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(54) Door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like

(57) A door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like, comprising at least one base (2), which is rigidly coupled to the framework of the body below the door and is provided with anchoring means (3) for at least one lever (4), which is keyed rigidly at the lower end of at least one rod (5), which is supported rotatably in the door, and at least one upper abutment (6), which is rigidly coupled to the framework of the body, for at least one pawl element (7), which is fixed to the upper end of the rod (5), the lever (4) being manually rotatable from at least one angular position for closing the door, in which it is engaged in the anchoring means (3) and in which the pawl element (7) is rigidly coupled to the upper abutment (6) monolithically with the lever, to at least one angular position for freely opening the door, in which it is disengaged from the anchoring means (3) and in which the pawl element (7) is disengaged from the upper abutment (6) monolithically with the lever, the lever (4) being provided with means (8) for safety coupling to the base (2) which are adapted to prevent the accidental disengagement of the lever (4) and can be actuated easily by means of at least one button (9) with the same hand with which the lever (4) is turned, the base (2), the lever (4), the pawl element (7) and the upper abutment (6) having an appropriately contoured substantially laminar configuration so as to minimize their weight and at the same time optimize their mechanical strength and rigidity characteristics.

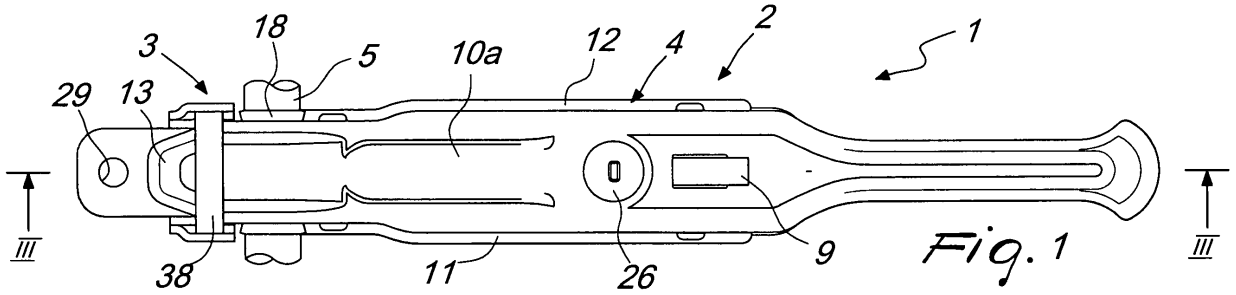

Fig. 1

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Description

[0001] The present invention relates to a door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like.

[0002] Devices for opening and closing the doors of trucks, particularly devices of the door sill-mounted type, are currently made of materials such as steel or cast iron and are suitably sized in order to ensure optimum mechanical strength and maximum durability. Meeting these requirements entails the use of a sufficient amount of raw material, the cost of which considerably affects the overall production cost of the items being considered; further, the manufacture of these products entails programming a series of cycles which entail the manufacture of respective intermediate components, with the consequent use of various devices and machine tools. Substantially, these traditional production technologies currently affect the final cost of the object to a substantial extent which is no longer acceptable in relation to current market requirements.

[0003] At the same time, the need is felt to provide door sill-mounted opening and closing devices which, while being provided with safety closure means adapted to prevent accidental opening, can be opened easily by the operator with just one hand.

[0004] The aim of the present invention is to obviate the above-cited drawbacks and meet the above-mentioned requirements, by providing a door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like which, while offering optimum characteristics of strength and durability, can be manufactured with a smaller amount of raw materials and with a smaller number of cycles, so as to limit the so-called lead time.

[0005] Within this aim, an object of the present invention is to provide a door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like which can be opened easily by the operator with just one hand.

[0006] Another object of the present invention is to provide a door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like which can be closed effectively and easily even in conditions in which the door or lever are not in the correct position.

[0007] Another object of the present invention is to provide a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation, and has a relatively low cost.

[0008] This aim and these objects are achieved by a door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like, characterized in that it comprises at least one base, which is rigidly coupled to the framework of the body below the door and is provided with anchoring means for at least one lever, which is keyed rigidly at the lower end of at least one rod which is supported rotatably in said door, and at least one upper abutment, which is rigidly coupled to the framework of the body, for at least one pawl element, which is fixed to the upper end of said rod, said lever being manually rotatable from at least one angular position for closing the door, in which it is engaged in said anchoring means and in which said pawl element is rigidly coupled to said upper abutment monolithically with said lever, to at least one angular position for freely opening the door, in which it is disengaged from said anchoring means and in which said pawl element is disengaged from said upper abutment monolithically with said lever, said lever being provided with means for safety coupling to said base which are adapted to prevent the accidental disengagement of said lever and can be actuated easily by means of at least one button with the same hand with which said lever is turned, said base, said lever, said pawl element and said upper abutment having an appropriately contoured substantially laminar configuration so as to minimize their weight and at the same time optimize their mechanical strength and rigidity characteristics.

[0009] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a front view of the door sill-mounted device according to the invention;
Figure 2 is a side elevation view of said device;
Figure 3 is a longitudinal sectional view of the device, taken along the line III-III of Figure 1;
Figure 4 is a perspective view of the door sill-mounted device;
Figure 5 is a front view of the base of the door sill-mounted device according to the invention;
Figure 6 is a perspective view of a constructive detail of said base;
Figure 7 is a perspective view of the pawl element of the device engaged in the upper abutment of the body of the truck;
Figure 8 is a front view of the pawl element engaged in the upper abutment of the body;
Figure 9 is a side elevation view of the pawl element engaged in the upper abutment of the body;
Figure 10 is a perspective view of the upper abutment of the body.

[0010] In the examplary embodiment that follows, individual characteristics may actually be interchanged with other different characteristics that exist in other examplary embodiments.

[0011] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0012] With reference to Figure 1, the reference numeral 1 generally designates a door sill-mounted device

for opening and closing the door of the body of trucks, trailers and the like according to the invention.

[0013] In this figure, as in all the others, the door of the body and the framework thereof are not illustrated for the sake of simplicity and clarity, since they are of a substantially known and traditional type and since it is fully evident, as it will become better apparent hereinafter, how the device is fixed to said door and said body.

[0014] The door sill-mounted device according to the invention comprises at least one base 2, which is rigidly coupled to the framework of the body below the door and is provided with anchoring means 3 for at least one lever 4, which is keyed rigidly substantially at the lower end of at least one rod 5, which is supported rotatably in said door. The device further comprises at least one upper abutment 6, which is rigidly coupled to the framework of the body, for at least one pawl element 7, which is fixed to the upper end of the rod 5.

[0015] The lever 4 can be turned manually in both directions from at least one angular position for the complete closure of the door (in which it is shown in all the accompanying figures), in which it is engaged within the anchoring means 3 and in which, monolithically therewith, the pawl element 7 is coupled to the upper abutment 6, to at least one angular position for freely opening the door, in which it is disengaged from the anchoring means 3, and in which, monolithically therewith, the pawl element 7 is disengaged from the upper abutment 6.

[0016] The lever 4 is conveniently provided with means 8 for safety coupling to the base 2 (see in particular Figure 3); said coupling means are adapted in particular to prevent the accidental disengagement of the lever 4 from the base 2, and conveniently can be actuated easily by means of at least one button 9 with the same hand with which the lever 4 is turned.

[0017] Very advantageously, the base 2, the lever 4, the pawl element 7 and the upper abutment 6 have a substantially laminar shape, which is conveniently contoured so as to minimize their weight and at the same time optimize their mechanical strength and rigidity characteristics. In addition to minimizing weight, in this manner a substantial containment of the use of raw material is also achieved.

[0018] The lever 4 is conveniently and preferably made of a material such as steel plate, with a thickness chosen appropriately in order to withstand the typical stresses to which the device is subjected; as an alternative, it is possible however to use other materials having equivalent mechanical characteristics.

[0019] The lever 4 has a transverse cross-section which is substantially shaped like an inverted letter U, with a geometry which can vary from one end to the other, so as to form an upper surface 10 and two mutually opposite contoured sides 11, 12; the upper surface 10 further forms a longitudinal stiffening ridge 10a. In this manner, the weight and the use of material are minimized. In particular, the extent of the upper surface 10 and of the contoured sides 11, 12 can vary from one end to the other.

