(No Model.)

2 Sheets—Sheet 1.

L. O. BOOSTRUM.

PROPELLER WHEEL.

No. 502,545. Patented Aug. 1, 1893.

Fig. 1.

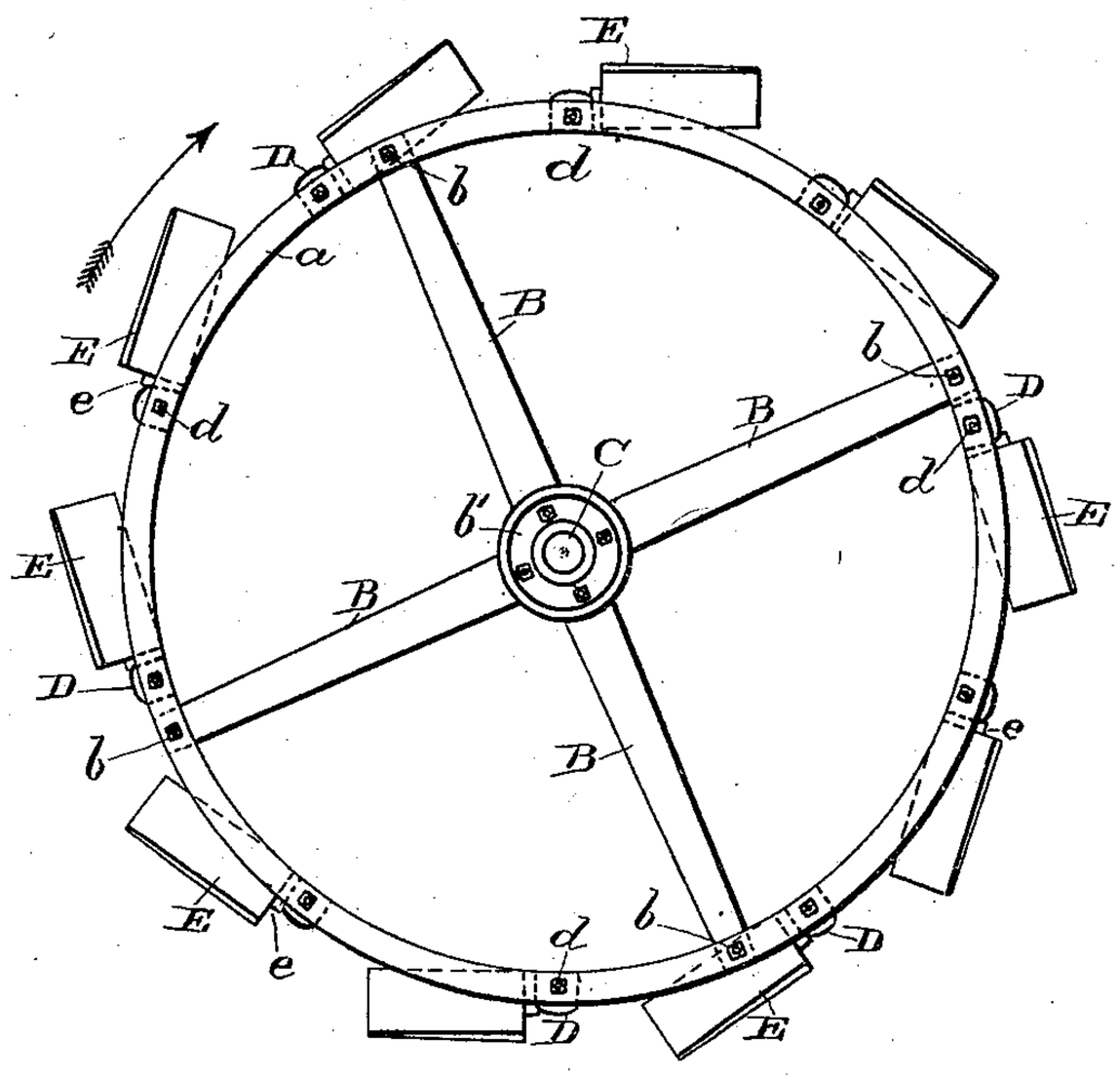


Fig. 2.

