

ICEBREAKER FOR OPERATION PREFERABLY IN SHALLOW FREEZING WATER

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ABSTRACT

The invention relates to shipbuilding, and more specifically – to the icebreakers and tugboats intended for operation in ice in shallow water conditions.

The proposed invention is aimed to improve maneuverability of the ship running
10 both ahead and astern in constrained environment in ice and in open water, as well as to improve its icegoing capabilities and to effectively handle air penetration to the operating AZT propellers and ship propulsors.

For this purpose the icebreaker intended for operation preferably in shallow freezing waters comprising a hull with a sled-like stern overhang having flat bottom and
15 ice protection shield along the perimeter of the overhang, and podded propulsion system disposed in the overhang and comprising two side propulsors mounted on the shafts symmetrically to the ship's CL, and arranged with regard to hull height so that the propulsor's tip edges do not protrude beyond the ship's base plane and design waterline at the propellers' location, and, *according to the invention*, is fitted with two 360-degree
20 azimuth thrusters (AZT) equipped with pulling propellers mounted on the AZT shafts in front of their pods with blade tip edges not protruding beyond the base plane and arranged symmetrically to the ship's CL displaced sternward in such a way that the distance between the disks of AZT propellers and disks of side propulsors is not greater than the diameter of propulsor and the 360-degree turn of azimuth thruster about its axes
25 with no contact to ship's propulsors is provided. In DWL area, the ship's stern overhang is of wedge-type icebreaking shape with 90° - 180° wedge angle along the DWL with its

surface being inclined at no less than 30° to the vertical. An ice protection shield with wedge-shape cross section does not protrude beyond the ship's hull and is formed so as to extend in the bow direction beyond the disks plane of ship's side propulsors by the value not greater than two diameters of the above-mentioned propulsors; moreover, it has height at which the lower edge of the shield in the stern protrudes upwards from the rotation axes of AZT propellers at least by half the radius of these propellers.

The proposed ship intended for operation in shallow freezing water offers improved maneuverability and icegoing capabilities comparing preferably with prototype.

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Fig 1.