SHIP PROPULSION INCLUDING INTERNAL PADDLE WHEEL

Mechanism for propelling a ship including a paddle wheel adapted to be rotated by rushing water admitted from the bottom of the hull of the ship at both sides of the wheel. The water strikes the paddles of the wheel at a tangent on each side thereof, whereby the wheel is adapted to be rotated selectively in desired directions. An interior pump drives at high speed and pressure against the paddle wheel. Water is discharged centrifugally from the top of the wheel. The ship can be propelled by wind power and the paddle wheel will serve as braking means.

The invention relates to ship propulsion and more particularly to a drive mechanism for a ship of the stern water-wheel type.

In this type of a ship, it is desirable that the hull of the ship be "down at the stern," in other words, that the stern of the hull draw somewhat more water than the bow.

An important feature of the present invention is to utilize the inflow of water from the sides of the ship through inlets and passages and to utilize pumped water under pressure for driving a water wheel mounted rearwardly of the center of the hull, which wheel in turn drives the shaft mounting the propeller.

In a modification of the invention the ship is driven by a wind power which drives a stern propeller via a paddle wheel mounted in the center of the hull. Water is fed to the paddle wheel to serve in braking the ship.

FIG. 1 is a top plan view of a ship embodying one form of the invention, parts being shown broken away.

FIG. 2 is a part elevational and part sectional view of the ship, parts being shown broken away.

FIG. 3 is an enlarged sectional view taken on the plane of the line 3--3 of FIG. 2.

FIG. 4 is a detail perspective view of the water wheel and controls.

FIG. 5 is a view similar to FIG. 1 of a ship embodying a modified form of the invention.

FIG. 6 is a side elevational view thereof, parts being shown broken away.

Referring now in detail to the various views of the drawings, in FIG. 1 a ship made in accordance with the invention is shown and designated generally at 10. The ship 10 comprises a hull 12 with stern 14 and bow 16 disposed as indicated. A compartment 18 is formed in the top of the hull rearwardly of the center thereof. Another compartment 20, is formed in the hull slightly forwardly of the compartment 18. Both compartments intersect the top surface of the hull, and compartment 20 is deeper than compartment 18 extending to a point adjacent the center of the hull.

A water wheel 22 is positioned vertically in compartment 20. Wheel 22 has closed sides 23 and 24 with paddles 26 therebetween at its periphery. A hub 27 on wall 24 is journalled in a bushing 28 seated in a recess in a side wall of the compartment. Another hub 30 is formed on the center of side 23 and seated in the other side wall of the compartment. Formed integrally with the hub 30 there is an elongated shaft 32 extending rearwardly through a passage 34 to the rear end of the hull. A propeller 36 is fixed on the outer extending end of shaft 32.

In accordance with the present invention, a hole 38 is formed in the bottom of the hull at one side thereof communicating with an upwardly extending passage 40 intersecting the compartment 20 at its upper end, the periphery of the wheel extending into said passage 40 at its top end. A similar hole 42 is formed in the bottom of the hull at its other side, communicating with a similar upwardly extending passage 44 intersecting the compartment 20 at its top end, the periphery of the wheel extending into said passage 44 at its top end. The compartment 20 intersects the top surface of the hull at the center of the hull by means of an opening or passage 45. A transverse metal pipe 46 is supported on the top surface of the hull above the passage 45, the ends of the pipe opening outwardly of the sides of the hull as best seen in FIG. 3. Midway its ends, the pipe is formed with a cutout portion 48 at its bottom side communicating with the compartment 20 at its top, through passage 45. Depending flanges 50, 52 are provided on the pipe on opposite sides of its cutout portion 48 to direct the water into the pipe. The flanges rest on the peripheries of the sides 23 and 24.

Controls for controlling the passage of water through the passages 40 and 44 are provided in the form of a shaft 53 extending through a vertical passage 54 in the hull adjacent the compartment 20 and passage 40 leading from inlet opening 38. An elongated closure plate 56 is fixed at one end of the bottom end of shaft 52 and is so positioned as to swing across the passage 40 to close the same. An actuating actuating plate 58 is fixed at one end on the upper end of the shaft with a handle 60 on its other end for turning the shaft. A shaft 62 similar to shaft 52 is similarly positioned in a passage 64 in the hull adjacent the compartment 20 and passage 44 leading to the inlet opening 42. An elongated closure plate 66 similar to plate 56 is fixed at one end on the bottom end of shaft 62 and so positioned as to swing across the passage 44 to close the same. An actuating elongated plate 68 is fixed on upper end of shaft 62 with a handle 70 on its other end for turning shaft 62.

