March 13, 1951 F. R. ABBOTT 2,544,642

REVERSING RUDDER FOR SMALL BOATS

Filed March 14, 1946 4 Sheets-Sheet 1

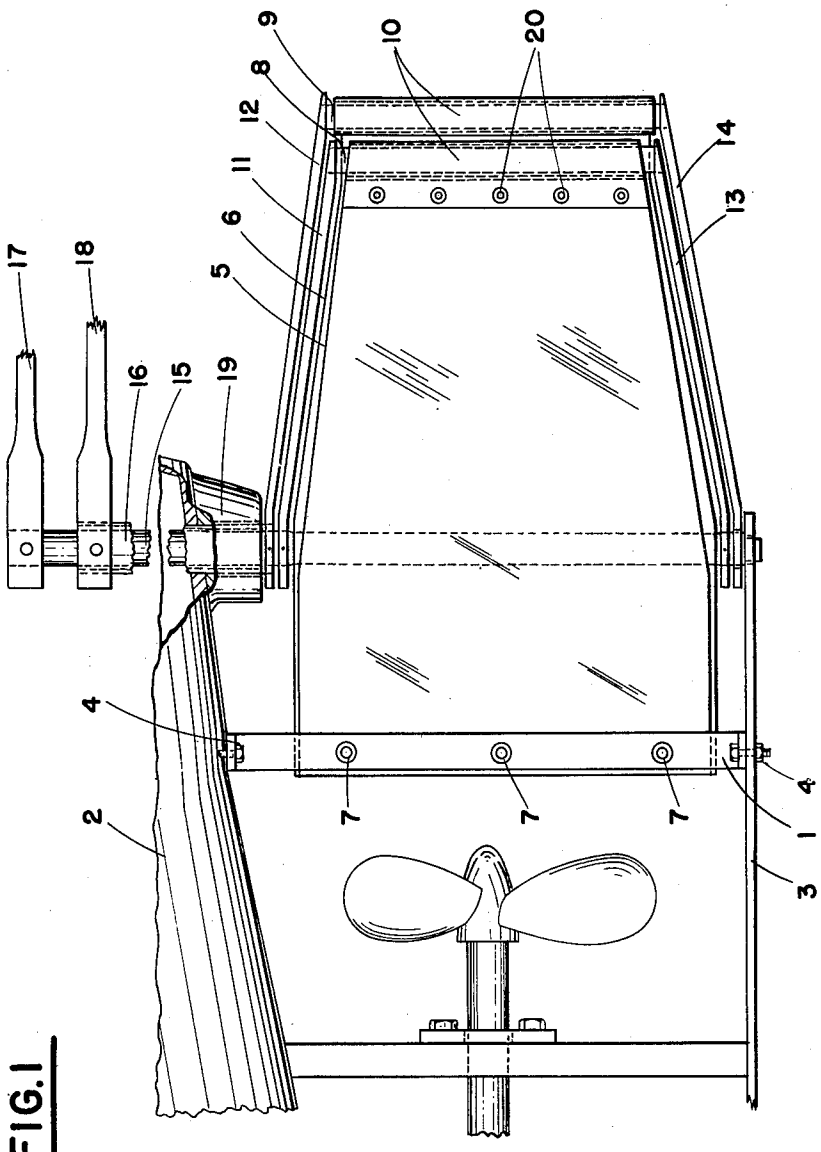


FIG. 1

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Filed March 14, 1946 4 Sheets-Sheet 2

