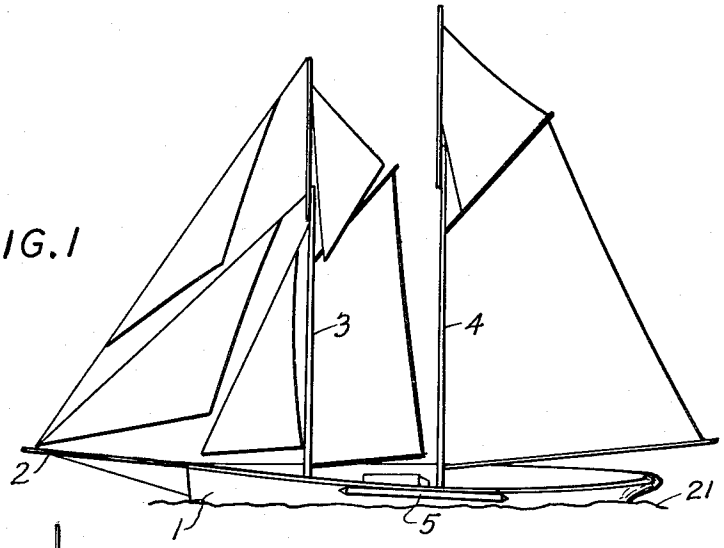
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FIG. 1



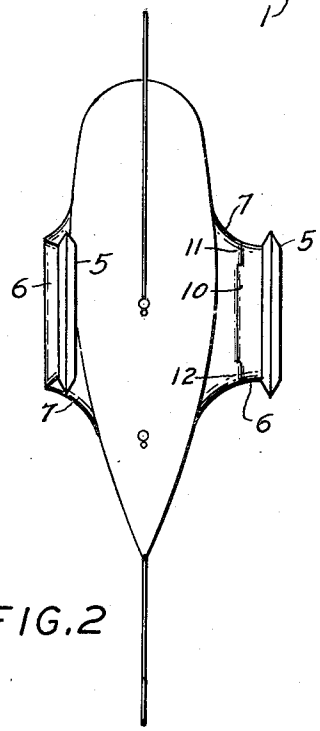


FIG. 2

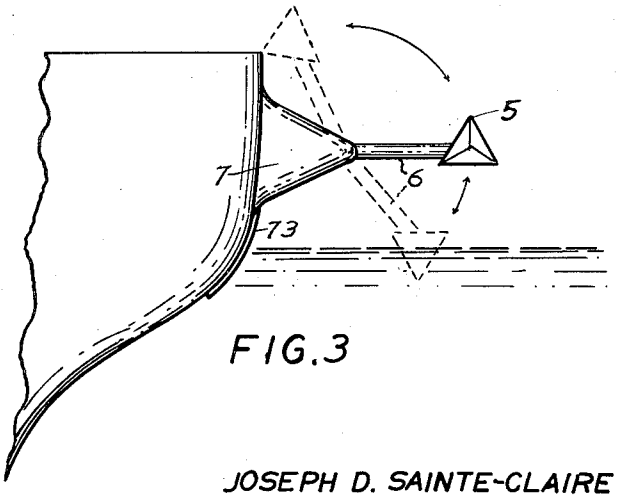


FIG. 3

JOSEPH D. SAINTE-CLAIRE
INVENTOR.

BY Earl C. Moore
Atty.

