(No Model.) 3 Sheets—Sheet 1.

D. URCH.

MARINE VELOCIPEDE.

No. 245,418. Patented Aug. 9, 1881.

Fig 1.

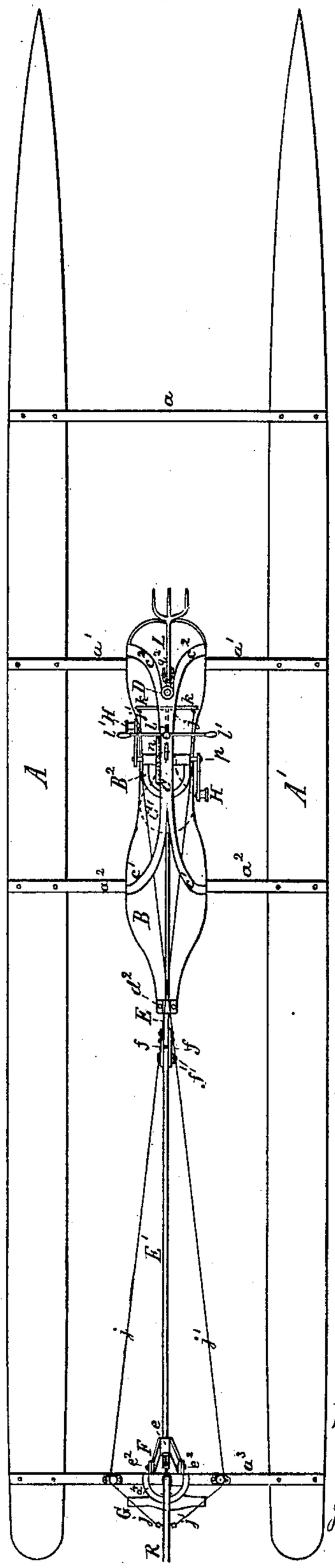
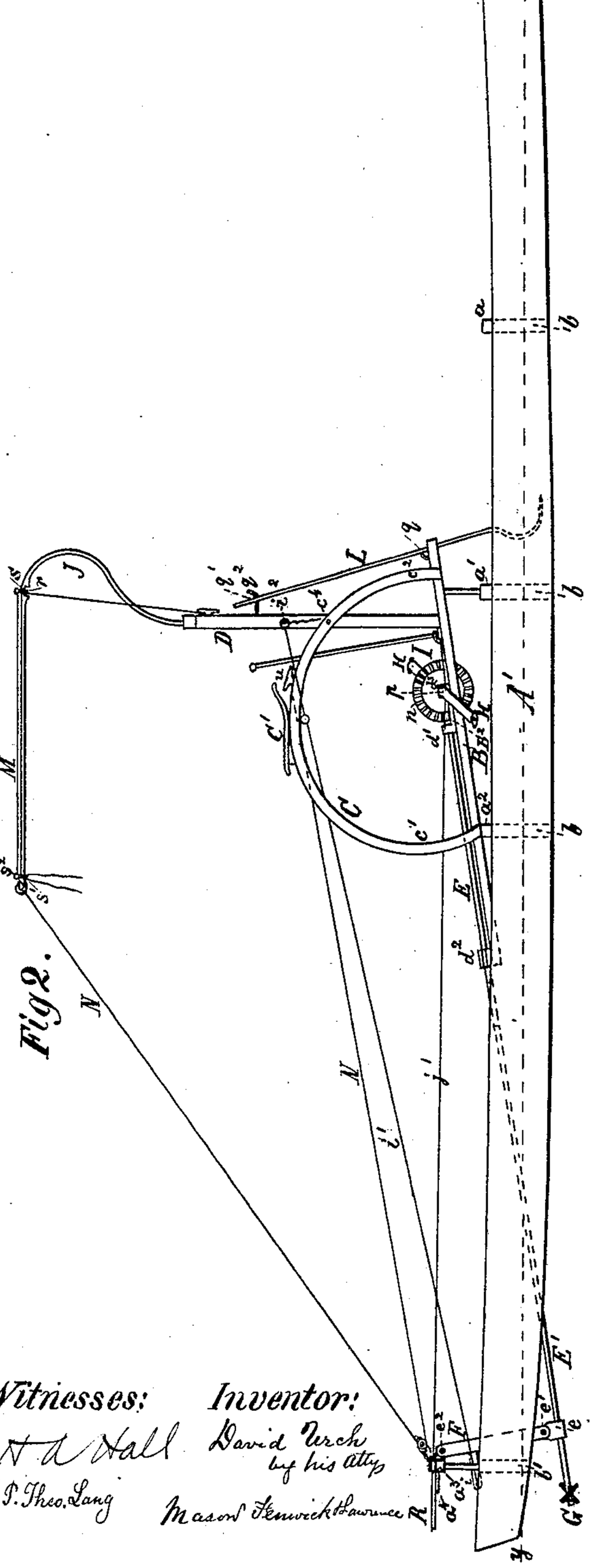


