ABSTRACT

A flanking rudder system for propeller driven boats including at least two transversely spaced rudder blades mounted in flanking positions on opposite sides of a boat propeller, with blade portions extending operationally fore and aft of the propeller, and single control means for simultaneously varying the effective rudder angles and positions with respect to the longitudinal axis of the boat and the propeller. The invention includes the sole use of flanking rudders, and also flanking rudders in combination with a standard central rudder blade. In one embodiment the flanking rudders are detachable to provide simplicity of mounting and permit blade interchangeability and angular positionment.

6 Claims, 15 Drawing Figures
BOAT FLANKING RUDDER SYSTEM

BACKGROUND OF THE INVENTION

Heretofore flanking rudder constructions and systems have been used, but in most instances complex mounting and control mechanisms were required, and efficiency of operation was less than optimum. The functions and use of flanking rudders are well known and it is the purpose of the present invention to provide improvements in structure, operation and mounting of such rudders.

SUMMARY OF THE INVENTION

It is accordingly a principal object of the present invention to provide a flanking rudder system for propeller driven, pleasure, relatively small boats to improve operational characteristics, with simplified control mechanism and simplicity of mounting. In obtaining these improvements, the flanking rudder blades mounted on opposite sides of the propeller are so positioned as to most effectively coact with propeller flow and boat design for boat control. To this end portions of the flanking rudder blades extend operationally fore and aft of the propeller in the varied control angles to which positioned. A single control is provided for cojoint directional control of the blades. In one embodiment the blades are detachable from a common mounting and control mechanism, and blades of different shapes and sizes can be interchanged and the angular positionment adjusted for propeller torque compensation.

Additional objects and advantages of the invention will be more readily apparent from the following detailed discussion of the preferred embodiments thereof when taken together with the accompanying drawings in which:

FIG. 1 is a rear perspective view of a flanking rudder system according to the invention as mounted at the stern of a boat hull which is fragmentarily shown;

FIG. 2 is a fragmentary vertical sectional view of rudder control and mounting mechanism for the form of FIG. 1;

FIG. 3 is a plan view of rudder control mechanism for a system including a central and flanking rudder blades;

FIG. 4 is a view similar to FIG. 1 of a modified form of flanking rudder system;

FIG. 5 is a fragmentary vertical sectional view of control and mounting mechanism for the form of FIG. 4;

FIG. 6 is a fragmentary plan view of rudder control mechanism for the form of FIG. 4;

FIG. 7 is an exploded perspective view of a further modification having detachable rudder blades;

FIG. 8 is a fragmentary plan view pictorially presenting control positionment with the present invention;

FIG. 9 is a perspective view of another form of the present invention;

FIG. 10 is an enlarged fragmentary view on line 10-10 of FIG. 9;

FIG. 11 is a top plan view of a flanking rudder system such as shown in FIG. 4 provided with a planing bar;

FIG. 12 is a side view of the structures shown in FIG. 11;

FIG. 13 is a perspective view of the improved flanking rudder;

FIG. 14 is a perspective view of a modified form of flanking rudder and planing bar assembly; and,

FIG. 15 is an enlarged fragmentary view of the adjusting means shown in FIG. 14.

Referring now in detail to the drawings, in FIG. 1 the stern of a boat hull 10 has operatively mounted thereon a rudder system in accordance with the invention, including the usual central rudder blade 12 and port and starboard flanking rudder blades 14 and 16 respectively mounted on opposite sides of propeller 18. The blades as shown are flat, although the shape can obviously be varied, operatively attached to shafts 20, 22 and 24, having bifurcated lower ends, by welding or the like. The upper portions of the shafts are rotatably mounted in and extend through elongated standard rudder ports 28 fixed in openings in the hull bottom by water tight mounting brackets 30. An O-ring 32 and cap 34 provide a seal for the shaft.

The upper ends 20A, 22A and 24A of the respective shafts have control arms 36, 38 and 40 detachably mounted thereon as shown, for example, at 42. A lever control system interconnects the arms for a single operator such as a tiller 52. The lever system includes a link 44 interconnecting the free ends of arms 36 and 40, and which can be of any desired construction although preferably, as shown, of a ball joint type for enhanced operational characteristics. A similar link 46 interconnects arm 38, intermediate its ends, with arm 40, intermediate its ends. A number of holes 39 may be provided in the arm 38 so that the relationship between rudder 12 and rudders 14 and 16 may be manually adjusted. Arm 38, attached to central rudder blade shaft 22 has a hole 48 adapted for tiller 52 or control means.

