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(71) Applicant: **Bianchi, Gianfranco**
16128 Genova (IT)

(72) Inventor: **Bianchi, Gianfranco**
16128 Genova (IT)

(74) Representative: **Dragotti, Gianfranco et al**
Dragotti & Associati srl
Via Turati 32
20121 Milano (IT)

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(54) **Finkeel for boats with foldable leeboards**

(57) The invention relates to a finkeel (2) for boats, having of a fixed part (3) attached to the hull (1) and a movable part comprising two leeboards (4, 5) that can be orientated in an independent manner.

According to the invention, each leeboard (4, 5) consists

of at least one upper element (4a, 5a) hinged to the fixed part (3) of the finkeel and a lower element (4b, 5b) hinged to the upper element, so that the leeboards can be folded up towards the fixed part (3) of the finkeel, to achieve lateral overall dimensions smaller than the width of the hull.

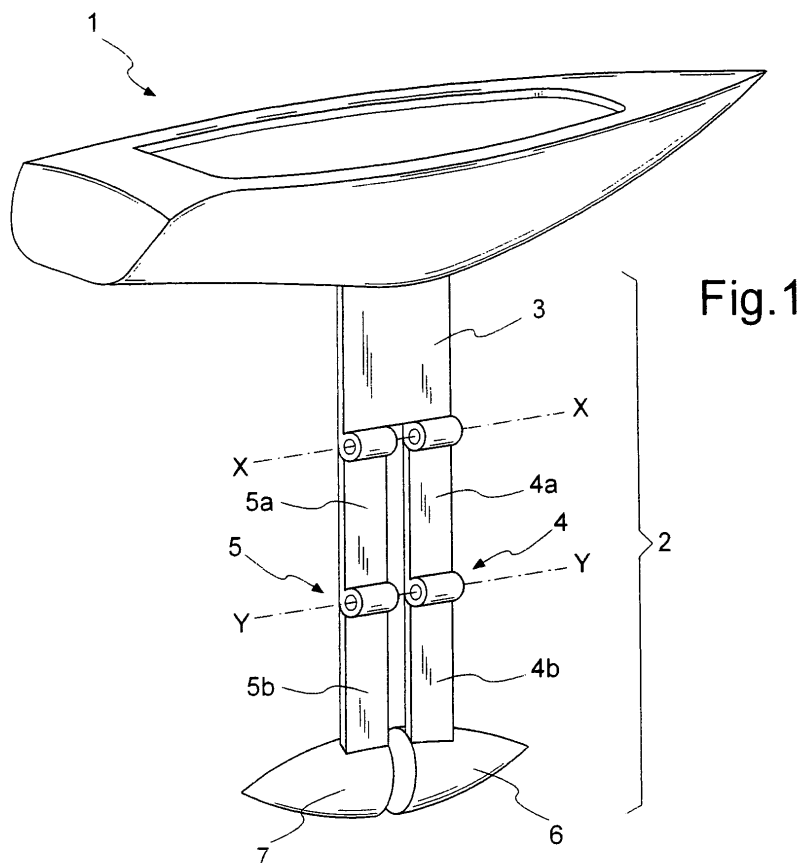


Fig.1

Description

[0001] The invention relates to a finkeel for boats, in particular sailing boats.

[0002] As is known, many sailing boats are equipped with a finkeel whose main functions are to assist the righting of the hull inclined by the action of the wind on the sails, and to prevent or in any case limit the leeway of the hull on the water.

[0003] In modern boats it is common practice to mount at the end of the finkeel a bulb containing lead or some other heavy material, suitable to form a ballast which increases the righting effect of the hull with the same total weight of the fin keel.

[0004] In order to improve this effect, finkeels have also been designed that are able to swing to the right or left relative to the longitudinal mid-plane of the hull, moving the bulb away from the centre of gravity of the boat and therefore increasing the righting moment, which is the product of the weight of the bulb multiplied by the arm of the weight force (i.e. its distance from the centre of gravity).

