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(54) **Device for locking the door of vehicles**

(57) A device (1) for locking the door of vehicles, of the type of vans, trucks, lorries, semi-trailer trucks, trailers and the like, comprising a base plate (2), which can be rigidly coupled to the frame of a vehicle, proximate to a door thereof; the plate (2) comprises means of retention for a lever (3), which can be rigidly keyed on a bar that is rotatably supported by the door; the lever (3) can rotate from at least one first angular position, in which the lever (3) can be engaged with the plate (2), by way of the retention means, for the locking of the door so as to close the compartment, to at least one second angular position, in which the lever (3) is disengaged from the plate (2), for the release and free movement of the door, and vice versa; the device (1) moreover comprises a button (8), which is fixed to the plate (2) and has a tooth (8a) which is arranged, in a first configuration of operation, so as to

interfere with an abutment flap (3a) of the lever (3), in order to obstruct the accidental rotation of the lever (3). The button (8) is supported so that it can rotate by a pin (9) which is secured to the plate (2), for the rotation, in a first direction of rotation (A), from the first configuration to at least one second configuration, in which the tooth (8a) is disengaged from the flap (3a), for the free rotation of the lever (3), and vice versa. When the lever (3) is engaged with the plate (2), and the button (8) is arranged in the first configuration, the point of contact (10) between the flap (3a) and the button (8), following an attempt to rotate the lever (3) in order to release the door, has a preset center distance (B) with respect to the rotation axis (C) of the pin (9), so as to develop a moment that is adapted to impose a rotation on the button (8) in a second direction of rotation, opposite to the first direction of rotation (A).

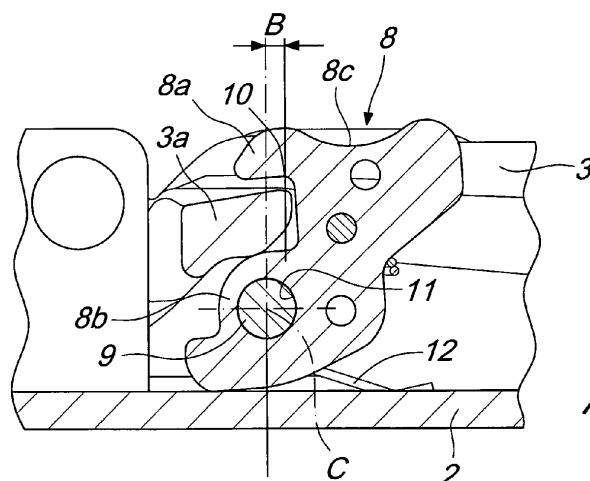


Fig. 5

Description

[0001] The present invention relates to a device for locking the door of vehicles.

[0002] Nowadays, the doors of vehicles such as vans, lorries, trucks, etc, are typically provided with specific apparatuses, called undersill devices, which are capable of ensuring the stable locking of the rear door in the closed configuration of the inner compartment of the container, thus preventing the accidental opening thereof and at the same time allowing manual actuation by an operator who wants to have access to the compartment.

[0003] Thus in substantially known manner, such devices comprise at least one base plate, which can be rigidly secured to the frame of the vehicle, below the door. When the door is arranged in the closed configuration of the compartment, the base plate can be coupled with a lever, which is keyed on the lower end of a bar, which is rotatably supported by the door itself, for the stable locking of the door.

[0004] More generally, when the door is open, the operator can grasp the lever in order to pull the latter into the closed configuration of the compartment, and, once such configuration is reached, he or she can lock the door by rotating the lever until it engages, as mentioned, with the plate.

[0005] Subsequently, a rotation of the lever, imparted in the opposite direction by the operator, causes the disengagement of the lever from the plate and thus makes it possible to open the door, thus allowing access to the compartment.

[0006] The undersill devices described above are moreover typically provided with apparatuses that guard against the danger of accidental openings of the door, an event that could occur following, for example, knocks against the lever, or as a result of vibrations and other stresses, transmitted to the lever and/or to the plate during the normal operation of the vehicle on which they are installed.

[0007] The above mentioned apparatuses usually comprise a tooth which is normally arranged so as to interfere with the free rotation of the lever, precisely in order to prevent the accidental release of the lever. Such tooth can be moved, by acting on a button, in order to remove the restriction on the rotation of the lever, and thus allow, on command, the opening of the door.

[0008] Such implementation solution is not however devoid of drawbacks.

