

[54] MARINE CRAFT STEERING MEANS

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[58] Field of Search 114/144 R, 144 A, 144 C,
114/162, 164, 167, 168, 39

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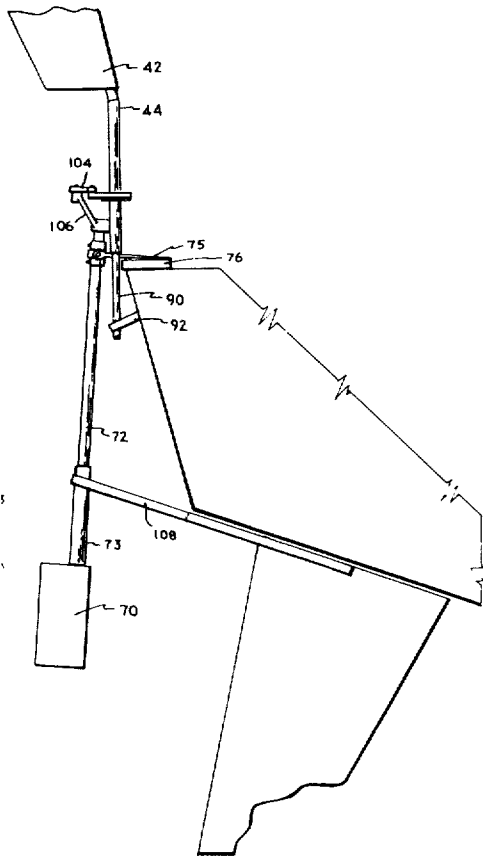
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[57] ABSTRACT

Self steering systems for marine craft are described which comprise wind direction sensing and course setting device, servo rudder member operatively connected to a rudder and connecting member linking the servo rudder member to the wind sensing and course setting device. In one embodiment, a supplemental rudder is removably attached to a craft with a servo blade which can be coupled to the wind sensing device means by linking mechanism that provides proportional control. In another embodiment, a pendulum servo blade is linked to a craft's rudder with mechanism that provides a sliding and rotatable connection which does not impose any weight on the craft's rudder. An alternative embodiment employs a modified spade rudder with a servo rudder and an integral servo mechanism. All of the embodiments are preferably provided with linking means to the wind sensing and course setting device which permit adjustability of the response of the system. The preferred wind sensing and course setting device that can be used with these systems employs vernier mechanism to permit a fine degree of control of the craft's direction.

