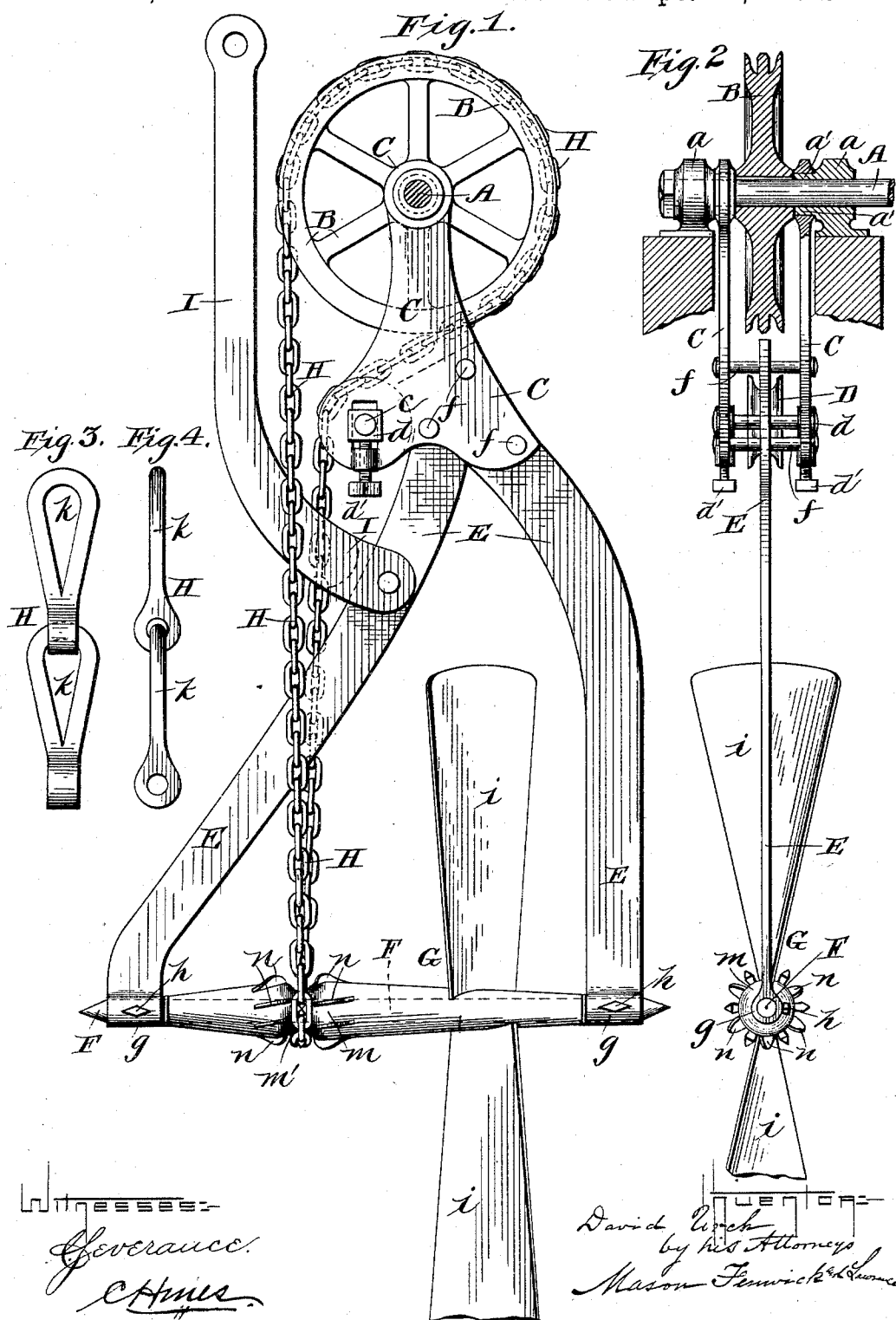


D. URCH.
PROPELLER FOR VESSELS.

No. 483,122.