June 16, 1964 J. D. SAINTE-CLAIRE 3,137,263

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FIG. 4

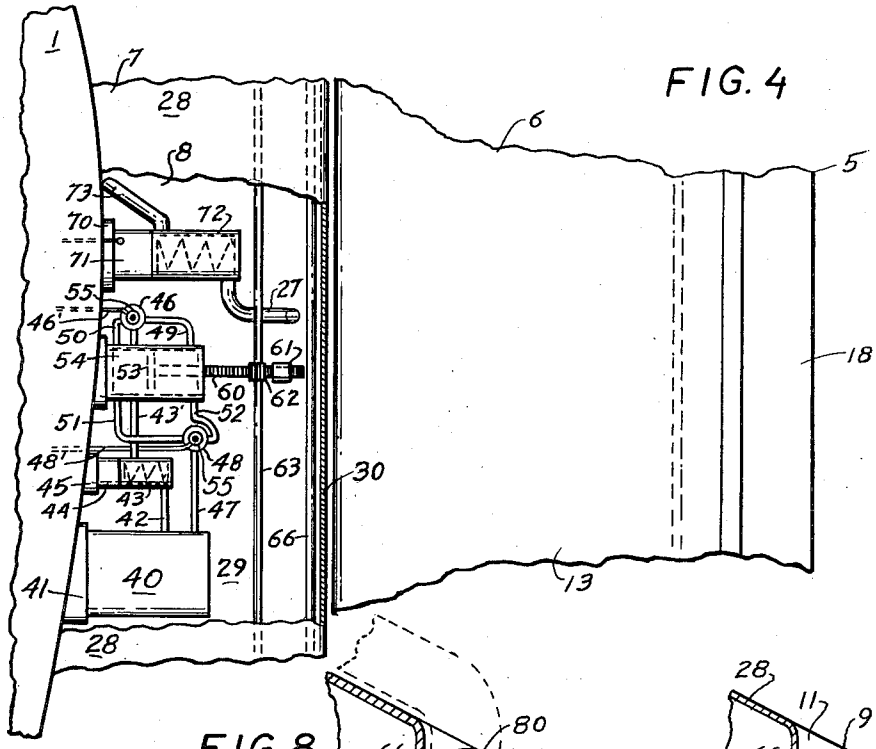


FIG. 8

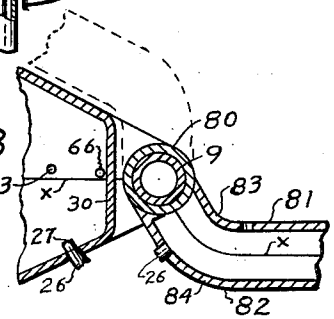


FIG. 6

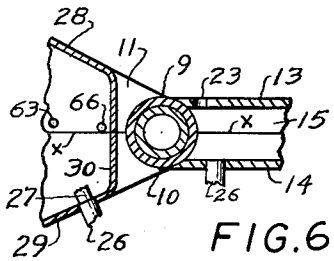


FIG. 5

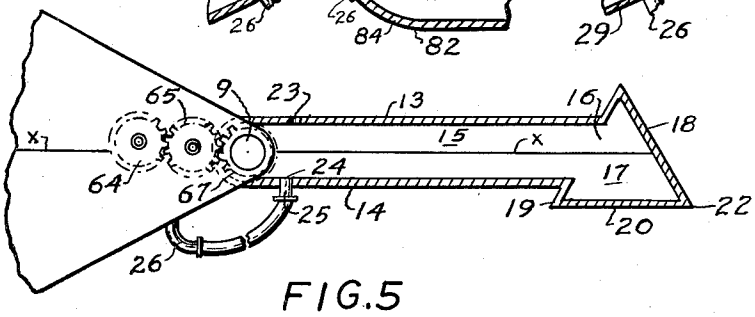
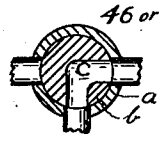


FIG. 7



INVENTOR.
JOSEPH D. SAINTE-CLAIRE
BY Earl E. Moore
Atty.

United States Patent Office 3,137,263 Patented June 16, 1964

3,137,263

BALLAST MEANS FOR SHIPS AND THE LIKE

Joseph D. Sainte-Claire, 5920 Wadsworth Ave., Highland, Calif.

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8 Claims. (Cl. 114—125)

This invention concerns ships and especially sailing ships. New and novel means are provided to reduce or check the list of the ship by providing outrigger ballast means. Such ballast means so placed is very effective and enables the ship to take advantage of very strong winds without reducing the sheeting. Merchant sailing ships could take advantage of this invention and especially racing ships in that the reduced listing would reduce the drag, hence more forward speed.

Means are provided for varying the effectiveness of the ballast by varying the cantilever length. Such a ballast is provided on both sides of the ship's hull and the ballast is provided with remote control means so as to hold the size of the crew down to a minimum. The invention is especially applicable to said ships of any size and type, but when applied to small craft, with or without auxiliary power, the ballast may then be controled entirely by manual operations.

One of the principal objects of the invention is to provide ships with outrigger ballast means which is effective to reduce listing due to wind pressure or for any other reason.

Another object is to oppose listing of a ship by providing extended counter ballast means which is effective on either side of a ship and wherein the ballast effect is variable so that a perfect counter ballast presents a perfect balance of the ship.

Another object is to extend a ballast means outwardly from the sides of a sailing ship to counteract wind pressure upon the sails and thus avoid serious listing of the ship in all kind of weather.

Other objects will become apparent upon perusal of the specification and claims.

In the drawings:

FIG. 1 is a side elevational view of a sailing ship with the invention installed thereon;

FIG. 2 is a plan view of the ship but with the sails removed, this view showing one ballast means extended and the other one retracted.

FIG. 3 is a vertical view of a portion of the ship and shown on an enlarged scale;

FIG. 4 is a plan view with portions broken away to show structural limits and to show interior views; this view is on a greatly enlarged scale;

FIG. 5 is a vertical view of a portion of a forward side of that shown in FIG. 4 and with some parts in section;

FIG. 6 is a vertical sectional view in greater detail of the hinge portion of that shown in FIG. 5;

FIG. 7 is a horizontal sectional view of a valve.