[0009] The simple contrivance described above often does not give the devices the necessary level of safety against a possible accidental release. Moreover, even with the adoption of the implementation solution described above, the possibility cannot be ruled out that, by acting with great force on the lever (or following a very violent shock), in the attempt to release the door, the breakage will be caused of the tooth and/or of the button, or simply the unwanted movement of the button, with consequent unwanted opening of the door itself and/or

damage to the device.

[0010] Therefore, in order to increase the guarantee that the locked configuration of the door is maintained, it is common to adopt double buttons (with respective springs adapted to keep them in position), or other further safety components.

[0011] The adoption of a second button, substantially functioning in accordance with the principles highlighted above, is thus often adopted in order to ensure the correct operation of the undersill device even following the breakage of one of the two buttons (or even only of one of the two teeth or of one of the two springs), as explained above.

[0012] Against this, it should be noted that the market in the sector increasingly requires implementation solutions that, while maintaining the qualitative and functional standards that the end consumer demands, offer ever-lower costs, in order to maintain the necessary competitiveness with a competition that is increasingly aggressive.

[0013] It thus seems evident that it is extremely difficult, if not impossible, to ensure that costs are kept low when the device is provided with highly complex apparatuses, such as those described above.

[0014] The aim of the present invention is to solve the above mentioned problems, by providing a device that is capable of achieving the locking of the door for closing the rear compartment of a vehicle of the type of lorries, vans, trucks, while at the same time guarding against the danger of accidental opening, with a simple and practical solution.

[0015] Within this aim, an object of the invention is to provide a device that is capable of locking the door of the vehicle in the closed configuration, while at the same time providing precautions against the danger of accidental opening, with a solution which is low cost.

[0016] A further object of the invention is to provide an economic device that ensures high reliability of operation, by reducing the risk of breakage of its components.

[0017] Another object of the invention is to provide an economic device that also ensures the required functionalities in the event of malfunction and breakage of one of its components.

[0018] Another object of the invention is to provide a device that is safely applied.

[0019] Another object of the invention is to provide a device that can be easily implemented using elements and materials that are readily available on the market.

[0020] This aim and these and other objects which will become better apparent hereinafter are achieved by a device for locking the door of vehicles, of the type of vans, trucks, lorries, semi-trailer trucks, trailers and the like, that comprises a base plate, which can be rigidly coupled to the frame of a vehicle, proximate to a door thereof, said plate comprising means of retention for a lever, which can be rigidly keyed on a bar that is rotatably supported by the door, said lever being rotatable from at least one first angular position, in which said lever can be en-

gaged with said plate, by way of said retention means, for the locking of the door so as to close the compartment, to at least one second angular position, in which said lever is disengaged from said plate, for the release and free movement of the door, and vice versa, **characterized in that** it comprises a button, which is fixed to said plate and which has a tooth that is arranged, in a first configuration of operation, so as to interfere with an abutment flap of said lever, in order to obstruct the accidental rotation of said lever, said button being rotatably supported by a pin which is secured to said plate, for the rotation, in a first direction of rotation, from said first configuration to at least one second configuration, in which said tooth is disengaged from said flap, for the free rotation of said lever, and vice versa, when said lever is engaged with said plate and said button is arranged in said first configuration, the point of contact between said flap and said button, following an attempt to rotate said lever in order to release the door, having a preset center distance with respect to the rotation axis of said pin, for the development of a moment that is adapted to impose a rotation on said button in a second direction of rotation, opposite to said first direction of rotation.

[0021] Further characteristics and advantages of the invention will become better apparent from the description of a preferred, but not exclusive, embodiment of the device according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a front elevation view of the locking device according to the invention;
 Figure 2 is a view from below of the lever and the plate, mutually engaged;
 Figure 3 is a side elevation view of the lever and the plate, mutually engaged;
 Figure 4 is a sectional view of Figure 1, taken along the line IV-IV;
 Figure 5 is a greatly enlarged detail of Figure 4;
 Figure 6 is a view from below of a further component of the locking device according to the invention;
 Figure 7 is a sectional view of Figure 1, taken along the line VII-VII.

[0022] With particular reference to the figures, the reference numeral 1 generally designates a device for locking the door of vehicles, of the type of vans, trucks, lorries, semi-trailer trucks, trailers and the like. More specifically, according to the preferred application, the device 1 enables the locking of the rear door of vehicles such as those mentioned above, which is placed so as to close an inner compartment intended for the storage and transport of various types of goods.

