

E. SPENCER.
Feathering Paddle-Wheels.

No. 150,903.

Patented May 12, 1874.

Fig 1.

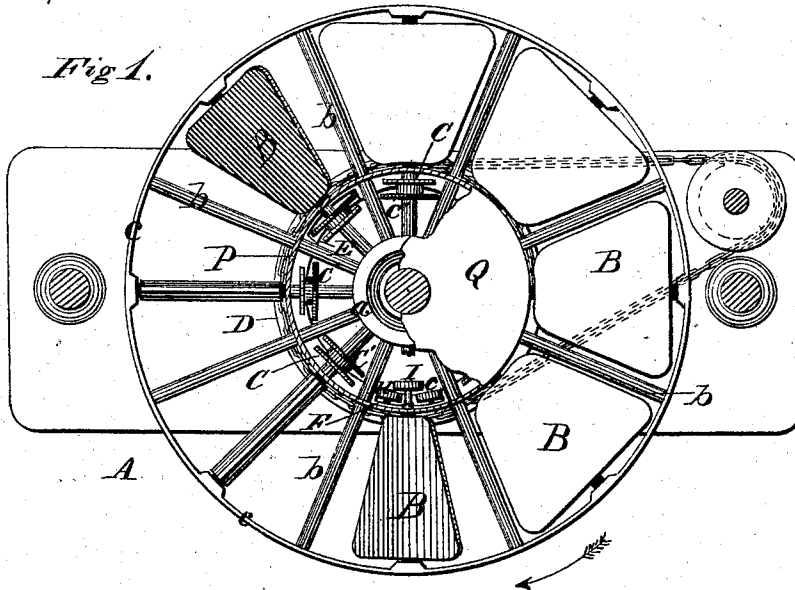


Fig 2.

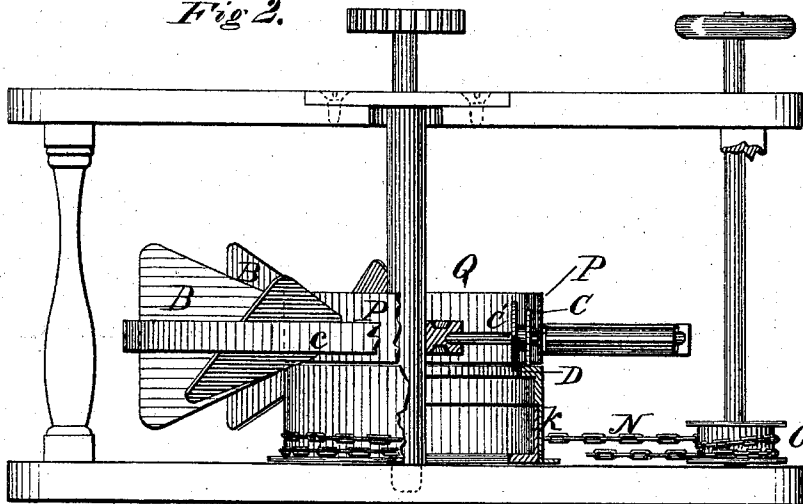
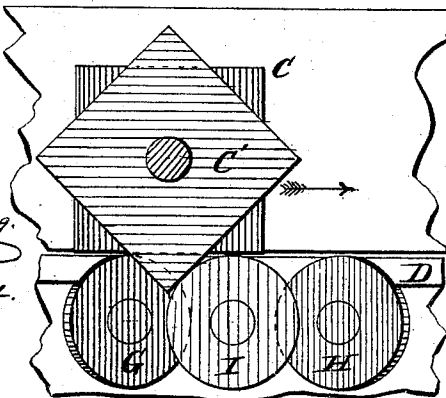
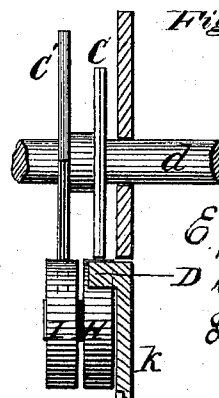


Fig 3.



Witnesses.
Harry King.
H. W. Dodge.

Fig 4.



Inventor.
E. Spencer,
by his attys
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UNITED STATES PATENT OFFICE.

ELIHU SPENCER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN FEATHERING PADDLE-WHEELS.

Specification forming part of Letters Patent No. **150,903**, dated May 12, 1874; application filed September 9, 1873.

To all whom it may concern:

Be it known that I, ELIHU SPENCER, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Feathering Paddle-Wheels, of which the following is a specification:

This invention relates to improvements in the wheel for which Letters Patent were granted to me May 21, 1867, No. 65,023; and consists in the use of square cams and rollers to feather the paddles; in making the said rollers adjustable, so that the paddles may be caused to feather at any desired point; and in other details, as hereinafter described.

Figure 1 is a top-plan view of my improved wheel with a portion of the central covering-plate broken away to show the feathering mechanism; Fig. 2, a side elevation of the wheel with one-half in section; and Figs. 3 and 4, respectively, a side and an edge view of the cams and rollers by which the paddles are feathered.

