

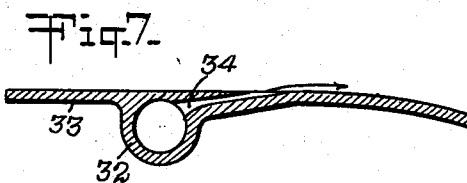
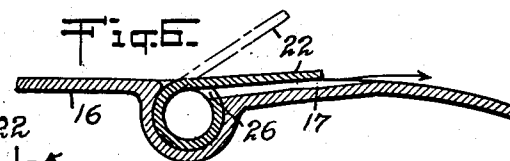
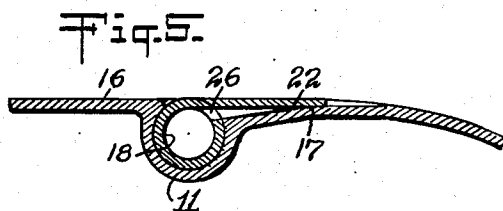
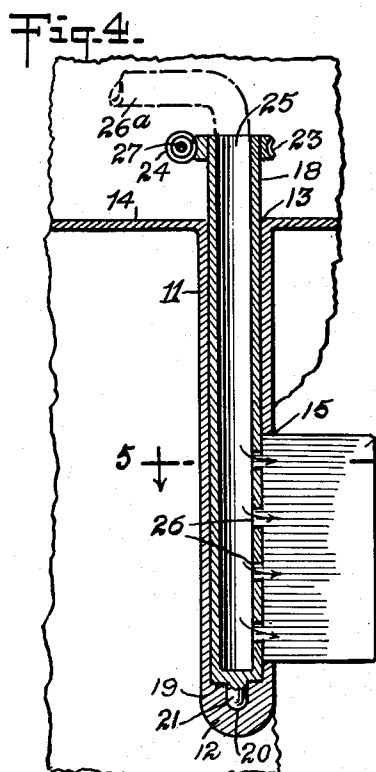
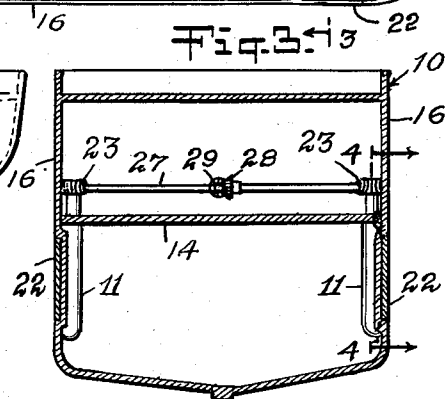
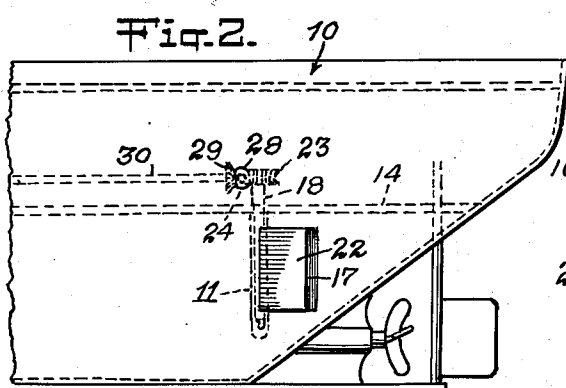
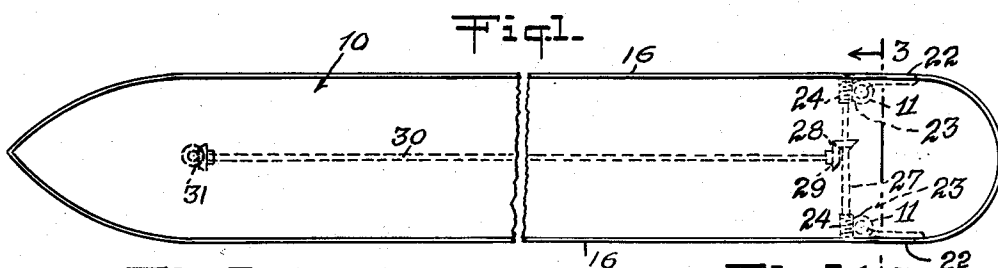
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2,663,276

SHIP CONSTRUCTION FOR REDUCING DRAG

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SHIP CONSTRUCTION FOR REDUCING DRAG

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1 Claim. (Cl. 114—67)

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This invention relates to improvements in boat construction, and more particularly to a means for increasing the speed of water borne vessels.