[0023] Constant reference will therefore be made to such preferred application hereinafter, but the possibility is not ruled out of the use (which still comes under the scope of protection claimed herein) of the device 1 according to the invention in different applications, accord-

ing to specific requirements.

[0024] The locking device 1 comprises a base plate 2, which can be rigidly coupled to the frame of the vehicle (usually, below the door, or in any case proximate to it).

[0025] The plate 2 comprises means of retention for a lever 3, which can be rigidly keyed on a bar which is rotatably supported by the door (and more specifically on a first end portion 4a of the bar, shown in dotted lines in Figure 1).

[0026] The lever 3 can rotate from a first angular position (in which the lever 3 and the other components of the locking device 1 are shown in the accompanying figures), in which the lever 3 can be engaged with the plate 2, by way of the aforementioned retention means, for the purpose of locking the door in order to close the compartment, to at least one second angular position, in which the lever 3 is disengaged from the plate 2, in order to thus allow the release and free movement of the door (and access to the compartment), and vice versa.

[0027] More generally, an operator can grasp the lever 3, when the door is open, in order to pull the door into the closed configuration of the compartment, and, once such configuration is reached, he or she can lock the door by rotating the lever 3 until it is arranged in the first angular position (shown in the accompanying figures), in which it is stably engaged with the plate 2, thus preventing the free movement (and accidental opening) of the door.

[0028] It should be noted that in substantially conventional manners, the locking device 1 according to the invention can also comprise an abutment lamina 5 (also called a "striker"), which in turn can be rigidly coupled to the frame of the vehicle, usually above the door (and substantially vertically aligned with the plate 2).

[0029] The lamina 5 comprises engagement means 6 for a pawl element 7, which in turn can be rigidly keyed on a second end portion 4b of the bar, opposite to the first end portion 4a and also shown in dotted lines in Figure 1.

[0030] So in fact, the rotation of the lever 3 integrally determines the movement of the pawl element 7 which, while the lever 3 can engage with the plate 2 thanks to the retention means, mates with the lamina 5 by way of the engagement means 6, thus reinforcing the stable locking of the door in the closed configuration of the compartment.

[0031] It should be noted that the lamina 5, the pawl element 7 and the engagement means 6 can be provided in various ways, including conventional ones (and for example according to what can be seen in the accompanying Figures 1 and 6), and thus we will not linger further on such components.

[0032] According to the invention, the locking device 1 comprises a button 8, which is fixed to the plate 2 (and substantially comprised in the retention means introduced above). The button 8 has a tooth 8a which is arranged, in a first configuration of operation (in which it is shown in the accompanying figures), so as to interfere with an abutment flap 3a of the lever 3, so as to obstruct

the accidental rotation of the lever 3 (and thus the unwanted release of the door).

[0033] The button 8 is moreover supported so that it can rotate by a pin 9 which is secured to the plate 2, in such a way as to be able to rotate, in a first direction of rotation, designated with A in the accompanying Figure 4, from the first configuration to at least one second configuration, in which the tooth 8a is disengaged from the flap 3a, in order to allow the free rotation of the lever 3, and vice versa.

[0034] So in fact, an operator, while he or she is grasping the lever 3 which is arranged in the first angular position and engaged with the plate 2, can act on the button 8, pressing it with a finger, imposing a rotation thereon in the first direction of rotation A and thus allowing the movement of the lever 3, and the release of the door.

[0035] Vice versa, as long as the lever 3 is forcibly engaged with the plate 2 and the button 8 is arranged in the first configuration (obstructing the rotation of the lever 3), any attempt at rotation of the lever 3, in order to release the door, brings the flap 3a of the lever 3 to press against the button 8 at a point of contact 10, which has a preset center distance B from the rotation axis C of the pin 9 (as can be clearly seen in Figure 5). The peculiar mutual arrangement described above makes it possible to develop a moment that is adapted to impose a rotation on the button 8 in a second direction of rotation, opposite to the first direction of rotation A.

[0036] Thus, the pressure exerted by the lever 3, if an attempt is made to force the device 1 or if it is acted on without pressing the button 8, tends to rotate the button 8 so as to keep it in the first configuration, and thus obstruct the rotation of the lever 3, thus conferring better safety on the device 1 according to the invention against possible accidental release, and in fact achieving the intended aim.

