that it comprises an absorbing pad (58) located close to the helical spring (45) and designed to limit the radial movement of said helical spring (45).

15. The locking system according to any one of claims 11 to 14, characterized in that it comprises a device (59) for slowing down at least the end of the movement of the locking member (26) towards its unlocked position.

16. The locking system according to any one of claims 1 to 15, characterized in that it comprises a securing mechanism for maintaining the locking member (26) in the locked position and an actuating member (56) which can be actuated by a user in order to deactivate the securing mechanism.

17. The locking system according to claim 16, characterized in that the securing mechanism comprises a retaining element (50) movable between:

- an active position, in which the retaining element (50) cooperates with the locking member (26), when said locking member (26) is in the locked position, in order to keep it in the locked position;
- and an inactive position, in which the retaining element (50) allows the locking member (26) to move towards its unlocked position.

18. The locking system according to claim 17, characterized in that the securing mechanism comprises second elastic return means (51) urging the retaining element (50) towards its active position, and in that the retaining

element (50) is designed so that the movement of the locking member (26) towards its locked position causes a movement of the retaining element (50) towards its inactive position, against said second elastic return means (51), to allow the movement of the locking member (26) up to its locked position.

19. The locking system according to claim 17 or 18, characterized in that the retaining element (50) comprises a protrusion (52) capable of engaging a hole (41) arranged in the locking member (26), in the locked position.

20. The locking system according to any one of claims 17 to 19, characterized in that the locking member (26) is arranged to move according to a translation in a first direction (D1), in that the retaining element (50) is arranged to move according to a translation in a second direction (D3) substantially orthogonal to the first direction (D1), the retaining element (50) comprising an inclined surface (53) forming a ramp capable of cooperating with the locking member (26).

21. The locking system according to any one of claims 17 to 20, characterized in that the actuating member comprises a button (56) having a leg (57) bearing on a wall (55) of the retaining element (50) which forms an inclined ramp, such that moving the button (56) causes a translation of the retaining element (50) towards its inactive position.

22. The locking system according to any one of claims 1 to 21, characterized in that the locking member (26) comprises a rigid plate.

23. A cabin of a vehicle, comprising:

- a cabin body (2);
- a solid element (20) fastened to the cabin body (2) and protruding inside the cabin (1);
- a door (10) mounted on the cabin body (2);
- a locking system (25) located inside the cabin (1), for locking the door (10) relative to the cabin body (2) in the closed position, the locking system (25) comprising a locking member (26) movable between an unlocked position and a locked position;

characterized in that the locking system (25) is fastened to the inner face of the door (10) and in that, when the locking member (26) in the locked position, the locking system (25) is arranged to retain the solid element (20).

24. The cabin according to claim 23, characterized in that the locking system (25) comprises a receiving portion which is opened towards the inside of the cabin (1) and which cooperates with the locking member (26) so that:

- in the unlocked position of the locking member (26), the receiving portion remains open towards the inside of the cabin (1) and receives the solid element (20), when the door (10) is closed;
- and, in the locked position of the locking member (26), the receiving portion and the locking member (26) form a retaining loop having a through opening (27) and retaining said solid element (20).

25. The cabin according to claim 23, characterized in that the locking system (25) is according to any one of claims 1 to 22.

26. The cabin according to claim 23 or claim 24, characterized in that the solid element (20) forms at least part of a loop extending from the cabin body (2):

27. The cabin according to any one of claims 23 to 26, characterized in that the solid element (20) is located near a pillar (9) of the cabin body (2) adjacent to a door edge.

28. The cabin according to any one of claims 23 to 27, characterized in that the solid element is a grab handle (20) designed to help a user to get in the cabin (1).

29. The cabin according to any one of claims 23 to 28, characterized in that the locking system (25) is secured to at least one structural beam (11, 12) of the door (10).