10 Claims, 13 Drawing Figures



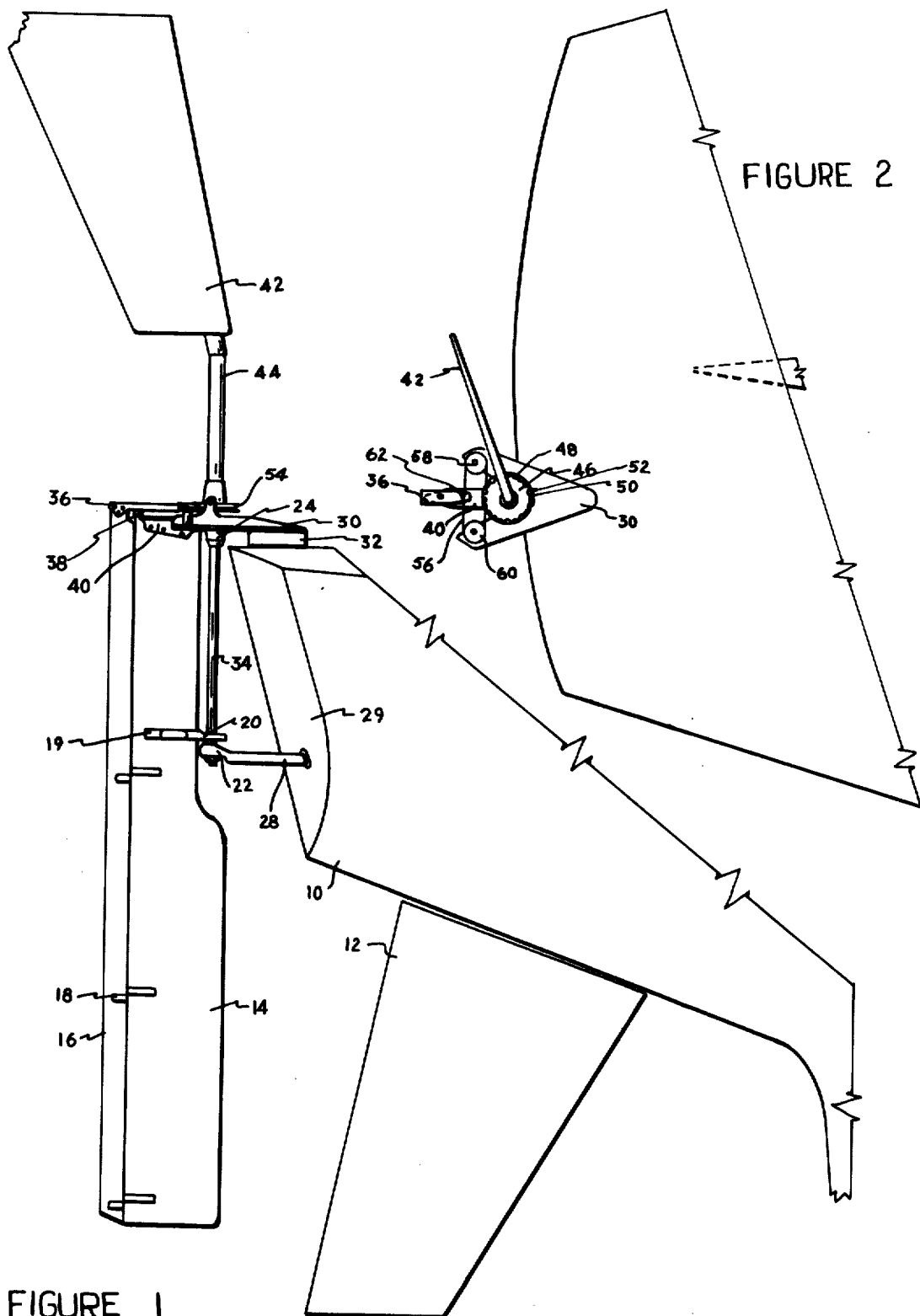


FIGURE 3

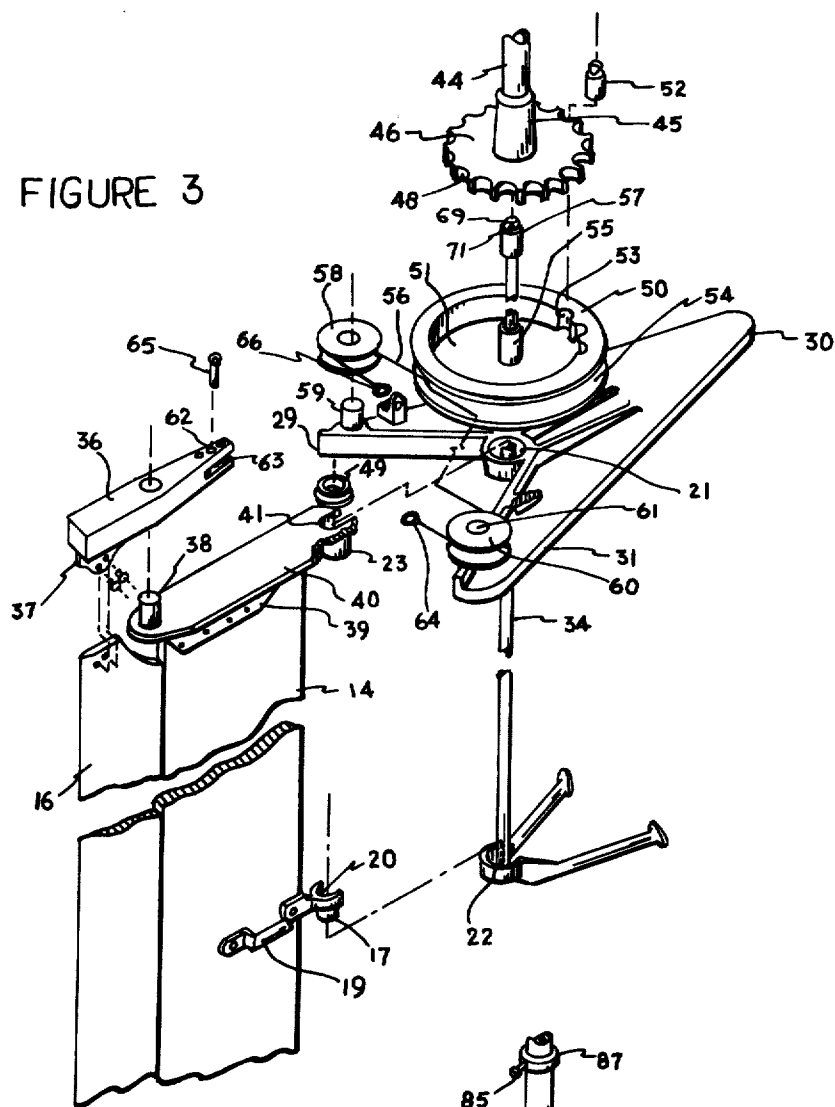
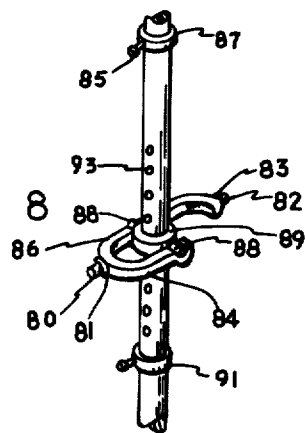
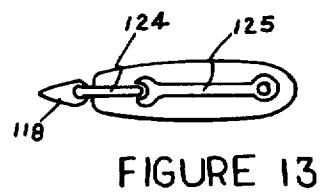
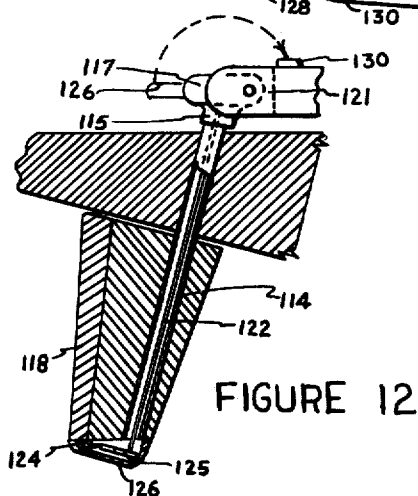
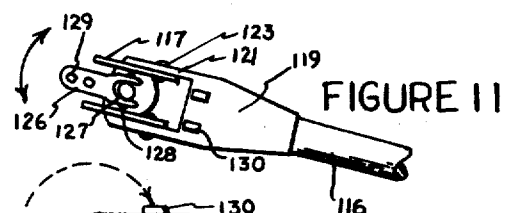
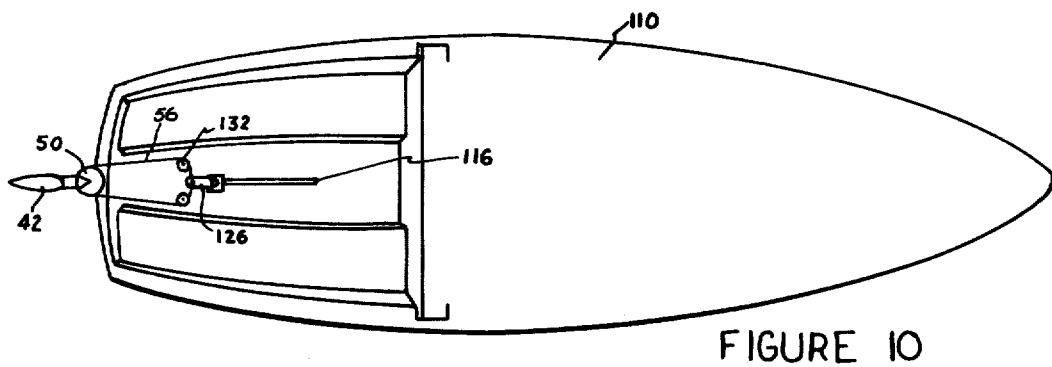
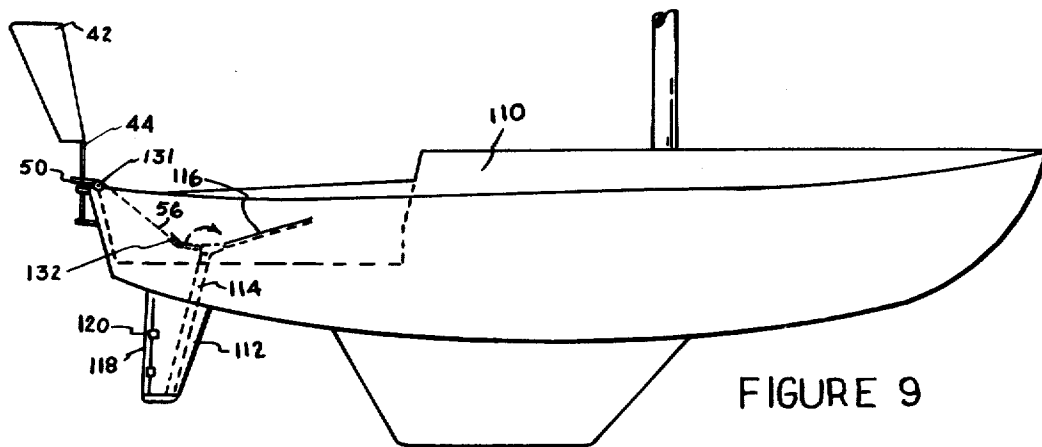


