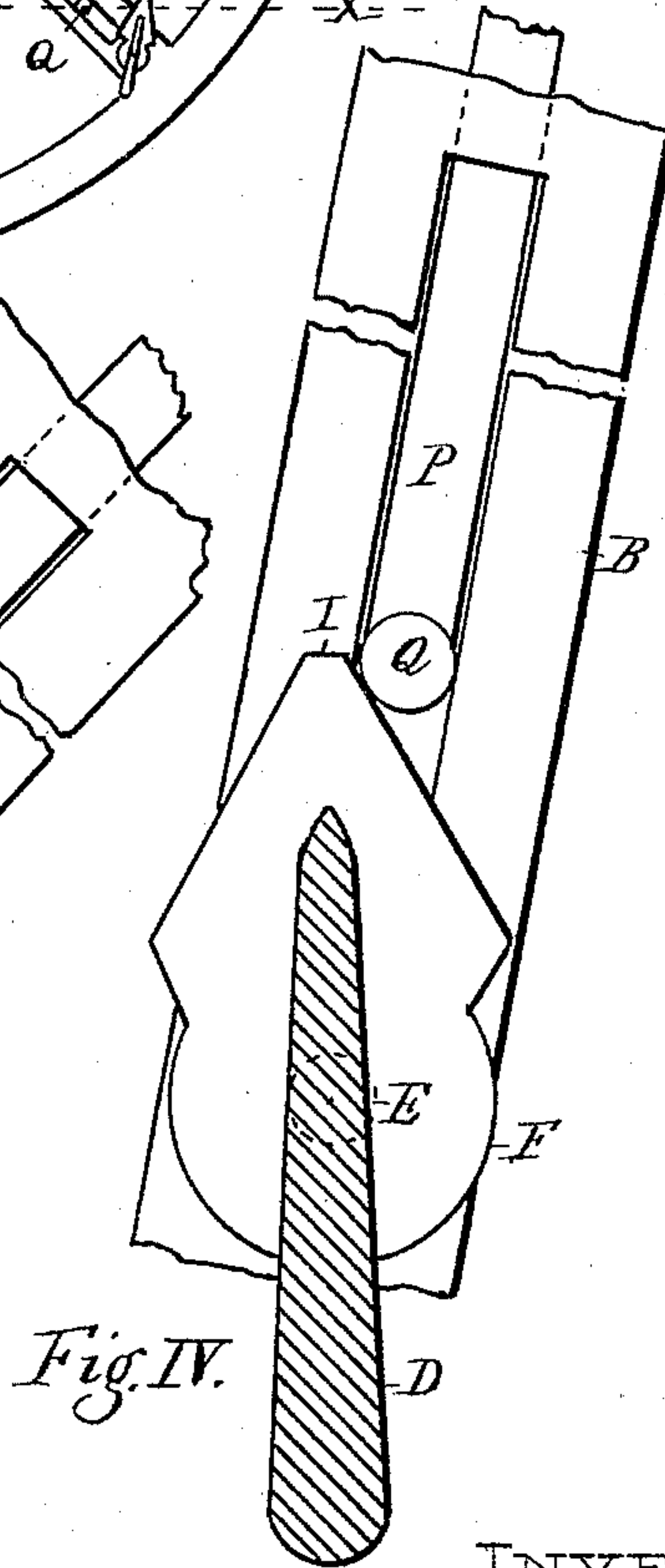