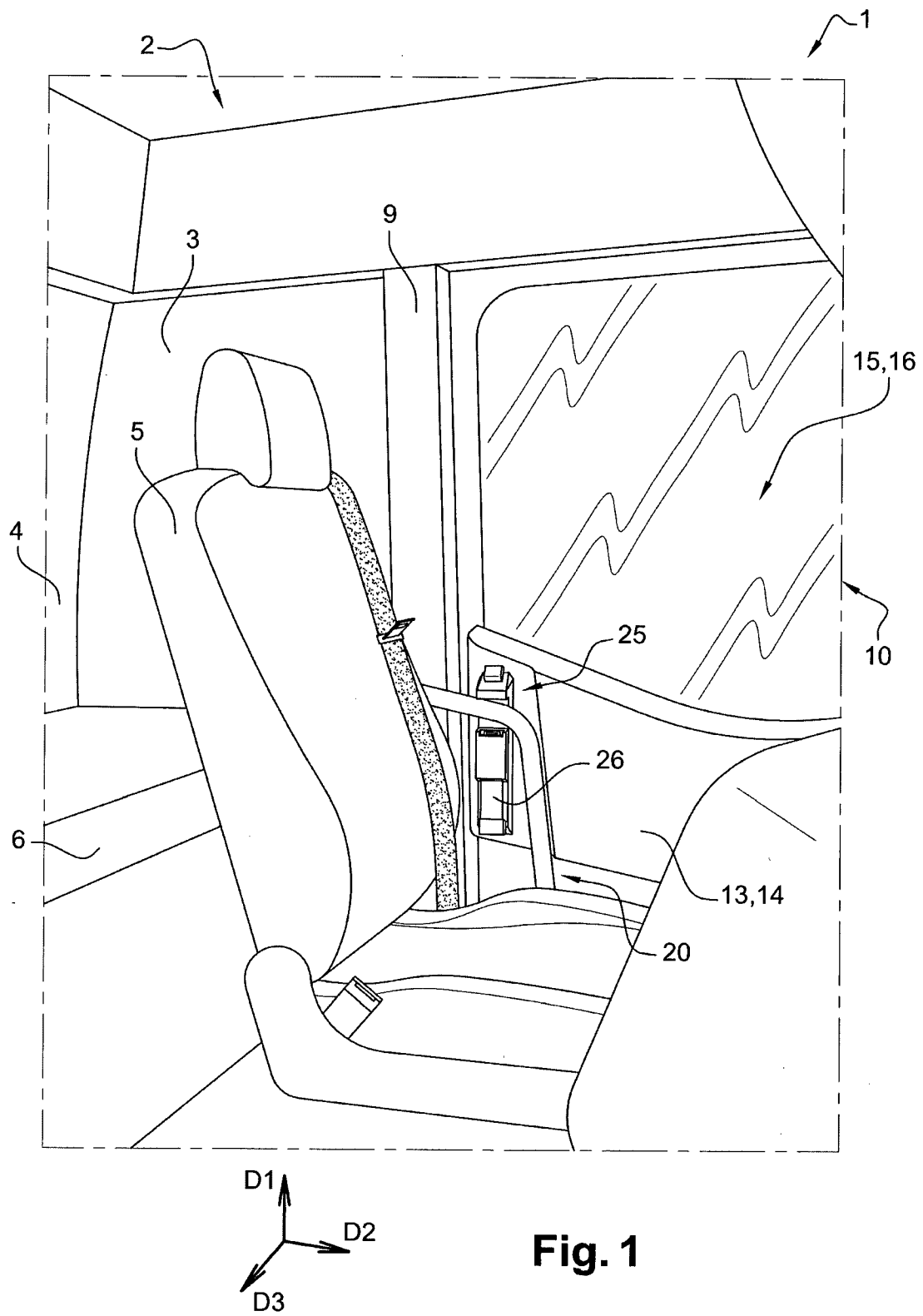
30. The cabin according to any one of claims 23 to 29, characterized in that the locking system (25) comprises:

