CLAIMS

We claim:

1. A trimmable rudder system for a power boat comprising:

a steering system for controlling direction of travel of the power boat and that includes a steering actuator;

a rudder assembly that is connected to the steering system and includes a rudder blade that extends generally vertically into the water and a rudder shaft that is connected to the steering actuator and has a longitudinal axis and that can rotate about the longitudinal axis to rotate the rudder blade for steering the power boat; and

a joint that is arranged between a hull of the power boat and the rudder assembly so that the rudder shaft can pivot about an axis that extends in a transverse direction through the joint that is generally perpendicular to the longitudinal axis of the rudder shaft.

2. The trimmable rudder system of claim 1, wherein the joint is a ball-and-socket joint.

3. The trimmable rudder system of claim 2, wherein the rudder shaft and the rudder blade extend from opposing sides of the ball-and-socket joint.

4. The trimmable rudder system of claim 2, wherein the ball-and-socket joint comprises a ball that includes a ball passage that extends through the ball and wherein the rudder shaft extends through and can rotate with respect to the ball inside of the ball passage.

5. The trimmable rudder system of claim 4, wherein a collar is connected to and extends from the ball so that the collar and ball move in unison with each other, the collar including a collar passage that is aligned with the ball passage, and wherein the rudder shaft extends through and can rotate inside of both of the ball and collar passages.

6. A power boat comprising:

a hull defining a bow, a stern, a port side, and a starboard side, and configured for traveling through water at a planing speed;

a steering system for controlling direction of travel of the hull through the water; and

a pair of rudder assemblies that extend from the hull and are spaced from each other and are operably connected to the steering system, each of the rudder assemblies including:

a rudder blade that extends generally vertically into the water and a rudder shaft that is connected to the steering system and has a longitudinal axis, wherein the rudder shaft can rotate about the longitudinal axis to rotate the rudder blade for steering the power boat;

a joint that is arranged between the hull of the power boat and each of the rudder assemblies so that each respective rudder shaft and rudder blade can pivot toward and away from each of the bow, the stern, the port side, and the starboard side of the hull.

7. The power boat of claim 6, wherein the joint is a ball-and-socket joint.

8. The power boat of claim 7, further comprising a drive having at least one propeller that is aligned with a centerline of the hull and wherein the pair of rudder assemblies is arranged on opposing sides of the centerline of the hull.

9. The power boat of claim 7, further comprising a pair of drives each of which includes at least one propeller, the pair of drives arranged on opposing sides of a centerline of the hull, and wherein the pair of rudder assemblies is aligned with the pair of drives.

10. The power boat of claim 7, wherein each of the rudder assemblies includes a trim actuator that can pivot the respective rudder blade in a longitudinal direction with respect to the hull and a camber actuator that can pivot the respective rudder blade in a transverse direction with respect to the hull.

11. The power boat of claim 10, wherein the steering system can operate the trim and camber actuators of the rudder assemblies independent of each other.

12. The power boat of claim 10, wherein the trim and camber actuators include hydraulic rams.

13. The power boat of claim 6, wherein the steering system includes a steering actuator that is movable for rotating the rudder shaft.

14. The power boat of claim 13, further comprising a steering arm connected to and rotating in unison with the rudder shaft and wherein the steering actuator engages the steering arm for rotating the steering arm relative to the longitudinal axis of the rudder shaft.

15. The power boat of claim 14, further comprising a plate that supports the steering actuator at an upper end of the respective rudder assembly, wherein the plate is spaced from the hull and moves in unison with the upper end of the rudder assembly so that the steering actuator can rotate the rudder shaft when the rudder shaft and the rudder blade are pivoted toward and away from each of the bow, the stern, the port side, and the starboard side of the hull.

16. The power boat of claim 15, wherein a pair of steering actuators is supported on the plate and engages opposing ends of the steering arm.

17. The power boat of claim 16, wherein a pair of steering actuators is arranged on opposing sides of the rudder shaft.

18. A method of steering and trimming a power boat comprising:

providing a steering system for controlling direction of travel of the power boat and that includes a steering actuator;

providing a rudder assembly that is connected to the steering system and includes a rudder blade that extends generally vertically into the water and a rudder shaft that is connected to the steering actuator and has a longitudinal axis and that can rotate about the longitudinal axis to rotate the rudder blade for steering the power boat; and

pivoting the rudder shaft to control trim and camber positions of the rudder blade.

19. The method of claim 18, wherein the joint is a ball-and-socket joint.

20. The method of claim 19, wherein each of the rudder assemblies includes a trim actuator that can pivot the respective rudder blade in a longitudinal direction with respect to the hull and a camber actuator that can pivot the respective rudder blade in a transverse direction with respect to the hull.

21. The method of claim 20, wherein the steering system can operate the trim and camber actuators of the rudder assemblies independent of each other.

CLAIMS

1. A trimmable rudder system for a power boat comprising:
a steering system for controlling direction of travel of the power boat and that includes a steering actuator;
a rudder assembly that is connected to the steering system and includes a rudder blade that extends generally vertically into the water and a rudder shaft that is connected to the steering actuator and has a longitudinal axis and that can rotate about the longitudinal axis to rotate the rudder blade for steering the power boat;

a hull defining a bow and a stern; and

a joint that is arranged between the hull of the power boat and the rudder assembly so that the rudder shaft can pivot about an axis that extends in a transverse direction through the joint that is generally perpendicular to the longitudinal axis of the rudder shaft, and at least one actuator configured to selectively and controllably pivot the rudder shaft toward and away from each of the bow and the stern.

