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(54) RELEASE APPARATUS FOR VEHICLE DOORS

(57) A release apparatus for doors of vehicles, such as vans, trucks, heavy goods vehicles, articulated trucks, trailers and the like, comprising a base (2), which can be anchored stably to the door, and a handle assembly (3), which can be anchored to at least one rod (A) that can be coupled rotatably to the door and supports respective means for anchoring to the frame of the vehicle. The handle assembly (3) can rotate with respect to the base (2) between at least one locking configuration, in which the anchoring means can engage even indirectly the frame of the vehicle, and at least one release configuration, in which the anchoring means are in any case disengaged from the frame of the vehicle, in order to allow the rotation of the door; a locking button (4) is coupled rotatably to the base (2) and is reversibly movable between at least one first angular position, in which it is arranged even indirectly so as to interfere with the motion of the handle assembly (3), and at least one second angular position, in which it 'is spaced from the handle assembly (3), in order to allow its movement; the button (4) comprises a laminar element (5), which is provided in one piece and has a substantially flat central portion (5a), which is interposed between respective opposite end flaps (5b), which are bent and are articulated to the base (2).

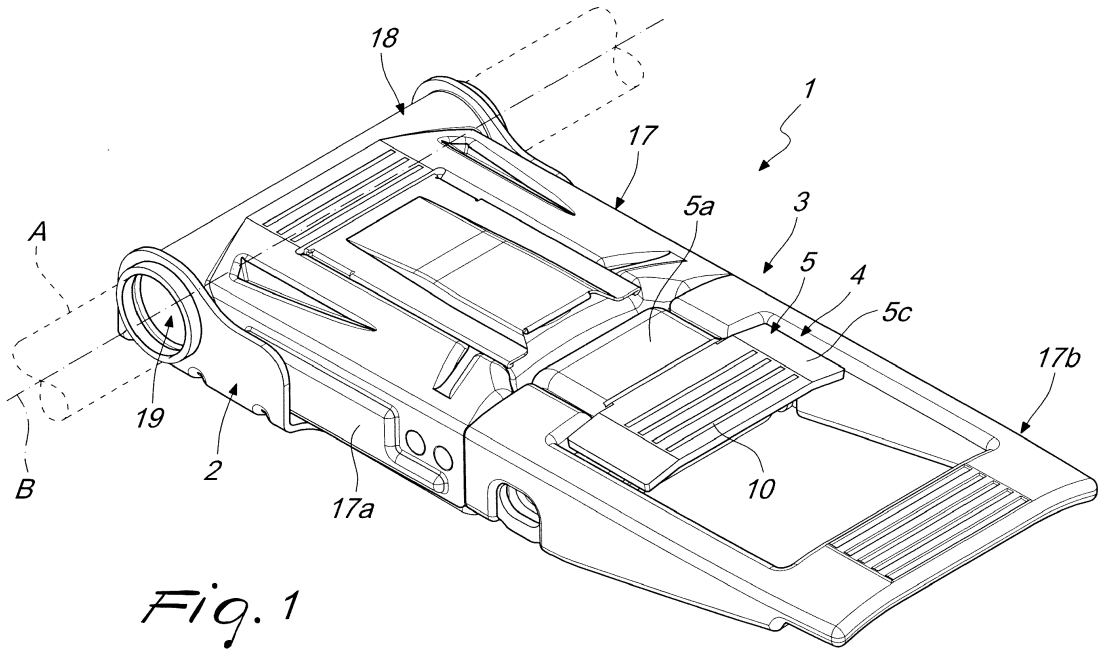


Fig. 1

EP 3 235 978 A1

Description

[0001] The present invention relates to a release apparatus for vehicle doors.

[0002] The rear (or lateral) doors usually arranged to close the loading compartment of trucks, vans, articulated trucks, heavy goods vehicles, trailers, and the like, are usually associated with particular apparatuses intended for their release, which can be operated when the user (for example the driver of the vehicle) indeed wishes to have access to the compartment.

[0003] According to methods that are by now well-established, while the vehicle is moving the door is in fact kept in the closed arrangement by engagement elements (hooks, claws, etc.) fixed to the ends of a vertical rod, which is coupled rotatably to such door. In this condition, the engagement elements engage respective retention elements, which are fixed to the frame of the vehicle (above and/or below the door).

[0004] Each release apparatus of the known type therefore comprises a handle, which is integral with the rod and is arranged substantially outside the door, so that it can be gripped and turned by the operator who wishes to access the compartment. The rotation of the handle causes the integral rotation of the rod and the consequent disengagement of the engagement elements from the retention elements, thus allowing free rotation to the door.

[0005] In addition to the general structure outlined above, however, it is necessary to provide further solutions, which prevent the accidental rotation of the handle, obviously to avoid the danger of unwanted openings of the door, for example while the vehicle is moving.

[0006] For this purpose, therefore, the free rotation of the handle is hindered by a button, which is usually arranged so as to interfere with the rotation of the handle proper (or of a component that is integral therewith).

[0007] In this manner, only as a consequence of the voluntary pressing of the button is it possible to space the button from the rotation trajectory of the handle in order to allow indeed the opening of the door.

[0008] Besides, as a further safety assurance (and to limit access to the compartment only to authorized personnel), apparatuses of the known type are also provided with key-operated devices, which again allow free rotation of the handle only to the owner of the key, the use of which allows indeed to deactivate a further hindrance to the movement of the handle (or of the button) proper.

[0009] However, this constructive solution is not devoid of drawbacks.

[0010] The button usually has a complex shape, since it has must have an external surface portion, intended to be pressed directly by the user, that is large enough to allow indeed practical interaction, and at the same time a supporting structure for said portion that vice versa must be able to ensure coupling to other components of the release apparatus, usually in very confined spaces and therefore with the need to comply with strict dimensional constraints.

[0011] In order to be able to comply with these requirements (and ensure adequate mechanical strength), according to methods that are by now well-established the button is obtained by means of a plurality of work steps, which usually include at least one weld, in order to compose the finished button starting from two or more intermediate components prepared separately.

[0012] For example, two respective supporting arms, responsible for rotary coupling to the base of the handle, are welded to a main body that has the outer surface intended to be pressed by the user.

[0013] These production methods are now entirely unsatisfactory, since they increase production costs in an entirely unwelcome manner, both due to the need to provide multiple work steps (which further require obviously long times) and due to the very nature of the steps required.

[0014] Welding activities in fact suffer several drawbacks, which make them increasingly undesirable: they in fact require qualified personnel for their execution and entail rather long execution times (for placing the parts, for providing the beads and for cleaning any slag).

[0015] Moreover, verifying the quality of the weld (which further is strongly influenced by the skill of the specific operator) requires an operator qualified for visual inspection or even the use of penetrating liquids, and in any case it is necessary to wait for a significant time before being able to perform it, since post-weld defects can occur hours later (cold cracks).

[0016] Finally, one should not forget that welding requires a specific cleaning process with chemical products, the disposal of which causes further problems.

[0017] The aim of the present invention is to solve the problems described above, by providing a release apparatus in which the button has low costs and production times.

[0018] Within this aim, an object of the invention is to provide a method for providing buttons for apparatuses for releasing the door of vehicles that can be provided rapidly, inexpensively, without requiring specific skills and without resorting to polluting materials.

[0019] Another object of the invention is to provide an apparatus in which the characteristics and strength of the button can be checked rapidly and easily without requiring qualified personnel.

[0020] Another object of the invention is to provide an apparatus in which the button can be manufactured even by operators lacking specific skills and without resorting to polluting materials while ensuring high reliability in operation.

[0021] Another object of the invention is to provide an apparatus that adopts a technical and structural architecture that is alternative to those of apparatuses of the known type.

[0022] Another object of the invention is to provide an apparatus that can be obtained easily starting from commonly commercially available elements and materials.

[0023] Another object of the invention is to provide an apparatus that has low costs and is safe in application.

[0024] This aim and these and other objects that will become better apparent hereinafter are achieved by a release apparatus according to claim 1.

[0025] This aim and these objects are also achieved by a method according to claim 13.

[0026] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the apparatus according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of an apparatus according to the invention;
Figure 2 is a front elevation view of the apparatus of Figure 1;
Figure 3 is a bottom view of the apparatus of Figure 1;
Figure 4 is a perspective view of the base and of the button of the apparatus of Figure 1;
Figure 5 is a perspective view of the button and of other components of the apparatus of Figure 1;
Figure 6 is a perspective view of the button of the apparatus of Figure 1;
Figure 7 is an exploded perspective view of the button of Figure 6;
Figure 8 is a perspective view of the laminar element of the button of Figure 6;
Figure 9 is a front elevation view of the laminar element of Figure 8;
Figures 10 and 11 are perspective views, taken with different inclinations, of the handle assembly of the apparatus of Figure 1;
Figure 12 is a highly enlarged-scale view of a detail of Figure 11;
Figure 13 is a bottom view of the handle assembly of the apparatus of Figure 1.

