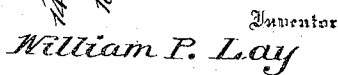


APPLICATION FILED JULY 28, 1917.

Patented Apr. 15, 1919.

2 SHEETS—SHEET 1.



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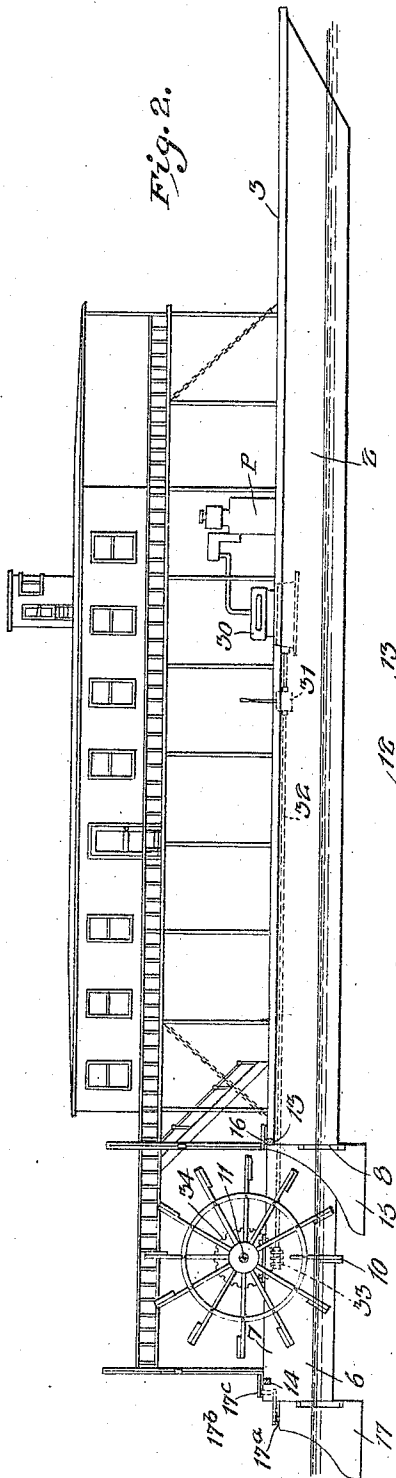


Fig. 2.

