

June 17, 1930.

C. E. WARD

1,764,918

PLANKING VANE FOR SHIPS

Filed Dec. 30, 1929

2 Sheets-Sheet 1

Fig. 1.

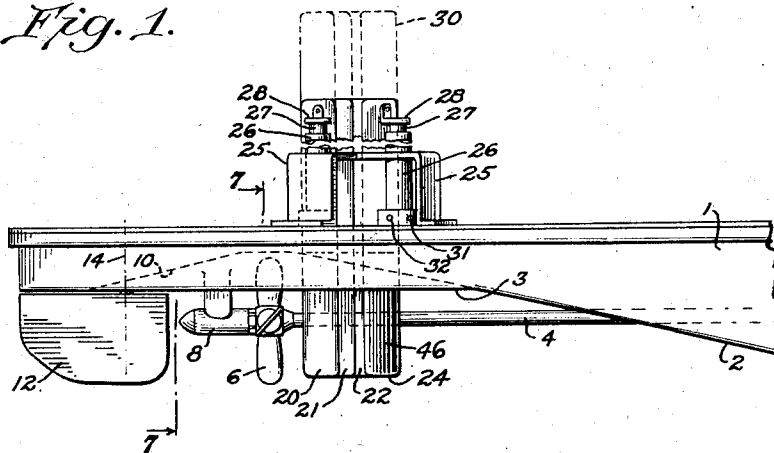


Fig. 2.

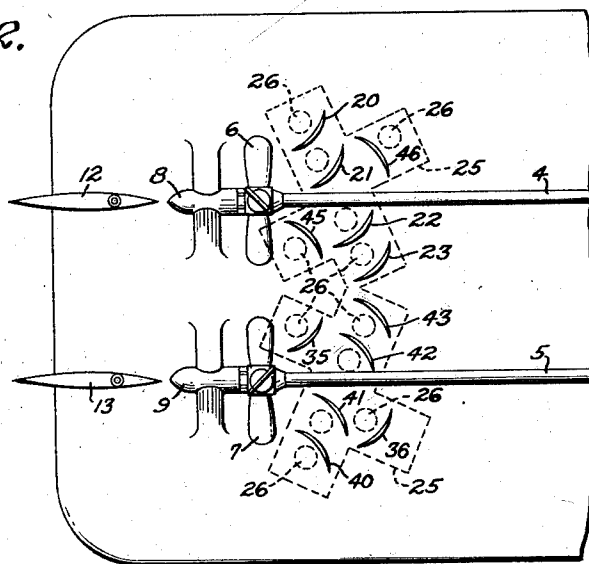
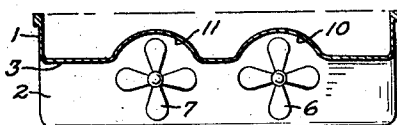


Fig. 7.



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FLANKING VANE FOR SHIPS

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2 Sheets-Sheet 2

Fig. 3.

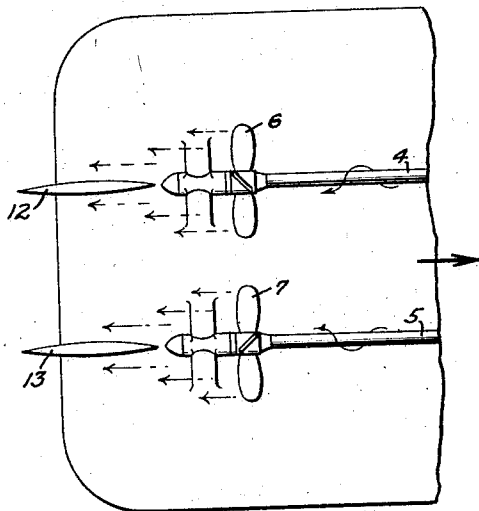


Fig. 4.

