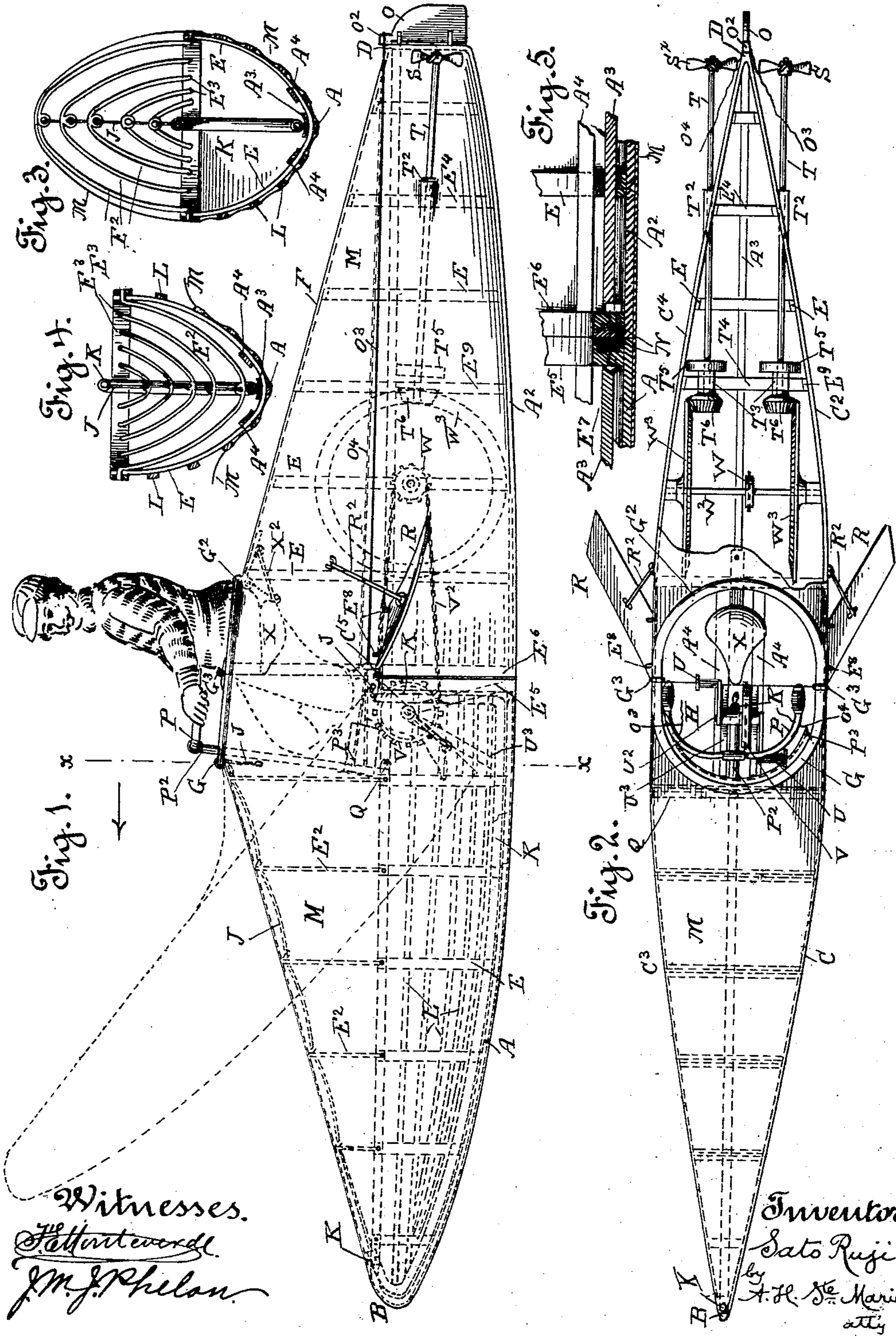


S. RUJI.
BOAT.

(Application filed Sept. 4, 1900.)

(No Model.)



UNITED STATES PATENT OFFICE.

SATO RUJI, OF SAN FRANCISCO, CALIFORNIA.

BOAT.

SPECIFICATION forming part of Letters Patent No. 684,311, dated October 8, 1901.

Application filed September 4, 1900; Serial No. 29,007. (No model.)

To all whom it may concern:

Be it known that I, SATO RUJI, of the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Boats, of which the following is a specification.