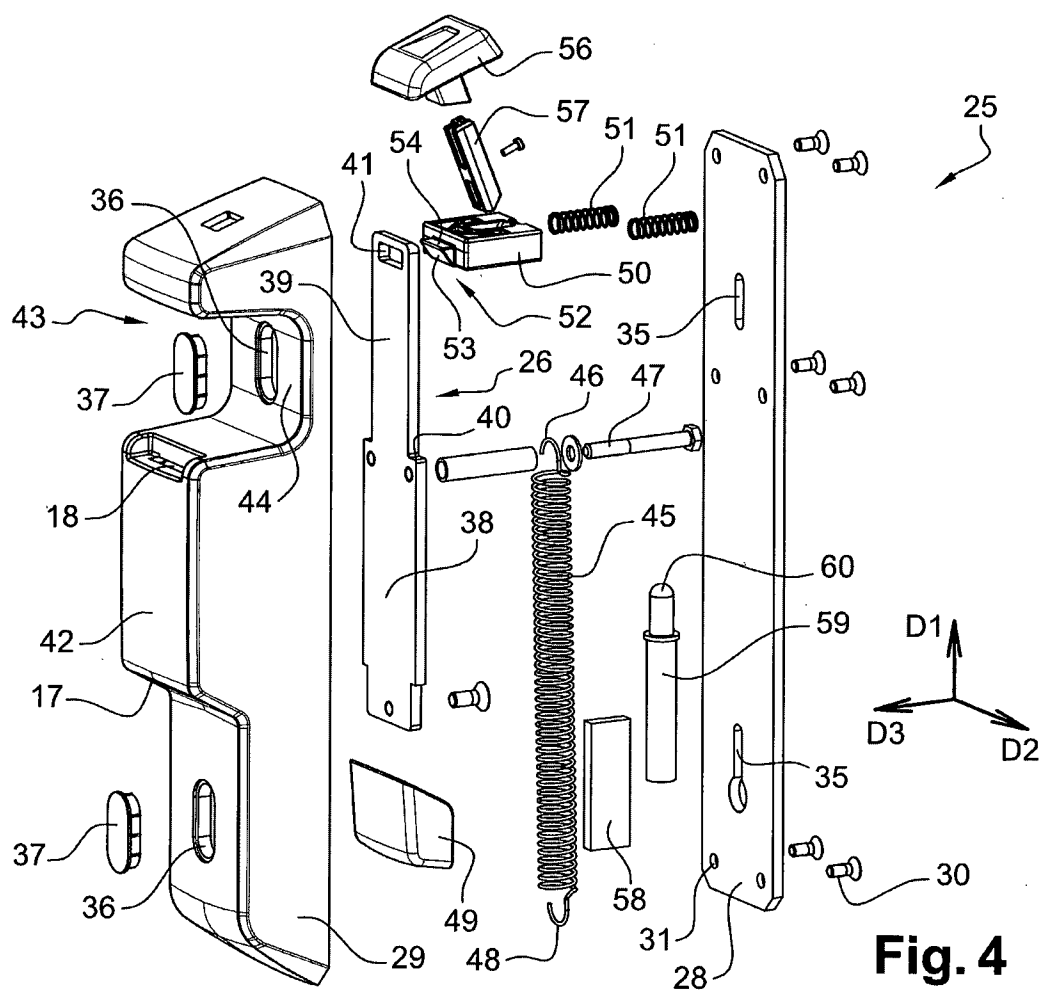
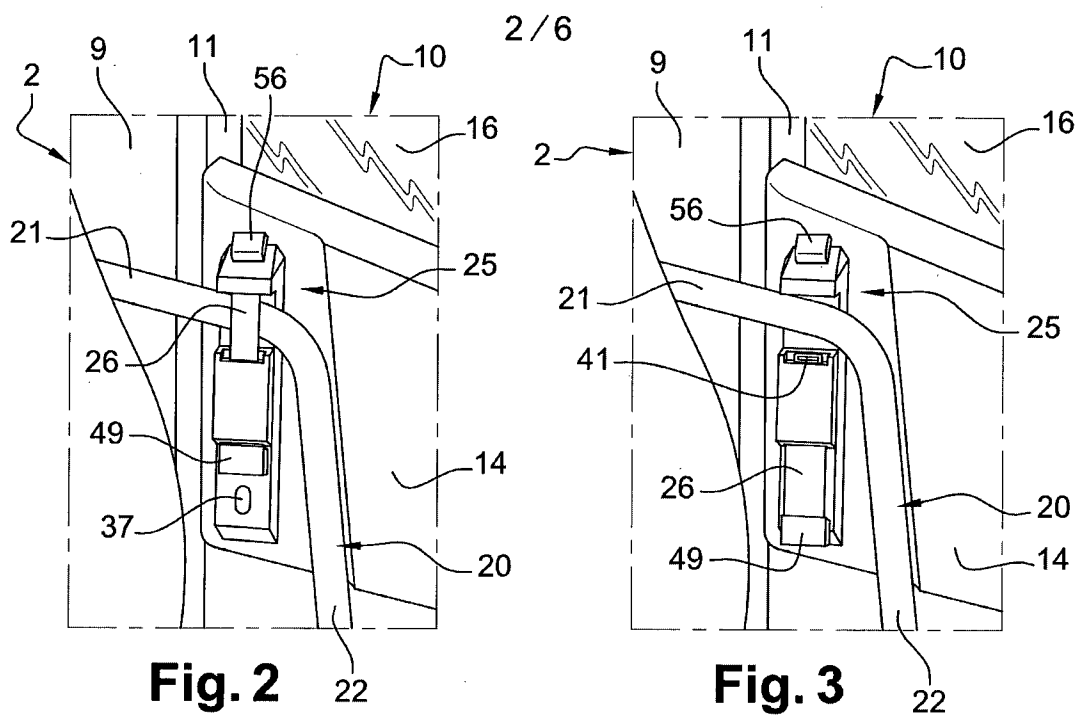
- a housing (24) having a rear plate (28);
- a support plate (33) which is fastened to the inner side of the door (10), and on which the rear plate (28) is secured, an internal covering (14) of the door (10) being sandwiched between the support plate (33) and the rear plate (28) of the housing (24).

