United States Patent

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[31] **P 15 81 104.8**

[54] **PROPULSION ARRANGEMENT FOR WATERCRAFT**
11 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** 115/28
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[50] **Field of Search** 115/28

[56] **References Cited**
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ABSTRACT: A marine vessel, having a concavity in the bottom of the hull, proximate to the bow, is propelled in water by the oscillatory motion of a propeller blade which is attached to the underside of the vessel and pumps water into and from the concavity. Instead of one propeller blade, a plurality of blades may be arranged side by side or in tandem.

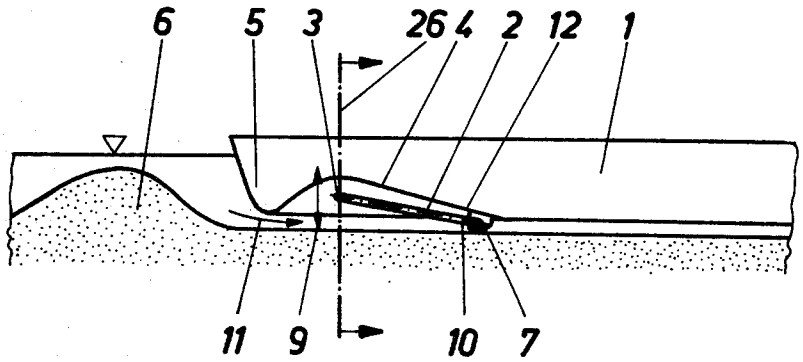

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Fig. 1

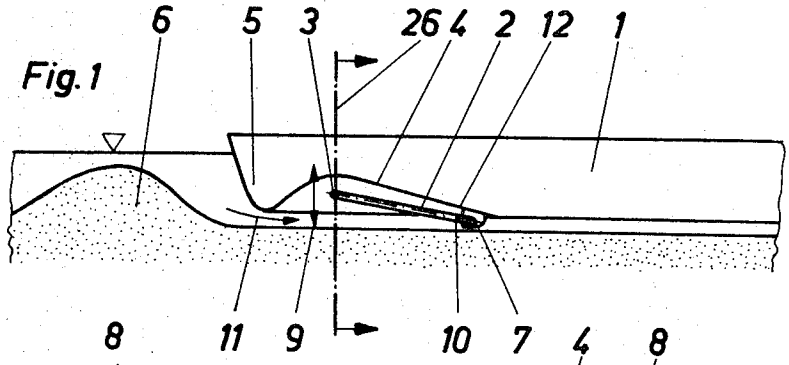


Fig. 2

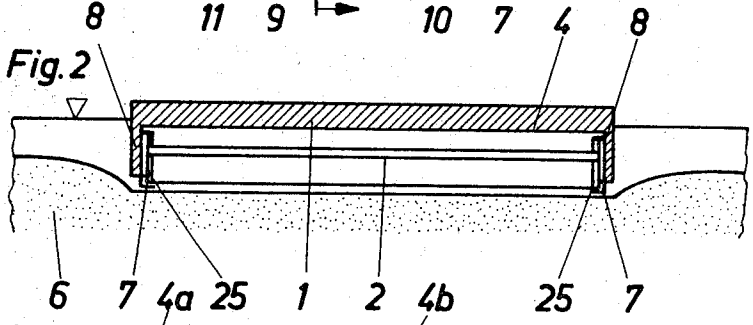


Fig. 3

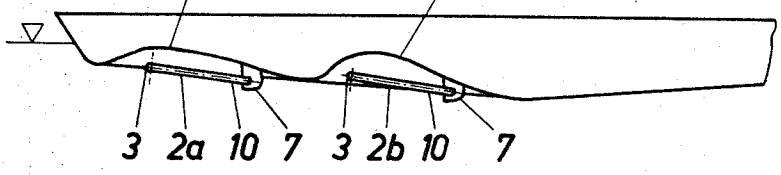
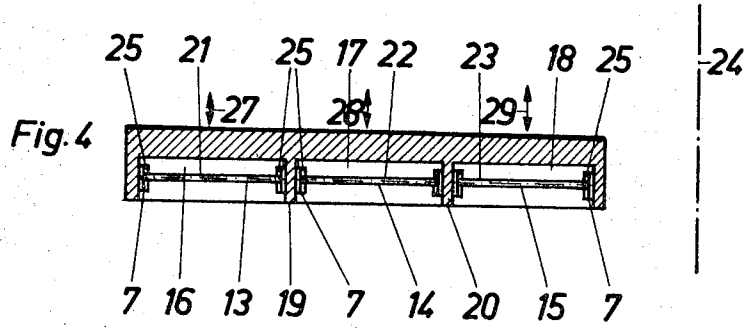


Fig. 4



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PROPULSION ARRANGEMENT FOR WATERCRAFT

BACKGROUND OF THE INVENTION

The present invention relates to a marine propulsion arrangement for watercraft of the type propelled in a fluid medium, and particularly to an arrangement comprising one or more propeller blades.

SUMMARY OF THE INVENTION

The novel feature of the invention resides in the installation of a propeller at the underside of the vessel proximate to the bow so that, in one of its positions, the blade is almost completely withdrawn into a concavity formed in the bottom of the hull. In one presently preferred embodiment the bow of the vessel is extended below the level of the keel and outlines a recess in which the propeller blade is receivable.