This is an improvement in portable water-craft designed for pleasure and utility in the navigation of inland or other placid waters and in which I employ foot-power as a means of propulsion after the bicycle fashion. To increase its portability, this improved craft is hinged amidships and is partly collapsible.

I will herein refer to the accompanying drawings, which form part of this specification, and in which like reference characters indicate like parts in the several figures.

Figure 1 is a longitudinal elevation showing the general construction of my improved boat. Fig. 2 is a top view of the same, partly broken away, so as to expose detail. Fig. 3 is a cross-section on the line $x x$ of Fig. 1 looking in the direction of the arrow. This view shows superribs of the forward part of the boat in their distended aspect. Fig. 4 is a similar section (less the upper covering) showing these superribs collapsed or dropped into the boat proper. Fig. 5 is a longitudinal section of a part of the keel, showing detail of the central hinge-joint.

This invention comprises a frame constructed and disposed somewhat like the frame of a racing-scutt or rapid-sailing skiff; but, unlike in such small craft, the ribs of my boat continue above the rail and join at the top, so as to constitute a fish-back-like superstructure rigid aft, but collapsible forward, with a manhole or hatch centrally disposed with reference to the stem and stern-post. Although my invention may be applied to larger craft for several persons, it is chiefly devised for one person, and for such use it is intended that my boat shall be about nine feet long, three feet high from keel to hatch, measured perpendicularly, and about two feet abeam at the rail amidships. I will therefore explain this invention with reference to such dimensions.

The keel of my boat is made of two parts A A², curved centrally downward and preferably bent up fore and aft, so as to constitute both stem and stern-post as well. It is curved

up at the prow, so as to form a cutter-runner-like stem B, which latter is brought well aft at its upper end, so as to insure stability and to afford a secure splice attachment for the forward ends of the port and starboard rails, which grasp the stem at this point upon opposite sides of it. These rails, like the keel, are made each in two sections C C² C³ C⁴ and extend from the said splice attachment with the stem B rearward to the top of the stern-post D, so that they shall be horizontal in general direction and about eighteen inches above the keel, measured perpendicularly amidships, as before stated. The upper end of said stern-post is riveted fast between the rearward ends of the port and starboard rails. Between this and their forward attachment with the stem B these rails will gradually swell or spread apart amidships to a width of, say, twenty to twenty-four inches. I may prefer to make the stern-post D separate from the keel A, in which case I will clip them fast together.

The ribs or frames E are made so that each port and its opposite starboard rib shall be one piece. Aft of amidships these ribs continue upward and converge to a central ridge-piece F, except where they meet the trimmer G of the centrally-disposed hatch H. The ridge-piece F is riveted at its rear end to and between the rails just in front of the stern-post D, and at its forward end it is clipped fast to the rear curved end of the hatch-trimmer G, centrally abeam. The forward ribs end at the rail and the superribs E² therefrom are bent horizontally at their lower ends, so as to pivot them to and within corresponding eyes or apertures E³ in the rail and ribs at their junction, as seen in Figs. 1, 4, and 5. This horizontal pivoting of the superribs E² is to admit of the latter being dropped back into the boat in order to facilitate the collapsibility of the superstructure. The pivots are hammered at their ends so as to form a rivet-head-like flange (or else provided with a nut or key) for the purpose of preventing the superribs E² leaving the eyes E³. The collapsible superribs E² are joined together at their upper ends centrally—that is to say, on a line fore and aft with the ridge-piece F—by means of a rope or jointed wire J passing around by the stem and keel through a pipe