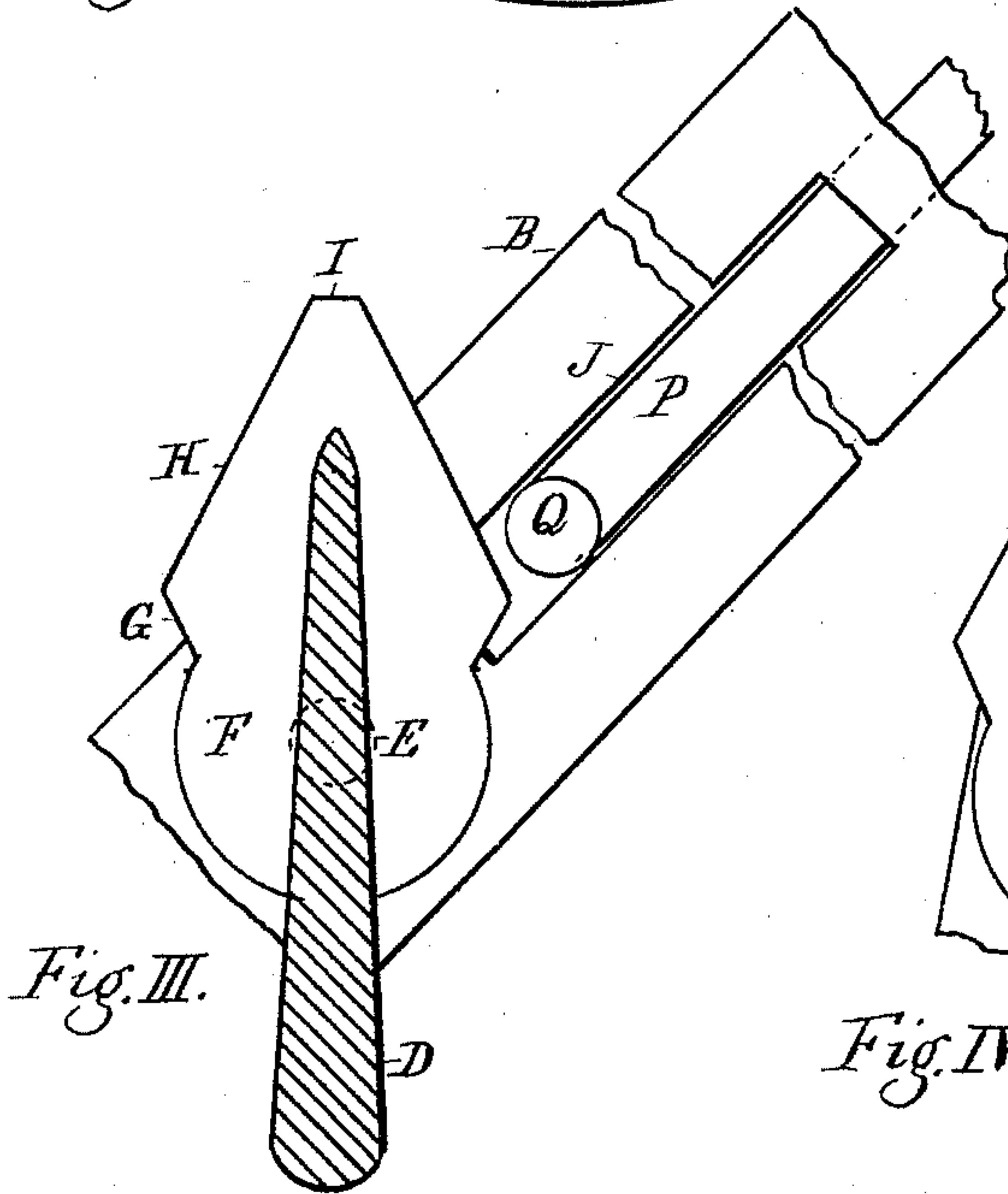
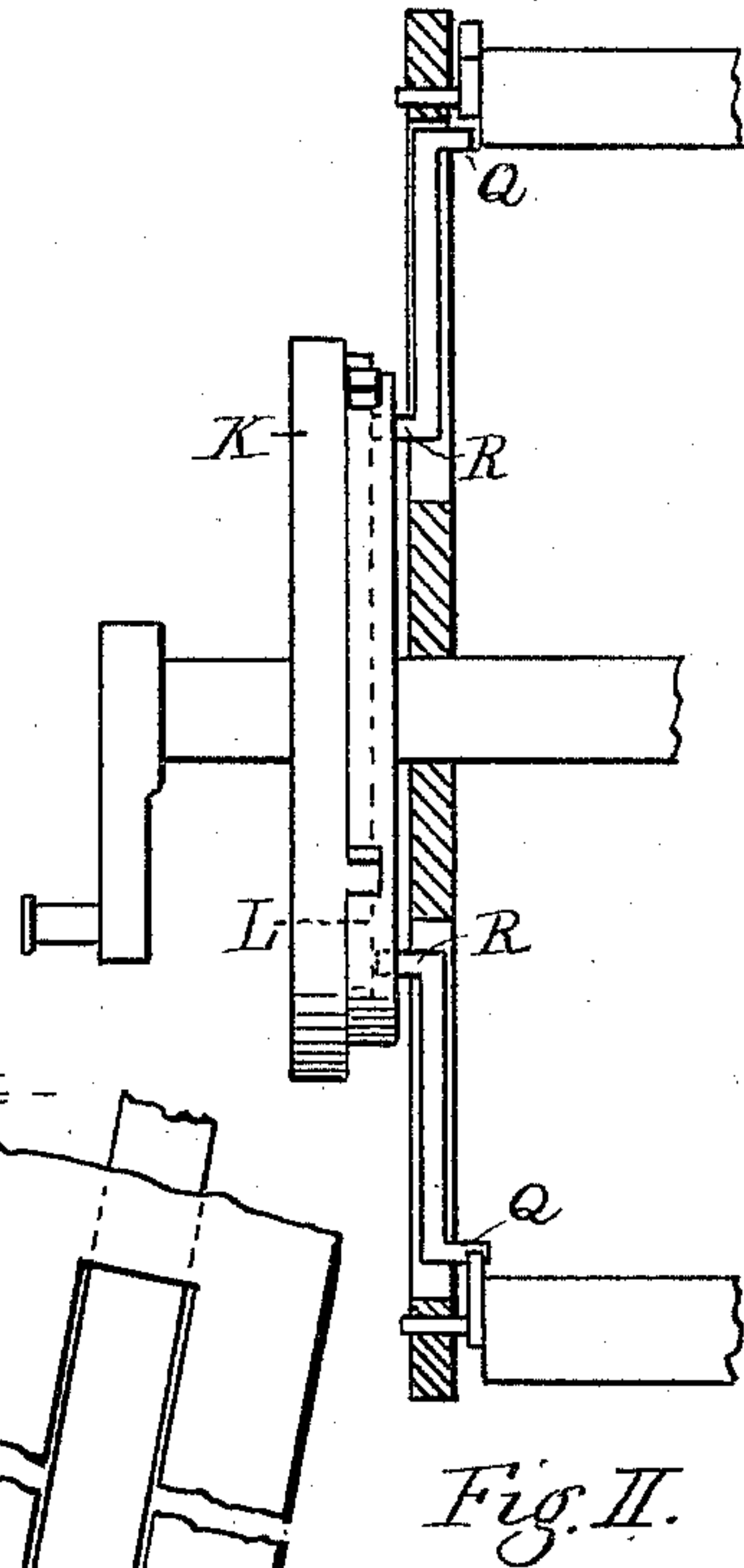