[0027] With reference to the figures, the reference numeral 1 generally designates a release apparatus for vehicle doors (typically but not exclusively for professional use).

[0028] These vehicles can be of the type of vans, heavy goods vehicles, trucks, articulated trucks, trailers, and the like, and therefore comprise an internal compartment, which is closed by at least one door (usually arranged at the rear) and is intended to accommodate and transport goods of various kinds.

[0029] The use of the apparatus 1 to release doors mounted (at the rear or even laterally) on means of transport of the type indicated above therefore constitutes a preferred application of the invention and will be referenced constantly in the continuation of the present description. At the same time, it is useful to note that the use of the apparatus 1 according to the invention in different fields and/or for different types of vehicle, as a function of the specific requirements, is not excluded (and in any case is within the protective scope claimed herein).

[0030] The apparatus 1 comprises a base 2, which can be anchored in a stable manner to the door: for example, the base 2 can be applied rigidly to the outer face of the door or can be arranged and fixed in a recess provided for this purpose along said door (along its external face).

[0031] Furthermore, the apparatus 1 comprises a handle assembly 3, which in turn can be anchored to at least one rod A (shown only in Figure 1 for the sake of simplicity), which in known manners can be coupled rotatably to the door (and typically held in a vertical orientation).

[0032] The rod A supports respective means (hooks, claws, etc.) for anchoring to the frame of the vehicle, substantially at one or both of its ends, which protrude from the volume of the door.

[0033] The handle assembly 3 can rotate with respect to the base 2 (about the axis B along which the rod A is arranged) between at least one locking configuration (in which it is shown in the accompanying figures) and at least one release configuration (in practice the handle assembly 3 can oscillate about these configurations).

[0034] In the locking configuration, the rod A is rotated so that the anchoring means mentioned above can engage even indirectly the frame of the vehicle, preventing indeed the free rotation of the door (when of course the latter is already arranged so as to close the compartment).

[0035] For example, this condition can be obtained, in known manners, by arranging suitable retention elements on the frame of the vehicle, above and below the position assumed by the door, so as to indeed be able to affect the anchoring means and engage them detachably.

[0036] In the release configuration, which is achieved with the partial rotation of the handle assembly 3, the anchoring means are in any case disengaged from the frame of the vehicle, so as to allow the free rotation of the door and access to the internal compartment of the vehicle.

[0037] Moreover, a locking button 4 is coupled rotatably to the base 2 and in turn can move reversibly between at least one first angular position (in which it is shown in the accompanying figures) and at least one second angular position.

[0038] In the first angular position (and especially when the handle assembly 3 is arranged in the locking configuration), the button 4 is arranged even indirectly so as to interfere with the movement of the handle assembly 3.

[0039] As long as it is held in this first angular position, it is thus impossible to move the handle assembly 3 from the locking configuration.

[0040] In this manner, in the first angular position the button 4 prevents any accidental releases, due for example to impacts and stresses against the door, the base 2 or the handle assembly 3, which might lead the latter to rotate in an unwanted manner (for example during vehicle motion) and therefore cause the disengagement of the rod A and of the anchoring means from the retention

elements.

[0041] Vice versa, in the second angular position, the button 4 is in any case spaced from the handle assembly 3 and therefore allows the movement of the handle assembly 3 (and the opening of the door).

[0042] According to the invention, the button 4 (which is the subject of Figures 6 and 7) comprises a laminar element 5 (Figures 8 and 9), which is provided in one piece and has a central portion 5a that is substantially flat (and at most slightly curved at the sides) and can be pressed directly by the user. Such central portion 5a is interposed between respective mutually opposite end flaps 5b, which are bent and articulated to the base 2 (in the manners that will be described hereinafter in relation to a possible embodiment).

[0043] It should be noted, therefore, that the laminar element 5 (which constitutes the button 4 or at least its primary component) is obtained starting from a single body, simply by bending, therefore without resorting to any welding step, and therefore achieving from the outset the intended aim.

[0044] In particular, the laminar element 5 is substantially constituted by a metal plate, which is cold-deformed beforehand to provide indeed the bent flaps 5b (indeed without resorting to any welding step).

[0045] Even more particularly, in the preferred constructive solution, which is mentioned only by way of nonlimiting example of the application of the invention, the central portion 5a has a bent end lip 6, which is optionally obtained by means of the same cold deformation step that allows to obtain the flaps 5b.

[0046] When it is in the first angular position, the lip 6 is usually kept rested by forcing against a transverse band that is shaped by the handle assembly 3.

[0047] In this manner, as long as the button 4 is not pressed, the lip 6 interferes with the movement of the handle assembly 3 from the locking configuration to the release configuration and therefore contrasts the rotation of the latter for the release of the door.

[0048] Usefully, the flaps 5b have respective mutually opposite orifices 7, in which it is possible to insert a respective transverse pivot 8 (Figures 4, 10 and 11), coupled to the base 2, thus achieving the consequent articulation of the button 4 to such base 2.

[0049] Even more particularly, the lip 6 is kept elastically in forced resting against the transverse band by one or more springs 9 (again Figures 4, 10 and 11) which are indeed wound around the transverse pivot 8.

[0050] Conveniently, the laminar element 5 comprises an auxiliary platform 5c, which is extended so as to be substantially coplanar from the central portion 5a on the opposite side with respect to the anchoring region of the handle assembly 3 to the rod A.

[0051] In this manner, the user can press directly the platform 5c instead of the central portion 5a, thus benefiting from a longer lever arm and therefore achieving a facilitated movement of the button 4.

[0052] Advantageously, the outer surface of the platform 5c that lies opposite the base 2 has an at least partial knurling 10, so as to facilitate interaction with the user and in particular allow him/her an even easier pressing action when he/she wishes to actuate the transition from the first angular position to the second angular position.

[0053] As already anticipated, the provision of apparatuses 1 in which the button 4 is constituted substantially exclusively by the laminar element 5 is not excluded.

[0054] On the other hand, in the preferred constructive solution the button 4 comprises usefully a structural reinforcement element 11 (Figures 4, 6 and 7), which is coupled rigidly to the laminar element 5, in order to increase the mechanical strength (of the button 4).

[0055] More particularly, and with further reference to the preferred (but not exclusive) constructive solution, the reinforcement element 11 is constituted substantially by a bracket that comprises a crossmember 12a and a pair of mutually parallel arms 12b (which are indeed connected by the crossmember 12a).

[0056] As is evident from the accompanying figures (for example Figures 6 and 7), the arms 12b have a center distance that is substantially complementary (slightly shorter) than the center distance of the flaps 5b and are inserted stably between them, the crossmember 12a being arranged on the opposite side with respect to the central portion 5a of the laminar element 5.

[0057] It should be noted that the arms 12b are provided with holes 13 which are aligned with the orifices 7, in order to allow the insertion of the pivot 8 for rotary coupling to the base 2 in such arms as well.

[0058] Favorably, the arms 12b are provided with first mutually opposite holes 14 which are aligned with second holes 15 provided along the flaps 5b.

[0059] In this way, corresponding mutual fixing elements 16, such as rivets, nails and the like, are inserted in the holes 14, 15.

[0060] Thus, even in the embodiment that provides for an additional component for the button 4 (constituted indeed by the reinforcement element 11), no welding is necessary, since the stable coupling between the laminar element 5 and the reinforcement element 11 is obtained in a fully practical and easy manner with rivets (or other mutual fixing elements 16 of a similar type).

[0061] In the preferred constructive solution, also shown in the accompanying figures by way of nonlimiting example of the application of the invention, the handle assembly 3 comprises at least one main plate 17 which is associated with means for fixing to the rod A (indeed to allow the integral rotation of the rod A when the handle assembly 3 is moved).

[0062] The fixing means comprise a tab 18, which is adjacent to and integral with the plate 17 and is partially rolled up so as to define a (substantially tubular) insertion seat 19 for the rod A.

[0063] Furthermore, the tab 18 is coupled to the plate 17 by means of at least one permanent connection element 20, such as a rivet (preferably), a nail, and the like.

