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(54) A plastic box with collapsible walls provided with folding support legs

(57) The present invention relates to a plastic box (1), whose lateral walls (3) are capable of collapsing against the bottom (2), with four folding support legs hinged under the bottom and capable of being closed by means of actuation levers with handle slightly protruding from the bottom (2) of the box (1).

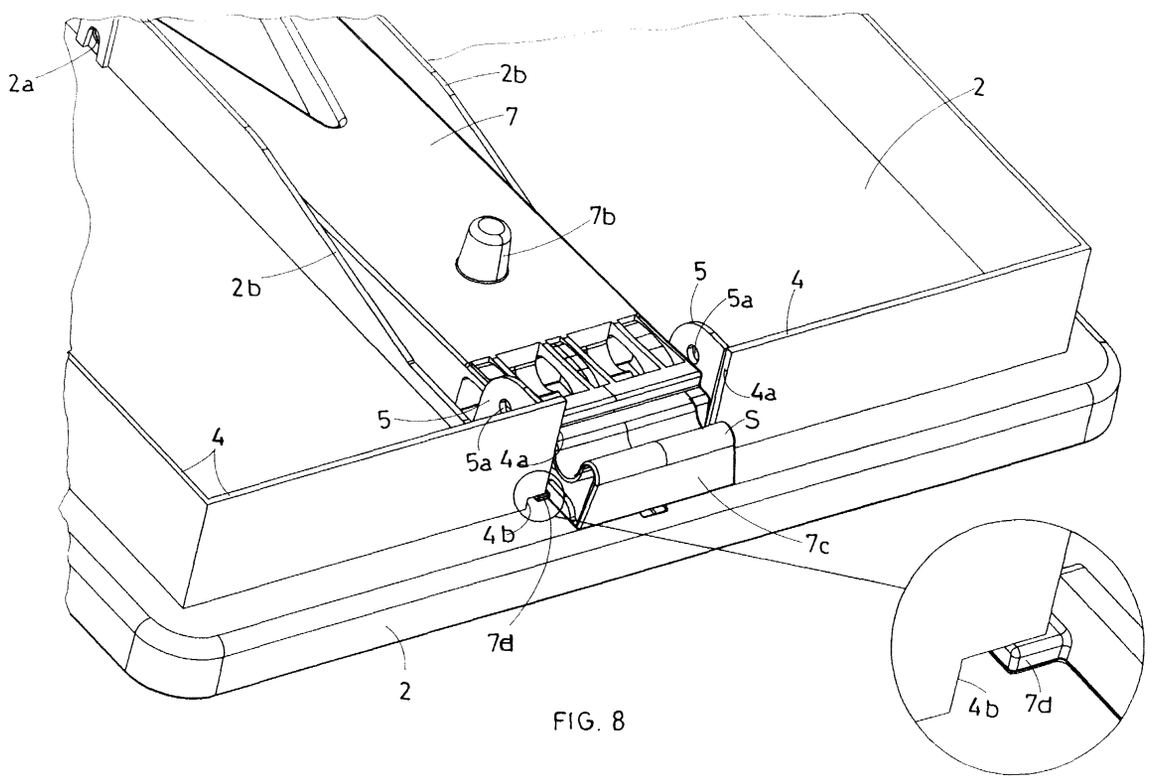

FIG. 8

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Description

[0001] The present patent application relates to a plastic box with collapsible walls, provided with support legs that can be folded under the bottom of the box.

[0002] Plastic-moulded boxes with four legs hinged on horizontal pins are already available on the market. In this type of boxes, the legs can be closed in a raised position under the bottom of the box or opened in a lowered, slightly divergent position in order to lift the box off the ground.

[0003] The applicant is the owner of the Italian patent for utility model No. 01264112, which relates to a similar box whose legs are closed by means of a lever pivoted at one end located in central position under the bottom of the box.

[0004] More precisely, each lateral pair of legs is attached to an actuation lever by means of a pin inserted into a suitably shaped slot of the lever, whose free end is connected to a plate that slides on the outside of one transversal edge of the box and ends with a handle located immediately under the border of the edge.

[0005] When holding the box from the sides the user can easily grab the handle of the two plates, in order to completely pull them up and hold them in place by means of a stop tooth located on the handles that engages in a suitable housing located on the edge of the box, immediately under the border.

[0006] The vertical movement of the plates lifts the actuation levers until they touch the bottom of the box. The vertical movement of the levers corresponds to the inward vertical overturn of the legs, because of the special shape of the slot in which the pin connecting each pair of legs to its actuation lever is inserted and slides.

[0007] The legs are closed by overcoming the opposite action of two springs that oppose the lifting of the two actuation levers. The springs also ensure the forced lowering of the levers as soon as the stop tooth is ejected from its housing, thus automatically opening the legs.

[0008] The purpose of the present invention is to use folding legs with actuation levers on boxes provided with collapsible walls, that is walls that can be collapsed towards the inside of the box until they are placed flat on the bottom.

[0009] These boxes are becoming more and more popular both for industrial and domestic use thanks to their reduced volume when closed, with consequent saving on space both during transportation and storage of empty boxes.

[0010] However, the folding legs as described above cannot be used on these boxes since they cannot be universally applied on different types of boxes.

[0011] As a matter of fact, the presence of collapsible - not fixed - walls does not allow to use sliding plates that can be attached to the edges in order to actuate the levers of the legs located under the box.

[0012] To this end, an innovative solution has been devised to ensure the easy actuation of the levers as well as their disengagement from the means used to hold them in place against the bottom of the box.

[0013] This purpose has been achieved through a new, original design of the free end of the actuation lever that features a sort of handle in which the user can insert his fingertips to move the lever. At its end, the lever is provided with means used to hold it in place under the bottom of the box capable of co-operating with suitable stop means on the box.

[0014] In the preferred embodiment of the invention, the handle is provided with a tooth that engages with a suitable notch located on the support base of the box, once the handle has been completely raised.

[0015] The handle is produced in a single piece with the actuation lever and features a thinner section used to attach it to the lever, which acts as an elastic hinge between the handle and the lever.

[0016] By pushing the handle towards the inside of the box, the user can flex it in order to disengage the stop tooth from the notch, thus automatically opening the legs by means of the springs loaded when the actuation levers of the legs are lifted.