or tube K, which (keelson-like) follows the direction of the keel within the boat. This collapsing line J for the forward superribs is guided by the tube K (or, as a substitute, by rings or pulleys) to a point just below the operator, so as to bring both its initial and terminal ends within his reach, so that he may raise or lower these pivoted ribs at will and at one operation without leaving his seat, which is within the hatch H. The tube K begins near the upper end of the stem and ends at mid-keel, from which points the within lying line J passes upward to the hatch. The ribs E are thoroughly riveted to the keel and rails and, in case of the superribs that are aft of the hatch H, also to the ridge F. An extra strong rib E⁴ is disposed at that point aft where the propeller-shafts, to be spoken of latter, leave the side of the boat in order to afford a strong support for the thrust-bearings of these shafts. I also provide a pair of strong ribs E⁵ E⁶ for a hinge-joint, also to be described later. At suitable distances between the keel and rail I run fore-and-aft stays or sheer-battens L on the planking-lines from stem to stern-post and which, like the rail, are riveted fast to the ribs E and to the stem and stern-post. These stays L and the keel and rail are disposed on the outside of the ribs, so as to admit of the outer hull-covering M, which I make of sealskin or other flexible substance, being tacked or otherwise made fast to said stays from its juncture with the stem, stern-post, and the keel to and around the superframe. This arrangement of the rail, keel, and sheer-battens on the outer side of the ribs is in order that the natural lines of depression of the sealskin or flexible outer covering (which are from without inward) may be disposed fore and aft along the water-lines, thereby providing clinker effects as an additional means to steady the motion of the boat abeam. (See Fig. 3.) The outer covering or integument M is to be well sewed or closely joined at the upper seam and thoroughly secured in place except to the forward or collapsible superribs E², which latter shall be free to drop forward into the boat by means of the collapsing line J to admit of their superlying integument or covering being also depressed or collapsed into the boat when so required. The superstructure extends about one foot and a half above the rail to allow proper freedom in the operation of a bicycle mechanism for guiding and propelling the boat. My object for making each rear rib and its corresponding superrib one continuous piece and the stern-post integral with the rear section of the keel and for rigidly joining the ridge-piece with the stern-post, hatch-trimmer, and rear ribs is to impart strength and stability to the rear section of the boat, so as to better sustain the action of the propelling mechanism. In order to support this mechanism in the bottom of the boat and to form a lining upon which to place fishing-

tackle, luggage, supplemental ballast, &c., as well as to impart greater firmness to the boat, I provide the keelson A³ and sister-keelsons A⁴.

I intend that my boat shall hinge upwardly from the rail, as suggested by the dotted lines at the left in Fig. 1, at a suitable point amidships to admit of its being properly bent up and folded together double, so that when folded the ridge-piece F shall be in the hollow of the ribs E² when the latter are collapsed by the line J. This boat, therefore, is practically severed or divided into two parts abeam amidships. At this point of juncture I provide the above-mentioned pair of joint-ribs E⁵ E⁶, (one to each section of the boat,) which ribs E⁵ E⁶ shall possess sufficient extra strength to enable the two sections of the boat to be thoroughly clamped together at the hinge-joint by means of clamps or bolts E⁷, and for the latter purpose these strong ribs are made to lie in juxtaposition and are faced on their inner or joint sides with strips of india-rubber N, well secured thereto by dovetail joint, waterproof or rubber cement, or otherwise. These rubber strips are sufficiently thick and elastic to exclude all water when this joint is properly clamped, as just said. As a means of holding the sections together in hinge connection, I employ a pair of hinges C⁵, one at each beam end of the joint, which I secure to the upper edge of the rail. This joint, as is manifest, necessitates that the keel, the rail, the sheer-stays, the hatch-trimmer, the keelson, sister-keelsons, and the outer covering shall be severed or apart, and therefore each section of the boat is made separate. When folded, the doubled joint end is to be flush or even—that is to say, no part of the boat or of its propelling mechanism will protrude beyond or across the joint. In case any of the mechanism shall cross the joint it is to be conveniently separable. The forward joint-rib E⁵, like the other forward ribs, ends at the rail, and the rearward joint-rib E⁶ continues up to the hatch-trimmer, with which it is riveted or clipped. At the juncture of the after joint-rib E⁶ with the hatch-trimmer and just fore of this rib E⁶ the hatch-trimmer is severed, as above mentioned, both port and starboard, on a line upward with the hinge-joint. The hatch-trimmer is thus divided into two equal parts, a forward half G and a rearward half G², so that the points of section shall admit of the forward half being hinged and doubled upon the rearward half by hinges G³ and allow the thus-doubled trimmer to pass between the rails C C³ when the boat is folded. The hatch H is of just sufficient width—say eighteen inches—to admit the operator when sitting in position ready to propel the boat and of a length—say twenty-four inches—to allow the free action of ordinary bicycle guide-handles. The hatch-trimmer is curved fore and aft to accommodate the body of the operator. The rudder O for guiding my boat in any