FIGURE 8





MARINE CRAFT STEERING MEANS

This application is a continuation of copending application Ser. No. 92,597, filed Nov. 25, 1970, now U.S. Pat. No. 3,765,361.

DISCLOSURE OF THE INVENTION

This invention relates to systems responsive to wind force and direction to control the course of a marine craft and, in particular, relates to self steering systems for sailboats.

These self steering systems generally comprise means for sensing the wind force and direction such as a vane, course setting means, servo rudder or tab means operatively connected to a rudder, and connecting means linking the servo means to the wind sensing and course setting means.

This invention comprises a self steering system for marine craft and possesses the following advantages: the system can be readily assembled for use and easily dismantled when not needed; parts of the system which are not removable can be readily disabled, e.g., permanently attached servo rudders can be readily interlocked into a null position; the device is rugged in construction; the course setting means permits minute changes in course settings; the system effects proportional control, i.e., there is continuous feedback to the device so that the course correction is proportional to the deviation or error in course; the device is adaptable to a plurality of craft; and, preferably, the system permits adjustability of response to accommodate varied sea conditions as well as a large variety of craft.

The invention comprises wind vane means which are rotatably mounted on the marine craft equipped with the system, which wind vane means are connected to the servo rudder with interconnecting means that permit proportional control by use of continuous mechanical feedback linkage from the craft's directional control surfaces. The invention disclosed and claimed herein employs a servo rudder which is mechanically linked to the marine craft's rudder by bracket means providing rotatable and sliding engagement with the servo rudder.