[0064] More particularly, in order to obtain the already

mentioned further coupling between the tab 18 and the plate 17, the tab 18 has two lugs 21 (although there might be only one), which protrude from the ends of its terminal edge 18a that lies opposite the plate 17. Each lug 21 and a respective lateral ridge 17a of the plate 17 are mutually fastened by a corresponding permanent connecting element 20.

[0065] In summary, therefore, and although different constructive choices are not excluded and are in any case within the protective scope claimed herein, in the preferred solution the plate 17 has a substantially rectangular contour and the ridges 17a extend from the two sides that are perpendicular to the rod A. The tab 18 in practice constitutes a sort of extension of such plate 17 and has on the opposite side the terminal edge 18a, at which (at its ends) the lugs 21 are defined.

[0066] By way of the additional coupling, the risk that any stresses that act on the handle assembly 3 might cause the deformation and/or unrolling of the tab 18 is avoided (or at least significantly reduced). Differently from what occurs in known solutions (which results to welds of the entire end edge to the handle), this result is achieved by means of rivets or other permanent connection elements 20, which mutually fasten the ridges 17a and the lugs 21, and therefore without incurring the numerous drawbacks associated with welding processes.

[0067] The present description therefore also relates to a method for providing locking buttons 4, which in turn are intended to be implemented in release apparatuses 1 according to the particularities described in the preceding pages.

[0068] The method provides, in a step a., for the provision of a laminar element 5 in one piece.

[0069] Then, in a step b., the method provides for bending two mutually opposite end flaps 5b of the laminar element 5, while a central portion 5a, interposed between the flaps 5b, is kept flat.

[0070] Then the method provides for articulating, in a step c., the end flaps 5b to a base 2 of the release apparatus 1.

[0071] More particularly, the bending step b. is obtained by cold deformation of the laminar element 5, which is chosen of the type of a metal plate. In this step b., performed by cold deformation or not, preferably the shaping of the end lip 6 is also achieved at the same time.

[0072] In a manner similar to what has already been observed for the apparatus 1 according to the invention, preferably the method according to the invention provides, in a step d. that follows step b. and precedes step c., for rigidly coupling a structural reinforcement element 11 to the laminar element 5 in order to increase mechanical strength.

[0073] This step d. can be performed in the manner already described in the preceding pages.

[0074] Operation of the apparatus according to the invention is as follows.

[0075] When the door is arranged so as to close the internal compartment of the vehicle and the handle assembly 3 is in the locking configuration, the anchoring means engage directly or indirectly the frame of the vehicle proper and prevent the opening of the door.

[0076] In order to have access to the compartment, the user must move the button 4 from the first angular position (by pressing on the central portion 5a or on the platform 5c, for example) and simultaneously move the handle assembly 3: the rotation of the latter in fact causes the rotation of the rod A and therefore the disengagement of the anchoring means.

[0077] By applying a further traction on the handle assembly 3 (possibly on a handgrip 17b that protrudes from the plate 17) it is thus possible to move the door.

[0078] In greater detail, in the locking configuration the button 4 contrasts the rotation of the handle assembly 3 by means of the lip 6, which rests by forcing (by way of the spring/springs 9) against the plate 17 (or in any case on the handle assembly 3).

[0079] As already anticipated, the button 4 (the laminar element 5) is provided in a manner that is entirely practical and easy starting from a one piece body made of metal plate which is bent at the flaps 5b.

[0080] After bending the flaps 5b, assembly with the base 2 is achieved in a simple manner by means of the pivot 8, which enters the orifices 7 provided along the flaps 5b of the laminar element 5.

[0081] Thus, the button 4 does not require any welding step and instead can be provided by cold deformation (or in any case by means of the simple bending of the flaps 5b, starting from a one piece body for example made of metal plate) rapidly and inexpensively without any subsequent operation and additional costs.

[0082] Effectively, the embodiment that provides for the presence of the reinforcement element 11 ensures greater structural strength, but this does not go to the detriment of simplicity and low cost of production, since the reinforcement element 11 can be easily fixed to the laminar element 5 by means of rivets (or similar fixing elements 16), and therefore again without welds or similar laborious processes.

[0083] The complete coupling of the tab 18 to the plate 17, which is required to avoid the danger of deformations of the former, also is obtained without any resort to welding steps.

[0084] The possibility to obtain the button 4 (and the other mentioned couplings) without welds but simply by cold deformations and optionally by resorting to rivets or the like allows to resort to personnel that lacks specific skills, and likewise any operator will be able to perform the necessary quality inspections on the characteristics and especially on mechanical strength.

[0085] Since it is not necessary to wait for the cooling of the parts to check for the late onset of cracks (as occurs for welding work), the simple inspections that are required can be performed promptly and rapidly (and without resorting to polluting materials).

[0086] Furthermore, differently from what occurs in known solutions, the provision of the button 4 does not

require the management of chemical products for cleaning, as instead is necessary when welding steps are provided.

[0087] In practice it has been found that the apparatus and the method according to the invention achieve fully the intended aim, since resorting to a button that comprises a laminar element that is provided in one piece and has a substantially flat central portion interposed between respective mutually opposite end flaps, which are bent and articulated to the base, allows to provide a button by means of a method that has low costs and production times.

[0088] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0089] In the examples of embodiment shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0090] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0091] 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 release apparatus for doors of vehicles, such as vans, trucks, heavy goods vehicles, articulated trucks, trailers and the like, comprising a base (2), which can be anchored stably to the door, and a handle assembly (3), which can be anchored to at least one rod (A) that can be coupled rotatably to the door and supports respective means for anchoring to the frame of the vehicle, said handle assembly (3) being able to rotate with respect to said base (2) between at least one locking configuration, in which the anchoring means can engage even indirectly the frame of the vehicle, and at least one release configuration, in which the anchoring means are in any case disengaged from the frame of the vehicle, in order to allow the rotation of the door, a locking button (4) being coupled rotatably to said base (2) and being reversibly movable between at least one first angular position, in which it is arranged even indirectly so as to interfere with the motion of said handle assembly (3), and at least one second angular position, in which it is spaced from said handle assembly (3), in order to allow the movement of said handle assembly (3), **characterized in that** said button (4) comprises a laminar element (5), which is provided in one piece and has a substantially flat central portion (5a), which is interposed between respective opposite end flaps (5b), which are bent and are articulated to said base (2).

2. The release apparatus according to claim 1, **characterized in that** said laminar element (5) is constituted substantially by a metal plate that is cold-deformed to provide said bent flaps (5b).

3. The release apparatus according to claim 1 or 2, **characterized in that** said central portion (5a) is provided with a folded end lip (6), which is usually kept, in said first angular position, in forced resting against a transverse band that is formed by said handle assembly (3), for interference in the movement at least from said locking configuration to said release configuration.

4. The release apparatus according to one or more of the preceding claims, **characterized in that** said flaps (5b) are provided with respective mutually opposite orifices (7) for the insertion of a respective transverse pivot (8), which is coupled to said base (2), and for the consequent articulation of said button (4) to said base (2).

5. The release apparatus according to claim 4, **characterized in that** said lip (6) is kept elastically in enforced resting against said transverse band by at least one spring (9), which is wound around said transverse pivot (8).

6. The release apparatus according to one or more of the preceding claims, **characterized in that** said laminar element (5) comprises an auxiliary platform (5c), which extends substantially in a coplanar manner from said central portion (5a), on the opposite side with respect to the anchoring region of said handle assembly (3) to the rod (A), for the facilitated movement of said button (4).

7. The release apparatus according to one or more of the preceding claims, **characterized in that** the outer surface of said platform (5c) that lies opposite said base (2) has an at least partial knurling (10), for an easier pressing action on the part of the user, for transition from said first angular position to said second angular position.

8. The release apparatus according to one or more of the preceding claims, **characterized in that** said button (4) comprises a structural reinforcement element (11), which is coupled rigidly to said laminar element (5), in order to increase the mechanical strength.

9. The release apparatus according to claim 8, **characterized in that** said reinforcement element (11) is constituted substantially by a bracket that comprises a crossmember (12a) and a pair of mutually parallel arms (12b), said arms (12b) having a center distance that is substantially complementary to the center distance of said flaps (5b) and being inserted stably between said flaps (5b), so that said crossmember (12a) is arranged on the opposite side with respect to said central portion (5a).

10. The release apparatus according to claim 9, **characterized in that** said arms (12b) are provided with first mutually opposite holes (14), which are aligned with second holes (15) provided along said flaps (5b), corresponding mutual fixing elements (16), such as rivets, nails and the like, being inserted in said holes (14, 15).

