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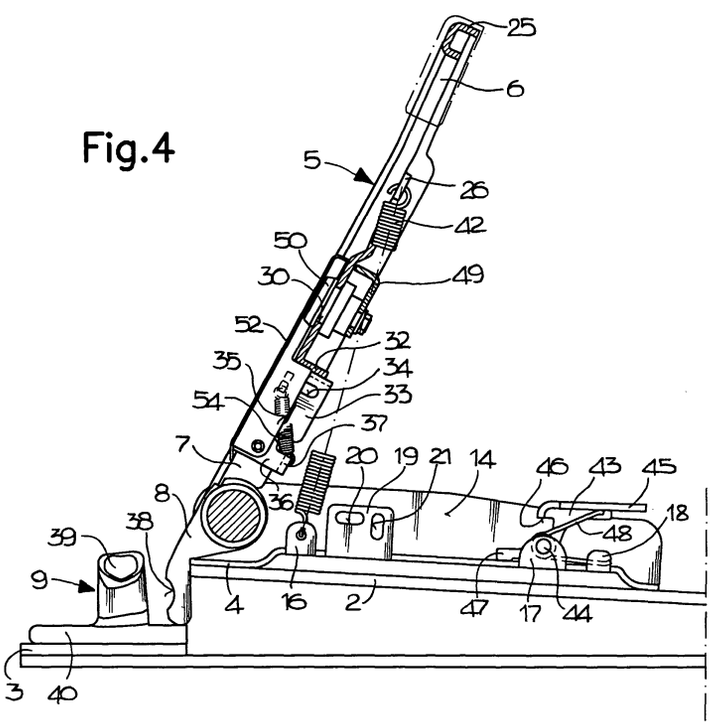
(54) Device for opening and closing a door for access to hermetically sealed compartments

(57) A device for opening and closing a door for accessing hermetically sealed compartments, comprising an actuation lever (5), pivoted externally to the leaf (2) of the door about an axis (A) that is arranged along the edge and is parallel thereto, and is able to rotate from a closure configuration, in which it is arranged substantially parallel to the leaf (2), to an opening configuration, in which it is spaced from the leaf (2), the actuation lever (5) having a first actuation end (6) that forms a first longer lever arm for manually opening and closing the leaf (2), and a second end (7) that is provided with a tab (8) that forms a second shorter lever arm for engaging a locator element (9) that is provided laterally with respect to the edge of the leaf (2), the tab (8) being adapted to engage the element (9) when the leaf (2) is substantially ajar, so as to allow its hermetic closure by pressing on the actuation end (6).

Fig.4



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Description

[0001] The present invention relates to a device for opening and closing a door for accessing hermetically sealed compartments, such as in particular bodies of trucks, trailers and the like.

[0002] In the field of storage and transport of goods that need to be preserved in isolation with respect to the outside environment, which comprises for example refrigeration cells and the like installed on trucks or other vehicles, devices for opening and closing the access door are known which are constituted by one or more actuation levers, pivoted on a cylindrical bar that is rotatably supported on the outside of the leaf of said door and provided with one or more hook-like members that are adapted to engage respective locator seats provided on the body or on the other leaf of the door.

[0003] In order to ensure effective hermetic closure of the door, perimetric gaskets made of a material such as elastomer are usually fitted along the edges of the leaves; such gaskets often have considerable transverse cross-sections and accordingly have a considerable elastic resistance to deformation.

[0004] In view of this, currently widely used closure devices are rather awkward and difficult to use, particularly because operators are forced to apply considerable efforts, which are often repetitive, in order to overcome the elastic resistance of the gaskets and accordingly produce a perfect hermetic closure.

[0005] The aim of the present invention is to obviate the cited drawbacks, by providing an opening and closure device that allows to hermetically close a door for accessing compartments for preserving goods, such as fixed or transportable refrigeration cells or the like, in an effective and easy manner.

[0006] Within this aim, another object of the present invention is to provide a device for opening and closing a door for accessing storage compartments whose repetitive use requires modest physical efforts on the part of operators.