[0017] For major clarity the description of the box according to the present invention continues with reference to the enclosed drawings, which are intended for purposes of illustration and not in a limiting sense, whereby:

- Fig. 1 is a top view of the box, in which the legs are folded under the bottom;
- Fig. 2 is a section of the box shown in Fig. 1 with the plane A-A;
- Fig. 3 is a section of the box shown in Fig. 1 with the plane B-B;
- Fig. 4 is a section of the box shown in Fig. 2, in which the legs are lowered and diverted;
- Fig. 5 is a section of the box shown in Fig. 3, in which the legs are lowered and diverted;
- Fig. 6 is an axonometric view of one of the actuation levers of the folding legs;
- Fig. 7 is a section, with the longitudinal symmetrical plane of the box, of one actuation lever matched with its corresponding pair of legs, sectioned with the same plane;
- Fig. 8 shows how the handles of the actuation levers engage with the support base of the box;
- Fig. 9 to 13 are sections of the actuation lever shaped as a handle at its end, showing the different means used to stop the handle under the bottom of the box.

[0018] With reference the aforementioned figures, the box (1) according to the present invention has a rectangular bottom (2). Four lateral walls (3) are hinged on horizontal pins on the four sides of the bottom (2), with the possibility of collapsing them inside of the box (1) until they are placed flat on the bottom (2), provided with a support base (4).

[0019] A notch (4a) is located in central position on the two transversal sides of the base (4), internally delimited by an opposite pair of tabs (5) with central holes (5a), in which the pivoting pins (6a) of each pair of folding legs (6) are inserted.

[0020] It must be noted that each pair of legs (6) is an integral part of a single plastic piece shaped as a portal and formed by a top crosspiece (6b) and two lateral legs (6).

[0021] A deep cradle (6c) is located in the centre of the top crosspiece (6b) with the pivoting pins (6a) protruding from the opposite walls.

[0022] Each pair of legs (6) is moved by means of an actuation lever (7) consisting in a longitudinal plate that laterally features an opposite coaxial pair of pins (7a) with horizontal axis at one end, which are inserted into housing holes (2a) located on a parallel pair of longitudinal separators (2b) on the lower side of the bottom (2).

[0023] The holes (2a) are located in the proximity of the transversal symmetrical axis of the box (1).

[0024] A cup housing (7b) is centrally located on the actuation lever (7), which houses a pre-compressed spring (8) located between the bottom (2) and the lever (7).

[0025] The free end of the actuation lever (7) features a head capable of acting as handle (7c), which goes through the notch (4a) and slightly protrudes outside the base (4).

[0026] Two flexible teeth (7d) are provided on the two sides of the handle (7c), capable of engaging with small notches (4) located on the base (4).

[0027] Each actuation lever (7) is connected to its pair of legs (6) by means of a pin (9) fixed through the cradle (6c) and inserted into a slot (7e) located on the lever (7) near the handle (7c).

[0028] When holding the box (1) from the two transversal sides of the bottom (2) the user can grab the handle (7c) with his fingertips and pull up the actuation lever (7), whose slot (7e) features an "L-shaped" profile that moves the pin (9) when the lever (7) is lifted, in order to overturn the pair of legs (6) towards the inside and upwards, thus closing them under the bottom (2).

[0029] During the vertical movement of the lever (7) the teeth (7d) interfere and slide against the internal side of the borders of the notch (4a), which features two ribs with inclined profile that force the teeth (7d) backwards until they engage with the notches (4b), in order to guarantee the firm stop of the lever (7) at the end of its stroke, regardless of the ejection force exerted by the spring (8).

[0030] The handle (7c) is produced in a single piece with the actuation lever (7) and features a thinner section (S) used to attach it to the lever, which acts as an elastic hinge between the handle (7c) and the lever (7).

[0031] By pushing the handle (7c) towards the inside of the box, the user can flex it in order to disengage the stop teeth (7d) from the notches (4b), thus automatically opening the legs (6) by means of the springs (8) loaded when the actuation levers (7) are lifted.

[0032] The constructive embodiments illustrated in Figs. 9 to 13 differ from the embodiment illustrated above only for the presence of different stop means of the handle.

[0033] In the embodiment illustrated in Fig. 9, instead of the notch (4a), the base (4) features a flexible tongue (40) with external button (40a), suitable for engaging into a hole located on the handle (7c), whose ending section (7e) exactly embraces the flexible tongue (40) from the outside.

[0034] To disengage the handle (7c) from the stop position, the user needs to push the button (40a) with his fingertips to flex the flexible tongue (40) towards the inside, until the button (40a) comes out of the housing hole and the lever (7) is actuated downwards under the action of the springs (8).

[0035] In the embodiment illustrated in Fig. 10, instead of the notch (4a), the base (4) features a flexible tongue (50) with internal tooth (50a), capable of engaging with a corresponding tooth (7f) on the ending section (7e) of the handle, which is held against the internal wall of the flexible tongue (50).

[0036] To disengage the handle (7c) from the stop position, the user needs to push the tongue (50) towards the outside with his fingertips until the tooth (7f) no longer interferes with the tooth (50a) and the lever (7) is actuated downwards under the action of the springs (8).

[0037] In the embodiment illustrated in Fig. 11, a flexible tongue (60) with internal tooth (60a) is located under the bottom of the box, capable of engaging into a corresponding slot (7g) located on the handle (7c).

[0038] To disengage the handle (7c) from the stop position, the user needs to flex the flexible tongue (60) towards the outside with his fingertips until the tooth (60a) comes out of the slot (7g) and the lever (7) is actuated downwards under the action of the springs (8).

[0039] The embodiments illustrated in Figs. 12 and 13 are identical to the embodiments illustrated in Figs. 9 and 10, respectively, with the only difference that in the embodiments shown in Figs. 12 and 13 the tongues (400) and (500) are rigid and not flexible, so that the lever (7) cannot be engaged or disengaged by means of the elastic deformation of the tongues (400 and 500).

[0040] In these last two embodiments the hinging pins (7a) of the lever (7) are housed in two elongated slots (20a) that allow the lever (7) to slide under the box as needed to actuate or eliminate the constraint between the button (400a) and the handle (7c) in the embodiment of Fig. 12, or between the tooth (500a) and the handle in the embodiment of Fig. 13.

Claims

1. A plastic box with collapsible walls, provided with folding support legs, of the type comprising:

   - a rectangular bottom (2) with four lateral walls

(3) hinged on horizontal pins on the four sides of the bottom (2), with the possibility of collapsing them inside the box (1) until they are placed flat on the bottom (2) featuring a support base (4) on the perimeter provided with an opposite pair of tabs (5) with central holes (5a) in which the pivoting pins (6a) of each pair of folding legs (6) are inserted;

- two opposite pairs of legs (6), each being an integral part of a single plastic piece shaped as a portal and formed by two lateral legs (6) and a top crosspiece (6b), centrally provided with a deep cradle (6c) with pivoting pins (6a) protruding from the opposite walls;
- an actuation lever (7) for each pair of legs (6) consisting in a longitudinal plate that laterally features an opposite coaxial pair of pins (7a) with horizontal axis at one end, which are inserted into housings (2 or 20) located on a parallel pair of longitudinal separators (2b) on the lower side of the bottom (2); it being provided that a cup housing (7b) is centrally located on the actuation lever (7), which houses a precompressed spring (8) located between the bottom (2) and the lever (7); it also being provided that each actuation lever (7) is connected to its pair of legs (6) by means of a pin (9) fixed through the cradle (6c) and inserted into a slot (7e) located on the lever (7) near its free end; a box being **characterised by** the fact that the free end of the lever (7) features a handle (7c) with means used to hold it in place under the bottom of the box capable of co-operating with suitable stop means on the box.

