J. ROURKE.

FEATHERING BLADE PADDLE WHEEL.

APPLICATION FILED FEB. 20, 1909.

936,478. Patented Oct. 12, 1909.

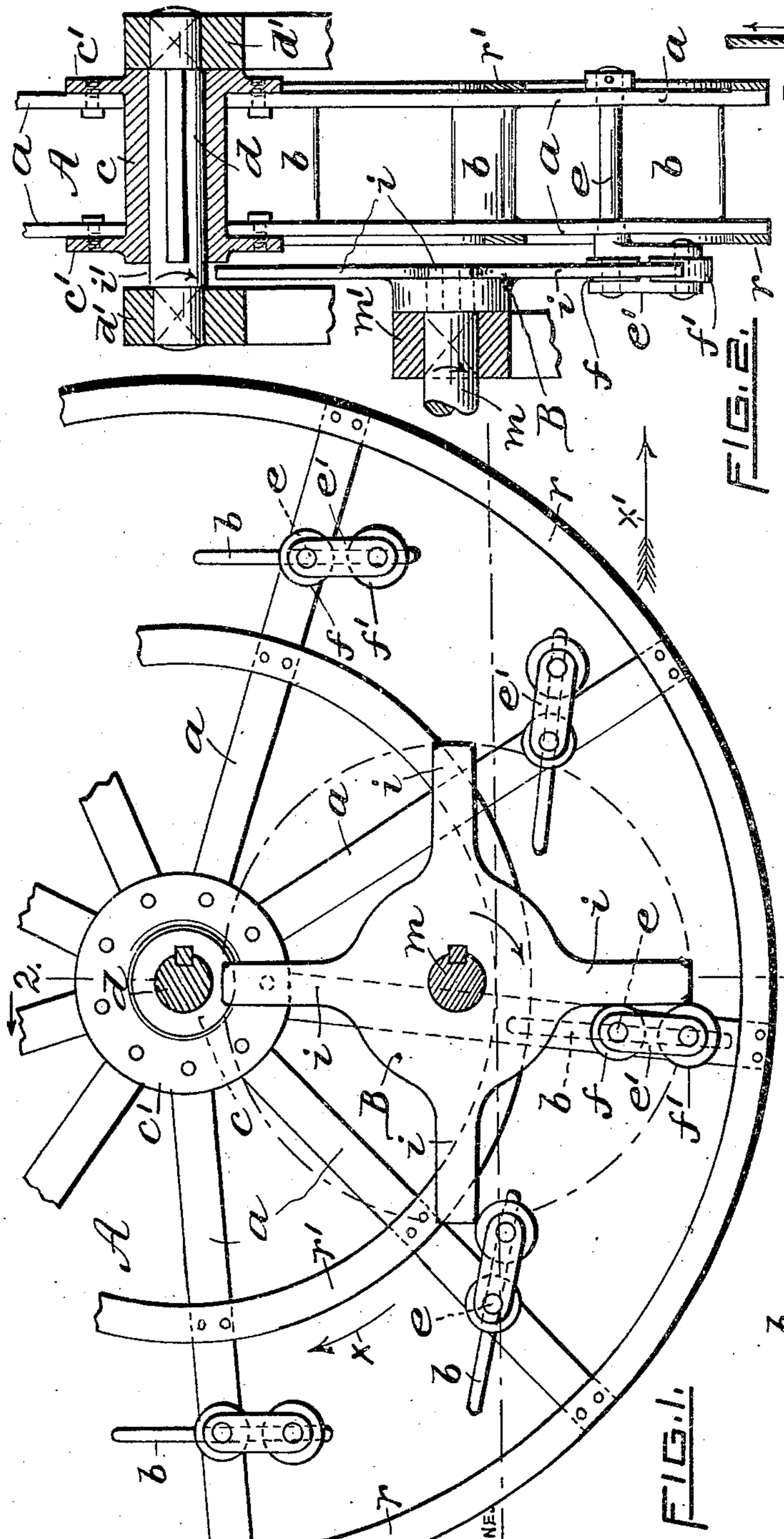

FIG. 2.