[0005] For this purpose, the finkeel is hinged at the bottom of the hull and is rotated with respect to its hinging axis by means of actuators, according to needs.

[0006] This type of finkeel is effective as regards righting of the boat, but it has limitations due to the fact that by rotating the finkeel in the manner explained above, the transverse resistance to the leeway of the hull decreases significantly owing to the smaller resisting cross-section of the rotated fin keel, without providing any advantages as regards the draught and therefore the possibility of access to tourist ports.

[0007] In order to overcome this problem, the Applicant of the present application has designed in the past a particular finkeel for boats, described in European patent application EP 1.464.572; the fin of this keel is composed of a fixed part which is solid with the hull, and supports at its end two hinged leeboards that can rotate independently of each other.

[0008] This solution has produced interesting results and the present invention aims at developing them further; for this purpose it would be advantageous to increase the length of the leeboards hinged to the fixed part of the finkeel, so as to augment the righting moment of the boat resulting from the product of their weight and that of the ballast bulbs present thereon, multiplied by their distance from the centre of gravity of the boat.

[0009] This possibility, however, is subject to a limitation as regards the length of the leeboards which, when they are rotated through 90° (i.e. are horizontal), should not exceed the maximum width of the hull since otherwise problems could arise during manoeuvring in tight spaces as occurs, for example, in ports.

[0010] The technical problem underlying the present invention is therefore that of providing a finkeel with movable leeboards having a greater length, all other conditions being the same, than that of known leeboards, with-

out however causing problems due to of an excessive width in relation to the hull.

[0011] The idea for solving this problem consists in designing a finkeel with foldable leeboards; to this end each leeboard comprises a first element hinged to the fixed part of the finkeel and a second element hinged to the first element, so as to form together a structure which may be folded up in a manner similar to that bird wings.

[0012] The characterizing features of the invention are recited in the claims appended to this description; they will emerge more clearly in the light of some exemplary embodiments of the invention, illustrated in the accompanying drawings wherein:

- Figs. 1 and 2 show schematically a perspective view and a stern view of a hull with a finkeel according to the invention, in respective operating conditions;
- Figs. 3 and 4 show, respectively, a side and a front view of an embodiment of a finkeel according to the invention;
- Fig. 5 shows a variant of the finkeel in Figs. 3 and 4;
- Figs. 6, 7 and 8 show a side view of a further embodiment of the finkeel according to the invention, in respective operating conditions.

[0013] With reference to the drawings, in them numeral 1 denotes overall the hull of a boat equipped with a finkeel 2 according to the invention.

[0014] This finkeel comprises a fixed part 3 integral with the keel of the boat and on which two foldable leeboards 4 and 5 are hinged.

[0015] The latter are in turn composed of two elements 4a, 4b; 5a, 5b which are hinged together and which support at the bottom two ballast bulbs 6, 7.

[0016] As can be seen in Fig. 2, the leeboards 4 and 5 may be folded up underneath the hull 1 so as to remain within its maximum width (indicated by broken vertical lines); to this end the finkeel 2 is provided with systems for rotating the upper elements 4a, 5a, with respect to their hinging axis X to the fixed part 3, and the lower elements 4b, 5b, with respect to the hinging axis Y to the upper elements.

[0017] In accordance with a first solution shown in Figs. 3 and 4, the upper elements 4a, 5a are each rotated by a respective gear mechanism which comprises a pinion 10, 11 and a gearwheel 12, 13 mounted on a pin 14, 15 solid with the element 4a, 5a.

[0018] The pinions of the gear mechanisms are actuated by respective motors (not shown in the drawings) or by hydraulic pistons which may advantageously be accommodated in the fixed part 3 of the finkeel 2.

[0019] The lower elements 4b, 5b of the latter are instead rotated with respect to the upper elements by means of hydraulic cylinders 18, 19.

[0020] The leeboards of the finkeel thus formed are folded up by rotating the upper elements 4a, 5a through operation of the gear mechanisms 10-13, and the lower elements 4b, 5b, through operation of the hydraulic cyl-

inders 18, 19.