Fig 2.



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(No Model.) 3 Sheets—Sheet 2.

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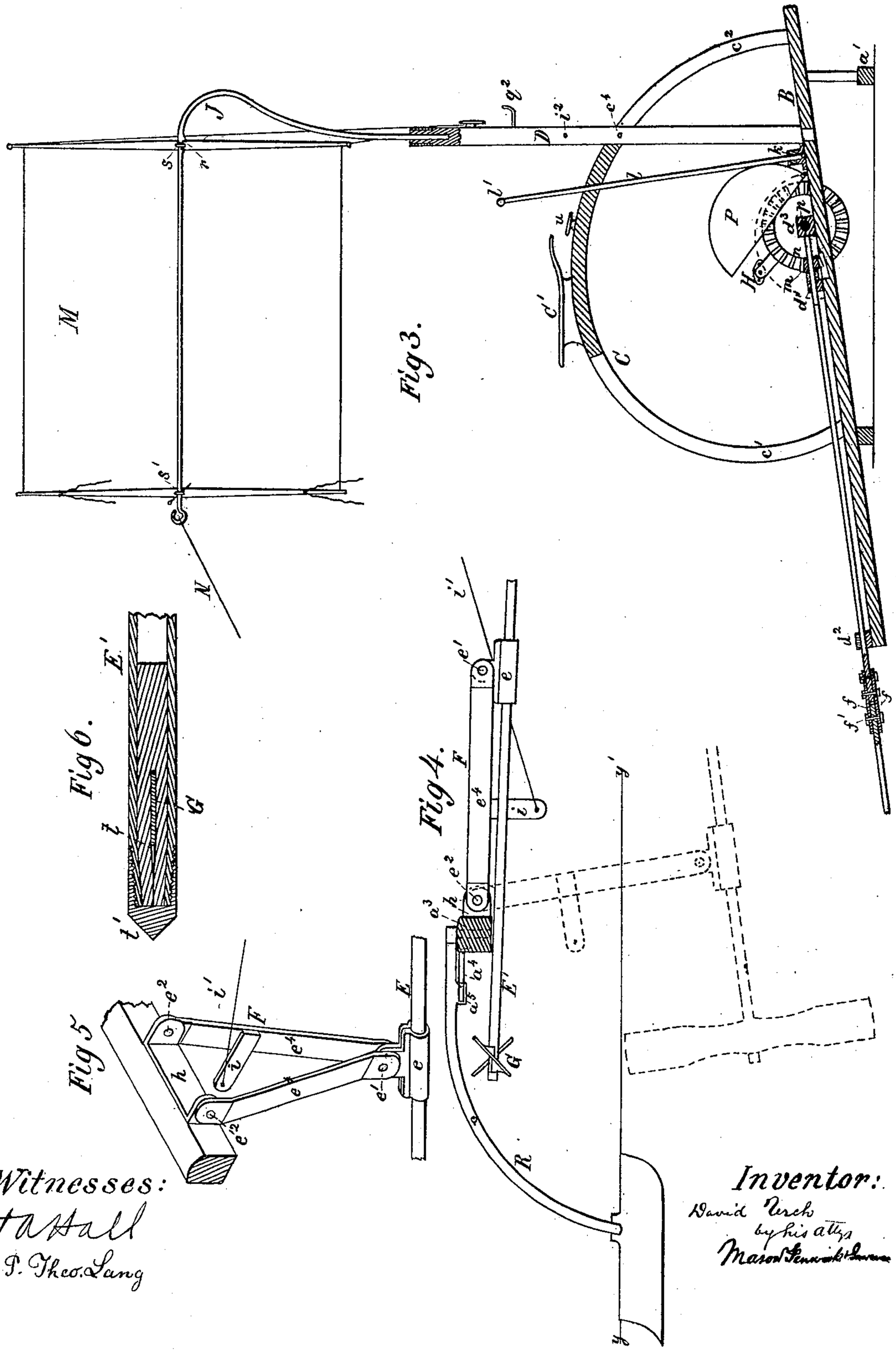