The invention also contemplates driving the water wheel 22 by water under pressure, by means of a motor driven pump 33a mounted in the hull. The pump forces water under pressure through upper substantially horizontally disposed ducts 71, connected to vertically disposed tubes or pipes 71', 71" supported in the hull alongside the passages 40 and 44, and connected at their bottom outlet ends to said passage by a pair of spaced nozzles 72, 72' disposed at a slight inclination to the horizontal, to point upwardly in the direction of the paddles 26 at the sides of the wheel. The openings in the upper open ends of the vertically disposed tubes or pipes 71', 71" are controlled by manually operated closure plates 56', 66' fixed to the control shafts 52 and 66, respectively, adjacent the pipe 46. The arrangement of the closure plates is such that when the closure plate 66 closes the passage 44, the corresponding upper closure plate 66' will also close the passage between the corresponding ducts 71' and vertical tube 71". Conversely, when the closure plate 56 opens the passageway to passage 40, the corresponding upper closure plate 56' will be swung away and will open the passageway for the pumped water and will permit the water under pressure to be discharged via pipe 71' through the nozzles 72 against the paddles 26 of the water wheel 22.

Mechanism is shown for steering the ship 10 comprising a horizontal shaft 74 journaled in a plate 76 on the forward wall of the compartment 20 and in the depending portion 77 of a closure plate 78 closing the compartment 20 and protecting the pipe 46. The shafts 52 and 62 extend upwardly through holes in the plate 78
with their actuating plates 58 and 68 outside the plate as best seen in FIG. 2. A flexible member 80 is coiled around the central shaft 74 between the legs 81 of a U-shaped plate laterally secured to the closure plate. One end of the flexible member 80 extends across the compartment 18 to guide roller 82 on one side of the hull, then rearward through a passage 84 to guide roller 86 at the rear of the hull, and then laterally and inwardly where it is connected to a lever 88. The other end of the flexible member 80 extends across the compartment 18 to guide roller 90 on the other side of the hull, then rearward through a passage 94 while guide roller 92 to the rear of the hull and then laterally and inwardly where it is connected to lever 88. Lever 88 is fixed on the top end of a shaft 96 rotatably mounted in bearings 98 on the rear end of the hull. A steering rudder 100 is fixed on the bottom end of shaft 96. A steering wheel 102 is mounted on the free outer end of shaft 74 in compartment 18.

In operation, the ship 10 will be propelled by the water forced through pipes 71' and 71" by pump 32a to the passages 40 and 44, the water striking tangentially against the paddles 26 of the paddle wheel 22. The wheel in turn transmits power to the propeller shaft 32 and propeller 36.

In order to propel the ship forward, the passage 40 and pipe 71' are opened by turning the actuating plate 58 by handle 60 whereby the closure plates 56 and 56', closing passage 40 and pipe 71' are swung to open position as shown in FIG. 3, the closure plates 66 and 66' closing passage 44 and pipe 71" remaining closed. The water rushing through the passage 40 strikes the paddles 26 of the paddle wheel 22 at its left hand side turning the wheel clockwise as viewed in FIG. 3. The water at the top of the wheel is driven out by centrifugal force through the opening 45 in the top of the hull, through the cutout portion 48 of pipe 46 and then through the pipe 46 to the right hand side of the open end thereof to the water W.

In order to propel the ship rearwardly, the closure plates 56 and 56' are closed by turning plate 58, and the closure plates 66 and 66' are opened by turning the actuating plate 68 by handle 70. The water rushing down pipe 71' and up through passage 44, striking the paddles 26 at the right hand side of the paddle wheel 22 and turning the wheel counterclockwise as viewed in FIG. 3. The water escapes by centrifugal force through the opening 45 in the top of the hull, the cutout portion 49 of pipe 46 then through pipe 46 to the left as viewed in FIG. 3, to the water W.

In steering, the rudder 100 is turned to the right or left by means of the steering wheel 102, flexible member 80, lever 88 and shaft 96.

