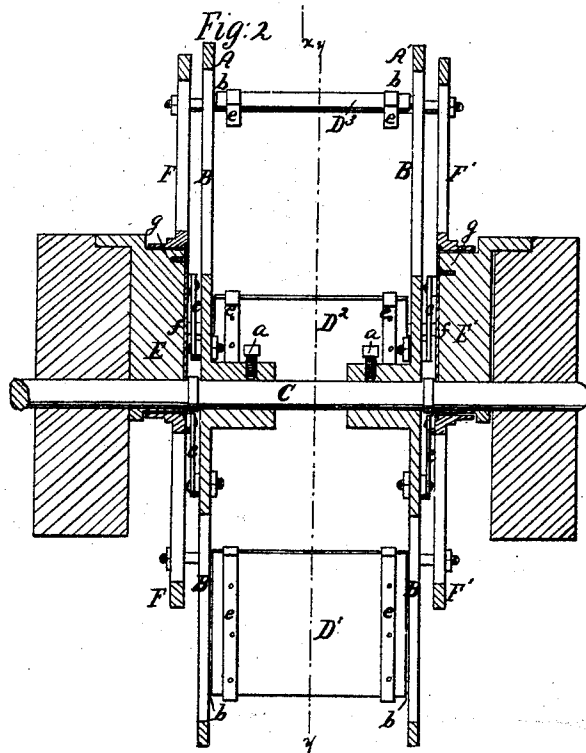
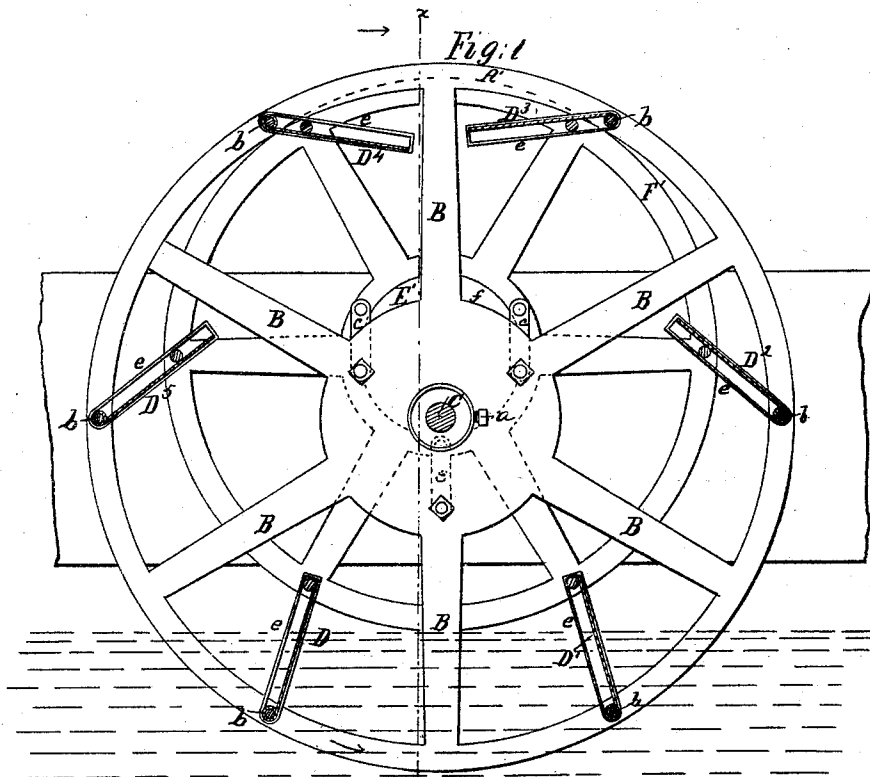


E. Haight. Paddle Wheel.

N^o 26,984.

Patented Jan. 31, 1860.



Witnesses
Alvin

Inventor
Edgar Haight

UNITED STATES PATENT OFFICE.

EDGAR HAIGHT, OF BUFFALO, NEW YORK.

IMPROVED PADDLE-WHEEL.

Specification forming part of Letters Patent No. 26,984, dated January 31, 1860.

To all whom it may concern:

Be it known that I, EDGAR HAIGHT, of Buffalo, in the county of Erie and State of New York, have invented a new and Improved Paddle-Wheel; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a vertical section of my invention, taken transversely through the shaft in a plane indicated by the line $y y$, Fig. 2, and looking in the direction of the arrow marked opposite to that line. Fig. 2 is a section of the same in a plane parallel to the shaft and represented by the line $x x$ in Fig. 1.

Similar letters of reference in both views indicate corresponding parts.

The principal objection to paddle-wheels with feathering-buckets heretofore has been that the buckets are very apt to become loose, the same being usually fastened only on one point, either in the center or at the end, or that said buckets, if properly fastened, create so much friction that the propelling power gained by the motion of the buckets is lost again by the increased power required to turn the wheels. In order to make a feathering paddle-wheel effective and practicable, it is necessary that each bucket should be supported at both ends as soon as it descends into the water, and their feathering motion should be attended with as little friction as possible. With this object in view I have constructed my wheel with two rings, which are placed outside of the regular wheel, and which revolve on trunnions that are secured to the frame-work with their centers at a certain distance above the center of the shaft. The buckets are suspended from pins which are secured to the rims of the wheel and which pass through loops on their edges, and they are guarded and steadied by rods that are fastened in the rings and which pass through suitable guides attached to the buckets. The rings are connected to the wheel by links or in any other suitable manner to preserve their respective position toward the wheel during the entire revolution, and the buckets are so arranged that they strike the water always with their fast edges in advance in whatever direction the wheel revolves.