Patented Sept. 20, 1892.



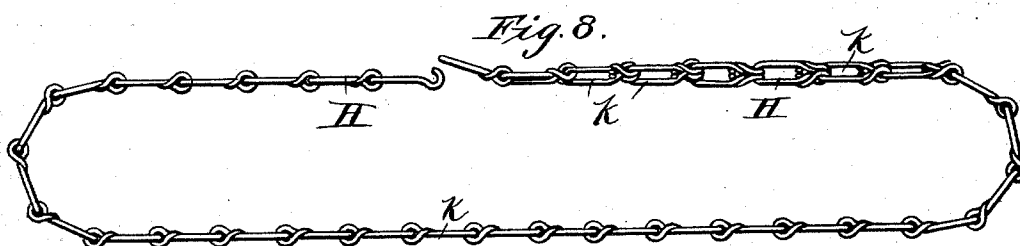
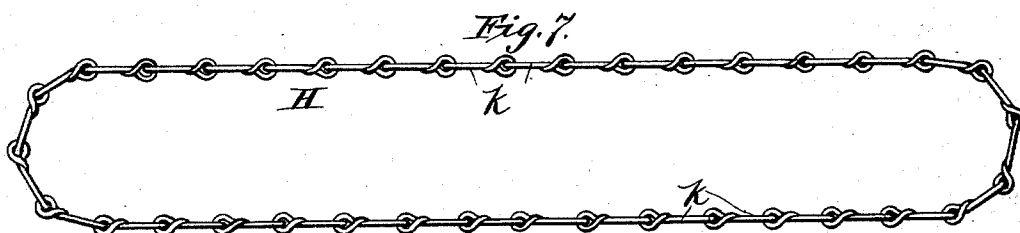
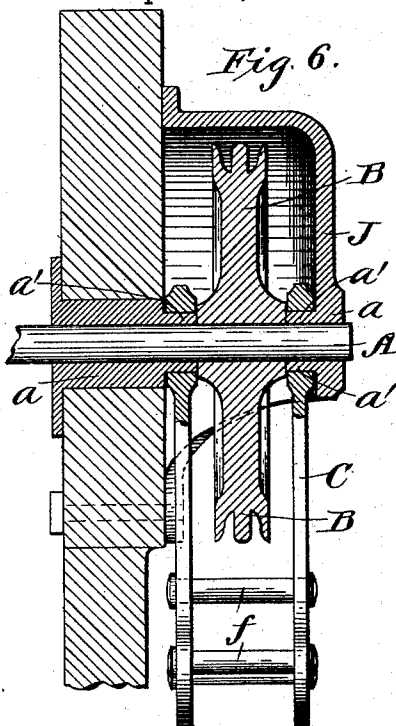
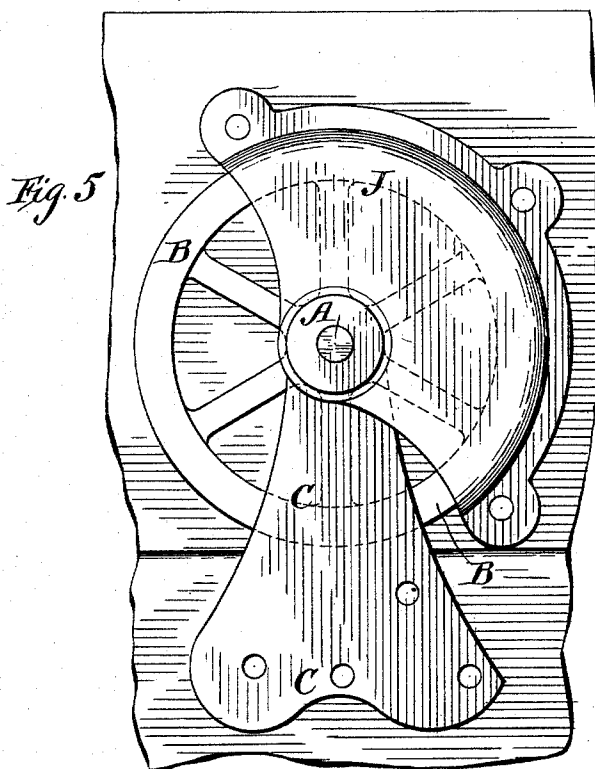
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ESSSE:-
Geverance.
C. Hines.