FIG. 2

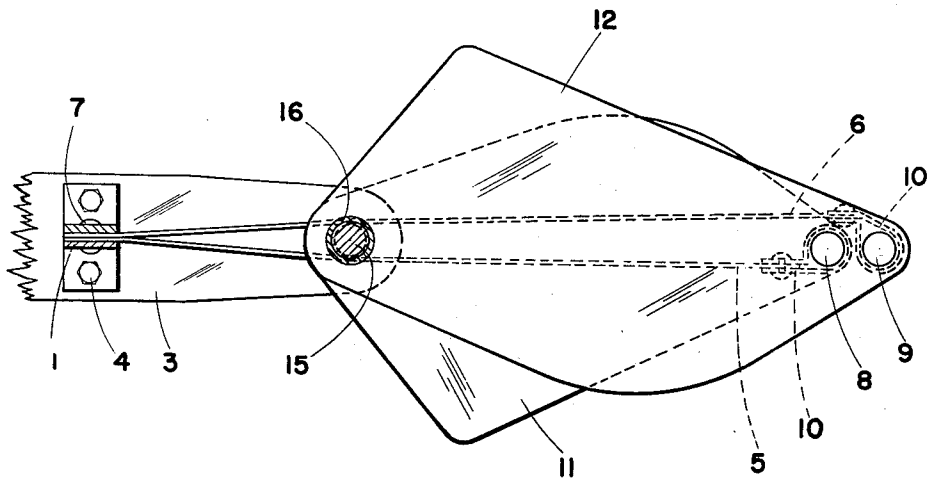
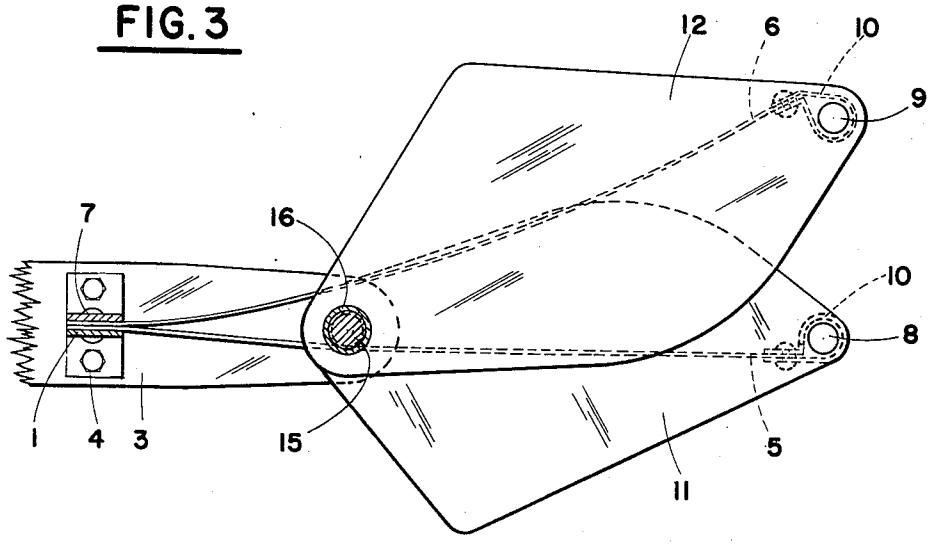


FIG. 3



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March 13, 1951 F. R. ABBOTT 2,544,642

