(No Model.)

H. BURRILL.

WATER WHEEL.

No. 420,988. Patented Feb. 11, 1890.

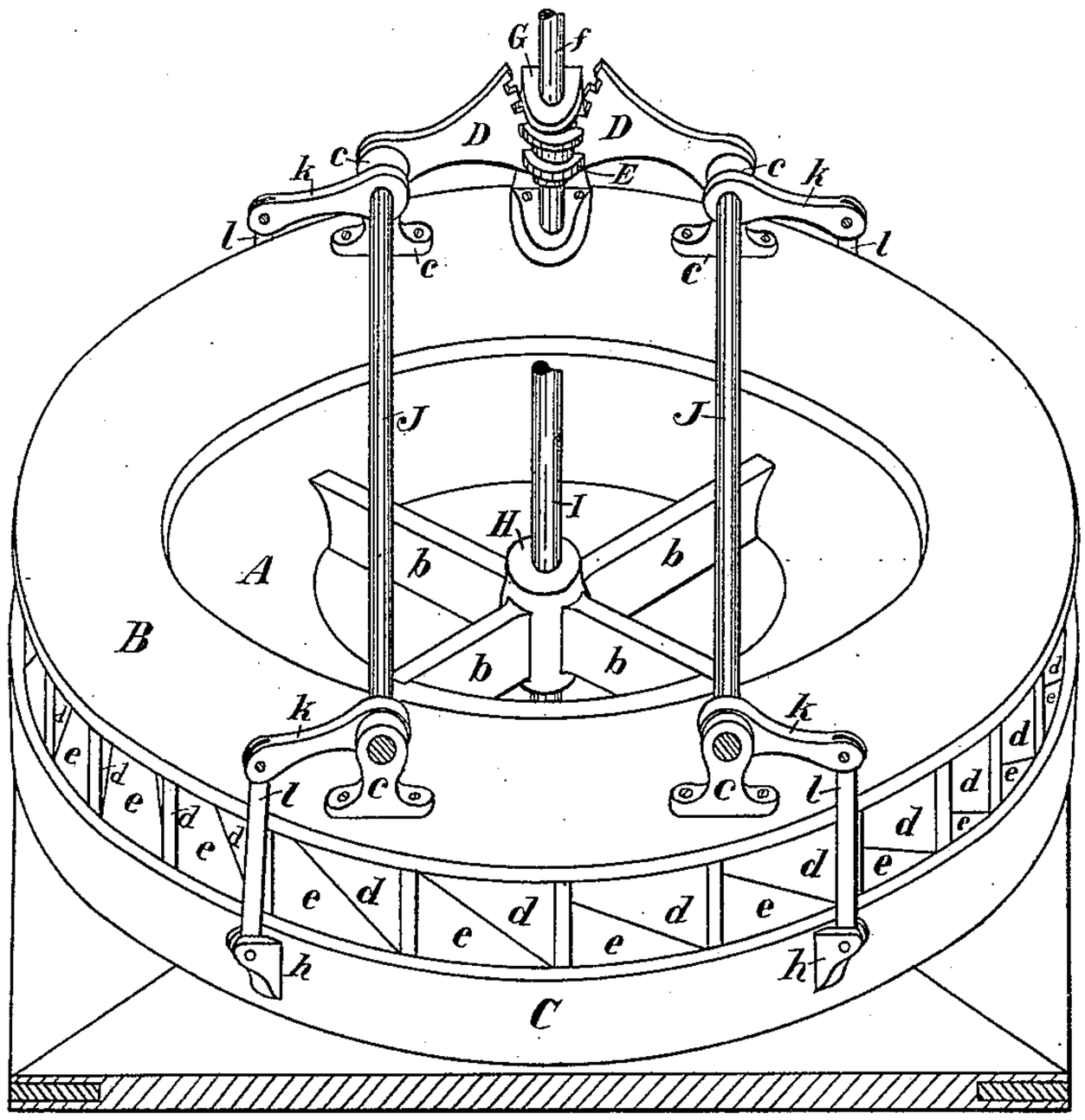

Fig. 1

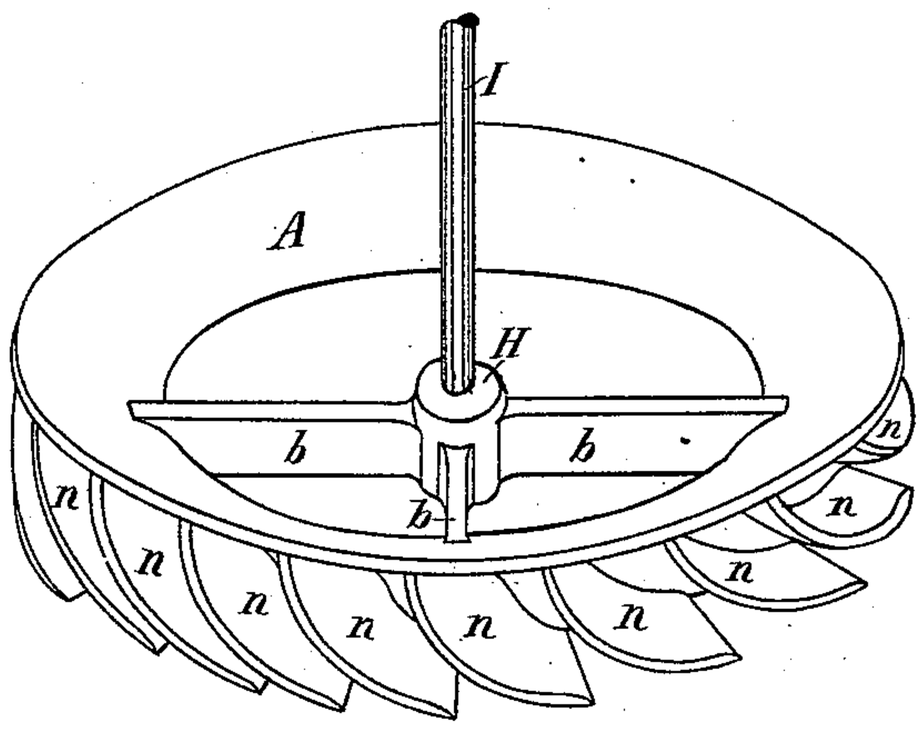

Fig. 2

WITNESSES:

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HIRAM BURRILL, OF SANGERVILLE, MAINE.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 420,988, dated February 11, 1890.

Application filed June 17, 1889. Serial No. 314,618. (No model.)

To all whom it may concern:

Be it known that I, HIRAM BURRILL, a citizen of the United States, residing at Sangerville, in the county of Piscataquis and State of Maine, have invented a new and useful Water-Wheel; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved low-pressure turbine water-wheel, and it belongs to that class wherein a rotary motion is imparted by the action of streams of water passing through chutes upon the buckets nearly tangentially with the periphery of the wheel, and a new manner of taking water for the same with its operating mechanism, as will hereinafter be fully described.

Throughout the description reference is made to the accompanying drawings, in which—

Figure 1 represents a perspective view of my improved water-wheel complete, showing the gate and operating mechanism. Fig. 2 is a perspective view of the wheel removed, showing its construction and position of the buckets upon the same.

Similar letters of reference represent correspondingly like parts throughout both figures.

In the drawings, B represents the chute-box, which is an annular-shaped structure having a central opening the size of the wheel to be inclosed and turned therein. The upper and lower portions of the chute-box are parallel and separated by diagonally-vertical partitions *d* at equal distances from each other, and extend through the annular portion of the box in such manner that streams of water passing through the spaces between each partition will be conveyed into the central opening at their respective points a little less than tangent with the inner diameter of the said chute-box—that is, with a right-hand wheel, as shown in the drawings. Each left-hand partition, forming the left side of each chute, (which is the space between these partitions,) forms a line tangent with the inner circumference of the chute-box. Consequently whatever passes through each chute will be transmitted into the central opening of the chute-box within the circumference of its inner diameter. As the inner is somewhat less than the outer diameter of the chute-box B, each opening or chute between the partitions *d* must necessarily be wedge shaped. Consequently the speed of the water passing through them must be accelerated and forced into the central opening.

