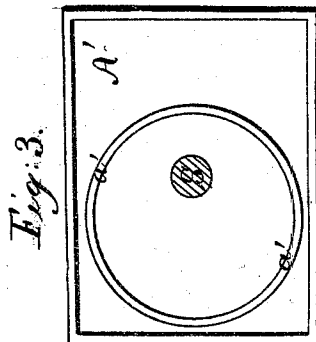
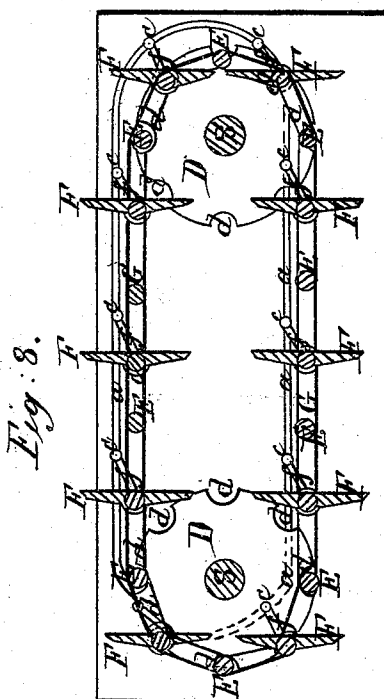
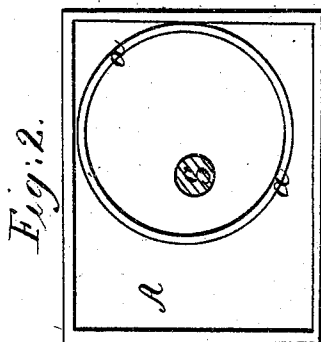
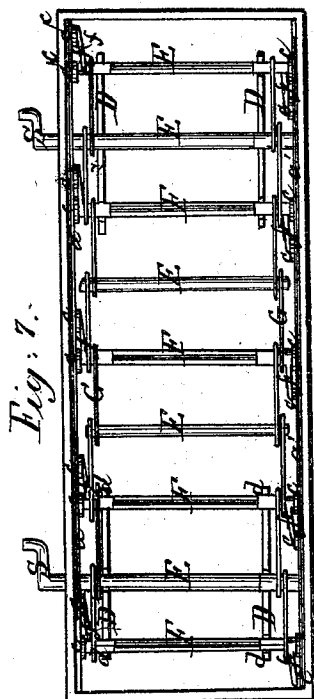
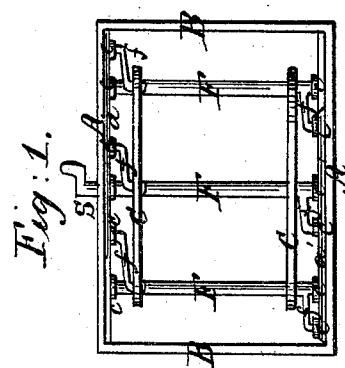
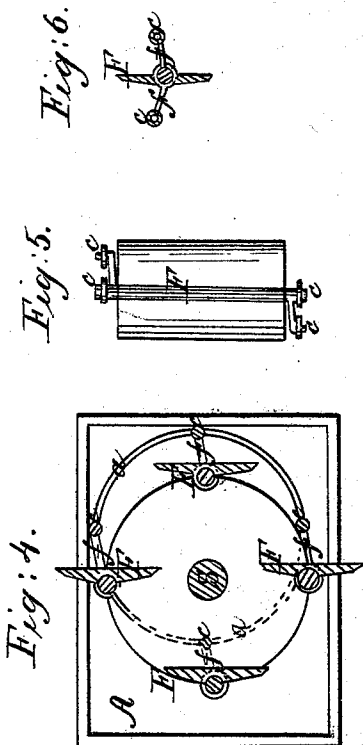


T. S. Bigelow. Chain Propeller.

N^o 39,522.

Patented Aug. 11, 1863.