FIG. 8 is a vertical sectional view showing a modified form of the invention.

In the drawings, a sailing ship is shown in FIG. 1 which is provided with the invention. Any type of ship could be provided with the invention, but it is believed that yachts of various kinds including cutters, bermudas, gunters, yawls, ketches, schooners, to name a few, may take advantage of the teachings of this inventon. The hull of a sailing ship is indicated at **1** having a bowsprit **2**, and masts **3** and **4** along with their sails, as shown.

The invention is applied to both sides of the ship and consists of a ballast tank **5**, the movable supporting fin **6** and the main stationary fin **7**. Although various kinds of material may be employed in the construction of the different parts, it is preferred to use metal and a metal which can have a long life in contact with sea water, or

a metal covered with a protective coating that can resist salt water corrosion for a long time. Various braces and reenforcements may be employed to strengthen the fixed and movable fins and also the ballast tank to make them rigid and strong to withstand the strains and stresses involved; it is believed, however, in view of the streamline shapes of the parts, that the shell, if thick enough, can be strong enough without bracings. Light weight strong plastics may be substituted for metal if the shell can be properly moulded in sections and joined together by cement; or perhaps each unit, that is, stationary fin **7**, movable fin **6** and ballast tank **5** can be cast in just two sections each, a top section and a bottom section as indicated by the seams *x*. Note, that the length of these fins is keelwise of the ship, that is, that the fins are in parallel arrangement with the keel of the ship.

The stationary fin **7** is a hollow shell and provides a large chamber **8** to accommodate various machinery and parts to be set out later. Obviously, the chamber is sealed at all openings thereto so as to exclude sea water. The fin where it joins the hull of the ship is carefully sealed and the fin made tight to the hull for its support and the support of all the parts in association therewith.

The movable fin **6** is also a shell and is hinged to the stationary fin **7** by a pipe axle **9** that extends through and is keyed to the segment **10** of the movable fin but has bearing support by the pair of end segments **11** and **12** of the fixed or stationary fin **7**. The near portions of the walls **13** and **14** of the movable fin join to one another at their forward and aft ends for streamline effect and their longitudinal keelwise edges join the pipe axle **9** as indicated in FIG. 6; thus a chamber **15** is provided in the movable fin to accommodate ballast water or other fluid. The outward edges of the walls **13** and **14** join the perimeter of the elongated opening **16** of the ballast tank **5** and in this manner the water chamber **15** joins the water chamber **17** of the tank to form a reservoir. The tank is shown as having a triangular cross-section, but it is to be understood that this tank may be round in cross-section or any other suitable shape deemed necessary in order to meet the objects of this invention. However, the tank as shown, has the three flat sides **18**, **19** and **20** tightly joined together. The side **20** is substantially parallel with the water surface **21** when in the position shown in FIG. 5, but when this tank is lowered to the water surface, the edge **22** becomes a keel-like means of an outrigger water vessel and can be employed to give more stability to the ship. The top wall **13** has a vent opening **23** so as to admit air when the tank and fin are being emptied of water and to allow escape of air when the reservoir (fin and tank chambers) is being filled. The bottom wall **14** has an opening **24** to which is fixed one end of a flexible duct or hose **25**. This hose has its other end connected to the fixed rigid elbow pipe **26** which is the outward extension of a pipe **27** within the chamber **7**.

The fixed fin **7** has an upper wall **28** and a lower wall **29** which have their inner edges joined securely to the hull of the ship **1** and their outer edges joined by the vertical wall **30**. Obviously, the segments **11** and **12** extend beyond the wall **30**. The forward and aft portions of fin **7** join together to provide a streamline effect.

Within the large chamber **8** of each stationary fin there is a large tank **40** having a base **41** which is configurated to snugly fit the side of the ship's hull and which tank is firmly secured to the hull **1**. This tank is adapted to contain an operative fluid under high pressure. This fluid may be a suitable oil. A pipe **42** connects the tank to the high pressure side of a screw type pump **43** that has its shaft connected to a suitable electric motor **44**. The motor is supported by the base **45** which is suitably shaped and firmly fixed to the hull **11** of the ship. The

low pressure side of the pump 43 connects with a valve 46 via pipe 43'. The outlet pipe 47 leads to a valve 48. The valves 46 and 48 are two-way controls for the fluid, for instance, the valve 46 may connect either pipe 49 or 50 with the suction pipe 43' and the valve 48 can connect the pressure pipe 47 with either pipe 51 or 52. By this arrangement, the piston 53 in the jack pump 54 can be moved in either direction by manipulating the valves 46 and 48. Each valve has a small electric motor 55 thereon with electrical conductors in the cables 46' and 48' running to a suitable control panel in the ship. These motors are reversible so that the valves can be turned in either direction.