[0037] More specifically, according to an embodiment of important practical interest, cited by way of non-limiting example of the application of the invention, the button 8 comprises a central block 8b, which has a through duct 11, in which the pin 9 can be accommodated. Moreover, from the lateral surface of the block 8b extends an appendage which complements, with an end portion thereof, the tooth 8a. Finally, at least one surface region 8c of the appendage is knurled, in order to favor actuation by an operator (who can thus press on such surface region 8c, in order to impose the desired rotation on the button 8).

[0038] Conveniently, the locking device 1 according to the invention comprises elastic means, which are interposed between the plate 2 and the button 8, in such a way that they are capable of developing an elastic reaction that opposes the rotation of the button 8 in the first direction A, and thus guarding against the danger of unwanted movements of the button 8.

[0039] In particular, the elastic means comprise a pair of torsion springs 12, wound around the pin 9, on opposite sides with respect to the button 8. A first end of each

spring 12 is fixed to the plate 2, while a second end of each one of them, opposite to the first end, abuts against the button 8, in such a way as to keep it in the first configuration, and thus with the tooth 8a arranged so as to interfere with the abutment flap 3a of the lever 3.

[0040] According to the preferred, but not limiting, embodiment of the application of the invention, the locking device 1 comprises two side walls 13, which extend at right angles from the flanks of the plate 2 and which support the pin 9. The retention means comprise a cross-member 14, which is distanced from the pin 9 and supported by the side walls 13. Below the cross-member 14, a curved end tip of the lever 3 can engage by interlocking (as can be seen for example in Figures 2 and 4), for the mating of the lever 3 with the plate 2.

[0041] Advantageously, the plate 2 with its side walls 13 (and optionally also the lamina 5) are made of steel plate, so as to contain the weight, and the costs associated with raw materials.

[0042] Operation of the device according to the invention is the following. The device 1 according to the invention can be easily actuated (by way of the lever 3), in order to lock the door of a vehicle in the closed configuration, by bringing the lever 3 to the first angular position and engaging it with the plate 2 by way of the retention means (and simultaneously securing the pawl element 7 to the lamina 5).

[0043] When the lever 3 is arranged in the first angular position, and is engaged with the plate 2, the button 8, with its tooth 8a, opposes the free rotation of the lever 3, and thus the unwanted release of the door (which is made possible only by the voluntary action of an operator, who must for this purpose press the button 8).

[0044] In this context, the mutual arrangement chosen for the components is such that any attempt to cause the rotation of the lever 3 (and hence the release of the door) without also acting on the button 8 will bring the flap 3a to press on the button 8, at a point of contact 10 that is such (thanks to the specific dimensioning and mutual arrangement of the elements involved) as to cause the creation of a moment, which effectively tends to make the button 8 rotate in the second direction of rotation, opposite to the first direction A, and hence works to contribute to keeping the button 8 in the above mentioned first configuration, obstructing the rotation of the lever 3, and at the same time reducing the risk of breakage or of forced release.

[0045] Thus by way of an adapted mutual arrangement, without the need for further complex components (such as a second button), it is possible to ensure the door is kept locked in the closed configuration, and a contribution to this result is moreover the choice to associate the same (and single) button 8 with two springs 12, the restraining reaction of which in turn exerts a thrust oriented in the second direction of rotation, opposite to the first direction A of rotation (for opening the lever 3).

[0046] The presence of two springs 12 ensures the correct operation even in the event of breakage of one of

them, thus conferring further safety and stability on the device 1 according to the invention.

[0047] Moreover, the use, as noted, of a single button, and thus of a limited number of components, as well as the choice to make them from steel plate, with very modest dimensions and weights, ensures that the associated costs are contained.

[0048] In practice it has been found that the device according to the invention fully achieves the intended aim, in that the arrangement of the components involved favors the creation of a moment adapted to impose a rotation on the button in a second direction of rotation, opposite to the first direction of rotation, for opening the lever, thus ensuring the locking of the door to close the rear compartment of a vehicle of the type of lorries, vans, trucks, while at the same time guarding against the danger of accidental opening, with a simple and practical solution.

[0049] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0050] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0051] In practice, the materials employed, as well as the dimensions, may be any according to requirements and to the state of the art.

