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BOAT CONTROL SYSTEM

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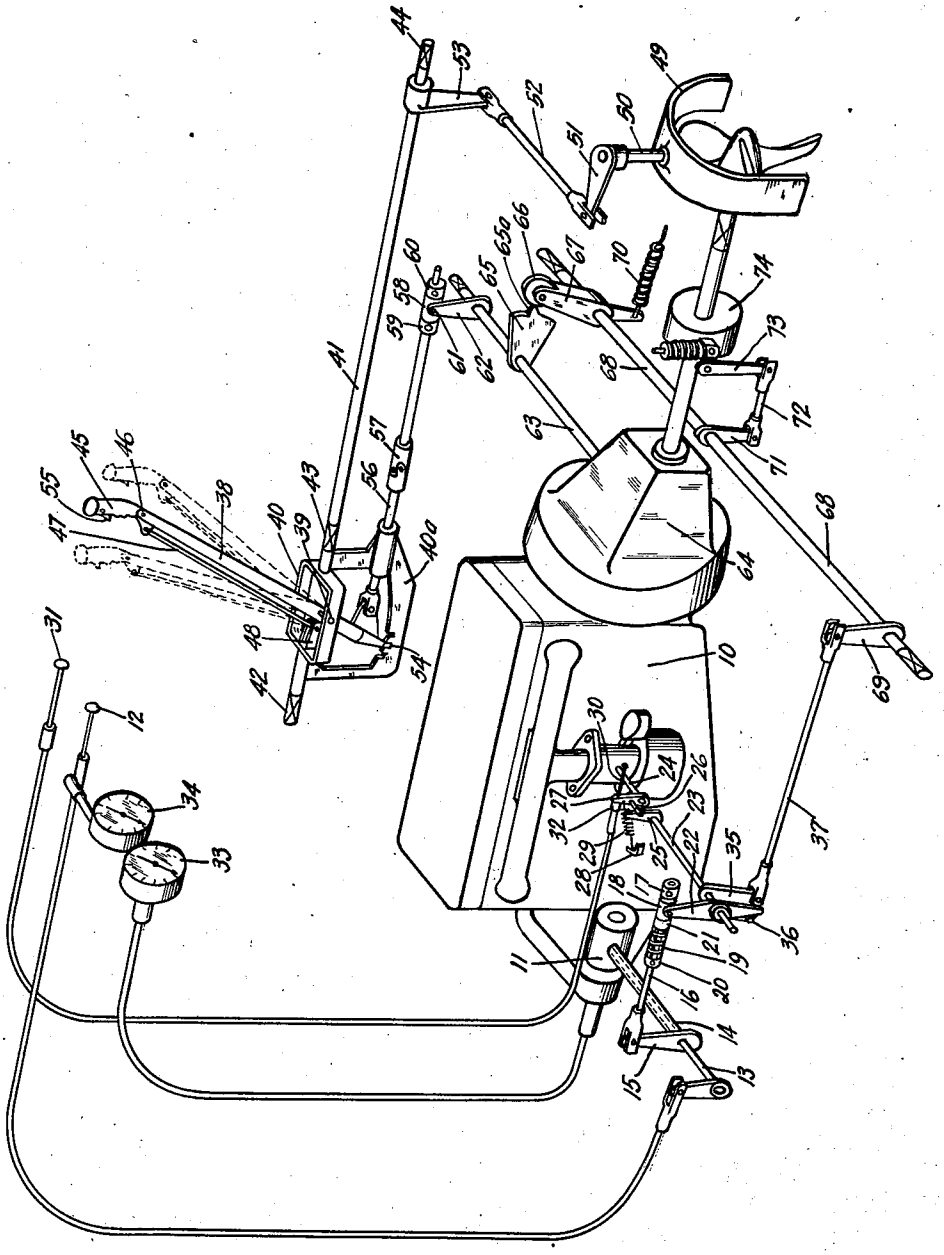

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BOAT-CONTROL SYSTEM

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20 Claims. (Cl. 115—35)

This invention relates to boat control systems.

Its chief objects are to provide improved control apparatus adapted for easy coordination of steering, increase and decrease of power application, reversing, steering in reverse, and braking; to provide for coordination of some or all of those things in conjunction with governor control; to provide for coordination of some or all of those things by the manipulation of a single control member; and to provide simplicity, economy and durability of construction.

