Sheet 1, 2 Sheets.

B. Gilbert.

Vibrating Propeller.

No. 10,229. Patented Nov. 15, 1853.

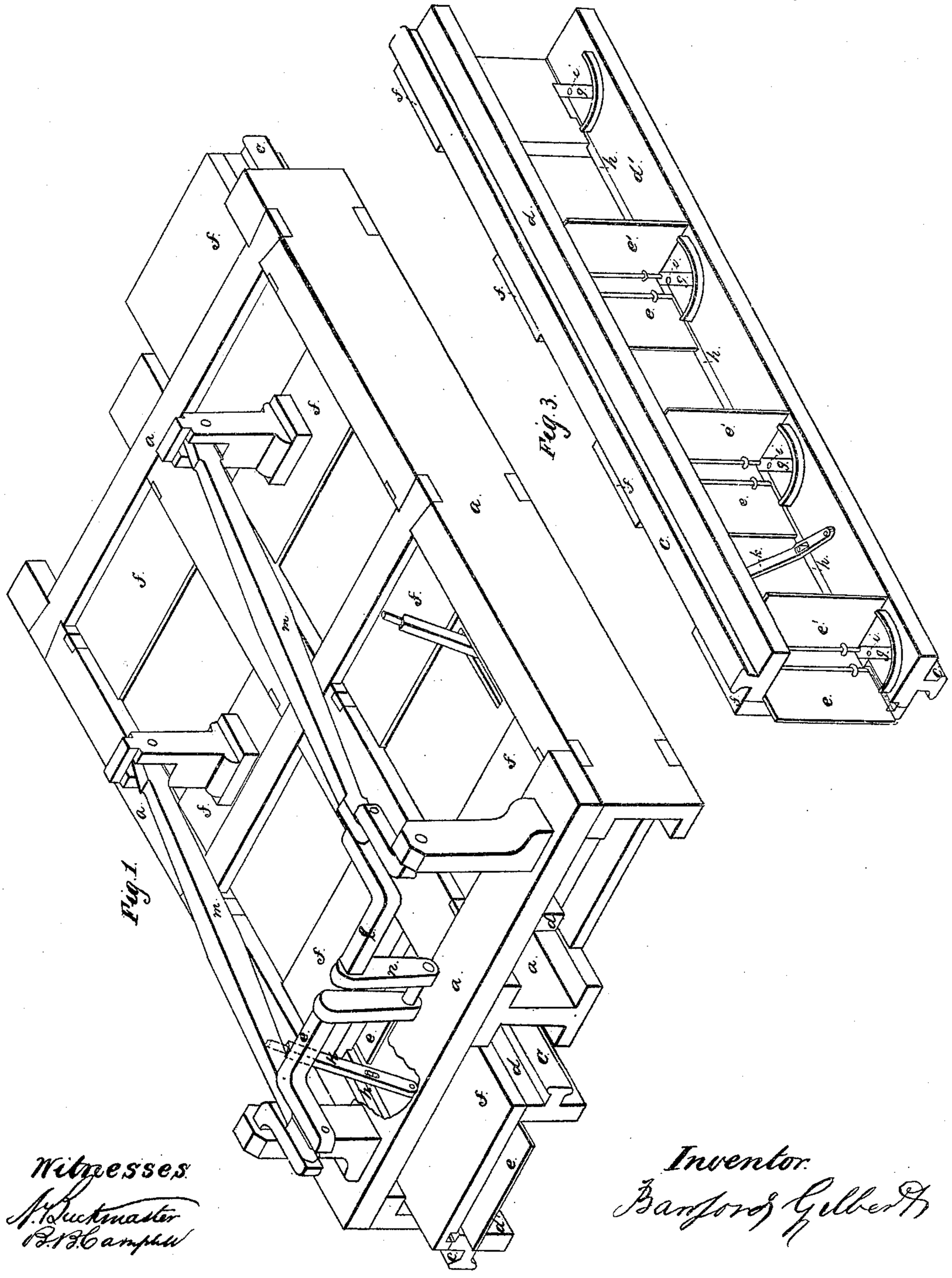

Fig. 1.

Fig. 3.

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Sheet 2, 2 Sheets.