A related invention disclosed herein and claimed in my prior parent application, Ser. No. 92,597, now U.S. Pat. No. 3,765,361 employs an assembly of a supplemental control rudder with a servo rudder with means permitting its ready attachment or detachment to the craft. Yet another system, disclosed and claimed herein employs a servo rudder permanently hinged to the craft's rudder with integral actuation means permitting locking of the servo rudder to the craft's rudder in a null position.

The wind sensing and course setting means common to these systems permits a fine degree of control of the course setting by use of vernier means interconnecting the wind sensing means and the servo blade means. The invention also includes an improved pintle and gudgeon means which permit facile installation and removal of appliances to marine craft.

The invention will now be described with reference to the Figures, of which;

FIG. 1 is a side view of a servo rudder and supplemental rudder assembly;

FIG. 2 is a plan view of the assembly;

FIG. 3 is an exploded isometric view of the assembly and of a wind sensing and course setting device;

FIG. 4 is a side view of a system having a pendulum servo rudder attached to the craft's rudder with improved bracket means;

FIG. 5 is a rear view of the system of FIG. 4;

FIG. 6 is a plan view of the assembly of FIG. 4;

FIG. 7 is a view of the tiller crank of the system of FIG. 4;

FIG. 8 is a view of the pendulum servo rudder suspension of FIG. 4; and

FIGS. 9-13 illustrate a system on a marine craft with a spade rudder having a permanently installed servo rudder and an integral actuation mechanism.

Referring now to FIG. 1, the invention is shown as installed on a sailboat 10 with the craft's main rudder shown at 12. The self steering control surfaces comprise a supplemental or trim rudder 14 and a servo rudder blade 16 that is hinged along at least a portion of the trailing edge of rudder 14 by hinges 18. The rudder assembly is removably secured to the craft by upper pintle means and lower pintle means 20 that fit into upper and lower gudgeon means 24 and 22, respectively. The gudgeon means are supported on the craft; the lower by bracket 28 that is affixed to the transom 29 of the craft and the upper by support plate 30 which is affixed to the deck with block 32. A rod 34 extends vertically along the centerline between gudgeon means 22 and 24 and the pintle means such as 20 are in the shape of a clevis that fits around rod 34 with a downwardly dependent skirt that extends into the annular space between the rod 34 and the upright walls of the gudgeon means. These improved pintle and gudgeon means are described in greater detail in the discussion of FIG. 3.

The trim rudder 14 pivots about rod 34 while the servo blade 16 pivots about the trailing edge of the trim rudder with a servo blade tiller means 36 being pivoted on fulcrum pin 38 that is carried by trim rudder tiller means 40.

Rod 34 extends a short distance above plate 30 and furnishes a vertical support for rotatable wind vane means 42. The latter means is supported by an open ended shaft 44 which is secured to a drive plate. This assembly telescopes over rod 34 and rests on rotational and thrust bearing means associated with the rod 34.

Referring now to FIG. 2, the drive plate 46 can be seen to comprise a circular plate 46 which is engageable with the course setting means of the system. The circular plate 46 has a plurality of peripherally disposed apertures 48 at regular and equal angular spacings. Surrounding plate 46 is drive means 50 which has several apertures arranged about its inner periphery which can be disposed in opposition to the apertures 48 in plate 46. Pin means 52 can be removably inserted between an opposed pair of apertures to lock the plate 46 to the drive means 50 at any angular setting.

Drive means 50 is mechanically linked to the servo rudder tiller means 36 by the cable and pulley arrangement shown in FIGS. 1-3. As shown in FIG. 1, the drive means has a peripheral edge groove 54 and serves as a pulley with cable 56 extending at least one complete revolution about pulley 50 with its ends extending in opposite directions and around idler pulleys 58 and 60 and into a pinned engagement with tiller means 36 at 62. If desired, the cable 56 can be continuous with its ends attached to a common eyelet that can be engaged with tiller 36. Preferably, the tiller 36 has several bores 62 for engagement with the eyelets of the cable and

these bores are positioned at different spacings from the fulcrum of the tiller so that the sensitivity of the system, i.e., the response of the system to course deviations can be varied.

A more complete illustration of the assembly appears in FIG. 3. The support plate 30 which is affixed from the deck with block 32 has a generally V-shape with legs 29 and 31 that have vertical reinforcing ribs. The ribs are tangent to the upright circular wall of upper gudgeon means 21 which is cup-shaped and which has a central bore through which is secured rod 34. The lower gudgeon means 22 has a similar shape, however, its side wall need not be continuous, but can extend for about 180° to 360° to provide an upper edge that will support the lower pintle means 20. The clevis shape of pintle 20 is apparent in FIG. 3 as it projects from bracket 19 which, preferably, has handle means to permit the gripping of the rudder assembly. Positioned at the bottom surface of pintle 20 is the pintle skirt 17 which has a lesser diameter than the clevis portion of pintle 20 to thereby provide a shoulder. The skirt 17 fits into the annular space between rod 34 and the wall of gudgeon means 22 while the shoulder beneath the clevis portion of pintle means 20 provides a vertical stop against the top edge of the wall of gudgeon means 22.