Passing around the circumference of the chute-box B is a flat vertical ring C, having inwardly-extending floors *e*, attached to and projecting horizontally from its upper edge. Each floor *e* closely fits within and extends through the chutes between each partition *d*, and, being rigidly confined to the ring C, is raised and lowered with the latter to increase or diminish the size of the chutes and regulate the quantity of water passing therethrough. The ring C is raised and lowered by the mechanism now to be described.

Upon the upper surface of the chute-box B are secured four vertical standards *c*, which have, passing through holes drilled in their upper ends, two horizontal shafts J, adapted to turn therein. Each shaft J is provided with two arms *k*, located near their opposite ends, rigidly fastened thereto and projecting outward as far as the outer edge of the chute-box B. The outer extremities of arms *k* are pivoted to connecting-rods *l*, which extend downward, and are also pivotally connected to the ring C, small projections *h* being cast upon this ring to pivot the connecting-rods *l* thereto. I also attach to one end of each horizontal shaft J the cogged arms D, projecting inward toward each other diametrically opposite the projection of the arms *k* and adapted to engage and be operated by the worm-wheel E, located upon a vertical shaft *f*. The vertical shaft *f* is held in position and arranged to turn within the sustaining-standard G, which latter is rigidly fixed in position upon the upper surface of the chute-box B. It can now be readily understood that by revolving the vertical shaft *f* in either direction the ring C, with its attached floors *e*, will, by the intermediate mechanism described, be raised or lowered, and thus regulate the size of the chutes.

Located in the central opening of the annular chute-box B, and adapted to turn horizontally therein, is the wheel proper, attached to a vertical wheel-shaft I, passing

through its hub H and stepped at its lower end upon any usual bearing. This wheel is constructed with a curved rim A of a depth equal to the depth of the chute-box, and has water-buckets *n* projecting outward from the concavity of the said rim A.

The upper and outer edge of the rim A revolves very near the upper surface of the chute-box B, as shown in Fig. 1 of the drawings, and the said rim is curved inward and downward therefrom the entire depth of the wheel, thus leaving a space within this concavity for the location of the water-buckets in direct communication with the chute-openings in the chute-box. The rim A is confined to the hub H by means of the spokes *b*, connecting them as shown in the drawings.

The water-buckets *n*, fastened to and projecting from the concaved portion of the rim A, are thin curved vanes located at equal distances from each other around the periphery of the wheel, and are in number one less than the number of chute-openings in the chute-box B. Thus streams of water passing through the chute-openings will strike with different proportions upon each water-bucket around the wheel, assisting materially in imparting and maintaining a rotary motion to the latter. The inner edges of the water-buckets *n* conform to the concave surface of the wheel-rim, and their outer edges project as far as the outer and upper edge of the said rim A, the width of the latter determining the breadth or surface of the said buckets.

The buckets *n*, I do not attach to the rim of the wheel in diametric unison, for their outer edges are located a little to one side of a line passing through the center of the wheel and the point of attachment of their inner edges. Thus in a right-hand wheel, as shown in Fig. 2 of the drawings, the outer edge of each bucket *n* projects to the left of a diametric line passing through the inner edge of the same, giving a broader surface to receive the impact of water from the surrounding chutes, and greatly adds to the force and power of the wheel so constructed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

An improved water-wheel consisting of the combination of the annular chute-box B, having vertical tangential partitions *d*, with chute-openings between them, the inclosing-ring C, with attached floors *e* passing through each chute, as described, the raising and lowering mechanism consisting of the standards *c*, horizontal shafts J, with attached arms *k*, connecting-rods *l*, pivoted to arms *k*, and ring C, the cogged arms D, also attached to shafts J and adapted to engage worm-wheel E, with its operating-shaft *f*, for the purpose described, with the improved wheel consisting of the inwardly-curved rim A, spokes *b*, and hub H, attached to wheel-shaft I, and the curved water-buckets *n*, attached to the concave surface of the rim, substantially as shown, and for the purpose described.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

HIRAM BURRILL.

Witnesses:
L. A. BURRILL,
C. W. HAYES.