11. The release apparatus according to one or more of the preceding claims, **characterized in that** said handle assembly (3) comprises at least one main plate (17) associated with means for fixing to the rod (A), said fixing means comprising a tab (18) that is adjacent to and integral with said plate (17) and is partially rolled up so as to define an insertion seat (19) for the rod (A), said tab (18) being further coupled to said plate (17) by means of at least one permanent connection element (20), of the type of a rivet, nail, and the like.

12. The release apparatus according to claim 11, **characterized in that** said tab (18) is provided with two lugs (21), which extend from the ends of the terminal edge (18a) of said tab (18), which lies opposite said plate (17), each one of said lugs (21) and a respective lateral ridge (17a) of said plate (17) being mutually fastened by a corresponding said permanent connection element (20).

13. A method for providing locking buttons (4), for release apparatuses (1) according to one or more of the preceding claims, which consists in:

    a. providing a monolithic laminar element (5) made in one piece,
    b. bending two mutually opposite end flaps (5b) of the laminar element (5), keeping flat a central portion (5a) that is interposed between the flaps (5b);
    c. articulating the end flaps (5b) to a base (2) of the release apparatus (1).

14. The method according to claim 13, **characterized in that** said bending step b. is obtained by cold deformation of said laminar element (5), which is chosen of the type of a metal plate.

15. The method according to claim 13 or 14, **characterized in that** it provides, in a step d. that follows said step b. and precedes said step c., for rigidly coupling a structural reinforcement element (11) to the laminar element (5) in order to increase the mechanical strength.

