

[54] **FLEXIBLE RUDDER**

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[51] Int. Cl. B63h 25/06

[58] Field of Search 114/162, 167, 168

[56] **References Cited**

UNITED STATES PATENTS

2,544,642 3/1951 Abbott 114/145

Primary Examiner—Andrew H. Farrell

[57] **ABSTRACT**

A vessel rudder consisting of a woven plastic water deflecting plate of a substantially trapezoid shape tensionally supported by a vertical slotted rod which is positioned in the center plane of the vessel's stern. A rudder stock is also positioned in the center plane. But aft of the vertical slotted rod a distance approximately equal to one fourth of the rudder plate's total maximum length. There is also fixed on the aft side another slotted rod supporting the back end of the woven plastic plate. And by turning the rudder stock plate it assumes a longitudinally curved shape for deflecting the water sideways.

1 Claim, 7 Drawing Figures

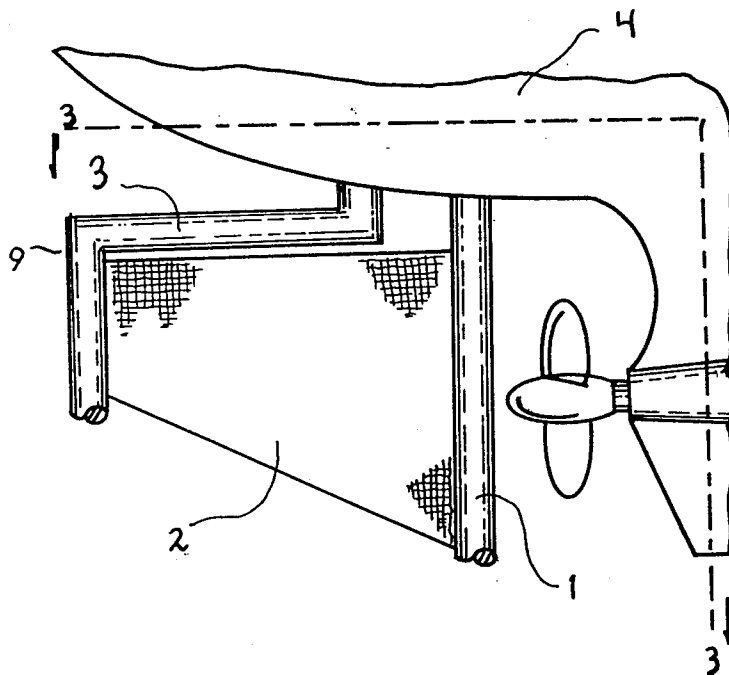


FIG. 1.

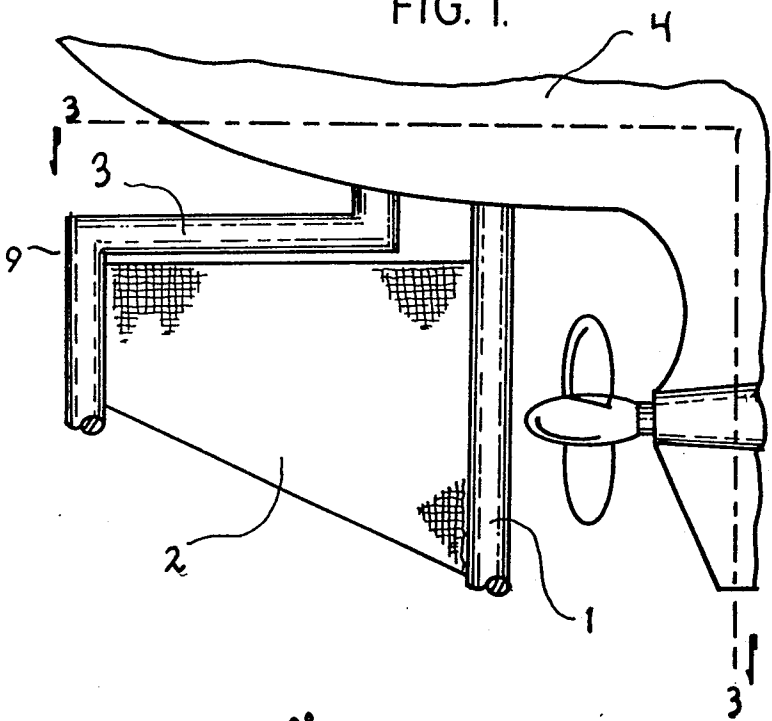


FIG. 2.

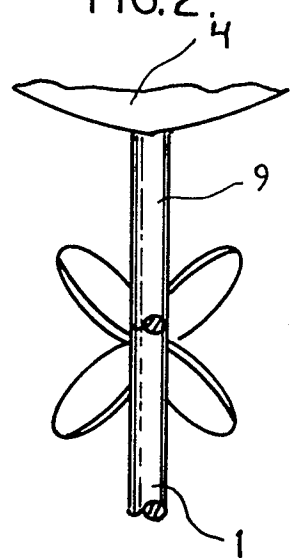


FIG. 3.

