

Water Craft with Water Jet Driving
Apparatus

The present invention relates to water jet driving apparatus for water craft, particularly shallow water craft.

A known water jet driving device for driving and steering in particular flat-bottomed water
5 craft has a pump mounted in a housing which is pivotal about a substantially vertical axis. The pump sucks in water at the bottom and ejects it obliquely downwardly.

Ideally, jet driving apparatus should have
10 high efficiency both at cruising speed and in the starting state, a low weight and a small demand for space being desirable at the same time.

The invention provides a water craft having a water jet driving apparatus comprising a flow guide
15 unit mounted for rotation about a substantially vertical axis, and a centrifugal pump in the flow guide unit, the pump being arranged to suck water from the bottom of the craft through a suction opening of the flow guide unit, to convey the water through a spiral duct
20 in the flow guide unit, and to eject the water obliquely downwards from an ejection opening of the flow guide

unit, the apparatus including at least one ventilation valve which connects the interior of the spiral duct with the ambient air dependently on the pressure in the duct.

5 The flow guide unit is preferably mounted in the hull of the craft, and the suction and ejection openings of the unit preferably do not project beneath the bottom of the craft.

The invention will be described further, by way of example, with reference to the accompanying drawings, in
10 which:

Figure 1 is a part-sectional schematic side view of a water jet driving apparatus in a water craft; and

Figure 2 is an enlarged section on line B-C of detail A in Figure 1.

15 In the water craft shown in Figure 1,

for the purpose of receiving a centrifugal pump housing 2 a so-called well shaft 4 is provided in the hull 1 and is closed by a well cover 4a. The centrifugal pump consists substantially of a rotor 5 which is enclosed by a spiral duct 6. The centrifugal pump serves for driving as well as for steering the ship. For these purposes the housing 2 is mounted so as to be pivotal through 360° about a vertical axis, under a gear casing 7 which in turn is fixed on the well cover 4a.

The rotor is driven by a motor (not shown) by way of conventional transmission elements including a clutch 8 and an angle drive mounted in the gear casing 7. A second motor 8 serves for driving the pivotal movement of the housing 2, by means of known driving members which are likewise mounted in the gear casing 7.

The water is sucked by the rotor 5 through a suction opening 20, into the spiral duct 6, and ejected through a downwardly directed outlet nozzle 21; in this way the water craft is driven. The craft can be steered by pivoting the housing 2 and thereby changing the direction of the nozzle 21.

A ventilation opening 23 (Fig. 2) is provided in a wall 22 of the spiral duct 6. A valve flap 24 fits sealingly into the ventilation opening 23 in an

upper extreme position and is pivotally connected by means of a rod 25 to a joint 26 in such a manner that it drops under its own weight into a lower extreme position illustrated in full line in Fig.2. In the other extreme position (in which the rod 25 occupies the position illustrated in chain-dotted line) the valve flap 24 closes the valve opening 23. A ventilation tube 27 communicating with the ambient air is provided in the well cover 4a, near the valve opening 23.

In particular when the centrifugal pump dips into the water, this occurs during assembly and may also occur e.g. when the craft is placed in the water, air is located in the spiral housing during starting up. During the starting state, the air is displaced by the water conveyed and can escape through the ventilation opening 23 and the ventilation tube 27. When the air has been displaced, the pressure of the flowing water urges the valve flap 24 against the ventilation opening 23 and closes it. Since the rod 25 is located outside the spiral duct and the valve flap 24 is flush with the interior of the spiral duct, the ventilation valve does not offer resistance during operation after start-up. Instead of, or in addition to, the weight of the valve flap 24, a spring (not shown) may be used to open the valve.

The jet driving apparatus described above has the advantage that it is protected against damage upon touching the ground and is suitable for small and easily manoeuvrable craft. It takes up a small space and has a low weight. The pump is self-priming and is insensitive against the ingress of sand and other contaminants. Also manoeuvrability is satisfactory, because the thrust jet is steerable all around in a stepless manner.



CLAIMS

1. A water craft having a water jet driving apparatus comprising a flow guide unit mounted for rotation about a substantially vertical axis, and a centrifugal pump in
5 the flow guide unit, the pump being arranged to suck water from the bottom of the craft through a suction opening of the flow guide unit, to convey the water through a spiral duct in the flow guide unit, and to eject the water obliquely downwards from an ejection opening of the flow guide unit,
10 the apparatus including a ventilation valve which connects the interior of the spiral duct with the ambient air dependently on the pressure in the duct.
2. A water craft as claimed in claim 1, in which the ventilation valve comprises a valve flap actuatable by the
15 pressure of the water flowing through the flow guide unit.
3. A water craft as claimed in claim 2, in which the valve flap lies within the spiral duct when the duct is empty, the flap being urged by the flowing water to a position in which it closes a ventilation opening and being maintained
20 in this position by the pressure within the duct.
4. A water craft as claimed in claim 3, in which the valve flap is urged to open by its own weight and/or by spring means.



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5. A water craft as claimed in claim 3 or 4, in which the valve flap is carried by a rod passing through the ventilation opening.
 6. A water craft as claimed in any of claims 1 to 5,
5 in which the flow guide unit is mounted in the hull of the craft.
 7. A water craft having a water jet driving apparatus, substantially as described with reference to, and as shown in, the accompanying drawings.
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