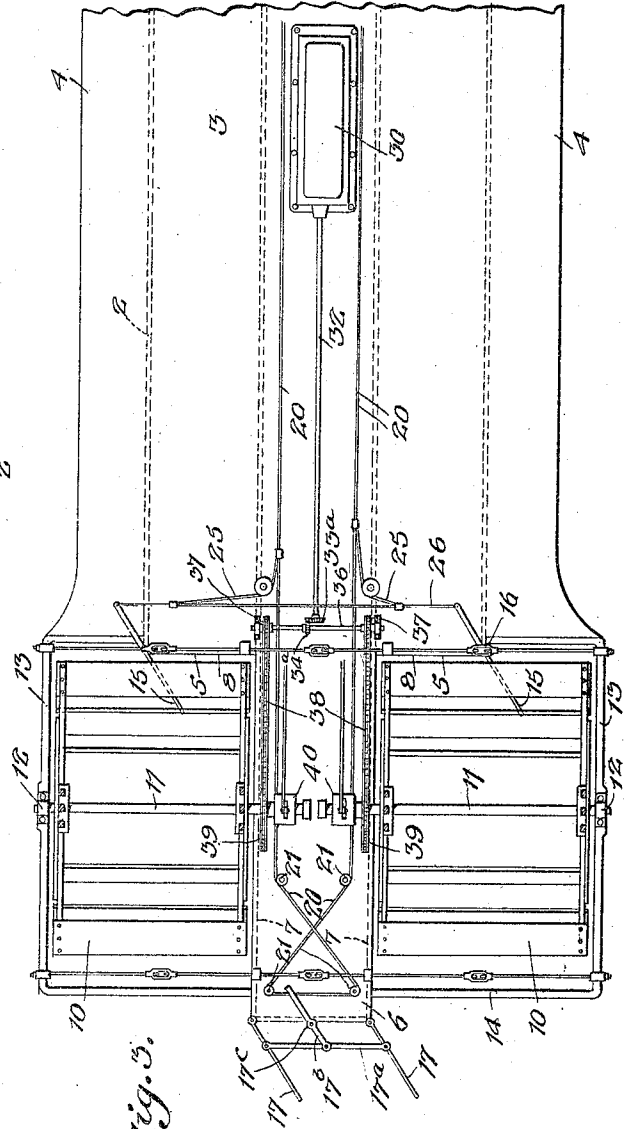


Fig. 3.

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To all whom it may concern:

Be it known that I, WILLIAM P. LAY, a citizen of the United States, residing at Gadsden, in the county of Etawah and State of Alabama, have invented certain new and useful Improvements in Marine Vessels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to marine vessels and more particularly to that type of vessel employing paddle wheels.

It is one of the objects of the present invention to facilitate the control of the vessel and especially to facilitate the steering or turning of the boat and render it readily adaptable for use in water courses with numerous short curves in its channel; and another object of the present invention is to provide improvements in the driving mechanism of a vessel for the purpose not only of conserving space but also to enable the employment of a type of compact, light, substantial power plant. The particular object of the present invention is to improve the arrangement of the propelling wheels or devices of the vessel and also the arrangement of steering devices in the form of rudders so that the back wash of the water from the propelling wheel or wheels as the case may be can be utilized to facilitate the turning or steering of the vessel and especially to provide a system of rudders which will enable the utilization of the back wash when the wheel or wheels are being rotated in either direction.

With these and other objects in view as will be rendered manifest in the following specification and clearly apparent to those skilled in the art, there is described in the following specification and illustrated in the accompanying drawings, the preferred form of the invention and also modifications thereof, these modifications involving the general principle of the invention and illustrating that changes in the details of the organization and the construction of the parts and the disposition thereof may be resorted to within the spirit of the invention and the limits of the appended claims.

The invention consists of the construction, the combination and in the details as more fully hereinafter described.

In the drawings:—

Figure 1 is a plan view of the main deck of the vessel, the deck partly being broken away to illustrate the position of the side or strake lines of the hull and showing the preferred form of driving mechanism connecting the motor plant and the paddle wheels;

Fig. 2 is a side elevation of the vessel;

Fig. 3 is a plan view of a modified form of the transmitting mechanism connecting the paddle wheels and the motor plant; and

Fig. 4 is a plan view showing diagrammatically another modification of the connecting mechanism between the paddle wheels and the power plant.

For the purpose of illustration I have shown the invention as applied to a vessel of the stern wheel type having a hull structure 2 with a main deck 3 which may be extended laterally of the strakes of the hull to form guards 4. I have found that a very efficient form of propelling organization may be obtained if the stern portion of the hull 2 of the vessel is laterally inwardly recessed as at 5 so as to form a relatively narrow and rearwardly extending stern portion 6 which preferably is of the same depth as the main hull portion 2 and the side walls 7—7 of which may be continued forwardly as indicated by the dotted lines toward or to the bow of the boat hull although obviously the forward extension of the reduced stern portion 6 may be omitted if desired forward of the transverse line 8 at the front end of the recesses of the hull. Mounted in the recesses 5—5 one on each side of the hull are paddle wheels 10 of suitable proportions and construction each having a shaft 11 the outer end of which is mounted in a bearing 12 mounted on a girt 13 which may be extended rearwardly from the guard 4 and the rear end of each girt 13 may be connected transversely to the hull end 6 by a beam or beams 14 to secure the desired rigidity and strength to support the shaft of the wheels. Material advantage in efficiency is secured if the wheels 10 are of such width as to project materially beyond the strake or sides of the hull 2 as clearly shown in Fig. 1, so that the projecting portion of the wheels 10 may operate in undisturbed water as the vessel is propelled forwardly, this arrangement securing in effect a semi-side wheel boat with the wheels arranged at the stern of the hull and projecting inwardly