It is a further object of the invention to improve upon the propelling systems and steering devices commonly used in power boats so that boats may be more readily and easily maneuvered and operated and that certain disadvantages in the standard systems now in use for this purpose may be obviated. In the operation of a power boat, it is necessary that the propeller be reversed so as to retard the forward movement of the boat, as, for example, in approaching a landing or avoiding a collision. As at present constructed, the means for reversing the propeller requires the manipulation of several controls in order to avoid stalling the motor. If the motor is stalled, the boat will drift and there is no means by which its forward motion may be stopped readily.

One of the principal objects of the invention is to provide a combination of control elements by which it is practically impossible to stall the motor when reversing the propeller. The arrangement is such that the devices which prevent the stalling of the motor are all controlled and interconnected with the single hand control by which the direction of the propeller is controlled so that during the reversing of the propeller, the motor will be automatically slowed down when in neutral and speed resumed when the reverse is engaged.

This makes it possible to reverse the propeller in either direction almost instantaneously without danger of stalling the motor and makes it possible for even an inexperienced operator to retard the forward movement of the boat and reduce the period required to bring the boat from its topmost speed to a safe landing speed. It also makes it possible to back the boat away from its mooring point more expeditiously than has been possible heretofore.

In combination with the features above set forth, the mechanism also includes a rudder of the type which will steer the boat when it is moving in reverse as effectively as in forward motion. The efficiency of the ordinary rudder used with power boats is greatly reduced in reverse because these rudders depend primarily upon the reaction from the stream flowing from the propeller, or the "prop-flow" as it is frequently termed. When the propeller is reversed, this stream flows away from the rudder and, consequently, the steering effect of the rudder is substantially reduced. In connection with my improved boat control, there is employed a form of rudder which is movable to either side of the plane of the propeller so that it acts with equal efficiency in either direction of movement of the boat. This rudder is connected to the single lever or stick by which the direction of the propeller is controlled. In this manner the operator of the boat may, with a single mechanism, control not only the direction of rotation of the propeller, but the speed of the motor and the steering of the boat in either direction.

Instead of the cradled and pivoted control stick shown herein, a steering wheel, the post of which is pivotally mounted, may be used. In fact, any single control element can be used provided that it has the capability of rocking in two planes.

The single figure of the accompanying drawing is a perspective view, somewhat diagrammatic, of a boat control system embodying my invention in its preferred form.

Referring to the drawing, the system comprises a motor 10, and a governor 11 therefor having a hand-knob 12 for setting the governor for different speeds, through a rock-shaft 13.

The governor controls the throttle through a hollow rock-shaft 14 which surrounds the setting shaft 13 and has secured upon it an arm 15 to which is hinged a link 16 having a stop-collar 17 secured upon its outer end. A slide-collar 18 is mounted upon the link 16 and is constantly urged toward the stop-collar 17 by a helical compression spring 19 which is interposed between a spring-seat collar 20 secured upon the link and a spring-seat collar 21 slidably mounted upon the link. The slide-collar 18 has hinged to it the upper arm of a two-armed lever 22 which is secured upon a rocker-rod 23 which is mounted in axial alignment with the oscillative throttle rod 24 of the motor.

Secured upon the rocker-rod 23 is an arm 25 which engages a stud 26 projecting from a throttle-lever arm 27 which is secured upon the throttle rod 24 and connected to a stationary bracket 28 by a pull spring 29.

The arrangement as described is such that the governor control can be over-ridden for slower

speed by compression of the spring 19, through connections hereinafter described, and can be over-ridden for faster speed, as for testing or clearing the motor, or for hand-control, with stretching of the spring 29, by pushing of the hand-knob 31.

For the latter purpose a push-wire 30 having a hand-knob 31 slidably extends through a hole in the throttle lever 27 and has secured upon it a push-collar 32 engaging the throttle lever.

The drive shaft of the governor has connection with a tachometer of which the dial is designated 33. It is mounted alongside of a dial 34 adapted to indicate the setting of the governor, the tachometer being adapted to check the accuracy of the governor control, both of the indicators reading the same when the governor-control is in proper adjustment.

For over-riding the governor-control for slower speed an arm 35 is pivoted on the rocker-rod 23 and provided with a stud 36 adapted to engage the lower arm of the lever 22 and thus turn the rod 23 to lower speed position, against the force of the spring 19, when a pull-link 37, hinged to the arm 35, is moved to the right as viewed in the figure.

In the embodiment here shown a single hand lever 38 is so mounted and has such connections that the boat can be completely controlled by manipulation of this single lever.