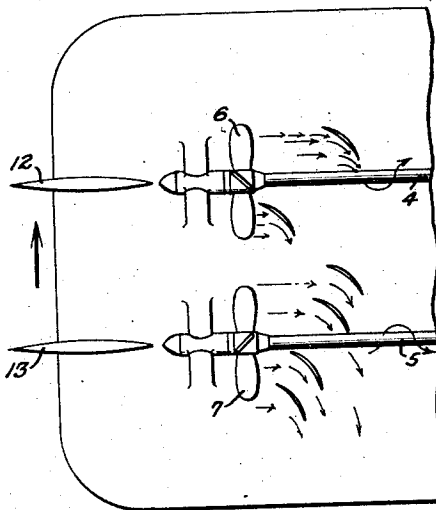


Fig. 5.

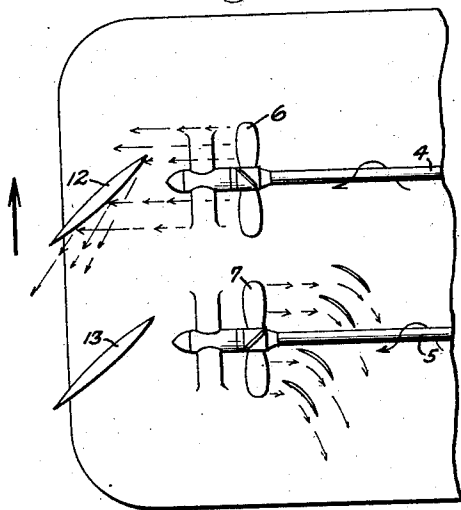
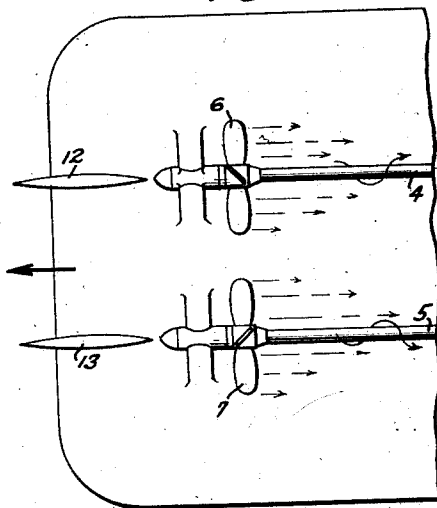


Fig. 6.



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FLANKING-VANE FOR SHIPS

Application filed December 30, 1929. Serial No. 417,500.

This invention relates to flanking vanes for boats and has for its object to provide a means for increasing the flanking action of the screws and rudders of a boat which will be more efficient in operation than those heretofore proposed.

With this and other objects in view the invention consists in the novel details of construction and combinations of parts as will be more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views,—

Fig. 1 is a side elevation of the stern of a towboat of the tunnel type to which this invention has been applied;

Fig. 2 is a bottom plan view of the parts shown in Fig. 1;

Fig. 3 is a diagrammatic bottom plan view of the stern illustrating the arrangement of parts for straight ahead steering;

Fig. 4 is a view similar to Fig. 3 showing the arrangement of parts for moderate flanking movement in one direction;

Fig. 5 is a view similar to Fig. 4 illustrating the arrangement of parts for maximum flanking in the same direction;

Fig. 6 is a view similar to Fig. 3 showing the disposition of parts for straight backing; and

Fig. 7 is a diagrammatic transverse sectional view taken as on the line 7—7 of Fig. 1 and looking in the direction of the arrows illustrating the tunnel type of construction of the boat.

In order that this invention may be the better understood it is said that with towboats and particularly those of the tunnel type of construction such as disclosed in the U. S. Letters Patent 1,559,660 granted November 3, 1925 to Charles E. Ward for rudder construction for tow-boats, the flanking movement of the boat to port or starboard is accomplished by a difference in rotation of the screws in conjunction with the setting of the rudders whereby the flow of water, from said screws, strikes the flat sides of the rudders in such manner as to cause

the desired movement of the stern of the vessel. This invention is directed to a modification or amplification of the propulsion and control of a tow-boat to produce a more pronounced and therefore a more efficient flanking movement thereof which is of particular advantage on rivers having a tortuous or winding course, and in connection with the docking of heavy freight cargoes.