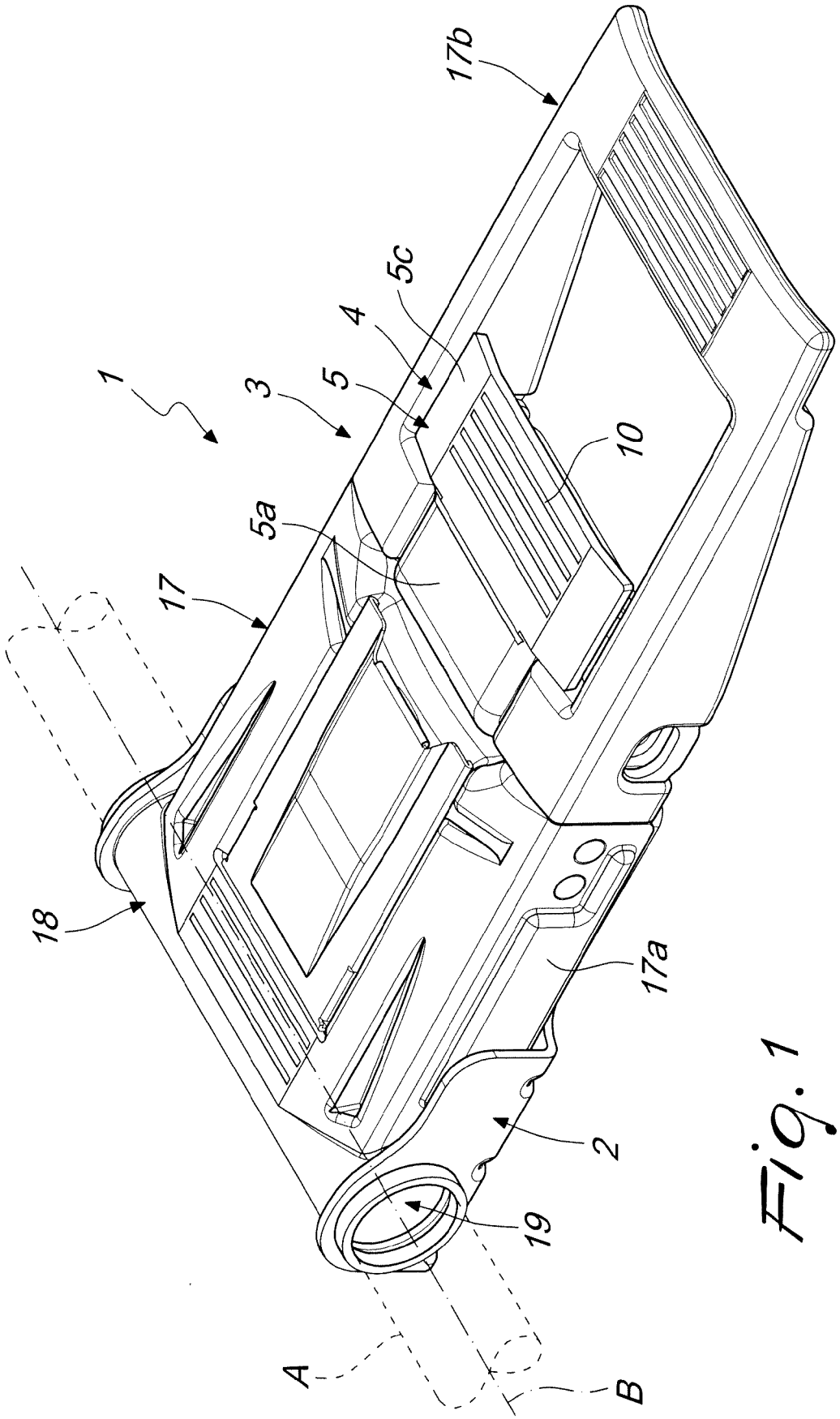


Fig. 1

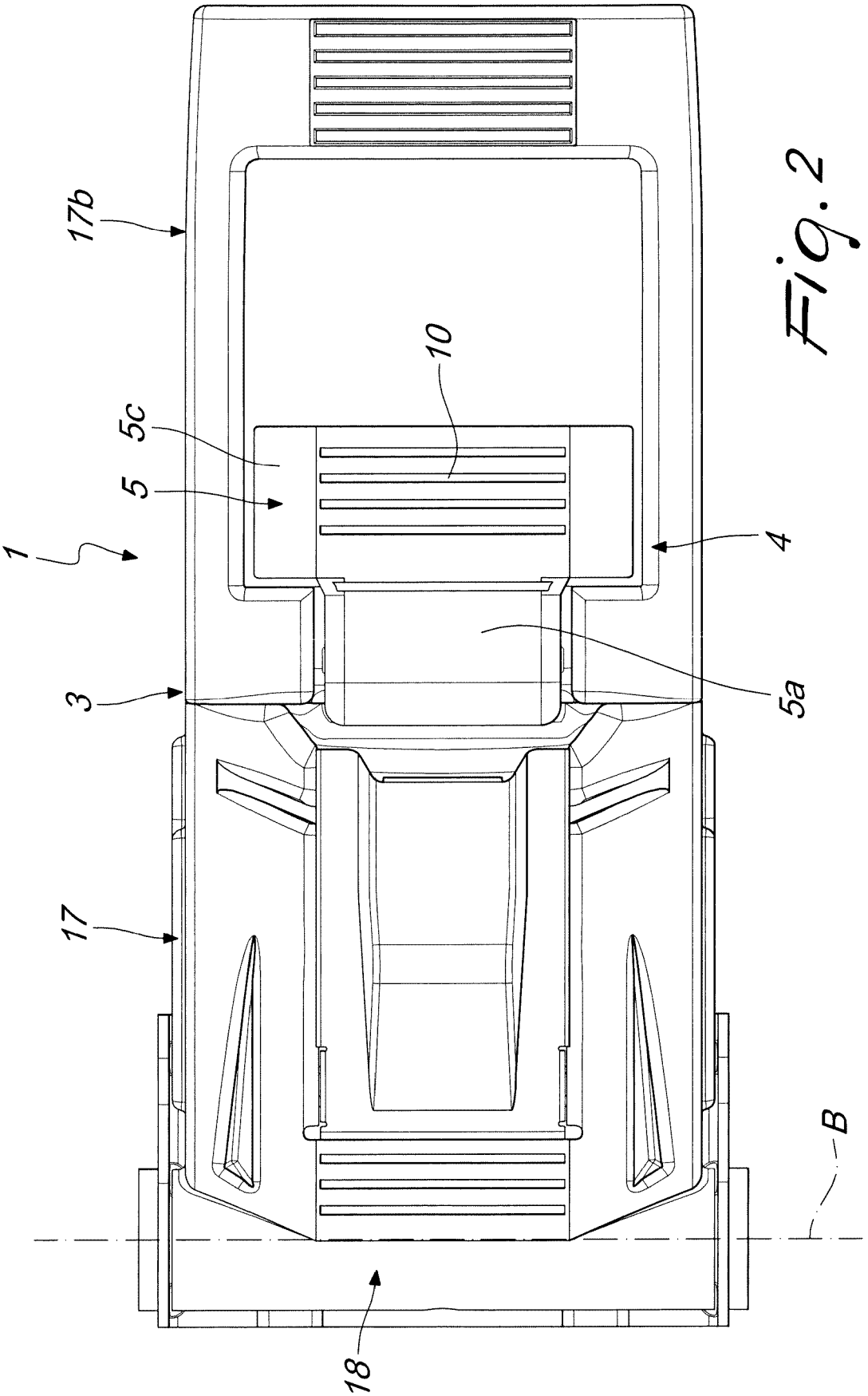


Fig. 2

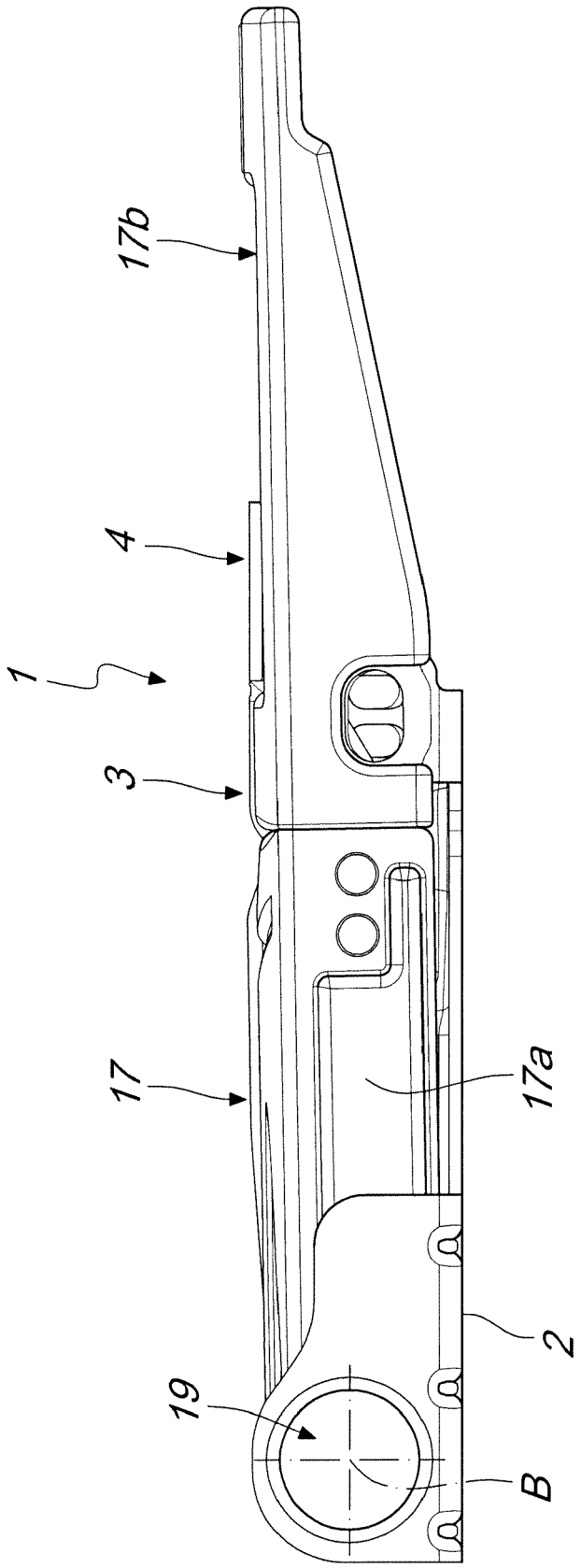


Fig. 3

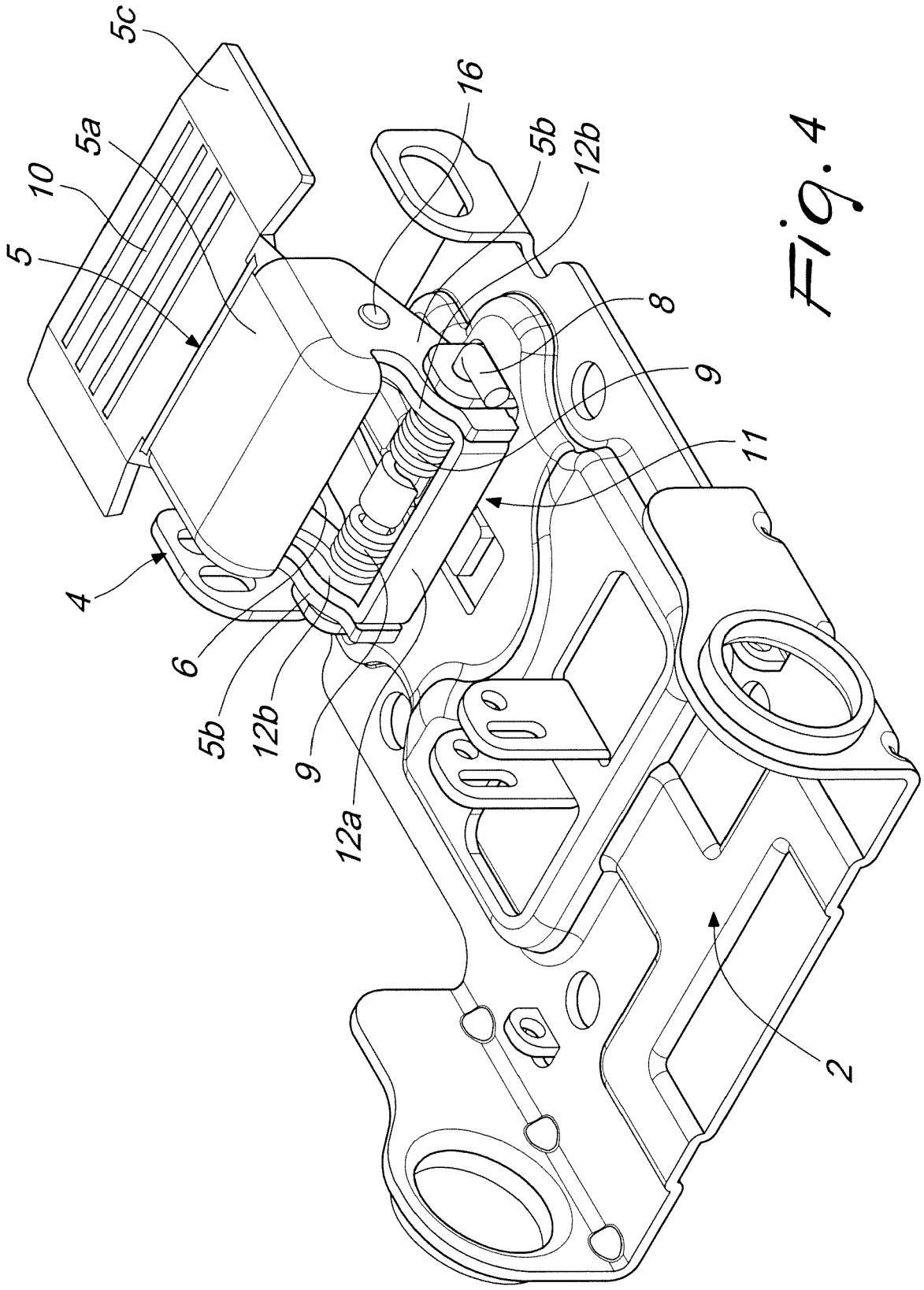


