

[54] **ICEBREAKING CARGO VESSEL**

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[52] U.S. Cl. **114/41**

[51] Int. Cl. **B63b 35/08**

[58] Field of Search **114/40-42**

[56] **References Cited**

UNITED STATES PATENTS

499,296 6/1893 Kruisbrink 114/42

FOREIGN PATENTS OR APPLICATIONS

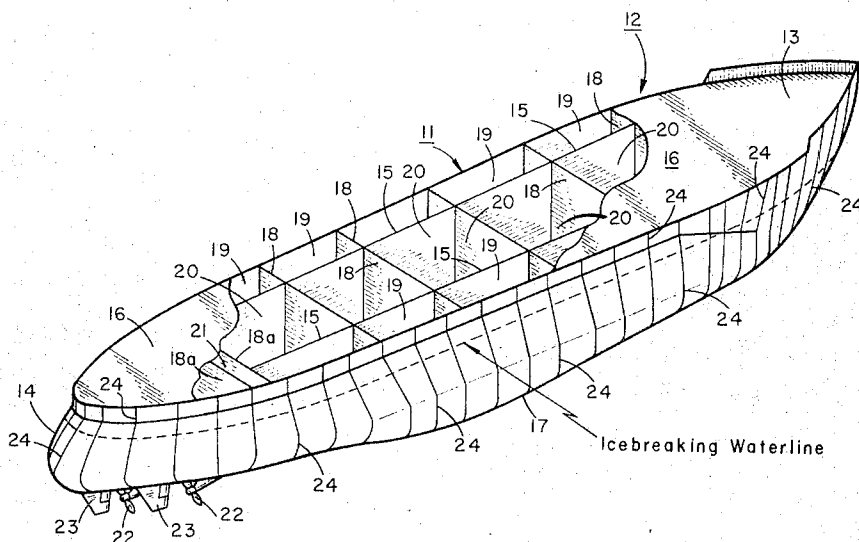
54,173 6/1935 Norway 114/40

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[57] **ABSTRACT**

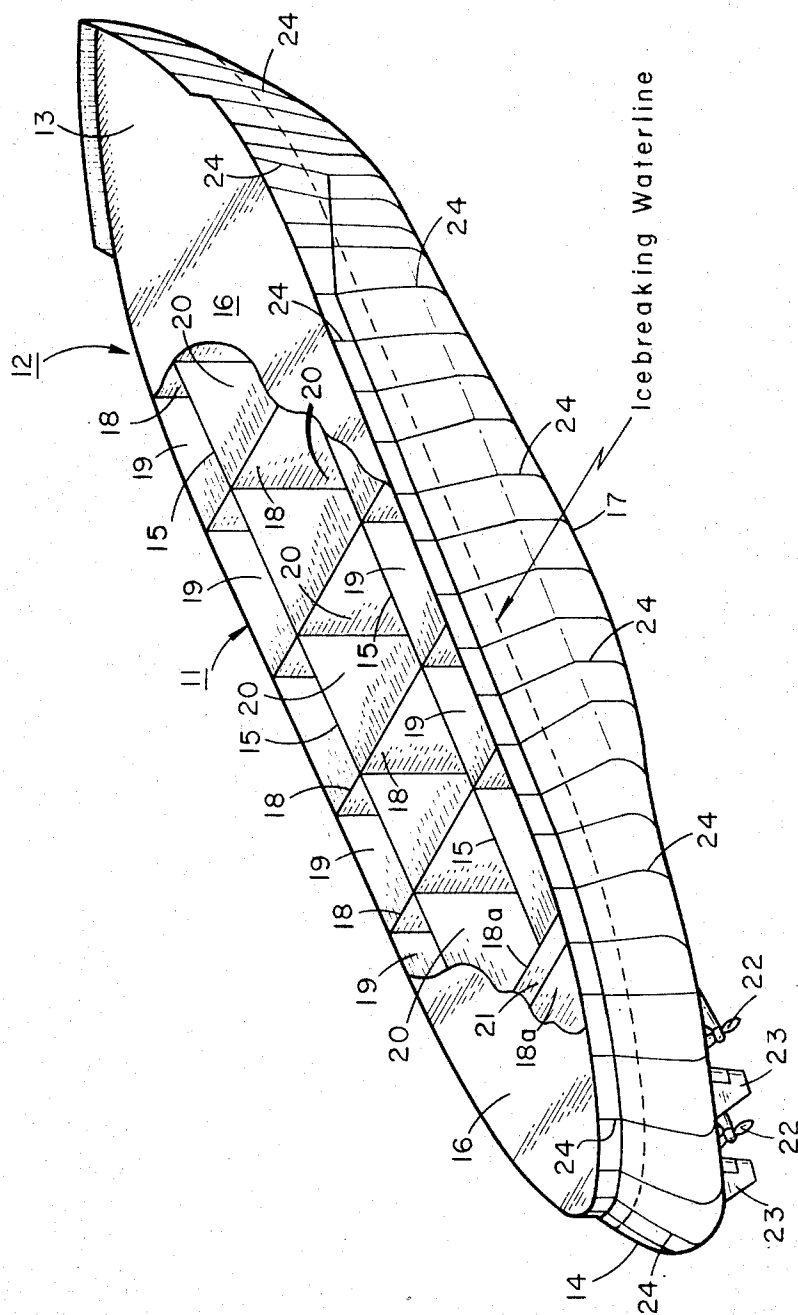
A hull shape for an icebreaking cargo vessel, such as a tank ship, is provided which provides for lower ice breaking resistance, greater displacement in ice, and greater rudder and screw protection against ice when proceeding astern in ice laden or ice covered waters than conventional icebreaking vessels. The hull shape is such that a down breaking bow and a maximum ice-water line beam is provided forward of the midpoint of the hull while aft of the midpoint the ice-water line beam is smaller than that forward, the hull beam below the maximum ice-water line beam being greater than the ice-water line beam in the aft part of the hull. Vertical sections through the hull forward of the mid point slope downwardly and inwardly while aft the vertical sections slope downwardly and outwardly.