It is an object of this invention to devise an attachment for ships which can be operated so as to decrease the drag due to water flowing along the sides of the ship, and also decrease the drag due to the water immediately to the rear thereof.

Another object of this invention is to devise a means for reducing water drag, and thereby increasing the speed of boats, which means can be readily controlled so as to be operated as desired by the ship's crew.

It is a further object of this invention to devise a speed-increasing means for ships which is simple in construction, and can be easily mounted on ships presently being constructed, as well as ships now in service, and which is not likely to be damaged by obstructions in the water.

It is still another object of this invention to provide a speed-increasing means for ships which means can be also used to serve as a brake for retarding the movement of a ship through the water.

Other objects and advantages will become apparent from the following description of the present invention, illustrated in the accompanying drawings, in which:

Figure 1 is a plan view showing the preferred form of my invention as applied to the ship.

Figure 2 is an elevational view of the stern portion of a vessel, showing the invention thereon.

Figure 3 is a cross sectional view taken on line 3—3 of Figure 1, showing the hull of the ship and the invention as connected thereto.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a sectional view taken on line 5—5 of Figure 4 showing a portion of the blade forming part of my device in its inoperative position.

Figure 6 is a view similar to Figure 5, showing in full lines the blade partially extended, and in dotted lines, showing the fully extended position.

Figure 7 is a sectional view similar to those of Figures 5 and 6, but showing a modified form of my invention.

Similar reference characters represent similar parts in the several figures.

Many attempts have been made in the past to devise a means of obtaining greater speed for water-borne vessels. As evidenced by the numerous patents and literature available on the subject, many different types of propellers, rudders and fins have been developed, as well as means to direct the flow along the sides of the boats, such as, for example, through channels. In addition, attempts have been made to direct

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air flow along the vessel surfaces in order to decrease the water drag. However, none of the devices originated in the past have proven to be successful. They have been either too cumbersome, too difficult to construct, required innumerable changes in the ship construction, or from their very natures, are not suited for the purposes intended.

I have devised a simple, compact, easily and cheaply constructed means which can not only be incorporated into new vessels, but can also be readily attached to present ships with minor modification thereof. My device, as will appear in the following description, comprises few moving parts, and complex means for attaching it to a vessel are not required. However, despite the fact that the means for accomplishing the purposes set out in the objects above are very simple, I have invented a device which will considerably reduce the effects of the drag of thousands of tons of water created behind moving boats as now built.

As shown in the drawings, 10 indicates a ship having a shape similar to that of the present-day vessels. Immediately adjacent the stern of the ship a cylindrical tube or housing 11 (see Figure 4) is formed in the vessel side plating 16 on each side of the boat. Each tube 11 extends vertically, as shown in Figure 4. The tube has a sealed bottom 12 below the waterline of the ship and an opening 13 at the top above the water line. A support member 14 may be secured to the top of the tube and to the boat structure in order to strengthen the tube. A vertically extending opening or slot 15 is provided along one side of the tube which slot extends through the plating 16. Immediately to the rear of the aligned opening 15 the ship plating 16 is formed with a longitudinally and vertically extending depression 17. Within the cylindrical member 11 a shaft 18 is rotatably mounted. The shaft 18 is supported vertically by bearing surface 19 formed in the cylindrical tube 11. A cup-shaped opening 20 formed in the member 11 receives a depending portion 21 of the shaft 18 in order to insure proper alignment of the shaft within the cylindrical member 11.

An aileron or fin 22 is fixedly secured to the shaft 18 in such a manner that it projects outwardly through the opening 15. The fin 22 and the depression 17 are so disposed and dimensioned that the aileron may be placed within said depression, as shown in Figure 5. When in such position the fin is in alignment with the contour of the hull plates, and thus little or no disruption in the normal flow of water will occur when my invention is not being used. As shown in Figures 2 and 3, the cylindrical tube 11, the depression 17, and fin 22, as well as opening 15, are so disposed that the fins will lie immediately below the load

water line of the ship. Housing 11 extends upwardly above the water line.

The shaft 18, as mentioned above, can be rotated within the housing 11. For this purpose a worm wheel 23 is attached to the top of the shaft and a worm 24 is shown in engagement therewith. Through means of the worm and wheel the shaft can be rotated in such a manner as to cause fin 22 to project outwardly from the side of the ship as shown in Figure 6.

