

[54] GEAR FOR BRAKING AND AUXILIARY STEERING SHIPS ON BRAKING THEM

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[51] Int. Cl. .... B63h 25/44

[58] Field of Search ..... 114/145 R, 151

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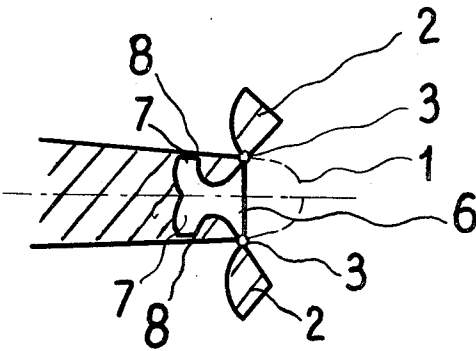
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[57] ABSTRACT

To exert a braking force with optional auxiliary steering on a ship, the bulbous portion of a bulbous bow of the ship is formed with at least one displaceable member which can be moved from a retracted position where it is smoothly contoured in the hull to an extended position where it extends into the water to exert braking force on the ship. A watertight bulkhead beyond the bulbous portion is formed with a water inlet leading to a passage with side channels having outlets at the side of the hull, and these outlets can be selectively covered or opened by independently operable gates.

10 Claims, 7 Drawing Figures



SHEET 1 OF 3

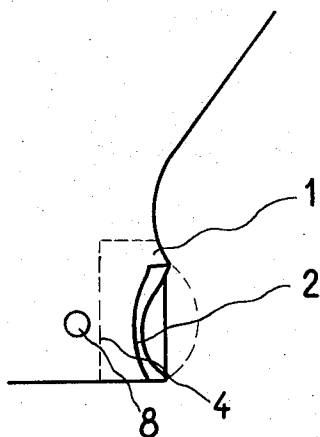


FIG. 1

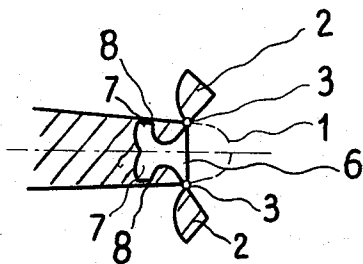


FIG. 2

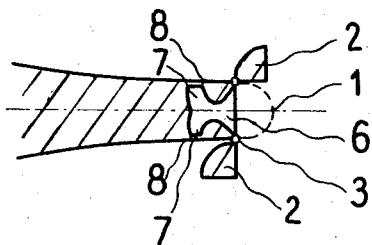


FIG. 3

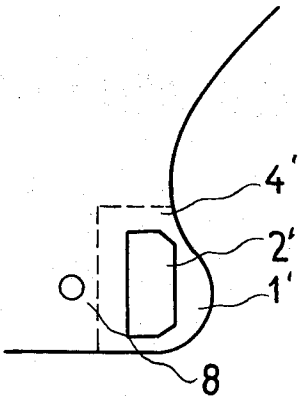


FIG. 4

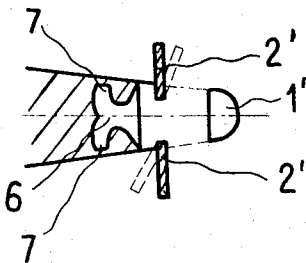


FIG. 5

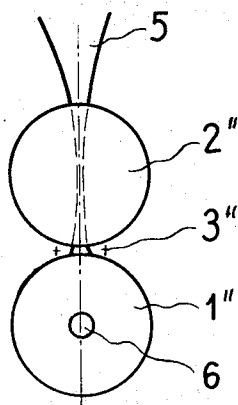


FIG. 6

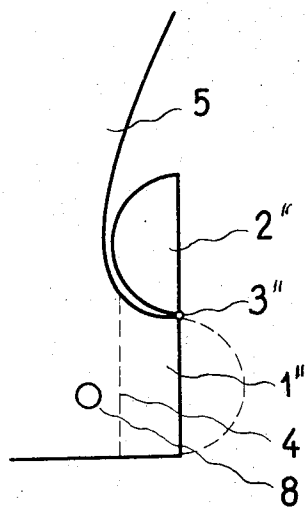


FIG. 7

## GEAR FOR BRAKING AND AUXILIARY STEERING SHIPS ON BRAKING THEM

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The invention relates to an apparatus for applying braking force to a ship and optionally for effecting auxiliary steering of the ship during braking.

