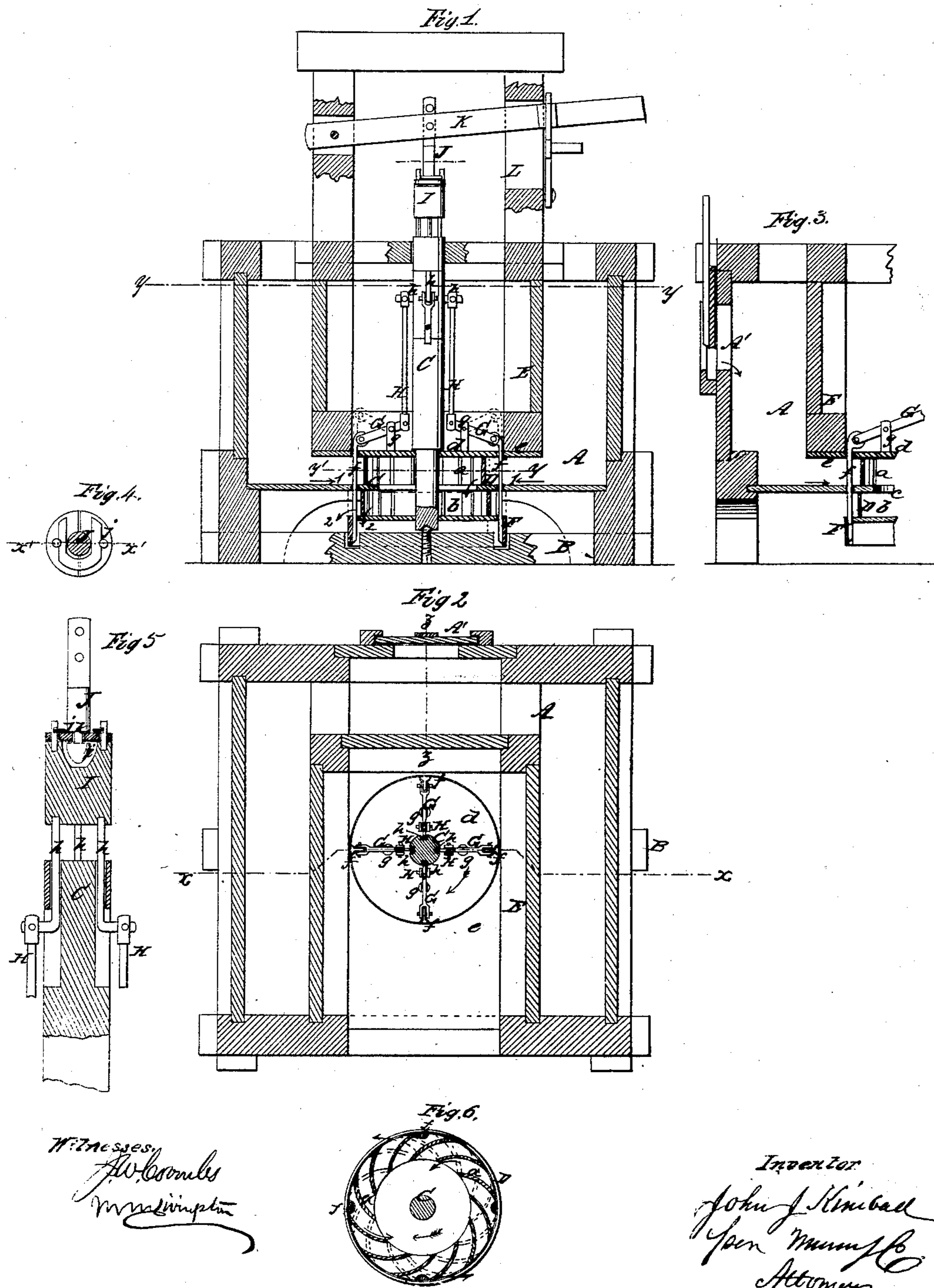


J. J. Kimball,

Water Wheel,

N^o 34,839.

Patented Apr. 1, 1862.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN J. KIMBALL, OF NAPERVILLE, ILLINOIS.

IMPROVED WATER-WHEEL.

Specification forming part of Letters Patent No. 34,839, dated April 1, 1862.