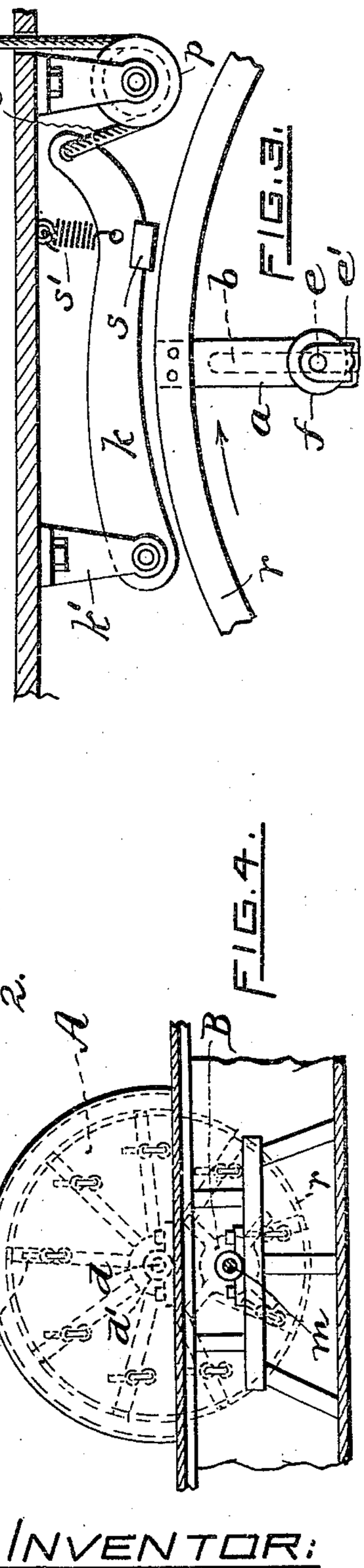

FIG. 3.

FIG. 1.

FIG. 4.

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FEATHERING-BLADE PADDLE-WHEEL.

936,478. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed February 20, 1909. Serial No. 479,056.

To all whom it may concern:

Be it known that I, JOHN ROURKE, a citizen of the United States, residing at New London, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Feathering-Blade Paddle-Wheels, of which the following is a specification.

My invention relates to improvements in revoluble paddle-wheels of the feathering-blade class or type adapted to propel steamboats or vessels, and in improved means for transmitting the force or power exerted by the driving engine to the paddle-wheel so as to effect the vessel's propulsion, and it consists in the novel construction and arrangements of parts, all as more fully hereinafter set forth and claimed.

By means of the present invention I am enabled to produce a feathering paddle-wheel in which the blades are devised and mounted so as to enter and leave the water with a greatly reduced degree of friction, the arrangement being such that the blades automatically and independently swing so as to present the least resistance area to the water, and in which the blades are successively and positively brought into the working or propelling position in a relatively gradual manner.

In my improved paddle-wheel the driving or actuating force is directly applied at or near a point adjacent the blade's pivots, thereby insuring positive action without rigidity of the contacting members. While as just stated the blades are positively brought into the working position the paddle-wheel is disconnected from the driving means. Another advantage derived by means of my invention is that engines of the so-called quick-speed type may be readily adapted and employed for transmitting power therefrom to rotate the paddle-wheels without the intervention of gearing, and in which the relative ratios of rotative speed may be varied as desired, the arrangement being such that the direction of rotation of the driving means causes the paddle-wheel to revolve in the same direction.

In the accompanying sheet of drawings, Figure 1 represents a front elevation of a feathering-blade paddle-wheel embodying my improvement, and also showing my improved means for driving the wheel, portions of the latter being broken away. Fig. 2 is a transverse sectional view taken substantially on line 2 2 of Fig. 1. Fig. 3 is a partial side view showing a brake device arranged to frictionally engage the rim of the wheel, and Fig. 4 is a front elevation in reduced scale corresponding somewhat with Fig. 1, showing the wheel-housing, &c.