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

[0008] This aim and these and other objects which will become better apparent hereinafter are achieved by the present device for opening and closing a door for accessing hermetically sealed compartments, comprising an actuation lever, which is pivoted externally to the leaf of the door about an axis that is arranged along the edge and is parallel thereto, and is rotatable from a closure configuration, in which it is arranged substantially parallel to the leaf, to an opening configuration, in which it is spaced from the leaf, characterized in that said actuation lever has a first actuation end that forms a first longer lever arm for manually opening and closing said leaf, and a second end that is provided with a tab that forms a second shorter lever arm for engaging a locator element that is provided laterally with respect to said leaf edge, said tab being adapted to engage said element when said leaf is substantially ajar, so as to allow its hermetic closure by pressing on said actuation end.

[0009] Further features of the invention will become better apparent from the detailed description of a preferred but not exclusive embodiment of a device for opening and closing a door for accessing hermetically sealed compartments according to the invention, illustrated by way of example in the accompanying drawings, wherein:

Figure 1 is a top view of the leaf of the door, arranged ajar and provided with the device with the actuation lever in the closure configuration;
Figure 2 is a top view of the leaf of the door provided with said device, with the actuation lever in the opening configuration:
Figure 3 is a partially sectional detail front view of the device, with the actuation lever in the closure configuration;
Figure 4 is a partially sectional detail top view of the device, with the actuation lever in the opening configuration;
Figure 5 is a partially sectional detail top view of said device, with the actuation lever in the closure configuration.

[0010] With particular reference to Figures 1 and 2, the reference numeral 1 generally designates a device for opening and closing a door for accessing hermetically sealed compartments according to the invention.

[0011] Consider, by way of example, a door for accessing a compartment for storing or transporting goods, constituted by a first leaf 2 and a second leaf 3 that are arranged side by side and are hinged along their parallel opposite sides; it is noted that the description that follows can be referred equally also to a door constituted by a single leaf.

[0012] The device comprises a base 4 for fixing to the outer face of the first leaf 2, to which an actuation lever 5 for manual opening and closing of the door is pivoted about an axis A that is substantially parallel to said leaf 2 and is arranged along one edge; according to the invention, the actuation lever 5 has a first actuation end 6 and a second end 7, which is located opposite with respect to the axis A and is provided with a tab 8 for engaging a respective locator element 9 that is fixed to the outer face of the second leaf 3 along the corresponding edge (likewise, in the fully similar case in which the access door is constituted by a single leaf, the locator element 9 can be fixed to the outer wall of the body. or of the container for storing or transporting the goods).

[0013] The lever 5 is pivoted to a cylindrical pivot 10, which is supported at its ends to the base 4 and whose axis of symmetry coincides with the axis A (generally, in applications the axis A is vertical); the actuation lever 5 can rotate about the pivot 10 from a closure configura-

tion (Figure 1), in which it is arranged substantially parallel to the base 4 and therefore to the first leaf 2, to an opening configuration (Figure 2), in which it is spaced from said leaf 2, assuming a preset angle with respect to it.

[0014] The device comprises means 11 for detachably retaining the actuation lever 5 in the closure configuration, as well as additional safety locking means 12 that are adapted to prevent said retention means 11 from being removed accidentally or by unauthorized individuals.

[0015] The base 4 has a substantially plate-like rectangular shape (Figures 3 and 4), and is affected at its comers by four holes 13 for fixing to the outer face of the leaf 2 by means of screws. The base 4 has its longitudinal edges (which in the specific case are arranged horizontally) folded at right angles so as to form two opposite side walls 14; two respective circular openings 15 are formed in said walls 14 at the ends that are proximate to the edge of the leaf 2, and face each other and are coaxial; the pivot 10 is inserted and locked in said openings. The central portion of the base 4 is slightly raised and forms a first pair of lugs 16 provided with holes, a second pair of lugs 17 provided with holes, and a third pair of lugs 18. A first longitudinal plate 19 is further rigidly coupled to the surface of the central portion of the base 4, is arranged at right angles thereto, and is provided with a first pair of slots 20, 21, one of which has its axis parallel to the base 4, the other one having its axis at right angles thereto.

[0016] The actuation lever 5, preferably made of folded metal plate (Figure 3), has its first actuation end 6 constituted by two longitudinal portions 22, 23 connected by a transverse portion 24, so as to form a sort of a handle that has a substantially U-shaped transverse cross-section; the portions 22, 23, 24 are partially covered by a protective sheath 25, for example made of synthetic material, which is suitable to facilitate its grip.

[0017] The second end 7 of the actuation lever 5 is shaped like a bush for articulation on the pivot 10; the tab 8 for engaging the locator element 9 provided on the second leaf 3 is rigidly coupled, for example by welding, substantially to the centerline of the bush.