[0052] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device (1) for locking the door of vehicles, of the type of vans, trucks, lorries, semi-trailer trucks, trailers and the like, that comprises a base plate (2), which can be rigidly coupled to the frame of a vehicle, proximate to a door thereof, said plate (2) comprising means of retention for a lever (3), which can be rigidly keyed on a bar that is rotatably supported by the door, said lever (3) being rotatable from at least one first angular position, in which said lever (3) can be engaged with said plate (2), by way of said retention means, for the locking of the door so as to close the compartment, to at least one second angular position, in which said lever (3) is disengaged from said plate (2), for the release and free movement of the door, and vice versa, **characterized in that** it comprises a button (8), which is fixed to said plate (2) and which has a tooth (8a) that is arranged, in a first

configuration of operation, so as to interfere with an abutment flap (3a) of said lever (3), in order to obstruct the accidental rotation of said lever (3), said button (8) being rotatably supported by a pin (9) which is secured to said plate (2), for the rotation, in a first direction of rotation (A), from said first configuration to at least one second configuration, in which said tooth (8a) is disengaged from said flap (3a), for the free rotation of said lever (3), and vice versa, when said lever (3) is engaged with said plate (2) and said button (8) is arranged in said first configuration, the point of contact (10) between said flap (3a) and said button (8), following an attempt to rotate said lever (3) in order to release the door, having a preset center distance (B) with respect to the rotation axis (C) of said pin (9), for the development of a moment that is adapted to impose a rotation on said button (8) in a second direction of rotation, opposite to said first direction of rotation (A).

2. The locking device according to claim 1, **characterized in that** said button (8) comprises a central block (8b), which has a through duct (11), for accommodating said pin (9), an appendage extending from the lateral surface of said block (8b) which complements, with an end portion thereof, said tooth (8a), at least one surface region (8c) of said appendage being knurled, in order to favor actuation by an operator.
3. The locking device according to claim 1, **characterized in that** it comprises elastic means, interposed between said plate (2) and said button (8), the elastic reaction of said elastic means opposing the rotation of said button (8) in said first direction (A).
4. The locking device according to claim 3, **characterized in that** said elastic means comprise a pair of torsion springs (12), wound around said pin (9), on opposite sides with respect to said button (8), a first end of each one of said springs (12) being fixed to said plate (2), a second end of each one of said springs (12), opposite to said first end, abutting against said button (8).
5. The locking device according to one or more of the preceding claims, **characterized in that** it comprises two side walls (13), which extend at right angles from the flanks of said plate (2) and support said pin (9), said retention means comprising a cross-member (14), distanced from said pin (9) and supported by said side walls (13), a curved end tip of said lever (3) being engageable by forced interlocking below said cross-member (14), for the mating of said lever (3) with said plate (2).
6. The locking device according to one or more of the preceding claims, **characterized in that** said plate

(2) with said side walls (13) thereof are made of steel plate, in order to contain the weight, and the costs associated with raw materials.