2. A box according to claim 1, **characterised by** the fact that for each lever (7) the base (4) features a central notch (4a) with internal edges with inclined profile, from which the handle (7c) slightly protrudes, whose sides feature two teeth (7d) capable of engaging with suitable small notches (4b) on the base (4); it being provided that the handle (7c) features a thinner section (S) used to attach it to the lever (7), which acts as an elastic hinge between the handle (7c) and the lever (7).

3. A box according to claim 1, **characterised by** the fact that for each lever (7) the base (4) features a flexible tongue (40) with external button (40a) capable of engaging with a corresponding hole located on the handle (7c), whose ending section (7e) exactly embraces the flexible tongue from the outside.

4. A box according to claim 1, **characterised by** the fact that for each lever (7) the base (4) features a flexible tongue (50) with internal tooth (50a) capable of engaging with a corresponding tooth (7f) on the ending section (7e) of the handle, which is held against the internal wall of the flexible tongue (50).

5. A box according to claim 1, **characterised by** the fact that for each lever (7) a flexible tongue (60) with internal tooth (60a) is located under the bottom of the box, capable of engaging into a corresponding slot (7g) located on the handle (7c).

6. A box according to claim 1, **characterised by** the fact that for each lever (7) the base (4) features a rigid tongue (400) with external button (400a) capable of engaging into a corresponding hole located on the handle (7c), whose ending section (7e) exactly embraces the rigid tongue (400) from the outside; it being provided that the hinging pins (7a) of the lever (7) are housed in two elongated slots (20a) that allow the lever (7) to slide under the box.

7. A box according to claim 1, **characterised by** the fact that for each lever (7) the base (4) features a rigid tongue (500) with internal tooth (500a) capable of engaging into a corresponding tooth (7f) on the ending section (7e) of the handle, which is held against the internal wall of the rigid tongue (500); it being provided that the hinging pins (7a) of the lever (7) are housed in two elongated slots (20a) that allow the lever (7) to slide under the box.