The following is a more detailed description of the invention:

A, again referring to the drawings, designates my improved paddle-wheel complete, the same, as shown, comprising a central hub *c* provided with end flanges c^1 to which are secured the two sets of laterally separated uniformly spaced radially extending spokes *a*, the ends of which are bolted to the outer tie rings or rims *r;* a similar but smaller tie ring r^1 is also secured to each set of spokes. The wheel is secured to a short shaft *d*, in turn supported and mounted to revolve in suitable bearings, as d^1, Fig. 2.

A blade or bucket *b* is disposed between each pair of spokes and is secured midway of its length to or being integral with a shaft or axle *e* pivoted to swing in said spokes, and being located at a suitable distance inward from the outer rim. The shaft *e* extends forwardly through the front spoke and has a short forked crank e^1 rigidly fixed thereon carrying vertically separated small freely revoluble friction rolls, *f*, f^1; the axis of the normally upper roll *f* being in alinement with that of said blade-shaft *e*. As thus devised and mounted the gravity or weight of the cranks and their rolls f^1 operate automatically to keep the respective blades *b* in a substantially vertical position at all times, except when they are immersed in the water while the wheel A and boat, one or both, are in motion, as clearly indicated in Fig. 1, wherein the curved arrow *x* shows the direction of rotation of the wheel and the horizontal arrow x^1 the corresponding direction of the boat's movement. It may be added that in Fig. 4 both the boat and wheel are represented as being stationary, therefore all the blades will then assume a vertical position, the heavier ends obviously being at the bottom.

The following is a description of the driving means: At a point below and parallel with the wheel's shaft *d* is located the engine or motor-driven shaft *m*, mounted to revolve in bearings m^1. The shaft *m* may extend transversely across the vessel so as to drive a

companion wheel. It may be added here that it is of course well known that steamboats of the side-wheel type usually have the paddle-wheels located on the port and starboard sides, both wheels being secured to a single transverse shaft to which the driving power is directly applied. In my improved wheel and driving connection or means the port and starboard wheels are independent of each other but are capable of being driven concurrently by the driving-shaft *m*, as before stated. The shaft *m* projects outward through the bearing and has a driving member B rigidly secured thereon. The member B is represented as having four radial equidistant arms *i* which describe a circle somewhat less than the semi-diameter of the paddle-wheel, as indicated in Fig. 1. The driving-arms *i* are disposed in a vertical circular plane in the path of the cranks e^1 and when in action are arranged to successively press against the contiguous faces of the rolls, *f* f^1, thereby forcing a wheel A around in the same direction in a practically continuous manner, the arms *i*, however, actuating the cranks intermittingly. As represented, the relative rotative speed of the driving member B to that of the wheel is two and one-quarter to one,—since the former has four arms and the latter nine.

In order to position the driving member B comparatively close to the front of the wheel A, and also to enlarge the circular sweep of the arms *i* a lateral space i^1 may be left between the hub *c* and the front bearing d^1, as shown in Fig. 2.

Assuming a vessel to be provided with my improved suitably housed paddle-wheels A and main driving or power-transmitting members B, substantially as shown in Figs. 1, 2 and 4, the action of the parts may be described as follows: Now, upon starting the engine or motive power connected with the driving-shaft *m*, thus correspondingly rotating the latter say in the arrow direction, (one, or possibly two, of the arms *i* of the power-transmitting member B then being in working engagement with the adjacent roll-carrying cranks e^1 of the corresponding lower blades) the paddle-wheel is caused to rotate in the same direction, but at a reduced angular speed or ratio. The lower or roll-carrying portion of the bottom edge of each un-immersed normally vertical freely-swinging blade enters the relatively stationary water first. At substantially the same instant the center of the blade or shaft *e* is also advancing angularly with the wheel at a rate of speed materially greater than what may be termed the relative motion of the water, thereby causing the blade to freely swing in the water to a nearly horizontal position (corresponding with the velocity of the wheel) until it is engaged by the corresponding arm *i* of the driver, which latter then forces it (the blade) axially to the substantially vertical immersed position, being that of greatest leverage or area presented by the blade to the water. The blade in cooperation with its said engaged moving arm continues to rotate the wheel, the blade itself meanwhile gradually swings on its axis and assumes a substantially horizontal position or minimum area of resistance to the water. As the blade emerges from the water and becomes released from the arm it automatically returns to the normal vertical position until it again enters the water on the forward or driving side. Meanwhile, the cranks of the other blades are engaged one after another by the successive arms of the revolving driving member B. Thus it is apparent that the lower or relatively weighted edge of the blade members enters the surface of the water first and emerges from it last, even though the boat be propelled in a forward or backward direction.