The tow-boat to which this invention is peculiarly adapted is of the usual and well known construction wherein the hull 1 is provided at the stern with an upwardly extending bottom 2 which terminates in a stern horizontal bottom 3 which is just below the surface of the water. In the type illustrated there are provided twin shafts 4 and 5 respectively provided with the screws 6 and 7 located adjacent the stern strut bearings 8 and 9, said screws being disposed in tunnels 10 and 11 of substantially semi-circular cross section and formed as shown in dotted lines in Fig. 1 by an upward extension of the inclined stern bottom. Rudders 12 and 13 are disposed respectively to the rear of, and in line with, the screws 6 and 7, the center of the rudder posts being indicated by the dot and dash line 14 in Fig. 1.

Immediately forward of each screw there is provided a gang of flanking vanes of curvilinear cross section which are so disposed relative to each other and the associated screw that the water from the latter will be deflected by said vanes, when in lowered position, to cause an increase in the flanking action. That is to say, the screw 6 has associated therewith a gang of vanes (four as shown in Fig. 2) two of which are disposed on one side of the propeller shaft 4 and the other pair 22 and 23 of which are located on the opposite side of said shaft. These vanes are all of substantially the same size, are curvilinear in cross section as clearly shown, and are of a length to extend from the lowermost reach of the screw upwardly through guide openings in the hull to a point above the deck to permit actuation of the vanes from said deck, as clearly indicated in Fig. 1. The individual

vanes are therefore substantially cylindrical in their formation except that the portion adapted to extend below the bottom of the boat may have a slight downward taper to the bottommost edge 24 thereof, this construction principally being to reduce the weight of metal.

The vanes 20, 21, 22 and 23 are disposed substantially in a straight line which is angularly disposed with relation to the propeller shaft 4, see Fig. 2. This angular setting may be made differently in accordance with the desired results and the particular type of boat, and therefore it is not desired to be limited to any particular setting except one which will cause the wheel water from the screw to be deflected by the vanes in a direction to the side of the boat whereby the flanking movement of the stern is increased.

The particular mounting for each vane is immaterial although it will be understood that suitable rollers and guides, not shown, will be provided for substantially frictionless vertical movement of each vane through the hull. In Fig. 1 there has been illustrated one means for mounting and actuating the vanes, comprising a suitable rigid structural frame 25 the upper portion of which serves as a guide for each vane, and within said frame and close to each vane there is mounted a hydraulic ram or similar elevating device 26 the piston 27 of which is adapted to engage an angular extension 28 from a vane, so that when the piston moves upwardly the associated vane may be raised to a position so that it will not intercept any wheel water or, in other words, the bottom 24 of the vane will be retracted within the hull of the vessel, the vane in its raised position being indicated in dotted lines at 30 in Fig. 1. When the vane is desired lowered the pressure is relieved from under the piston 27 of the elevating device 26 whereupon the vane will move downwardly, due to its weight, into operative position and in this movement the vane will depress the piston 27 into its cylinder, the lowermost position of the piston regulating the lowermost position of the associated vane. Fluid for each ram is admitted thereto through suitable connections indicated in Fig. 1 at 31 and 32.

The other screw 7 has associated therewith, and forwardly thereof on opposite sides of its shaft 5, a pair of vanes 35 and 36 which likewise are set in a line angularly disposed with relation to said shaft and substantially parallel to the setting of the gang vanes above described. The vanes 35 and 36 are exactly similar in construction to said gang vanes associated with the screw 6, and each of the vanes 35 and 36 is actuated by a duplicate of the elevating device 26 above described.