UEEUE:-
David Urch
by his Attorneys
Mason, Fenwick and Lawrence

(No Model.)

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Fig. 9.

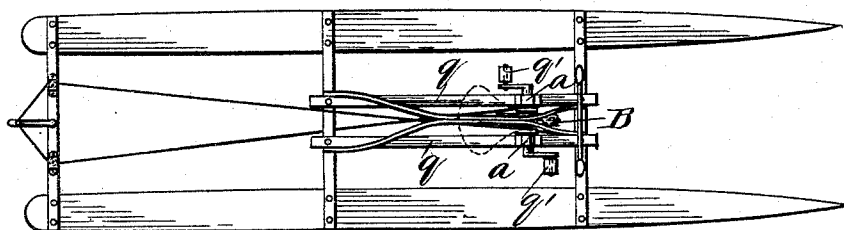


Fig. 10.

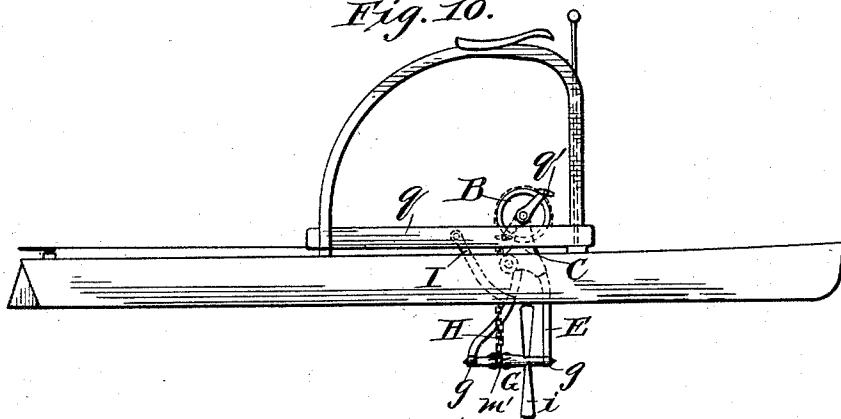
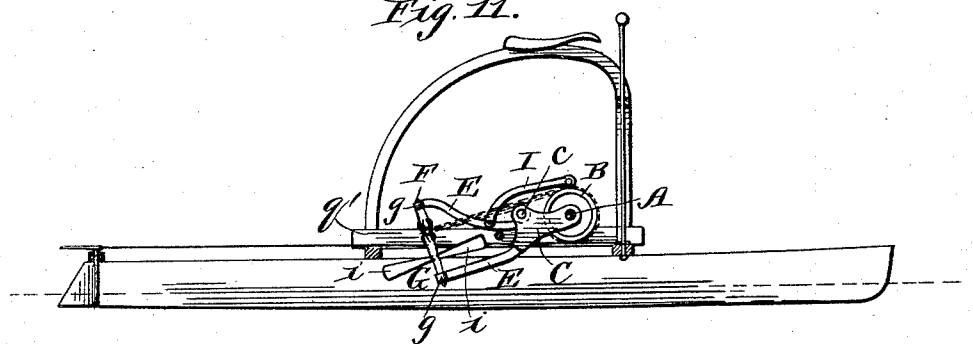


Fig. 11.