The upper gudgeon is formed as an integral portion of the trim rudder tiller means 40. This appears as a U-shaped recess 41 which is of sufficient width and depth to surround pin 34. A semi-circular skirt 23 is secured to the underside of tiller means 40 in alignment with the rear and sides of the recess 41. This skirt is of sufficient diameter to be inserted in the annular groove between the sides of gudgeon 21 and rod 34. In this assembly, the weight of the rudder is preferably borne by the upper gudgeon, however, if desired, the lower gudgeon could also support the weight of the rudder. The improved pintle and gudgeon means thus described can be readily engaged even though the lowermost gudgeon 22 is beneath the water line or is invisible from the surface. In this assembly, the lower pintle 20 can be guided into engagement with the clevis end of the pintle engaged about rod 34 at any vertical position along this rod. The rudder assembly can then be slid down rod 34 while guiding upper pintle skirt 23 into gudgeon 21.

The servo blade and trim rudder assembly is apparent from FIG. 3. Bracket 39 can be riveted or bolted to the trim or supplemental rudder and to the under surface of tiller 40. Fulcrum pin 38 is centered on the trailing edge of rudder 14 and along the hinge joint between rudder 14 and servo blade 16. The latter can be riveted or otherwise secured to bracket 37 which is secured to the undersurface of servo blade tiller means 36. The latter is fulcrumed on pin 38.

The fore end of tiller means 36 has a bore 62 and a groove 63 at right angles thereto to form clevis means to receive the eyelets 64 and 66 that are attached to opposite ends of cable 56. A pin 65 can be inserted through bore 62 when the eyelets are placed in vertical alignment with a bore 62 and thereby mechanically link the drive pulley 50 with the tiller means 36. The disconnection of the tiller means can be rapidly accomplished simply by pulling pin 65 which, preferably, is retained to the unit by a chain, not shown, that passes through the eye in pin 65 and is secured to plate 30. The connection of the unit can be made almost as quickly by one person by inserting the eyelets into groove 63 and

holding them in this position with one hand while inserting pin 65 with the other hand.

The rear legs 29 and 31 of plate 30 support vertical bosses 59 and 61 on which are rotatably mounted idler pulley means 58 and 60, respectively. After the rudder assembly has been mounted in the gudgeon means, thrust bearing means 49 is placed on rod 34 and pulley 50 is slipped over this rod. Pulley 50 has a flat rim 51 and an upright wall to define a circular recess to receive drive plate 46. Disposed about the inner periphery of its upright wall at regular and equal angular spacings are a plurality of apertures in the form of semi-circular notches 53. Rod 34 also supports bearings or bushings 55 and 57. The upper end of rod 34 is reduced in diameter to provide a shoulder to support the upper bushing 57, a cap 69 is placed over bushing 57 and a pin 71 is placed through a bore in the end of rod 34 to secure bushing 57. The vane shaft 44 rests on rod 34 in engagement with bearings 55 and 57. The lower bearing 55 also serves as a thrust bearing to support the weight of the assembly.

The vane shaft 44 terminates with a sleeve 45 that is secured to circular plate 46. The latter has a plurality of peripherally arranged apertures in the form of semi-circular notches 48 which have the same diameter as notches 53 on pulley 50. The insertion of pin 52 between opposed notches interlocks plate 46 to pulley 50. The notches 48 are also positioned at regular and equal angular spacings which are slightly different, i.e., greater or lesser spacings, than the spacings of notches 53. In a typical embodiment, plate 46 has 36 notches spaced at 10° intervals while pulley 50 has five notches spaced at 12° intervals. In this fashion, varied settings of as slight as 2° between the wind vane 42 and the tiller 36 can be made using the mating notches in a vernier manner.

The aforementioned course setting mechanism is linked to the servo blade tiller means with mechanical means that insures proportional control. This is achieved by the pivoting of the servo blade tiller means 36 on the trim rudder with its connection 62 to the transverse cable ends 64 and 66 being aft of the pivot axis for the trim rudder. Any error signal movement of the servo rudder tiller 36 causes an opposite movement of trim rudder 14 so that the trim rudder tiller and fulcrum 38 of the servo rudder tiller is moved in the direction of the error signal movement, thereby closing tiller 36 towards its null position. This can be visualized by assuming an error signal which pulls the forward end of tiller 36 to the left and causes counterclockwise rotation of the tiller 36. This rotation of the servo blade 16 causes the trim rudder 14 to rotate clockwise, thereby moving its tiller and piggyback tiller 36 in a clockwise arc about the centerline of rod 34. This moves the end of tiller 36 closer to the left idler pulley 60. Since cable 56 is stationary, this movement causes continuously decreasing magnitude of the error signal correction as the trim rudder moves in response to the initially applied error signal. The error signal is also continuously decreased as the craft comes about to the correct heading and the combined effect of these changes is to rapidly decrease the error signal in proportion to the magnitude of the course correction.