The hand lever 38 is fulcrumed at 39 in a rocking frame comprising an upper rectangular portion 40, which is disposed in a horizontal position in normal straight-line driving of the boat, and a lower, U-shaped porton 40a, which at such times is disposed in a vertical position. The rocker frame has in axial extension thereof two oppositely extending rods which constitute a rock-shaft 41, of which the bearings are indicated at 42, 43, 44.

The hand lever 38 has a handle 45 hinged to its upper end at 46 and connected by a parallel motion link 47 with a bracket 48 mounted in the rocking frame so that the handle 45 continues to be in a substantially vertical position, for firm hand engagement, as the hand lever is moved forward and backward.

For effective steering at low speeds, and especially for effective steering in reverse, which with the ordinary rudder is partially or wholly defeated by the fact that the slip stream is toward the boat and away from the rudder instead of being deflected by the latter, a U-shaped rudder 49, straddling the propeller, is here shown, such a rudder being adapted to deflect the propeller's slip-stream and thus provide jet steering in either forward or backward movement of the boat.

The rudder stem, 50, is connected to the rock-shaft 41 by an arm 51, a link 52 and an arm 53, and in either forward or backward movement of the boat the advance end of the boat moves in the lateral direction in which the hand lever 38 is moved.

The hand lever extends below its fulcrum 39 and is provided with an end latch 54 controlled, through suitable connections, by a release trigger 55, and adapted to be engaged in one or another of notches formed in the U-shaped swinging-frame member 40a, for holding the hand lever in forward, neutral or reverse position.

Hinged to the lower arm of the hand lever is a two-part link 56 provided with a universal joint 57 and having rotatably mounted on its rear end a collar 58 held between positioning collars 59, 60. Hinged to the collar 58 at 61 is an arm 62 secured upon a transverse rock-shaft 63 which extends into and controls the reverse gear 64 of the motor.

Secured upon the shaft 63 is a cam 65 formed with a hump 65a, and a cam roller 66 associated therewith is mounted upon an arm 67 which is secured upon a transverse rock-shaft 68 having an arm 69 hinged to the link 37. The hump 65a of the cam is adapted to over-ride the governor-control and throttle down the motor at such times as the reverse gear is in neutral, but a pull spring 70 is adapted to hold the roller 66 in contact with the cam, on either side of the hump, and thus restore the effectiveness of the governor-control, as soon as the hand lever has passed neutral position in either direction.

Also the rock-shaft 68 has connection, through an arm 71, a link 72 and a lever 73, with a propeller brake 74, the arrangement being such that the brake is applied when, but only when, the transmission is in neutral.

The mode of operation is manifest from the foregoing description, as are also the advantages corresponding to the above statement of objects.

Various modifications are possible within the scope of the appended claims.

I claim:

1. A boat control system comprising a motor throttle, governor-control-over-riding means, motor-disabling means, a brake, steering means, a manual-control member, and means operatively connecting said member with all of the other elements recited.

2. A boat control system comprising a motor throttle, motor-disabling means, a brake, steering means, a manual-control member, and means operatively connecting said member with all of the other elements recited.

3. A boat control system comprising steering means effective in forward or reverse movement of the boat, said steering means comprising rudder means adapted to be impinged upon by the slip stream of the propeller in both directions, means for reversing the direction of propeller thrust, a single control member and operative connections from said control member to the steering means and the reversing means.

4. A boat control system comprising steering means, a single manual-control member, means operatively connecting the control member and the steering means, and means also operatively connected to said manual-control member for effecting at least one of the following: braking, propeller-reversing.

5. A boat control system comprising a motor, a propeller, steering means, throttle-control means, motor-disconnecting means, propeller-reversing means, a manual-control member, and actuating connections between said member and each of the said means.

6. A boat control system comprising a motor, a propeller, steering means, throttle-control means, propeller-reversing means, a manual-control member, and actuating connections between said member and each of the said means.

7. A boat control system comprising a motor, a propeller, steering means, throttle-control means, braking means, propeller-reversing means, a manual-control member, and actuating connections between said member and each of the said means.

8. A boat control system comprising a hinged frame providing a fulcrum and a ratchet for a control lever, a control lever fulcrumed thereon and engageable with said ratchet, steering means

connected to said frame for actuation by hinging movement thereof, and propeller-controlling means connected to said lever for actuation by movement of the lever about its fulcrum.