REVERSING RUDDER FOR SMALL BOATS

Filed March 14, 1946 4 Sheets-Sheet 3

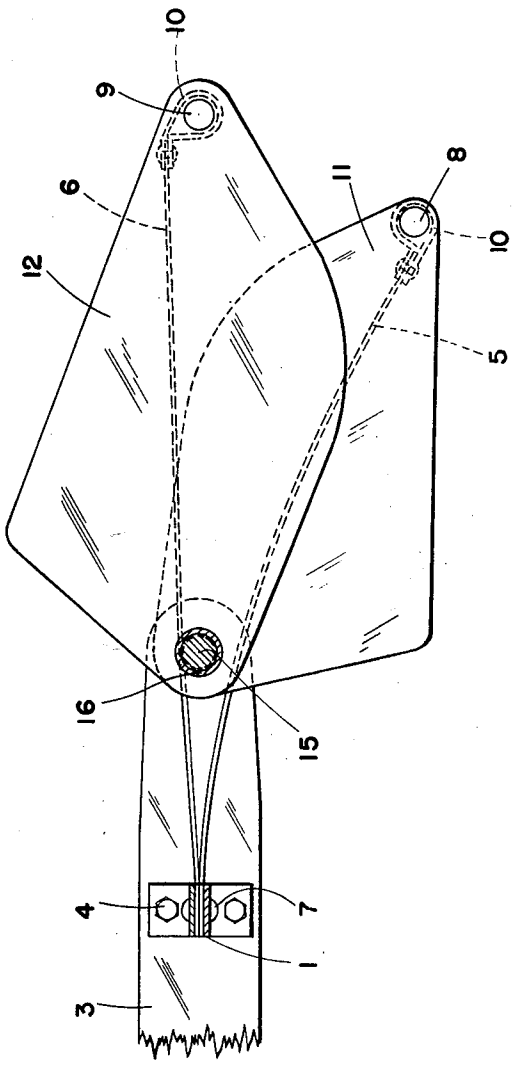


FIG. 4

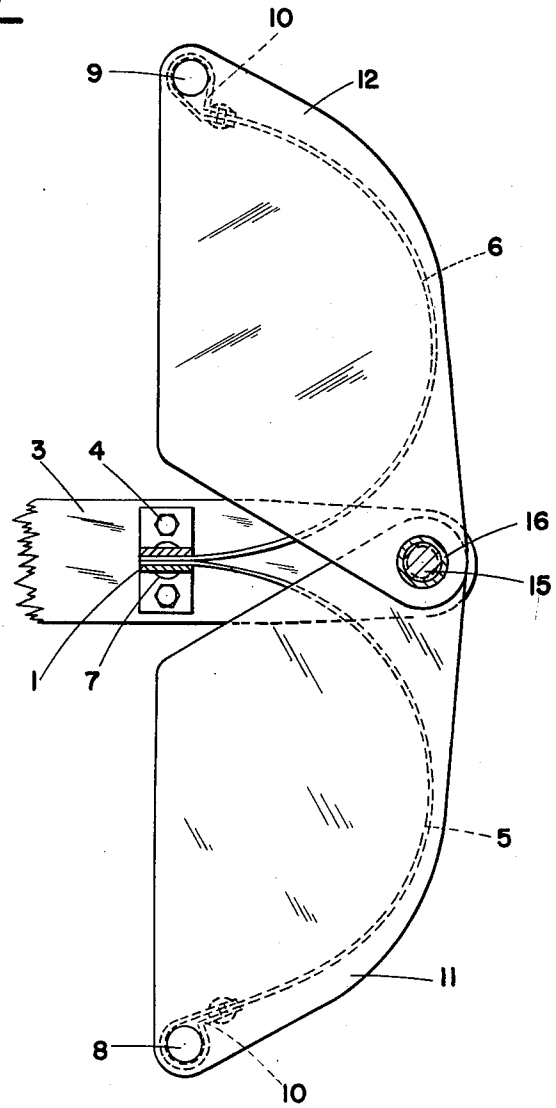
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March 13, 1951 F. R. ABBOTT 2,544,642

REVERSING RUDDER FOR SMALL BOATS

Filed March 14, 1946 4 Sheets-Sheet 4

FIG. 5



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2,544,642

REVERSING RUDDER FOR SMALL BOATS

Frank R. Abbott, San Diego, Calif.

Application March 14, 1946, Serial No. 654,483

18 Claims. (Cl. 114—145)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

My invention relates to the maneuvering of small boats and more particularly to a rudder mechanism for deflection and reversal of the slip stream or propeller wash.

It is known in the art that the forward direction of small boats may be varied by a simple rudder acting on the wash from the propellers.

It is likewise known that direction can be completely reversed without excessive deviation from existing line of travel by a reversible pitch propeller or a reverse gear on the propulsion mechanism with accompanying clutch. These methods present cost, weight, handling and maintenance problems to small boat operation. The effective accompaniment of both of the foregoing motions by a single mechanism is unknown in the art.

It is the primary object of this invention to provide improved means for reversing and controlling the direction of travel of small boats by the interception of their propeller wash.

Another object of this invention is to provide said mechanism for adjustment and reversal of the propeller wash that is light weight, inexpensive, simple to install, operate and maintain.

The invention also resides in certain novel structural characteristics which facilitate carrying out the foregoing objects and contribute both to simplicity of the mechanism and to the reliability of operation as well as to the ease and expeditious manner of accomplishing the desired results.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with accompanying drawings in which:

Figure 1 is a fragmentary view of a side elevation of the after end of a small boat with cutaway portion to show manner of mounting my invention.

Figure 2 is a plan view with rudders in position for course dead ahead.

Figure 3 is a plan view with rudders in position for course to starboard.