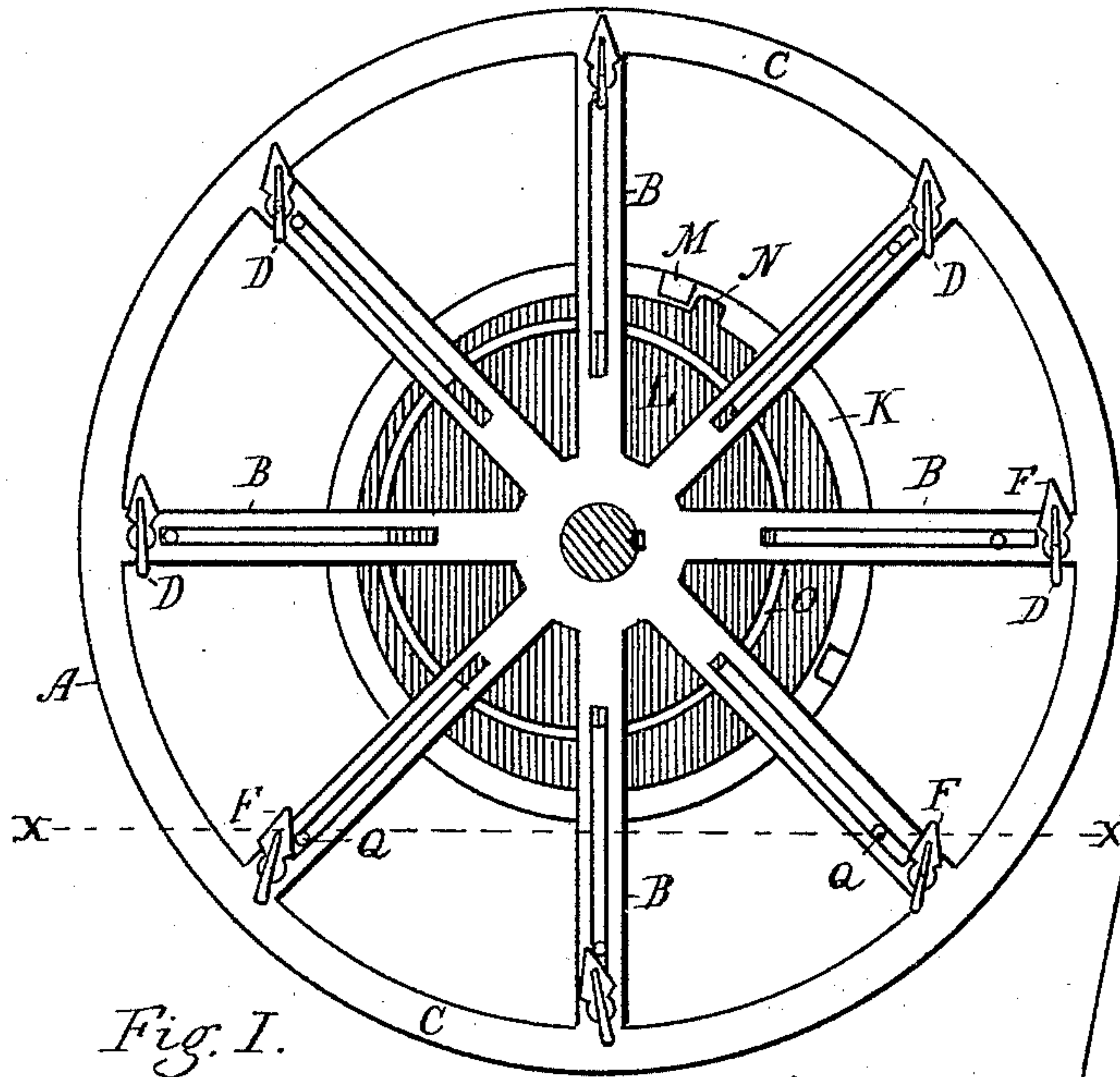