In similar manner the screw 7 has associated therewith a gang of vanes 40, 41, 42 and 43 arranged in a line angularly disposed to the shaft 5, the vanes 40 and 41 being on one side of said shaft and the other vanes 42 and 43 being on the other side thereof. Further these vanes are of the same size, shape and construction as those of the gang associated with the screw 6. However, the angular set of these two gangs of vanes is asymmetrical as contradistinguished from parallel. In other words, the lines of both gangs would cross at a point midway between the shafts 4 and 5. Likewise the screw 6 has associated therewith a pair of vanes 45 and 46 disposed on opposite sides of the shaft 4 forward of the screw, said pair being angularly set in a line with respect to said shaft, and said pair being identical with the pair 35 and 36 but asymetrically disposed thereto as contradistinguished from parallelly disposed thereto. Further each of the vanes 40, 41, 42, 43, 45 and 46 are mounted in a frame such as indicated at 25 and adapted to pass through the hull of the vessel, being elevated by a device identical with the device 26 above described, see Figs. 1 and 2.

The elevating devices of each gang of vanes may be and are preferably interconnected with a common fluid pressure line so that the vanes of each gang will be raised or lowered simultaneously. Further, the elevating devices for the starboard vanes 35 and 36 may be serially connected with the devices for the port gang vanes to establish simultaneous control of the vanes 20, 21, 22, 23, 35 and 36. Likewise the port vanes 45 and 46 may be operated simultaneously with the starboard gang vanes. In other words, for some types of boats it may be highly desirable to have the starboard gang vanes or those associated with the screw 7 operate simultaneously and equally with the port pair of vanes associated with the screw 6 as indicated in Fig. 4. On the other hand, it is within the scope of this invention to control the fluid pressure to the several elevating devices so that the starboard gang vanes may be operated independently of the port pair of vanes.

Referring now more particularly to Fig. 3 there is disclosed the arrangement of parts for ahead steering. That is to say, the screws 6 and 7 are rotating in the directions indicated on their shafts 4 and 5 so that the wheel water is being forced astern in the direction indicated by the dotted arrows. Further the rudders 12 and 13 are set straight and all flanking vanes are raised completely within the hull so that the rudders furnish the only means for steering the vessel which, therefore, takes a forward course as indicated by the heavy arrow. The positions of the vanes have not been

indicated in this figure since to do so would have made the diagram complex.

In Fig. 4 there is illustrated the arrangement of parts for moderate flanking to port, or in the direction indicated by the heavy arrow. This is accomplished by rotating both screws 6 and 7 in the reverse manner to that shown in Fig. 3 with the result that the wheel water is forced ahead as indicated by the dotted arrows. The rudders 12 and 13 are set straight. The starboard gang of vanes as well as the port pair of vanes have, however, been lowered from the hull and are extending into the water to receive the flow thereof from the screws.

The vanes thus brought into position present their concave surfaces to the flow of the wheel water and deflect the same in a lateral direction which accomplishes the movement of the stern of the vessel to port all as clearly indicated. Obviously if this produces too much flanking movement, the port pair of vanes need not be brought into position.

In Fig. 5 is disclosed the arrangement of parts to produce maximum flanking to port. Here the port screw is being rotated to force water astern and the rudder 12 associated with said screw is set over to receive the wheel water and deflect the same in a direction to starboard as indicated by the dotted arrows, thus producing some movement of the stern of the vessel to port. However, and in order to obtain the maximum flanking to port, the starboard gang of vanes is lowered into operative position and the starboard screw 7 is rotated to force water ahead, and the rudder 13 associated therewith is put over to starboard. This results in the wheel water from the screw 7 striking the vanes associated therewith and being deflected laterally, as indicated by the dotted arrows, which augments the port flanking to a maximum degree. It is to be noted that the port pair of vanes is left retracted within the hull, for obviously they would serve no useful purpose if brought down into the path of water to the port screw.

Coming now to Fig. 6 there is shown diagrammatically the arrangement of parts for straight backing. All vanes have been withdrawn into the hull, the screws 6 and 7 are rotating to force the water ahead, and the rudders 12 and 13 are set straight.