In operation, the lever control system operates to simultaneously angularly adjust all the rudder blades as desired for boat directional control in forward or reverse directions. The flanking rudder blades 14 and 16 are so positioned and have such dimensions that portions thereof extend fore and aft of the propeller in all positions of angular adjustment for most efficient coaction with the propeller. The blades are preferably flat and mounted as close to the hull and propeller as possible without interference to the propeller and still permit full rudder control.

While the rudders shown in the drawings FIGS. 1, 2 and 3 and described herein are illustrated as being perpendicular to the hull, the rudders may be angled outwardly to any desired angle. By angling the rudders outwardly, they will function to provide horizontal trim for the boat, as well as the boat's steering means.

FIGS. 4, 5 and 6 show a modification which omits a central rudder blade. In this form, flanking rudder blades 60 and 62 are attached to a cross plate or member 64, substantially as a one-piece construction or with detachable blades (not shown) which is secured to shaft 66 extending through bearing housing 68, similar to housing 28 of FIG. 2. A control arm 70 is attached to the upper end of shaft 66. A tiller rod 72 is connected to the free end of arm 70. In this embodiment the flanking rudder blades 60, 62 and member 64 pivot as a single unit upon turning of shaft 66. The dimensions and positionment of blades 60, 62 and member 64 are such that upon angular movement of the flanking rudder, one blade or portion thereof will extend behind the propeller while the other will pass in
Greatly enhanced boat operation control results, and the construction is extremely simple and inexpensive to make, mount and control. In order to prevent rocking of cross member 64 and unwanted side thrusts on shaft 66, the boat bottom 65 is provided with a pair of tracks 67 and 69 which are engaged by the rudders. Such tracks are particularly useful on curved or V-bottom craft.

The form shown in FIGS. 7 and 8 incorporates a detachable construction for the flanking rudders. The usual standard rudder 80 is attached to shaft 82 mounted in a usual controllable manner. Flanking rudder blades 84, 86 are detachably connectible to a common bar or plate 88 through coacting holes as at 90 in the respective members by bolts or the like, not shown. The blades 84, 86 again flank the propeller. The plate 88 is attachable to rudder 80 by a bracket 92 or the like, and coacting holes 94 and bolts, not shown.

The connecting plate 88 can be flat, V-shaped or curved semicircularly around the propeller. If desired, the starboard blade can be preset to offset propeller torque.

In this embodiment the blades, in operation, also extend forward and behind the propeller. A single tiller bar serves for control of the flanking rudder and the construction is such that no additional holes need be drilled in the hull for installation. The rudder blade, post and coacting mounting structure can be suitably reinforced as required to compensate for additional strain resulting from the flanking rudder construction.

FIG. 8 shows varied angular positions of the flanking rudder system and components of FIG. 7 and it will be noted that the rudder system is offset with respect to the propeller shaft 83 to permit removal of the shaft without removing the rudder assembly.

Referring now to FIGS. 9 and 10, a more expensive to manufacture but improved version of my invention is illustrated. In the drawings the flanking rudder assembly 10' comprises rudders 12', 14', and 16' each connected to its respective rudder shaft 20', 22', and 24'. The upper ends 20'A, 22'A, and 24'A are connected via connectors 42' to lever arms 36', 38' and 40'. Arm 38' includes an off-set angle portion 100 which carries a tiller receiving end member 102 at its extended end.

Arm 38' alradily receives a slide block 104 which rotatably mounts connector 106. A fixture 108 also secured to the slide block 104 is internally threaded for reception of a lead screw 110. The extended end 112 of screw 110 is divisibly connected to reversible motor 114 whereby the slide block 104 may be electrically positioned along arm 38' to thereby determine the turning relationship between shaft 22'A and flanking rudder shafts 20'A and 24'A. Fixture 106 is connected to lever arm 40' via adjustable hydraulic ram 120 while arms 40' and 36' are interconnected via a further ram 122 so that as slide 104 is moved along arm 38' the angular relation between arms 36' and 40' may be suitably adjusted by directing pressure fluid to and from the ends of the ram cylinders of rams 120 and 122 from a source not shown in the drawings.

The connectors 21, 23 and 29 between cylinders 120 and 122 and rudder arms 36' and 40' are preferably of the ball and socket type to prevent binding during operation of the device.