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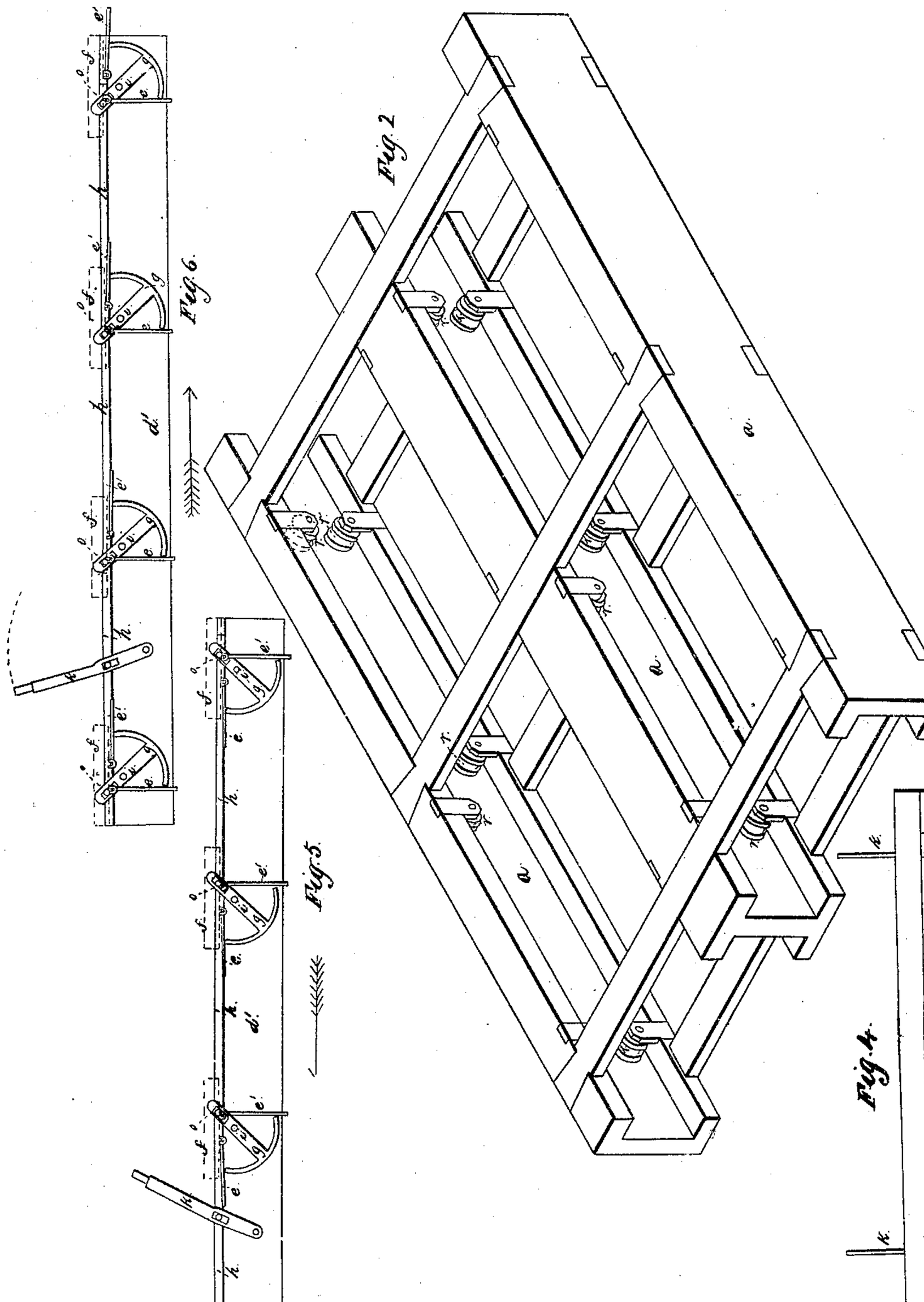

Witnesses.
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UNITED STATES PATENT OFFICE.

BANFORD GILBERT, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN PROPELLERS.

Specification forming part of Letters Patent No. **10,229**, dated November 15, 1853.

To all whom it may concern:

Be it known that I, BANFORD GILBERT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Reciprocating Propellers for Steamboats; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification.

