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(54) **Vessel stabilisation means and method**

(57) A vessel having a prow is provided with steerable propulsion means at the prow, means for determining accelerations of the vessel and control means for, depending on the accelerations determined, controlling the

propulsion means for at least partially compensating said accelerations. The propulsion means may comprise at least one waterjet, preferably with a steerable outlet nozzle.

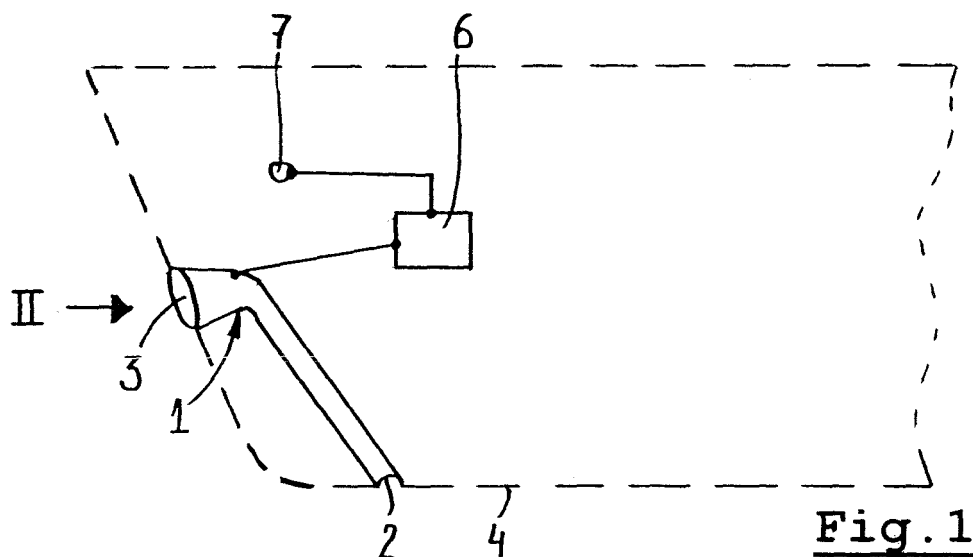


Fig. 1

Description

[0001] The invention firstly relates to a vessel having a prow. The stability of a vessel is determined by many factors, among which the relation between its dimensions, its velocity and the swell. Depending upon these (and other) factors an unacceptable loss of stability of the vessel may occur.

[0002] It is a first object of the present invention to provide measures which will increase the stability of a vessel.

[0003] Thus, in accordance with a first aspect of the present invention a vessel having a prow is provided, which is characterised by the provision of steerable propulsion means at the prow, means for determining accelerations of the vessel and control means for, depending on the accelerations determined, controlling the propulsion means for at least partially compensating said accelerations.

[0004] The combination of steerable propulsion means at the vessel's prow, acceleration determining means and control means allow the creation of a propulsive force at the prow of the vessel counteracting the determined accelerations and thus stabilizing the vessel. Depending on the reaction time of said combined means a quick and direct compensation of said accelerations is possible, still before the vessel has experienced large, or unacceptable, displacements. Thus dangerous situations, such as for example broaching of the vessel as a result of swaying, yawing and/or rolling of the vessel can be prevented and the heading and speed of the vessel may be maintained as much as possible.

[0005] In a preferred embodiment of the vessel the propulsion means comprise at least one water-jet; more preferably said water-jet may be provided with a steerable outlet nozzle. This provides a fast-reacting effective propulsion means.

[0006] Further, in such a case, it is possible that the outlet nozzle of the water-jet is positioned in the vertical central plane of the vessel, that means directly at the prow of the vessel, or near to the prow in the keel. In combination with the steerable outlet this provides excellent steering characteristics for obtaining the desired compensation of accelerations.

[0007] However, according to an alternative embodiment it is also possible to provide at least two, differently oriented water-jets with stationary or steerable outlet nozzles, possibly with valves, for example at opposite sides of the prow. By a proper activation of these water-jets also the desired effect may be established.

[0008] It is conceivable that one water-jet with two opposite outlet nozzles, on either side of the prow, is used. In such an embodiment valves at the outlet of the nozzles may be used as additional control systems and to mitigate resistance.