By providing the swinging cranks e^1 with the freely turning rolls, *f* f^1, the degree of friction due to the force employed in propelling the wheel by the driving member B is materially reduced, it being borne in mind that the blades are integral with or rigidly secured to the shafts and cranks.

I have deemed it advisable to provide means for securing or practically locking the wheels A in a stationary position to prevent axial movement, as for example when the boat is docked or at anchor. To that end the device shown in Fig. 3 may be employed, wherein a suitably located swinging lever *k* is fulcrumed in a bracket k^1 secured to the underside of the deck and over the top of the wheel's rim. To the free end of the lever is secured a cord *l* passing around a guide sheave and leading therefrom to any conveniently accessible point. The act of pulling the cord upward depresses the lever and causes its shoe *s* to frictionally contact with the paddle-wheel's rim, the holding force being due to and controlled by the degree of pressure applied to the cord. Upon releasing the cord the spring s^1 acts to return the lever back to the normal inoperative position.

What I claim as my invention and desire to secure by United States Letters Patent is:—

1. The combination with a paddle-wheel provided with a plurality of circumferentially spaced independently swinging feathering-blades, of revoluble driving means arranged with respect to the blades so as to positively position them in a successive manner to rotate the wheel.

2. The combination with a paddle-wheel provided with a plurality of circumferentially spaced independent normally freely-swinging feathering-blades, of a revoluble power-transmitting member having a plu-

rality of arms operatively and successively engageable with the blades for rotating the wheel.

3. The combination of a paddle-wheel provided with a plurality of uniformly spaced independent swinging feathering-blades, each having a crank secured thereto so as to automatically maintain the blade in a normally vertical position when it is out of water, and a revoluble power-transmitting member having arms disposed in the path of said cranks arranged to successively engage the latter for temporarily positioning the blades in the water to rotate the wheel.

4. The combination with a paddle-wheel having a plurality of peripherally disposed independent freely-swinging feathering-blades mounted therein, of revoluble driving means engageable with and actuating said paddle-wheel, said means when in use rotating the paddle-wheel in the same direction therewith but at a slower speed ratio.

5. A paddle-wheel provided with a plurality of front and rear laterally separated uniformly spaced and suitably braced spokes, a corresponding number of interposed independent freely-swinging feathering-blades mounted in and located near the outer ends of the spokes, and having each blade rigidly secured to or integral with an axle extending through the respective front spoke adapted to keep the blade in the normal vertical inoperative position by gravity during a part of the wheel's revolution.

6. The combination with a paddle-wheel having a series of uniformly spaced independent freely-swinging feathering-blades located therein near its rim, of a driving or power-transmitting member whose outer diameter is less than the semi-diameter of the paddle-wheel.

7. In a paddle-wheel of the character described, provided with a plurality of spaced independently movable blade members, each having a crank secured thereto carrying truck-rolls, of a revoluble power-transmitting member having arms disposed in the path of said cranks, arranged to frictionally contact with its rolls, substantially as described and for the purpose set forth.

In testimony whereof I have affixed my signature, in presence of two witnesses.

JOHN ROURKE.

Witnesses:
GEO. H. REMINGTON,
CALVIN H. BROWN.