

(No Model.)

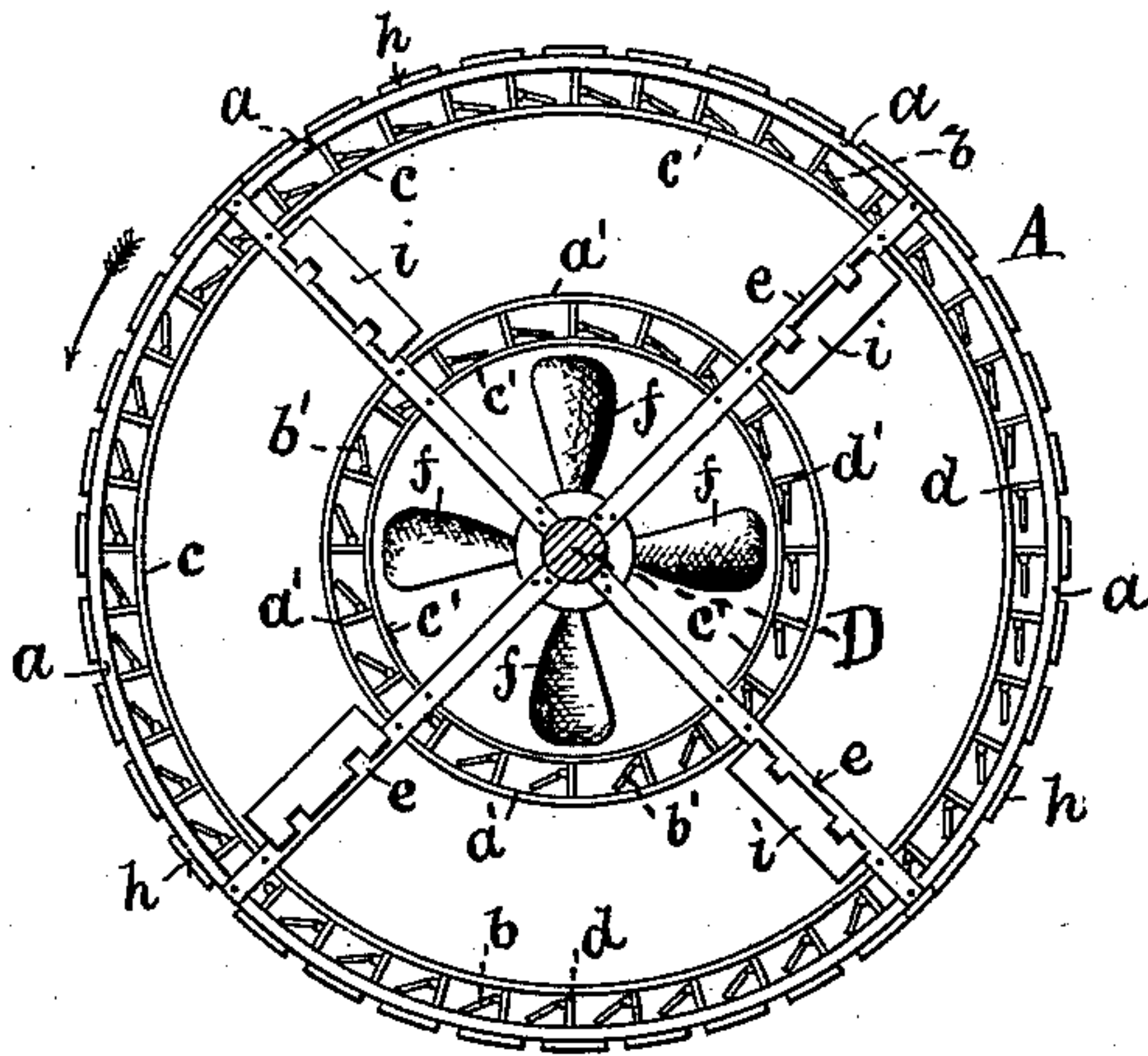
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# PROPELLING WHEEL FOR VESSELS.