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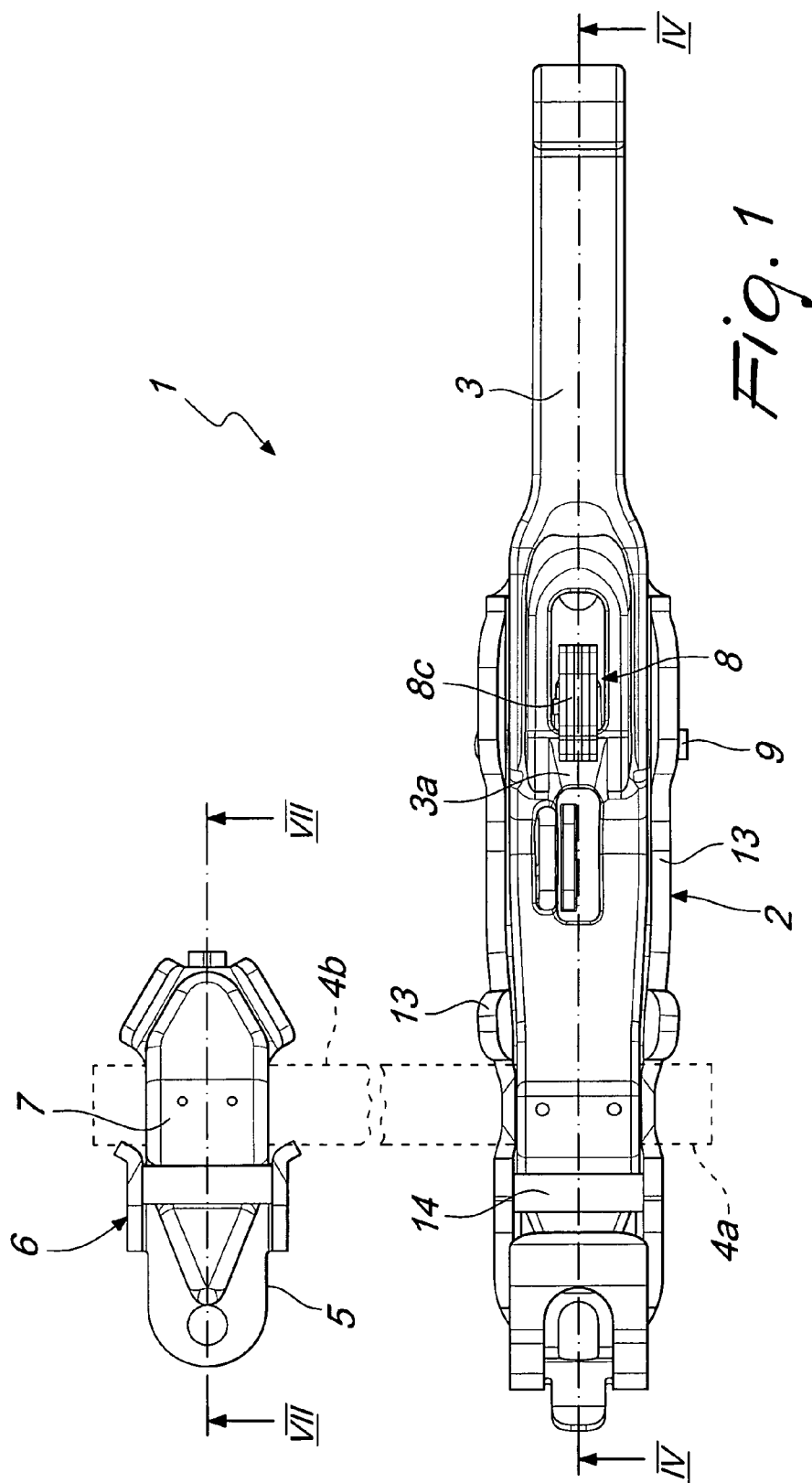
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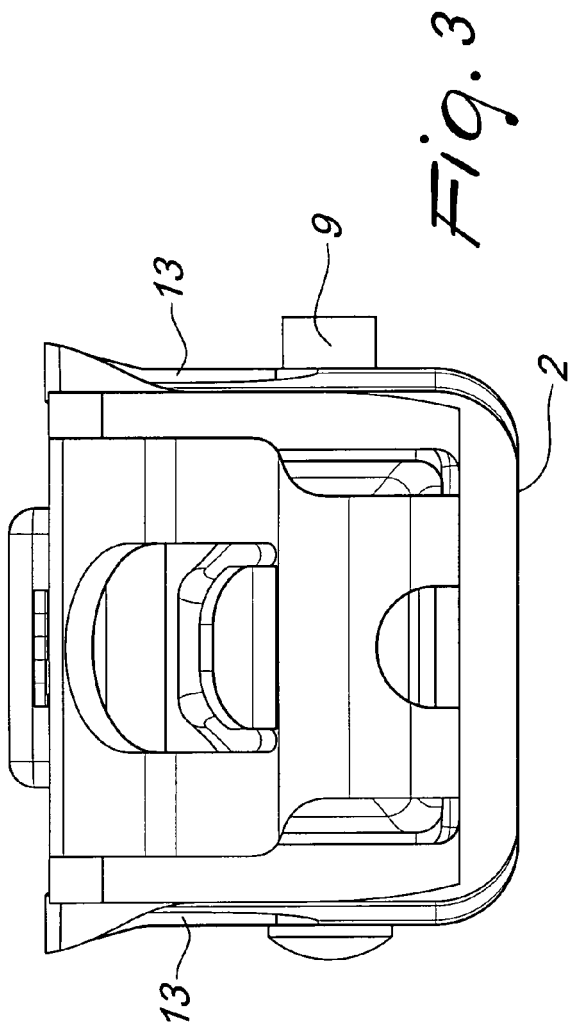
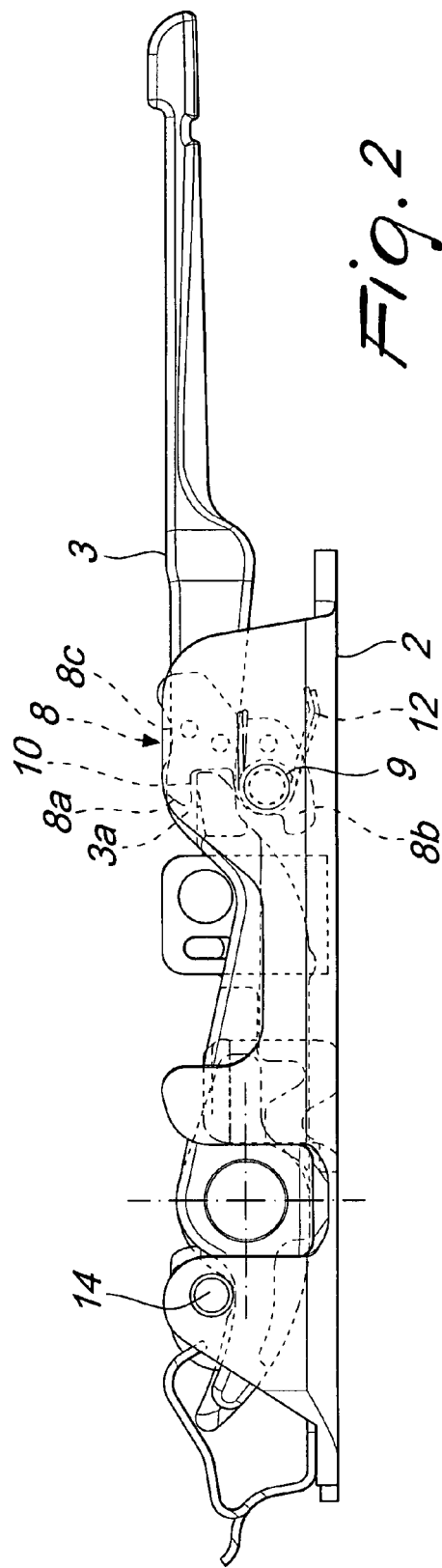