[0009] Further it is preferred that the means for determining accelerations of the vessel comprise acceleration sensors for determining the direction and magnitude of said accelerations (rotational as well as translational ac-

celerations). Such sensors are known per se. But also GPS-related means may be used.

[0010] Preferably the control means are devised for controlling, alone or in combination, the following parameters of the water-jet: power, direction of propulsion and duration of propulsion. As a result an optimal response to the sensed accelerations may be created.

[0011] To enhance navigation and/or dynamic positioning the control means may be governed by the navigation system or dynamic positioning system of the vessel.

[0012] The invention further relates to a method for compensating accelerations of a vessel, comprising the steps of determining said accelerations and, depending on the accelerations determined, controlling steerable propulsion means positioned at the prow of the vessel for at least partially compensating said accelerations.

[0013] In a preferred embodiment of said method the step of controlling the propulsion means comprises controlling, alone or in combination, the following parameters of the propulsion means: power, direction of propulsion and duration of propulsion.

[0014] Further, preferably, in said method the propulsion means comprise at least one water-jet.

[0015] Hereinafter the invention will be elucidated while referring to the drawing, in which:

Figure 1 schematically represents a side elevational view of the prow region of a vessel in accordance with the present invention;

Figure 2 illustrates, again schematically, a frontal view according to II in figure 1;

Figure 3, in correspondence with figure 2, illustrates an alternative embodiment of the vessel;

Figure 4 illustrates a top plan view of an embodiment with one water-jet having two opposite nozzles close to the prow of the vessel, and

Figure 5 illustrates a side elevational view of the embodiment according to figure 4.

[0016] Firstly referring to figure 1 the prow region of a vessel 4 is illustrated. At the prow a steerable propulsion means 1, in this embodiment a water-jet having a water inlet 2 and a water outlet nozzle 3, is provided.

[0017] In the illustrated embodiment the water-jet 1, and specifically its outlet nozzle 3, is located in the vertical central plane 5 (see figure 2) of the vessel. The outlet nozzle 3, in a manner known per se on the field of water-jets, is steerable (as indicated schematically by two possible positions 3' and 3" in figure 2). The positioning of the outlet nozzle 3 is controlled by a control means 6 as based on signals received from at least one sensor 7 for determining accelerations of the vessel 4. Such a sensor 7 may, for example, be an acceleration sensor.

[0018] In the embodiment according to figures 1 and 2 the water inlet 2 is positioned centrally at the keel region of the vessel 4, but any other convenient location may be chosen.

[0019] By steering the outlet nozzle 3 of the water-jet (but also, if needed and when possible, by controlling the power and duration of activation of the water-jet, for example) a propulsive force may be generated at the prow region of the vessel 4 for compensating the accelerations experienced by the vessel, thus stabilising the vessel.

[0020] It is conceivable to use more than one propulsion means 1. For example, as illustrated in figure 3, two propulsion means 8,9 (in this case again water-jets) may be applied which, in the illustrated embodiment, are not located in the central vertical plane 5 of the vessel 4, but at opposite sides thereof (more specifically this applies for the outlet nozzles 10 and 11 thereof). In this embodiment the outlet nozzles 10 and 11 have a stationary position (yet, steerable is conceivable as well) and the resulting propulsive force acting on the prow of the vessel is established by a proper selection of propulsion parameters (among which power and duration) of the propulsion means 8, 9 individually.

[0021] It is noted that in the embodiment according to figure 3 the inlets 12 and 13 of the water-jets are located at the sides of the vessel 4; however, any other convenient position may be selected too.

[0022] Referring to figures 4 and 5, an embodiment is illustrated comprising more than one (here two) nozzle outlet means 3. For example, as illustrated best in figure 4, one propulsion means 1 with two nozzles 14 and outlet valves 15 is provided. Figure 5 illustrates one of the two nozzles 14 in a side elevational view.

[0023] The invention is not limited to the embodiments described before which may be varied in many ways within the scope of the invention as defined by the appending claims.