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C. Hines

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by his Attorney,
Mason, Fenwick & Lawrence

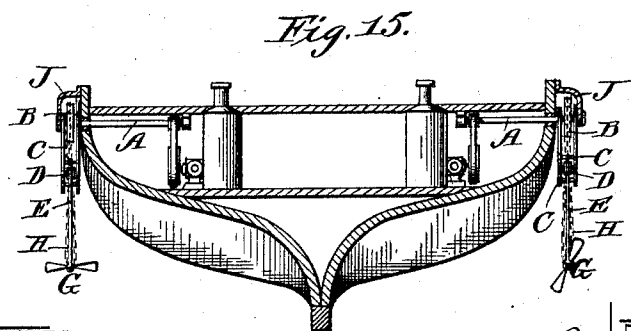
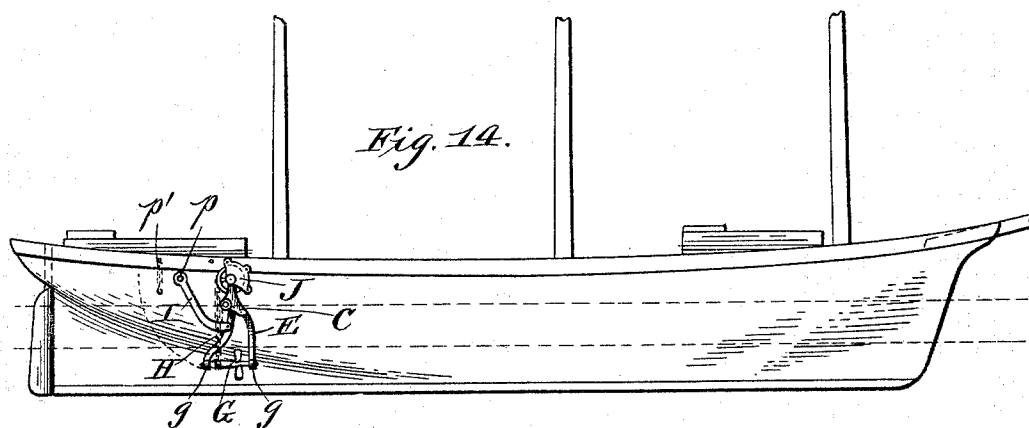
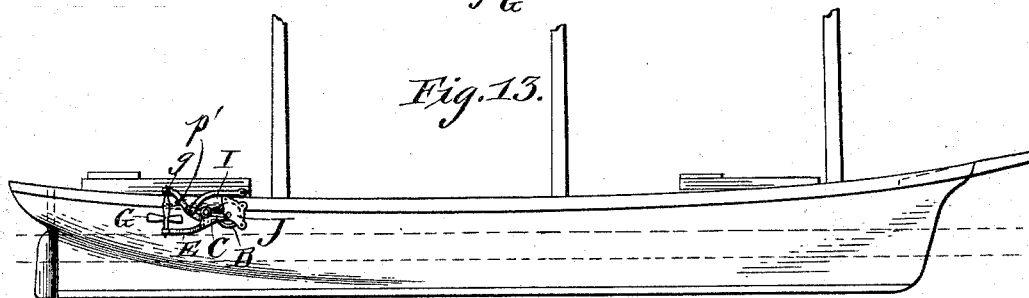
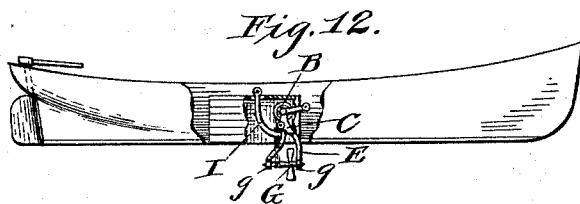
(No Model.)

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No. 483,122.

Patented Sept. 20, 1892.



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UNITED STATES PATENT OFFICE.

DAVID URCH, OF PORTSMOUTH, NEW HAMPSHIRE.

PROPELLER FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 483,122, dated September 20, 1892.

Application filed May 27, 1892. Serial No. 434,647. (No model.)

To all whom it may concern:

Be it known that I, DAVID URCH, a citizen of the United States, residing at Portsmouth, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Propellers for Marine Craft; 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.