My invention consists in the combination, with the double floats, of the anchors, one of which is connected with each pair of floats, and which operate at the same time to retain those floats which are for the time out of use in a horizontal position, so as to present as little resistance to the water as possible, and also to sustain the other float in its vertical position in the water when its stroke is against the water, while it leaves it free to swing back on the return-stroke to the position which it will naturally assume when drawn back through the water at the angle of least resistance, whatever that may be in practice, all the anchors in one carriage or frame being connected by a rod, so that with the aid of a handle they may be simultaneously turned, so as instantaneously to reverse the action of the propeller by bringing those floats which were inactive into operation, and raising and retaining those previously in use in the horizontal position and out of the way, by means of which without stopping the engine or even reversing its action the effect will be changed and the boat propelled in an opposite direction.

In the drawings, Figure 1 is a perspective view of a double set of propellers made on my improved plan. Fig. 2 is a perspective view of the frame-work in which the reciprocating propellers move. Fig. 3 is a perspective view of one set of propellers turned so as to show their construction and arrangement more clearly. Fig. 4 is a transverse section of my propellers in their frame, and Figs. 5 and 6 are longitudinal sections of one set of propellers without the frame, the two figures showing the paddles set in reverse positions.

In the several drawings the same letters refer to like parts of the machinery.

To enable others skilled in the art to construct and use my improved propeller, I will proceed to describe its construction and operation.

In the drawings, *a a* is a frame-work of timber or iron, strengthened by cross-pieces and braces, which is designed to contain a double set of propellers. This frame-work may be covered at top, but is open to the water beneath. To the longitudinal side pieces of the frame are attached friction-rolls *r r*, &c., at suitable distances apart, so as to receive the guides *c c*, attached to the sides of the propeller-frames.

The propeller-frames (see Fig. 3) consist of two side pieces *d d'*, of the same length as the frame-work *a* and rather deeper than the floats or paddles *e e'*, &c. In each propeller-frame there may be several pairs of these floats *e e'*, placed so far apart as not to interfere with each other.

The construction and operation of each pair of floats are alike. The description of one pair will therefore suffice.

The floats *e e'* are placed side by side and are hung loosely on hooks or hinges, by which they are attached to the boards *f f*, one of which connects the two sides of the frame over each pair of floats. When in a state of rest, the floats would both hang perpendicularly side by side on the frame and liable to swing to and fro were they not kept apart and fixed in the requisite positions by the anchors *g*. There is one anchor for each pair of floats. The shank of the anchor is attached to one of the side pieces *d'* of the propeller-frame by means of the pin or pivot *i*, on which it turns, and is placed between the two floats in each pair. The arms or flukes of the anchor form a quadrant, or one-fourth of a circle, and as the extremities of the arms are blunt and rest against the face of the floats between which the anchor is placed they prevent the floats from coming together, keeping them at all times at least ninety degrees apart, as shown in Figs. 5 and 6, so that when the float *e'* is in a perpendicular position the float *e* will be horizontal, or nearly so. The pivot *i* is a short distance from the top of the shank of the anchor and above it, as the extremity of the shank is a pin *o*, which passes through a longitudinal slot in the shank. This pin *o* connects the top of the shank with a rod of iron *h*, which lies in a groove at the upper edge of

the side piece d'. To this rod h all the anchors in one propeller are attached in the manner just described, so that when the rod h is slid backward or forward by the handle k (which is attached by pins to the slide d' of the frame and to the rod h in like manner as the shank of the anchor) it turns all the anchors simultaneously. The distances between the pins i and o and the sweep of the handle k are so adjusted as that by pushing the handle K either backward or forward the fluke of each anchor passes through an arc of ninety degrees, carrying one float on each pair up to a horizontal position and allowing the other float to fall to a perpendicular position. The change effected by altering the position of the handle k is shown in Figs. 5 and 6. When one float e in a pair is raised by the fluke of its anchor to a horizontal position, it is immovable and has no effect to propel the boat or to impede its progress, while the other float e', when passing in one direction through the water, is retained in its vertical position by being pressed against the extremity of the fluke of the anchor, and in the return-stroke of the engine, when passing in the opposite direction, is free to swing back at any angle which it may naturally assume in being dragged through the water, presenting, of course, its thin edge to the water, thus affording the least possible resistance to its passage. At the next stroke of the engine it will of course, by being pushed against the water, fall into a vertical position, presenting its broad edge to the water, and so on. The guides c c are of any suitable shape to slide between the friction-rolls r r r, &c., attached to the frame-work a a, and form part of the sides d d' of the propeller, one guide extending on each side along the whole length of each propeller-frame. The design of these guides is to form the bearing of the propellers in the frame-work a a, as they do not come in contact at any other points than where the guides rest between the rolls, and they secure an easy and uniformly steady motion of the propellers in the frame-work a a.