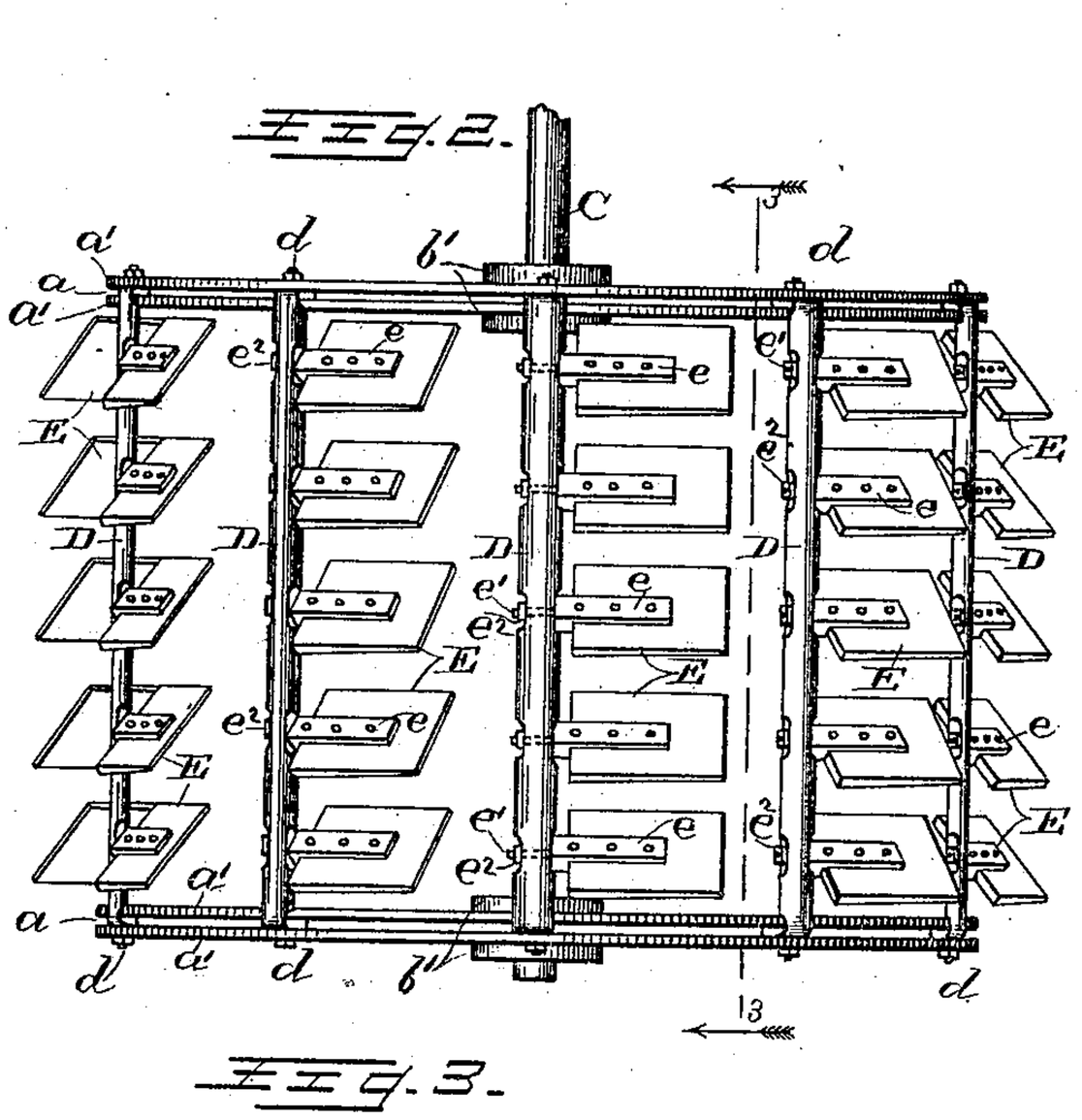
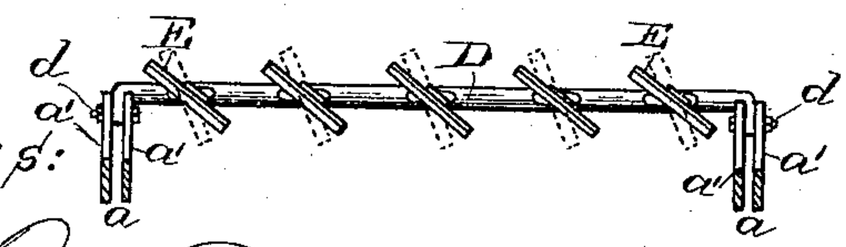


Fig. 3.