7 Claims, 1 Drawing Figure



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ICEBREAKING CARGO VESSEL

CROSS-REFERENCE TO RELATED APPLICATIONS

This application contains subject matter related to Ser. No. 46,649 filed June 16, 1970 for Peter M. Kimon, Ser. No. 48,326 filed June 22, 1970 for Peter M. Kimon and Charles L. Crane, Jr. and Ser. No. 100,171 filed Dec. 21, 1970 for William O. Gray.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is directed to an ice breaking cargo vessel. More particularly the invention is concerned with an ice breaking tank ship where the tanks are mainly located in the cargo area. In its more specific aspects, the invention is concerned with an ice breaking tank ship having a hull of particular configuration which provides greater maneuverability, greater displacement, and greater rudder and screw protection from ice when proceeding astern.

2. Description of the Prior Art

It has been heretofore known to provide a tanker ship with a hull of particular configuration for use in ice such as the S. S. Manhattan which made an experimental voyage through the Northwest Passage to Prudhoe Bay on the north slope of Alaska. The S. S. Manhattan, however, was a converted conventional tanker fitted with a special bow and other equipment since it was not built originally for voyage through the Northwest Passage.

It has also been known to provide ice breaking ships of various hull configurations to break ice to form a passage for other vessels of a conventional design. However, it has not been known heretofore to provide a cargo vessel with a specially designed hull for ice breaking and built to carry maximum cargo for its displacement. Nor has it been known to construct tank ships of this nature.

The present invention is therefore quite important, new, useful and unobvious since it allows building of cargo vessels which may be used in arctic waters and which serve also as an ice breaker for itself.

The following listed U.S. patents were considered with respect to the present invention:

15,472	1,445,839	3,016,865
17,472	1,500,000	3,075,489
63,577	1,591,748	3,125,977
151,774	1,726,882	3,130,701
499,296	1,859,139	3,191,572
593,664	1,875,629	3,286,674
743,171	2,322,790	3,289,623
812,656	2,364,845	3,331,347
857,766	2,374,845	3,335,686
857,776	2,517,978	3,352,270
993,440	2,663,276	3,382,678
1,121,006	2,669,961	3,410,241
1,195,857	2,754,791	3,416,216
1,254,892	2,764,954	3,435,796
1,398,246	3,009,434	

SUMMARY OF THE INVENTION

The present invention may be briefly described and summarized as involving a marine vessel for use in Arctic operations having a hull of specific configuration in which the hull has a down breaking ice bow with the maximum ice-water line beam well forward of the mid point of the hull. The ice-water line beam aft of the maximum beam tapers inward and forms or develops a

smaller beam aft of the vessel's midpoint. The hull of the vessel below the ice-water line approaches a maximum beam aft of the maximum ice-water line beam and this maximum hull beam is maintained well into the after part of the vessel and the hull beam is greater than the ice-water line beam. Vertical sections through the hull from forward to aft are such that forward, the hull slopes downwardly and inwardly and aft, the hull slopes downwardly and outwardly.