(No Model.)

R. FORWARD.
FEATHERING PADDLE WHEEL.

No. 417,162.

Patented Dec. 10, 1889.



WITNESSES:

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ROSS FORWARD, OF CINCINNATI, OHIO.

FEATHERING PADDLE-WHEEL.

SPECIFICATION forming part of Letters Patent No. 417,162, dated December 10, 1889.

Application filed August 12, 1889. Serial No. 320,469. (No model.)

To all whom it may concern:

Be it known that I, ROSS FORWARD, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Feathering Paddle-Wheels, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure I is a side elevation of my feathering paddle-wheel; Fig. II, a vertical section of a portion of the wheel; and Figs. III and IV, end views in detail of the paddles or blades, showing their position with relation to the slotted radial arms of the wheel.

This invention is an improvement on the construction of the feathering paddle-wheel for which Letters Patent were issued to me February 29, 1876, No. 174,220; and it consists, first, in making the eccentric groove which receives the sliding bars in the form of a circle eccentrically disposed, instead of an irregular path with no common center, and giving it a revolving center on the paddle-wheel shaft just so far from the true center as will serve to move the slides the required distance to catch and hold in one position of their revolution the revolving paddle-cams and loosen them at another; and, secondly, in altering the shape of the paddle-cams by dispensing with the pointed short shoulders, which, as shown in the aforementioned Letters Patent, have their sides disposed tangentially, and in also obviating the necessity of the horizontally-disposed or radial shoulders, as shown in Fig. 5 of said patent. Instead thereof the cams in this invention have their lower side concentric with the center or pivotal point to a point slightly above the horizontal central line, from which point the cam is formed into a short tangential line and then bent inwardly toward each other on a tangential line the point of which is truncated. This change in the cam is called for by reason of making the eccentric path a regular circle, and in order to gain thrust from the submerged paddle from the moment it touches the water, which this improvement enables it to do by entering more perpendicularly or edgewise into the water, as will now be fully set forth in detail.