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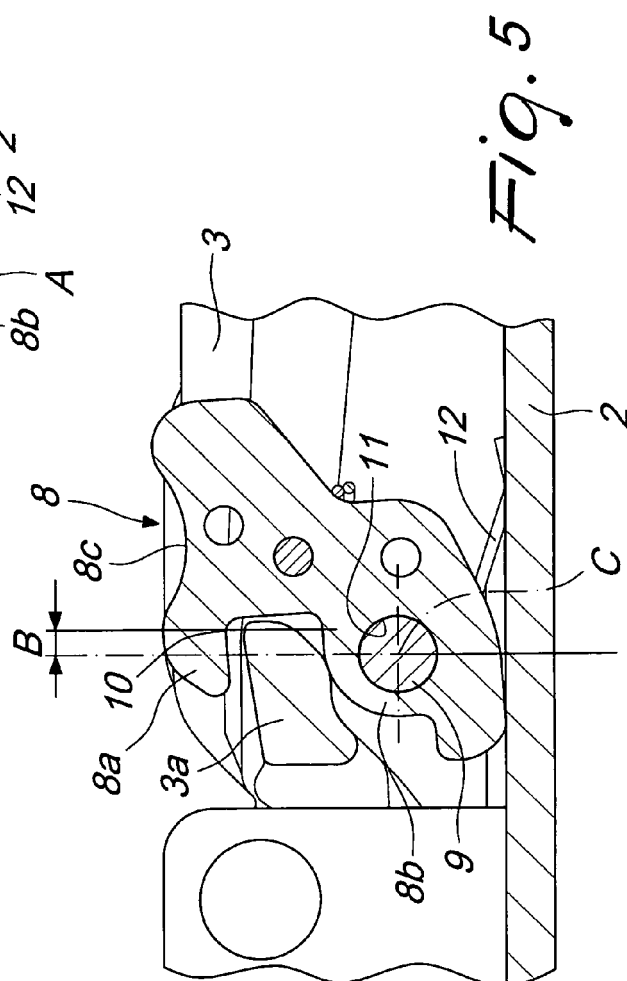
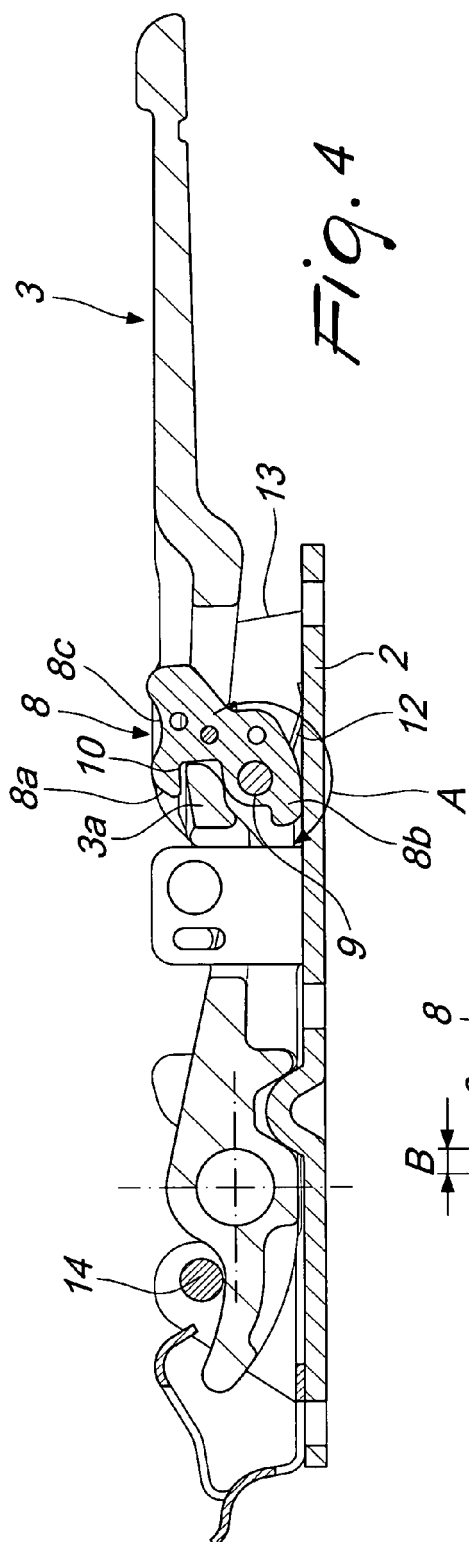
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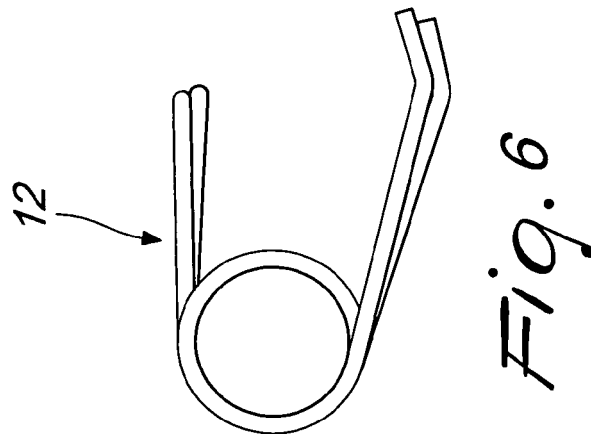