FIG. 7 shows a section through a two-way valve which can be used in this invention for valves 46 and/or 48. The outer casing of the valve is shown at "*a*" and the rotor with the passage therethrough are shown at "*b*" and "*c*" respectively. Either side pipe may be placed in connection with the bottom pipe by turning the rotor "*b*."

The piston 53 in the jack pump has its piston rod extended well beyond the pump in the form of a toothed rack 60 which reciprocates through a guide bearing member 61 that is fixed to the bottom wall 29 of the fin 7. This rack is in mesh with a pinion gear 62 which is keyed to a long cross-shaft 63. This cross-shaft has bearing in the fore and aft end portions of the fin and where the ends extend outwardly to support a gear 64 at each end thereof. Each gear 64 is in mesh with a free running gear 65 and the gears 65 are keyed to a long cross-shaft 66 which has its bearing also in the fore and aft end portions of the fin 7. Each gear 65 is in mesh with a gear 67. Each gear 67 is keyed to an end of the axle pipe 9 so that when the toothed rack 60 is reciprocated, the movable fin 6 can be raised or lowered to the desired position.

A base 70 supports a reversible electric motor 71 to the hull of the ship and this motor operates a screw type pump 72 that can be run in either direction, that is, to pump sea water from the pipe 73 to the pipe 27 and hence into the chambers 15 and 17 at a rapid rate, or reversed to empty water from the chambers at a rapid rate. This pump and motor must be of a large size so that the water is moved quickly for the reason that the ballast demand varies from time to time depending upon wind, tide and maneuvering operations of the ship.

The form of the invention shown in FIG. 8 discloses a different shaped movable fin in that it is offset so that it can better and more neatly overlap the main fin 7. The segment 80 of this movable fin is keyed to the axle-pipe 9 as in the first form of the invention so as to rotate with it. The upper and lower walls of this fin are indicated at 81 and 82. These walls are parallel but both are offset by providing the curved portions 83 and 84 respectively. The dotted lines in FIG. 7 show how closely the fin can be juxtaposed to the fixed main supporting fin 7.

Certain novel features and details of this invention are disclosed herein, and in some cases in considerable detail, in order to make the invention clear in at least one form thereof. However, it is to be clearly understood that the invention, as disclosed, is not necessarily limited to

the exact form and details disclosed since it is apparent that various modifications and changes may be made without departing from the spirit and scope of the claims of this invention.

Having thus described my invention, what is claimed as new and desired to secure by Letters Patent is:

I claim:

1. An outrigger ballast means for ships and the like; a keel-wise stationary fin fixed to the side of a ship above the water line, a movable keel-wise fin hinged to the stationary fin at the outer edge thereof, a chamber in the movable fin adapted to be filled and emptied of a fluid, variable means in the stationary fin in connection with the movable fin for swinging it to any one of a variety of vertical positions, and means to quickly fill and empty the chamber of fluid.

2. The ballast means recited in claim 1 wherein the means to fill and empty the chamber is a reversible pump in combination with a reversible electric motor, and wherein the fluid is sea water.

3. The ballast means recited in claim 1 wherein a keel-wise elongated tank is fixed to the distal edge of the movable fin, a closed chamber in the tank in connection with the chamber in the movable fin.

4. The ballast means recited in claim 2 wherein the movable fin is offset so that when it is swung over the stationary fin they can nest closely together.

5. The ballast means recited in claim 1 wherein the variable means includes a cylinder with a reversible driving means therein and which has a part extending therefrom in the form of a toothed rack, a shaft extending along the stationary fin having a pinion means meshed with the rack, the shaft having its opposite ends extending outwardly of the stationary fin and each end provided with a gear, a shaft forming the hinge and having a gear on each end thereof and which gears are in mesh with the first mentioned gears so that movement of the toothed rack raises and lowers the movable fin.

6. A sailing ship with a ballasted outrigger attached thereto along each side thereof above the water line, each outrigger comprising a keel-wise main support fin and a keel-wise movable fin hinged thereto along an outer edge thereof, a chamber in the movable fin for ballast fluid, means in the main support fin having connection with the chamber for quickly loading and unloading it with fluid, and other means in the main support fin having connection with the movable fin for swinging it upwardly and downwardly to various positions.

7. The ship recited in claim 6 wherein the movable fin is offset so that it can swing onto the main supporting fin and neatly rest thereon.

8. The ship recited in claim 7 wherein a pipe forms the hinge and passes through alined bores in interfitting segments of the said fins.

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