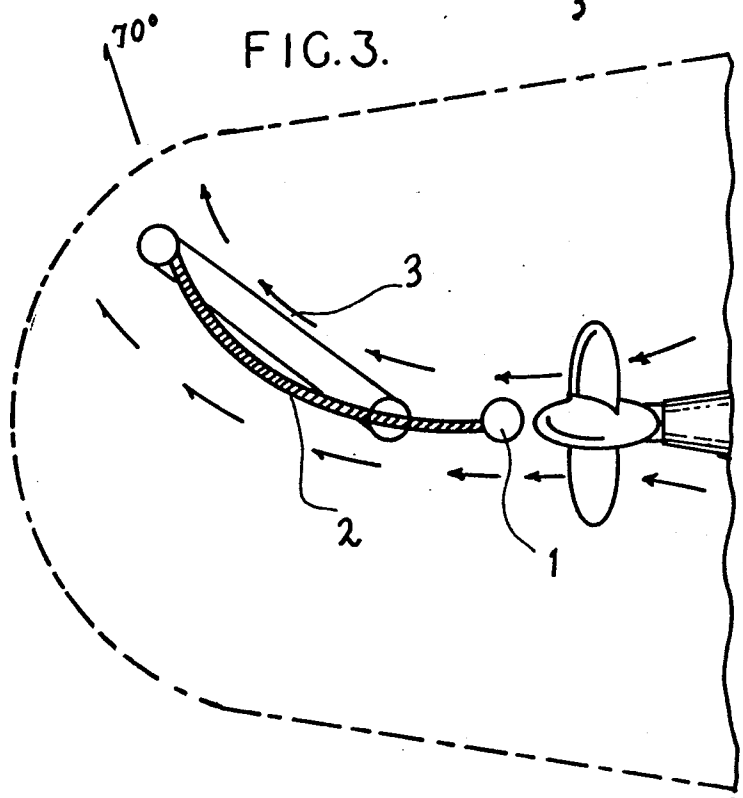


FIG. 4.

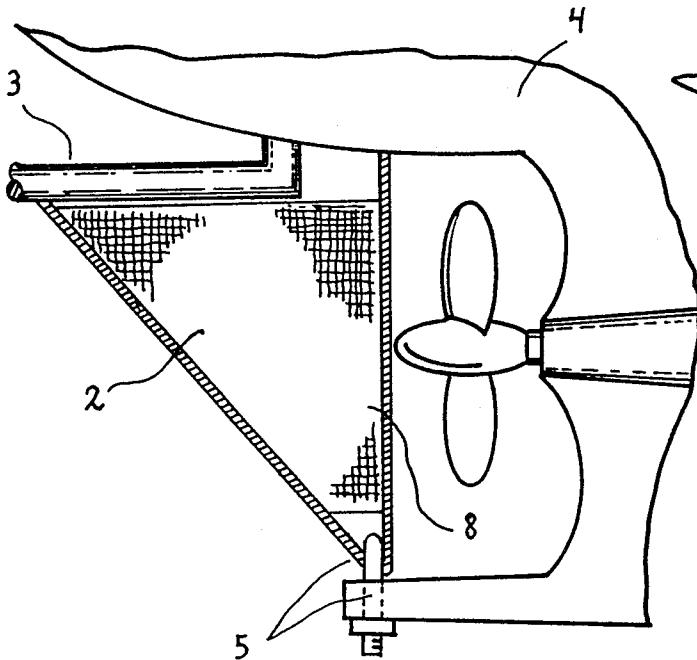


FIG. 5.

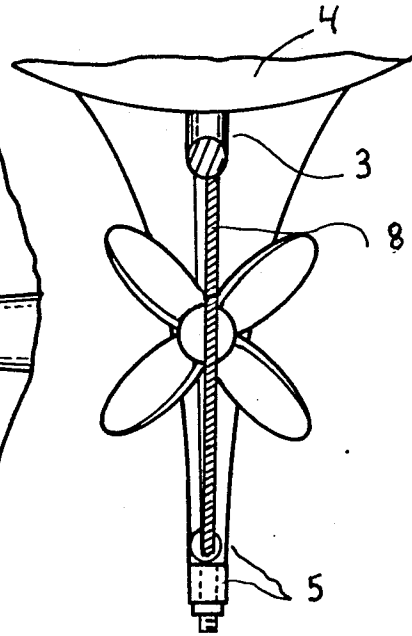


FIG. 6.

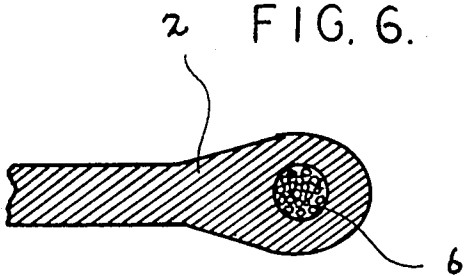
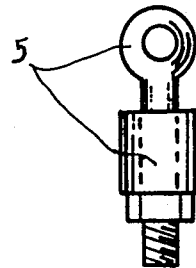


FIG. 7.



FLEXIBLE RUDDER

1. Field of Invention

This invention relates to vessel rudders.