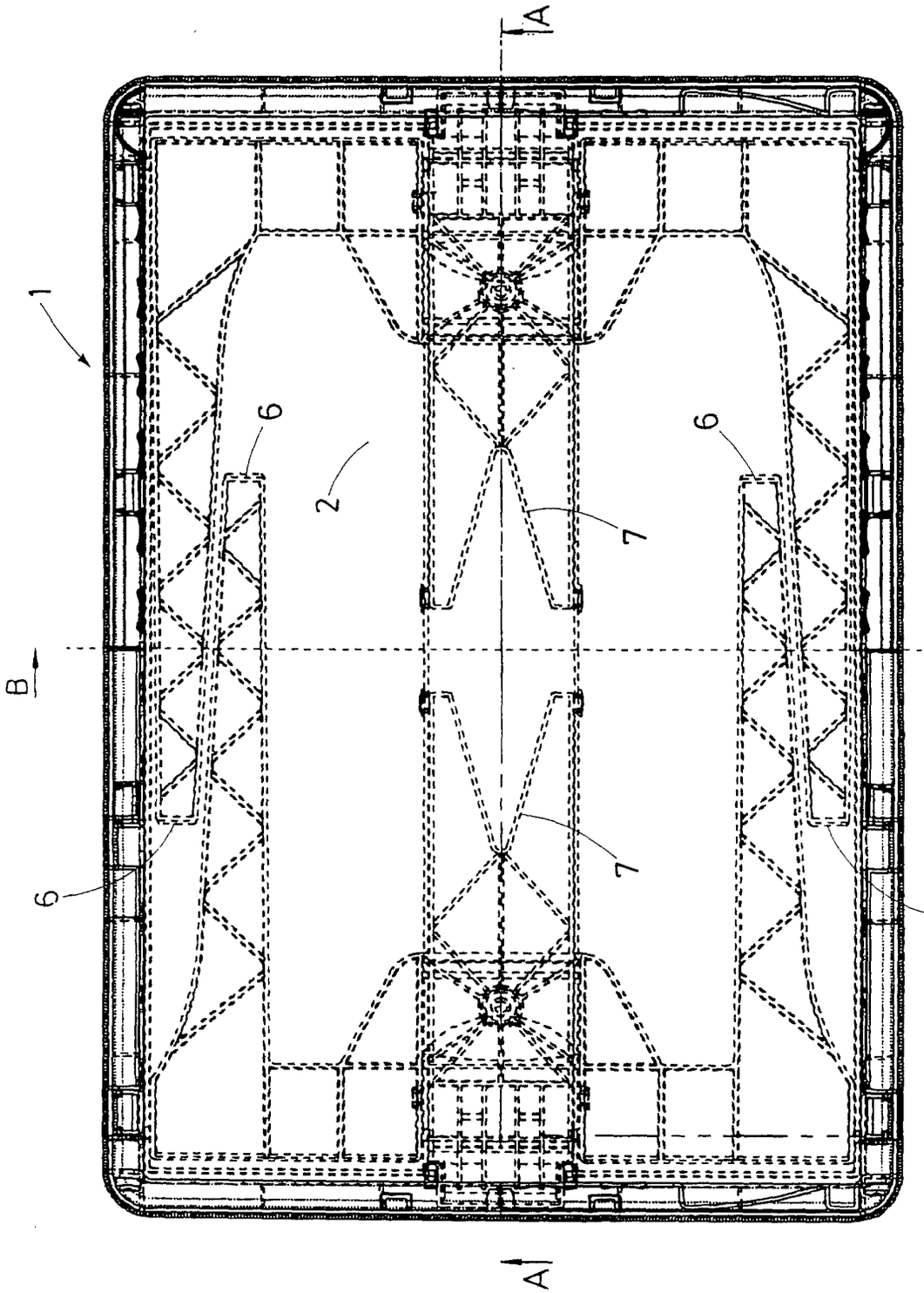

FIG. 1

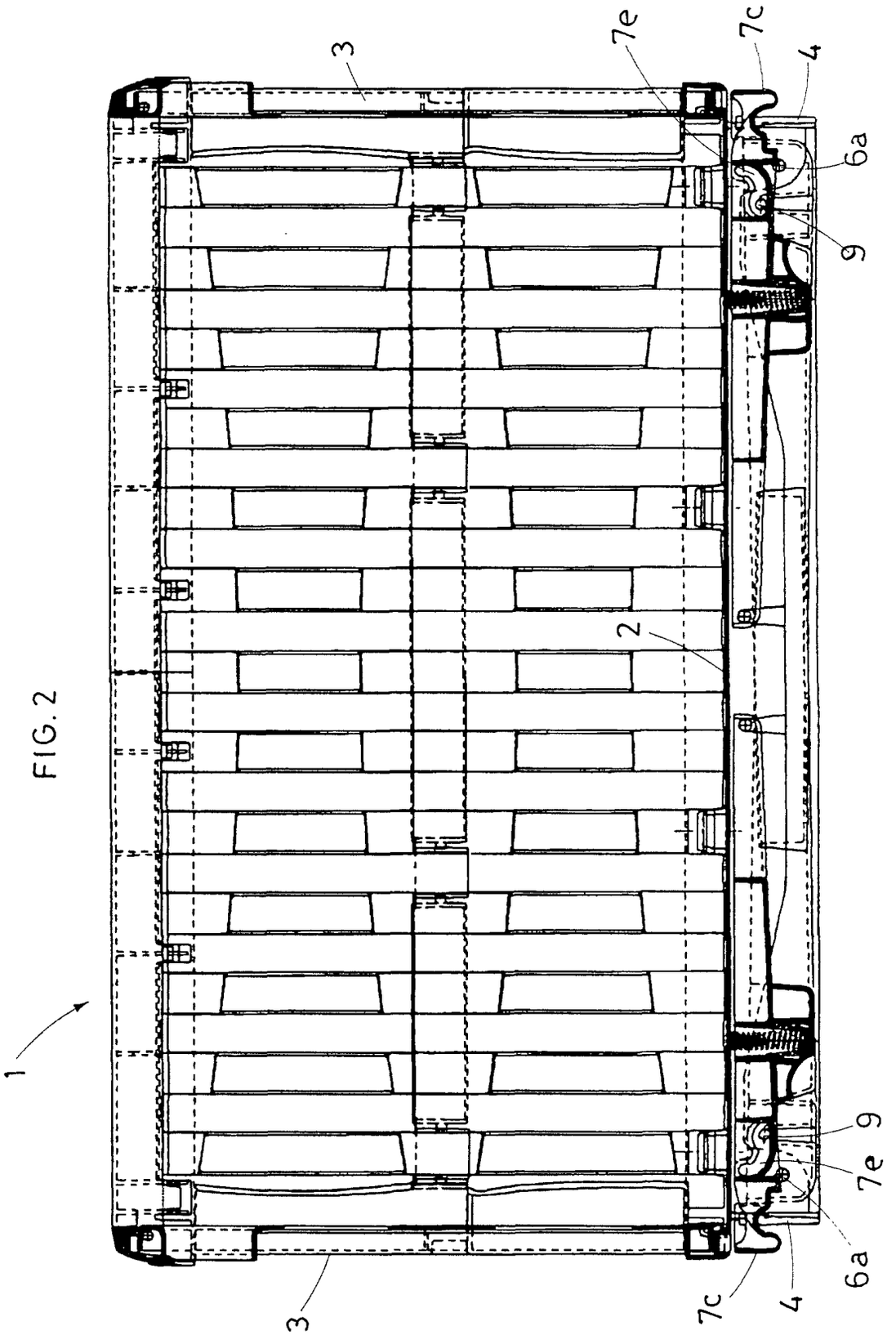

FIG. 2

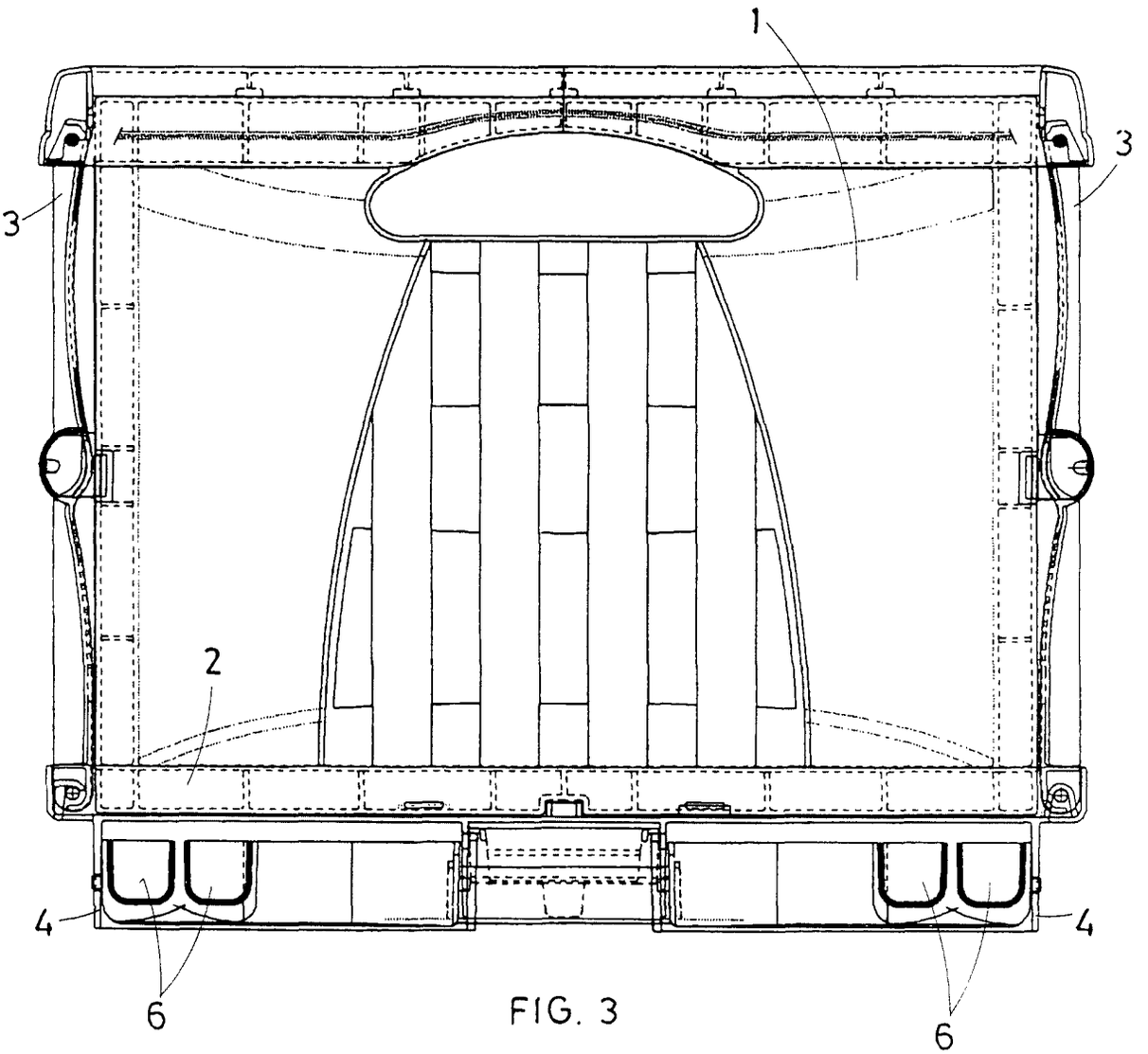