31. The cabin according to any one of claims 23 to 30, characterized in that the locking system (25) comprises an actuating member (56) which can be actuated by a user in order to cause the locking member (26) to move towards its unlocked position, the actuating member (56) being positioned and arranged so that it can be actuated by a downward push of the user.

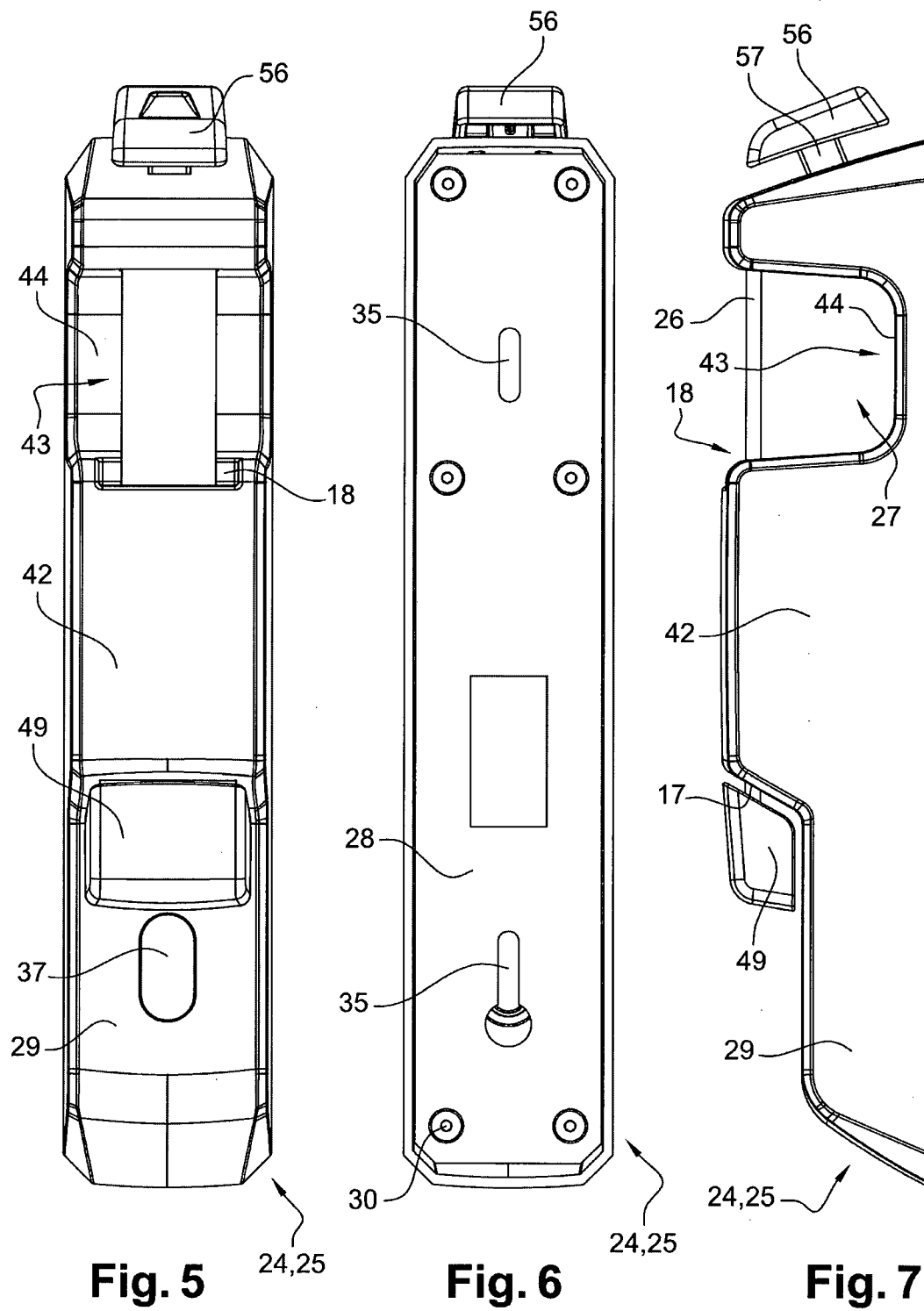
32. The cabin according to any one of claims 23 to 31, characterized in that the locking member (26) is positioned substantially vertically, the retaining loop of the locking system (25) being designed to receive and retain a substantially horizontal portion (21) of the solid element (20).