[0020] The lever 4 forms, at its mutually opposite ends, an end lug 13, which is adapted to engage in the anchoring means 3, and a terminal grip portion 14, which is contoured so as to form at least one sort of receptacle 15, which is adapted to accommodate a sort of insert 15a for protecting the hands of the operator. The insert 15a is made for example of a synthetic material such as plastics or other materials having equivalent characteristics.

[0021] The lever 4 forms positively a sort of perimetric border 16, which connects the upper surface 10 and the contoured sides 11 and 12 and which, if sized appropriately, is adapted to give the lever 4 optimum strength and rigidity (increasing the resisting cross-section without increasing significantly the weight of said part).

[0022] The contoured sides 11, 12 of the lever 4 form respective mutually opposite and coaxial first keying holes 17 for the rod 5, in which a first portion 18, which is tubular with riveted ends (or has another cross-section adapted to prevent rotation), is fixed; the rod 5 is inserted and locked in said portion by way of connecting elements of the type with an exposed pin (not shown), or of the type with a concealed (effraction-resistant) pin, or by welding. The pin-based connection, in particular, allows to disassemble quickly and easily the rod 5 from the lever 4 for maintenance, part replacement, and other operations.

[0023] Circular coaxial holes 19 are provided in the sides 11 and 12 for the insertion of at least one transverse pin 20, the function of which will be explained hereinafter; the pin 20 further stiffens and strengthens the lever 4.

[0024] The means 8 for the safety coupling of the lever 4 to the base 2 comprise, as mentioned above, at least one button 9, which is supported rotatably on at least one respective pin 21, which is fixed, at its ends, to the contoured sides 11, 12 of the lever 4.

[0025] The button 9 forms an extension 22, which ends with a sort of tooth 23, and a protrusion 24; the button 9 can rotate advantageously, about the pivot 21, from a position for restraining the lever 4, in which the tooth 23 is engaged in the base 2 (as explained hereinafter), to a position for releasing the lever 4, in which the tooth 23 is disengaged from the base 2 so as to allow the free rotation of the lever 4. The possibility to open the device with just one hand (grip on the lever 4 and actuation of the button 9 preferably with the thumb) is particularly advantageous, since it facilitates and simplifies loading and unloading operations and allows them to be faster.

[0026] The safety coupling means 8 conveniently comprise two torsion springs (not shown for the sake of clarity in the figures, but of a substantially known and traditional type), which are keyed along the pin 21 on opposite sides and are adapted to keep the button elastically in the position for restraining the lever 4. Each one of the torsion springs has a first end which is associated with the button 9 and a second end which abuts against the lever 4. Fitting two torsion springs associated with the button 9 allows to keep said button elastically in the coupling position even if one of the two springs breaks.

[0027] Optionally, in relation to the specific operating requirements, the lever 4 forms a substantially circular hole 25, at which at least one key-operated safety detent 26 is fitted in order to retain the button 9 in said position for restraining the lever 4, said detent being adapted, in particular, to abut at the protrusion 24 of the button 9, so that said button cannot be turned except by actuating said detent with its own key.

[0028] The lever 4 is affected, at the longitudinal ridge 10a, by two first through holes 27 and 28, the function of which will be explained hereinafter.

[0029] The base 2 is conveniently and preferably made of a material such as steel plate, or of another material having equivalent characteristics, whose thickness is sized appropriately in order to withstand the typical stresses to which the device is subjected. The base 2 is affected by at least three circular holes 29 for fixing, by means of screws, to the body of the truck (not shown in the figures), said screws being concealed, when the device is fitted, by the lever 4 in the angular closure position.

[0030] The base 2 is affected, substantially at one of its ends, by an opening 30, which is substantially shaped like a capital letter D and in which the straight side is constituted by a raised rim 31, in which the tooth 23 of the button 9 is adapted to engage in such position for restraining the lever 4 to the base 2.

[0031] It is noted here that the direction of the rotation of the button 9 about the pin 21 (the opposite direction with respect to the one provided in known devices) allows to achieve the maximum assurance of closure against any accidental and unexpected event: any impact against the button in fact evidently acts in the direction for closing the device, i.e., it facilitates the engagement of the tooth 23 below the rim 31. The button 9 is provided with minimal space occupation, such as to not protrude from the profile of the lever 4, so as to remain perfectly protected against any transverse impacts. The release of the button 9 occurs by pressing with a finger substantially parallel to the lever 4 (transversely), not at right angles thereto, as occurs in all known traditional devices.

[0032] The base 2 comprises second through holes 32, 32a, which are adapted to be arranged, when the lever 4 is in the angular closure position, below the longitudinal ridge 10a and adjacent to the first through holes 27, 28, so that it is possible to fix thereto customs seals and the like, not shown in the figures. In greater detail, the second through holes 32, 32a are provided in a plate 33, which is inserted in a respective slot 34 provided in the base 2 and comprises a terminal portion 35, which is substantially folded at right angles, for fixing to the base 2, for example by means of at least one rivet; at the slot 34, the base 2 in fact forms a sort of protrusion 36 below which the folded portion 35 is arranged.

[0033] The means 3 for anchoring the end lug 13 of the lever 4 conveniently comprise at least one bracket 37, which has a substantially U-shaped transverse cross-section and is affected at its ends by two mutually opposite coaxial holes, in which a first cross-member 38 is locked; the lug 13 engages below said cross-member when the lever 4 is in the angular closure position; the bracket 37 is fixed conveniently to the base 2 by way of at least one pair of rivets 38a, which can engage in fixing holes 38b and 38c (Figure 6).

[0034] The base 2 conveniently comprises first elements for retaining the lever 4 in said angular closure position, in a substantially vertical direction, which are generally designated by the reference numeral 39, and first elements for retaining the lever 4 in the angular closure position, in a substantially horizontal direction, generally designated by the reference numeral 40 (reference should be made to Figure 5 among the others).

[0035] The first elements 39 for retaining the lever 4 in a vertical direction comprise conveniently two first mutually opposite lateral flaps 41, 42, which are shaped by the base 2 and are folded substantially at right angles thereto and expand from one end of the base 2 to the other; the first lateral flaps 41, 42 are adapted to engage respectively at the contoured sides 11, 12 of the lever 4 and in particular inside them, so as to prevent their accidental movements in a vertical direction. Further, the coupling of the first lateral flaps 41, 42 to the contoured lateral sides 11, 12 allows to close the device in critical conditions in which the lever 4 is not perfectly aligned vertically with the base 2 (for example when the inclined arrangement of the vehicle produces a slight rotation of the door caused by the plays in the connections, or other similar situations).

[0036] The first elements 40 for retaining the lever 4 in a horizontal direction favorably comprise two first recesses 43, 44, which are provided in the first contoured flaps 41, 42 and in which the pin 20 is adapted to engage transversely; this allows to prevent, when the lever 4 is in the closure position, accidental displacements in a horizontal direction. Further, the closure of the device is facilitated even in conditions in which the lever 4 is not perfectly aligned horizontally with the base 2.

[0037] The pawl element 7 (Figures 7, 8 and 9) is preferably and advantageously made of a material such as steel plate. It has a transverse cross-section which is shaped substantially like an inverted letter U with a geometry which can vary from one end to the other and with an appropriately sized thickness, so as to form an upper face 45 and two contoured side walls 46, 47. The pawl element 7 advantageously forms a sort of perimetric contour 48, which blends the upper face 45 to the contoured side walls 46 and 47 and helps to give optimum strength and rigidity to the part while maintaining a reduced weight thereof.

[0038] The contoured side walls 46, 47 of the pawl element 7 form respective second holes 49 for keying the rod 5, which are mutually opposite and coaxial and inside which a second tubular portion 50 is fixed: in the second tubular portion 50, the rod 5 is inserted and locked by way of connecting elements of the type with an exposed pin (not shown) or of the type with a concealed pin (effraction-resistant), or by welding. The pin means, in par-

ticular, allow to disassemble easily and quickly the rod 5 for maintenance, part replacement, and the like.