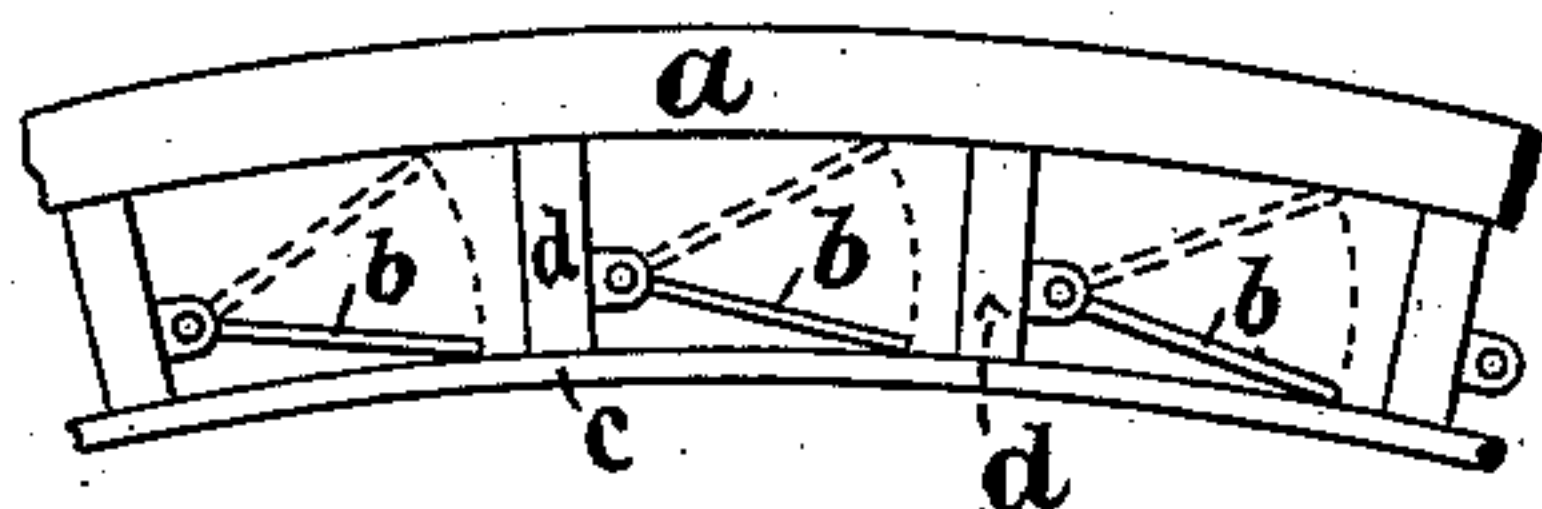
No. 362,508.

Patented May 10, 1887.