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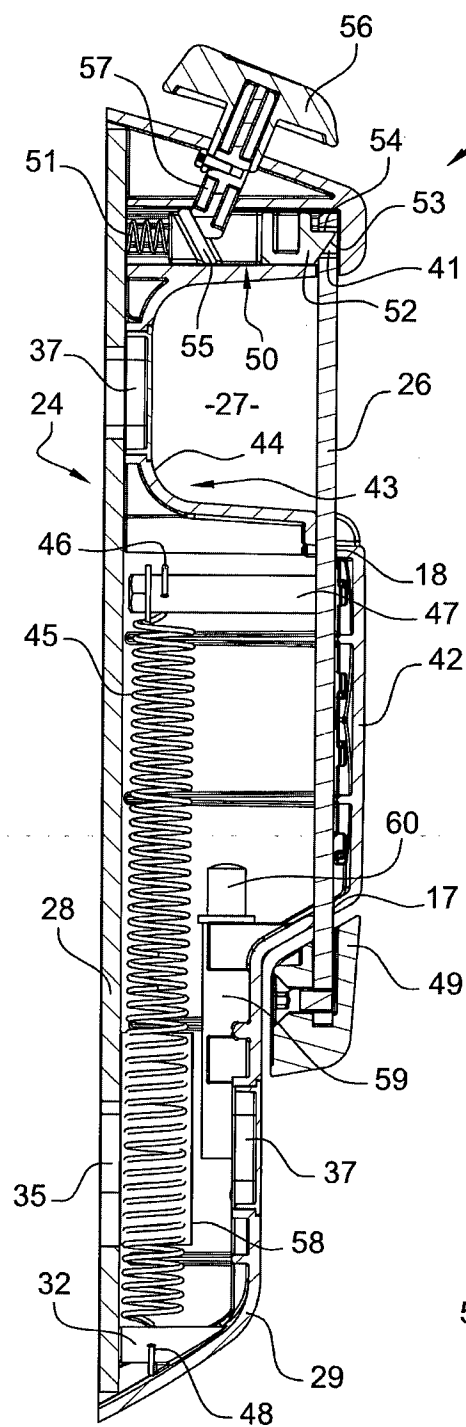