In the drawings, A represents the wheel,

which is suitably journaled in a pillow block or frame having suitable radial arms B and perimeters C. The paddles D are pivoted near the ends of the arms B and made heavier on one side of the center than on the other, so that gravity will always tend to keep them in a perpendicular plane. They are also made wider on one side than on the other, so that when they enter the water the pressure of the water on the blade will cause them to let go at the proper moment, and thus prevent them from lifting water. Thus, as shown at Figs. III and IV, the blades below the center pivot E represent the wide part of the paddles, and when not acted upon by the water or held in any position by means of the sliding arms or studs will be in the vertical position shown in those figures.

The blades D have at each end a peculiarly-shaped cam F. The lower half of these cams are concentric with the pivot E, and slightly above the center at each side the edge of the cam branches out, as shown at G, a short distance, and then branches inwardly, as shown at H, or converging toward each other, the upper end being truncated, as shown at I.

The radial arms B are each provided with slots J, which terminate at or near the arc or circle formed by the lower half of the cam F, for purposes which will be hereinafter more fully set forth.

The pillow-block K, in which the paddle-wheel shaft is journaled, has on its face a disk L, centrally pivoted on the paddle-wheel shaft, and at suitable points on the pillow-block K are studs M M, placed at such distance apart as to allow the disk L to turn approximately a quarter of a revolution. The movement of the disk is limited by an integral stud N coming into contact with the studs M M.

On one face of the disk L is a circular groove O, eccentrically disposed thereon, and each one of the slots J of the radial arms is equipped with a slide P, one end of which has a stud Q on one side, which rests within the slot J, while the other end has a stud R on its other side, which travels in the circular groove O. The studs Q on the outer ends of the slide-arms P are designed to come in contact with the cams F on the ends of the pad-

dles, and the object in disposing of this circular groove O eccentrically with the paddle-wheel shaft is to provide for the vertical positions of the paddles and to hold them in proper vertical position when the paddles are thrust into the water at the downward stroke. To illustrate, suppose that the line x in Fig. 1 represents the surface of the water. The blade on being held in a vertical position by means of the stud Q and having the largest surface of the blade below the center pin E prevents the blade or paddle from being turned. The inclined face H, which is in contact with the pin Q, provides for the vertical adjustment of the paddle as the wheel travels through the water. The circular groove O, being eccentrically disposed, draws up the slide-arm P, so as to compensate for the downward travel and the inclination of the edge of the cam.

The advantage secured by this invention and changing construction is the greatly reduced friction upon the slide pins or studs Q, saving wear and tear and giving increased power to the thrust of the wheel, inasmuch as this construction does not hold the paddles in a cutting position in the water until, as shown in Fig. 4 of the original patent, the slide-stud releases the shoulders on the cam, but the paddle drops more perpendicularly into the water and continues to push against its breadth of the water until it gains its entire depth and passes beyond the point where the cam-head is released.

A further great advantage is secured by the present construction of the cam, because thereby the paddle is earlier dropped into a pushing position and held in such a manner as to prevent its moving with a sudden blow to strike the shoulder of the stud or slide-arm, and thus affect it injuriously.

As the manner of reversing the wheel and

the disk containing the eccentric groove is the same as in the patent already issued to me, there is no particular necessity in referring to that feature, and I have therefore omitted an allusion to it.

What I claim as new is—

1. A paddle-wheel having on the pillow-block and pivoted to the paddle-wheel shaft a disk limited in its rotation by suitable studs and provided thereon with a circular groove eccentrically disposed, and suitable slide-arms engaging with said eccentric groove and with the cams of the paddles, substantially as herein set forth.

2. In a paddle-wheel, the paddles pivoted at each end with the largest-surface blade below the pivot and having a cam provided with concentric lower edge and tangentially-disposed faces on its upper side, substantially as herein set forth.

3. In a paddle-wheel, the paddles pivoted at each end with the largest-surface blade below the pivot and having a cam provided with concentric lower edge and tangentially-disposed faces, in combination with slide-arms for holding and releasing said cams, substantially as herein set forth.

4. In feathering paddle-wheels, the combination of the disk having the eccentrically-disposed circular groove in one face with the slide-arms each having a stud at one end to travel in said groove and a cam on its other end, each cam being made with a concentric lower edge and tangentially-disposed faces, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand, this 6th day of September, 1888, in the presence of witnesses.

ROSS FORWARD.

Witnesses:

J. S. ZERBE,
R. S. MILLAR.