Fig. 4

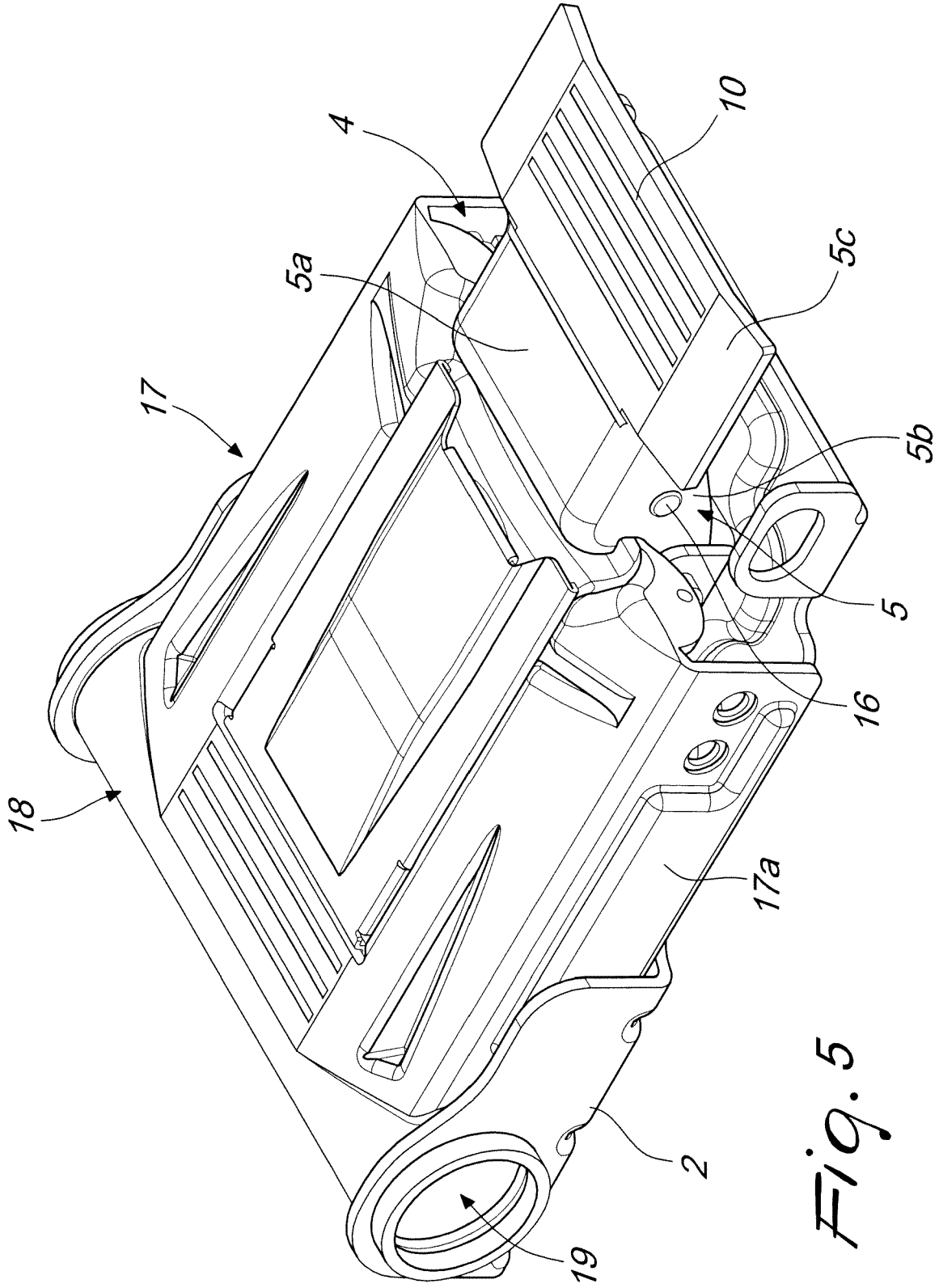


Fig. 5

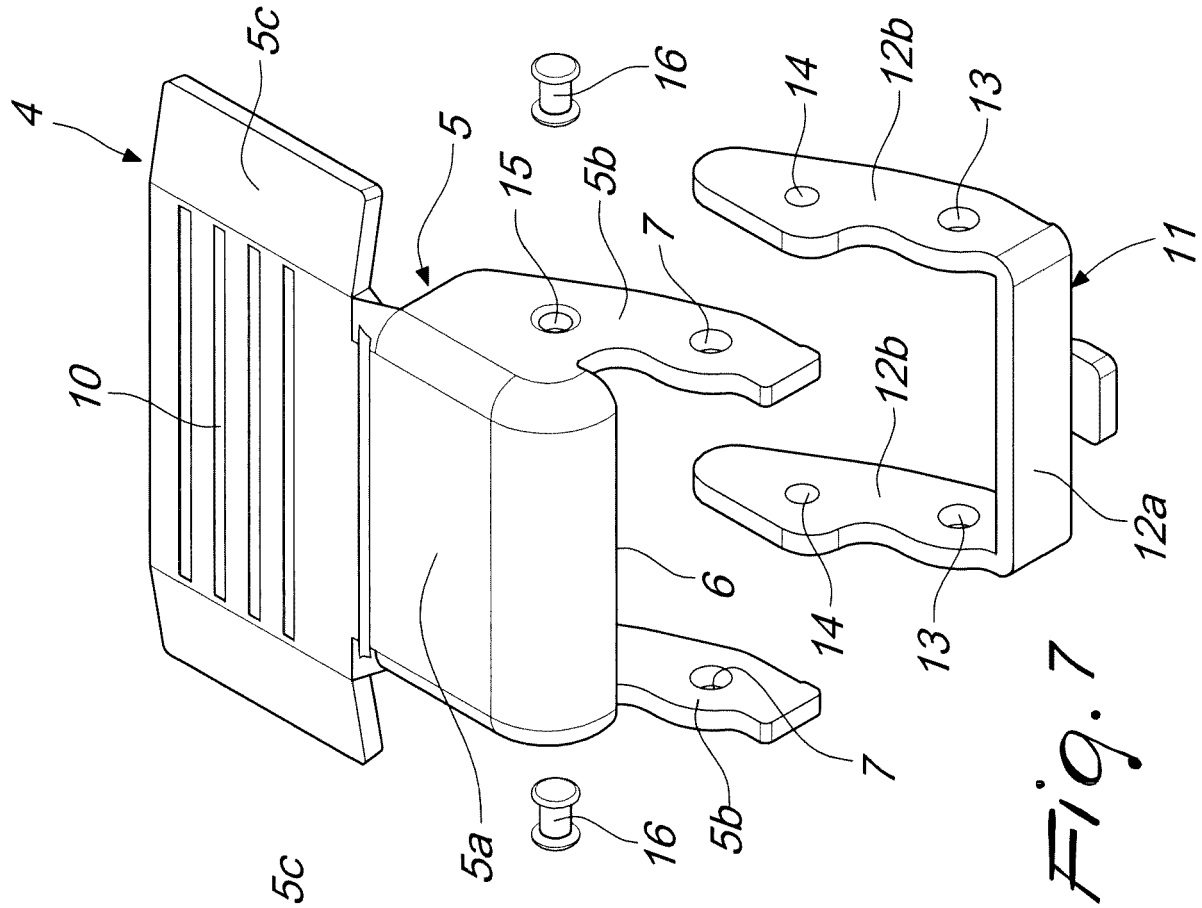

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5c
5
16
15
5b
7
14
12b
13
11
10
12b
6
14