Shaft 18 is hollow, as shown at 25, and at the bottom of the shaft adjacent the connection between the shaft and the aileron, openings 26 are provided. The hollow portion of the shaft constitutes a conduit. As shown in Fig. 4, an air line 26a may be connected to the conduit in shaft 18 and by means of the openings 26 a flow of air may be directed outwardly along the rear surface of the aileron.

In Figure 1 there is shown a shaft 27 upon which two of the worms 24 may be mounted. Through means of this shaft 27 and the worms 24, ailerons at both sides of the vessel can be controlled. A bevel gear 28 mounted on shaft 27, is in engagement with a bevel gear 29 mounted on the longitudinally extending shaft 30. At the forward end of the vessel the shaft 30 is shown to be connected to additional gearing 31. Through the use of this additional gearing, a mechanical connection may be continued up to the control room of the vessel. Thus, it is seen that ailerons 22 at both sides of the vessel may be controlled directly through mechanical means by the crew members operating the ship. Of course it is to be understood that any suitable form of control and power means may be employed. For example, electrical or hydraulic actuating mechanisms controlled through suitable servo units may be utilized. Also, it is clear that the gears 23 and 24 may be replaced by different types of gears or that suitable lever mechanism may be used in place thereof.

As shown in Figure 5, the aileron is in inoperative position. As shown in full lines in Figure 6, the fin has been moved outwardly of the ship sufficiently to permit the passage of air between the fin and the ship plating 17. When the vessel is under way a flow of air can be obtained between the hull and the fins to reduce water drag. When the ship is moving through the water, and the fin is in the position shown by full lines in Fig. 6, the suction of the water will cause air to flow down through the shaft 18 and outwardly through the openings 26 along the side of the vessel, as shown by the arrow. Of course, if desired, air can be forced under pressure through the shaft 18. The air will flow along the surface of the boat between the water and the hull and thus there will be a marked reduction in water drag.

The invention can be used as a brake severing to retard forward motion by causing the fins 22 to be extended from the side, to the extent shown by the phantom lines in Fig. 6. When thus extended considerable braking effect can be obtained.

Figure 7 shows a modification of my invention. As shown in Figure 7, a housing 32 may be formed integrally with the plating 33. This housing 32 is similar to the housing 11 in that it extends vertically along the inner side plating and in that it is closed at the bottom and open at the top. Housing 32 and the vessel plating 33 have holes 34 extending therethrough leading from the hollow portion of the housing to the exterior of the vessel. It should be noted that housing 32 may

be made as a separate element and then attached to the ship plating. Cylinder 11 likewise may consist of a separate element.

As in the previous modification, when the ship reaches a suitable speed air will be drawn down the housing 32 and out through the openings 34. As a result the water will not follow the contour of the vessel and the drag of the water will be reduced.

From the foregoing description it will be seen that I have devised a novel means of increasing the speed of waterborne vessels. It will also be seen that the apparatus which I employ for increasing the speed is relatively simple in construction and can be mounted in vessels at a reasonable cost.

Moreover, it is apparent that my invention may be employed in the hulls of flying boats for all of the aforementioned purposes described herein.

While I have shown and described a preferred form of my invention it will be understood that variations in details of form may be made without departing from the invention as defined in the appended claim.

I claim:

In a water-borne vessel having side plating, along the outer surface of which water moves relatively to the ship during the ship's forward progress, a vertically disposed housing arranged within the ship's hull, a tubular shaft journaled in said housing and terminating above the ship's water-line in an open end adapted for the reception of a tension equalizing medium to be delivered rearwardly along-side-ship below the water-line thereof, said plating being formed with a depression below the ship's water-line and there presenting a rearwardly extending wall surface bearing at its forward end an inwardly off-set relation to the outer surface of said plating in the vicinity of said housing and bearing at its rear end a fared-in relation to the ship's hull, and a fin carried by said shaft and accommodated within said depression for adjustment inwardly and outwardly of said depression incident to rotation of said shaft in one direction or the other, said fin being normally disposed in close proximity to the rearwardly extending wall surface of said depression and forming therewith a narrow passage terminating at its outer end substantially in the plane of the outer surface of said plating and there serving as an ejector nozzle having its inner end terminating in communication with said shaft and thus adapted for the reception of a tension equalizing medium to be supplied through that shaft in accordance with the fluid-requirements as set up within said ejector nozzle under the relative flow of water past the exit end of said nozzle.

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