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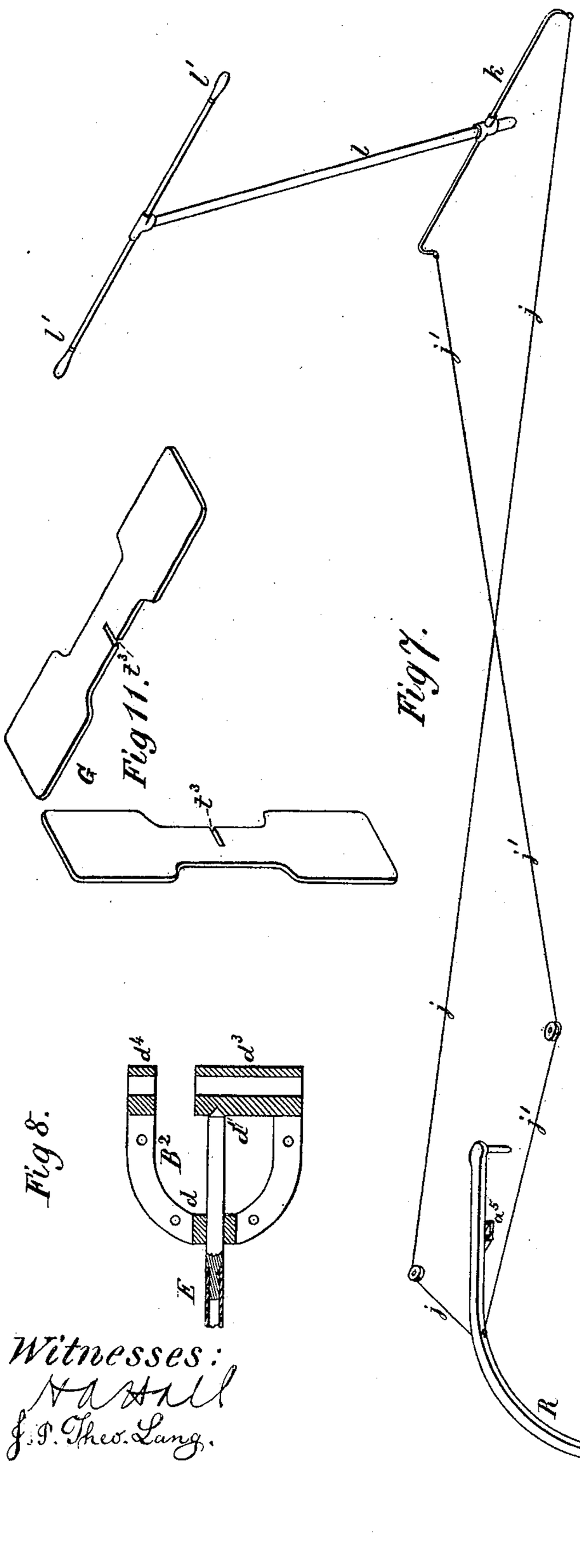

Fig 11.

Fig 8.

Fig 7.

Fig 12.

Fig 9.

Fig 10.

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UNITED STATES PATENT OFFICE.

DAVID URCH, OF PORTSMOUTH, NEW HAMPSHIRE.

MARINE VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 245,418, dated August 9, 1881.

Application filed March 12, 1881. (No model.)

To all whom it may concern:

Be it known that I, DAVID URCH, of Portsmouth, in the county of Rockingham and State of New Hampshire, and a citizen of the United States, have invented a new and Improved Boat, which I call a "Marine Bicycle," of which the following is a specification.