One set of propellers only may be used, if desired; but the motion of the boat in that case would not be as regular as if a double set were used, as represented in the drawings, Fig. 1.

My propellers are to be entirely submerged, and may be placed either at the stern of the boat or a double carriage or frame at each side, or one double carriage underneath the vessel, where its conformation will admit of such an arrangement.

When a double carriage, as represented in the drawings, is used, the advantage of my improved propeller is most apparent, for in that case one set of floats in one carriage is always acting against the water during the time when the corresponding set in the other carriage is being drawn back, and by their connection to one crank-shaft the same stroke which propels the boat with the floats of one carriage draws the corresponding floats in the other carriage back to be ready to commence its stroke when the other has just expended its force, and this without experiencing in any great degree that loss of power by reaction which is incident to the use of the ordinary duck's foot or other reciprocating propellers heretofore proposed and invented. The reciprocating motion is communicated to the propellers from the crank-shaft l by the connecting-shafts m m. Motion is communicated to the crank-shaft l by the crank-arm n, which is moved by the steam-engine or other motor in any of the usual methods.

Having thus described the construction of my improved propellers, it is almost needless to dwell more at length on its mode of operation. Suppose the paddles or floats to be set by the handle k in the position shown in Figs. 1 and 5, the foremost float e in each pair being retained in a horizontal position by the fluke of its anchor, and the hind float e' allowed to hang vertically. (The arrows underneath Figs. 5 and 6 show the direction in which the boat will be propelled with the paddles set as shown in those figures.) Now, if the propeller is moved by the engine in a direction contrary to that of the arrow in either figure, the float e', Fig. 5, will be pressed by the water against the extremity of the fluke of the anchor, and being then in a vertical position will present its broadside to the water, in which it is submerged, and will retain its position during the whole of that stroke of the engine. So soon, however, as the return-stroke commences and the propeller is drawn back in the direction of the arrow (the float e being still retained in its horizontal position) the float e', hanging loosely on its hinges, will swing back into a nearly horizontal position, assuming naturally that angle at which it can be drawn through the water with the least resistance. If it is designed to reverse the course of the boat, the handles k, being in the position shown in Fig. 5, are drawn forward into the position shown in Fig. 6, which instantaneously changes the position of the anchors and consequently the floats also, bringing the float e, which before was out of the way and in a horizontal position, into use and raising the float e' out of the way. (See Fig. 6.) This will of course immediately change the effect of the motion of the propellers and will at once reverse the motion of the boat.

In ordinary arrangements for changing the action of paddle-wheels and propellers the motion given by the engine to the propeller must be reversed, which requires the stopping of the engine and reversing its action; but by my arrangement no such detention is necessary, as the paddles or floats may be reversed independently of the action of the engine and of the motion of the propeller-frames. The boat may also be caused to turn round to either side by reversing the action of one set of propellers and not of the other side, so that

in case of emergency if the rudder becomes from any cause unmanageable the vessel might be steered by means of the propellers themselves.

Having thus described my improved propeller, I do not desire to claim as my invention the use of submerged propellers actuated by a reciprocating motion, nor the use of propellers with two leaves or floats hinged at or near their point of connection and operating by opening and closing as they pass to and fro through the water, as in the case of the duck's-foot propeller; but

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

The combination of the anchors *g* with the double floats or paddles *e e'*, suspended so as to hang vertically in the water when in use and operating with a horizontal reciprocating motion, one of the floats in each set propelling the boat in one direction and the other float in each set propelling it in the opposite direction, one anchor being combined with each set of double floats for the purpose of retaining one float in a horizontal position, so as to pass through the water with the least possible resistance when not in use and sustaining the pressure of the water against the paddle in use when in the vertical position, which the anchor compels it to retain while propelling the boat and leaving it free to assume the angle of least resistance while returning through the water, the simultaneous reversing of the double paddles being accomplished by means of a handle, which shifts the connecting-rod, to which all the anchors in one frame are attached, in the manner hereinbefore described.

BANFORD GILBERT.

Witnesses:

B. B. CAMPBELL,

N. BUCKMASH.