Figure 4 is a plan view with rudders in position for course to port.

Figure 5 is a plan view with rudders in position to reverse direction of travel of the boat.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment. It is to be understood, however, that I do not intend to limit the invention by such disclosure for I aim to cover all modifications and alternative

2

constructions falling within the spirit and scope of the invention as defined in the appended claims.

In accordance with my invention two adjacent identical metal strip supports 1 slightly separated athwartship are fastened vertically to a hull 2 and a skeg 3 by bolts 4 slightly aft of the propeller and symmetrical relative to the projected center line of the propeller shaft. The lead edges of a port rudder 5 and a starboard rudder 6 are fastened between and to the supports 1 by rivets 7. The rudders are flexible and preferably constructed of rubber impregnated fabric or laminated material which is pulled taut and secured by rivets 20 to metal straps 10 that encircle trailing vertical metal port post 8 or starboard post 9 respectively. These posts are fastened, at the top, to the after end of corresponding streamlined top port plate 11 or starboard plate 12 which are interleaved and likewise to similar bottom port plate 13 or starboard plate 14 (also interleaved). The after ends of the top and bottom plates are inclined off horizontal towards each other and the rudders are also tapered to insure formation of closed end semi-cylindric cups when the rudders are in position having maximum effect on propeller wash. The forward ends of plates 11 and 13 are secured to a vertical shaft 15 which is located immediately aft of the supports 1 back about one-third of the distance between them and the posts 8 and 9. The forward end of the plate 12 is secured to a metal sleeve 16 which freely encircles the shaft 15 and extends in an upward direction thru a control lever 18. The forward end of the plate 14 is apertured to permit its free movement about the shaft 15 which extends downward thru and is shouldered against the skeg 3. The shaft and sleeve project in an upward direction thru a watertight bearing 19 in the hull and are respectively secured at a convenient operating height to horizontal control levers 17 and 18. The control levers operate either of the corresponding rudders conventionally when the other is held steady in a position having least effect on the propeller wash.

The relative position of the shaft 15 and the rudder leading edges is an essential feature of my invention, as it insures slack in the rudders for the formation of curved surfaces in propeller wash when rudder trailing edges are moved laterally and forward to effectively reverse the wash and thereby the direction of the boat.

As shown in Figure 2, the rudders are positioned to maintain a boat course dead ahead,

The propeller wash trails immediately aft and the rudders are neutral as the boat proceeds directly forward. A slight adjustment of either rudder can be made to insure adherence to course if necessary to counteract the effect of propeller rotation, drift or current.

The rudders positioned for starboard boat course are shown in Figure 3. The wash from the propeller impinges on the surface of the starboard rudder **6** and the boat proceeds to starboard. The port rudder **5** is inactive.

The rudders positioned for port boat course are shown in Figure 4. The wash from the propeller impinges on the surface of the port rudder **5** and the boat proceeds to port. The starboard rudder **6** is inactive.

The rudders positioned to reverse boat direction by each control lever being turned 120° in opposite directions are shown in Figure 5. The propeller wash impinging on the port and starboard rudder surfaces is effectively reversed by the cylindrical shape of the rudder material and the boat proceeds backward at about 50% forward speed.

The invention described herein may be manufactured and used by or for the Government of the United States for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of pliant material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, and control mechanism for moving said rudders to form curved surfaces in said wash.

2. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of rubber impregnated fabric with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash and control mechanism for moving said rudders to form curved surfaces in said wash.

3. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of laminated material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, and control mechanism for moving said rudders to form curved surfaces in said wash.

4. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of pliant material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, and control mechanism for moving said rudders to form semi-cylindrical cups in said wash.

5. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of rubber impregnated fabric with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, and control mechanism for moving said rudders to form semi-cylindrical cups in said wash.

6. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of laminated material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, and control mechanism for moving said rudders to form semi-cylindrical cups in said wash.

7. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of pliant material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the plates abaft the rudder leading edges for moving said rudders to form curved surfaces in said wash.

8. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of rubber impregnated fabric with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the plates abaft the rudder leading edges for moving said rudders to form curved surfaces in said wash.

9. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved stream-lined top and bottom plates, two adjacent rudders of laminated material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the plates abaft the rudder leading edges for mov-

ing said rudders to form curved surfaces in said wash.

10. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved, stream-lined top and bottom plates, two adjacent rudders of pliant material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the plates abaft the rudder leading edges for moving said rudders to form semi-cylindrical cups in said wash.

11. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved, stream-lined top and bottom plates, two adjacent rudders of rubber impregnated fabric with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the plates abaft the rudder leading edges for moving said rudders to form semi-cylindrical cups in said wash.

12. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of interleaved, stream-lined top and bottom plates, two adjacent rudders of laminated material with leading edges secured to said movable body and trailing edges respectively to said plates, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the plates abaft the rudder leading edges for moving said rudders to form semi-cylindrical cups in said wash.

13. A rudder mechanism for controlling direction of a boat having propulsion machinery for creating a propelling slip stream, said mechanism comprising a pair of substantially planar flexible rudder members positioned in the slip stream and having leading and trailing edges, a pair of movable supports connected respectively to the trailing edges of the rudder members, a common pivot mounting for the supports disposed intermediate the leading and trailing edges of the rudder members, and means including said supports for flexing said rudder members substantially one hundred and eighty degrees, whereby the trailing edges of the rudder members may be moved laterally and forwardly to reverse the direction of the slip stream.

14. A rudder mechanism for controlling direction of a boat having propulsion machinery for creating a propelling slip stream, said mechanism comprising a pair of substantially planar flexible rudder members positioned in the slip stream and having leading and trailing edges, a pair of movable supports connected respectively to the trailing edges of the rudder members, and a pivotal mounting for each of the movable supports, including upper and lower plates pivoted aft of said leading edge and arranged substantially parallel to the slip stream for confining changed directions thereof to horizontal movement and so positioned that lateral and forward swinging movement of a support will carry the trailing edge of the associated member from a rear position into a position substantially laterally spaced from the leading edge, thereby substantially reversing the direction of the slip stream.

15. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of movable supports, two adjacent rudders of pliant material with leading edges secured to said movable body and trailing edges respectively to said supports, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of baffles secured parallel to the direction of wash at the ends, respectively, of each said support thereby enclosing the rudders and confining the redirected wash to substantially unidirectional flow from each rudder, and control mechanism for moving said rudders to form curved surfaces of at least ninety degrees curvature in said wash.

16. Mechanism for controlling direction of a movable body through adjustment and reversal of slip stream or propeller wash created by its propulsion machinery comprising a pair of movable supports, two adjacent rudders of pliant material with leading edges secured to said movable body and trailing edges respectively to said supports, the major surfaces of said rudders in neutral position being substantially parallel to said wash, a pair of independently operable levers, a sleeve movable by one of the levers, a shaft movable by the other of said levers, said sleeve and shaft being connected respectively to the forward ends of the supports abaft the rudder leading edges for moving said rudders to form curved surfaces in said wash.

17. A rudder mechanism for controlling direction of a boat having propulsion machinery for creating a propelling slip stream, said mechanism comprising a pair of flexible rudder members positioned in the slip stream and having leading and trailing edges, a pair of movable supports connected respectively to the trailing edges of the rudder members, and a common pivot mounting for the supports disposed forwardly of the trailing edges of the rudder members, whereby the trailing edges of the rudder members may be moved laterally and forwardly to cause the rudder members to form simple curved surfaces of at least ninety degrees curvature within the slip stream.

18. A rudder mechanism for controlling direction of a boat having propulsion machinery for creating a propelling slip stream, said mechanism comprising a pair of flexible rudder members positioned in the slip stream and having leading and trailing edges, a pair of movable supports connected respectively to the trailing edges of the rudder members, and a pivotal mounting for each of the movable supports, so positioned that lateral and forward swinging movement of a support will carry the trailing edge of the associated member forwardly to curve the surface of said

associated member substantially one hundred and eighty degrees within the slip stream.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,574,718	Westendarp	Feb. 23, 1926

FOREIGN PATENTS

Number	Country	Date
50,343	Netherlands	May 15, 1941
23,166	Great Britain	1909
387,033	France	Apr. 27, 1908
375,602	Germany	May 15, 1923