[0018] Respective flaps 26 are provided along the lateral portions 22, 23 of the first actuation end 6, are folded inwardly and are both provided with small holes 27. The central portion 28 of the actuation lever 5 is substantially flat, has a slightly folded and substantially straight end edge 29, and is affected by an opening 30 and by a quadrangular window 31; a cross-member 32 for supporting a second plate 33 is rigidly coupled below said central portion 28 and at the distal transverse side of the window 31, and is adapted to support a second plate 33 that is provided with a second pair of slots 34, 35, which when the actuation lever 5 is in the closure condition are arranged so that they substantially correspond respectively to the first pair of slots 20, 21 of the first plate 19.

[0019] A lower protrusion 36 protrudes from the central portion 28 and at one of the longitudinal sides of the window 31 and forms an eye 37 at its end.

[0020] The engagement tab 8 is substantially fork-shaped, with its respective prongs provided with recesses 38 (Figure 4); the distance between the transverse portion 24 of the first actuation end 6 of the actuation lever 5 and the axis A constitutes a first lever arm, while the distance between the recesses 38 of the engagement tab 8 and said axis A forms a second lever arm. Advantageously, the first lever arm is considerably longer than the second lever arm, so as to allow to close the door with a very modest pressing force on the first actuation end 6, by way of the engagement of the locator element 9 in the recesses 38 with the first leaf 2 simply ajar, without adhering to the vehicle body.

[0021] The locator element 9 is preferably substantially T-shaped and forms an end portion 39 that is parallel to the second leaf 3 and is adapted to engage, with the actuation lever 5 in the closure configuration, within the recesses 38 of the engagement tab 8. At the base, the element 9 is rigidly coupled to a plate 40 that is affected by holes 41 for fixing by means of screws to the second leaf 3 or to the outer wall of the vehicle body.

[0022] Two traction springs 42, in which the respective first ends are engaged in the small holes 17 of the flaps 26 and the second ends are coupled to the first pair of lugs 16 of the base 4, keep the actuation lever 5 stably in the closure configuration (Figures 3 and 4).

[0023] The means 11 for detachably retaining the actuation lever 5 in the closure position comprise a sort of rocker 43, which is pivoted on a pivot 44 that is supported at the centerline by the second pair of lugs 17 provided on the base 4 of the device. The rocker 43 has an upper end 45 that is substantially flat and shaped like a button and forms at the front a straight edge 46; the rocker also has an elongated lower end 47. The rocker 43 is associated with elastic means, preferably constituted by a pair of coiled springs 48, which are inserted respectively at the ends of the pivot 44 and have first ends that abut below the upper end 45 of said rocker and second ends that rest on the raised central portion of the base 4 and are retained laterally by the third pair of lugs 18 provided on said base.

[0024] The rocker 43 can rotate, preferably by manual pressure on the upper end 45, from a first stable angular position, ensured by the action of the coiled springs 48, in which the edge 46 engages above the end edge 29 of the actuation lever 5 in order to prevent its rotation from the closure configuration to the open configuration (Figure 5), to a second angular position, in which the edge 46 is substantially disengaged from the end edge 29 and allows to turn the actuation lever 5 in the opening configuration.

[0025] The elements 12 for the safety locking of the actuation lever 5 in the closure configuration comprise a tab 49, which is substantially L-shaped and is connected to a rotatable support 50 that is engaged in the opening 30 and is affected in an upward region by a slot 51

for the insertion of an appropriately provided key. By using said key, it is possible to turn the tab 49 from a locking position, in which it is substantially superimposed on the lower end 47 of the rocker 43, preventing its actuation (Figure 5), to a release position, in which it is arranged laterally in order to allow to act freely on said rocker.

[0026] An upper cover 52 is fitted and is pivoted at one end about an axis that is parallel to A (Figures 3 and 4) so as to overlap the central portion 28 of the actuation lever 5. Along one of its lateral edges, the cover 52 has one or more substantially hook-shaped protrusions 53 for engaging the end of a retention spring 54, the opposite end of which is fixed to the eye 36: the spring 54 allows to keep the cover 52 stably on the central portion 28 of the actuation lever 5.