My invention relates to that description of boat known as "catamaran;" and it consists, first, in an inclined plank or platform between two boats or floats, supported on cross-bars, and carrying mechanism for operating a propeller, and having a saddle support and saddle mounted upon it, and all being combined as will be hereinafter described; second, in the combination of two boats or floats constructed to move through water with a draft relatively very shallow with respect to a screw-propeller, a screw-propeller provided with a vertically and laterally bracing hinged stay for holding it in and adjusting it out of the water, and set to work beneath water with a draft relatively much greater than the draft of the two boats, and a mechanism applied upon a mounting-plank between the two boats or floats for operating the propeller, the said combination being such that the propeller is caused to revolve in a plane at right angles to its shaft, notwithstanding the fact that the propeller-driving mechanism is at an altitude much greater than the axis of the propeller proper, by reason of the platform and propeller shaft being inclined downward, and also such that the propeller will be stayed vertically as well as braced laterally, and its shaft will be caused to remain firm and rigid, notwithstanding it is jointed between its ends, while the propeller and it are revolved beneath the water, and still is capable of being raised with the propeller from a point below its joint out of the water, as necessity or occasion may demand, all as will be presently described; third, in the combination of two boats or floats, a mounting plank or platform of the two boats, having a saddle support and saddle mounted upon it, a submerged screw-propeller, having a shaft made in two parts united by plates, pins, and a hinge-pivot, a hinged supporting or suspending device, comprising counter-braces, a sliding tube, and a lever-arm, a mechanism for revolving the propeller mounted upon the plank or platform of the two boats or floats, a means for raising the propeller and its shaft and suspending device out of the water and again lowering the same from the plank or platform, the whole combination above mentioned being such that the screw-propeller can be applied between the two boats, and the propeller can be securely confined against upward and sidewise-deflecting forces while beneath the water, and thus rendered capable of working with a much deeper draft of water than that of the boats or floats, and while these results are attained facilities are afforded whereby the propeller can be raised from the plank or platform of the two boats or floats entirely out of the water during such times as the boat proper is moving along shallow places or grounding, or is moving under sail, or running in shoal water to or from landing-places, or is clearing grass and other obstacles in the range of the propeller in its submerged position; fourth, in the two boats or floats provided with partition-blocks to form separate air-tight safety-compartments, which also serve, in addition to the office of stays or knees to the planking, as a means for receiving and sustaining the screw-bolts which fasten the cross-bars of the two boats in their positions, thus enabling these bars to firmly sustain the strain upon the two boats, and to remain firm while bearing the weight of the propeller-driving mechanism, the mounting plank or platform and its adjuncts, as well as the boatman; fifth, in an arch-shaped saddle-support and a platform in combination with a mast extended up from the platform and fastened to the saddle-support, as hereinafter described, whereby the mast and sail or canopy carried by it are firmly supported against lateral and other strains or forces, and the mast can also be located centrally upon the platform and between the two boats or floats upon which the platform is supported; sixth, in the combination of the two boats or floats, the mounting plank or platform for supporting the propelling mechanism, the saddle-support, the mast fitted between the braces of the saddle-support and bolted thereto, a sail-support, a sail or canopy and cords whereby the sail-support and sail or canopy can be adjusted to suit the requirements of the wind or the necessities of the situation—that is, the sail may be set horizontally and serve as an awning

or canopy against sun and rain, or swung around horizontally and then turned down vertically or at any desired angle to the wind, or it can be furled and kept so, or it may be removed entirely from the mast; seventh, in the combination of the two boats or floats, the submerged screw-propeller, the mechanism for revolving the propeller, the saddle-support with saddle for the boatman, the rudder pivoted at its forward end to one of the cross-bars of the boats or floats and supported and held upon an arc or segmental bed-piece in rear of its pivot, and mechanism whereby the rudder is turned either to the right or left by the operator while straddling the saddle and its support, and a very positive action of the rudder against the water in steering a back course is secured; eighth, it consists in a grass-collecting fork or guard, arranged as hereinafter described, to lift and remove the grass or other obstructions, in combination with the submerged propeller and its shaft, and the two boats or floats, whereby the propeller is kept from being disturbed by grass or other obstructions collecting about or winding around its shaft and blades; ninth, in a marine velocipede, which comprises in its construction two shallow-draft boats or floats set apart, but united, an adjustable inclined submerged propeller placed between the two boats, intermediate means for rotating the propeller supported by the platform between the boats, and an intermediate steering-rudder, as hereinafter described; tenth, it consists in providing a bearing-plate which serves as a bearing for the power-shaft and as an end-thrust bearing for the propeller-shaft, and an ordinary bearing for the said shaft to turn in, and at the same time is adapted for the reception of the bevel-gear wheel; and, eleventh, it consists in the hinged supporting and bracing device whereby the propeller-shaft and the propeller are held down to their working position while being revolved and can be raised out of the water when occasion requires.