[0039] The contoured side walls 46, 47 are affected by respective second recesses 51, 52, both of which are substantially shaped like an inverted letter V with a rounded vertex.

[0040] The pawl element 7 forms a sort of tapered beak 53, which is adapted to engage in the upper abutment 6.

[0041] The upper abutment 6 is conveniently made of a material such as steel plate of appropriate thickness. The upper abutment 6 is fixed to the framework of the body of the truck preferably by means of adapted screws, not shown in the figures, which are engaged in two holes 54 provided at the ends of said upper abutment 6 (Figure 10).

[0042] The upper abutment 6 positively comprises second elements for retaining, in the angular closure position, the pawl element 7 in a horizontal direction, which are generally designated by the reference numeral 55, and second elements for retaining, in the same angular closure position, the pawl element 7 in a vertical direction, which are generally designated by the reference numeral 56.

[0043] The second elements 55 for retaining in a horizontal direction the pawl element 7 comprise two contoured protrusions 57 and 58, which are shaped substantially like an inverted letter V in which the ends are rigidly coupled to the surface of the upper abutment 6. The second V-shaped protrusions 55, 56 are adapted to engage respectively in the second recesses 51, 52 of the contoured side walls 46, 47, so that accidental movements thereof in a horizontal direction can be prevented.

[0044] Each one of the substantially V-shaped protrusions 55, 56 is shaped starting from a portion of the upper abutment 6, which is cut along two parallel sides and is deformed plastically.

[0045] The second elements 56 for retention in a vertical direction comprise two mutually opposite second terminal flaps 59, 60, which are formed by the upper abutment 6 and are folded substantially at right angles thereto and are curved; the second terminal flaps 59, 60 are conveniently adapted to engage at the end of the pawl element 7 which lies opposite the beak 53, so that accidental movements thereof in a vertical direction are prevented and centering thereof is facilitated.

[0046] The particular shape of the second retention elements 55, 56 advantageously allows to fasten the device even in critical conditions of the positioning of the door with respect to the body in which the pawl element 7 is not perfectly aligned with the upper abutment 6.

[0047] The upper abutment 6 forms a pair of wings 61, 62, which are substantially flat and parallel and mutually opposite and are designed to fix the ends of a second cross-member 63, below which the beak 53 of the pawl element 7 is adapted to engage in the angular position for closing the door. The wings 61, 62 form respectively guides 64 which are bent for the easy insertion of the beak 53 below the cross-member 63.

[0048] The method of use of the door sill-mounted device according to the invention is intuitive according to what has been described above.

[0049] It has thus been shown that the invention achieves the proposed aim and objects.

[0050] The device thus provided has an extremely low weight, a need which is increasingly felt in the field of goods transportation, yet maintains high mechanical characteristics of strength and durability; the particular shape of the lever is such that any stress acts so as to facilitate the closure of the device and reduces drastically the risk of accidental opening.

[0051] Moreover, the device can be manufactured at costs which are significantly lower than those which characterize currently commercially available door sill-mounted closure devices, by means of the substantial saving in the use of raw material and in the production cycle: its manufacture by using steel plate, preferably obtained by stamping or equivalent technologies, passes through the production of a single intermediate components, instead of a plurality of intermediate components (each one for each processing step), as occurs for traditional products.

[0052] Further, the device can be actuated for opening and closing the door by using a single hand, typically by gripping the grip portion of the lever and by acting on the button with the thumb of the same hand, decisively facilitating the operations for loading and unloading goods on the part of the operator.

[0053] Any accidental impact on the button acts advantageously in the direction of closing the device.

[0054] Moreover, as clarified above, the device can be closed easily even in situations, which are actually rather infrequent, in which the alignment between the lever and the base, and respectively between the pawl element and the upper abutment, is not perfect.

[0055] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0056] All the details may further be replaced with other technically equivalent ones.

[0057] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0058] 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 door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like, **characterized in that** it comprises at least one base

(2), which is rigidly coupled to the framework of the body below the door and is provided with anchoring means (3) for at least one lever (4), which is keyed rigidly at the lower end of at least one rod (5) which is supported rotatably in said door, and at least one upper abutment (6), which is rigidly coupled to the framework of the body, for at least one pawl element (7), which is fixed to the upper end of said rod (5), said lever (4) being manually rotatable from at least one angular position for closing the door, in which it is engaged in said anchoring means (3) and in which said pawl element (7) is rigidly coupled to said upper abutment (6) monolithically with said lever, to at least one angular position for freely opening the door, in which it is disengaged from said anchoring means (3) and in which said pawl element (7) is disengaged from said upper abutment (6) monolithically with said lever, said lever (4) being provided with means (8) for safety coupling to said base (2) which are adapted to prevent the accidental disengagement of said lever (4) and can be actuated easily by means of at least one button (9) with the same hand with which said lever (4) is turned, said base (2), said lever (4), said pawl element (7) and said upper abutment (6) having an appropriately contoured substantially laminar configuration so as to minimize their weight and at the same time optimize their mechanical strength and rigidity characteristics.

2. The device according to claim 1, **characterized in that** said lever (4) is made of a material such as steel plate.

3. The device according to claims 1 and 2, **characterized in that** said lever (4) has a transverse cross-section which is substantially shaped like an inverted letter U and has a geometry which can vary from one end to the other, so as to form an upper surface (10) and two contoured sides (11, 12).

4. The device according to one or more of the preceding claims, **characterized in that** said lever (4) forms a sort of perimetric border (16) for connecting said upper surface (10) and said contoured sides (11, 12), said border being adapted to give said lever (4) optimum strength and rigidity.

5. The device according to one or more of the preceding claims, **characterized in that** said contoured sides (11, 12) of said lever (4) form respective first mutually opposite and coaxial keying holes (17) for said rod (5), which are mutually opposite and coaxial and in which a first portion (18), which is tubular or has another cross-section and has riveted ends, is fixed, said rod (5) being inserted and locked therein by means of connecting elements of the type with an exposed or concealed pin or by welding.

6. The device according to one or more of the preceding claims, **characterized in that** said means (8) for the safety coupling of said lever (4) to said base (2) comprise at least one button (9), which is supported so that it can rotate on at least one respective pin (21) which is fixed to said lever (2) at its ends, so as to be protected during loading and unloading operations, said button (9) forming an extension (22), which ends with a sort of tooth (23), and being rotatable, about said pin (21), from a position for restraining said lever (4), in which said tooth (23) is engaged at the edge (31) of a respective opening (30) provided in said base (2), to a position for the disengagement of said lever (4), in which said tooth (23) is disengaged from said edge (31) so as to allow the free manual rotation of said lever (4).

7. The device according to one or more of the preceding claims, **characterized in that** said button (9) is oriented so that any stress which acts from the outside, such as impacts and the like, acts in the direction which facilitates the engagement of said tooth (23) in said edge (31) and therefore in the direction for closing the device.

8. The device according to one or more of the preceding claims, **characterized in that** said lever (4) has such a shape that any deformation induced by external actions facilitates the engagement of said tooth (23) in said edge (31), so as to ensure the closure of the device.

9. The device according to one or more of the preceding claims, **characterized in that** said safety coupling means (8) comprise at least one respective torsion spring, which is keyed along said pin (21) and is adapted to keep said button (9) elastically in said position for restraining said lever (4), said torsion spring being provided with a first end which is associated with said button (9) and a second end which abuts against said lever (4).

10. The device according to one or more of the preceding claims, **characterized in that** said safety coupling means (8) comprise two torsion springs, which are keyed along said pin (21) on opposite sides and are adapted to keep said button (9) elastically in said position for restraining said lever (4), so that said button (9) can be kept elastically in said restraining position even if one of the springs breaks.

11. The device according to one or more of the preceding claims, **characterized in that** said lever (4) forms at least one substantially circular hole (25), in which at least one key-operated safety detent (26) is locked in order to retain said button (9) in said position for restraining said lever (4), said detent (26) being adapted to abut at an appropriately provided protru-

sion (24) provided in said button (9).