FIG. 3

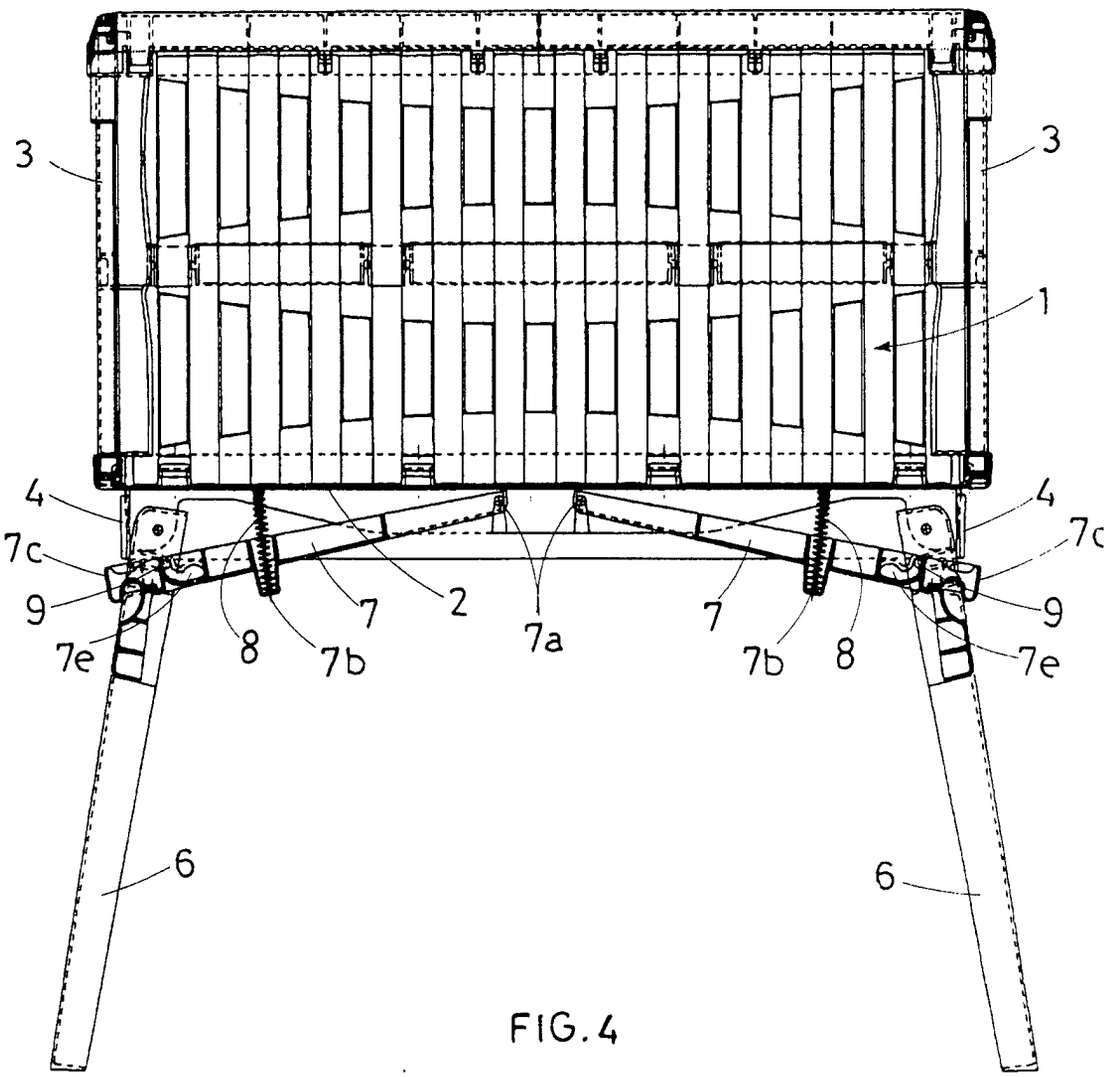

FIG. 4

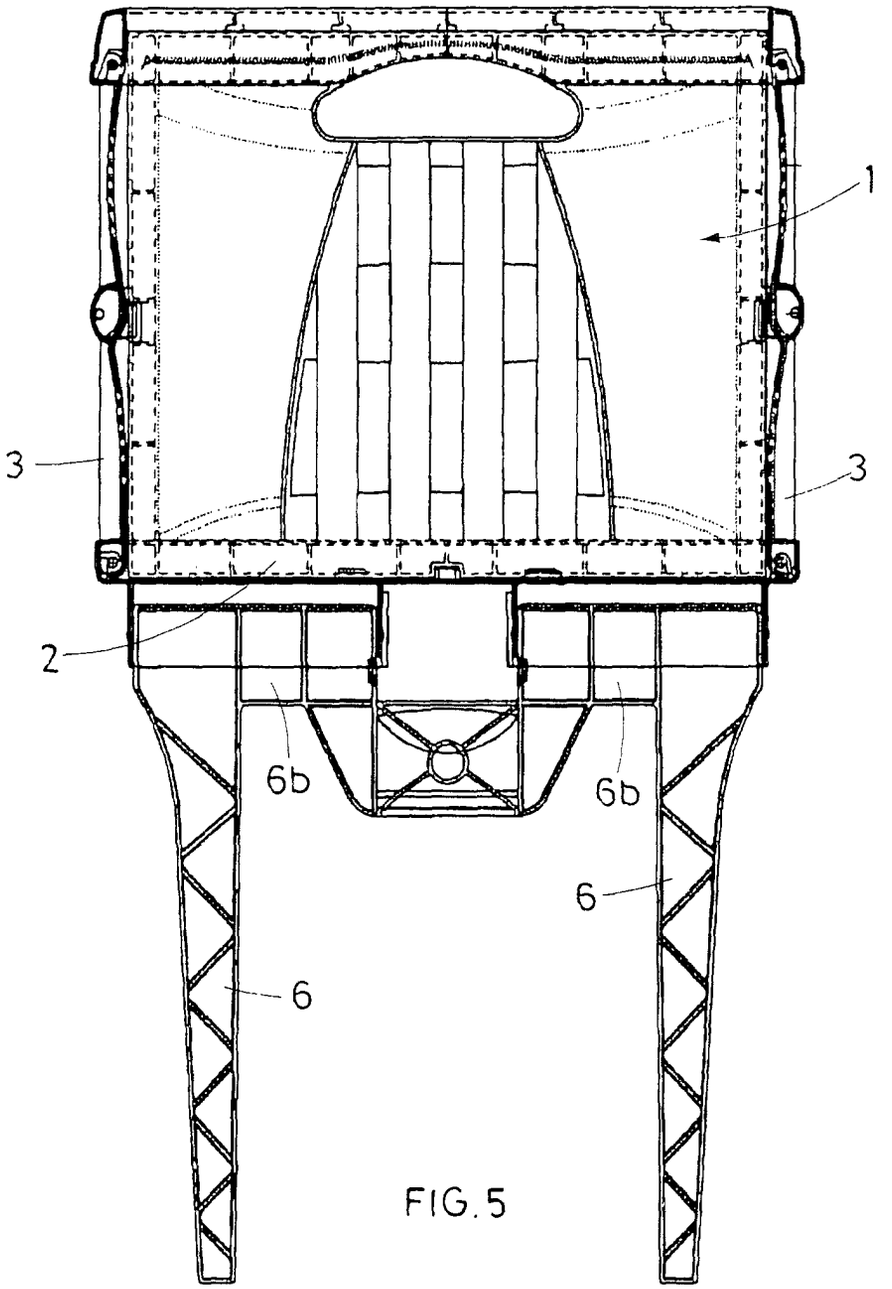

FIG. 5