2. The trimmable rudder system of claim 1, wherein the joint is a ball-and-socket joint.

3. The trimmable rudder system of claim 2, wherein the rudder shaft and the rudder blade extend from opposing sides of the ball-and-socket joint.

4. The trimmable rudder system of claim 2, wherein the ball-and-socket joint comprises a ball that includes a ball passage that extends through the ball and wherein the rudder shaft extends through and can rotate with respect to the ball inside of the ball passage.

5. The trimmable rudder system of claim 4, wherein a collar is connected to and extends from the ball so that the collar and ball move in unison with each other, the collar including a collar passage that is aligned with the ball passage, and wherein the rudder shaft extends through and can rotate inside of both of the ball and collar passages.

6. A power boat comprising:
a hull defining a bow, a stern, a port side, and a starboard side, and configured for traveling through water at a planing speed;

a steering system for controlling direction of travel of the hull through the water; and

a pair of rudder assemblies that extend from the hull and are spaced from each other and are operably connected to the steering system, each of the rudder assemblies including:
a rudder blade that extends generally vertically into the water and a rudder shaft that is connected to the steering system and has a longitudinal axis, wherein the rudder

shaft can rotate about the longitudinal axis to rotate the rudder blade for steering the power boat;

a joint that is arranged between the hull of the power boat and each of the rudder assemblies, and actuators configured to selectively and controllably pivot each respective rudder shaft and rudder blade toward and away from each of the bow, the stern, the port side, and the starboard side of the hull.

7. The power boat of claim 6, wherein the joint is a ball-and-socket joint.

8. The power boat of claim 7, further comprising a drive having at least one propeller that is aligned with a centerline of the hull and wherein the pair of rudder assemblies is arranged on opposing sides of the centerline of the hull.

9. The power boat of claim 7, further comprising a pair of drives each of which includes at least one propeller, the pair of drives arranged on opposing sides of a centerline of the hull, and wherein the pair of rudder assemblies is aligned with the pair of drives.

10. The power boat of claim 6, wherein the steering system includes a steering actuator that is movable for rotating the rudder shaft.

11. The power boat of claim 10, further comprising a steering arm connected to and rotating in unison with the rudder shaft and wherein the steering actuator engages the steering arm for rotating the steering arm relative to the longitudinal axis of the rudder shaft.

12. The power boat of claim 11, further comprising a plate that supports the steering actuator at an upper end of the respective rudder assembly, wherein the plate is spaced from the hull and moves in unison with the upper end of the rudder assembly so that the steering actuator can rotate the rudder shaft when the rudder shaft and the rudder blade are pivoted toward and away from each of the bow, the stern, the port side, and the starboard side of the hull.

13. The power boat of claim 12, wherein the steering actuator comprises a pair of steering actuators supported on the plate and engaging opposing ends of the steering arm.

14. The power boat of claim 13, wherein the pair steering actuators is arranged on opposing sides of the rudder shaft.

15. A power boat comprising:
a hull defining a bow, a stern, a port side, and a starboard side, and configured for traveling through water at a planing speed;

a steering system for controlling direction of travel of the hull through the water; and

a pair of rudder assemblies that extend from the hull and are spaced from each other and are operably connected to the steering system, each of the rudder assemblies including:
a rudder blade that extends generally vertically into the water and a rudder shaft that is connected to the steering system and has a longitudinal axis, wherein the rudder shaft can rotate about the longitudinal axis to rotate the rudder blade for steering the power boat;

a joint that is arranged between the hull of the power boat and each of the rudder assemblies so that each respective rudder shaft and rudder blade can pivot toward and away from each of the bow, the stern, the port side, and the starboard side of the hull;

wherein the joint is a ball-and-socket joint; and

wherein each of the rudder assemblies includes a trim actuator that can pivot the respective rudder blade in a longitudinal direction with respect to the hull and a camber actuator that can pivot the respective rudder blade in a transverse direction with respect to the hull.

16. The power boat of claim 15, wherein the steering system can operate the trim and camber actuators of the rudder assemblies independent of each other.

17. The power boat of claim 15, wherein the trim and camber actuators include hydraulic rams.

18. The power boat of claim 15, wherein the steering system includes
a steering actuator that is movable for rotating the rudder shaft; and

a steering arm connected to and rotating in unison with the rudder shaft and wherein the steering actuator engages the steering arm for rotating the steering arm relative to the longitudinal axis of the rudder shaft.

19. The power boat of claim 18, further comprising:
a plate that supports the steering actuator at an upper end of the respective rudder assembly, wherein the plate is spaced from the hull and moves in unison with the upper end of the rudder assembly so that the steering actuator can rotate the rudder shaft when the rudder shaft and the rudder blade are pivoted toward and away from each of the bow, the stern, the port side, and the starboard side of the hull.

20. The power boat of claim 19, wherein a pair of steering actuators is supported on the plate and engages opposing ends of the steering arm.

21. The power boat of claim 20, wherein a pair of steering actuators is arranged on opposing sides of the rudder shaft.