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Inventor:
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By W. B. Richards,
his Atty.

(No Model.) 2 Sheets—Sheet 2.

L. O. BOOSTRUM.

PROPELLER WHEEL.

No. 502,545. Patented Aug. 1, 1893.

Fig. 4.

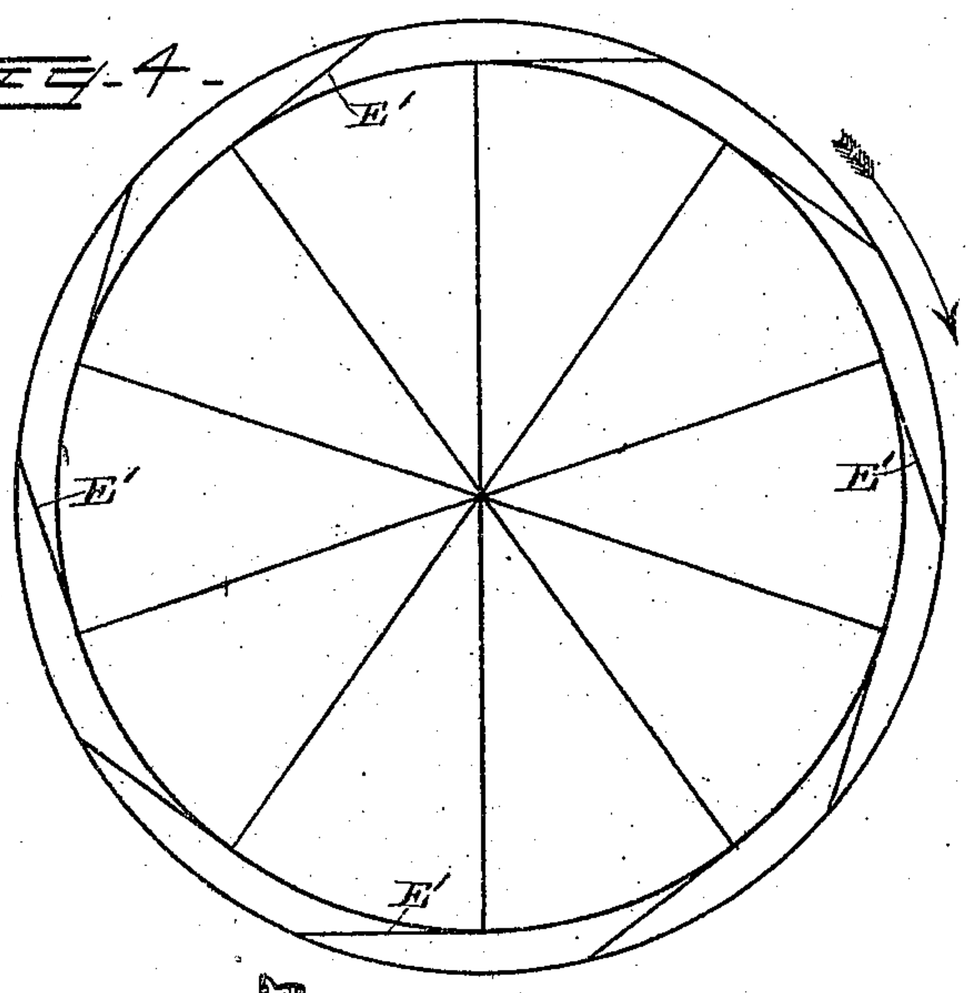
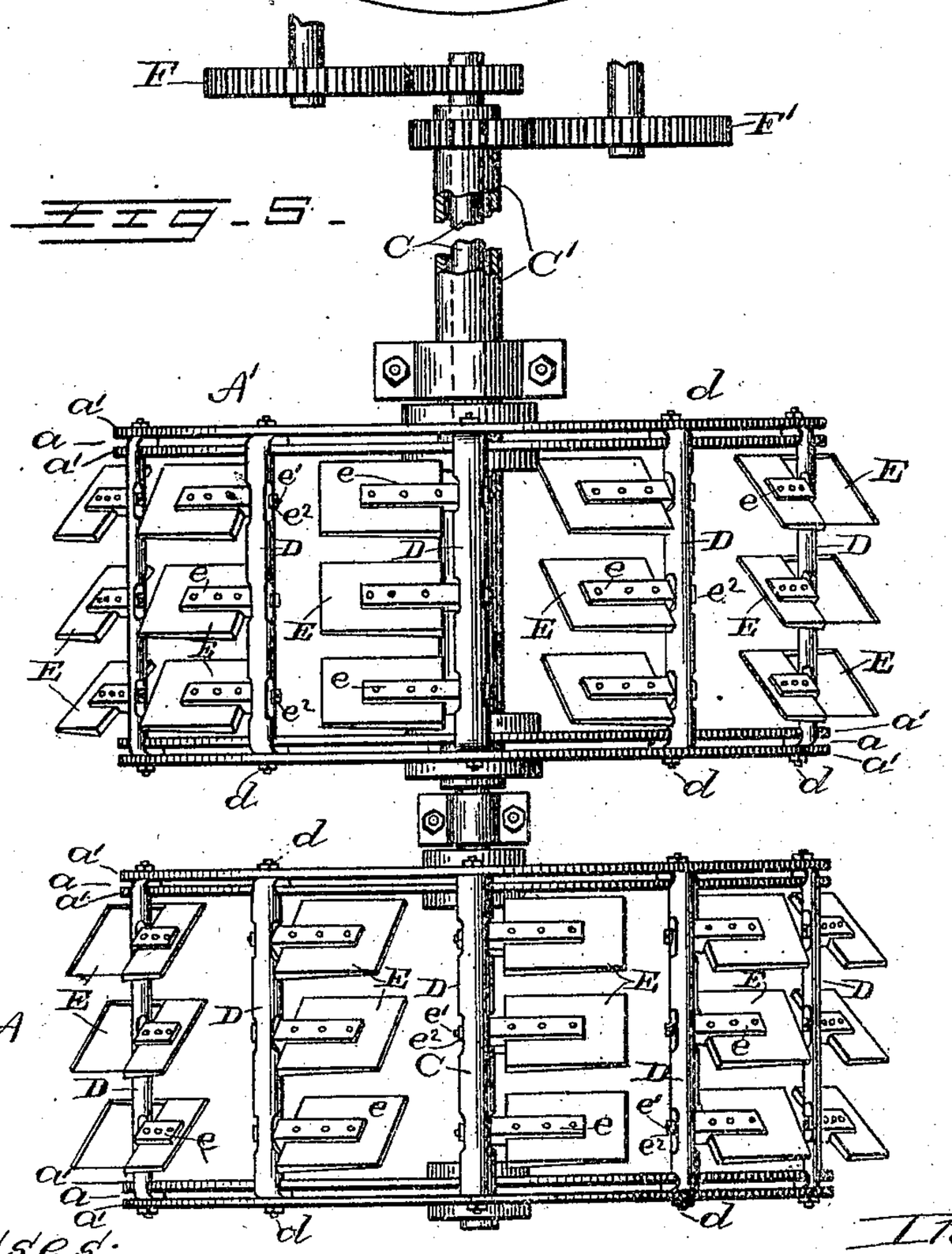