desired course is of the ordinary type, of thin tough board, with rudder-post O^3 integral therewith. It is operated by port and starboard rudder lines $O^3 O^4$, secured aft to the rearward edge of the top of the said rudder-post, but free from the sides thereof, and thence passing forward to the wheel or guide-handles P , by means of which the said rudder-lines and the interconnected rudder are actuated. The handles P may be a pair of ordinary bicycle guide-handles, Figs. 1 and 2, with their vertical shaft P^2 removably stepped into a beam Q and free to be lifted out of the way when folding the boat. The beam Q is secured to the rails $C C^3$. For properly securing the forward ends of the rudder-lines in operating connection with the wheel I provide a cross-bar P^3 , (shown curved in Fig. 2,) rigidly fast abeam to the vertical shaft P^2 at about the elevation of the rail and of sufficient length to insure prompt reply to the action of the guide-handles. I cross the rudder-lines in their interconnection with the rudder-post and the wheel, so that the port line shall be secured to the starboard end of the cross-bar and the starboard line to the port end thereof, in order that the boat may be guided in its course as a bicycle for the same movements of the guide-handles—that is to say, the boat will move to port when the port guide-handle is pulled and to starboard when the starboard guide-handle is pulled. The rudder-post extends above the rail, so as to enable the rudder-lines to be brought forward along the sides of the boat, preferably outside just above the rail, and enter the boat at or near the hinge-joint. The rudder O is hinged to and just abaft of the stern-post D in the usual way.

To insure greater stability in the movements of my boat, I provide a pair of wings R , preferably made in the form of the lateral fins of a fish and arranged one on each side of the boat just above the water-line to perform the functions of bilge-keels for the purpose just mentioned. These fins or wings incline rearward at a suitable angle—say forty degrees—to the line of the keel and somewhat upward in the direction of the prow at an angle of about fifteen degrees, gradually increasing to twenty degrees upward at their outer forward point. They also point slightly upward laterally or in their outward sweep, so that their action on the water shall be gradual from the sides of the boat outward and for other obvious reasons. For a boat of the size herein assumed the length of the fins R is about fifteen inches and their width is about five inches. These fins are hinged or pivoted, as at E^8 , Figs. 1 and 2, to adjacent ribs or to suitable dead-wood or bridging secured between adjacent ribs, so as to enable them to be closed up against the sides of the boat for more convenient portability. To hold them rigidly in their functional aspect, I provide to each an adjustable brace R^2 , disposed upwardly from the upper surface of the fin

and pivoted at its lower end to this upper surface and at its upper end to one of the rear ribs E . I prefer to make the fins R of baleen, but I may make them of aluminium or any other suitable material. It is intended that the draft of my boat with the operator in shall be about one-half its perpendicular height, or near to the rail, and it is at this point that the lower edges of the fins are pivoted.

As before stated, the propulsion of my boat is effected by a modified form of bicycle mechanism which operates oppositely - twisted screws $S S^x$. These twin screws are made to revolve toward each other, looking from above, each by its shaft T . The propeller-shafts T are journaled at the proper points aft where they pass through the sides of the boat by means of thrust-bearings T^2 , so that the propellers $S S^x$ shall be just abreast of the stern-post and at such an elevation that they shall not extend below the bottom of the keel. The bearings T^3 for the inner ends of the shafts T are secured to a beam T^4 , which is made fast at its ends to the opposite sides of a strong rib E^9 at a sufficient height to allow the said shafts to dip slightly downward aft. I point these propeller-shafts slightly downward, so they will tend to steady the boat to counteract the weight of the operator and to obviate any sudden jar or backlash from any cause, and for the same purpose I provide the inner end of each of the propeller-shafts with a suitable balance-wheel T^5 , properly keyed fast. Just forward of the balance-wheels T^5 on the said inner ends of the shafts T , I provide small bevel-pinions T^6 , by means of which the shafts are revolved. The aforesaid bicycle mechanism comprises a pair of pedals U , made fast to the opposite ends of a short spindle U^2 , which latter is journaled to a pair of brackets U^3 , that are properly disposed and secured in place just forward of the hinge-joint. Centrally on the pedal-spindle U^2 is rigidly keyed a driving sprocket-wheel V , which actuates a sprocket-pinion W through a sprocket-chain V^2 . The pinion W is secured centrally on an arbor W^2 , disposed abeam abaft of the operator. To this arbor W^2 and as close to the sides of the boat as will admit of their free revolution I secure two oppositely-disposed bevel-wheels W^3 , so arranged thereon as to exactly mesh with and actuate the aforesaid bevel-pinions T^6 , which will have the effect aforesaid of revolving the twin propellers $S S^x$ toward each other, looking downward, when the pedals U are revolved forward in the usual way. The proportionate diameters of the sprocket-wheel V to the sprocket-pinion W and of the bevel-wheels W^3 to the bevel-pinions T^6 is such as to revolve the screws and propel the boat at a great speed, consistent with the power of the operator, when the pedals are worked rapidly. The pedal-spindle U^2 is removable from the brackets U^3 to admit of it and the pedal U , sprocket-wheel

V, and chain V² thereon being lifted out and placed in the rear section of the boat when doubling up.