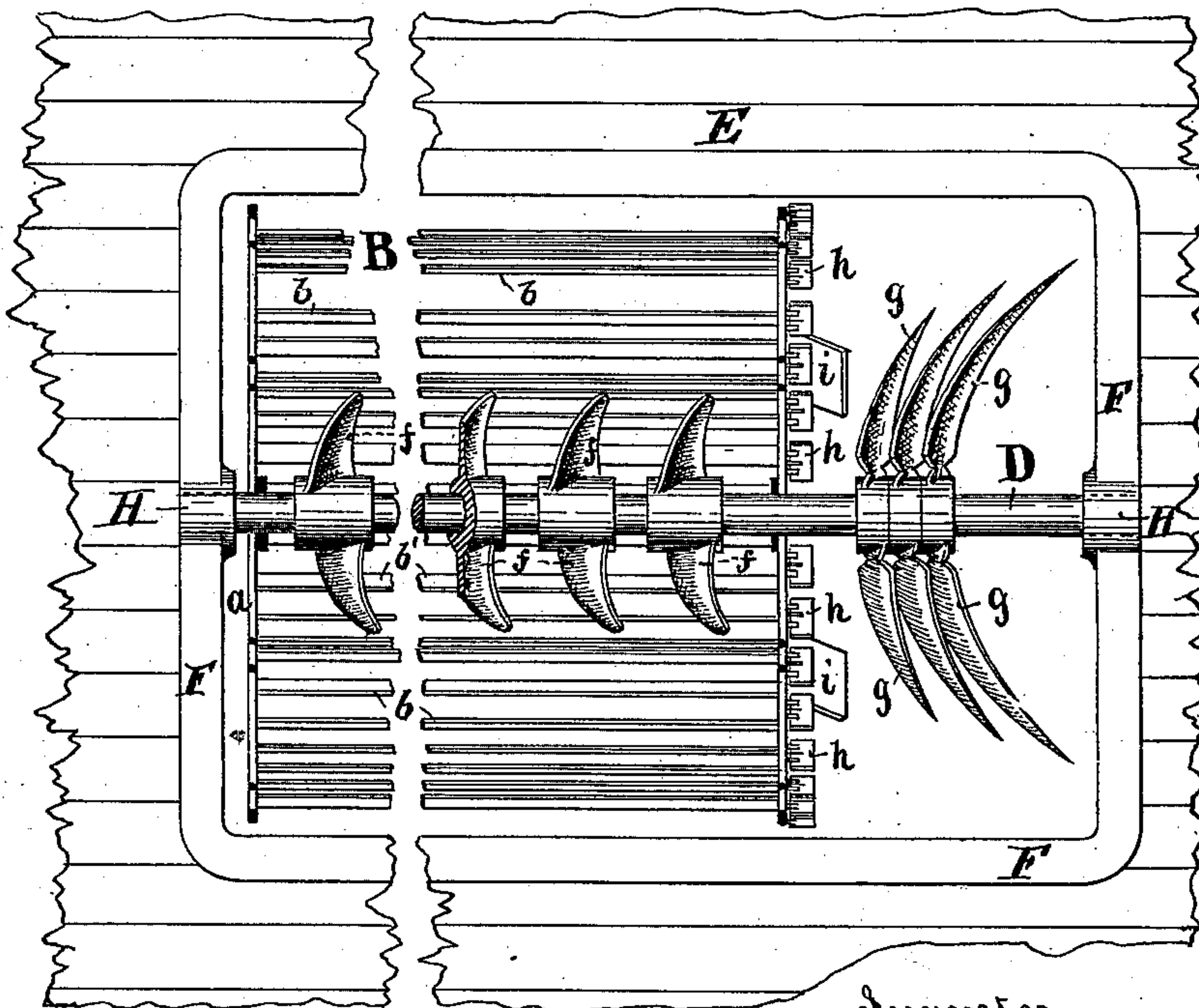
**FIG. 1.**



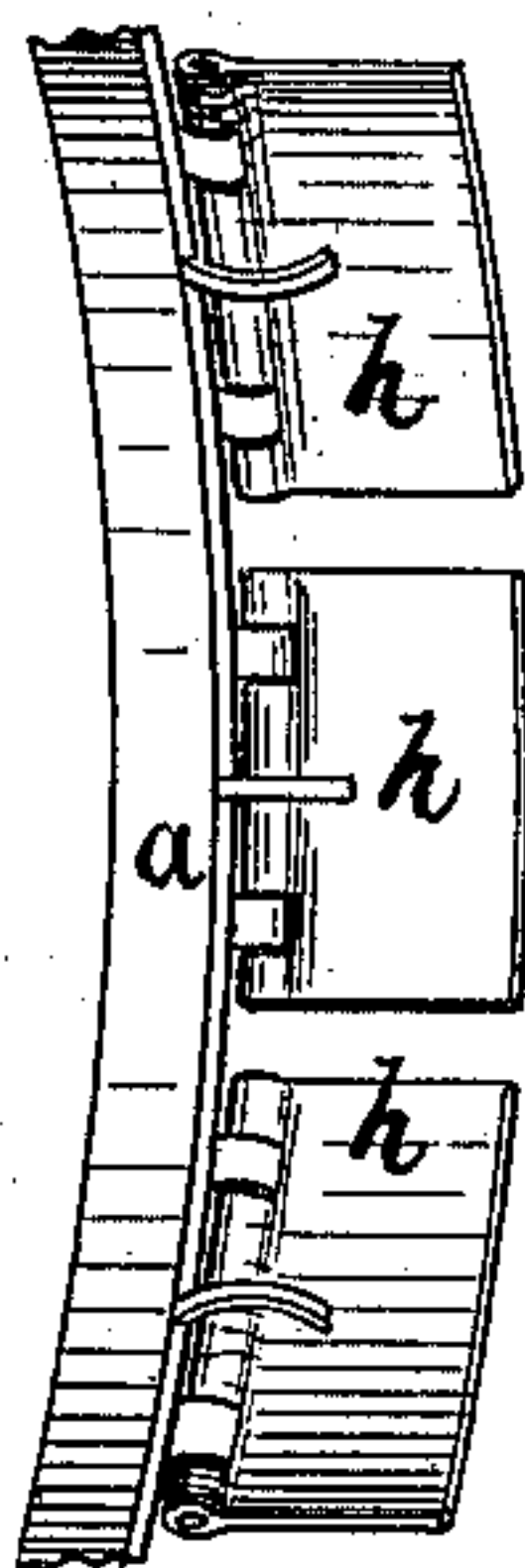
**FIG. 3.**



**FIG. 2.**



**FIG. 4.**



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## PROPELLING-WHEEL FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 362,508, dated May 10, 1887

Application filed January 5, 1882. Serial No. 49,426. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID GREENE HASKINS, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Wave-Power Motors, of which the following is a specification.

My invention relates to an improvement in means whereby water or air may be made to act as an automatic and independent motive power; and the invention consists of a wheel or cylinder on or within which are arranged one or more series of blades of any desired width concentric with and parallel to the axis of said wheel or cylinder. The said blades are hinged at one edge and are limited in their movement to any desired angle of inclination, so that when the wheel or cylinder with its blades is submerged, either wholly or in part, in moving water—that is, in water flowing, as in a river, or rising and falling, as in the waves or swell of the sea—the pressure of the fluid upon the said blades will cause the wheel or cylinder to rotate, and always in one and the same direction. A forward motion in the direction of the axis of the cylinder is effected by attaching other blades hinged and limited in their action, but swinging at right angles with said axis, and also spiral flanges or propeller-blades (one or more) to the axial shaft or to some other parts of the wheel or cylinder. In addition, propeller-blades may be attached to an extension of the axis at the rear of the cylinder, by means of which a greatly-increased propelling-power may be attained.

Referring to the drawings, Figure 1 is an end view of a cylinder embodying my invention. Fig. 2 is a plan view of the same, shown as attached to a raft. Fig. 3 is an enlarged view of a section of the periphery of the cylinder. Fig. 4 is also an enlarged view of a portion of the periphery, showing the connection of the blades *i i*.

A, Fig. 1, represents an end view of a cylindrical frame, and B, Fig. 2, is a view of the same, shown as attached to a raft, E.

The cylindrical frame A is mounted on a shaft, D, which is journaled in bearings H H on the inner frame, F, of the raft E, the opening in said frame being sufficiently large to admit of the free rotation of the cylinder A and attachments to the shaft D. It is open at both