Fig. 5.



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UNITED STATES PATENT OFFICE.

LEWIS O. BOOSTRUM, OF GALESBURG, ILLINOIS.

PROPELLER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 502,545, dated August 1, 1893.

Application filed September 16, 1892. Serial No. 446,048. (No model.)

To all whom it may concern:

Be it known that I, LEWIS O. BOOSTRUM, a citizen of the United States, residing at Galesburg, in the county of Knox and State of Illinois, have invented certain new and useful Improvements in Propeller-Wheels, of which the following is a specification.

My invention relates to improvements in propeller wheels.

A main object of the invention is to furnish a propeller wheel which will it is believed give greatly improved results over ordinary constructions of propeller wheels, and to this end and object my invention consists in a propeller wheel having the blades located on or approximately on the periphery of the wheel, as in a paddle wheel, but disposed in relative angular positions both circumferentially and axially of the wheel, to radial lines from the axis of the wheel, or each in oblique position, or inclination, with reference to a line paralleling the axis of the wheel, and each in a transverse direction thereto, disposed tangential or approximately so to the inner line or side of the path of its orbital revolution, whereby each blade as it is revolved in its orbit by the wheel, will thrust backwardly and inwardly of the wheel against the water in such manner that the "slip" is reduced to a minimum, the full area of the blades made effective, and the results obtained in forcing a vessel forwardly, with a given amount of power, are brought to a maximum; the organization of the blades also being such as to reduce the vacuum or back drag to a minimum, as the blades forcing the water backwardly and inwardly or convergently of the wheel will counteract the divergent tendency due to the centrifugal force attending the revolution in water, of all propeller wheels.

In carrying out this main object of my invention subsidiary improvements are evolved, which consist in novel structural features, novel organizations of parts, and novel combinations of parts, the operations of which parts as organized and as combined will be hereinafter fully described, and also specified in the claims hereto appended.

Mechanism embodying the structural peculiarities of the different parts; the disposition of the different parts to act together in the composite body, the propeller wheel; and the combinations forming the subject matter of the improvements, are illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of my improved wheel; Fig. 2, a top plan; Fig. 3, a sectional elevation of the wheel rim in line 3, 3, in Fig. 2, side elevation of a blade carrying arm, and end elevations of a series of blades mounted thereon; Fig. 4, a diagrammatic illustration of part of the action of the wheel; Fig. 5, a top plan of two of my improved wheels, arranged and adapted to revolve concentrically, and in opposite directions.

The frame work of the wheel, as I have shown it, is formed of a pair *a* of annular rims *a'*, *a'*, at each end of the wheel. The outer ends of the wheel spokes B, are seated between the rims *a'* of each pair *a* of rims, where they are secured by bolts *b* which pass through the rims and spokes and fix the rims to the spokes, and to each other. The inner ends of the spokes B are fixed to the hub *b'* which is mounted on the propeller shaft C, and may be mounted, journaled, and operated in any ordinary or desired manner with the wheel immersed as is common with screw propellers. Bars D extend from one pair *a* of rims to the pair at the opposite end of the wheel, the ends of which bars are fitted between the rims *a'* of each pair of rims, and are fixed thereto by bolts *d*, which pass through the rims *a'* and through the ends of the bars D, and thus fix the bars in place on the rims *a*.

The bars D not only serve to carry the blades E, as hereinafter described, but they also serve to securely hold the two pairs *a* of rims *a'* firmly in place.

Each blade E is fixed to a bracket *e*, the shank *e'* of which passes through a bar D, and is held therein by a nut e^2. Each blade E is preferably in form a flat plate of oblong rectangular form, thin at its outer free end to facilitate its passage through the water, and heavier at its fixed end to give it stiffness and strength where most required. Circumferentially of the wheel, as shown best at Fig. 1, each blade is preferably fixed thereto in such position that a line drawn lengthwise of the blades at any place on the surface thereof, will be at a tangent or approximately at a tangent to a circle coincident with the inner end of said

line, as indicated by the series of lines E′ at Fig. 4, and axially of the wheel the blades are each in its cross section oblique to a line parallel with the wheel axis, or as may be otherwise stated, are oblique to a radial line from the axis of the wheel, as shown best at Fig. 3. Loosening the nuts e^2 will permit adjusting the blades E at different angles to the axis of the wheel as shown by dotted lines at Fig. 3, and said nuts can be tightened to again fix the blades in position after such adjustments.

The blades E located on the wheel, as shown, will have an effective area, of their entire surfaces, and the inner part of the wheel interior to a circle swept by the inner ends of the blades, will be free from any part of the blades, and present an unobstructed way for the passage of the water as it is forced rearwardly by the blades.

An operative effective propeller wheel may have but a single circular series of blades E, but recurring series are more effective as shown at Fig. 2, where five different circular series of blades are shown.