[0027] The method of use of the device according to the invention is intuitive: assuming that the first leaf 2 is initially open (Figure 2), it is turned until it reaches a substantially ajar position; the actuation lever 5 is in the opening configuration and is spaced from the base 4, so that the engagement tab 8 can reach the vicinity of the locator element 9. The end portion 39 of the element 9 at this point engages in the recesses 38 of the prongs of the engagement tab 8: by applying a limited pressure to the first actuation end 6, by means of the favorable lever arm, it is possible to overcome the elastic contrast of the door gaskets, placing the actuation lever 5 in the closure configuration and the first leaf 2 parallel to the wall of the vehicle body (Figure 1): the end edge 29 of said lever engages automatically below the edge 46 of the upper end 45 of the rocker 43.

[0028] In order to achieve maximum assurance of safety against accidental or unwanted opening of the actuation lever 5, one acts with the appropriately provided key in the slot 51 of the rotatable support 50, arranging the tab 49 so that it overlaps the lower end 47 of the rocker 43: this prevents any rotation of said rocker so as to disengage the actuation lever 5 (Figure 5). The leaf 2 can be opened by performing the above described operations in reverse.

[0029] It is noted that it is possible to apply additional safety seals, constituted by steel cables or similar means, which pass through corresponding slots 20, 21, 34, 35 of the first and second plates 19, 33.

[0030] The opening and closure device can be fitted on a large variety of storage and transport containers of various sizes and shapes. Its use, even repeatedly, ensures maximum effectiveness and safety in the hermetic closure of the compartment without requiring excessive efforts on the part of the operators in order to overcome the elastic contrast offered by the sealing gaskets.

[0031] It has thus been shown that the invention achieves the intended aim and objects.

[0032] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0033] All the details may further be replaced with other technically equivalent ones.

[0034] 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.

[0035] The disclosures in Italian Utility Model Application No. BO2002U000112 from which this application claims priority are incorporated herein by reference.

[0036] 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 for opening and closing a door for accessing hermetically sealed compartments, comprising an actuation lever (5), which is pivoted externally to the leaf (2) of said door about an axis (A) that is arranged along the edge and is parallel thereto, and is able to rotate from a closure configuration, in which it is arranged substantially parallel to said leaf (2), to an opening configuration, in which it is spaced from said leaf (2), **characterized in that** said actuation lever (5) has a first actuation end (6) that forms a first longer lever arm for manually opening and closing said leaf (2), and a second end (7) that is provided with a tab (8) that forms a second shorter lever arm for engaging a locator element (9) that is provided laterally with respect to said edge of the leaf (2), said tab (8) being adapted to engage said element (9) when said leaf (2) is substantially ajar, so as to allow its hermetic closure by pressing on said actuation end (6).

2. The device according to claim 1, **characterized in that** said engagement tab (8) is substantially fork-shaped, with prongs provided with respective recesses (38), said locator element being substantially T-shaped and forming an end portion (39) that is parallel to said leaf (2) and is adapted to engage in said recesses (38) when said device is in the closure position.

3. The device according to claims 1 and 2, **characterized in that** said actuation lever (5) is shaped, at said axis A, substantially like a bush for articulation about a respective pivot (10) that is supported on said leaf (2), said engagement tab (8) being rigidly coupled to said bush substantially at the centerline.

4. The device according to one or more of the preceding claims, **characterized in that** said engagement tab (8) is connected to said articulation bush by welding.

5. The device according to one or more of the preceding claims, **characterized in that** it comprises means (11) for detachably retaining said actuation lever (5) in the closure configuration.

6. The device according to one or more of the preceding claims, **characterized in that** said detachable retention means (11) comprise a rocker (43) that is supported so that it can rotate on a pivot (44) that is rigidly coupled to said leaf (2), forming an upper end (45), which is provided with an edge (46) that is substantially parallel to said leaf (2), and an elongated lower end (47), said rocker (43) being able to rotate, by manual pressure on said upper end (45) and in contrast with elastic means (48), from a first stable angular position, in which said actuation lever (5) is retained in the closure configuration below said edge (46), to a second angular position, in which said edge (46) disengages from said actuation lever (5), allowing its rotation into the opening configuration.

7. The device according to one or more of the preceding claims, **characterized in that** it comprises safety locking elements (12) that are adapted to retain said actuation lever (5) in the closure configuration.

8. The device according to one or more of the preceding claims, **characterized in that** said safety locking elements (12) comprise a tab (49) that is supported so that it can rotate in said lever (5) about an axis that is substantially perpendicular thereto and is adapted to engage detachably above said lower end (47) of said rocker (43) so as to prevent its rotation from said first angular position to said second angular position.