ends and of such diameter and length as may be required for the work to be performed.

*a* is a thin ring, preferably made of metal, and secured to the axial shaft D by means of ribs *e e*.

*c* is another ring, arranged within and concentric to ring *a*, to which latter it is attached by means of the cross pieces or braces *d*, as clearly shown in Fig. 3. To the cross-pieces *d* are hinged or pivoted the blades *b*, which may be made of thin metal or wood, and which extend the entire length of the cylinder, and are limited in their swinging movement to the space between the outer ring, *a*, and inner ring, *c*, as indicated by the full and dotted lines in Fig. 3. The said blades may be made hollow and air-tight, with a tendency to float upon the water.

Within the cylinder and concentric with the outer rings, *a* and *c*, and the hinged blades *b* may be arranged a similar series of rings, *a'* *c'*, and blades *b'*, also secured to the radial arms *e e*, and operating in a similar manner to the outer series.

A cylinder constructed as above described is designed to be placed for operation in water that is in motion—that is to say, in water which is flowing, as in a river or current, or rising and falling, as in the waves or swell of the sea—and may be wholly or partially submerged in the water. The pressure exerted upon the blades will cause the cylinder to rotate in one and the same direction at all times.

For example, supposing the pressure of the water to be downward, the blades *b* will naturally take the several positions shown in full lines in Figs. 1 and 3, in which positions the tendency of the said downward pressure upon all the blades except those on the right side causes them to move or rotate in the direction indicated by the arrow, while those on the right side assume a position in which they offer no material resistance to the rotation. On the other hand, if the pressure of the water is upward, the blades will all respectively reverse their position, those on the left hand offering no resistance; but nevertheless their motion or rotation will continue in the same direction. The interior series of blades act similarly to the outer series, and there may be more than one interior series, if desirable, to increase the power.