from the sides thereof by reason of their location in the recesses 5. One of the important features of my present invention resides in the provision of a system of rudders so that irrespective of whether the paddle wheel or wheels as the case may be is being driven forward or reversed, the back wash from the wheel will be utilized to assist in the turning of the boat by reason of the reaction of the back wash water against an adjacent rudder. To secure this effect, I mount a pair of rudders 15 on rudder posts 16 forward of the paddle wheels 10 the posts being shown as hung on the outer corners of the sides of the hull and at the ends of the transverse stern walls 8 and I also mount on the end of the reduced stern portion 6, a pair of rudders 17 having posts 18 pivoted at the corners of the end of the stern section 6. From this it will be seen that as the paddle wheels are rotated to propel the vessel forwardly, back wash from the wheels reacts against the rudders 17 so that when these rudders are turned in either direction, the reaction of the back wash water will materially aid in turning the boat. When the paddle wheels 10 are being turned to move the boat rearwardly or reverse it, then the back wash of the water from the wheels will react on the rudders 15 and assist in turning the boat. To my knowledge there has been no previous provisions made of rudders so disposed with relation to the propelling device of a vessel as to utilize the back wash from the propelling device or wheel when the latter is rotated in either of its directions during the operation of the vessel. It is obvious of course, that it is desirable to concurrently swing all of the rudders in a similar direction, and to secure this, the rearmost rudders 17 are shown as connected by any suitable device at any suitable location, as for instance, by the link 17^a, and it may be connected to a lever 17^b pivoted at 17^c, the lever being connected to a tiller rope 20 passed around suitable guide pulleys 21 and then stretched forwardly to and around a drum 22 which may be operated by any suitable system of tiller or steering wheels. To secure the concurrent action of the rudders 15 with the rudders 17, suitable connection is made between the rudders 15 and the tiller rope 20, such means being shown in Fig. 1 as comprising a short length of rope or cable or other suitable flexible element 25 which may be connected to a connecting rod 26 attached to levers on the rudders 15, so that as one stretch of the tiller rope 22 is pulled forwardly and the opposite stretch shifts rearwardly to compensate therefor, the connecting rod or bar 26 of the forward rudder 15 will be shifted properly transversely across the hull to change the angle of and control the rudders 15.

It will be understood of course, that my improved rudder system can be utilized in combination with a single paddle wheel just as well as with a pair of twin paddle wheels as here shown, so long as one of the rudders is located forward of the paddle wheel and the other aft thereof, so that one or the other of the rudders will be disposed to get the back wash from the wheel when the latter is rotated in one direction or the other.

Another important feature of my invention is to provide means for operating and controlling the paddle wheels 10 either independently of each other or for connecting them for coöperation uniformly and unidirectionally in the propulsion of the vessel. To that end a feature of the invention consists in providing a suitable type of power plant shown herein as comprising a motor or motors 30, preferably of the internal combustion type which may be operated with any suitable fuel, and I find that a very economical cost of fuel for this type of engine consists of a gas from a producer plant from which the gas may be led directly to the combustion engine or engines of the power plant. In the form of my invention shown in Fig. 1, I employ two motors 30—30, to the crank shafts of which are connected suitable reverse devices 31 from which lead shafts 32 these extending rearwardly along the hull and mounted in suitable bearings on the reduced hull portion 6 between the wheels 10—10, and having on the ends a worm gear 33 intermeshing with respective worm wheels 34 which are secured on the inner portion of the shafts 11—11 of the paddle wheels. The inner ends of the shafts 11 are brought into close juxtaposition and are adapted to be coupled together by a suitable clutch structure indicated at 35. By this means the two shafts may be positively coupled together so that the wheels can be rotated together forward or backward.