In the accompanying drawings, Figure 1 is a plan or top view of my improved boat. Fig. 2 is a side elevation of the same, the canopy-sail which is removed in Fig. 1 being in its place. Fig. 3 is a partial longitudinal section and side elevation of a portion of my invention, the sail-canopy being turned down vertical to the horizon. Fig. 4 is a partial longitudinal section and side elevation of a portion of my invention, showing rear portion of the propeller-shaft, the propeller, and the supporting and raising and lowering device raised out of the water, in full black lines, and the same parts lowered into the water in dotted lines. Fig. 5 is a perspective view of the supporting and raising and lowering device, and a portion of one of the cross-bars of the two boats or floats, and a portion of the propeller-shaft, in the same position as shown by dotted lines in Fig. 4. Fig. 6 is a detail section of the lower or rear end of the propeller-shaft, showing the arm of the propeller-blades clamped in place by the split end of the shaft and a nut thereon. Fig. 7 is a perspective view of the rudder detached from the boat, and showing the mechanism for operating it. Fig. 9 is a transverse section of one of the floats or boats in the line of one of the cross-bars and partition-blocks showing the fastening-bolts screwed into said blocks. Fig. 10 is a perspective view of the grass-collecting fork or guard detached from the boat; and Fig. 11 is a perspective view of two pair of propeller-blades having their bars half-notched in order that they may be halved together. Fig. 12 is a plan view of the sail-support and sail, the roller set vertical, and shown in different positions.

The two boats, A A′, are long, narrow, and of shallow draft, being of any approved outline and each formed, internally, with five air-tight safety-compartments which are perfectly independent of each other. These compartments are formed by placing transverse partition-blocks *b* across the hold of the boat. The partitions are made very stout and strong in order to not only sustain the planking of the boat, but also to afford a means for receiving and sustaining the strain which comes upon the bolts *c c* employed at these points for the purpose of securing the cross-bars *a a′* a^2 a^3 which unite the two boats A A′ firmly in position upon the decks of the boats or floats.

It will be seen from Fig. 9 of the drawings that the bolts *c* pass down through the bars *a a′* a^2 a^3 and deck and into the sustaining partition-blocks *b*, and by this means great rigidity is given to the structure comprising the cross-bars *a a′* a^2 a^3, two boats, A A′, and the partition blocks *b*, and especially that great capability is given to the boats A A′ for sustaining the mounting plank or platform B, the bearing-plate B^2 for the propeller-shaft E E′ and power-shaft *p*, and all the parts mounted upon the plank or platform, as well as the boatman, without making the boat proper too heavy and cumbersome, and while this is so the usual air-tight compartments are maintained.

The mounting plank or platform B is set inclining backward, its front end being made to rest on tubes, through which fastening-bolts are passed, such bolts extending through the platform and the cross-bars *a′* in any proper manner. The rear end or portion of the plank or platform rests flat upon the cross-bar a^2. This platform or plank, although inclined, stands at all points some distance above the water-line *y y*, and it being narrow occupies a position between the boats A A′ with its sides a considerable distance from the inner sides of the boats or floats, as shown. By this construction lightness with firmness upon the water is secured, and the boatman is not liable to be rolled or rocked sidewise while managing the boat.

On the platform or plank B an arch-shaped saddle-support, C, is mounted. This support has four legs, *c′* c^2, each pair being formed by making the support proper with splits at each

end and turning out the wood to form the legs in reverse directions, laterally, so that the legs shall stand inclined, as shown. This construction of the saddle-support gives lightness with great strength, and there is no danger of the rider, although considerably elevated and upon a very narrow support, being thrown over, for the two boats, separated as shown, maintain an almost level set upon the water. The saddle-support may be provided with slots or holes at the lower ends of its legs and at the point where the mast is bolted to it, in order to adopt the height of the saddle to various sized persons.