To all whom it may concern:

Be it known that I, JOHN J. KIMBALL, of Naperville, in the county of Du Page and State of Illinois, have invented a new and Improved Water-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, making a part of this specification, in which—

Figure 1 is a vertical central section of my invention, taken in the line xx , Fig. 2; Fig. 2, a horizontal section of the same, taken in the line yy , Fig. 1; Fig. 3, a vertical section of a portion of the same, taken in the line zz , Fig. 2; Fig. 4, a transverse section of the spindle which fits into the upper part of the wheel-shaft; Fig. 5, a vertical central section of the wheel-shaft, taken in the line xx , Fig. 4; Fig. 6, a detached horizontal section of the wheel, taken in the line $y'y'$, Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to an improvement in that class of horizontal water-wheels which discharge their water at the periphery and are provided with an annular gate.

The object of the invention is to graduate the power of the wheel with greater nicety than has been hitherto done, and to this end the wheel is provided with two sets of buckets, one set being above the other and the lower set encompassed by the gate, which is raised and lowered by a series or system of levers arranged substantially as hereinafter shown and described.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A represents the penstock of the wheel, which is of rectangular form and has a bridge-tree B below it, on which the shaft C of the wheel is stepped.

D is the wheel, which is secured permanently on the shaft C and is provided with two sets of buckets a b , the upper set a having a reverse position to the lower set b , as will be fully understood by referring to Fig. 6, in which the lower set of buckets are represented by dotted lines. The water acts first by impact against the upper buckets a of the wheel and passes inward toward the center

of the wheel. This direction is given the water by the form of the buckets a , and the water, as it reaches the center of the wheel below the buckets a and plate c , presses outward by centrifugal force. The lower buckets b , in consequence of having a reverse position to the upper buckets a , coincide with the direction of the escaping water, which acts with the remaining force left it against the convex sides of the buckets b . By this arrangement the water is not allowed to act as a drag upon the wheel.

The two sets of buckets a b are divided by an annular horizontal plate c , which is in line with the bottom of the penstock A, the lower set of buckets b being below the bottom of the penstock, as shown clearly in Figs. 1 and 3.

The top plate d of the wheel is flush with the bottom plate e of a box E, which is fitted within the penstock A, but does not communicate with it. This box E protects the top of the wheel from the pressure of the water and compels the water to act first upon the upper set of buckets a , as indicated by the arrows 1, and then to act upon the lower set b , as indicated by the arrows 2 in Fig. 1. The water is let into the penstock through a gate A'.

F represents an annular gate, which encompasses the lower part of the wheel—to wit, the buckets b . This gate is allowed to slide freely on the lower part of the wheel, and it has four uprights f attached to it at equal distances apart. These uprights extend up a short distance above the top plate of the wheel and are each attached to a lever G. The fulcrum of these levers are in the upper parts of uprights g on the top plate of the wheel, and the inner ends of the levers are attached to upright rods H, which are connected at their upper ends to rods h , said rods being fitted in the shaft C of the wheel and allowed to slide freely up and down therein. The rods H project up above the shaft C and are fitted in a head I, which may be of the same diameter as the shaft C. This head I has a vertical rod J attached to it by a swivel-connection i , as shown clearly in Fig. 5, said connection being formed by a plate j on the top of the head fitting in a groove k in the rod. The upper end of the rod J is connected

to a lever K, which is fitted in a framing L on the upper part of the penstock.

From the above description it will be seen that by adjusting the lever K the annular gate F may be raised and lowered and the discharge of the water from the wheel, and consequently the power of the same, regulated as desired. The water, it will be seen, first acts upon the buckets *a* of the wheel, passes to the center thereof, and then flows outward, and the issues or spaces between the lower set of buckets *b* are rather smaller than the issues or spaces between the upper buckets in order to prevent an undue escape of the water, or, in other words, to insure a full effect of the reacting force of the water in passing out between the lower set of buckets *b*.

It will be seen that the gate F may be adjusted while the wheel is in motion, as the head I can rotate around the rod J. This arrangement for adjusting the gate is an important feature, as it does not interfere at all with the operation of the wheel.

I do not claim, broadly, an annular gate, for they have been used and arranged in various ways; but I am not aware that an annular gate has ever been used in connection with a wheel provided with two sets of buckets, the gate encompassing the lower set, which is below the penstock.

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

The wheel D, provided with two sets of buckets *a b*, one set *b* being below the bottom of the penstock A, and the top of the wheel fitted in the bottom of a box E in the penstock, in combination with the annular gate F, placed in the lower part of the wheel, encompassing the buckets *b*, and connected with the adjusting-lever K by the rods *f H h*, and lever G, all arranged substantially as and for the purpose set forth.

JOHN J. KIMBALL.

Witnesses:

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