In the form of the invention shown in Fig. 3, I have employed a single motor 30 having its crank shaft extended at 32 and provided on its end with a beveled pinion 33^a which meshes with a complementary pinion 34^a on a jack shaft 36 which is provided with sprocket wheels 37 operating sprocket chains 38 which extend rearwardly and drive sprocket gears 39 which are mounted on sleeves on the shafts 11 of the paddle wheels, the sprocket wheels 37 being connectible to the shafts through any suitable form of clutch and reverse mechanism indicated at 40, the levers from which may be extended forward and suitably connected together or controlled by the pilot of the boat in an obvious manner. By means of the reverse device, the shafts 11 can be driven in either direction on the sprocket wheel 37 and it is obvious that they can be rotated simultaneously together in either direction.

One modification of the invention is illustrated in Fig. 4 wherein I employ two motors 30 the jack shafts 32 of which are connected to suitable reverse gears 40^a from which extend shafts 41 having on their ends beveled gears 42 meshing with complementary gears 43 on respective crank shafts 44 each of which is provided with a pinion socket 45 over which runs a chain 46 driving a sprocket wheel 47 which is rigidly connected to a respective paddle wheel shaft 11. From this it will be seen that either wheel is connected with its own motor plant and may be driven in either direction at will and for the purpose of coupling them together for unitary operation in either direction, the inner ends of the shafts 11 are provided with a suitable clutch device 35^a.

While fuel for the motors of the power plant may be derived from any suitable source and at any suitable time, I have shown in the present instance, a gas producer P in Fig. 2, provided for the purpose of supplying fuel to the motors.

Obviously my improved system of rudders may be utilized in combination with propelling wheels of various types of vessels and it is understood that various modifications and changes in the details of construction, combination of parts, and in their sizes and proportions may be resorted to within the spirit of the present invention and the appended claims.

It will be seen that in each of the different forms of the transmitting mechanism connecting the power plant to the wheel shafts it is possible to drive each of the wheels entirely independent of the other and in any direction at any rate of speed so that if desired the steering of the vessel may be facilitated by driving one of the wheels in a direction opposite to that of the other or by driving the wheels in the same direction at different rates of speed so that one wheel would have more driving force than the other and therefore tend to turn the vessel. It is possible by the forms of drives shown to reverse one wheel while the other is driving ahead.

It will be understood that the tiller control apparatus and also the controlling levers for the various power units, clutches, and

reverse gears will be disposed as most convenient to the operator at any point or location on the vessel. Subject matter disclosed in this application and not claimed herein is claimed in a divisional application filed by the applicant.

What is claimed as new is:—

1. The combination, in a marine vessel, of a shallow draft hull having its stern reduced in width to form lateral recesses; wheels in the recesses, and a pair of rudders one at the lateral extremity of each recess and junction of the side of the hull, and at the longitudinal center, vertical plane of the adjacent wheel so as to take backwash therefrom when the wheel is reversing.

2. The combination, in a marine vessel, of a hollow draft hull having its stern reduced in width to form lateral recesses; and paddle wheels of greater width than the width of the recesses, and a pair of rudders, one at the lateral extremity of each recess and junction of the strake, and at the longitudinal center, vertical plane of the adjacent wheel so as to take backwash therefrom when the wheel is reversing, and another pair of rudders at the stern of the hull, to take backwash or wheel water when going ahead.

3. In the combination with the hull of a vessel having its stern recessed inwardly from the sheer planes of the sides to form wheel pockets and a narrow central rear hull portion, a pair of rudders, each located to swing on a vertical axis in the plane of one side of the hull and at the rear end of said side so as to swing outwardly into undisturbed water during headway.

4. In combination with the hull of a vessel having its stern recessed inwardly from the sheer planes of the sides to form wheel pockets and a narrow central rear hull portion, a pair of rudders each located to swing on a vertical axis at the junction of the hull sides and the forward walls of the recesses outwardly into undisturbed water during headway, and another pair of rudders hung at the corners of the narrow hull portions to receive undisturbed water when the vessel is reversing.

In testimony whereof I affix my signature.

WILLIAM P. LAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."