In the modified form of ship 10' shown in FIGS. 5 and 6, wind power is used in place of water power for propelling the ship, and paddle wheel 22' is used for braking purposes. A shaft 104 extends through a passage 106, in the hull, lengthwise, thereof, leading to the compartment 20'. One end of the shaft 104 is fixed to the hub 29' of the side wall 24' of paddle wheel 22' and its other end connected to one end of a coupling 108, the other end of the coupling being operatively connected to a rotatable reciprocable shaft 110 carrying opposed spaced bevel pinions 112 and 114. Clutching mechanisms in the form of a transversely grooved sleeve 116 is fixed on the other end of the shaft 110. An actuating lever 118 pivoted upwardly in the hull has one end coacting with the groove 120 in the sleeve 116, its other end projecting above the top surface of the hull. A wind motor 122 in the form of a compound curved plate 123 coaxes to drive the shaft 110. Plate 123 is fixed on an upright shaft 124 extending above the top surface of the hull and downward through a passage 126 in the hull. The bottom end of shaft 124 carries a bevel pinion 126 adapted to mesh with either pinion 112 or pinion 114 on shaft 110 for rotating the shaft 110 in opposite directions.

In ship 10', steering is accomplished by means of a manually operated lever 88' fixed on the top of shaft 96' mounting rudder 100'. The bottom end of shaft 96' is journaled in a bracket 128 fixed on the bottom surface of the hull and extending rearwardly thereof. The lever 88' is above the top surface of the hull for ready manipulation.

In all other respects, the ship 10' is similar to ship 10 and similar reference numerals are used to indicate similar parts throughout.

In operation, the ship 10' will be propelled by the force of the wind, as the plate 123 will be rotated which in turns transmits power to the shafts 110 and 104 through the engaging pinions. Shaft 104 turns wheel 22" which turns the propeller shaft 32' and propeller 36'.

When the wheel 22'' is rotating, passages 40 and 44 will be closed so that the wheel 22'' serves simply as a coupling means between the wind driven plate 123 of wind motor 122 and propeller 36'. When braking is desired to slow down the ship, passage 44 and pipe 71" will be opened if the ship is moving forwardly or passage 40 and pipe 71' will be opened if the ship is moving rearwardly, and pump 32a will be turned on to drive water under pressure against the paddle wheel 22' to retard its rotation so that turning of propeller 38" is retarded and the ship is decelerated.

If passage 40 and pipe 71' are opened while the paddle wheel is rotating clockwise as viewed in FIG. 3, under force of water under pressure applied by pump 32a, then the ship will be driven forward by wind power applied to rotate the compound curved plate 123 in cooperation with water power applied by pump 32a. By this arrangement, pump 32a can be used for propelling the ship alone, or for propelling the ship in cooperation with the wind motor, or for decelerating the ship. Furthermore, the pump can be deactivated and the ship can be propelled by wind power alone.

What is claimed is:

1. Ship propulsion means, comprising: a hull having a central axially horizontal cylindrical compartment; a paddle wheel disposed in axially horizontal position in said compartment, the axis of the wheel extending longitudinally of the hull; means rotatably supporting the wheel to rotate in a substantially vertical plane extending transversely of the hull; shaft connected axially at one end to said wheel for rotation thereby, said shaft extending to the rear of the hull; a propeller at the rear end of the hull connected to the other end of the shaft for rotation thereby to propel the hull when said hull is immersed in water; said hull having passages opening into the compartment at opposite sides of the hull; pipes in said hull opening into said passages respectively near the ends thereof; a pump in the hull connected to said pipes respectively for driving water under pressure against the paddle wheel to rotate the same at high speed; and manually operable closure means for independently closing a pipe and passage at either side of the hull, so that the paddle wheel rotates in one direction when one pipe and passage are open while the other pipe and passage are closed and vice versa; and pipe means extending transversely of the hull over said compartment, said compartment having an opening at the top thereof into said pipe means, whereby water is discharged by centrifugal force from the top of the paddle wheel into said pipe means when the paddle wheel is rotating at high speed.

2. Ship propulsion means as defined by claim 1, wherein the said closure means comprises first closure plates swingable across ends of the passages to close and open the same, and second closure plates swingable across upper ends of the pipes to close and open the same; two vertical shafts, each vertical shaft carrying one of the first closure plates and one of the second closure plates; and handle means at upper ends of the vertical shafts for turning the same.
3. Ship propulsion means as defined by claim 1, further comprising a wind motor having a compound curved plate; a vertically disposed other shaft rotatably supporting said curved plate above the hull; and transmission means connecting said other shaft to the paddle wheel, whereby the ship is driven by wind power applied to the compound plate to rotate the same while the pump is turned off and both pipes and passages are closed by the closure means; and whereby the ship is braked when one of the passages is opened and said pump is operated to retard rotation of the paddle wheel.