13
12a
7
5a
16
5b

Fig. 7

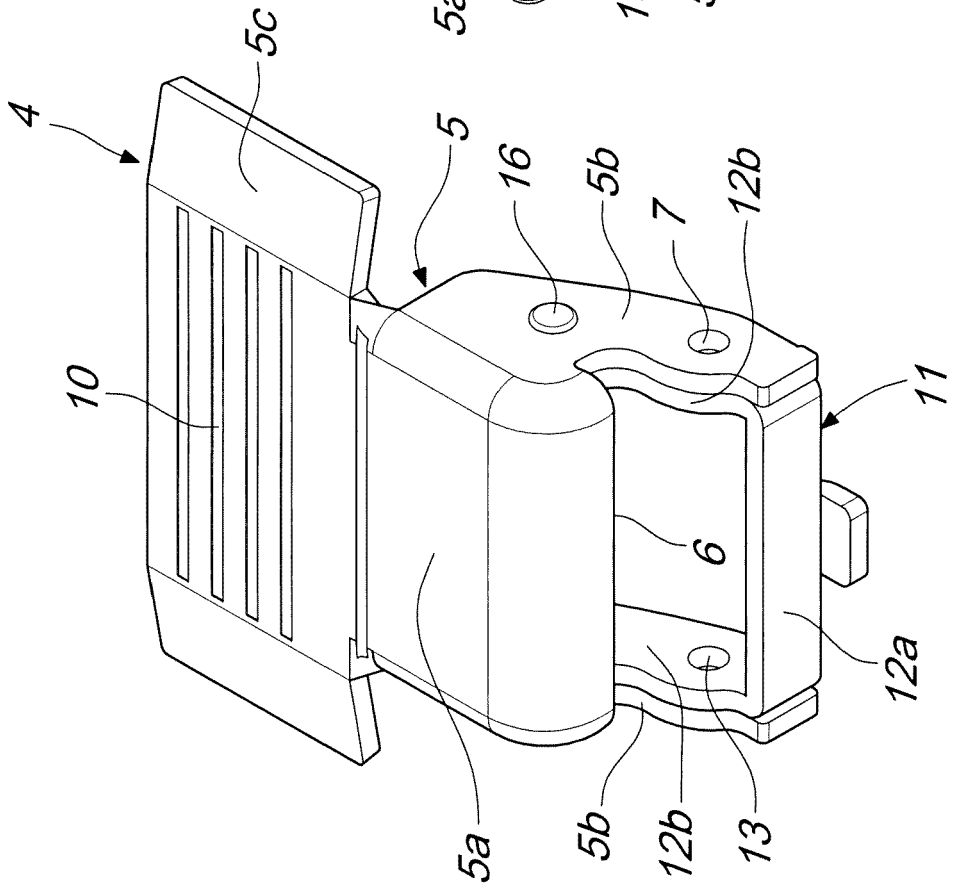

4
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6
12a
5a
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12b
13

