To all whom it may concern:

Be it known that I, HENRY O. WESTENDARP, of Saugus, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Means for Controlling and Reversing Vessels, of which the following is a specification.

The present invention has for its object to provide improved means for controlling and reversing vessels without reversing the motive power agent.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying specification, and the claims appended thereto.

In the accompanying drawings which are illustrative of my invention, Figure 1 is a view in side elevation of the stern portion of a vessel equipped with one form of my improved apparatus; Fig. 2 is a top plan view of a rudder; Fig. 3 is a view similar to Fig. 1 of a modification, a portion of the side of the vessel being broken away to show part thereof; Fig. 4 is a horizontal sectional view of the vessel showing a gearing in plan, and Fig. 5 is a sectional view of a detail.

Referring to the drawing, Figs. 1 and 2, 10 indicates the hull of a vessel which may be of any usual or suitable construction, and 11 a propeller carried by the shaft 12. The shaft may be driven by any suitable motive power agent, as an internal combustion engine or an elastic fluid turbine. The rudder comprises a number of hinged parts which, for ordinary steering purposes, are flat against each other and are moved by a steering post in the usual manner. For decreasing the speed of the vessel, stopping and reversing it, the parts of the rudder are expanded to a greater or less extent to form a box-like receptacle which is also adapted to receive the propeller either by moving the receptacle toward the propeller, moving the propeller toward the receptacle or both.

The rudder comprises two rectangular side plates 13 and 14. The plate 13 has spaced eyes 15 which surround a spindle 16 and are fastened thereto by pins 17 so that the plate will turn with the spindle. The plate 14 is fixed at its upper portion to a sleeve 18 concentric with the spindle 16 and is supported at its lower end and by an eye 19 which loosely surrounds the spindle between the eyes 15 on plate 13, forming a type of ordinary pin hinge. The spindle 18 and sleeve 18 together form the rudder post. At both the upper and lower ends, plates 13 and 14 are connected together by a pair of triangular plates 20 and 21 hinged to each other, as indicated at 22, and to the plates 13 and 14, as indicated at 24 and 25. When the rudder is folded up or collapsed, as shown in Fig. 1, plates 20 and 21 lie flat against each other and form top and bottom extensions of the rudder. When the rudder is opened up, as shown in Fig. 2, plates 20 and 21 form top and bottom walls of the housing or receptacle. The spindle 16 is supported at its lower end by a suitable bearing 26 carried by an arm 27 which is pivoted at 27 to move in a vertical plane on an extension 28 of the keel plate. The spindle 16 of a sleeve 18 and sleeve 18, which together form the rudder post, extend to a point within or above the deck of a vessel and terminate within a casing 29 having an open side which is closed by a cover 30. Carried by the casing 29 is a sleeve 30 which forms a guide and bearing for the upper ends of spindle 18 and sleeve 18. Located in casing 29 is a bevel gear wheel 31 carried by sleeve 18 and a bevel gear wheel 32 carried by spindle 18 and meshing with these gear wheels are two similar gear wheels 33 and 34. The gear wheel 33 is fastened on the end of a rod 35 and the gear wheel 34 is fastened on the end of a sleeve 36 surrounding rod 35. Rod 35 and sleeve 36 are supported in a bearing 30 on casing 29. On the outer end of sleeve 36 is fixed a steering wheel 38 and on the outer end of rod 35 is a handle 39 connected to the steering wheel by a suitable release latch 40. 40 indicates the handle 39 for releasing latch 40. The casing 29, together with the parts carried thereby, is adapted to be moved in a vertical longitudinal plane, the rudder post turning on pivot 27. To this end a suitable lever 41 is provided connected by a link 42 to the sleeve 30. The lever moves over a segment 43 and has a latch 44 which engages suitable notches in the segment. The sleeve 30 moves in a suitable guide 30. When in the position as shown in full lines, the sleeve 30 rests against a stop 45 and the bottom of the casing 29 may engage a suitable rest. In the present instance, it is shown as resting on the top of the deck. The rudder is shown 110
as being partially balanced by a suitable plate 46 pivoted on spindle 16 by means of spaced eyes 47 which surround the spindle. To maintain the plate 46 in alinement with the rudder it is provided with extensions or arms 48 which are located between the plates 13 and 14. When the rudder is collapsed plates 13 and 14 engage between them the extensions or arms 48 so that plate 46 moves with them, thus partially balancing the rudder in the well known manner.

In the ordinary forward operation of the vessel, the rudder is collapsed, as shown in Fig. 1, and the various parts are in the full line position. The handle 39 is latched to the steering wheel 38 by latch 40. Now, when the steering wheel is turned, the handle 39 moves with it so that rod 35 and sleeve 36, and consequently gear wheels 39 and 34 move together as a unit. This will turn gear wheels 32 and 31 and the spindle 16 and sleeve 18 as a unit and in the same direction to move the rudder for guiding the vessel, as is well understood. Under these conditions the spindle 16 and sleeve 18 act as a rudder post which is turned through the gearing by the steering wheel 38.