My invention relates to means adapted for use, either principal or auxiliary, for propelling and controlling marine craft; and it consists in certain constructions, combinations, and arrangements of a screw-propeller and mechanism for operating and manipulating it, whereby many useful advantages are secured, among which are the conveyance of the driving-power from the shaft to a propeller having its support at right angles, or nearly so, to said power-transmitting shaft; the capability of swinging the propeller into and out of the water concentrically with said power-transmitting shaft and of working the propeller at any proper angle less than a right angle to the horizon; the capability of detaching the propeller and storing it away when it is not required as an auxiliary relief propelling means and of again replacing it when its use is required for aiding disabled vessels or for any use that it is adapted for in connection with marine craft; the relief of the driving-shaft from weight of the propeller proper and its mechanism; the reduction of friction at the point where the propeller is directly supported; the utilization of the propeller hub or sleeve as a chain-pulley and as an adjunct to the propeller-blades for aiding in propelling the craft to which the invention is applied, and the adaptation of the screw-propeller to either the sides or center of craft of various kinds having a center keel or center board and to such as row-boats and to craft that come under the head of "catamarans," operated by manual or other power, as will be hereinafter described.

In the accompanying drawings, Figure 1 is a side elevation showing a screw-propeller with my improved hub or sleeve, propeller-support, suspending, driving, and manipulating or lowering and raising mechanism. Fig.

2 is a partial section at a right angle to the view shown by Fig. 1 and an end elevation of the parts not shown in section, the driving-chain being removed. Fig. 3 is a flat or face view, and Fig. 4 an edge view, of a different form of driving-chain from that shown in Fig. 1. Fig. 5 is a broken detail view showing a slight change in the supporting-bearings and illustrating one way of attaching the invention to the side of a craft. Fig. 6 is a vertical section and partial elevation of the parts shown in Fig. 5 and at a right angle to said view. Fig. 7 is an edge view of the chain formed of links, such as are shown in Figs. 3 and 4, as it appears before the necessary half-twist is given to it; and Fig. 8 is also an edge view of the chain as it appears after the half-twist is given to it. Fig. 9 is a top view of a treadle-operated catamaran, the rider's seat being shown by dotted lines, having my improved propeller mechanism applied to it. Fig. 10 is a side view of the parts shown in Fig. 9, the propeller proper being lowered for use. Fig. 11 is a side view of the parts shown in Fig. 10, the propeller proper being raised out of the water. Fig. 12 illustrates my invention applied in a hollow center box of a pleasure or row boat. Figs. 13 and 14 show my invention applied to the sides of different styles of marine craft. In Fig. 13 the propelling mechanism is shown raised out of the water, and in Fig. 14 lowered into the water. Fig. 15 is a cross-section showing the invention as applied on crafts similar to those shown in Figs. 13 and 14.

A in the drawings represents a driving-shaft mounted in bearings *a* of any suitable firm structure portion; B, a power-transmitting chain-pulley keyed on said shaft; C, plates arranged close to said pulley and hung upon lateral extension-bearing portions *a'* of the bearings *a*, so as not to ride upon the said shaft; D, an auxiliary chain supporting and directing and tension pulley applied between the plates C on an idler-shaft *c*, being fitted in vertically-adjustable bearing-blocks *d*, the blocks being adjusted by screws *d'* in order to regulate the tension upon the chain; E, a bifurcated suspending-plate, its branches being constructed and arranged so as to diverge in opposite directions from the central portion of the plate. This suspender is bolted at *f* to

the plates C, and at its lower ends is formed with cylindrical boxes *g*, into which the ends of a stationary shaft F, which serves as a propeller-support, are inserted, and said shaft is secured against turning by set-screws *h*, having, preferably, diamond-shaped heads.