[0021] In this connection it is worth to emphasize the importance of the fixed part 3 of the fin keel.

[0022] Indeed, it allows movement of the axis of rotation X away from the keel of the hull, allowing rotation upwards (i.e. through an angle greater than 90°) of the upper elements 4a, 5a of the fin keel, since they do not interfere with the hull; the leeboards may thus be folded up in a manner similar to that of bird wings (Fig. 2).

[0023] The variant of the finkeel 2 shown in Fig. 5, where the same numbering of the parts already described has been maintained, differs from that described above in that for rotating the upper elements 4a, 5a, another hydraulic cylinder 20, 21 is used instead of the pinions 10 and 11, with the associated motor.

[0024] In this case the hydraulic cylinders 20, 21 have the function of operating the gear mechanism which moves the gearwheels 12 and 13 integral with the pins 14, 15; in order to favour the action of the cylinders 20 and 21, the fixed part 3 of the finkeel has openings where they are advantageously accommodated.

[0025] By way of a further possible embodiment of the invention, Figures 6 to 8 show the example of a finkeel where, when it is in the vertical condition of Fig. 6, the hinging axis Y of the lower elements 4b, 5b is perpendicular to the drawing sheet of Figs. 6-8 and to the hinging axis X of the upper elements 4a, 5a.

[0026] In order to rotate the lower elements with respect to the upper elements, in this variant hydraulic cylinders 24, 25 are used and act in the plane of said elements: before, during or at the end of this operation, the upper elements 4a, 5a are rotated with respect to their hinging axis X.

[0027] Figs. 7 and 8 show the sequence of these operations for the leeboard 5 of the finkeel; a similar sequence is also performed for the leeboard 4 (although it is not shown in the drawings), the upper element 4a thereof, however, is rotated about the axis X on the opposite side to the corresponding element of the leeboard 5, with respect to the vertical mid-plane of the boat defined by the fixed part 3 of the finkeel.