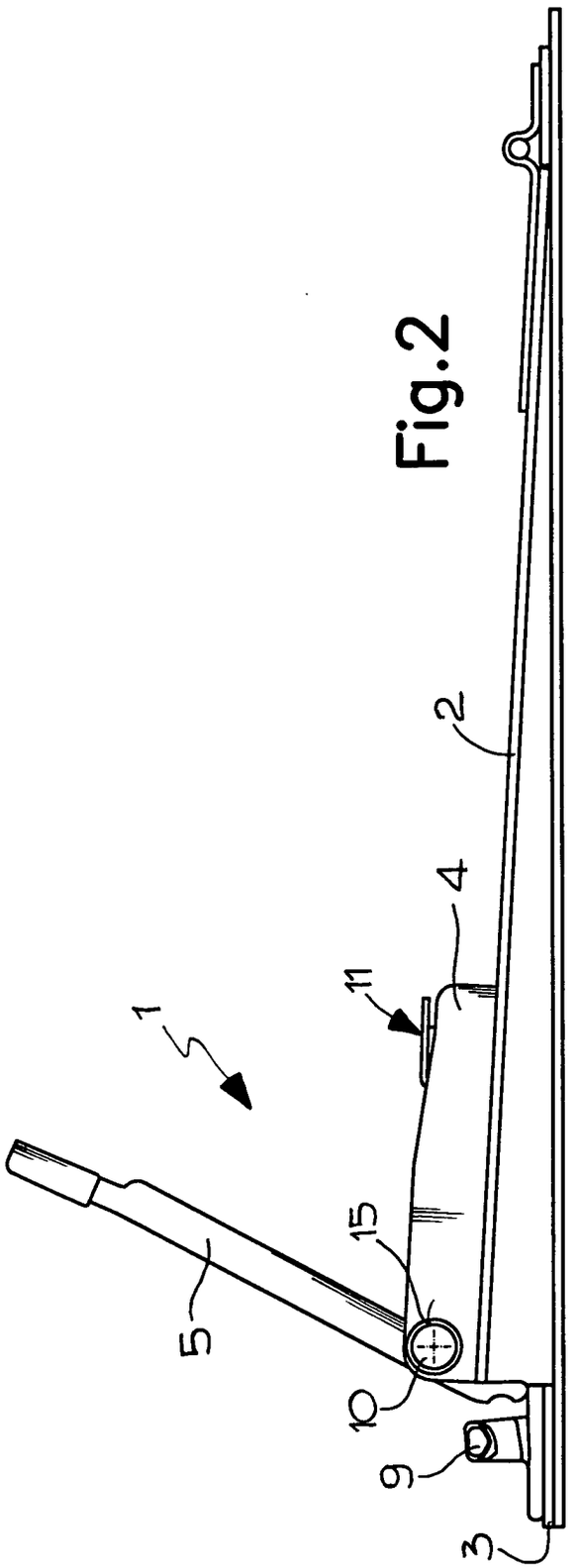


Fig.2

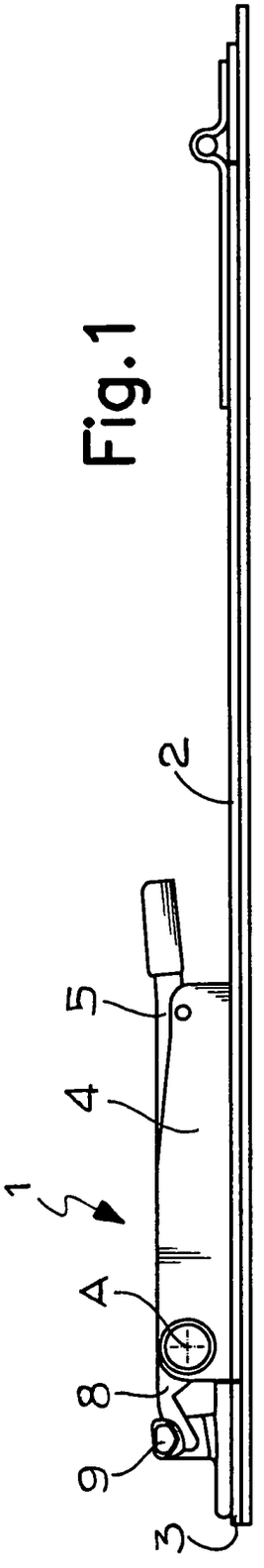


Fig.1