G is a screw-propeller having, preferably, two blades *i i*. The hub of these blades is in form of a long sleeve, with an intermediate enlarged portion having a groove *m'* formed therein. This enlarged portion comprises two oppositely-tapered conical portions connected at their bases by a concave annular portion of less diameter than the base of the cone portions, and on each of these conical portions spiral ribs *n*, tapering to nothing in opposite directions, are provided, as shown. By this construction a means answering the purpose of a grooved pulley for a driving-chain H is provided, and at the same time a hub or sleeve is secured which is light and symmetrical and by its spiral ribs acts as an auxiliary to the propeller in moving the craft. The hub or sleeve being long and fitted loosely on the stationary shaft gives great steadiness to the propeller, and all torsional strain and the great friction experienced when the shaft, as well as the propeller, revolves are overcome. The chain H is arranged by reason of the pulley D, so as to pass properly upon the hub of the propeller, although the same is placed at right angles to the driving-pulley shaft A. The chain shown in Fig. 1 contains an even number of links and is constructed with a half twist or turn in its entire length, as illustrated in Fig. 8. Unless an even number of links are used in a chain of the type shown in Fig. 1 and a half twist or turn either to the right or left is imparted to the chain it is found that this part of the invention is of very little practical utility. Therefore I employ an even number of links in the chain shown in Fig. 1, and before converting the chain into an endless one I give it a half twist or turn to the right when I desire to transmit power to run a shaft in one direction, and I give it a half turn or twist to the left when the purpose is to run in an opposite direction.

I is an adjusting and lifting bar connected to the suspender E. By this bar the whole structure can be swung down or up on the extensions of the shaft-bearings concentrically with the driving-shaft, and when adjusted either for operation or disuse it can be secured firmly by a pin at *p* or by a chain *p'*. When the structure is lowered so that the shaft of the propeller is parallel with the water or its suspender is at a right angle to the horizon or vertical, it will remain so while the power is applied, both whether the propeller is revolved backward or forward, and it will not change its position even if the pin at *p* is not brought into use for holding it, and while this is so if the power is stopped the swinging suspender with propeller can be moved in the arc of a circle by a slight force of the hand. This proves that while the lift-

ing and adjusting bar is a useful device for manipulating the suspender and attached propeller its use for holding down the propeller to its work while the power is applied is not necessary to the successful working of the propeller. Therefore I do not limit myself to its use as a holding-down means when the suspender stands at right angles to the horizon or vertical, and yet I regard it as an important adjunct as an adjusting and manipulating means. The adjustment for use may be to a position less than a right angle by having a series of holes in the lifting-bar. So, also, may the adjustment out of use be to a position less than a right angle by having a series of pins for the hook of the chain to catch upon.

In cases where the invention is applied to the sides of a craft overhanging bearing-plates J forming-housings may be provided, as represented in Figs. 5, 6, 13, 14, and 15, and when the invention is applied to row or pleasure boats a central box may be constructed in the boat and the propeller rise and descend therein the same as the center-board of boats. It might also in this manner be applied usefully to steamboats. In applying it to catamarans it is mounted upon two longitudinal pieces *q*, connected to transverse pieces and arranged to swing on a power-shaft having crank-arms with treadles *q'*, as illustrated in Figs. 9, 10, and 11.

The power-pulley B, as well as the directing-pulley D, is grooved, and in the grooved periphery of the pulley D projecting sprocket-teeth are provided, so as to take hold of the chain and give it a positive movement, and similar projecting teeth for the same purpose are provided in the grooved hub of the propeller proper. In Figs. 3, 4, 7, and 8 I have shown flat links *k* for forming the chain, which may be adopted if desired, and when adopted it is not necessary to have an even number. To still further avoid friction, the suspended plates C might have antifriction-rollers at their points of bearing; so, also, might the driving-shaft be provided with such rollers at its point of bearing in the boxes.

When my invention is applied as shown in Fig. 12, the major portion is inclosed and the driving-wheel shaft passes out at right angles to the upper forward corner of the box and rests in substantial portions, and the propeller is raised and lowered by the lifting-bar I, which projects through the top of the box in about the same manner as the rod of the common center-board is now used. With this arrangement either the treadles for foot-power or cranks for hand-power, or steam, electricity or any other suitable means may be adopted for driving the shaft.

