J. A. Etzler. Sheet 1, 4 Sheets.

Sails & Rigging.

No. 2,533. Patented Apr. 1, 1842.

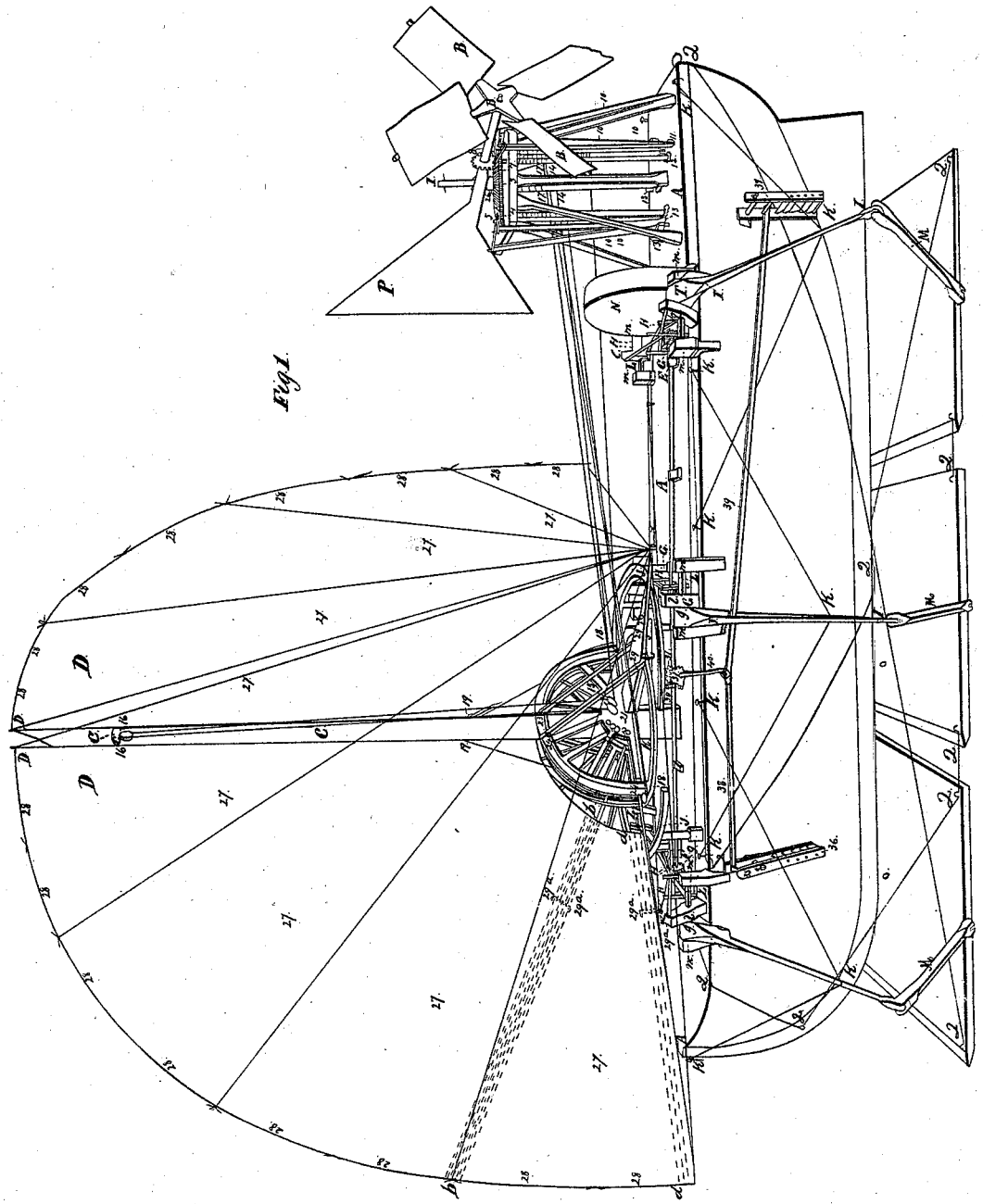


Fig 1.