From the foregoing it will thus be seen that by this invention there is provided a plurality of readily replaceable vanes which are bodily retractable within the hull of the vessel when not desired in use but which may be extended from said hull, by any suitable means, to a position to receive the water from the wheels or screws and to deflect said water either to port or to starboard as desired thus augmenting the action

of the wheels or screws and the rudders in accomplishing flanking movement of the vessel. These vanes may be raised or lowered according to the above description, or various other means for raising, or lowering, or for both raising and lowering said vanes may be utilized including the employment of a rack rigidly disposed on each vane and engaged by a pinion receiving power, either independently or in serial connection with other pinions, from any suitable source. Also each vane may be independently operated or several vanes may be rigidly cross-connected and a single elevating device employed for operating the connected vanes. Although this invention has been described as applied to a tow-boat provided with a tunnel, it is apparent that boats of other construction may have the vanes as described built in at such positions as to cooperate with the screws for the purposes defined. Further the vanes could be placed fore or aft of each screw, although it is most desirable to have them placed on the side of the screw opposite to the rudder, irrespective of the location of the strut bearing for the screw shaft. Lastly it is not desired to be limited to the exact angularity of the set of vanes since the feature desired is a placement of said vanes to obtain a deflection up to 90° of the column of water from the screws. Therefore not only may the vanes be disposed at different angles, but their curvature may be altered and the width of each vane may be varied in accordance with the particular service in which they are incorporated.

It is obvious that those skilled in the art may vary the details of construction as well as arrangements of parts without departing from the spirit of the invention, and it is therefore not desired to be limited to the foregoing except as may be required by the claims.

What is claimed is:—

1. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means being slidable into the hull of the vessel.
2. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means being vertically retractable into the hull of the vessel.
3. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means comprising a vane slidable into the hull of the vessel.
4. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means comprising a vane angularly set with respect to the flow of the wheel water, said vane being slidable into the hull of the vessel.
5. Auxiliary flanking means for vessels provided with a propeller, a driving shaft

therefor, and a rudder, said means comprising a plurality of vanes disposed on opposite sides of said shaft, said vanes being retractable into the hull of the vessel.

5 6. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means disposed on the side of said propeller opposite said rudder and being retractable into the hull of the vessel.

10 7. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means comprising a curved vane retractable into the hull of the vessel.

15 8. Auxiliary flanking means for vessels provided with a propeller, a driving shaft therefor, and a rudder, said means comprising a plurality of vanes differently directed, said vanes disposed on opposite sides of said shaft, said vanes being retractable into the hull of the vessel.

20 9. Auxiliary flanking means for vessels provided with a propeller and a rudder, said means being slidable into the hull of the vessel and mounted for ready replacement.

25 10. In a vessel the combination of a propeller, a rudder associated with said wheel; and means slidable into the path of the wheel water to augment the action of said rudder.

30 11. In a vessel the combination of a propeller; a rudder associated with said propeller; and means movable into the path of the propeller to augment the action of said rudder, said means having a constant angular set with respect to the rotational plane of said propeller.

35 12. In a vessel the combination of a propeller; a rudder associated with said propeller; and means slidable into the path of the propeller water to augment the action of said rudder.

40 13. In a vessel the combination of a propeller; a rudder associated with said propeller; and means slidable into the path of the propeller water to establish deflecting channels therein, said means augmenting the action of said rudder.

45 14. In a vessel the combination of a propeller; a rudder associated with said propeller; and means comprising a plurality of vanes slidable into the path of the propeller water to establish substantially equal deflecting channels therein, said vanes augmenting the action of said rudder.

50 15. In a vessel the combination of a propeller; a rudder associated with said propeller; and means comprising a plurality of vanes arranged in groups, each group movable into the path of the wheel water each group to differently augment the action of said rudder.

55 16. In a vessel the combination of a plurality of propellers; independently operated rudders one associated with each propeller;

and means retractable into the hull of the vessel to augment the effort of said rudders.

17. In a vessel the combination of a plurality of propellers; independently operated rudders one associated with each propeller; and means retractable into the hull of the vessel to change the flow of propeller water established by said rudders.

18. In a vessel the combination of a plurality of propellers; independently operated rudders one associated with each propeller; and means retractable into the hull of the vessel and cooperating with said rudders to change the flow of water to and from said propellers.

In testimony whereof I affix my signature.
CHARLES E. WARD.

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