9. A vehicle control system comprising a hinged frame providing a fulcrum for a control lever, a control lever fulcrumed thereon, a rock-shaft coaxial with and connected to said frame for actuation by hinging movement thereof, a link connected to said lever for actuation by movement of the lever about its fulcrum, and propeller-reversing means actuated by said link.

10. A boat control system comprising a motor, a governor-control therefor, a propulsion member driven by the motor, means for connecting and disconnecting the motor with relation to the propulsion member, latch means for disabling the governor-control, and motor control means operable while the governor-control is held disabled by said latching means.

11. A boat control system comprising a motor, a propeller, steering means, propeller-reversing means, a unitary manual-control member, and actuating connections between said member and each of said means.

12. A boat control system comprising steering means, a motor throttle, a brake, a unitary manual-control member, and means operatively connecting said member with each of the other three elements recited.

13. In a control system for power operated boats comprising an engine and a propeller, a single control device for reversing the direction in which the boat is moved by the propeller and for steering the boat, said device including a rudder movable to either side of the plane of rotation of the propeller, operating connections from the control device to the rudder, and means for retarding the rotation of the propeller and for reducing the speed of the engine also connected to said control and operable therefrom in shifting the control device for reversing the direction of the propeller.

14. In a power boat control system including an engine, a propeller and propeller driving means, a single control device movable in two planes to control the direction in which the boat is moved by the propeller and the steering of the boat, respectively, a throttle for controlling the speed of the engine, a brake for retarding the rotation of the propeller, means actuated by the movement of the control device in one of its planes simultaneously to disconnect the propeller driving means, apply the brake to the propeller and operate the throttle to reduce the speed of the engine, a rudder surrounding the propeller and movable to either side of the plane of rotation of the propeller, and connecting means between the control device and the rudder and operable by the movement of the control device in its other plane.

15. In a power boat control system including an engine, a propeller and propeller driving means, a control stick, a rocking cradle in which the stick is pivoted, connections from the stick to the propeller driving means, a rudder surrounding the propeller and movable to either side of the plane of rotation of the propeller, operating connections from the cradle to the rudder, a throttle for the engine and a governor for the throttle, and means actuated during pivotal movement of the control stick for overriding the governor and closing the throttle.

16. In a power boat control system including an engine, a propeller and reversible propeller driving means, a control stick which is pivotally mounted so as to be movable on two axes, a rudder connected to the stick and movable when the stick is rocked on one axis, means to reverse the driving means operable when the stick is rocked on its other axis, a brake for the propeller and a throttle for the engine, and means actuated during the last named rocking movement of the stick to apply the brake and close the throttle.

17. In a power boat control system including an engine, a reversible propeller, a control device which is capable of movement in two planes, a rudder comprising a pivoted shield surrounding the propeller and movable on either side of the plane of rotation of the propeller, connections from the control device to the rudder whereby the rudder may be operated by movement of the control device in one plane, means connected with the control device whereby the movement of the control device in the other plane will reverse the propeller, and means associated with the control device for controlling the speed of the engine and of the propeller during the reversal of the propeller.

18. In a power boat control system including an engine, a reversible propeller driven thereby, a brake on the propeller, a throttle for the engine, a governor for the throttle and a rudder, a single pivoted control device having forward, neutral and reverse positions when moved in one plane and having a secondary movement independent of the pivotal movement, a shaft for reversing the propeller connected to the control device, a trip on the shaft having connections to the brake, the throttle and the governor to apply the brake, close the throttle and override the governor when the control device is in neutral position, and means to connect the control device to the rudder whereby the rudder may be moved by the secondary movement of the control device.

19. In a power boat control system including an engine, a reversing gear and propeller shaft driven thereby, a throttle for the engine, a governor for the throttle and a rudder, a single pivoted control device having forward, neutral and reverse positions when moved in one plane and having a secondary movement independent of the pivotal movement, a shaft connecting the control device and the reversing gear, a trip on the shaft having connections to the throttle and the governor to close the throttle and override the governor when the control device is in neutral position, and means to connect the control device to the rudder whereby the rudder may be moved by the secondary movement of the control device.

20. In a power boat control and steering system, including an engine, a reversing gear and propeller shaft driven thereby, a throttle for the engine, a pivoted control device having forward, neutral and reverse positions when moved in one plane, said control device being also movable in a second plane, a shaft connecting the control device and the reversing gear and movable when the control device is moved in the first plane, a second shaft having connections to the throttle, means actuated by the first named shaft when the control device is in neutral position for closing the throttle, and connections from the control device to the rudder whereby the rudder is operated when the control device is moved in the second plane.

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