By arching and forking the support C the mast D can be more properly located upon the mounting plank or platform, and the mast set in the longitudinal center line of said platform and bolted to the support at c^4, as shown, will be firmly stayed and held against forward and lateral movement by the legs c^2 c^2 and bolt c^4. The support is provided with a seat, C′, in form of an ordinary riding-saddle, and the boatman straddles upon it while operating the propelling mechanism and rudder and propeller-adjusting mechanisms.

The propeller-shaft E E′ is arranged between the two boats and centrally of the mounting-platform B. Its front section or portion, E, is provided with a conical bearing or thrust-sustaining end of steel or bearing-metal. This portion E is fitted to bearing-boxes d and d' of the bearing plate or casting B^2 on the platform B, and to a box, d^2, also on the platform B, while the rear portion, E′, of this shaft is supported in a suspended hinged tube, e, of a hinged bracing and supporting device, F, as shown. The propeller-shaft having its front portion, E, and rear portion, E′, made separate from one another, it is necessary that the parts be coupled or united by bolts, strap-plates f, and a pivot-pin, f', so that the part E′ may be capable of moving freely in an upward direction from a given position, and then back to said position, when the bracing device F does not act to resist an upward movement; but when the bracing device is set to resist an upward movement, the portion E′ of the propeller-shaft cannot move either upwardly or laterally, and can only revolve in right or left directions with the part E of said shaft, and hence the propeller G, which is on the portion E′ of the shaft, will be held to its work with great rigidity and firmness while revolving beneath the surface of the water.

It is of great importance to have the propelling mechanism, as well as the operator thereof, mounted considerably above the water-line, and at the same time to have shallow-draft floats or boats A A′, and a deep-draft propeller, G, and in such a combination to have the two parts of the propeller-shaft always remain on the same straight axial line, while the propeller is being revolved beneath the water, so that a smooth and regular motion, without undue friction and torsional strain shall be avoided; and it is equally important to make provision for raising the propeller G out of and above the water while the boat proper is being grounded, or while she is moving under sail, or in shallow water, or while going to and from landings. All of these objects are secured by my construction, as shown and herein described.

It will be seen that the supporting and bracing device F comprises two diagonal bars, e^4 e^4, united at their lower ends to the tube e by a hinge pin or pivot, e', and at their upper ends to a double angle-iron plate or bar, h, attached to the cross-bar a^3. At this last-mentioned point of connection short hinge pins or pivots e^2 are provided. This device F, by being constructed, as shown, and applied to the propeller-shaft and to the cross-bar a^3 of the boats or floats A A′, affords counterbracing to the propeller-shaft against lateral movement in either direction, and also a firm staying against vertical movement in an upward direction at such times as the propeller-shaft is revolving beneath the water; and while this is so it permits the shaft to rise, in fact becomes the means whereby to lift it and the propeller G out of the water when it is necessary to run the boat with her propeller above water. For adjusting the device F a lever-arm, i, is formed on one of its bracing-legs, and a cord, i', is extended from this lever-arm to the platform or saddle-support, and fastened to a pin, i^2, by means of rings on the cord, as shown. When the cord i' is drawn the tube e slips forward on the part E′ of the propeller-shaft, and the joints e' e^2 allow the device F to change its angle with respect to the shaft E E′, and as the device F moves and the tube e slides the part E′ of the shaft and the propeller are lifted out of the water from the position shown in dotted lines in Fig. 4, to the position shown in full lines in same figure of the drawings. The great benefit of this bracing device lies in its great rigidity and adjusting capabilities, while it is exceedingly light and strong; and besides this, it avoids the necessity of packing the propeller-shaft in a stuffing-box which works with great friction. This latter benefit will be more highly appreciated by bearing in mind that usually a single person's power is employed for propelling my boat. In fact, my invention, although useful in some of its parts with boats operated by steam or other like agents, is mainly designed for that class of pleasure structures which are operated by a person straddling the saddle-support and working the propeller with his feet resting on revolving treadles.