An alternative servo blade assembly is shown in FIGS. 4-8. This assembly employs servo blade 70 on the end of shaft 72 which is rotatably supported in a collar carried by a gimbal mount carried by plates 74

and 75 which are attached to the craft's deck by blocks 76. This mounting of blade 70 permits its rotation about its own axis and about an axis generally parallel to the longitudinal axis of the craft and an axis perpendicular thereto. Plates 74 and 75, shown in FIG. 6, have bores in their outboard ends in which is inserted the ends of yoke 78. This yoke, which is rotatably mounted in plates 74 and 75, is also shown in FIGS. 5 and 8 as having shaft ends 80 and 82 which extend past flanges 81 and 83 which restrain axial movement of the yoke. Yoke 82 is J-shaped with a short aft leg 84 that terminates with a notch which is opposite a corresponding notch in the continuous leg 86 to permit mounting of trunnions 88 at right angles to the axis of the yoke through the bores in plates 74 and 75. As shown in greater detail in FIG. 8, trunnions 88 project from collar 89 in which shaft 72 is slidably and rotatably mounted. The vertical position of shaft 72 in the assembly is secured by collar 87 which has a pin 85 that is inserted through a radial bore in the collar and one of several bores 93 which are longitudinally disposed along shaft 72. The upper surface of collar 89 serves as a thrust bearing support for the weight of the servo rudder 70. A similar collar 91 is provided beneath collar 89 to restrain against upward movement of the rudder shaft 72. The trunnions 88 can be locked in place by suitable means, e.g., by a cable (not shown) which can be attached to the yoke on one side of a trunnion, laid over the trunnion and removably pinned to the yoke on the other side of the trunnion.

The wind vane assembly is shown in FIGS. 4 and 6 as laterally disposed on the craft's deck. The wind vane means 42 is secured to shaft 44 which can be slipped over the free end of rod 90 that is mounted on the craft by bracket 92. Bearings similar to those described with regard to rod 34 are also provided on rod 90 to permit free rotation of shaft 44.

At a point along its length, shaft 44 carries a drive plate 46 which is notched at 96 similarly to plate 46 previously described with regard to FIGS. 1-3. A crank means is rotatably carried by shaft 44. This crank means has a crank arm 100 and at least a partially arcuate section 102 which is concentric with plate 46. The inner periphery of the arcuate section 102 has a plurality of notches that are spaced at regular and equal angular intervals similarly to notches 53 of pulley 50 previously described. The crank means are interlocked to the drive plate 94 by a pin 103 which can be inserted between opposed notches in these elements.

The free end of crank arm 100 is connected by linking arm 104 to tiller means 106 which is carried by shaft 72. The tiller means appears best in FIG. 4 and can be seen to comprise a cap that fits on the upper of shaft 72 with an upwardly directed tiller arm that is linked to rod 104. Rod 104 has a clevis end 105 with a pin that is inserted through a bore in the arm of the tiller 106 to permit variation in the vertical alignment of the tiller arm and crank arm 100 and also to accommodate the sidewise swing of the upper end of shaft 72 and its tiller means 106.

The lowermost end of shaft 72 is mechanically linked to the craft's rudder 12 by a bracket 108 that permits rotational and sliding engagement with the shaft 72, thereby avoiding any of the weight of the servo rudder assembly from being imposed upon the rudder 12. The bracket 108 is U-shaped with legs that are attached to the rudder and an aft stirrup portion 110 that engages

a sleeve 73 on shaft 72 in a sliding fit. The servo blade 70 is rotated by wind vane means 42 through its mechanical linkage to tiller 106. As the blade is rotated, the craft's movement through the water causes the blade to swing sidewise and rotate the craft's rudder 12 by the mechanical linkage of bracket 108. This movement of rudder 12 changes the craft's course to maintain a constant heading to the wind.

The device has a constant mechanical feedback to effect proportional control. This can be seen in the illustrations of FIGS. 5 and 7 which show the servo blade 70 in solid lines when the craft's rudder is on the centerline and in broken lines when the craft's rudder is on the offset position when the craft's rudder has turned counterclockwise. In the solid line drawing, the tiller crank is aligned along the craft's centerline. When the craft's rudder is turned counterclockwise, however, the shaft 72 swings counterclockwise on trunnions 88. If the wind direction doesn't change, vane 42 isn't moved and, accordingly, rod 104 is stationary and tiller 106 must rotate in a counterclockwise direction through an angle which is shown in FIG. 7 as angle A. This relationship can be described with regard to proportional control if it is supposed that the craft has deviated to the left of its set course to such an extent that the initial course correction, caused by clockwise rotation of vane 42, has rotated servo blade 70 clockwise, resulting in a counterclockwise swing of shaft 72 and rudder 12 to the position shown by the broken lines. As the craft comes about to the correct heading, the rudder 12 returns to the craft's centerline and blade 70 also returns to the same directional setting since this blade is rotated clockwise by tiller 106 as the rudder returns. Concurrently with the return of the craft to its correct heading there will be a counterclockwise rotation of shaft 44 relative to rod 90 since the vane 42 is held at a constant azimuth by the wind force while the craft comes about to the correct heading. This results in a return of rod 104 to the position shown in the solid lines of FIG. 5 so that when the craft has returned to the proper heading, the servo blade and rudder are aligned along the craft's centerline.