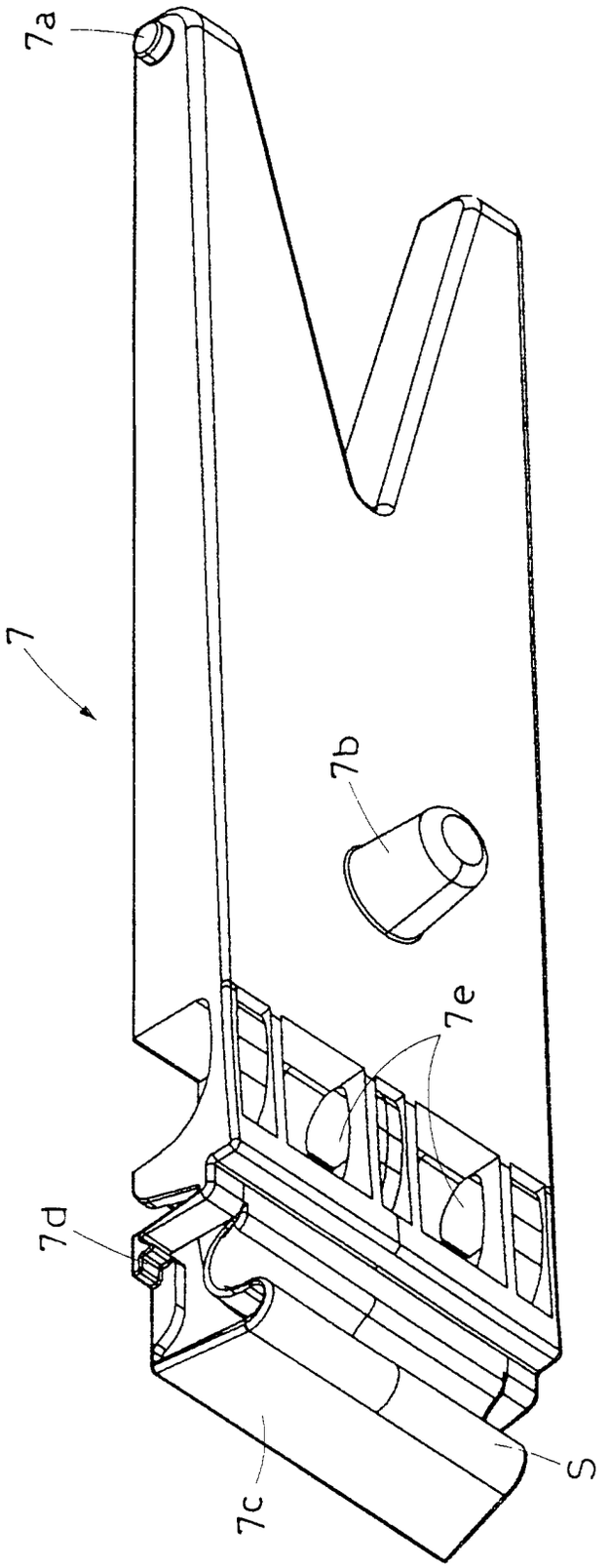

FIG.6

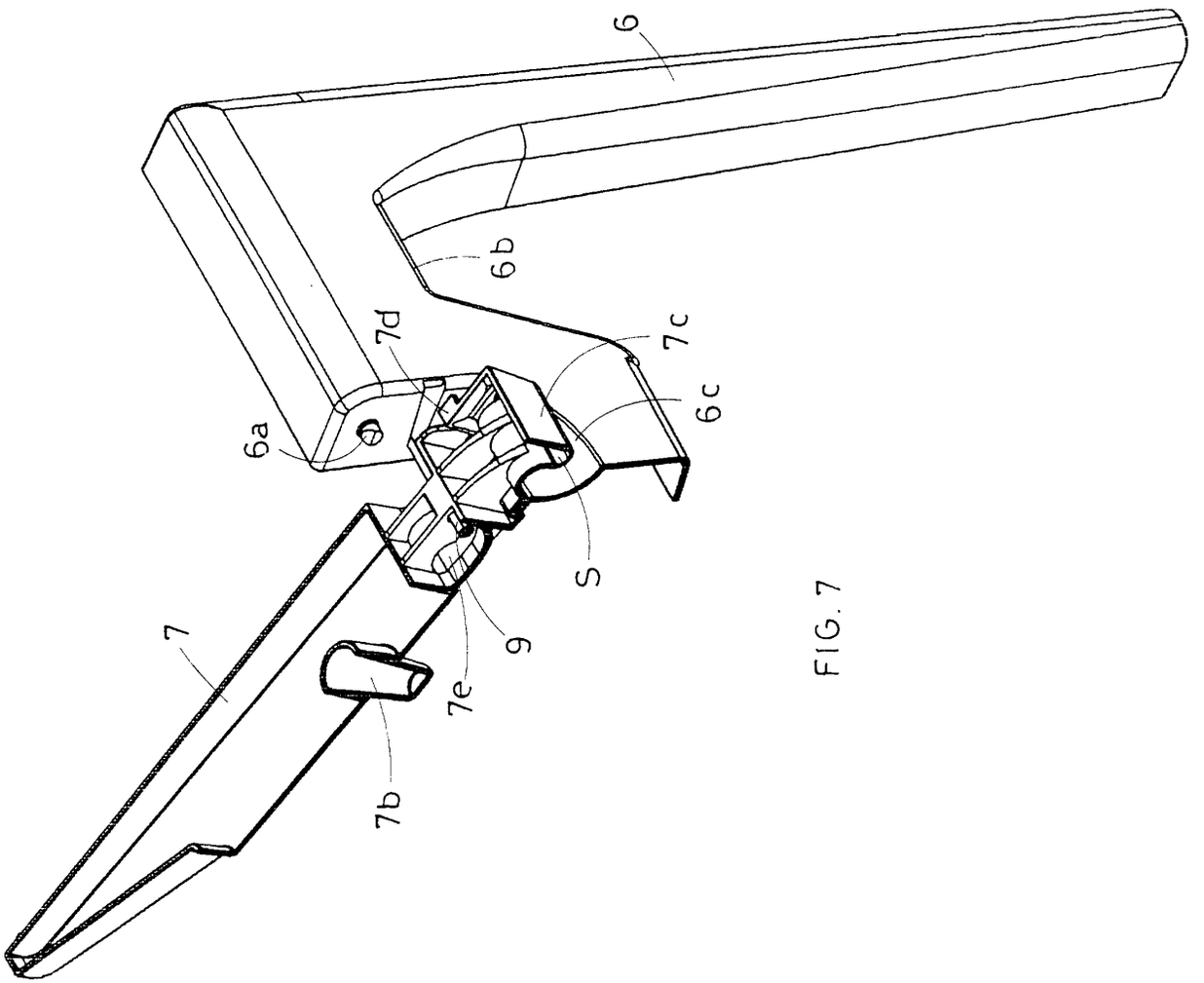

FIG. 7

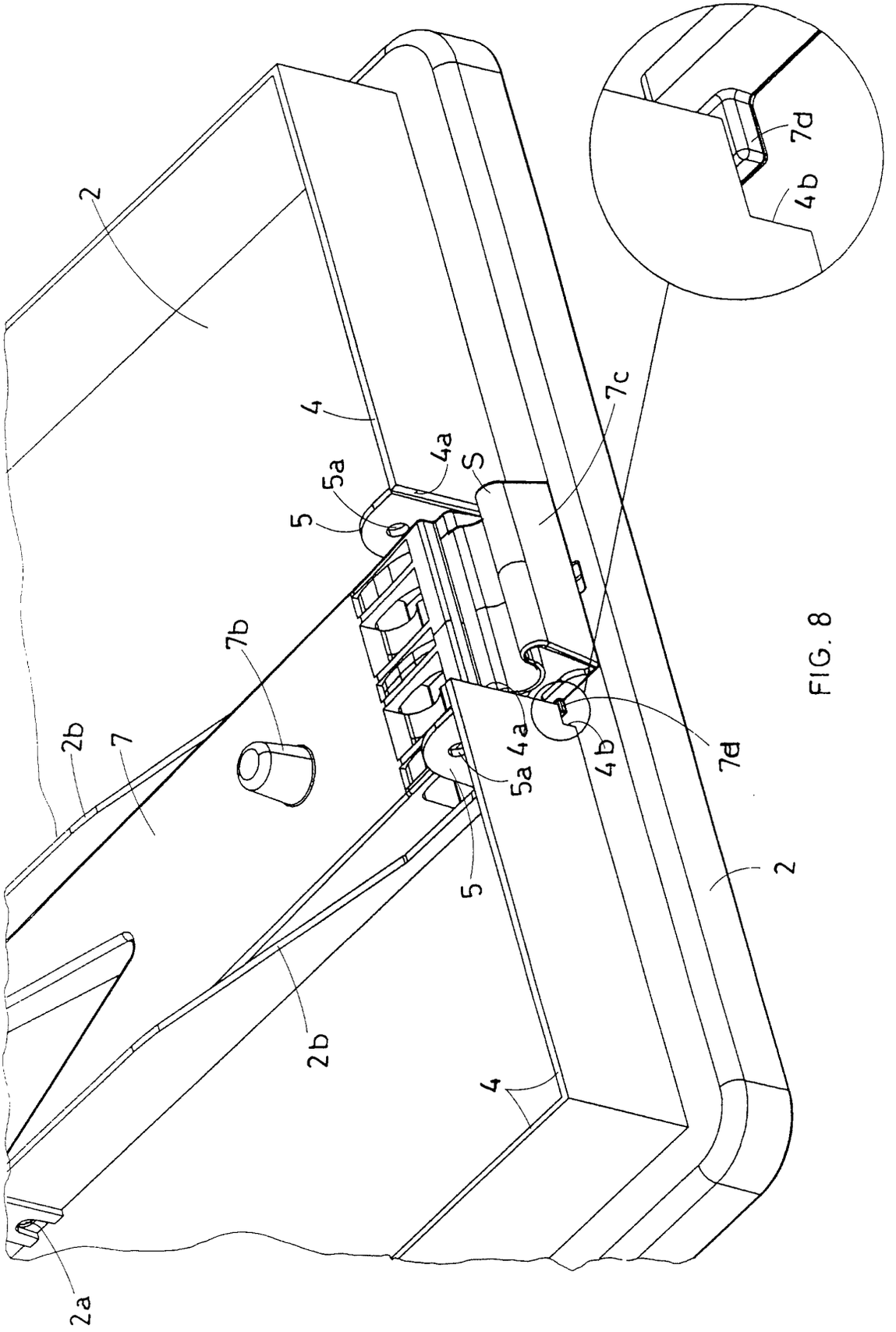