J. A. Etzler. Sheet 2, 4 Sheets.

Sails & Rigging.

No. 2,533. Patented Apr. 1, 1842.

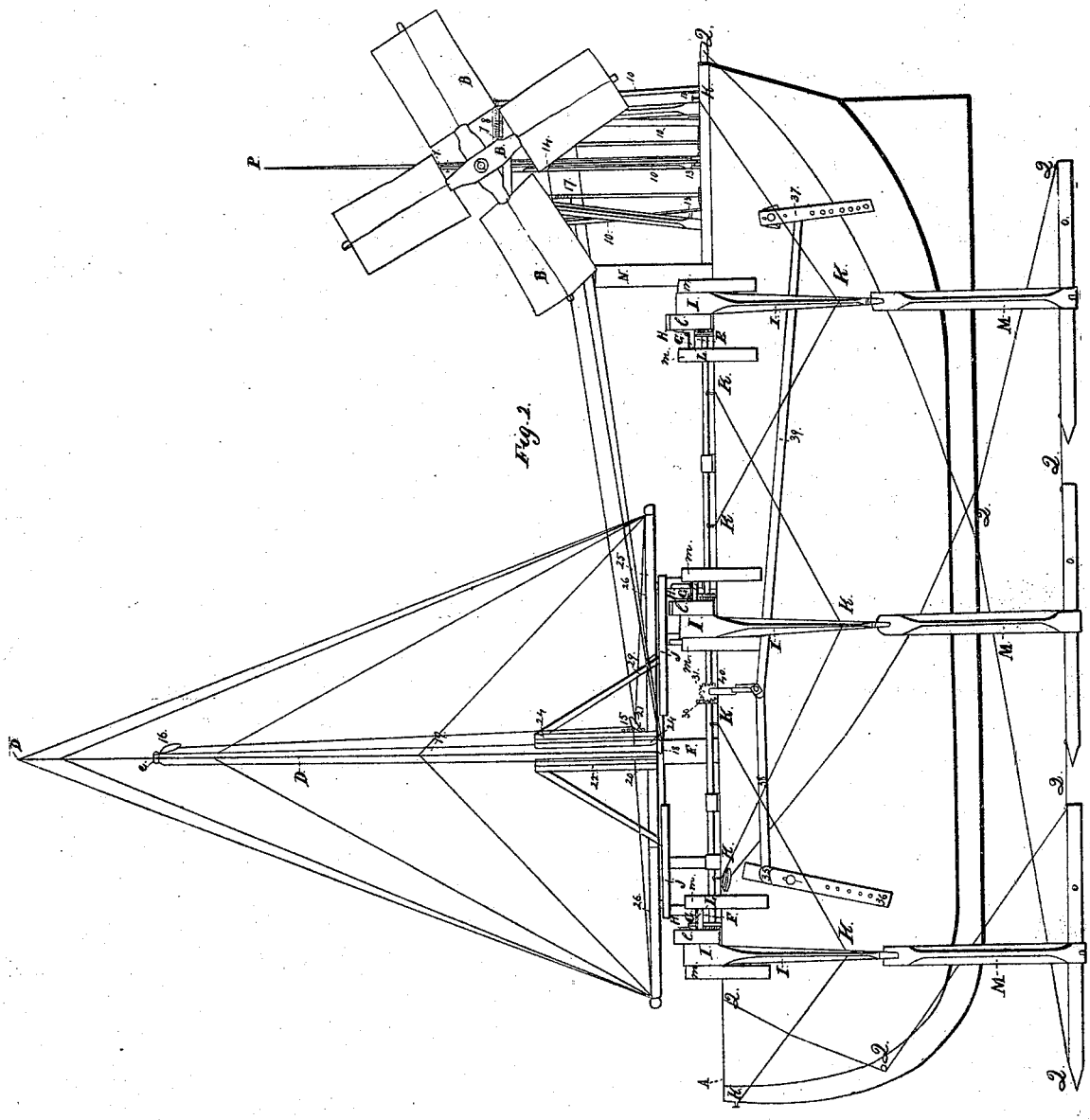


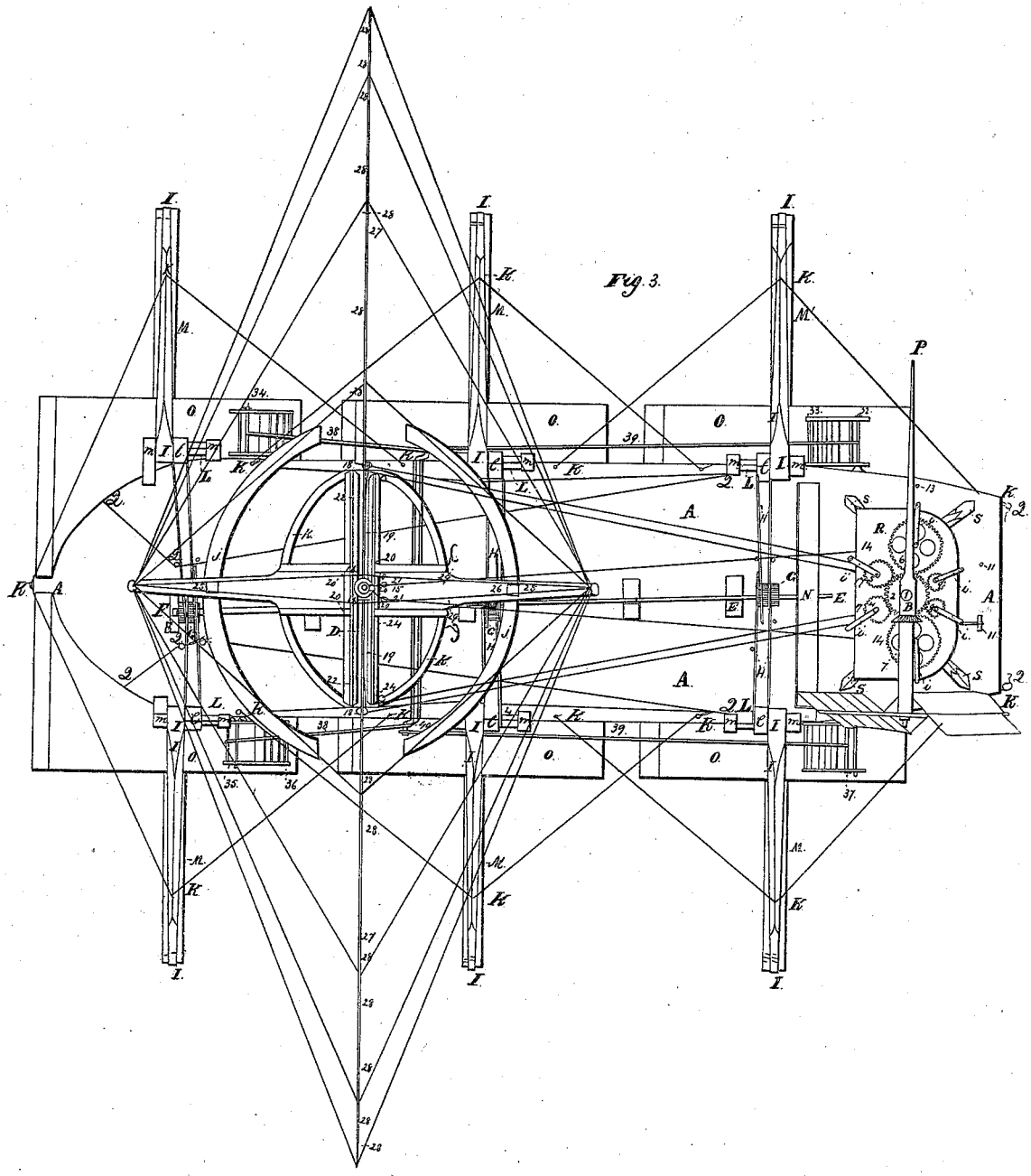
Fig. 2.