When it is desired to stop the vessel or reverse its direction of movement, the latch 40 is released by lever 40*, and the handle 39 is turned in a clockwise direction, the steering wheel 38 being simultaneously turned in an anti-clockwise direction. This turns gear wheels 32 and 31 in opposite directions and hence gear wheels 32 and 31 which mesh therewith. Turning gear wheels 32 and 31 in opposite directions results in turning spindle 16 and sleeve 18 in opposite directions and opening up more or less the parts of the rudder to form a triangular shaped receptacle (see Fig. 2) of which plates 13 and 14 form the side walls and plates 20 and 45 the top and bottom walls. The water now thrown off from the propeller, which remains in operation, enters to greater extent the receptacle so formed and tends to retard the vessel. The retardation effect can be varied by varying the amount by which the plates 13 and 14 are separated, and is due to the fact that a certain amount of the water, instead of escaping freely from the propeller is caught in the receptacle and forced to reverse its direction and flow forward. The reaction due to this tends to move the vessel backward. This reaction effect increases as the rudder is opened up. To obtain the greatest reaction; i.e., for propelling the vessel backward at the highest speed, the rudder, after being opened up, and the propeller are moved toward each other so as to bring the propeller up to or within the receptacle formed by the rudder. In the arrangement shown in Fig. 1, this is accomplished by moving the rudder toward the propeller by means of lever 41.

As is obvious, when latch 44 is released lever 41 may be turned to move the rudder post on pivot 27 to bring the receptacle toward the propeller. Of course, the greatest reversing effect is obtained when all the water from the propeller is thrown off into the receptacle.

In Figs. 3, 4 and 5, is shown an arrangement similar to that shown in Figs. 1 and 2, except that instead of the rudder being movable fore and aft toward and away from the propeller, it is stationary, and the propeller is moved toward and away from it. 50 indicates the rudder which may be of the same structure as that shown in Figs. 1 and 2 and operated and opened up in the same manner by means of steering wheel 51 and hand lever 52. 53 indicates the propeller carried by a shaft 54 which in the present instance is shown as being driven by a suitable prime mover 55 through a double reduction gearing. The shaft 54 is connected to the gearing by a suitable coupling which permits it to be slid longitudinally. This forms in substance a sliding coupling between the prime mover 55 and the shaft which permits the shaft to be moved without being disconnected from the prime mover. In the present instance the prime mover 55 drives a pair of gear wheels 57 on countershafts 58. On each countershaft 58 is a low speed pinion 59 which in turn drives a pair of gear wheels 57 on countershafts 58.

105 bars 63 having enlarged ends 64 in which are openings through which the countershafts 58 pass. The pinions 59 are located between adjacent ends 64 and such ends are held in spaced relation to each other by U-shaped bars 65, thus spacing apart the cross bars 63. 66 are suitable bearings in the cross bars 63 for the shaft which carries gear wheel 62. The openings in the ends of cross bars 63 are sufficiently large that the frame 115 as a whole may be slid back and forth on countershafts 58 carrying with it gear wheel 62 and pinions 59. 67 is an operating handle for moving the frame. It is suitably pivoted at 68 and is fastened to the frame as indicated at 69 by a suitable pin and slot connection to give it freedom of movement. Any suitable means may be provided for holding the operating handle 67 in adjusted position.

The operation is the same as that already described in connection with Figs. 1 and 2. In retarding or reversing the direction of movement of the vessel the rudder 50 is first opened up after which the handle 67 is 120
moved to bring the propeller toward the rudder. When the handle 67 is moved the frame comprising cross bars 63 and bars 65 slides on countershafts 58 carrying with it gear wheel 62 and low speed pinions 59.

The gearing may be of any suitable type. In the present instance the high speed pinion 56 and gear wheels 57 are shown as being of the herring-bone type and the others as having straight teeth.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a vessel, the combination of a hull, a propeller therefor, a rudder comprising a plurality of plates hinged to each other and normally flat in engagement with each other, and means for moving said plates to form a receptacle closed on its top, bottom, and sides, and having an open end which faces the propeller.

2. In a vessel, the combination of a hull, a propeller therefor, a propeller shaft, a rudder comprising a pair of flat plates hinged at one vertical edge, top and bottom plates hinged to the tops and bottoms of the first named plates, said plates adapted to be flat in engagement with each other during normal forward operation, and means for expanding said plates to form a receptacle having an open side facing the propeller.

3. In a vessel, the combination of a hull, a propeller therefor, a rudder comprising a plurality of members adapted to be expanded into a receptacle, and means for moving the rudder and propeller fore and aft relative to each other when said members are expanded.

4. In a vessel, the combination of a hull, a propeller therefor, a rudder comprising a plurality of plates hinged to each other and normally flat in engagement with each other, means for moving said plates to form a receptacle closed on its top, bottom, and sides, and having an open end which faces the propeller, and means for moving the rudder and propeller relative to each other to vary the distance between them.

5. In a vessel, the combination of a hull, a propeller therefor, a propeller shaft, a rudder comprising a pair of flat plates hinged at one vertical edge, top and bottom plates hinged to the tops and bottoms of the first named plates, said plates adapted to lie flat in engagement with each other during normal forward operation, means for expanding said plates to form a receptacle having an open side facing the propeller, and means for moving the rudder toward the propeller.

6. In a vessel, the combination of a hull, a propeller therefor which is always driven in the same direction, a rudder post comprising two adjacent members, a rudder comprising vertical plates one fixed to each member of the rudder post, means for turning the two members of the rudder post to move the rudder plates simultaneously in the same direction, or in opposite directions, and means for moving the rudder and propeller toward and away from each other.

7. In a vessel, the combination of a hull, a propeller therefor, a rudder post pivoted at its lower end to move longitudinally of the vessel, said rudder post comprising two members, a rudder comprising two vertical plates one fastened to each member of the rudder post, means for turning the two members of the rudder post to move said rudder plates either in the same direction or in opposite directions, and means for moving the rudder post on its pivot to move the rudder toward the propeller.

It witness whereof, I have hereunto set my hand this 23rd day of April, 1917.

HENRY O. WESTENDARP.