The propeller-blades are generally used in pairs—that is, an arm with two blades is employed instead of two arms with four blades, as shown in Figure 1; and when one pair only is used the end of the part E′ of the shaft is made solid by plugging it, as shown. This end is made slightly conical, and a kerf or split made radially is formed in it, and on the out-

side a screw-thread following the taper is cut, and on this thread a closed pointed nut, t', is fitted. The propeller-blades are applied in position by inserting the plate or arm on which they are formed edgewise into the kerf t and then turning up the nut t' until the arm is tightly clamped by the split screw-threaded portion of the part E′ of the propeller-shaft. This mode of confining the blades to the propeller-shaft is very simple and effective, and may be usefully employed in small propellers. When two pairs of blades are used they will be fastened to the shaft in just the same manner as when one pair is used, but it will be necessary to form two kerfs or splits, one crossing the other radially and centrally, in the cone part of the shaft-section E′, and also to form halving kerfs or notches t^3 in the arms of the respective pairs of blades, as shown in Fig. 11, so that the arms pass respectively in part through one another.

The rudder R is pivoted to the cross-bar a^3 and confined to a circle-plate, a^4, by an overhanging lip, a^5, being free to swing either to the right or left. From the rudder cords $j\,j'$ are extended to the platform B and connected to a horizontally-vibrating yoke, k, pivoted on the platform B by means of an upright rod, l, to which it is rigidly connected, said rod having right and left hand handles $l'\,l'$, by which it is vibrated. This rudder mechanism is clearly shown in Fig. 7; and by means thereof the boatman can, while riding on the saddle c, steer the boat with the greatest convenience and celerity. He can also hold the rudder in a positive manner against the water in steering a course backward; and in addition to this the handles afford an auxiliary means whereby to propel the boat, for by pulling upward upon the handles with the hands while pressing downward with the feet upon the revolving treadles H of the propelling mechanism I an additional force will be applied for revolving the propeller G. The propelling mechanism I comprises the shaft p, having crank-arms carrying the treadles H H and fitted in bearing-boxes $d^3\,d^4$ of plate B^2, a bevel-wheel, m, on the front section, E, of the propeller-shaft, and a larger bevel-wheel, n, on the power-shaft p, and located in a recess of the plate B^2 between the bearing-boxes $d^3\,d^4$. If steam or hand power should be applied to shaft p the foot-treadles would be dispensed with; but it is believed the treadle arrangement is the best, and in the adaptation of these treadles for the purpose stated they are located in proper relation to the saddle c', and are operated in the same manner as an ordinary bicycle.

In the construction of the treadles, propeller-shaft, mast, and other sustaining metal portions of my boat, tubular iron plugged with solid iron at such points as may be necessary is adopted in order to secure strength with lightness, and at the points where tubes are used for inclining the plank or platform B tubes made extensible may be adopted in order to nicely adjust the platform with respect to the desired depth of draft of the propeller G; or these tubes may be substituted by adjusting nuts on the fastening-bolts of the platform.

The grass-collecting fork or guard L is provided with several tines, and it can be raised away from its fastening to clear it of collected grass, and again lowered upon its fastening. On the rear of the handle of the fork projecting portions $q\,q'$ are formed, and these portions catch, respectively, upon the platform B and upon bent hooks q^2 of the mast D when the fork or guard is in its working position. The fork being suspended upon the hooks q^2 and simply resting on the front of the platform, can be lifted away from its connections just as soon as it is raised high enough to clear the hooks q^2.

The mast D is open at its top and receives a sail-canopy support, J, which swings around horizontally, as occasion requires. On the horizontal part of this support a sail-canopy, M, is fitted, and it serves as an awning against sun and rain, and also as a sail. It is fitted by means of yards having eyes $s\,s'$ to the said support, and it operates as follows: The eye s fits around a neck, r, of the support and turns around the same, while the eye s' fits around the rear part of the support and both slides and turns on the same. From the rear end of the support J a cord, N, termed the "sheet," is extended to a block on the cross-bar a^3, and from thence to a cleat, u, of the saddle-support C, and by means of this sheet or cord the sail, after being turned down vertically, can be set more or less to the wind, either right or left, the sail in turning down moving around on the horizontal portion of its support, and in turning at an angle to the wind moves with the vertical part of the same.