Fig. 6

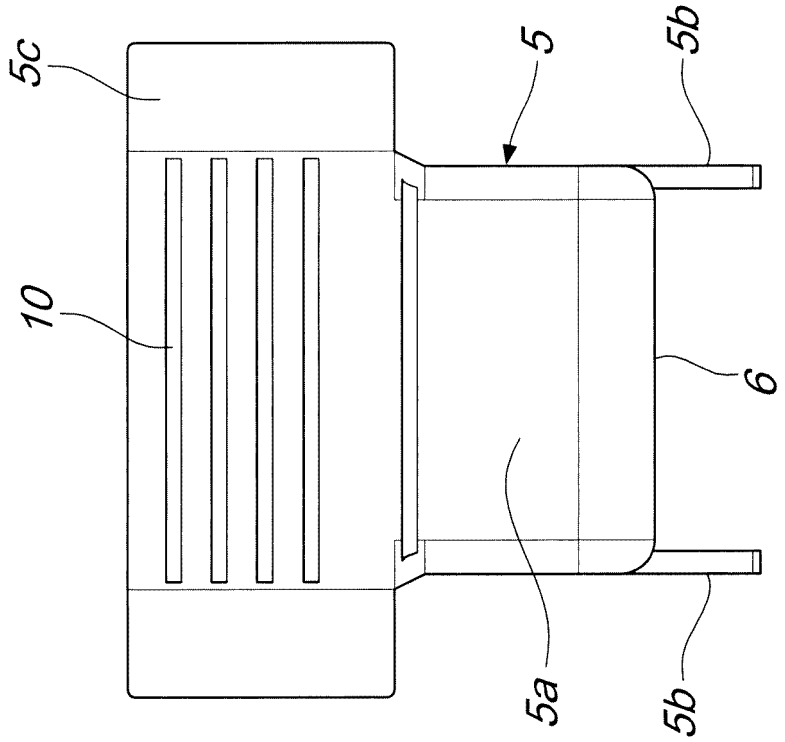


Fig. 9

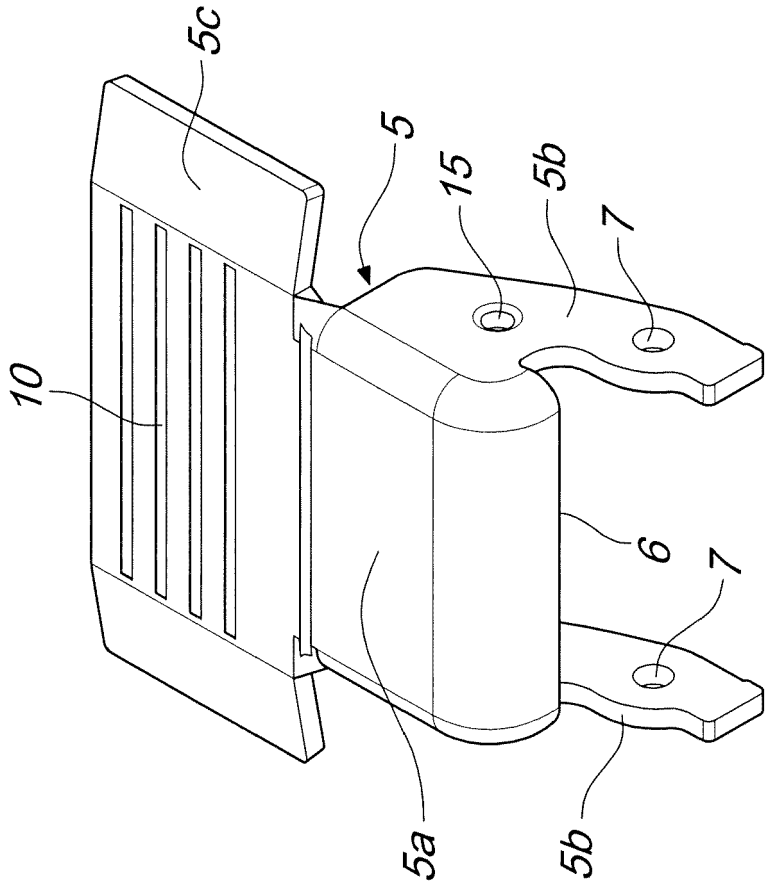


Fig. 8

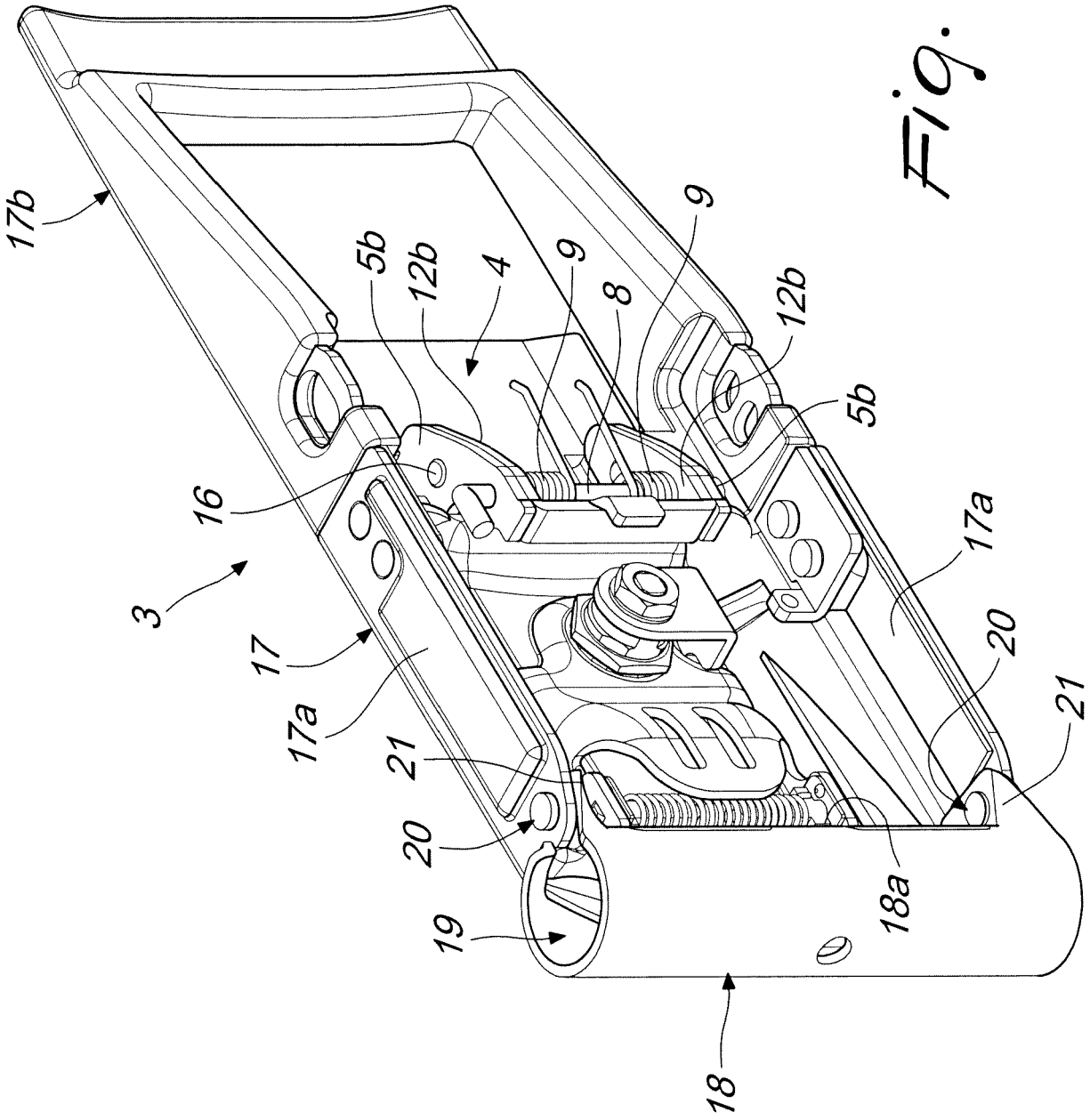


Fig. 10

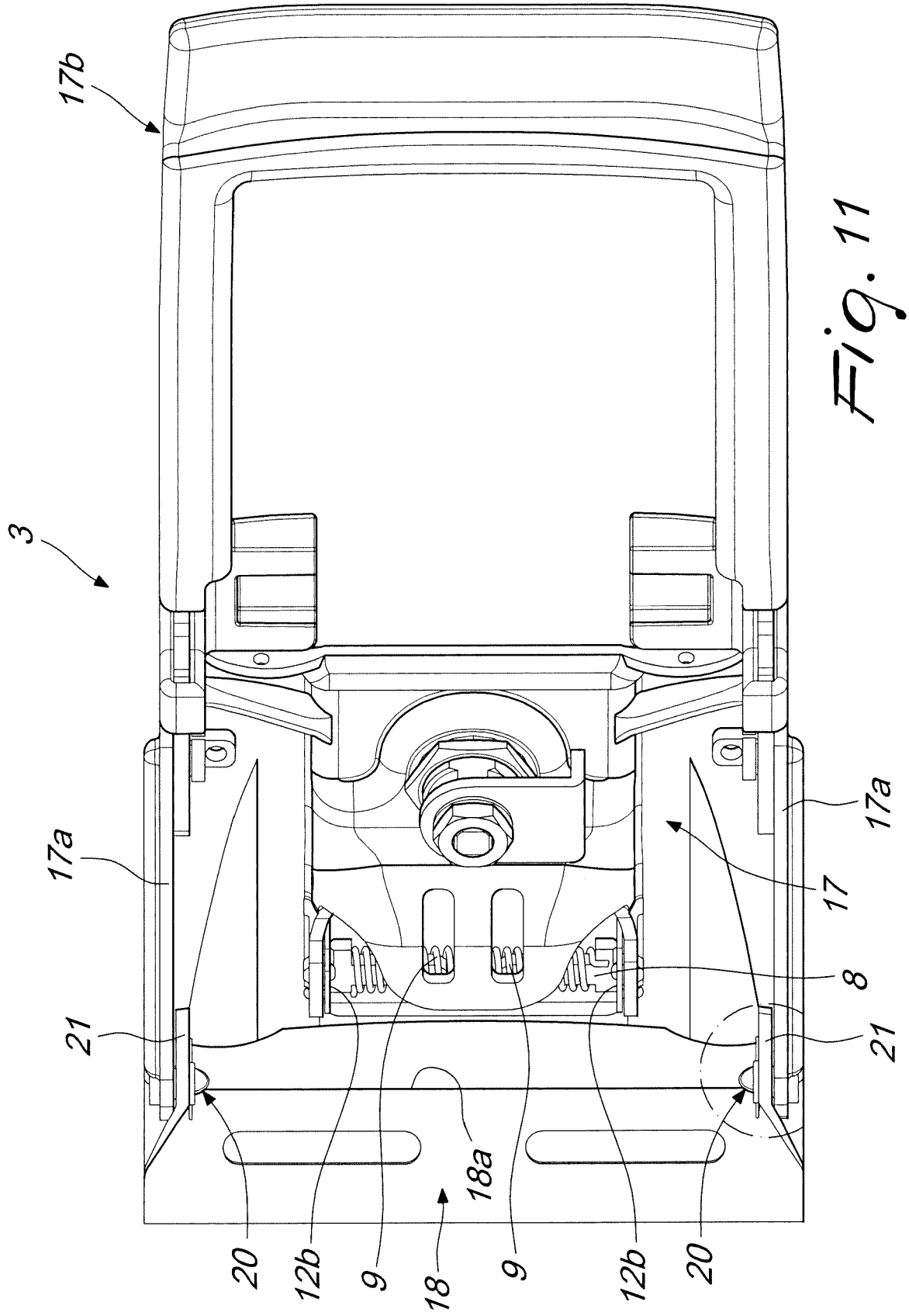


Fig. 11

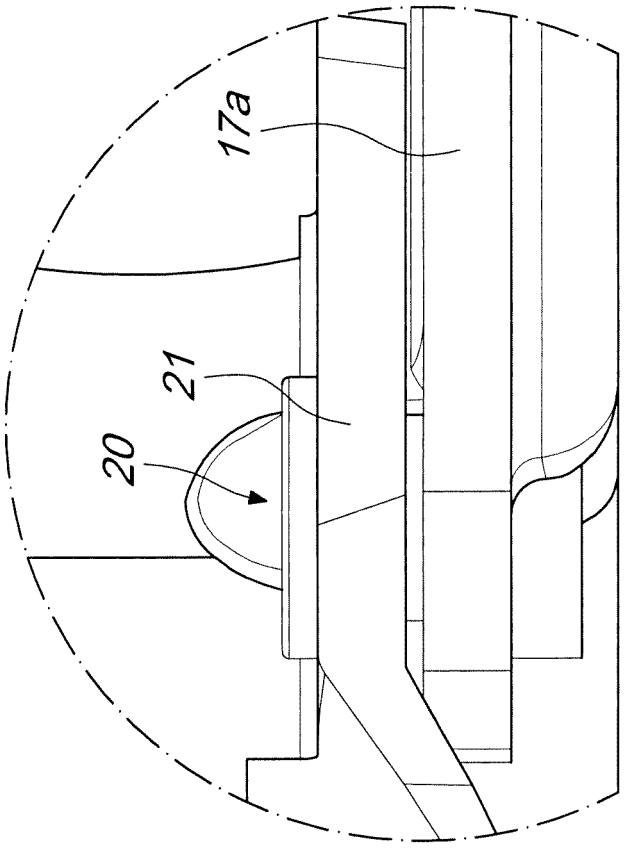


Fig. 12

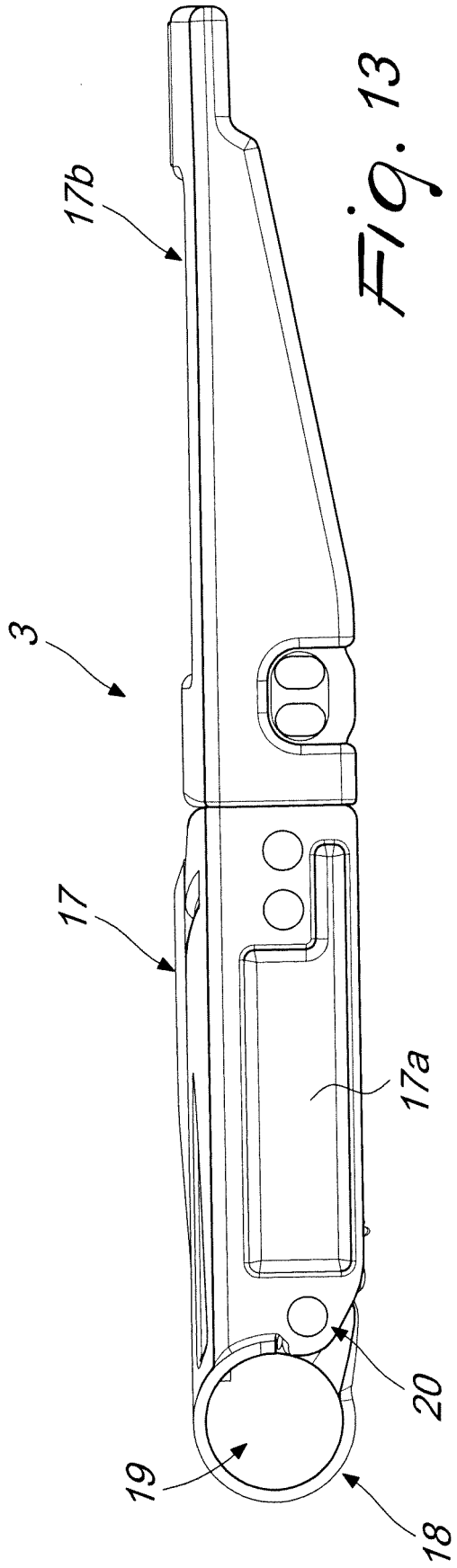


Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 16 42 5034

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* the whole document *	2-15	E05B13/10
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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	27 September 2016	Geerts, Arnold

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