Claims

1. Vessel having a prow, **characterised by** the provision of steerable propulsion means at the prow, means for determining accelerations of the vessel and control means for, depending on the accelerations determined, controlling the propulsion means for at least partially compensating said accelerations.
2. Vessel according to claim 1, wherein the propulsion means comprise at least one water-jet.
3. Vessel according to claim 2, wherein the water-jet is provided with a steerable outlet nozzle.
4. Vessel according to claims 3, wherein the outlet nozzle of the water-jet is positioned in the vertical central plane of the vessel.
5. Vessel according to claims 2, provided with at least two, differently oriented water-jets with stationary or steerable outlet nozzles.

6. Vessel according to one of the claims 2-4, wherein one water-jet is provided with two opposite outlet nozzles.

5 7. Vessel according to any of the claims 3-6, wherein valves are provided at the outlet of the nozzles.

8. Vessel according to any of the previous claims, wherein the means for determining accelerations of the vessel comprise acceleration sensors for determining the direction and magnitude of said accelerations.

10 9. Vessel according to any of the previous claims, wherein the control means are devised for controlling, alone or in combination, the following parameters of the water-jet: power, direction of propulsion and duration of propulsion.

15 10. Method for compensating accelerations of a vessel, comprising the steps of determining said accelerations and, depending on the accelerations determined, controlling steerable propulsion means positioned at the prow of the vessel for at least partially compensating said accelerations.

20 11. Method according to claim 10, wherein the step of controlling the propulsion means comprises controlling, alone or in combination, the following parameters of the propulsion means: power, direction of propulsion and duration of propulsion.

25 12. Method according to claim 10 or 11, wherein the propulsion means comprise at least one water-jet.

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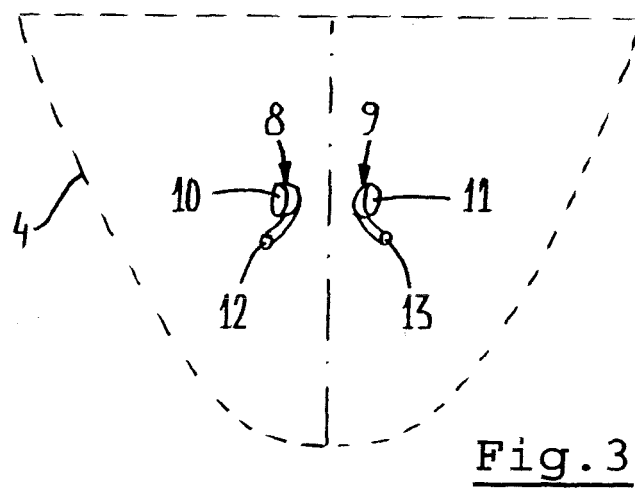
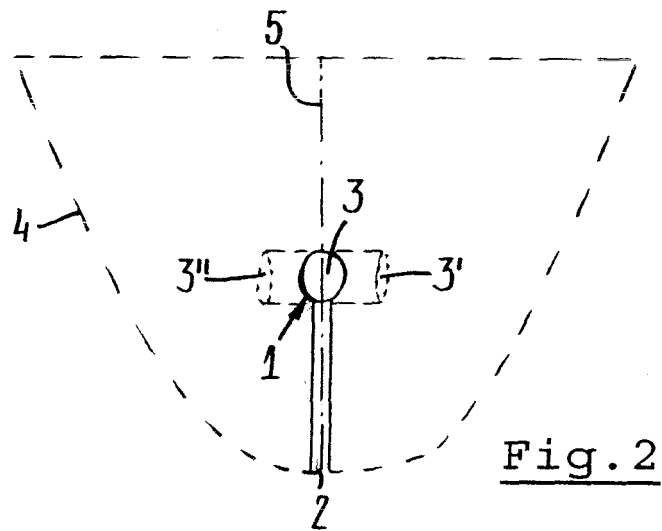
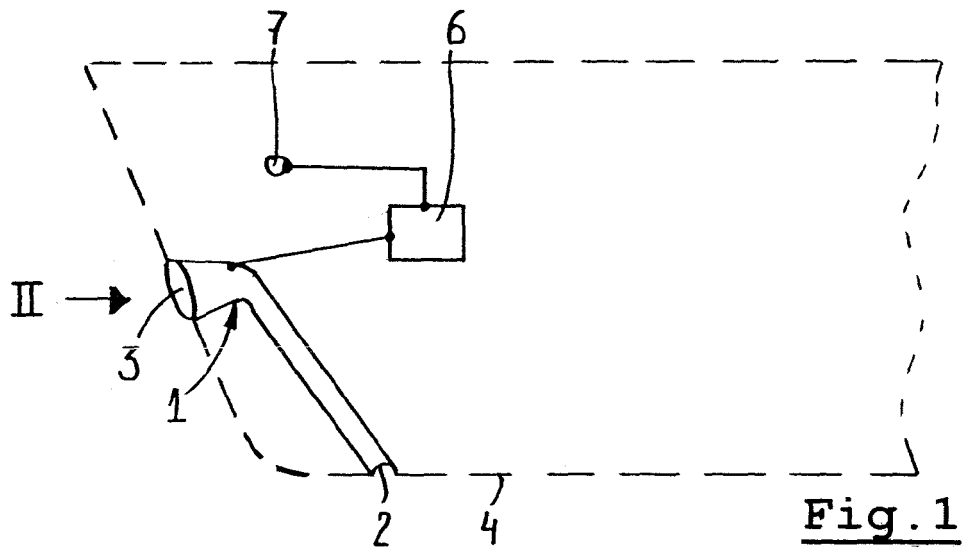
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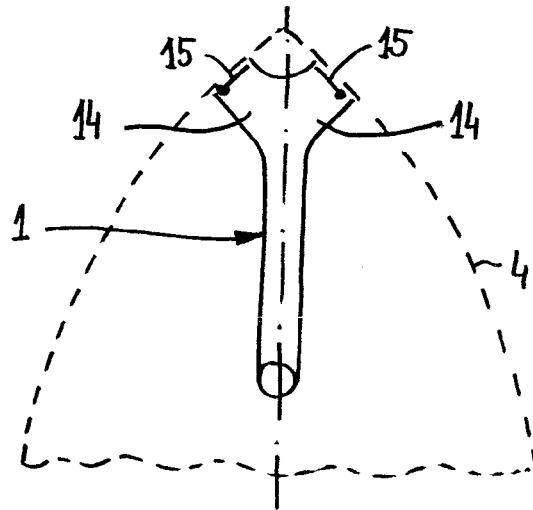