A represents the frame of the wheel, consisting of a central hub, *a*, provided with rigid radial arms *b*, which have their outer ends secured rigidly to an outside circular rim, *c*, as shown in Figs. 1 and 2. B are the paddles or blades of the wheel, mounted in the frame between the arms *b* on radial shafts *d*, which pass through the middle of the blades, and have their ends mounted loosely in the hub and rim, respectively, each paddle being free to rotate independently on its own axis in the frame of the wheel. C C' are square cams or plates, two of which are secured rigidly on the inner end of each paddle-shaft *d*, for the purpose of feathering or turning the paddles at the proper times, and of holding the paddles from turning during the proper intervals, as hereinafter explained. The outer cams C are arranged with their edges or faces at angles of forty-five degrees to the edges of the inner cams; or, in other words, each cam is set an eighth of a revolution in advance of its fellow, as shown in Figs. 3 and 4. D is a fixed, but adjustable, ring, secured below and concentric with the wheel, and so arranged that as the wheel revolves the outer cams C are carried around over the face of the ring, while the inner cams C' pass around just within the same, as shown. The outer cams slide with one edge

close to the upper face of the ring, so that they are thereby prevented from rotating, and the paddles held from turning in the frame of the wheel. As, however, the cams do not actually touch the plate, there is no friction between them. E and F are two openings in the ring or plate D, at the points where the paddles are to be feathered or turned, so that as the revolution of the wheel carries the paddles around each one is released and permitted to turn on its axis at the instant its outer cam C passes over each of the openings. In each of the two openings there are three fixed rollers, G H I, the two former being arranged edge to edge in the path of the outer cam C, while the last is mounted by the side of the others in the path of the inner cam C', as shown in Fig. 1. The two sets of rollers in the two openings are alike in every respect.

The operation is as follows, the wheel being turned toward the right, as indicated by the arrows: The revolution of the wheel carries the paddles around through the water, the paddles being held in position edgewise or flatwise during the proper intervals by means of the outside cams C sliding over the plate or ring D, as before stated. While the paddles are passing from E to F they stand vertically, and act flatwise against the water. As each paddle approaches the opening F, the lower corner of its inner cam C' strikes the roller I, and, in passing over the same, is turned an eighth of a revolution, thereby bringing the point of the cam C down in front of the roller H, which gives the cam another eighth of a revolution, and thereby turns the paddle over in a horizontal position, edgewise to the water, as shown. From the roller H the cam C passes above the ring or plate D, which holds the paddles in the horizontal or feathered position until they reach the opening E, when the rollers act upon the cams in the same manner as at the first opening, and thereby turn the blades over successively to a vertical position, flatwise to the water.

It will be observed that when the wheel is turning in the direction shown the rollers G do not come into operation. When, however, the wheel turns in the opposite direction, the rollers G act upon the cams, and the rollers H remain idle, the feathering of the paddles be-

ing the same as described, except that they are feathered from E to F, and not the reverse, as above described.

In order that the paddles may be caused to feather sooner or later, the ring or plate D, which has the rollers secured thereto, is provided, on its lower side, with a rim or flange, *k*, which is mounted on a flange or hub, *l*, as shown in Fig. 2, so as to permit the plate D to turn, and thereby move both sets of rollers to the right or left. In this way the paddles may be caused to feather at such point that very few of them will act in the water, or cease to act at a very early point, and thus the power or "hold" of the wheel be varied, as required. The plate is adjusted by a chain, N, wound about the flange or rim *k*, and carried around a drum, O, the shaft of which is provided with a hand-wheel, as shown in Figs. 1 and 2.

For the purpose of excluding grass, floating sticks, and other obstructions, I mount in the wheel a drum, P, which surrounds the cams, &c., and fits down closely to the plate D, as shown in Fig. 2, the top of this drum being closed by a plate, Q, as shown.

It will be observed that in its general construction and operation the present wheel resembles my original; but, by substituting the cams and rollers for the old feathering mechanism, I make the wheel run easier, steadier, and without the shock and jar which were incidental thereto.

By making the rollers adjustable, I am enabled to control the wheel easily, and to vary

its hold, as may be necessary. By inclosing the feathering mechanism, the wheel is enabled to run in water filled with obstructions without any danger whatever of the feathering mechanism being disabled.

It is obvious that the construction shown is applicable alike to tide-wheels and to wind-wheels.

Having thus described my invention, what I claim is—

1. In a wheel constructed substantially as shown, the square cams C C', secured to the paddles, in combination with the plate D and rollers G H I, arranged substantially as shown and described.

2. In the wheel constructed and operating substantially as described, the movable plate D, having the rollers G H I attached thereto, as shown, whereby the points at which the paddles feather may be varied or changed, as set forth.

3. In combination with a paddle-wheel provided with the blades B, having the cams C C' attached rigidly to their journals or shafts, the movable plate D, having the rollers I H attached, with the chain N and shaft or drum O, arranged to operate as and for the purpose set forth.

ELIHU SPENCER.

Witnesses:

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