The sensitivity of the auto steering means of FIGS. 4-7, i.e., the degree of movement effected in servo blade 70 by movement of crank arm 100 can be readily varied to accommodate a variety of sea conditions. The response of the system to an error signal input, as well as the degree of proportional control effected by the feedback linkage, is controlled by the relationship between the vertical distance X from trunnions 88 to the connection between tiller 106 and rod 104 and the length of crank arm 100. As the distance X decreases, the amount of response will increase; as the length of crank arm 100 increases, the amount of response will also increase. Accordingly, the response of the system can be controlled by variation in either or both of vertical distance X or the length of crank arm 100. The preferred manner of adjusting this response is by variation of the distance X simply by adjusting the position of shaft 72 in collar 89. This is achieved by locking collars 87 and 91 at any of the longitudinally spaced bores 93 in shaft 72. Alternatively, or simultaneously, another change that could be made would be to lengthen crank arm 100 with a variable extension means, not shown.

An advantage of the devices as shown in FIGS. 1-8 is that each of these can be readily removed or disengaged from operation. The servo blade 70 shown in the

embodiment of FIGS. 4-8 can be removed from the craft simply by disconnecting crank arm 104, removing the trunnions from their support in yoke 82, and lifting the servo blade assembly with the blade 70 turned to pass through stirrup portion 110. The craft can then be controlled with its conventional rudder.

The self steering system shown in FIGS. 1-3 can be disengaged as simply. The auxiliary rudder 14 and its dependent servo rudder blade 16 can be lifted from the craft after wind vane assembly has been removed. This is accomplished by lifting the vane assembly from its support on rod 34 and then lifting the rudder assembly to remove the supporting pintles from their mating gudgeons 21 and 22.

As can be seen from FIG. 3, a significant feature of the device is that it requires a minimum of attachment points to the marine craft. The entire weight of the structure, including the wind vane assembly and the auxiliary rudder assembly can be supported by only two points of attachment to the craft. These are plate 30 which can be attached to the deck of the craft and the lower support point, gudgeon 22. This compactness of the unit insures ease of installation and removal of the device.

Another advantage of both of the embodiments shown in FIGS. 1-8 is that they can be supported firmly on the marine craft. The major weight of the units can be carried by deck plates. This is considerably superior to systems which are supported entirely or even partially by the craft's rudder assembly, which must then bear the weight of the system as well as any bending moments imposed by wind forces.

FIGS. 9-13 illustrate adaption of the wind sensing and course setting means described with regard to FIGS. 1-3 to a marine craft 110 which is fitted with a modified spade rudder 112. This rudder is supported beneath the craft on a rudder post 114 which projects into the craft and terminates therein with a tiller arm 116 pivotally secured thereto. The rudder shown is commonly fabricated of a foamed plastic such as a polyurethane, covered with fiberglass and a tubular post 114 is extended substantially the entire length of the rudder to reinforce the latter.

The rudder is modified in accordance with this invention to secure servo rudder means 118 to either its leading or trailing edge by hinge means 120. The actuation means for this servo rudder is provided integral with the rudder as shown in FIGS. 11-13. A shaft 122 is extended through the bore in the rudder formed by tubular post 114 and this shaft projects below the rudder 112. A lever arm 125 is attached to the lower end of shaft 122 so that it projects towards the servo rudder 118. A servo rudder tiller 124 is attached to the lower end of the servo rudder and this tiller projects into engagement with the free end of lever arm 125. The free ends of these elements are engaged in a joint such as the prong and socket joint shown which permits lever arm 125 to transmit a rotational force to tiller 124 as shaft 122 is rotated. Other equivalent joints such as a slot and pin engagement or mating, arcuate racks could be used, if desired.

The tiller and lever assembly at the lower end of the rudder is preferably enclosed by a suitable cap 126 which has a slot in its trailing edge for insertion of tiller 124. Preferably, the lower end of servo rudder 118 extends downwardly to provide an unbroken profile along the lower edge of the rudder, as shown.

The upper end of post 114 is rigidly secured to a cap 115 which has side flanges 117. The tiller arm 116 has a yoke 119 with side flanges 121 that surround flanges 117 and are secured thereto by pins or bolts 123. The upper end of shaft 122 projects between flanges 117 and a crank arm 126 that has a clevis means 127 is pivotally secured to the shaft by pin 128. Crank 126 has a plurality of bores 129 along its length. The crank arm can be swung between the position shown in FIG. 11, where it can be freely moved to cause a proportional and opposite rotation of the servo rudder 118, to a position where it is restrained between ears 130 on yoke 119. In the latter position, the servo rudder is interlocked in a null position to the rudder 112.

The wind sensing and course setting means that can be secured to crank arm 126 can be essentially that shown in FIGS. 1-3. This comprises wind vane 42 on shaft 44 and drive pulley 50 which has vernier engagement means to the vane assembly. The cable 56 is extended over idlers 132 and opposed idlers 58 and 60 which are supported on the craft at opposite sides of crank arm 126. Eyelets at the ends of the cable are pinned to one of the plurality of bores 129 with a pin such as 65 previously described.

The system differs slightly from that of FIGS. 1-3 since the crank arm is connected to the vane means at a point which is aft, rather than forward, of the servo rudder fulcrum which is along shaft 122. In this assembly, the ends of cable 56 are not crossed, but instead project directly to idlers 58 and 60. In other respects, the operation of the system is similar to that described with regard to FIGS. 1-3.