2. Background of Invention

In the past, several types of vessel rudders have been developed, tested and adopted in order to provide a smaller turning circle and to improve the course keeping of the vessel. These effects were obtained by increasing the size of both the rudder and the steering mechanism. Thus, radical changes had to be made to the steering mechanism. These changes resulted in a much heavier vessel and increased cost and maintenance. The present day airfoil shaped rudder is very effective, in that, it provides a lot of side lift. However, it is almost always ineffectual at slow speeds. Also both the plate and airfoil shaped rudders, by having almost flat surfaced areas and by subjecting the encountered water mass to a rapid change in velocity, fail to gain a maximum side lift force. Thus, a lot of water is dragged from the suction area in the form of vortexes and eddies. Also, these have the disadvantages of being too heavy as well as having a stalling point of about 35°. To overcome these difficulties, no single solution to these problems has been found.

Accordingly the main object of the afore-mentioned invention is to provide a rudder with an increased side lift capability, a reduction of weight without having to alter the steering mechanism.

A second object is to provide a rudder whereby the water can be directed sideways at 70° by keeping the rudder at 35°.

A third object is to reduce the drag on the vessel as compared to the airfoil or plate type rudder.

SUMMARY OF THE INVENTION

In summary, the object of the present invention is to overcome the disadvantages of the above-mentioned rudders by providing rudder areas where suction and pressure forces can be fully obtained with a rudder consisting entirely of woven plastic cloth tensionally supported with one side attached to a rigid vertical positioned elongated rod support and firmly and permanently attached to the center plane a short distance forward to the vessel's stern. The other side would be attached to an elongated inverted positioned member of the rudder stock fastened on the rudder stock. Turning the rudder would, therefore, give a lengthwise curved shape to the cloth and thus would smoothly convey the water sideways.

THE DRAWING

FIG. 1 is a side elevation of the stern of a vessel illustrating a preferred embodiment of my rudder;

FIG. 2 is a back elevation similar to FIG. 1;

FIG. 3 is taken along line 3—3 of FIG. 1 and illustrates the flow of water to 70° sideways although the rudder is positioned at 35°.

FIG. 4 is similar to FIG. 1. but illustrates the rudder cloth supported by metal cables;

FIG. 5 is a back elevation similar to FIG. 4;

FIG. 6. is an enlarged fragmentary sectional view of the woven plastic cloth embodying the supporting cable element;

FIG. 7. is a back elevation of the shoe gudgeon and illustrat-

ing the cables supporting members.

With reference to FIG. 1., the cloth 2 may be made of any suitable lightweight, flexible, non-porous material capable of withstanding the ravages of salt water such as dacron. The fabric must have a tensile strength of at least 25,000 pounds per square inch to withstand the impact and stresses to which it is subjected. The material 2 may have any desired shape for the purpose intended but it is preferable to make it in the shape shown in the drawings, FIG. 1, FIG. 4, having the front and back edges terminating in a reinforced, thickened portion FIG. 6, which slide into and are held in a slot provided by a vertically positioned rigid slotted rod member positioned ahead of the rudder stock and fastened or bolted in the center plane of the stern of the vessel.

The back vertical edge of the material fits and is retained in a slot provided by another vertically positioned rod member which is fastened to the rudder stock aft side so as to obtain a reduction of weight in the vessel and so to create less strain on the steering gear. The supporting vertical members may be made of metal such as titanium or steel. However, an alternative is provided by a vessel's having the shoe gudgeon whereby the cloth reinforcing cable may be fastened to it by any means known thus eliminating the need of using the vertically positioned rod members and thus obtaining a lighter rudder and a decrease in drag to the vessel.

I have found it preferable to have the front 1 and back 9 supporting members vertically positioned. However they may be inclined to converge on the vertical line of the rudder stock if desired. It is believed that it will be apparent from the foregoing description and drawing that prior to the rotating of the rudder stock the material would be tensioned to provide proper seakeeping to the vessel. However, by turning the rudder stock the end 9 would gradually come nearer the front vertical member enabling the material to assume an increasing lengthwise curved form or until reaching 35°. The back edge of the material would then point to approximately 70°. Thus, the water mass would be channeled gradually sideways on both surfaces of the rudder material enabling the rudder increased side water pressure and suction force. Accordingly, there would be a gain in increased side lift with less drag to the vessel.

My claim is:

1. A rudder stock and a rigid vertically positioned slotted rod fastened on the top side of the center plane of a vessel's stern, substantially forward from the rudder stock with the lower side fastened to a gudgeon, said rudder stock having two vertical members, one aft of the other and placed aft of the forward vertical rod, said rudder stock supporting a horizontally elongated member interconnecting the forward member and an aft member and ending in another vertically positioned slotted rod, a water deflecting plate comprising a substantially trapezoid shaped woven flexible non-stretchable plastic tightened on the front and back edges, slidably retained by the two vertically positioned rods, said deflecting plate supporting slotted rods being composed of metal cable, wherein the top ends are likewise fastened one at the same place of the vertically positioned supporting slotted rods, and wherein the two vertically plate supporting rigid members are two cables fastened at the topside at the same place as the rods.

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