If the sail is not required for propelling the boat it may be removed, or it may be adjusted horizontally over the head of the boatman and thus serve as a sun-shade or canopy to protect him from the sun or from rain. A pin, s^2, passed into the support holds it unfurled or extended. The sail may be folded or furled by sliding its rear yard and eye on the support to the neck r and then compacting its folds and tying it with cords applied on the support. Cords may be run from the rear end of the sail to the saddle-support, and by these the sail may be furled or moved to a position for having its folds compacted and tied.

The propelling-gears are covered by means of a hinged cap, P, which has notches in its lower edges to receive the crank and propeller-shafts as it is lowered parallel with the platform B.

In operating practically with my improved boat I have submerged the propeller to a proper depth for the speedy propulsion of a given-sized boat without submerging, as is done with all other boats driven by a propeller, an equal draft-surface of the boats or floats, and the re-

sult has proved very satisfactory. I have found that a propeller sixteen inches in diameter is the most effective for a boat twenty feet long, and, so far as I know, the draft of water of a boat of this length has not been less than the diameter of the propeller employed prior to my invention, whereas with my construction the draft of water of the boats or floats is only about one-fifth that of the diameter of the propeller. This result I have secured by the means described, whereby a screw-propeller may be practically employed in combination with two shallow-draft boats or floats united rigidly together and operated by gearing mounted upon a plank or platform and set in motion by a shaft having crank-arms or treadles on its ends, and which propeller, although submerged to a considerable depth, can be controlled for use in shallow water.

My propeller proper is prevented from moving longitudinally in its bearings by means of the conical bearing on its front end abutting against the bearing-plate B^2, and in this respect it overcomes a very great difficulty experienced heretofore.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An inclined plank or platform of and between two boats or floats, supported on cross-bars and carrying mechanism for operating a propeller, and having a saddle-support and saddle mounted upon it, all being combined substantially as and for the purpose herein described.

2. A submerged screw-propeller provided with a hinged vertically and laterally bracing stay for holding it to its work beneath the water and for raising it out of the water, in combination with two boats having a draft of water much less than the diameter of the propeller, and with mechanism, substantially as described, for driving the propeller, substantially as and for the purpose described.

3. The boats A A′, a submerged screw-propeller, G, hinged supporting device F, having a lever-arm, *i*, and the sliding tube *e*, in combination with the jointed shaft and operating mechanism, substantially as and for the purpose described.

4. The boats A A′, constructed with partition-blocks *b*, in combination with the cross-bars *a a′ a² a³*, and the bolts which fasten the bars to the boats, substantially as and for the purpose described.

5. In combination with two boats or floats and a platform, an arch-shaped laterally-braced saddle-support and mast, the latter extended from the platform and fastened to the saddle-support, substantially as and for the purpose described.

6. In combination with two side floats or boats, a platform, and a mast, a sail-support fitted loosely on the mast and a sail fitted loosely upon the support, and provided with means whereby it can be kept unfurled, be furled, and also adjusted to a horizontal position to serve as a canopy, and vertically and obliquely to serve as an ordinary sail, substantially as described.

7. The rudder R, pivoted to the cross-bar a^3 of the boats A A′, and supported by plate a^4 in rear of the point where it is pivoted, in combination with the cords *j j′*, yoke *k*, and upright rod *l*, with handles *l′ l′*, said rod being mounted or pivoted on the platform and arranged in relation to the saddle-support and treadles, substantially as and for the purpose described.

8. The combination of the removable grass-collecting fork or guard L, arranged, as described, to lift and remove grass and like obstructions, submerged screw-propeller, and the two shallow-draft boats A A′, substantially as and for the purpose described.

9. A marine velocipede comprising in its construction two shallow-draft boats or floats set apart, but united, an inclined adjustable submerged propeller placed between the boats or floats, intermediate means for rotating the propeller supported by a platform between the boats or floats, and an intermediate steering-rudder, substantially as and for the purpose described.

10. The supporting, bracing, and raising and lowering device F, having a hinge connecting means at its upper end and a tube *e* jointed to its lower end, combined with an adjustable propeller-shaft, substantially as and for the purpose described.

11. The bearing-plate B^2, having bearing-boxes d^3 d^4, which are on arms of the plate, and also having bearing-boxes *d d′*, in combination with the propeller-shaft and treadle-shaft, and with the bevel-wheels *m n*, applied within the said plate, substantially as and for the purpose described.

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Witnesses:
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