FIG. 8

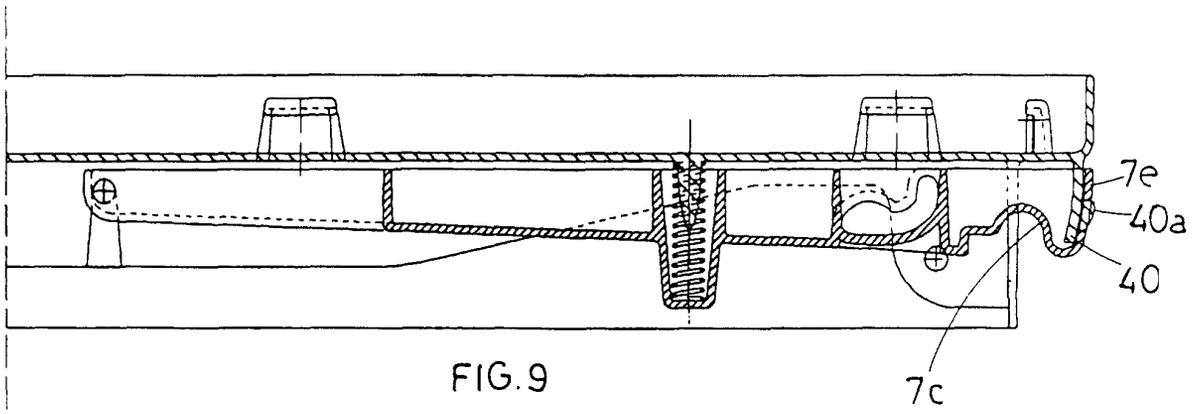

FIG. 9

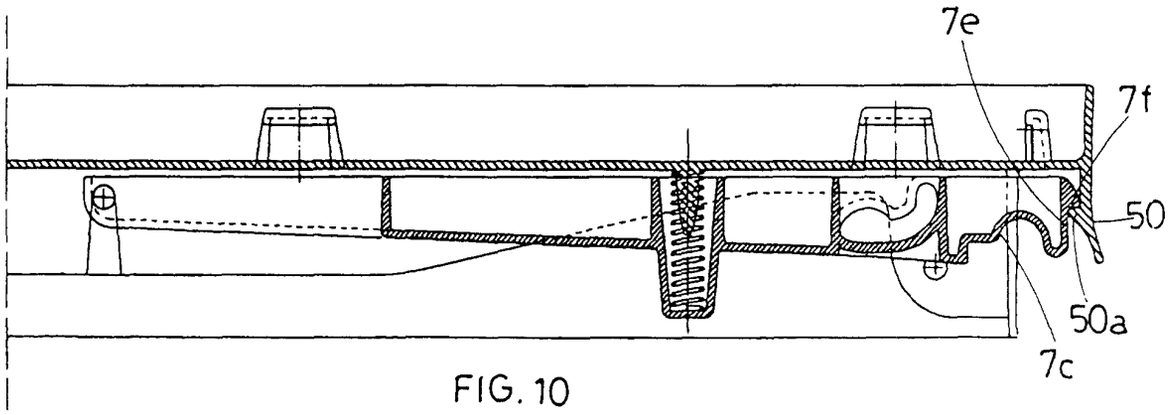

FIG. 10

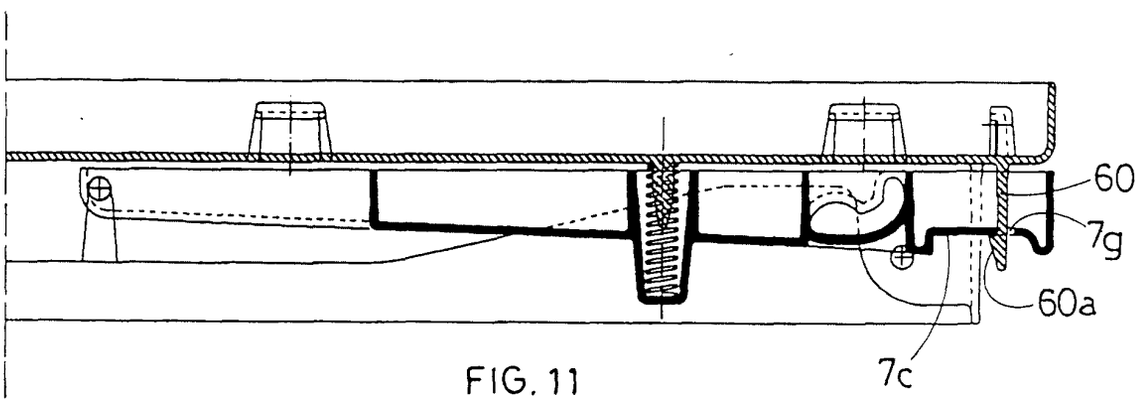