Fig. 8

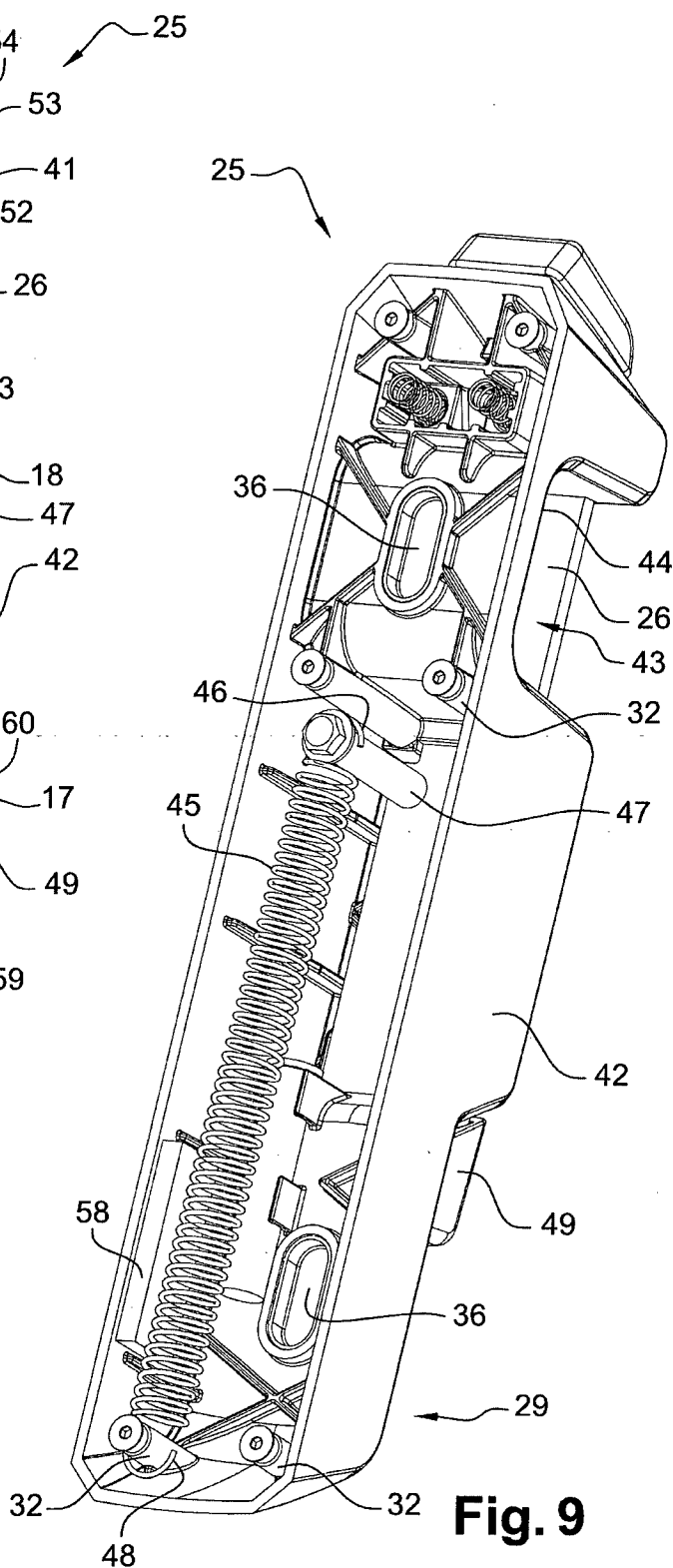


Fig. 9