12. The device according to one or more of the preceding claims, **characterized in that** said lever (4) forms a longitudinal ridge (10a), which is affected by first through holes (27, 28), second through holes (32, 32a) being provided which are rigidly coupled centrally to said base (2) and are adapted to be arranged, when said lever (4) is in the angular closure position, below said ridge (10a) and adjacent to said first through holes (27, 28), so that it is possible to fix customs seals and the like thereto.

13. The device according to one or more of the preceding claims, **characterized in that** said lever (4) comprises a terminal grip portion (14), which is contoured so as to form at least one sort of receptacle (15), which is adapted to accommodate an insert (15a) for protecting the hands of the operator.

14. The device according to one or more of the preceding claims, **characterized in that** said insert (15a) is made of a synthetic material such as plastics.

15. The device according to one or more of the preceding claims, **characterized in that** said base (2) is made of a material such as steel plate.

16. The device according to one or more of the preceding claims, **characterized in that** said base (2) comprises first elements for retaining said lever (4), in said angular closure position, respectively in a substantially vertical direction (39) and in a substantially horizontal direction (40).

17. The device according to one or more of the preceding claims, **characterized in that** said first elements (39) for retention in a vertical direction comprise at least one pair of first lateral flaps (41, 42), which are shaped by the base (2) and are folded substantially at right angles thereto and are adapted to engage respectively at said contoured sides (11, 12) of said lever (4), so as to prevent their accidental movements in a vertical direction and so as to allow to close the device in critical conditions in which said lever (4) is not perfectly aligned vertically with said base (2).

18. The device according to one or more of the preceding claims, **characterized in that** said first elements (40) for retaining said lever (4) in a horizontal direction comprise at least one pair of first recesses (43, 44), which are provided in said first lateral flaps (41, 42) and in which at least one pin (20) rigidly coupled to said lever (4) is adapted to engage transversely, so as to prevent accidental movements of said lever (4) with respect to said base (2) and thus allow the closure of the device even in conditions in which said lever (4) is not aligned perfectly horizontally with said base (2).

19. The device according to one or more of the preceding claims, **characterized in that** said second through holes (32, 32a) are formed in a plate (23), which is inserted in a respective slot (34) provided in the base (2), and comprises an end portion (25) which is folded substantially at right angles and is fixed below said base (2).

20. The device according to one or more of the preceding claims, **characterized in that** said base (2) is affected by at least two circular holes (29) for fixing, by means of screws, to the body of the truck, said screws being substantially concealed by said lever (4) in said angular closure position.

21. The device according to one or more of the preceding claims, **characterized in that** said anchoring means (3) comprise at least one bracket (37), which has a substantially U-shaped transverse cross-section and is affected, at its ends, by two mutually opposite coaxial holes, in which a first cross-member (38) is locked, the terminal lug (13) of said lever (4) being adapted to engage below said first cross-member in said angular closure position, said brackets (37) being fixed to said base (2) by means of at least one pair of rivets (38a), which can engage in respective fixing holes (38b, 38c).

22. The device according to one or more of the preceding claims, **characterized in that** said pawl element (7) is made of a material such as steel plate.

23. The device according to one or more of the preceding claims, **characterized in that** said pawl element (7) has a transverse cross-section which is substantially shaped like an inverted letter U which has a geometry that can vary from one end to the other, so as to form a upper face (45) and two contoured side walls (46, 47).

24. The device according to one or more of the preceding claims, **characterized in that** said pawl element (7) forms a sort of perimetric contour (48) for connecting said upper face (45) and said contoured side walls (46, 47), which is adapted to give to said pawl element (7) optimum strength and rigidity.

25. The device according to one or more of the preceding claims, **characterized in that** said contoured side walls (46, 47) of said pawl element (7) form respective mutually opposite and coaxial second holes (49) for the keying of said rod (5), a second portion (50) having a tubular or other cross-section being fixed in said holes, said rod (5) being inserted and locked therein by way of connecting elements of the type

with an exposed or concealed pin, or by welding.

26. The device according to one or more of the preceding claims, **characterized in that** said upper abutment (6) is made of a material such as steel plate.

27. The device according to one or more of the preceding claims, **characterized in that** said upper abutment (6) comprises second elements for retaining said pawl element (7) in said angular closure position, respectively in a substantially horizontal direction (55) and in a substantially vertical direction (56).

28. The device according to one or more of the preceding claims, **characterized in that** said second elements for retention in a horizontal direction (55) comprise at least one protrusion (57, 58), which is substantially shaped like an inverted letter V, in which the ends are rigidly coupled to the surface of said upper abutment (6), said second V-shaped protrusion (57, 58) being adapted to engage in a respective second recess (51, 52) provided in at least one of said contoured side walls (46, 47) of said pawl element (7), so as to prevent accidental movements thereof in a horizontal direction, said second elements for retention in a horizontal direction (55) and in a vertical direction (56) being adapted to allow the closure of the device even in conditions in which said pawl element (7) is not aligned perfectly with said upper abutment (6).

29. The device according to one or more of the preceding claims, **characterized in that** said second substantially V-shaped protrusion (57, 58) is shaped starting from a portion of said upper abutment (6) which is cut along two parallel sides and deformed plastically.

30. The device according to one or more of the preceding claims, **characterized in that** said second elements (55) for retention in a horizontal direction comprise two of said second protrusions (57, 58) which are substantially V-shaped and are mutually substantially parallel.

31. The device according to one or more of the preceding claims, **characterized in that** said second elements (56) for retention in a vertical direction comprise at least one second terminal flap (59, 60) of said upper abutment (6), which is folded substantially at right angles thereto, said second flap (59, 60) being adapted to engage at one end of said pawl element (7).

32. The device according to one or more of the preceding claims, **characterized in that** said second elements (56) for retention in a vertical direction comprise two second mutually opposite terminal flaps (59, 60) of said upper abutment (6), which are folded substantially at right angles thereto, said second flaps (59, 60) being adapted to engage respectively at one end of said pawl element (7) so as to prevent accidental movements thereof in a vertical direction.

33. The device according to one or more of the preceding claims, **characterized in that** said upper abutment (6) comprises two substantially flat and parallel wings (61, 62) for fixing the ends of a second cross-member (63), below which the beak (53) of said pawl element (7) is adapted to engage in said angular closure position of the door.

Amended claims in accordance with Rule 86(2) EPC.

1. A door sill-mounted device for opening and closing the door of the body of trucks, trailers and the like, **characterized in that** it comprises at least one base (2), which is rigidly coupled to the framework of the body below the door and is provided with anchoring means (3) for at least one lever (4), which is keyed rigidly at the lower end of at least one rod (5) which is supported rotatably in said door, and at least one upper abutment (6), which is rigidly coupled to the framework of the body, for at least one pawl element (7), which is fixed to the upper end of said rod (5), said lever (4) being manually rotatable from at least one angular position for closing the door, in which it is engaged in said anchoring means (3) and in which said pawl element (7) is rigidly coupled to said upper abutment (6) monolithically with said lever, to at least one angular position for freely opening the door, in which it is disengaged from said anchoring means (3) and in which said pawl element (7) is disengaged from said upper abutment (6) monolithically with said lever, said lever (4) being provided with means (8) for safety coupling to said base (2) which are adapted to prevent the accidental disengagement of said lever (4) and can be actuated easily by means of at least one button (9) with the same hand with which said lever (4) is turned, said base (2), said lever (4), said pawl element (7) and said upper abutment (6) having an appropriately contoured substantially laminar configuration so as to minimize their weight and at the same time optimize their mechanical strength and rigidity characteristics, wherein said lever (4) has a transverse cross-section which is substantially shaped like an inverted letter U and has a geometry which can vary from one end to the other, so as to form an upper surface (10) and two contoured sides (11, 12) and said lever (4) forms a sort of perimetric border (16) for connecting said upper surface (10) and said contoured sides (11, 12), said border being adapted to give said lever (4) optimum strength and rigidity.

2. The device according to claim 1, **characterized**

in that said lever (4) is made of a material such as steel plate.

3. The device according to one or more of the preceding claims, **characterized in that** said contoured sides (11, 12) of said lever (4) form respective first mutually opposite and coaxial keying holes (17) for said rod (5), which are mutually opposite and coaxial and in which a first portion (18), which is tubular or has another cross-section and has riveted ends, is fixed, said rod (5) being inserted and locked therein by means of connecting elements of the type with an exposed or concealed pin or by welding.