Witnesses.
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Inventor.
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UNITED STATES PATENT OFFICE.

THOMAS S. BIGELOW, OF LAKE MILLS, WISCONSIN, ASSIGNOR TO HIMSELF,
LUTHER E. PORTER, AND SAM'L. M. ROWE, OF SAME PLACE.

IMPROVED PADDLE-WHEEL.

Specification forming part of Letters Patent No. 39,522, dated August 11, 1863.

To all whom it may concern:

Be it known that I, THOMAS S. BIGELOW, of Lake Mills, in the county of Jefferson and State of Wisconsin, have invented a new and useful Improvement in Paddle-Wheels for Propelling Vessels and other Appropriate Uses; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and the letters and figures marked thereon, which form part of this specification.

In the said drawings, which are hereunto annexed, Figure 1 represents a plan or top view of my invention. Figs. 2 and 3 are interior side views of the ends of the box or frame in which the wheel is placed. Fig. 4 shows a side sectional view of Fig. 1 at the line *x*. Fig. 5 shows the construction of the buckets or floats of my improved paddle-wheels. Fig. 6 shows an end view of one of said floats. Fig. 7 shows a top view of my invention in an extended or elongated form, and Fig. 8 is a side sectional view of Fig. 7 at the line *x*.

The nature of my invention consists in so constructing a paddle-wheel which may be employed for propelling vessels, or for any other appropriate uses, that the buckets or floats thereof shall be kept and retained in a vertical position during the entire revolution of said wheel, so as to descend into the water and emerge from it in such a manner as to occasion the least possible loss of power, and at the same time to cause said buckets or floats, while beneath the water and passing through it, to present the greatest possible amount of reacting surface, thus obtaining the greatest and most efficient propelling force.

To enable those skilled in the art to understand, construct, and make use of my invention, I will now proceed to describe the same particularly.

Similar letters of reference in the several figures denote corresponding parts of my invention.

The arrangement by which I accomplish the object of my invention—namely, secure the invariable vertical position of the floats—consists in having said floats *F* provided at each end thereof with fixed shafts or journals, which are supported in bearings in two circular end pieces or frames, *C*—one at each end

of said floats—so that the journals and floats may revolve freely in the aforesaid bearings.

It further consists in providing the ends of each of said journals or shafts with cranks, (marked *f* in the drawings,) the ends of which are provided with antifriction-rollers *C*, and on each end of said float-shafts are larger antifriction rollers or wheels *C'*, that sustain the chain or extension which moves around in the circular tracks or grooves (marked *a* and *a'*, respectively, in Fig. 1;) but in the extended form of my invention (shown in Figs. 7 and 8) there are fixed upon the side pieces or inclosing-frame of the wheel, in which or upon which the grooves *a a'* are made, a suitable shoulder, projection, or groove arranged directly beneath the straight and horizontal portions of said grooves *a a'* and made parallel thereto, (marked *b b'* in the drawings,) upon which the rollers *c' c'* on the ends of the prolonged float-shafts rest and roll along, the said supporting-projections thus serving to sustain the endless chain *G*, to which the floats are attached, and keep it from sagging down when passing from one drive-wheel to another, thereby very greatly facilitating the effective and practical operation of the machine. It will be observed that the cranks or arms *f* are not attached to the float-shafts at their extreme ends, but that the said float-shafts project out far enough beyond the point at which the arms *f* are attached to permit the rollers *c'* to be adjusted upon them, and that said rollers *c'* may rest upon the projections *b b'*. These cranks may be of any suitable length, provided only that the lengths of said cranks be equal. The cranks *f*, at either end of the paddle-wheel, all lie parallel to each other, with their heads *c* in the same direction, though the cranks at opposite ends of said floats do not lie parallel to each other, and the direction in which the heads *c* lie at one end of said floats is nearly opposite that in which they lie at the other end thereof.