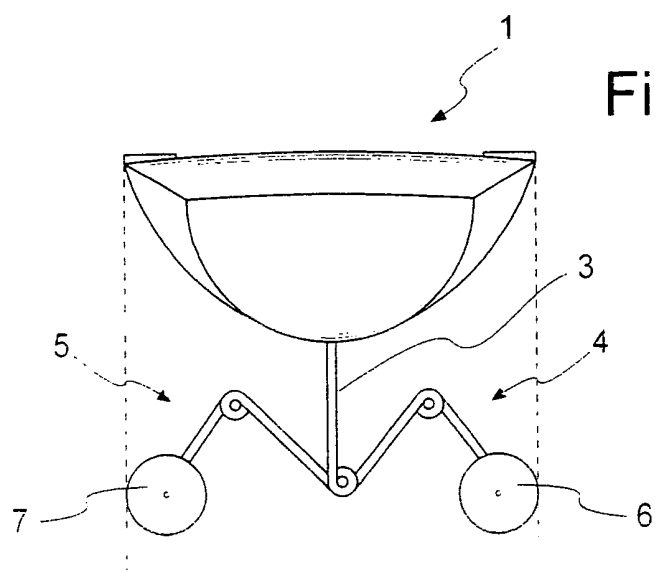
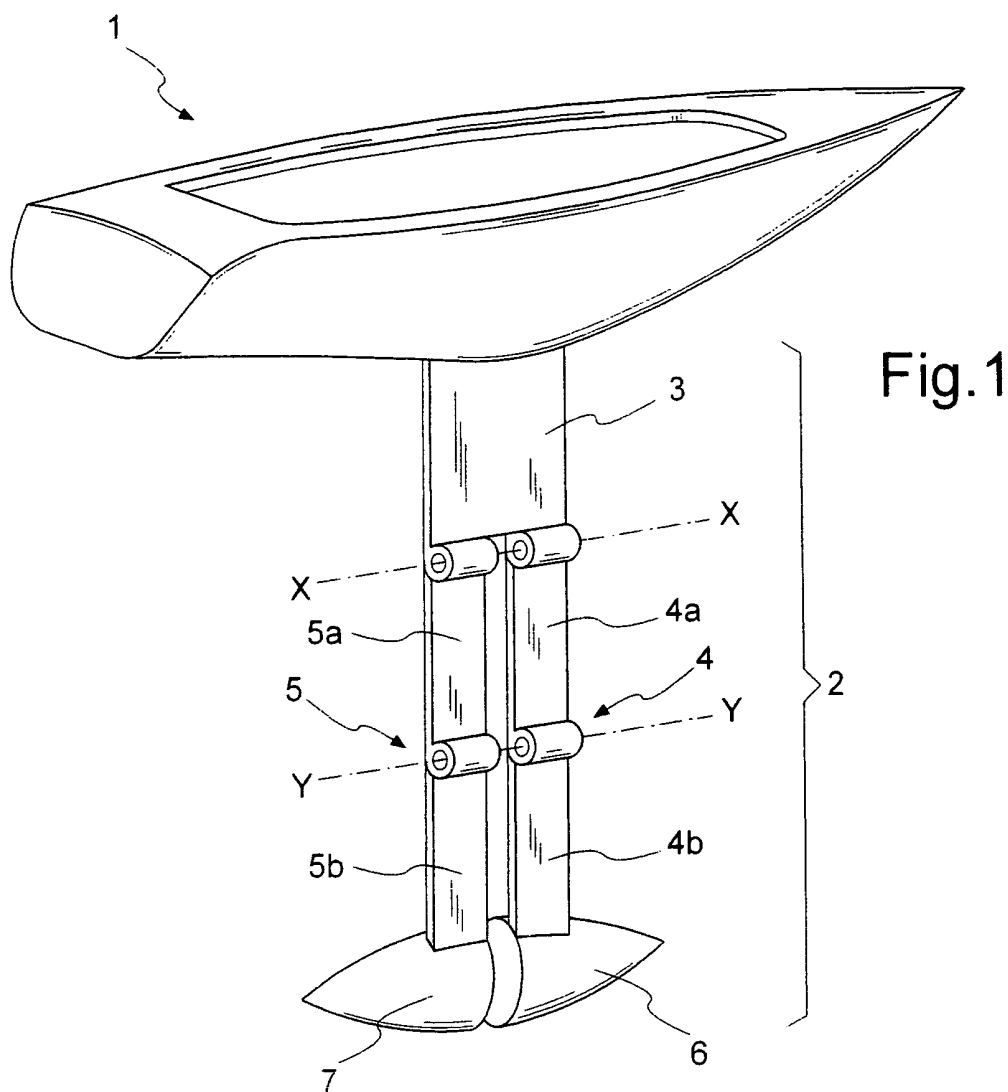
[0028] As can be seen, this solution also allows folding up of the leeboard 4 and 5 of the finkeel underneath the hull, so as to cause them to retract into its widthwise overall dimensions; differently from before, in this case the hydraulic cylinders 24, 25 operate in the plane of the lower elements 4b, 5b and may therefore be aligned with them, being accommodated inside the upper elements 4a, 5a which do not have openings as in the example of Fig. 5.

[0029] Finally, it should be noted that in all the above cases the leeboards 4 and 5 of the finkeel 2 may be rotated on the same side with respect to the mid-plane of the boat defined by the fixed part 3 of the finkeel, so as to increase the righting moment, like it occurs in the known fin keels, for example such as that described in patent application EP 1,464,572 in the name of the present applicant.

[0030] All of these variants nevertheless fall within the scope of the claims which follow.