#### 2. Description of the Prior Art

Hitherto no apparatus for braking and for auxiliary steering of ships during braking have been employed, and attempts to use parachutes, board flaps, or similar devices has not resulted in practical success.

Braking of large ships is of particular importance for navigational safety since the stopping distance by the use of the propeller alone is too long. Moreover, when a ship is braked by means of its propeller and it deflects from its direction of its travel, re-steering of its due course is not always possible because of low operational effectiveness of the rudder at low speeds of the ship.

This condition is especially dangerous in narrow waters, such as canals and straits.

### SUMMARY OF THE INVENTION

An object of the invention is to provide apparatus for braking and for auxiliary steering of ships during braking, especially from cruising speed, without the utilization of expensive and complicated devices driven from the marine power plant.

This object is achieved by the provision of an openable bulbous bow, the front portion of which is divided in the plane of symmetry of the ship into two halves in the shape of flaps mounted on the immovable section of the bow by means of hinges. The flaps are independently pivotable outwardly through an angle less than 180°. The bulbous bow is provided with a bulkhead separating the front portion from the remainder of the hull and the bulkhead has a water inlet leading to a passage branching into two side channels having outlets at the side of the ship which may be closed by means of remotely controlled side gates.

A modification of the apparatus according to the invention consists in providing the bulbous bow with side flaps forming lateral side portions of the bulbous bow and independently displaceable outwardly at an angle smaller than 180° in relation to vertical axes of rotation of the flaps.

A simplified modification of the apparatus according to the invention, adapted principally for braking, consists in that a movable section of the bulbous bow is mounted on a hinge at the upper section of the bulbous bow to be pivoted upwardly and fixed in vertical position against the stem.

The advantages resulting from the utilization of the apparatus according to the invention include an important and significant increase in the drag resistance of the hull without participation of the main drive plant, as a consequence of which the stopping distance can be shortened. There also exists the possibility of reducing the turning radius, at cruising speed as well as at lower speeds, and the capability of steering a set course, or to change the course during the braking operation.

### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevational view of the bulbous bow of a ship with the apparatus of the invention,

FIG. 2 is a top plan view of the bulbous bow in the course of braking,

FIG. 3 is a top plan view of the bulbous bow in the course of braking with auxiliary steering,

FIG. 4 is a side elevational view of the bow showing a modification of the apparatus according to the invention,

FIG. 5 is a top plan view showing the apparatus of FIG. 4 in the course of braking,

FIG. 6 is a front elevational view of a simplified modification of the apparatus according to the invention, with the front section of the bulbous bow lifted up, and

FIG. 7 is a side elevational view showing the apparatus of FIG. 6.

### DETAILED DESCRIPTION

Referring to FIGS. 1-3 of the drawing, therein is seen a bulbous bow portion of a ship which is adapted to be opened to effect a braking force on the ship with optional steering.

The openable bow portion 1 of the ship is isolated from the remainder of the hull by a rigid, watertight bulkhead 4.

The bow portion 1 is divided at the longitudinal plane of symmetry of the ship into two half-bulbous segments or flaps 2 which are hinged at 3 to a fixed part of the hull.

In the watertight bulkhead 4 there is arranged an inlet 6 to a passage branching into two side channels 7 having lateral outlets at the side of the hull. The outlets of the channels 7 can be closed by means of side gates 8 which are controlled remotely.

In the section of the bulbous bow partitioned by the watertight bulkhead 4, there is disposed a mechanism (not shown) for displacing the flaps 2 away from one another towards the sides of the ship through an angle less than 180°. In a simple embodiment, the mechanism can act to turn the hinges to move the flaps between the retracted and extended positions thereof. In the retracted position the flaps cooperatively form the bulbous portion of the bow and are smoothly contoured in the hull.