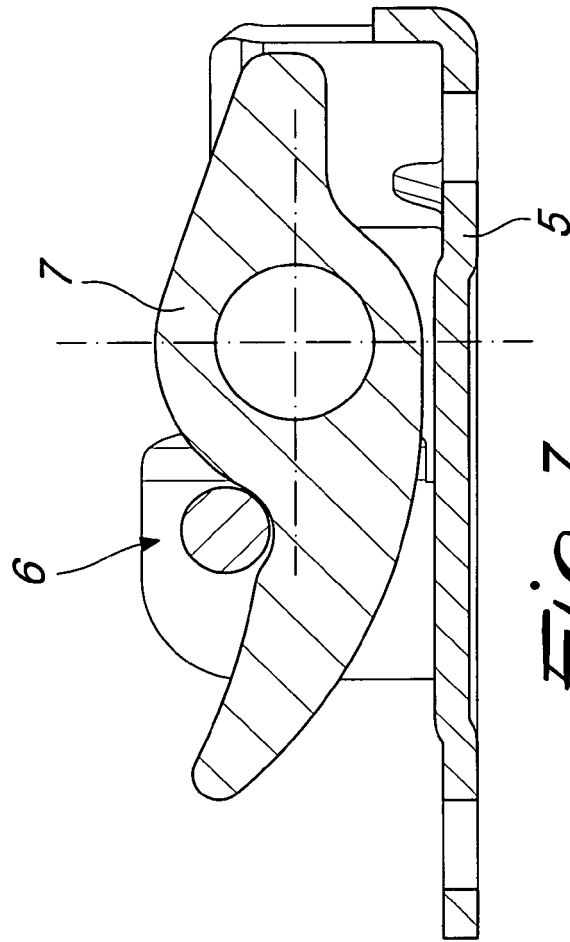
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EUROPEAN SEARCH REPORT

Application Number
EP 12 42 5096

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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