Fig. 4

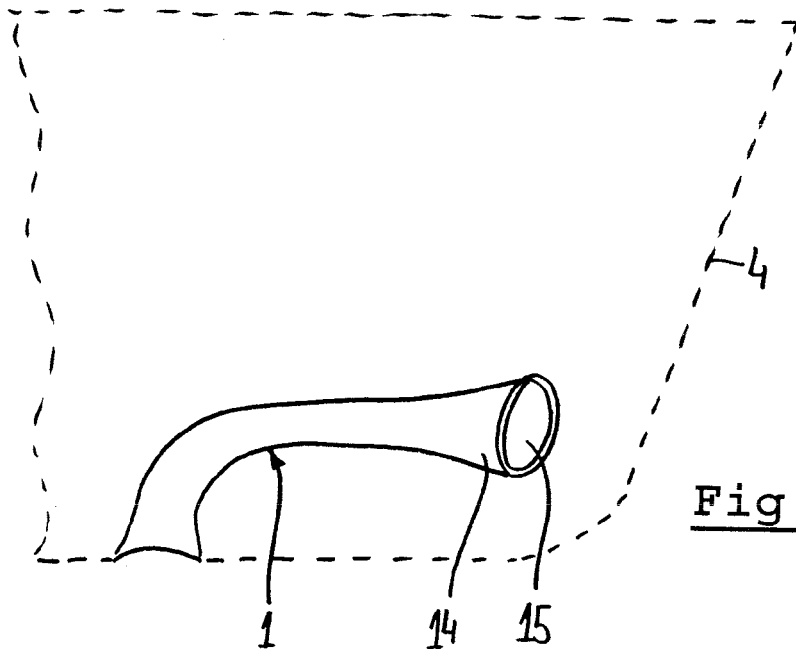


Fig. 5



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Office

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Application Number
EP 07 10 9308

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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