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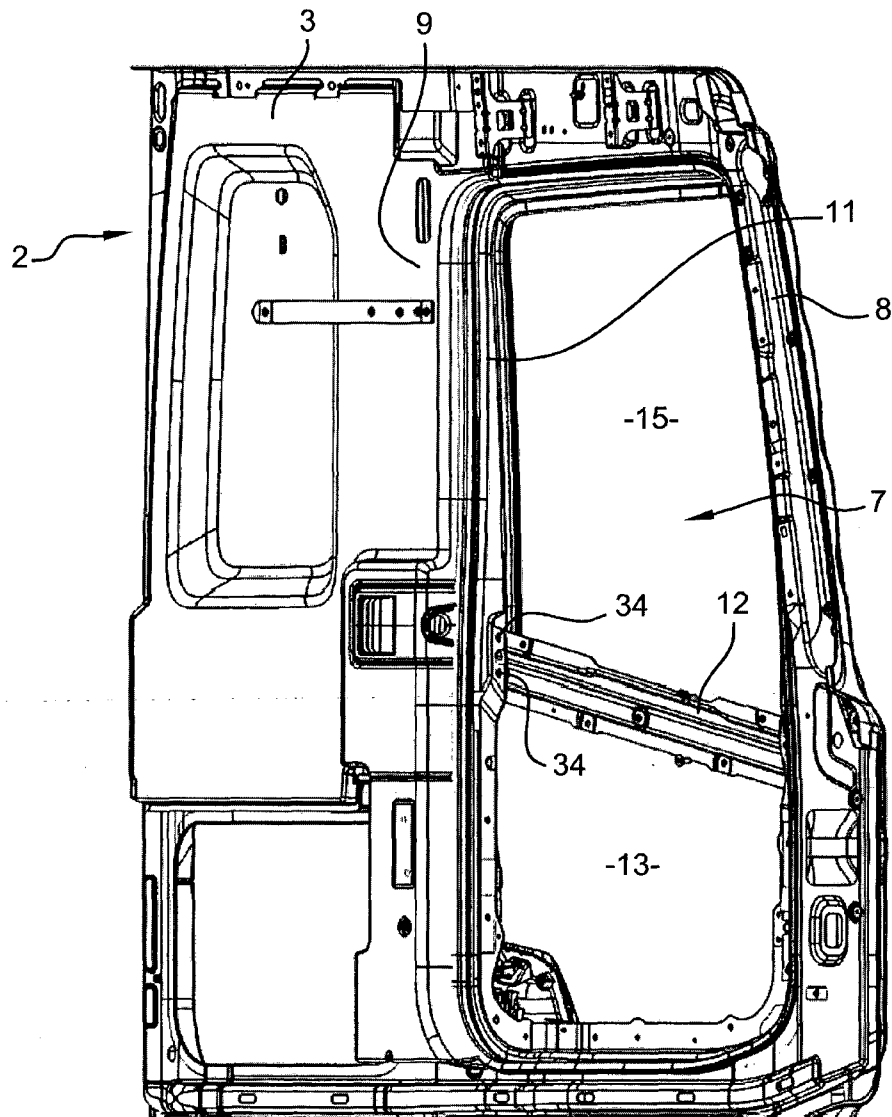