Manifestly minor changes can be effected in details without departing from the spirit and scope of the invention as defined in and limited solely by the appended claims.

Referring to FIGS. 11, 12 and 13, there is shown a modified form of my improved flanking rudder having the additional provisions of a planing bar. In FIGS. 11 through 13, the flanking rudder assembly is of the general type described in reference to FIGS. 4 through 6 and in the following detailed description, prime reference characters corresponding to those employed in FIGS. 4 through 6 are employed where appropriate.

The flanking rudder includes flanking rudder blades 60' and 62' which are attached to a cross plate or member 64' substantially as a one-piece construction. The cross plate 64' has secured thereto a member 200 to which is secured the vertical shaft 66', which shaft passes through a suitable bearing housing so that the rudders may be controlled from within the boat. Shaft 66' is bored as at 202, and the extended upper end receives a fitting 204 having connection to a source of pressure fluid such as a pump or a hydraulic accumulator not shown in the drawings. The lower end of the bore 202 connects with end 206 of a single acting fluid pressure ram 208, which ram is spring returned to the planing bar neutral position shown in FIG. 12. The pressure fluid ram 208 has a ram rod 210, the extended end of which is pivotally connected to a link 212 at pivot pin 214. The other end of the link 212 is pivotally connected to a boss 214 at pivot pin 216. The boss 214 is secured to the upper surface 218 of planing bar 220. The planing bar 220 is connected to the trailing edge of top plate 64' by hinge means 222 illustrated in the drawings as a conventional piano hinge, whereby when fluid pressure is directed to the pressure fluid ram 208, the force of the pressure acting against the piston and internal return spring and acting through the linkage 212 and 214 depresses the trailing edge of the planing bar 220, as illustrated, for example, in FIG. 13, thereby accomplishing the known planing bar functions.

A modified form of flanking rudder planing bar assembly is illustrated in FIGS. 14 and 15 wherein the unitary generally U-shaped flanking rudder generally designated 250 is provided with a planing bar 252 connected to the trailing edge of the top plate 254 by an extended hinge 256. The angle of the planing bar 252 relative to the plane of plate 254 is manually adjustable via an arcuate bracket 256 having one end secured to the lower surface of the planing bar 252 wherein the free end is provided with an arcuate track 258. One surface, such as surface 260, of the track 258 may be toothed to provide a rack engageable by pinion 262 rotatable via shaft 264 and actuator 266, as more clearly illustrated in FIG. 15.

While the planing bar construction has been described in reference to FIGS. 11 through 15 and in association with a flanking rudder of the type illustrated in FIGS. 4 through 6, it will be appreciated that such construction could also be employed in conjunction with the flanking rudder illustrated in FIGS. 7 and 8.

I claim:
1. A flanking rudder system for propeller driven boats comprising: transversely spaced flanking rudder blades mounted in flanking positions on opposite sides
of the propeller; said blades being cojointly angularly movable with respect to the boat and propeller; said blades being so dimensioned and positioned as to have portions thereof extending fore and aft of the propeller at all angular positions thereof; including a central rudder blade positioned intermediate said flanking blades and cojointly angularly adjustable therewith; further including rudder posts pivotally mounted each of said rudder blades attached thereto below said boat, said posts extending above the boat bottom, lever arms respectively connected to an upper free end of each said post, a link interconnecting the free ends of said lever arms on said posts mounting said flanking rudder blades, a link interconnecting a said lever arm for a said flanking rudder blade post intermediate the ends thereof and said lever arm for said central rudder blade post, and means operatively connected with said central rudder blade post for rotation thereof, said lever arms and said links constituting a control system operable upon rotation of said central rudder blade post to simultaneously and equally angularly adjust the positions of all said rudder blades through the respective mounting posts therefor.

2. A system as claimed in claim 1, including water tight elongated bearing assemblies mounting said rudder posts through the bottom of said boat.

3. The invention defined in claim 1 wherein the connection between said link and said lever arm for said control rudder blade post is adjustable.

4. The invention defined in claim 3 wherein the means for adjusting said adjustable connection comprises a motor driven lead screw.

5. The invention defined in claim 4 wherein the motor is reversible.

6. The invention defined in claim 5 wherein the said links interconnecting the free ends of said arms on said posts mounting said flanking rudder blades comprise hydraulic rams.

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