To enable those skilled in the art to make

and use my invention, I will proceed to describe its construction and operation.

The wheel is constructed of two rims $A A'$, supported by suitable arms B and secured to the shaft C by means of set-screws a . These rims are connected by pins b , from which the buckets $D, D^I, D^{II}, D^{III}, D^{IV},$ and D^V are suspended, as clearly represented in Fig. 1, the outer edge of each bucket being coiled or provided with loops to fit to the pins b .

As the shaft C leaves the wheel on each side it passes through trunnions $E E'$, which are firmly secured to the frame-work which supports the journal-boxes of the shaft. The centers of the trunnions $E E'$ are in a line drawn vertically through the center of the shaft and at a certain distance from the latter. Said trunnions serve for bearings to the rings $F F'$, which revolve freely on the same and which are connected with the wheel by links c , that are pivoted to the hubs of the rings and to the hubs of the wheel, as clearly represented in the drawings. The length of these links has to correspond to the distance of the centers of the trunnions from the center of the shaft, and the diameter of the rings $F F'$ ought to be such that rods d , which are fastened on said rings and near to their outer circumference, move freely inside the rims $A A'$ of the wheels.

The number of the rods d , which connect the rings $F F'$, corresponds to the number of buckets, and they pass through guides e , which are secured to the buckets. Instead of these guides, however, the rods d might be slotted, so as to admit the buckets and form guides for the same; but I prefer to use the guides e , as represented in the drawings, in order to preserve the full strength of the rods d .

In order to keep the rings $F F'$ from running off of the trunnions $E E'$, small recesses are turned into their hubs to receive plates f , which are secured to the trunnions by means of screws g , as clearly shown in Fig. 2. I do not confine myself, however, to this particular mode of retaining the rings, as there are various means for accomplishing the same object.

The operation is as follows: When the wheel, together with the rings, is rotated, the position of a certain point on the rings in relation to a certain point in the rims of the

wheel changes, so that these two points are situated twice in the vertical line drawn through the center of the wheel, and in one of these cases the point on the wheel is below and in the other above the point on the rings. During the rest of the revolution the point on the wheel is sometimes in advance, and sometimes behind the point on the rings, and the distance of these two points varies, their distance being in its maximum as they pass the vertical line below the center and in its minimum as they pass the vertical line above the center of the shaft. The amount of variation is equal to the double distance of the center of the shaft from the centers of the trunnions $E E'$. This will be fully understood by following the motion of one of the pins b and the corresponding one of the rods d . Commencing at the position of the bucket D and moving the wheel in the direction of the arrow marked on the same the pin b will reach its largest distance from the rod d as the bucket passes through the vertical line drawn through the center of the shaft, and at the same time the bucket stands in a vertical position, being supported on both ends. As the bucket comes into the position D^I the pin b begins to approach the rod d and the rod d is slightly in advance of the pin b , and as the bucket leaves the water it is in a tangential position, so that it takes up no backwater. The pin b approaches now the rod d still farther, as will be noticed, by following the motion of the bucket to the position D^{II} , and by the time it reaches the position D^{III} the bucket is nearly in a horizontal position, so that it passes through the air with but little resistance, the pin b still being behind the rod d . By the time the bucket passes through the vertical line above the center the pin b takes its position just above the rod d and quite close to the same, and the bucket is brought in a vertical position. As the revolution continues the distance between the pin b and the rod d begins to increase, the former being now in advance of the latter, and by the time the bucket reaches the water the rod d takes up its position at or near to the outer edge of the

bucket, supporting the same nearly with the same effect and firmness as if it was permanently secured on both ends.

It will be noticed that each bucket as it passes through the vertical line above the center turns on its pin b , so that it descends into the water always with that edge in advance which is permanently secured to the rims of the wheel by the pin. By these means if the bucket meets with an obstruction as it passes down into the water it is less liable to become deranged than it would be if its loose edge should strike the water first. The motion of the buckets and the effect of the wheel are precisely the same in whatever direction the shaft is rotated, so that it is equally effective in backing as in propelling a vessel. From this it will be understood that the depth of the buckets must be twice as large as the distance of the centers of the trunnions $E E'$ from the center of the shaft, and I have found from experience that the best proportion between the diameter of the wheel and that of the rings is about as nine to seven and one-fourth.

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of the rings $F F'$, rods d , and trunnions $E E'$, or their equivalents, in combination with the buckets D , pins b , and guides e , or their equivalents, constructed and operating substantially as and for the purpose described.

2. Giving to the buckets a complete revolution around the pins b , from which they are suspended, substantially as specified, so that they strike the water with the fast edge in advance in whatever direction the wheel revolves.

3. The employment of the links c , substantially as described, for the purpose of connecting the rings $F F'$ with the rims $A A'$ of the wheel.

EDGAR HAIGHT.

Witnesses:

B. GNOURL,
J. F. BUCKLEY.