DESCRIPTION OF THE DRAWING

The present invention will be further illustrated by the single FIGURE which is a perspective showing of a preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT RELATIVE TO THE DRAWING

Referring now to the drawing numeral 11 designates the hull of vessel 12 having a fore peak 13 and a stern 14, longitudinal bulkheads 15 which may be parallel or at an angle to the main deck 16 and the bottom 17 and transverse bulkheads 18 which are parallel to each other. All bulkheads extend from the main deck 16 vertically to the bottom 17. The bulkheads 15 and 18 form wing tanks 19 and center tanks 20.

A pump room, cofferdam or fuel oil tank 21 formed of bulkheads 18a separates the tanks 19 and 20 from an engine room in the stern part of the vessel 12.

It is to be noted that the hull 11 is flaired outwardly at the maximum ice-water line beam in the forward part of the vessel and the hull slopes downwardly and inwardly while in the aft sections the hull flairs downwardly and outwardly providing a greater beam and consequently adds displacement.

The vessel may have two or more screws 22 (only two are shown) and rudders 23. The screws 22 and rudders 23 are located such that they are well below the stern overhang which protects them from ice. The lines 24 shown on the hull 11 illustrate vertical sections taken through the vessel 12 from stem to stern and illustrates vividly the features of the present invention.

The engine room may be provided with steam, oil, or nuclear powered propulsion means not shown and also the main deck may be provided with living quarters, a bridge and one or more stacks leading upwardly from the propulsion means and engine room to carry off gases, vapors, smoke, and the like.

In the present invention the vessel breaks ice in a downward fashion as the vessel moves ahead. Since the body of the vessel aft of a maximum beam becomes narrower on the ice-water line vicinity but remains at a maximum beam below the ice breaking water line thereby relieves ice friction and allows room in the broken ice path for the stern to swing giving the vessel greater maneuverability while still maintaining high displacement for given water line dimensions. Ice is also moved away from the rudders and screws when the vessel moves astern.

Thus the combined effects of the invention are the provision of (i) a down breaking bow with a down and inward slope at the maximum beam, (ii) a path in the ice significantly wider than the stern to reduce ice friction and provide room for the broken ice to use as the maximum beam passes, (iii) a wider ice broken path to maneuver the stern for turning the vessel about in

heavy ice. A significant slope on the sides of the hull as shown in the drawing assists in breaking the ice and also moving it away from the rudders and screws when moving ahead as well as astern.

The nature and objects of the present invention having been fully described and illustrated and the best mode and embodiments contemplated set forth, what I wish to claim as new and useful and secure by Letters Patent is:

1. An ice breaking vessel having a hull, bow and stern in which:
 - the bow is down breaking and has a maximum ice-water line beam forward of the midpoint of the hull;
 - the ice-water line of the hull aft of the maximum beam having a smaller beam aft of the hull's midpoint;
 - the maximum beam on the ice-water line slopes downwardly and inwardly;
 - the hull below the ice-water line having a maximum beam aft of the maximum ice-water line beam, which is maintained in the aft part of the vessel, where the maximum hull beam is greater than the ice-water line beam;
 - vertical sections through the hull from forward to aft being such that from forward to aft the hull slopes downwardly and inwardly and the hull in the aft

sections including the stern slope downwardly and outwardly;

whereby the vessel has greater maneuverability, greater displacement, greater icebreaking facility, and is provided with greater rudder and screw protection against ice when proceeding astern in ice laden or covered waters than conventional ice breaking vessels.

2. A vessel in accordance with claim 1 in which the stern overhangs propulsion means and steering means.
3. A vessel in accordance with claim 1 in the propulsion means is a plurality of screws.
4. A vessel in accordance with claim 1 in which the hull interior has a cargo area comprising a plurality of tanks.
5. A vessel in accordance with claim 4 in which the plurality of tanks are formed by longitudinally and transverse spaced apart bulk heads extending vertically from a main deck of the vessel to the bottom of the hull.
6. A vessel in accordance with claim 4 in which means are provided for separating the tanks from the stern.
7. A vessel in accordance with claim 6 in which the separation means comprises a pump room, cofferdam or fuel oil tank.

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