FIGS. 4 and 5 show a modification of the apparatus according to the invention, in which the bow portion 1' is immovable but is provided with side flaps 2' displaceable outwards. The bow portion 1' is partitioned from the remainder of the hull by a strong watertight bulkhead 4'. The flaps 2' form lateral side portions of the bulbous portion of the bow as shown in FIG. 4 and in the retracted position are smoothly countoured in the hull.

FIGS. 6 and 7 show a simplified modification of the apparatus according to the invention, adapted exclusively for braking. In this embodiment a non-divided displaceable front section of the bulbous bow 1'', in the form of a flap 2'', is mounted on a single hinge 3'' fastened to the upper part of the bulbous bow 1''. The flap 2'' is displaced upwards to abut against the stem 5 and thereby increase the drag resistance of the ship and hence effect braking on the ship. The flap 2'' lies within the curvature of the bow in a vertical position and forms a straight line in elevation at the front of the bow as seen in FIG. 7.

The operation of the apparatus according to the invention consists in displacing the flaps by means of their associated mechanism, into displaced position, which results in an increase of the drag resistance of the

hull. In the case of non-equal displacement of the flaps, a net lateral force is produced to steer the ship.

FIG. 2 and FIG. 5 in solid lines show the flaps in symmetrical displaced positions for exerting braking force on the ship whereas FIG. 3 and FIG. 5 in dotted lines

show the flaps in non-symmetrical displaced positions for exerting both braking and steering forces on the ship.

By simultaneously opening the side gates 8 a uniform discharge of water from the bulbous bow 1 on both sides of the ship is achieved, and in combination with the mutually independent displacement of flaps 2, increases the effectiveness of braking and auxiliary steering of the ship.

In their opened position, the flaps substantially increase the drag resistance of the hull. Moreover, by displacing the flaps through different angles, and by suitable control of the discharge of the water from the channels, a lateral force is obtained controlling the direction of travel of the ship.

What is claimed is:

1. Apparatus for braking a ship comprising a bulbous bow portion including at least one displaceable member having a retracted position in which it forms part of said bow portion and is smoothly contoured in the bulbous portion thereof, and an extended position in which the displaceable member extends into the water to exert braking force on the ship, a water-tight bulkhead in said bow portion separating said bulbous portion from the remainder of the hull, said bulkhead having an inlet which opens into said bulbous portion for admission of water when said displaceable member is in extended position, said bulkhead further having a passage from said inlet and side channels having outlets at the sides of the hull, and openable side gates on said hull at said outlets of the side channels.

2. Apparatus as claimed in claim 1 wherein said displaceable member is the forward portion of said bulbous portion.

3. Apparatus as claimed in claim 2 wherein two displaceable members are provided in symmetrical relation relative to the longitudinal axis of symmetry of the ship, said two displaceable members being half-bulbous portions which in the retracted position cooperatively form the bulbous portion of said bow.

4. Apparatus as claimed in claim 3 wherein each of the displaceable members is hinge mounted for independent pivotal movement between its retracted and extended positions.

5. Apparatus as claimed in claim 2 wherein said displaceable member forms the front of said bulbous portion of the bow and is pivotable about a horizontal axis for movement through an angle less than 180° between its extended and retracted positions.

6. Apparatus as claimed in claim 5 wherein said displaceable member is pivoted upwardly to its extended position and lies within the curvature of the bow to form a straight line at the front of the bow.

7. Apparatus as claimed in claim 1 wherein said inlet is of conical shape and narrows rearwardly.

8. Apparatus as claimed in claim 1 wherein two displaceable members are provided in symmetrical relation relative to the longitudinal axis of symmetry of the ship.

9. Apparatus as claimed in claim 8 wherein said two displaceable members are mounted for pivotal movement about vertical axes through angles less than 180°.

10. Apparatus as claimed in claim 8 wherein said two displaceable members are flaps forming lateral side portions of the bulbous portion of said bow.

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