5 Claims

1. Finkeel for boats, having a fixed part (3) to be attached to the hull (1), a movable part comprising two leeboards (4, 5) hinged to the fixed part (3) and rotatable independently of each other with respect thereto, **characterized in that** each leeboard (4, 5) comprises at least one upper element (4a, 5a) hinged to the fixed part (3) and a lower element (4b, 5b) hinged to the upper element, so that the leeboards can be folded up towards the fixed part (3) of the finkeel, to obtain overall dimensions smaller than the width of the hull.
2. Finkeel according to Claim 1, wherein the hinging axes of the upper elements (4a, 5a) and lower elements (4b, 5b) of the leeboards (4, 5) are parallel.
3. Finkeel according to Claim 1, wherein the hinging axis of the lower elements (4b, 5b) is perpendicular to the hinging axis of the upper elements (4a, 5a).
4. Finkeel according to any one of the preceding claims, comprising means (10-15, 18-19; 20, 21; 24, 25) for rotating the upper elements (4a, 5a) and lower elements (4b, 5b) of the leeboards (4, 5).
5. Finkeel according to Claim 4, wherein the means for rotating the elements (4a, 5a, 4b, 5b) which form the leeboards (4, 5) comprise gear mechanisms and/or hydraulic cylinders.
6. Finkeel according to any one of the preceding claims, wherein ballasts (6, 7) are attached at the ends of the leeboards.
7. A boat comprising a finkeel (2) according to any of the preceding claims.