J. A. Etzler. Sheet 3, 4 Sheets.

Sails & Rigging

No. 2,533. Patented Apr. 1, 1842.

Fig. 3.



J. A. Etzler. Sheet 4, 4 Sheets.

Sails & Rigging

No. 2,533. Patented Apr. 1, 1842.

Fig 5

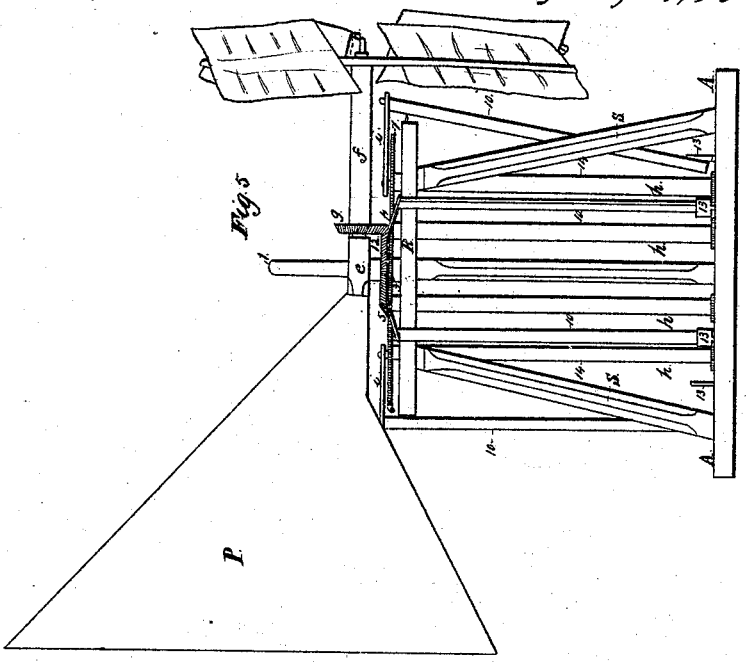
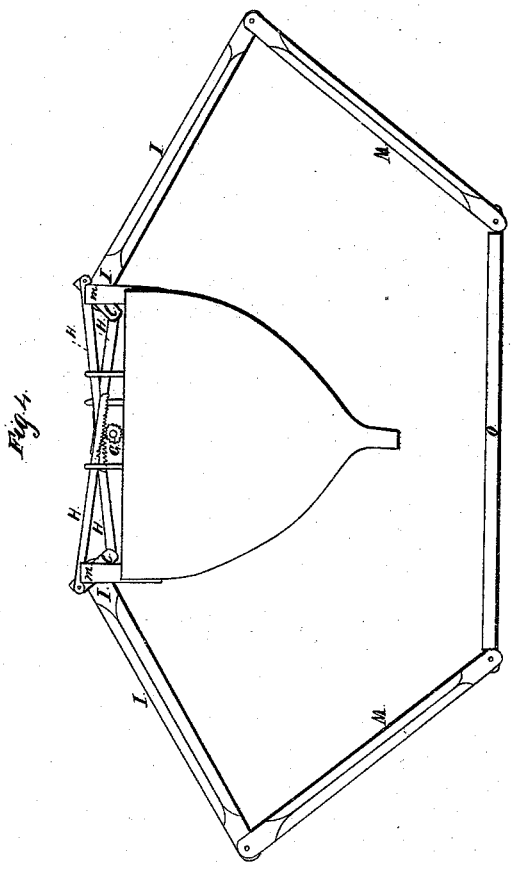


Fig 4.



UNITED STATES PATENT OFFICE.

JOHN A. ETZLER, OF PHILADELPHIA, PENNSYLVANIA.