4. The device according to one or more of the preceding claims, **characterized in that** said means (8) for the safety coupling of said lever (4) to said base (2) comprise at least one button (9), which is supported so that it can rotate on at least one respective pin (21) which is fixed to said lever (2) at its ends, so as to be protected during loading and unloading operations, said button (9) forming an extension (22), which ends with a sort of tooth (23), and being rotatable, about said pin (21), from a position for restraining said lever (4), in which said tooth (23) is engaged at the edge (31) of a respective opening (30) provided in said base (2), to a position for the disengagement of said lever (4), in which said tooth (23) is disengaged from said edge (31) so as to allow the free manual rotation of said lever (4).

5. The device according to one or more of the preceding claims, **characterized in that** said button (9) is oriented so that any stress which acts from the outside, such as impacts and the like, acts in the direction which facilitates the engagement of said tooth (23) in said edge (31) and therefore in the direction for closing the device.

6. The device according to one or more of the preceding claims, **characterized in that** said lever (4) has such a shape that any deformation induced by external actions facilitates the engagement of said tooth (23) in said edge (31), so as to ensure the closure of the device.

7. The device according to one or more of the preceding claims, **characterized in that** said safety coupling means (8) comprise at least one respective torsion spring, which is keyed along said pin (21) and is adapted to keep said button (9) elastically in said position for restraining said lever (4), said torsion spring being provided with a first end which is associated with said button (9) and a second end which abuts against said lever (4).

8. The device according to one or more of the preceding claims, **characterized in that** said safety coupling means (8) comprise two torsion springs, which are keyed along said pin (21) on opposite sides and are adapted to keep said button (9) elastically in said position for restraining said lever (4), so that said button (9) can be kept elastically in said restraining position even if one of the springs breaks.

9. The device according to one or more of the preceding claims, **characterized in that** said lever (4) forms at least one substantially circular hole (25), in which at least one key-operated safety detent (26) is locked in order to retain said button (9) in said position for restraining said lever (4), said detent (26) being adapted to abut at an appropriately provided protrusion (24) provided in said button (9).

10. The device according to one or more of the preceding claims, **characterized in that** said lever (4) forms a longitudinal ridge (10a), which is affected by first through holes (27, 28), second through holes (32, 32a) being provided which are rigidly coupled centrally to said base (2) and are adapted to be arranged, when said lever (4) is in the angular closure position, below said ridge (10a) and adjacent to said first through holes (27, 28), so that it is possible to fix customs seals and the like thereto.

11. The device according to one or more of the preceding claims, **characterized in that** said lever (4) comprises a terminal grip portion (14), which is contoured so as to form at least one sort of receptacle (15), which is adapted to accommodate an insert (15a) for protecting the hands of the operator.

12. The device according to one or more of the preceding claims, **characterized in that** said insert (15a) is made of a synthetic material such as plastics.

13. The device according to one or more of the preceding claims, **characterized in that** said base (2) is made of a material such as steel plate.

14. The device according to one or more of the preceding claims, **characterized in that** said base (2) comprises first elements for retaining said lever (4), in said angular closure position, respectively in a substantially vertical direction (39) and in a substantially horizontal direction (40).

15. The device according to one or more of the preceding claims, **characterized in that** said first elements (39) for retention in a vertical direction comprise at least one pair of first lateral flaps (41, 42), which are shaped by the base (2) and are folded substantially at right angles thereto and are adapted to engage respectively at said contoured sides (11, 12) of said lever (4), so as to prevent their accidental

movements in a vertical direction and so as to allow to close the device in critical conditions in which said lever (4) is not perfectly aligned vertically with said base (2).

16. The device according to one or more of the preceding claims, **characterized in that** said first elements (40) for retaining said lever (4) in a horizontal direction comprise at least one pair of first recesses (43, 44), which are provided in said first lateral flaps (41, 42) and in which at least one pin (20) rigidly coupled to said lever (4) is adapted to engage transversely, so as to prevent accidental movements of said lever (4) with respect to said base (2) and thus allow the closure of the device even in conditions in which said lever (4) is not aligned perfectly horizontally with said base (2).

17. The device according to one or more of the preceding claims, **characterized in that** said second through holes (32, 32a) are formed in a plate (23), which is inserted in a respective slot (34) provided in the base (2), and comprises an end portion (25) which is folded substantially at right angles and is fixed below said base (2).

18. The device according to one or more of the preceding claims, **characterized in that** said base (2) is affected by at least two circular holes (29) for fixing, by means of screws, to the body of the truck, said screws being substantially concealed by said lever (4) in said angular closure position.

19. The device according to one or more of the preceding claims, **characterized in that** said anchoring means (3) comprise at least one bracket (37), which has a substantially U-shaped transverse cross-section and is affected, at its ends, by two mutually opposite coaxial holes, in which a first cross-member (38) is locked, the terminal lug (13) of said lever (4) being adapted to engage below said first cross-member in said angular closure position, said brackets (37) being fixed to said base (2) by means of at least one pair of rivets (38a), which can engage in respective fixing holes (38b, 38c).

20. The device according to one or more of the preceding claims, **characterized in that** said pawl element (7) is made of a material such as steel plate.

21. The device according to one or more of the preceding claims, **characterized in that** said pawl element (7) has a transverse cross-section which is substantially shaped like an inverted letter U which has a geometry that can vary from one end to the other, so as to form a upper face (45) and two contoured side walls (46, 47).

22. The device according to one or more of the preceding claims, **characterized in that** said pawl element (7) forms a sort of perimetric contour (48) for connecting said upper face (45) and said contoured side walls (46, 47), which is adapted to give to said pawl element (7) optimum strength and rigidity.

23. The device according to one or more of the preceding claims, **characterized in that** said contoured side walls (46, 47) of said pawl element (7) form respective mutually opposite and coaxial second holes (49) for the keying of said rod (5), a second portion (50) having a tubular or other cross-section being fixed in said holes, said rod (5) being inserted and locked therein by way of connecting elements of the type with an exposed or concealed pin, or by welding.

24. The device according to one or more of the preceding claims, **characterized in that** said upper abutment (6) is made of a material such as steel plate.

25. The device according to one or more of the preceding claims, **characterized in that** said upper abutment (6) comprises second elements for retaining said pawl element (7) in said angular closure position, respectively in a substantially horizontal direction (55) and in a substantially vertical direction (56).

26. The device according to one or more of the preceding claims, **characterized in that** said second elements for retention in a horizontal direction (55) comprise at least one protrusion (57, 58), which is substantially shaped like an inverted letter V, in which the ends are rigidly coupled to the surface of said upper abutment (6), said second V-shaped protrusion (57, 58) being adapted to engage in a respective second recess (51, 52) provided in at least one of said contoured side walls (46, 47) of said pawl element (7), so as to prevent accidental movements thereof in a horizontal direction, said second elements for retention in a horizontal direction (55) and in a vertical direction (56) being adapted to allow the closure of the device even in conditions in which said pawl element (7) is not aligned perfectly with said upper abutment (6).

27. The device according to one or more of the preceding claims, **characterized in that** said second substantially V-shaped protrusion (57, 58) is shaped starting from a portion of said upper abutment (6) which is cut along two parallel sides and deformed plastically.

28. The device according to one or more of the preceding claims, **characterized in that** said second elements (55) for retention in a horizontal direction comprise two of said second protrusions (57, 58)

which are substantially V-shaped and are mutually substantially parallel.

29. The device according to one or more of the preceding claims, **characterized in that** said second elements (56) for retention in a vertical direction comprise at least one second terminal flap (59, 60) of said upper abutment (6), which is folded substantially at right angles thereto, said second flap (59, 60) being adapted to engage at one end of said pawl element (7).

30. The device according to one or more of the preceding claims, **characterized in that** said second elements (56) for retention in a vertical direction comprise two second mutually opposite terminal flaps (59, 60) of said upper abutment (6), which are folded substantially at right angles thereto, said second flaps (59, 60) being adapted to engage respectively at one end of said pawl element (7) so as to prevent accidental movements thereof in a vertical direction.