As the wheel is revolved, the blades E are carried around in a circular orbit, in the direction shown by the arrow at Fig. 1, and the inclined positions of the blades are such that their thrust against the water will be backwardly and inwardly of the wheel, thus forcing a cylinder-shaped body of water rearwardly from and centrally of the wheel, and thus preventing vibration, while at the same time utilizing the full effective force of the area of all of the blades E, and thereby obtaining approximately the greatest thrust that is available, per indicated horse power, in a propeller wheel.

By adjusting the blades E, as hereinbefore described, the effectiveness of their rearward thrust may be regulated as required or desired.

In order to insure absence of vibration under about all circumstances, and possibly to secure the most perfect action of my propeller wheel, two of them may be mounted concentrically, as shown at Fig. 5, where the outer wheel A, is shown as carried on a shaft C which passes through a hollow shaft C′ on which the inner wheel or forward wheel A′ is carried. The gear wheels F, F′, are adapted as shown to rotate the wheels A, A′, respectively, in opposite directions, and the blades on the wheels A, A′, point in opposite directions, or in such manner that the blades of each wheel revolve with their free ends foremost as hereinbefore described in reference to the single wheel. It will be evident that other ordinary gear mechanism may be used to revolve the wheels A, A′, in opposite directions.

I have shown the best mode of carrying out the broad invention made by me which I have thus far devised; but I desire to be understood as considering the scope of my invention as covering not only the particular means shown for securing the blades around the periphery of an open frame wheel, but also any organization of devices in which the described novel principle of construction may be embodied—that is—a construction in which a series of blades extend circumferentially around the periphery of the wheel, and in which each blade extends tangentially to the wheel, in the plane of the blades revolution in a direction transversely of the axis of the wheel, and inclined to the axis of the wheel in a direction in line with said axle, whereby they are given an inward and rearward thrust against the water substantially as hereinbefore described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A propeller wheel, embodying in its structure, a shaft, radiating arms or spokes, rims, bars approximately parallel with the shaft, and blades fixed to said bars, from which they project tangentially, and are inclined to the wheel axle, substantially as described.

2. A propeller wheel, embodying in its composite structure, substantially as hereinbefore described, an axial shaft, blade-supports fixed to said shaft, and a circular series of blades located at or near the periphery of the wheel, each of which blades is fixed to the blade support in such position that in one direction across the blade it lies in a plane tangential to, or approximately tangential to, the orbital path of its inner end, and in a direction transversely thereof lies in a plane oblique to the axial shaft.

3. A propeller wheel comprising in its composite structure, substantially as hereinbefore described, an axial shaft, parts fixed to said shaft and extending outwardly therefrom, and one or more series of blades, each series of which blades is disposed circumferentially of the wheel to revolve in a circular orbit, and each blade of which series is disposed transversely of the wheel axis, in a plane tangential or approximately so to its orbital path of revolution, and disposed axially of the wheel in a plane oblique to the axis of the wheel.

4. A propeller wheel, comprising in its composite structure, a wheel frame, with a circumferential series of blades mounted on its periphery, each blade arranged approximately tangential to the circular path of their inner ends when revolving, and inclined to the axis of the wheel, and adjustably connected with the wheel frame, whereby their inclination in planes oblique to the axis of the wheel can be lessened or increased, as desired, substantially as described.

5. A propeller wheel, comprising in its composite structure, a wheel frame, with a circumferential series of blades mounted on its periphery, each blade arranged approximately tangential to the circular path of their inner ends when revolving, and transversely of the blade, inclined or oblique to the axis of the wheel, in combination with another similar wheel with paddles arranged in a reverse direction from those of its fellow wheel, both of which wheels revolve on the same axial line,

and means for revolving said wheels in opposite directions, substantially as described.

6. A propeller wheel, comprising a carrying shaft, radial arms or spokes, rims, *a*, arms D, and blades E, fixed to the bars D, in planes axially of the wheel, oblique thereto, and in planes circumferentially of the wheel, tangentially or approximately so to the periphery of the wheel, substantially as described.

7. A propeller wheel, comprising a carrying shaft, radial arms or spokes, rims *a* formed of parts *a'*, between which the outer ends of the spokes are secured, bars D, secured to the rims *a*, and blades E, mounted on the bars D tangentially to the wheel, and oblique to the carrying shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEWIS O. BOOSTRUM.

Witnesses:
B. F. HOLCOMB,
F. O. PETERSON.