NAVIGATING AND PROPELLING VESSELS BY THE ACTION OF THE WIND AND WAVES.

Specification of Letters Patent No. 2,533, dated April 1, 1842; Antedated November 20, 1841.

To all whom it may concern:

Be it known that I, JOHN ADOLPHUS ETZLER, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Combination of Mechanism or Apparatus to be Applied to the Navigating of Vessels, which apparatus so combined I denominate the "Naval Automaton"; and I do hereby declare that the following is a full and exact description thereof.

The nature of my invention consists, first, in a novel mode of applying the power of the wind, by means of which one man is enabled to manage a sail of a peculiar construction, so as to reef, or unreef, or to veer it, as may be required; the power to effect which is to be derived from a wind-wheel furnished with wings operating in the manner of wind-mill sails, said wind-wheel being placed at the stern of the vessel, and being connected by suitable gearing and tackle, with the sail, which, as above remarked, is of a peculiar construction, and denominated by me a fan sail; it is so named because its two halves, or sections, are capable of being lowered and folded together, and of being unfolded and opened out in a manner resembling the folding and unfolding of a fan.

My second improvement consists in the mode in which I apply the power of the waves, or the resistance of the water, as the vessel rises, or sinks therein, to the operating of propelling apparatus of any suitable kind, and which, as well as the power of the wind-wheel, may be applied to the pumping out of water, or to other purposes for which the power so obtained may be rendered available. The power of the waves I obtain by the employment of floats, or platforms, which are situated below the keel of the vessel, and which being thus placed sufficiently below the surface to be in still water, render effective the alternate motions of the vessel up and down, by means of the apparatus to which said floats are connected, and which will be presently described.

In the accompanying drawings, Figure 1, is a perspective view of the whole apparatus. Fig. 2, is a side view thereof. Fig. 3, a top view. Fig. 4, a part of one of the floats and its appendages, and Fig. 5, the wind-wheel with a part of the apparatus appended thereto.

In each of these figures, like parts are designated by the same numbers, or letters, of reference.

A, A, is the deck of the vessel. B, B, the wind-wheel, and D, D, the fan sail. The wind-wheel may be either horizontal, or vertical; in the accompanying drawings, it is represented in the latter form. The sails are kept to the wind by means of a tail P, in the ordinary manner. The shaft *e*, which sustains the tail P, turns on the vertical shaft 1. The shaft *f*, of the wind-wheel is tubular, and through it passes a cylindrical shaft attached to *e*, upon which shaft the tubular part *f*, revolves. To the hollow shaft *f*, is attached a bevel wheel *g*, which gears into a horizontal bevel wheel 2, that turns freely on the shaft 1. Attached to the under side of wheel 2, is a spur wheel 3, as seen most distinctly in Fig. 5. The spur wheel 3, is surrounded by six other spur wheels, numbered 4, 5, 6, 7, 8, and 9, either of which may be thrown, at pleasure, into gear with the spur wheel 3. These six spur wheels are respectively attached to the upper ends of six vertical revolving shafts, or spindles *h*, *h*, *h*, which have their lower bearings on the deck of the vessel, or in suitable steps standing thereon; near their lower bearings they are each furnished with ratchet wheels and pawls to prevent their motion excepting in the proper direction. The upper bearings of these spindles pass through the platform R, which is supported by the posts S, S, rising from the deck, and sustaining the wind-wheel; their upper pivots, or gudgeons, run in the inner ends of the connecting pieces *i*, *i*, *i*, (see Fig. 3) the outer ends of which are jointed to the rods, or levers, 10, 10, 10, (see Fig. 5) which rods, or levers, are hinged near their upper ends, to the platform R. The spindles *h*, *h*, *h*, pass through openings in the platform R, which are elongated so as to allow them sufficient play to admit of the respective wheels being thrown into, and out of, gear with the wheel 3; and by drawing the lower end of either of the rods 10, 10, outward, the wheel which it carries will be thrown into gear with said wheel, and its spindle *h*, will be made to revolve. Nos. 11, 12, 13, represent pins, or other devices, by which the levers 10, 10, may be held in place, so as to keep the respective wheels either in

or out of gear. Around the spindles *h*, *h*, ropes are to be wound and unwound, by which the sail D, D, is to be managed.