My invention will transmit power to either horizontal or perpendicular shafts or to shafts at any inclined angle; but its most effective use is at a right angle to the driving-shaft, and it is capable of use at high speeds as well as low speeds.

The invention may be used either as a principal or an auxiliary means of marine propulsion for almost every class of vessel or boat known, and, being compact and simple, and yet powerful, it can be efficaciously employed. Its attachment to the side of any craft at points nearest any available power on board can be effected in an hour or two, as it requires no alteration to the vessel further than the insertion into the planking of a strong bearing for the power-shaft and the fastening to the boat of the plate J as a bearing for the outer end of the power-shaft, and the said parts can be readily removed and stored away if not further required; but if not removed the propeller can be quickly swung up out of the way, and as easily dropped to its operating position again when needed for use, and when adjusted for use or out of use can be firmly fastened by suitable means, as hereinbefore described.

The provision for raising and lowering the propeller without disarrangement of any of its parts or endangering its operative character is very important, and the fact that the mechanism runs equally well whether the propeller-shaft is placed at a right angle to the horizon or parallel therewith establishes the great utility of the arrangement. The wheels in this arrangement may be so placed as to have the transmission of power in one way direct, and as a chain, unlike a belt, can be run loosely, the slightly-indirect return of the loose side of the chain is effected with hardly-noticeable friction. When in motion, there are two movements of the chain, one over the wheels and the other a half-revolution of itself or a turn inside out every time it passes once around. If chains of the clevis form (shown in Figs. 3, 4, 7, and 8) are used, the grooves in the rim of the drive-wheel and pulley will be of a form to receive the chain edgewise, and the number of links may be even or odd. Such a chain would produce less impediment to the progress of that portion of it necessarily submerged, though in this device both the chain and shaft supports do not offer half the obstruction experienced from the use of the rudder-post now in use; and it is the design of my invention to avoid impediment through the water without sacrificing power. By raising the pulley D the very nicest degree of tension on the chain can be effected and retained by tightening the set-screw. By providing the thin spiral projections on the hub or sleeve that part which would be an obstruction in the revolution of the propeller is made a most efficient aid in that direction, and at the same time these projections serve the purpose of the flange in the ordinary wheel and effectually prevent the chain from coming off, and they also act as guides to convey the chain to its exact place upon the wheel.

My invention as an auxiliary means of propulsion of sailing vessels carrying hoisting-engines will prove valuable, as it occupies

only the bare width of a twisted propeller-blade, and when swung up out of the water is neither in the way nor any impediment to the motion of the vessel. The organization is such that the power-pulleys may be enlarged, so as to use small propellers in waters of slight depth.

In rivers and harbors vessels provided with my invention can be moved without delay without the aid of a tug-boat, and when becalmed at sea they may still make progress with this device driven by the hoisting-engine, and with two of these comparatively inexpensive propellers on the sides of a vessel, each driven independently, a vessel may be steered or turned around without moving forward or backward, and may be handled and berthed more easily and with finer and truer precision than by the use of any other means hitherto employed.

For steamers of every class provided with auxiliary engines my invention may be used to increase their speed, and particularly in cases of ocean and large craft, by utilizing their small engines to operate it.

For naval-vessels, "freighters," and "tug-gers," and every kind of craft having any spare power this invention will be found very useful as an auxiliary in moving or controlling their position. For small row-boats this device can be used, and the operator can face his direction instead of, as with oars, working backward, and while the oarsman must exert his power when his hands are farthest from the line of the body the operator of this device can exert power more easily and with greater force, because he can apply power from a point closer to the body, and as an attachment to the catamaran style of craft it is found very useful, and it avoids the necessity of making such structures of great length.