FIG. 11

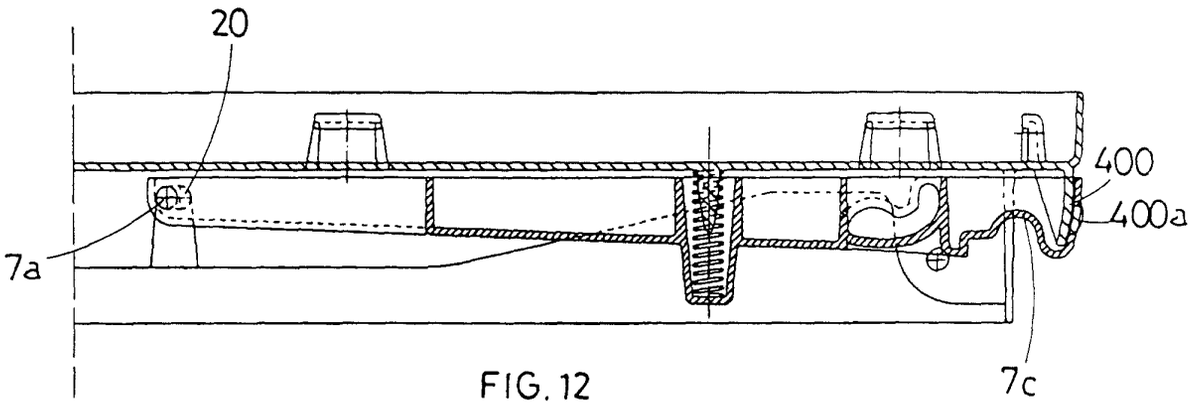

FIG. 12

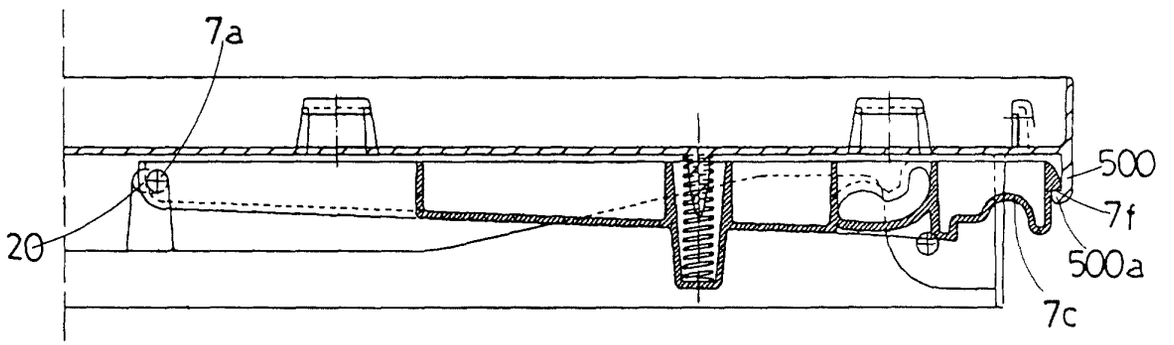

FIG. 13