A vessel incorporating the propulsion arrangement of the present invention is well adapted for passing through shallow waters having submerged sandbanks. The pumping motion executed by the propeller sucks up sand and clears a channel through which the vessel may proceed. The extension of the bow below the keel prevents the sucking in of air, so that the efficiency of the propulsion arrangement is increased.

In one presently preferred embodiment of the invention the vessel is provided with one propeller of substantially the same blade length as the width of the hull. This arrangement is particularly satisfactory when the sandbanks are wider than the vessel. In another preferred embodiment a plurality of separate blades are disposed side by side across the width of the hull. The blades may be of the same or of different size and oscillate at the same or at different speeds. In the latter case differential speeds may be coordinated with the steering controls of the vessel.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a longitudinal sectional view of the bow portion of a vessel embodying one form of the improved propulsion arrangement;

FIG. 2 is a cross-sectional view of the vessel as seen in the direction of arrows from the line 26 in FIG. 1;

FIG. 3 is a longitudinal sectional view of the bow portion of a vessel wherein the propulsion arrangement comprises two propellers in tandem; and

FIG. 4 is a cross-sectional view of the bow of a vessel with three propellers side by side.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1 there is shown the hull 1 of a vessel which has at its underside a concavity 4, extending from the bottom of the hull toward the interior of the vessel's body. A propeller blade 2 in the concavity 4 has a rear end 10 pivotally mounted with clearance on the hull 1 for movement about a horizontal axis normal to the longitudinal axis of the vessel. The front end of the blade 2 is articulately attached to a shaft 3 which is actuatable by drive means such as, for example, a Diesel engine (not shown) to move up and down as indicated by the arrow 9. The movements of shaft 3 cause the blade 2 to oscillate about its rear end 10 and to move toward, and away from, the wall 12 in the interior of the concavity 4. The body of the vessel itself, and detent means 7 prevent excessive displacement of the rear end 10 of the blade 2.

The pumping motion of the oscillating blade 2 produces a stream which is indicated by the arrow 11 whereby the vessel moves in opposite direction. An extension of the bow 5 below the level of the keel of the vessel, as well as the side walls 8 of the hull, prevent air from being sucked in during the intake stroke. Rocks or sand 6 scooped up during the upward stroke of the blade 2 are harmlessly deflected from the blade surface remote from the wall 12, since the speed at which the blade moves is slower than the speed of the fluid flow.

FIG. 2 shows that the length of the propeller blade 2 is approximately equal to the width of hull 1. The reference numerals 25 denote vertical guides for the shaft 3.

The vessel shown in FIG. 3 has two concavities respectively denoted by 4*a* and 4*b* in the bottom of the hull. Propeller blade 2*a* is movable in concavity 4*a* and propeller blade 2*b* is movable in concavity 4*b* at coordinated or separate speeds relative to each other.

According to FIG. 4 each of three propeller blades denoted by the numerals 13, 14 and 15 respectively, is disposed in a separate compartment denoted by numerals 16, 17 and 18 and separated from the adjacent blade or blades by the walls 19 and 20. Blade 13, mounted on the drive shaft 21, blade 14 on drive shaft 22, and blade 15 on drive shaft 23, are movable at different speeds in the direction of the arrows 27, 28 and 29. Vertical guides 25 for the respective drive shafts are provided in each of the compartments 16, 17 and 18.

If, for example, blade 15 has a greater and blade 13 a lesser up-and-down speed, as indicated by the relative lengths of the arrows 27, 28 and 29, the vessel will turn about an imaginary axis such as the line indicated by the numeral 24.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of marine propulsion arrangement for watercraft of the type propelled in a fluid medium and having propeller blades mounted on a horizontal axis differing from the types described above.

We claim:

1. A marine propulsion arrangement for watercraft, comprising a hull having a bottom part provided with a submerged concavity adjacent to the bow, propeller blade means having a rear end and a front end, said rear end being movably attached to the underside of said hull and said front end being movable in said concavity up and down to thereby pump water into and from said concavity, and means for moving said front end.

2. A marine propulsion arrangement as defined in claim 1 wherein said propeller blade means is movable into a position contiguous with a portion of said bottom part inside said concavity.

3. A marine propulsion arrangement as defined in claim 1, further comprising a projection on said bow extending substantially vertically downwardly in front of said concavity.

4. A marine propulsion arrangement as defined in claim 1 wherein said means for moving said front end of said propeller blade means includes a shaft extending in a direction which is substantially normal to the longitudinal axis of said vessel.

5. A marine propulsion arrangement as defined in claim 4 comprising vertical guides for said shaft.

6. A marine propulsion arrangement as defined in claim 1, further comprising detent means for restricting movement of said rear end of said propeller blade means.

7. A marine propulsion arrangement as defined in claim 1 wherein said blade means comprises a blade whose length is substantially equal to the width of said hull.

8. A marine propulsion arrangement as defined in claim 1 wherein said blade means comprises a plurality of blades arranged in tandem, and said concavity includes separate concavities for said blades.

9. A marine propulsion arrangement as defined in claim 1 wherein said blade means comprises a plurality of blades disposed side by side.

10. A marine propulsion arrangement as defined in claim 9 wherein said plurality of blades is disposed across the entire width of said hull.

11. A marine propulsion arrangement as defined in claim 10 wherein each of said blades is movable at a speed different from the speed of the other blades.