My invention overcomes many of the experienced difficulties arising from the drag of the propeller on vessels under sail and lessens the difficulty and labor required to raise and lower the propeller; and it overcomes the objection to the unsymmetrical appearance of vessels equipped with such contrivances, and admits of the raising and lowering being performed under almost any conditions of sea and weather.

What I claim as my invention is—

1. In a propeller for marine craft, the combination of a chain, a driving-pulley arranged on a driving-shaft supported upon a portion of a craft and having the chain passed around it, a directing-pulley supported upon a suspending-frame, also supported by the craft, and having the chain also passed about it, and a propeller hung in the said suspending-frame and provided with a hub, around which the chain is passed, said propeller having its supporting-shaft and its hub at right angles, or nearly so, to the said driving-shaft and the said chain being passed around said hub in a direction at right angles, or nearly so, to the

direction in which it is passed around the driving-pulley and the directing-pulley, substantially as described.

2. In a propeller for marine craft, a driving-chain constructed with a half-twist, in combination with a driving-pulley supported by a portion of a craft and having the chain passed about it, a directing-pulley supported by a suspending-frame hung upon a portion of the craft and swinging concentrically with the driving-shaft of the driving-pulley, and a propeller-hub supported by the said suspending-frame, the said directing-pulley having the chain passed about it at right angles, or nearly so, to its axis and the said hub having the chain passed about it at right angles, or nearly so, to its axis, substantially as described.

3. In a propeller for marine craft, the combination of the pulley D, having its shaft arranged in adjustable bearing-boxes, of a suspending-frame supported by a portion of the craft, and which are mounted on set-screws, the driving-pulley B, supported by a portion of the craft, the chain, and the propeller-hub, the said chain being arranged about the pulleys and the hub and the hub being at right angles, or nearly so, to the driving-shaft and supported by the suspending-frame, substantially as and for the purpose described.

4. In a propeller for marine craft, the combination of the bearings of the shaft having lateral extensions, the suspending-plates fitted around said extensions, the suspender connected to the ends of a stationary shaft, the driving-shaft, the driving-pulley, the directing-pulley, the chain, and the propeller-hub arranged at right angles to the driving-shaft and having the chain passed around it in a direction at right angles to the direction in which it is passed around the driving-pulley, and the directing-pulley, the said bearings, shaft, suspending-plates, suspender, stationary shaft, the driving-shaft, and the driving-pulley being supported by a portion of the craft, while the directing-pulley and the propeller-hub are supported by the suspending-frame, substantially as described.

5. The combination of the suspending-

frame, the propeller having a sleeve or hub with a stationary shaft, said frame being supported by a portion of the craft, substantially as and for the purpose described.

6. In a propeller for marine craft, the shaft-bearings having lateral extensions, in combination with the supporting-craft, the propeller, and the means by which said propeller is suspended, and with the shaft, and the means by which the propeller is revolved, substantially as described.

7. The propeller-hub formed with a groove for the chain and with spiral ribs on each side of said groove, in combination with a stationary shaft and a chain for revolving the propeller, substantially as described.

8. In a propeller for marine craft, the combination of a screw-propeller, a suspending means supported by a portion of the craft and hung concentrically with the driving-shaft and adapted to swing around said shaft in a circle or a part of a circle, and a lifting and holding bar, substantially as and for the purpose described.

9. In a propeller for marine craft, the combination, with a boat, of a crank-shaft, a driving-pulley on said shaft, a directing-pulley, a suspending means, a propeller having its shaft arranged at right angles to the driving-shaft, a chain passed around said pulley and around the hub of the propeller, and a lifting and holding bar, the said mechanism being supported by substantial portions of the boat, substantially as described.

10. The combination of a boat provided with the inner and outer bearings, the driving-shaft, the plates C, the bifurcated suspender E, the supporting-shaft for the propeller, the propeller having revolving hub, the driving-pulley, the directing-pulley, and the chain passed around the pulleys and the hub of the propeller, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

DAVID URCH.

Witnesses:

JOHN HATCH,
J. W. WEEKS.