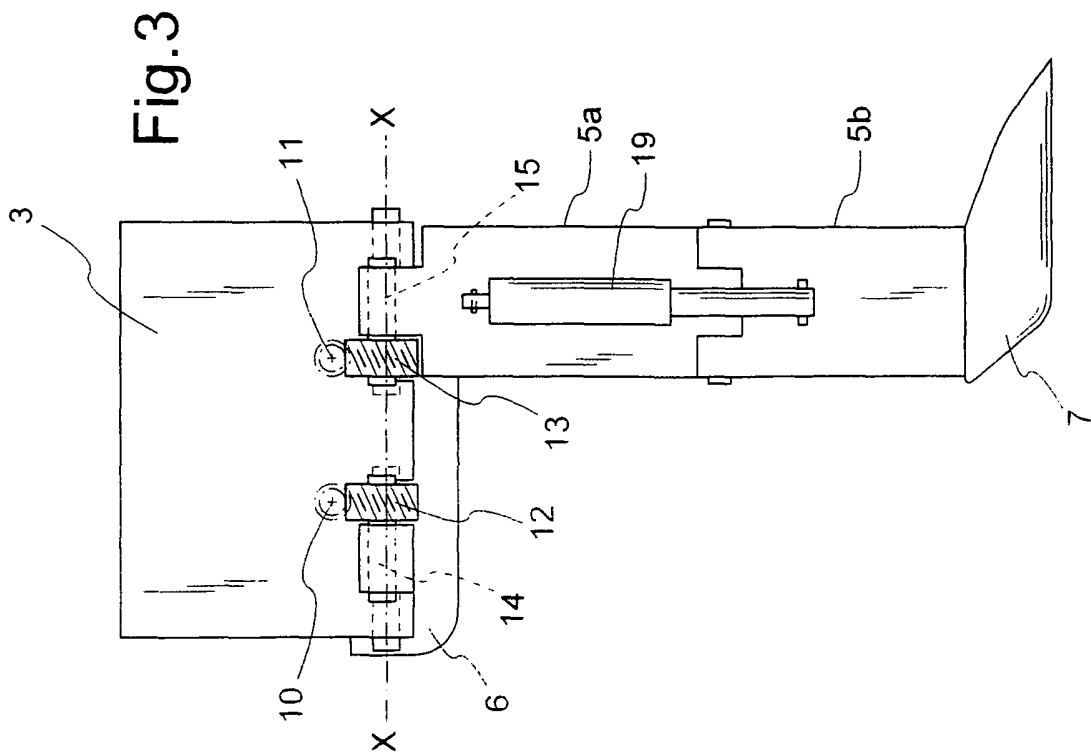
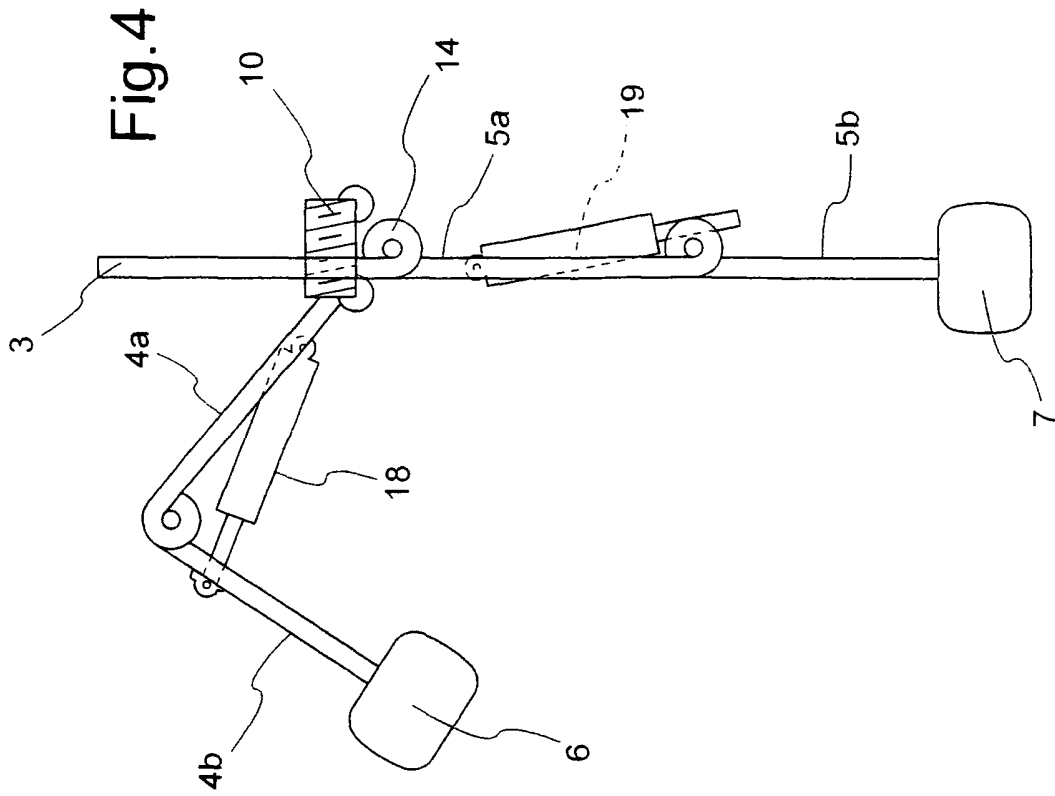
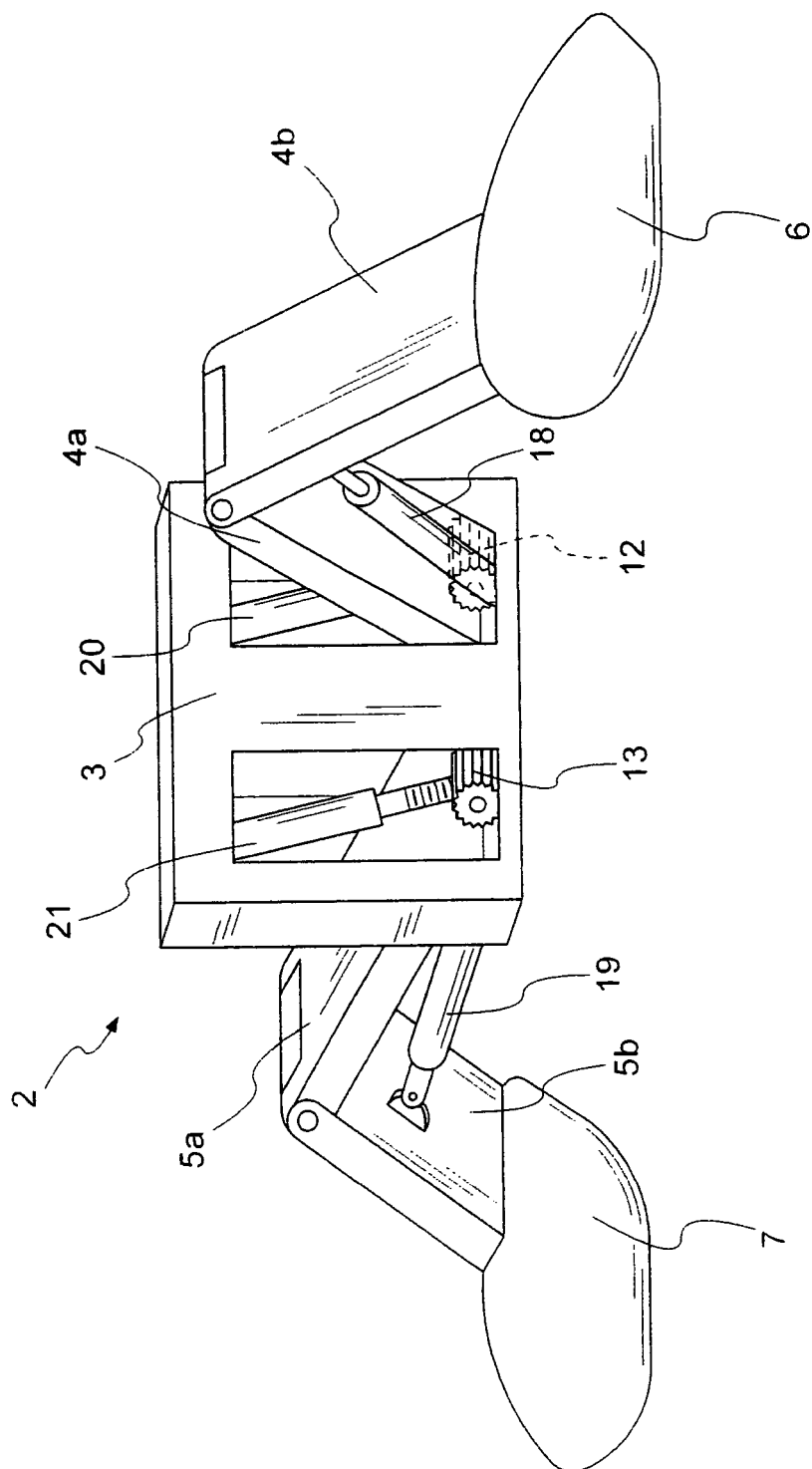
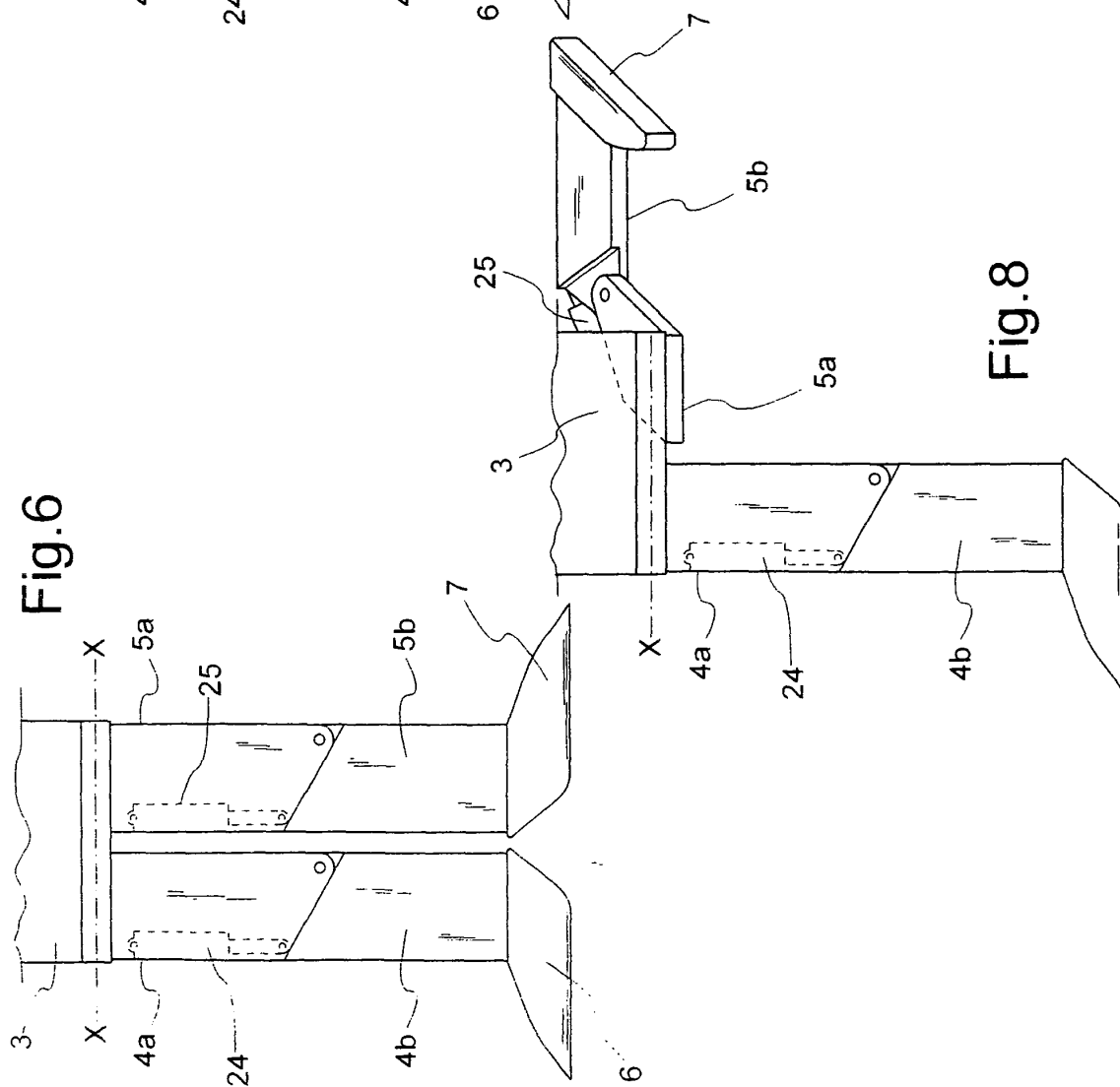
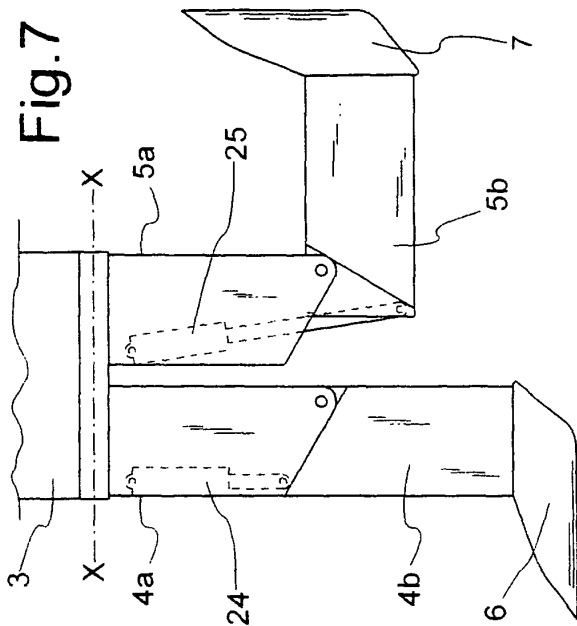


Fig.5







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 11 0267

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	NL 1 002 990 C2 (JACHTWERF JONGERT B V [NL]) 6 November 1997 (1997-11-06) * figures *	1-7	INV. B63B41/00 B63B39/02 B63B43/08
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A	CH 388 803 A (ROUTCHENKO WLADIMIR [FR]) 28 February 1965 (1965-02-28) * claims; figures *	1,4,5	
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B63B
Place of search		Date of completion of the search	Examiner
Munich		26 October 2006	Moya, Eduardo
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 11 0267

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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26-10-2006

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REFERENCES CITED IN THE DESCRIPTION

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