The seat X for the operator is so hinged to the rear section G² of the hatch-trimmer as to admit of its being doubled under the ridge-piece F, and it is kept rigid in its operative position by any suitable means, such as a brace X² or a bolt and keepers, or else it may be made to slide under the ridge-piece, if desired. I prefer to arrange the machinery of my boat so as to have the brackets for the pedal-spindle located just sufficiently forward of the hinge-joint to clear the joint, the balance of the machinery properly disposed, as before described, in the after section of the boat and the position of the operator's seat just abaft of the hinge-joint, so that he may be free to shift his center of gravity fore or aft as well as laterally to enable him to accommodate his action and the weight of his body to prevent any roll or pitch in the rapid motion of the boat.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A boat having two flexibly-joined frame-sections, one of which sections is foldable upon the other, and a cover adapted to overlie the tops of the sections when open, substantially as described.

2. A boat having two flexibly-joined frame-sections, one of which sections is foldable upon the other, and a foldable covered superstructure supported by the sections, collapsible for a portion of its extent, substantially as and for the purpose described.

3. A boat having two frame-sections, one of which is foldable upon the other, side hinges connecting the abutting ends of the sections, and a cover adapted to overlie the tops of the sections, substantially as described.

4. A boat comprising a hull-frame primarily in two parts abeam, a similarly-divided superstructure rigid aft but collapsible forward so as to admit of the two sections of the boat being doubled upon each other, and a flexible covering overlying both the hull-frame and superstructure, substantially as described.

5. A boat comprising a hull primarily in two parts abeam, and a fish-shaped back or superstructure rigid aft but collapsible forward and having a somewhat-centrally-disposed manhole or hatch, said hull and superstructure being respectively pivoted or hinged at the rail and hatch-trimmer so as to admit of the two sections of the boat being doubled upon each and the collapsed forward end dropped upon the rigid rear section, substantially as described.

6. A boat comprising a collapsible superstructure, pivoted ribs therefor, and a line joining said ribs together whereby the same

can be raised or lowered at will, substantially as described.

7. A boat comprising foldable sections, a partly collapsible and foldable superstructure thereon, pivoted superribs for the collapsible part of said superstructure, a line flexibly joining said superribs together, and means, for guiding said line in the direction of the stem and keelson to a point near the operator so as to bring both the initial and terminal ends of the line within his reach, substantially as described.

8. A boat comprising a hull made in two sections, a similarly-divided superstructure thereon having a centrally-disposed hatch, a seat adjustable within said hatch, and suitable propelling and steering mechanisms located partly in the forward section of the boat and partly in the rear section thereof so that the operator seated within the hatch may be free to shift his center of gravity fore or aft as well as abeam and thus accommodate his action and the weight of his body to prevent roll or pitch of the boat while it is rapidly moving, substantially as described.

9. A boat provided with lateral fins acting as bilge-keels to steady it abeam, said fins being disposed horizontally outward, inclined somewhat aft and slightly upward laterally, and bent up in their forward aspect so that they will always ride the water, with no propensity to dive, and will have a lifting tendency to right the boat automatically when either rolling or pitching, substantially as described.

10. A boat having lateral fins hinged on a substantially horizontal line to it so as to enable them to be closed up against its sides for more convenient portability, and means, for holding said fins in position, substantially as described.

11. A boat composed of foldable sections, provided with lateral fins hinged to it on substantially horizontal lines so as to enable them to be turned against its sides, and means for holding said fins in position, substantially as described.

12. A boat with flexible covering, having the within-lying rail, sheer-battens, as well as the keel disposed on the outer side of the ribs next adjacent the flexible covering so that the natural lines of depression of its covering between the sheer-battens, &c., will be from without inward, fore and aft or along the water-lines, thereby providing clinker effects as a means to steady the motion of the boat abeam, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SATO RUJI. [L. S.]

Witnesses:

MASUJI MUJAKAWA,
J. M. J. PHELAN.