The fan sail D, D, is divided into two parts, and these, when fully raised, meet together against the mast C, and appear as in the drawing, Fig. 1. These parts are kept expanded by thin poles, the lower ends of which work on pins in the semicircular pieces 20, 21, near the foot of the mast; the two outward, concentric semi-circles 22, 23, serving as guides to them in raising and lowering; they have, also, holes 24, 24, through them into which pins, or bolts, may be passed for the purpose of aiding in sustaining the thin poles in their respective positions. These poles pass along and are attached to the sail in the direction of the lines 27, 27, radiating at equal distances from each other. Across the outer extremities of these thin poles, are others 28, 28, which form the outline of the sail, and are so connected as to fold together, and to cause the intermediate portions of the sail to fold regularly. When the sail is entirely struck, the respective thin poles 27, 27, will be in a horizontal position, as shown by the dotted lines *d*, *d*, and they may be held together by a clamp, hook, chain, or rope, as shown at 29ª, 29ª; or when partially lowered, as in the line *b*, *b*, they may in like manner be confined in place, and the same will hold good of any higher elevation.

There is a beam, No. 25, 25, which extends out horizontally from the semi-circles 20, 21, and always stands at right angles to the sails. From each of the extremities of this beam, lines extend to the outer ends of the thin poles which keep the sail stretched, and thus efficiently aid in supporting it. This beam is to revolve horizontally, and is supported on the semi-circular ways *j*, *j*, upon which run the friction rollers 26, 26. The precise shape of the fan is arbitrary, and is determined by the different lengths of the expanding poles. The curved pieces *k*, *k*, are braces to the semi-circles 22, 23.

From the respective spindles, *h*, *h*, *h*, of the wind-wheel apparatus, ropes are conducted by means of suitable blocks, or pulleys, to the parts of the sail upon which they are to operate; those marked 14, 15, 16, run from their respective spindles to the foot of the mast C, and pass thence through blocks up to the upper end of said mast, and thence through blocks to the uppermost poles of the respective halves of the fan sail. Others of them, 17, 18, and 19, run from two of said spindles to the bottom of the fan, at some convenient distance from the center at each side, and from thence, 18, up to the uppermost, or to any lower pole, of the fan, in order to draw it down, should not its own weight be found sufficient for that purpose. The two remaining ropes run from the two remaining spindles to the outside of the bottom of each half of the fan, to turn it in either direction around its center, or mast. This arrangement will, of course, admit of some variation, without departing from the general principle of action.

By the foregoing combination of the respective parts, one man will have sufficient command of the fan sail to be able to hoist, or to lower, it in any degree, or to veer it to such extent as may be required by the direction of the wind, the whole being effected by the due management of the levers 10, 10, and the consequent movement of the spindles *h*, *h*.