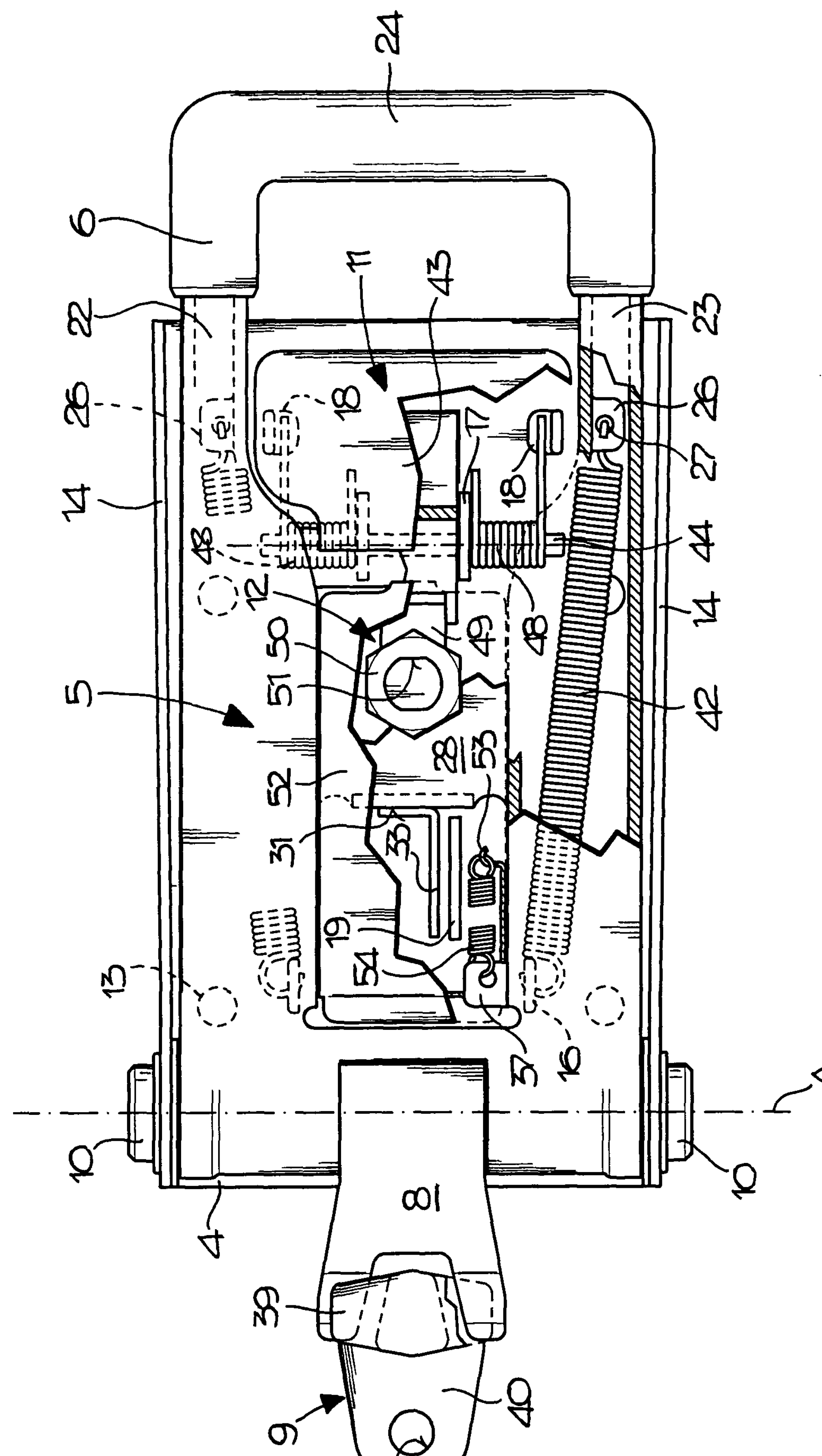
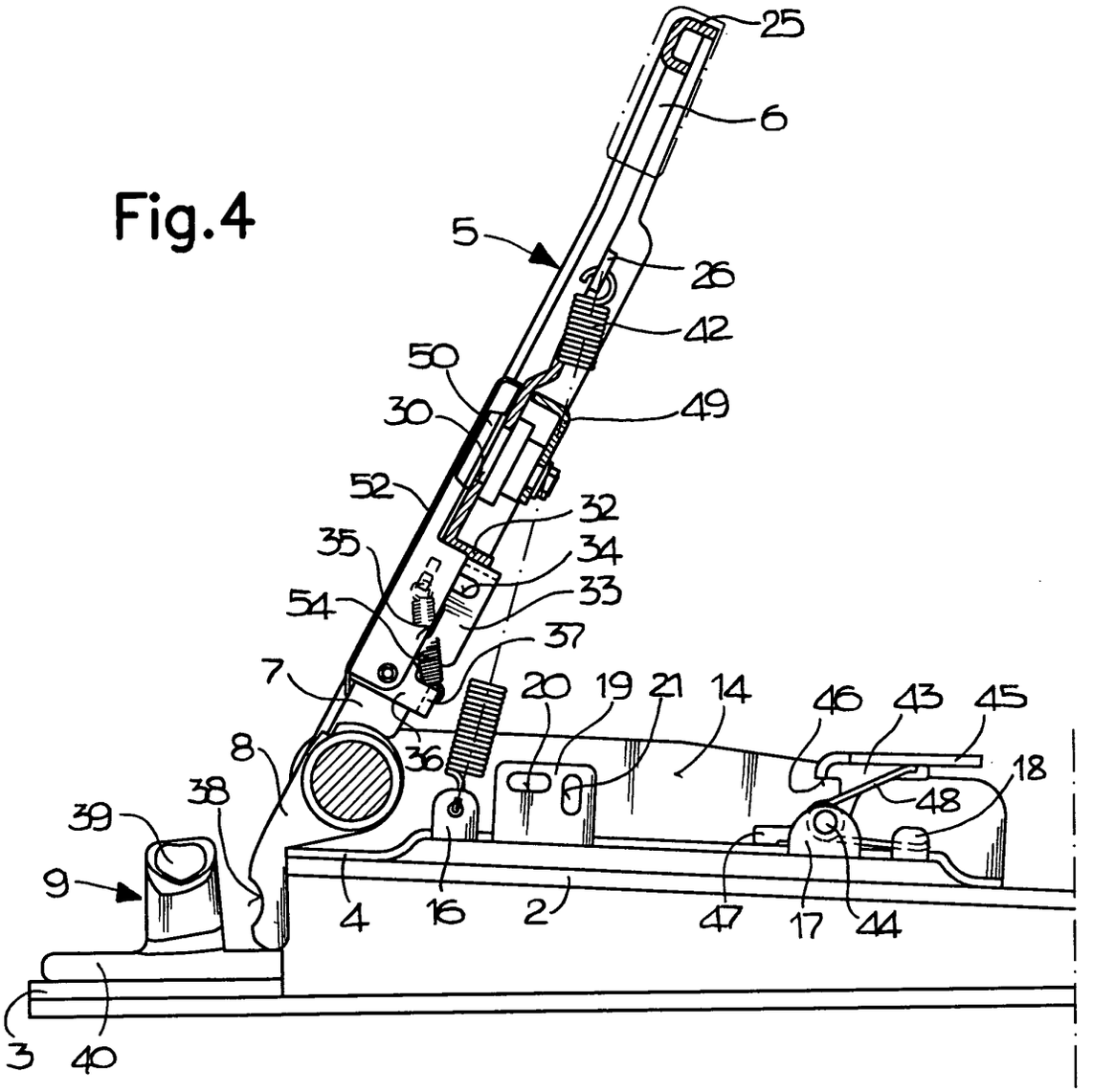


Fig.3

Fig.4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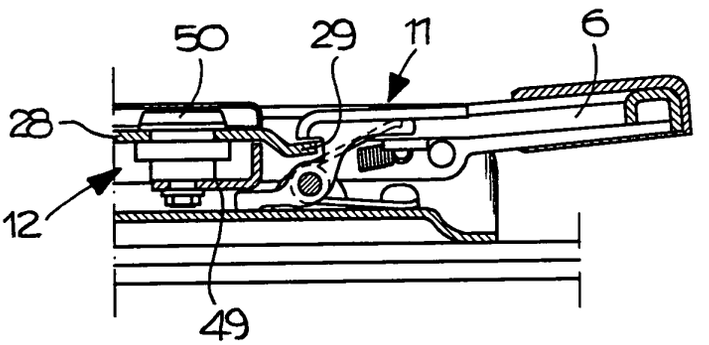
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Fig.5