31. The device according to one or more of the preceding claims, **characterized in that** said upper abutment (6) comprises two substantially flat and parallel wings (61, 62) for fixing the ends of a second cross-member (63), below which the beak (53) of said pawl element (7) is adapted to engage in said angular closure position of the door.

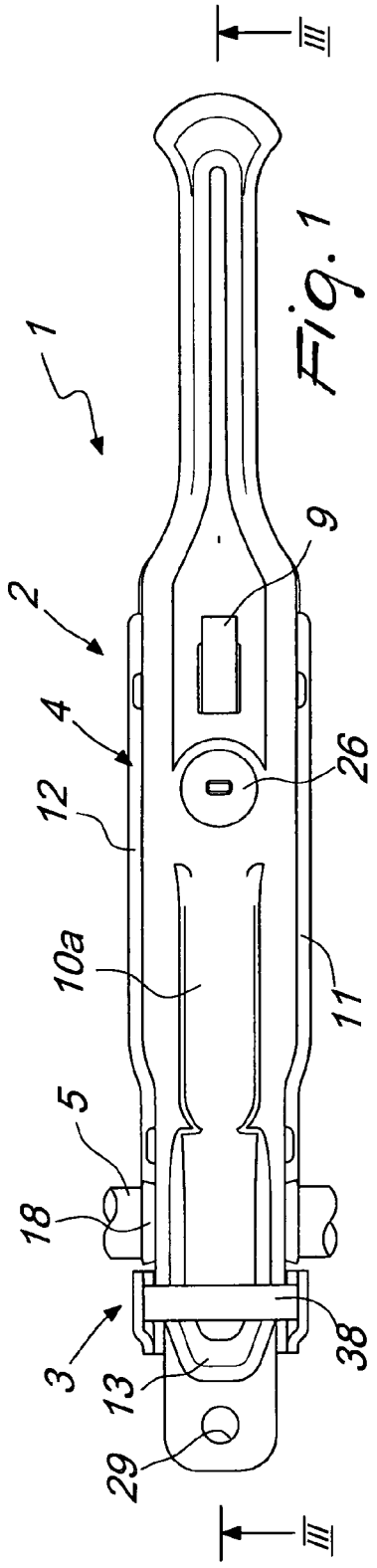

Fig. 1

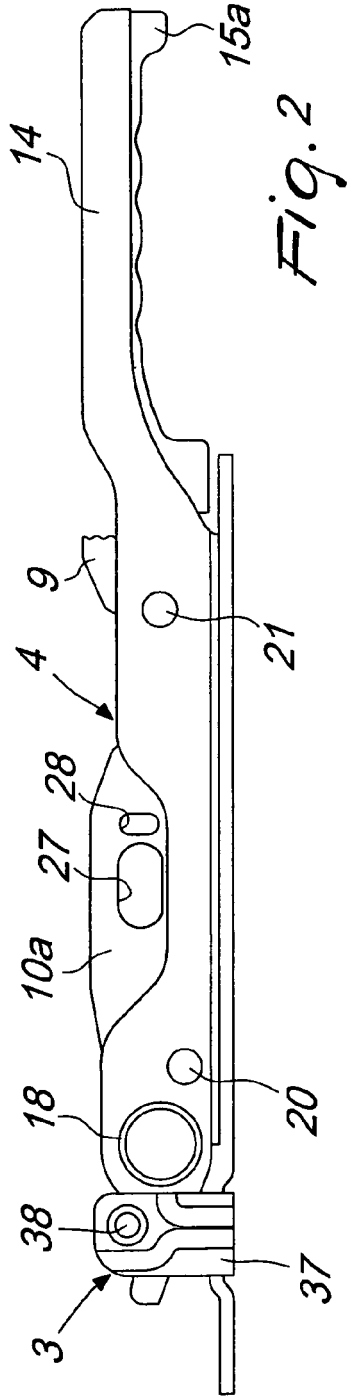

Fig. 2

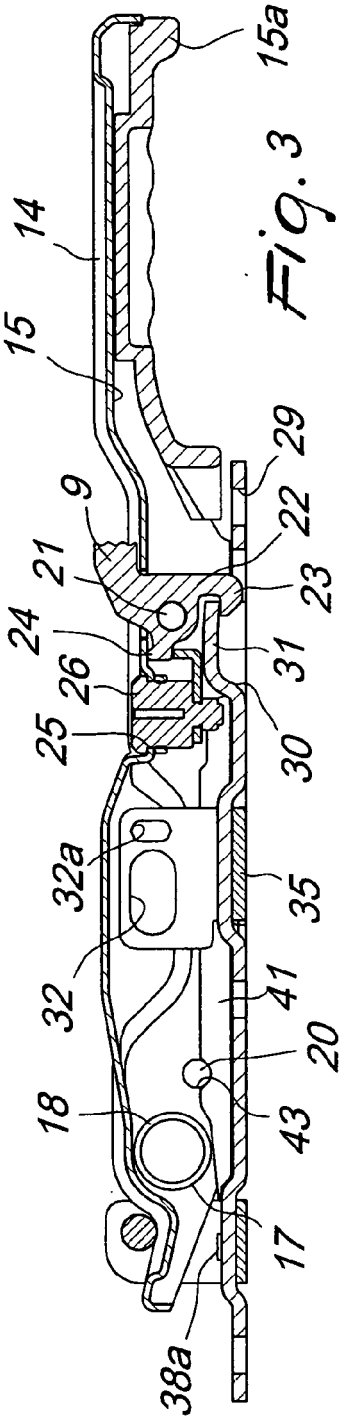

Fig. 3

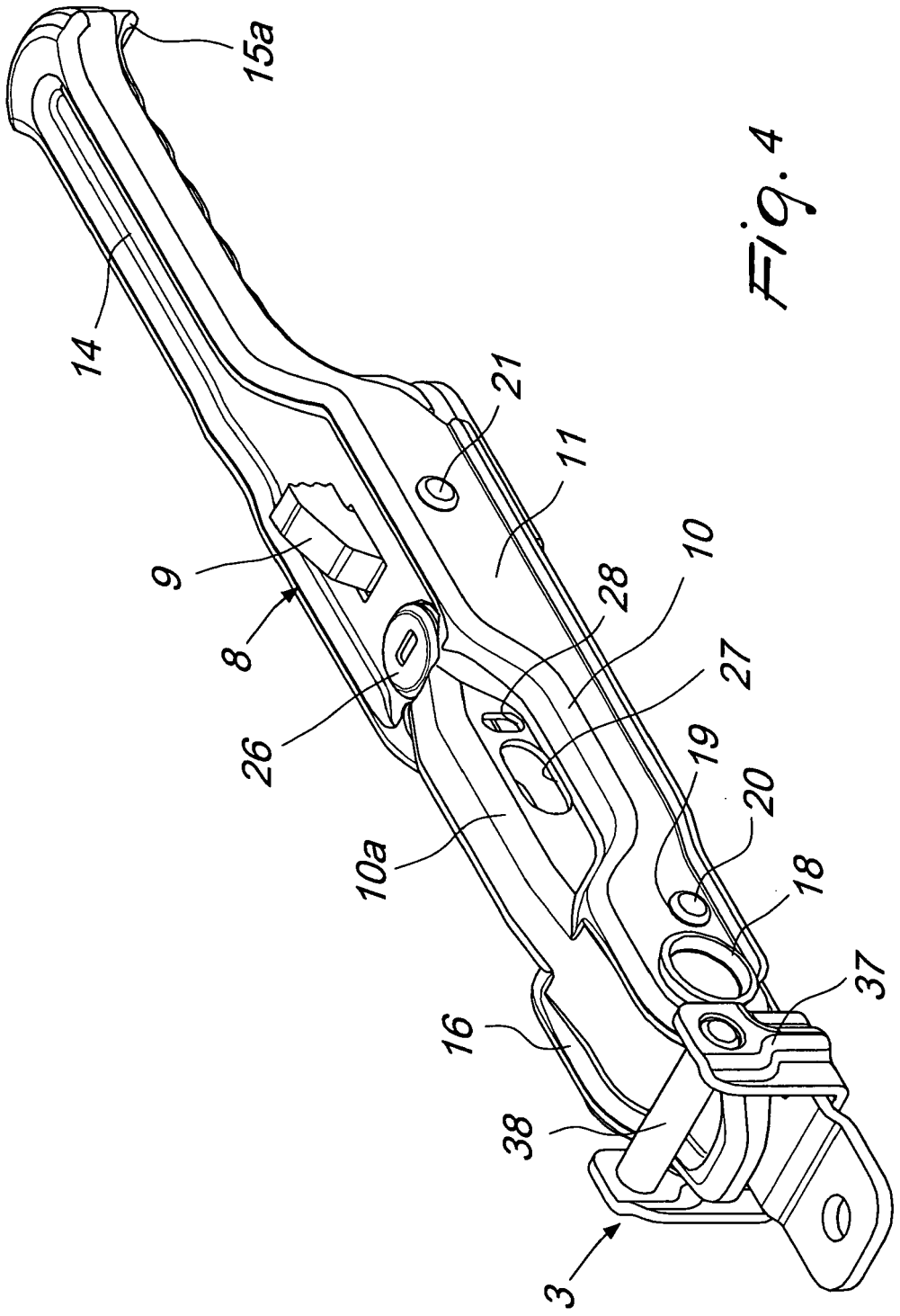

Fig. 4

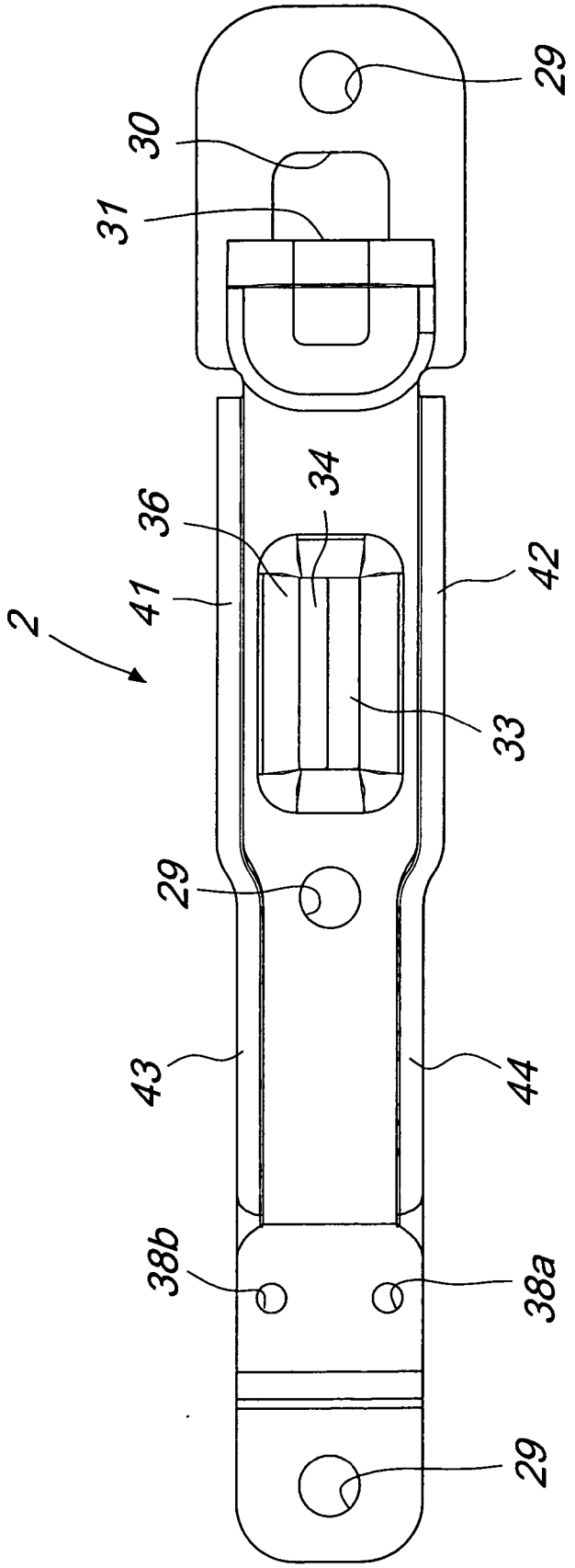

Fig. 5

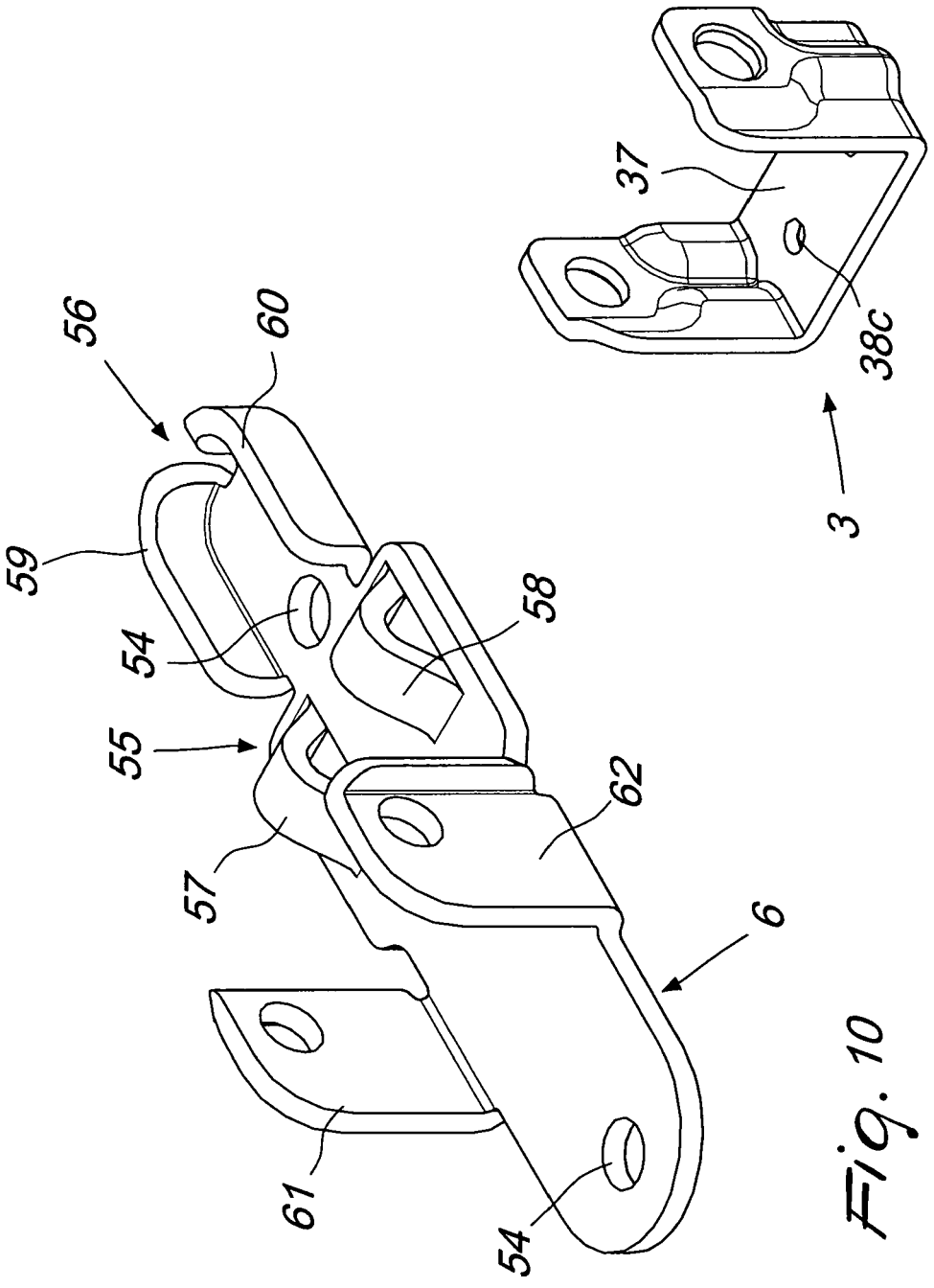

Fig. 6

Fig. 10

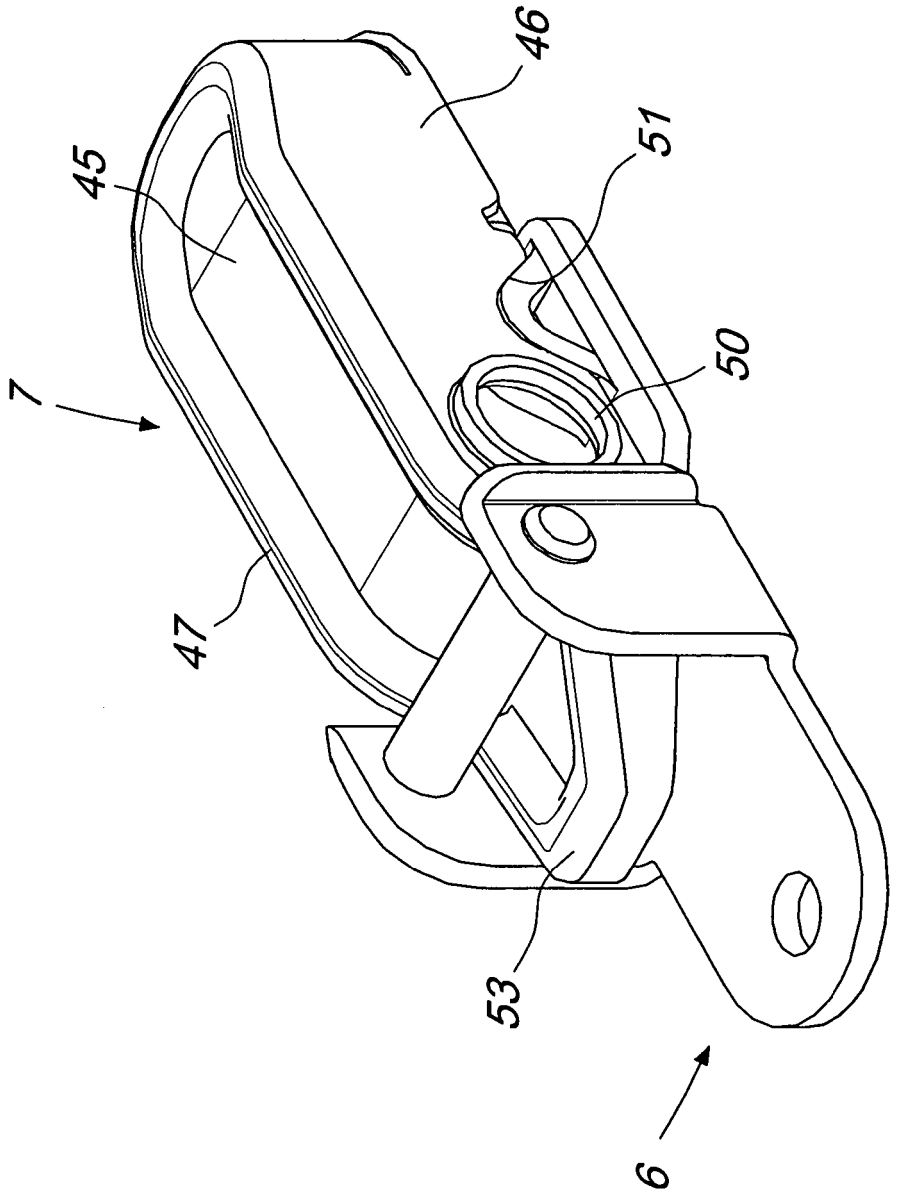