My second improvement, that of employing the power of the waves, or of the resistance of water to the motion of a solid, as the vessel rises and falls, is as follows. Along the deck, at, or near, its middle, I place a shaft E, E, which is to revolve in suitable bearings; this shaft is to be as little elevated as possible, and upon it I place as many ratchet wheels as may be deemed necessary; three of these are shown at G, G, G, but the number is not limited. Upon each of these wheels there rest, by their own weight, two pair of bars, or rods, of metal H, H, which have ratchet teeth on their lower sides toward their inner ends; at their outer ends they are attached by joint pins to arms of metal, or of wood, *l*, *l*, affixed to a shaft L, L, which shaft turns on gudgeons in the standard *m*, *m*. Each of the ratchets operates upon the ratchet wheels G, in its motion in one direction only; the arrangement for effecting this so as to cause them to communicate a like motion to the shaft is a thing well understood by machinists. On each of the shafts L, is firmly attached a beam, or jointed arm I, extending down obliquely, on the outside of the vessel, and reaching nearly, or quite, to the surface of the water, and each of these is, at its outer end, jointed to a similar beam, or arm, M, and this is, in like manner, jointed to a movable platform, or float, O. The arrangement of the arms I, and M, and of the float O, is seen distinctly in Fig. 4. The floats, or platforms, O, O, may be varied in number; their position is to be horizontal; and they are to be placed so far below the keel of the vessel as may be requisite to keep them from coming into contact with it by the rising and sinking of the vessel in the water. They should be so braced together by ropes and chains at their corners, and by others running diagonally, as shown at Q, Q, as to be retained, as nearly as may be, in a horizontal position, relatively to the vessel. The beams, or arms, I, I, may, also, be braced by ropes, or chains, attached to them and to the gunwale, or other part of the vessel, as shown at K, K.

It will be readily seen that, by an arrangement of parts substantially the same with that above described, the shaft E, F, will be made to revolve with a motion nearly continuous, as it will be turned by the ratchets both by the rising and the falling of the vessel. The floats being in water which is nearly still, and the vessel being made to rise and fall, by the agitation of the waves, the floats will, by the resistance opposed to them by the water, cause the beams, or arms, M, I, to work upon their joints, and these in their turn will cause the ratchets to vibrate upon the ratchet wheels G, G, and the shaft E, F, to revolve. N, is a fly-wheel on one end of said shaft, to aid in regulating its motion.

The rotary motion thus obtained may be applied to the purpose of aiding in propelling the vessel, either by the action of paddle wheels, or of reciprocating propellers of any of the known kinds. For driving the ordinary paddle wheels, a bevel wheel 30, upon the shaft E, F, may be made to gear into another, 31, upon the shaft of such paddle wheel. Nos. 32, 33, 34, 35, 36, and 37, represent reciprocating paddles, placed under water, toward the stem and stern of the vessel, at each side of it; these may be provided with shutters, which close and open as they are moved back and forth in the water; these propellers may be made to move in reversed directions by rods 38, 39, operated on by a crank, 40, on the shaft of the wheel 31. These modes of propelling are given merely as exemplifications of the various plans which may be adopted, and without any intention of limiting, or confining myself in this particular, as the rotary motion of the spindle E, F, or that of the wind-wheel, may be applied to produce any other required rotary, or reciprocating, motion, by means of proper gearing. When the power derived either from the wind-wheel, or from the floats, is not required for managing the sails, or for propelling the vessel, it may be employed for working the pumps, for weighing the anchor, for raising, or lowering, heavy weights, or for other useful purposes.

Having thus, fully described the manner in which I construct my naval automaton, and shown the operation thereof, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The application of the power of the wind to the managing of the sails, by a combination and arrangement of the respective parts of the apparatus substantially the same with that herein described; by which combination and arrangement of parts one man will be enabled to manage and conduct any vessel with ease and certainty; that is to say, I claim the arrangement of the gearing, and of the rods, spindles, and ropes, connected with the wind-wheel, and made to operate upon the fan sail, as herein set forth.

2. I, also, claim the manner of constructing and arranging the fan sail, so as to admit of its being raised and lowered on each side of the mast, and of being veered by means of the tackle connected with the wind-wheel. I claim likewise the manner in which I have combined the floats, below the keel of the vessel, with the shaft E, F, upon the deck thereof, said combination being effected by means of the jointed beams, or arms, M, and I, of the ratchet bars, or rods, H, H, and of the ratchet wheels G, G, so as to produce a rotary motion capable of being applied in the manner, and for the purposes, herein set forth, by which the power of the waves may be applied to the propelling of the vessel, or to other useful purposes.

JOHN ADOLPHUS ETZLER.

Witnesses:

THOS. BARLOW ZANTZINGER,
WILLIAM OSBORNE.