Fig. 10

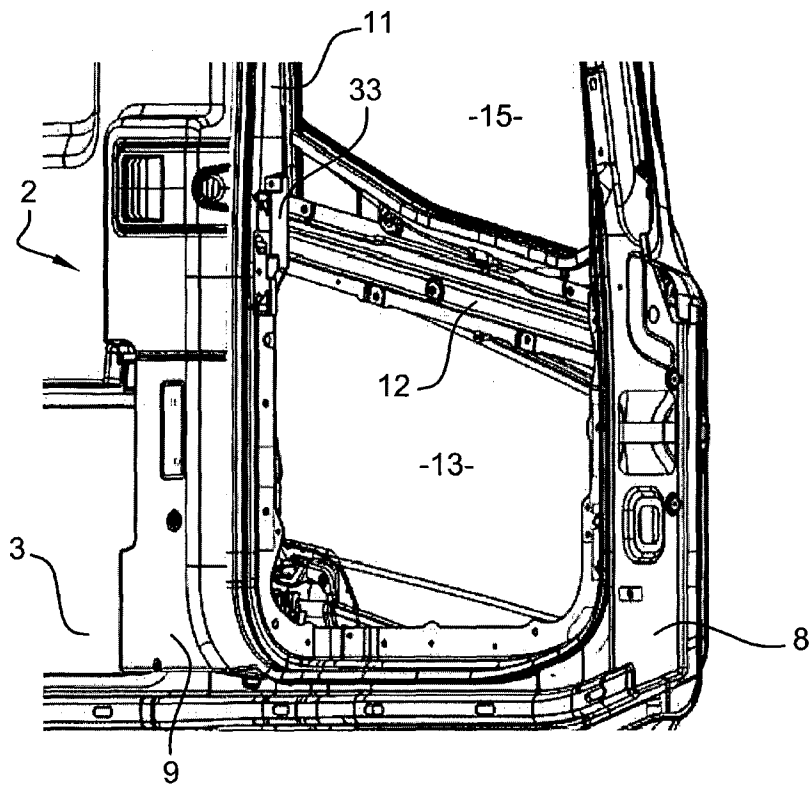


Fig. 11

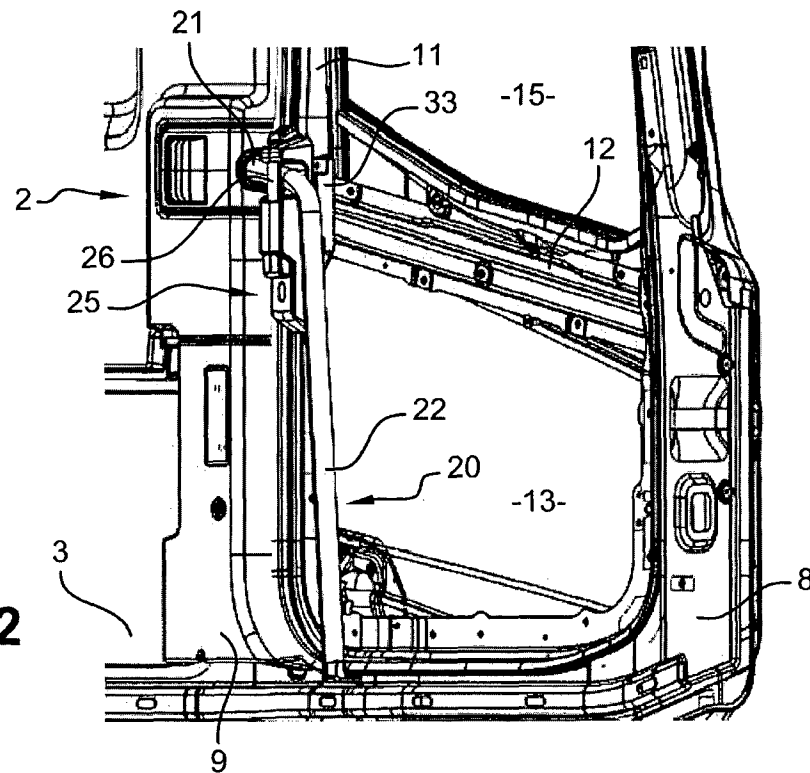


Fig. 12

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/001474

A. CLASSIFICATION OF SUBJECT MATTER INV. E05B17/20 E05B77/28 E05B77/44 E05B83/42 E05C1/04 ADD.		
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 E05C		
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 practicable, search terms used) EP0-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/120040 A1 (GROENVELD ROELF JOHAN [NL]) 25 October 2007 (2007-10-25)	1-15, 22-30,32
Y	the whole document -----	16-21,31
X	US 5 445 470 A (SCHIRTZINGER GARY A [US]) 29 August 1995 (1995-08-29) column 2; claim 1; figures 1-3 -----	1,16-21
Y	NL 1 012 724 C2 (STENMAN HOLLAND NV [NL]) 1 February 2001 (2001-02-01) page 3 - page 4; figures 1-7 -----	16-21,31
Y	US 4 179 143 A (SHY MIN C [TW]) 18 December 1979 (1979-12-18) column 2; figures 2-3,7-8 -----	16-21,31
-/--		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 21 March 2014	Date of mailing of the international search report 31/03/2014	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Ansel, Yannick	

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/001474

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 296 07 349 U1 (PAEBST KNUT [DE]; KLABUNDE FRANK [DE]) 22 August 1996 (1996-08-22) the whole document	23
A	----- DE 10 2007 030255 A1 (HS GENION GMBH [DE]) 2 January 2009 (2009-01-02) paragraphs [0002], [0007]; figures 1-2 -----	23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2013/001474

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007120040	A1	25-10-2007	EP 2013433 A1 14-01-2009 NL 1033540 C1 19-10-2007 WO 2007120040 A1 25-10-2007
US 5445470	A	29-08-1995	NONE
NL 1012724	C2	01-02-2001	NONE
US 4179143	A	18-12-1979	NONE
DE 29607349	U1	22-08-1996	NONE
DE 102007030255	A1	02-01-2009	DE 102007030255 A1 02-01-2009 EP 2189338 A2 26-05-2010