Fig. 7

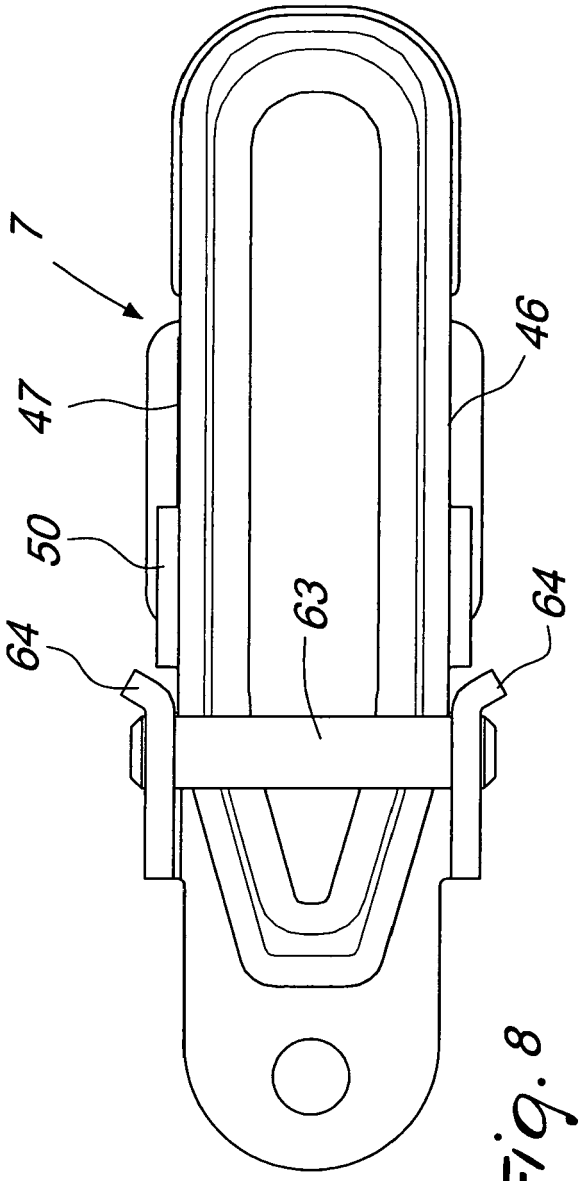

Fig. 8

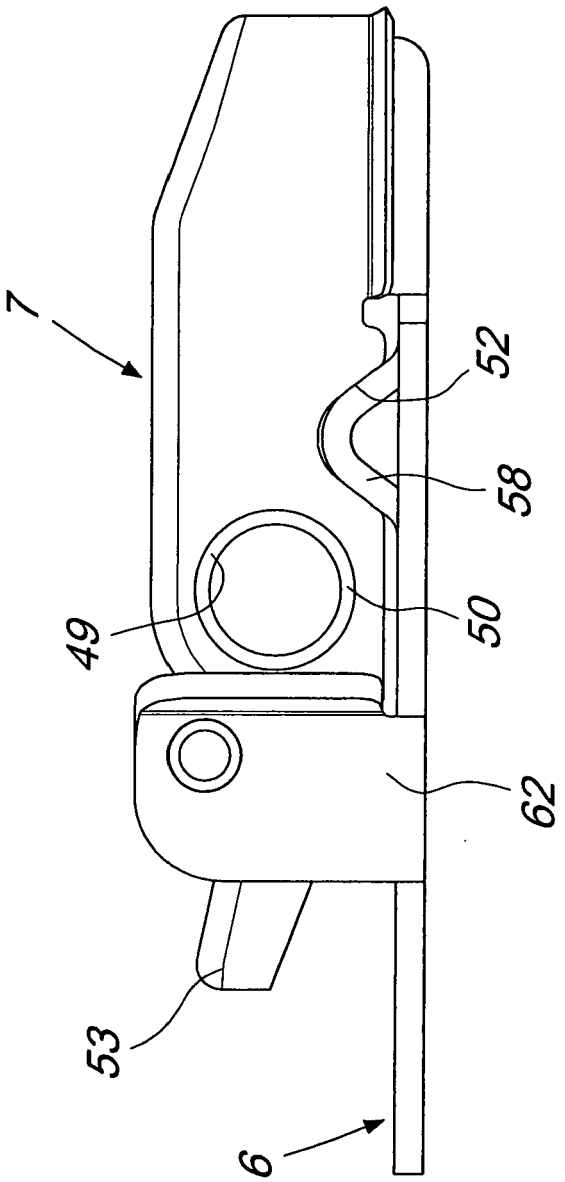

Fig. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5800

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 May 2006	Westin, K

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 42 5800

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