On or in the interior surfaces of the ends of the wheel-box are arranged the aforesaid grooves *a a'*, which control and guide the crank *f*. The manner in which said grooves are arranged is clearly shown in the drawings. The diameter of said grooves is the same as the diameter of the wheel-heads *C*, and the center of the groove *a* lies a distance to the

right of the crank-shaft S, to which the power is applied, and the center of the groove *a'* a distance to the left thereof equal to the length of the cranks *f*.

To facilitate the working of my invention, the ends *c* of the cranks or levers *f*, which move around in said grooves *a a'*, may be provided with small antifriction-rollers *d d d*. By this arrangement, when the power is applied to the crank S and the wheel revolves, the crank or bent lever *f*, acted upon by the grooves *a* and *a'*, keeps the floats F in a vertical position during the entire revolution.

The object of having the levers lie in different directions is to obviate a dead-point in the leverage which would impede the ready operation of the invention.

Figs. 1 to 6 represent the parts as seen when the form of my paddle-wheel is circular, and Figs. 2 and 3 represent the ends of the paddle-box laid down, so as to show the arrangement and relative position with respect to the central shaft, S, of the controlling-grooves *a a'*.

After the floats and journals, provided with the levers *f*, constructed as shown, are put together to form the paddle-wheel, and said levers *f* are arranged parallel to each other at each end of the wheel, as aforesaid, the exact position of the grooves *a a'* can be determined either by measurement of the length of and observing the direction in which said crank-levers lie, or by fastening one of said floats in a vertical position and revolving the wheel, when the end of said lever *f* would describe the position of the aforesaid groove or track.

Figs. 7 and 8 represents another, though an equivalent, form, which is an extension of the circular form. It consists in dividing the said circular grooves and connecting the semicircles by any required length of straight track or groove, so as to have any desired number of floats passing through the water at once to augment the propelling force to any required degree.

In Figs. 7 and 8, G represents two endless chains, formed by jointing together strips of metal or other suitable material, which are connected transversely by the shafts or rods E, which pass through the joints in said chain, thereby holding it together, and the floats F, which pass through said joints in a similar manner, in the bearings of which the floats may revolve, as described hereinbefore. At each end of the track are arranged the cir-

cular heads D, fixed upon the shafts S, by which said heads D are revolved. In the circumference of said heads D are formed the notches or cogs *d*, the distance between said notches being the same as the length of the joints in the aforesaid endless chain, so that said rods E and the journals or shafts of the floats F enter into said notches or depressions *d*, and hence as the circular heads D are revolved by the shaft S the endless chains G, with the floats F, are revolved also, and the floats are still kept in a vertical position by the said grooves *a a'*. If desired, when the extension form is used, there may be three drive-wheels—one at each end and one at the middle—and the power may be applied to one or all.

The form shown in Fig. 1 can readily be adapted by placing it in such a position that the shaft S shall be longitudinal, to be used as a rudder or series of rudders for steering vessels of all kinds, as it can readily be attached to the stern of a vessel, either as above for the purpose of steering, or in its horizontal position for the purpose of propelling, the same.

Having thus described my invention, I will proceed to state what I claim as my invention and desire to secure by Letters Patent—

1. Providing the prolonged float-shafts and the arms *f* with the antifriction-rollers *c c'*, when used in combination with the grooves *a a'* and the projections or grooves *b b'*, arranged and operating as and for the purposes herein shown and described.

2. The combination and the arrangement of the frame C, the floats F, provided with fixed and prolonged shafts, as shown, the arms *f*, and the antifriction-rollers *c c'*, with the outer frame, A A', provided with the peculiarly-arranged circular grooves *a a'*, all operating substantially as and for the purposes shown and specified.

3. The combination and arrangement of the floats F, provided with the prolonged fixed shafts, as shown and described, the arms *f*, the antifriction rollers *c c'*, the endless chain G, and drive-wheels D D, with the grooves *a a'*, and projections or grooves *b b'*, as and for the purposes herein delineated and set forth.

THOMAS S. BIGELOW.

Witnesses:

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E. E. BIGELOW.