On the central shaft, D, a series of propeller-blades, *f f*, is placed, so that as the cylinder rotates a forward movement in the direction of its length will be imparted to the cylinder, or a spiral flange may be attached to the shaft for the same purpose.

When still greater propelling-power is required, the central shaft, D, may be extended to the rear of the cylinder, as shown in Fig. 2, and to this shaft is attached a series of propeller-blades, *g g*, which are made somewhat wider at their attachment to the hub or collar that surrounds the shaft, and taper off to a point, the general shape being that of the tail of a fish.

In the construction shown in Fig. 1, the cylinder is designed to be attached to an object to which motion is to be imparted, and moving with such object. It may be attached to a floating vessel in any way to admit of free rotation, and is arranged with its axis parallel to the longitudinal line of the vessel; or it may be applied to a raft of logs in any suitable manner. When the rotation is effected by the rise and fall of the waves, the cylinder will have a forward motion and proceed against the wind and advancing waves automatically.

In the above description I have mentioned the cylinder as applicable for use only in water. By making the cylinder of lighter materials it may be used in the form shown in Fig. 1 in connection with balloons for propelling the same through the air, or for propelling vessels by wind-power. A forward movement may also be imparted to the cylinder by the action of other hinged blades set crosswise or at right angles to the blades *b b'*—viz., by the blades *h*, hinged around the ring *a*, and also by the blades *i*, hinged to the ribs *e*. These blades are limited in their movement similarly to the blades *b b'*. In some cases the blades *h* may be of some elastic material fixed or permanently attached at one edge instead of hinged to the ring *a*.

The rotation of the wheel or cylinder may be readily stopped at any time by means of a brake operated in any suitable manner from the deck of a vessel. If connected with and moved by the brake, a buffer may be made to press against the ends of the hinged blades. Their upward and downward play, which is the sole cause of the rotary motion, will be checked without difficulty.

In the case of a wheel of moderate size it may be set in a frame pivoted vertically and connected with a rod passing upward through the deck, by means of which the facing of the wheel, together, of course, with the direction of its motion, may be changed at pleasure. It is also an advantage of such a wheel that it admits of being readily put in place, or removed and taken on the deck of a vessel while the same is in motion.

The hinged blades *h* and *i* may be attached to any screw-propeller for the purpose of increas-

ing its propelling-power. This result is accomplished by the rotative pressure of said blades and by the upward and downward action of the waves upon their surfaces. These blades may be made with a helical twist on their unconfined edges.

When cylinders of my device are used to propel vessels, a convenient way of using them is to attach one to each side of a vessel by means of hinged cranes, whereby they may be lifted out of the water at pleasure; but the forward motion may be arrested or reversed either as above described or as follows: A series of hinged blades, *i*, may be attached to ribs *e* on the inside of the cylinder, and be so connected with wires or small rods to a ring or hub sliding on the axis of the cylinder that as said ring is moved forward or backward the angle of the blades may be changed at pleasure, together with the direction of their propelling-power.

It should be explained that when the cylinder is used by itself, or unattached, it should be provided with an axial shaft, of wood, of sufficient buoyancy to sustain it, half submerged or more, upon the surface of the water. This shaft should be cylindrical, or preferably in the form of a truncated cone, the base being at the rear end, and a few inches larger in diameter than the advancing end. The object of this construction is to secure a slight downward inclination or pitch to the cylinder to increase its speed. It is important, however, that the diameter of the two ends of the cylinder (or of the peripheries of the blades) should be equal, in order to secure the desired action of the waves.

Corrugating the blades in the general direction of the forward motion desired, but so as to operate as a screw, is of advantage both as to increasing the propelling-power and also in imparting stiffness to the blades, which will then allow of their being made of very light sheet metal.

What I claim as my invention is—

A wheel or cylinder constructed with one or more series of hinged or swinging blades limited in their play to any desired angle and arranged concentrically with the periphery of the said wheel or cylinder on axes parallel to the axis of said wheel or cylinder, and provided, further, with one or more series of similar blades arranged also concentrically with respect to the periphery of said wheel or cylinder, but swinging at right angles, or nearly so, with the axis of said wheel or cylinder, as and for the purpose set forth.

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

DAVID GREENE HASKINS.

Witnesses:

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E. PLANTA.