The upper end of post 114 is rigidly secured to a cap 115 which has side flanges 117. The tiller arm 116 has a yoke 119 with side flanges 121 that surround flanges 117 and are secured thereto by pins or bolts 123. The upper end of shaft 122 projects between flanges 117 and a crank arm 126 that has a clevis means 127 is pivotally secured to the shaft by pin 128. Crank 126 has a plurality of bores 129 along its length. The crank arm can be swung between the position shown in FIG. 11, where it can be freely moved to cause a proportional and opposite rotation of the servo rudder 118, to a position where it is restrained between ears 130 on a yoke 119. In the latter position, the servo rudder is interlocked in a null position to the rudder 112.

The wind sensing and course setting means that can be secured to crank arm 126 can be essentially that shown in FIGS. 1-3. This comprises wind vane 42 on shaft 44 and drive pulley 50 which has vernier engagement means to the vane assembly. The cable 56 is extended over idlers 131 and opposed idlers 132 which are supported on the craft at opposite sides of crank arm 126. Eyelets at the ends of the cable are pinned to one of the plurality of bores 129 with a pin such as 65, previously described.

The system is similar to that of FIGS. 1-3 since the crank arm is connected to the vane means at a point which is between the projection of the servo rudder fulcrum which is along its hinged connection to rudder 112 and the main rudder fulcrum which is along post 114. In this assembly, the ends of cable 56 project directly to idlers 132. In other respects, the operation of the system is similar to that described with regard to FIGS. 1-3.

The invention has been described with regard to specifically illustrated embodiments which constitute pres-

ently preferred modes of practice of the invention. It is not intended that the invention be construed as unduly limited by way of these illustrations, but, instead, it is intended that the invention be defined by the means, and their obvious equivalents, set forth in the following claims.

I claim:

1. In a self steering means having mechanical feedback for a marine craft having a main rudder which comprises course setting means supported on said craft, servo rudder means comprising a servo rudder support shaft, a servo blade mounted thereon, pivot means carried by said craft to suspend, vertically, said servo rudder means and permit its rotation about the axis of said support shaft and about an axis generally parallel to the longitudinal axis of said craft, tiller means mounted on said support shaft above said pivot means, tiller connecting means connecting said tiller means to said course setting means, and a stirrup shaped bracket fixed to said craft's main rudder and extending about and in sliding and rotating engagement with said servo rudder support shaft and being of sufficient width to permit passage of said servo blade there-through whereby said servo rudder can be temporarily removed from the craft.

2. The self steering means of claim 1 wherein said pivot means are gimbal means whereby said servo rudder means is pivotable about an axis generally parallel to the longitudinal axis of said craft and about an axis perpendicular thereto.

3. The self steering means of claim 1 wherein said course setting means comprises wind vane means rotatably supported on said craft and said tiller connecting means comprises crank means secured in driven connection to said vane means and having a link extending from an arm of said crank means to said tiller means with sensitivity adjustment means comprising collar means slidably fixed on said servo rudder support shaft whereby the vertical distance of said tiller means above said pivot means can be fixedly adjusted.

4. The self steering means of claim 1 wherein said shaft carries adjustment means permitting adjustment of its vertical spacing of said tiller means above said pivot means.

5. The self steering means of claim 4 wherein said adjustment means comprises said shaft in slidable mounting in said pivot means with collar means thereon to permit locking said shaft at varied vertical positions in said pivot means.

6. The self steering means of claim 1 wherein said course setting means comprises a wind vane, support

shaft therefor, means to rotatably support said shaft on said marine craft, a circular plate carried by said shaft, a plurality of circularly disposed apertures at regular angular spacings on said plate, drive means mechanically linked to said tiller connecting means and rotatable about the axis of said wind vane support shaft, a second plurality of circularly disposed apertures at mating opposition to said first plurality of apertures and disposed at regular and different angular spacings than said first plurality of apertures, pin means to interconnect one of said first plurality of apertures with one of said second plurality of apertures whereby to provide variable and vernier interconnection between said plate and said drive means.

7. The self steering means of claim 6 wherein said plate is circular with said first plurality of apertures being peripherally disposed notches and said drive means comprises a crank arm with a partially arcuate section concentric with said plate and bearing a plurality of notches as said second plurality of apertures on the inner periphery of said arcuate section.

8. The improved course setting means for a self steering system for a marine craft which comprises a wind vane, support shaft therefor, means to rotatably support said shaft on a marine craft, a circular plate carried by said shaft, a plurality of circularly disposed apertures at regular angular spacings on said plate, drive means rotatable about the axis of said shaft and having a second plurality of circularly disposed apertures at mating opposition to said first plurality of apertures and disposed at regular and different angular spacings than said first plurality of apertures, pin means to interconnect one of said first plurality of apertures with one of said second plurality of apertures whereby to provide variable and vernier interconnection between said plate and said drive means.

9. The course setting means of claim 8 wherein said plate is circular with said first plurality of apertures being peripherally disposed notches and said drive means has a circular rim at least partially surrounding said plate with said second plurality of apertures being notches along the inner periphery of said rim.

10. The course setting means of claim 8 wherein said plate is circular with said first plurality of apertures being peripherally disposed notches and said drive means comprises a crank arm with a partially arcuate section concentric with said plate and bearing a plurality of notches as said second plurality of apertures on the inner periphery of said arcuate section.

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