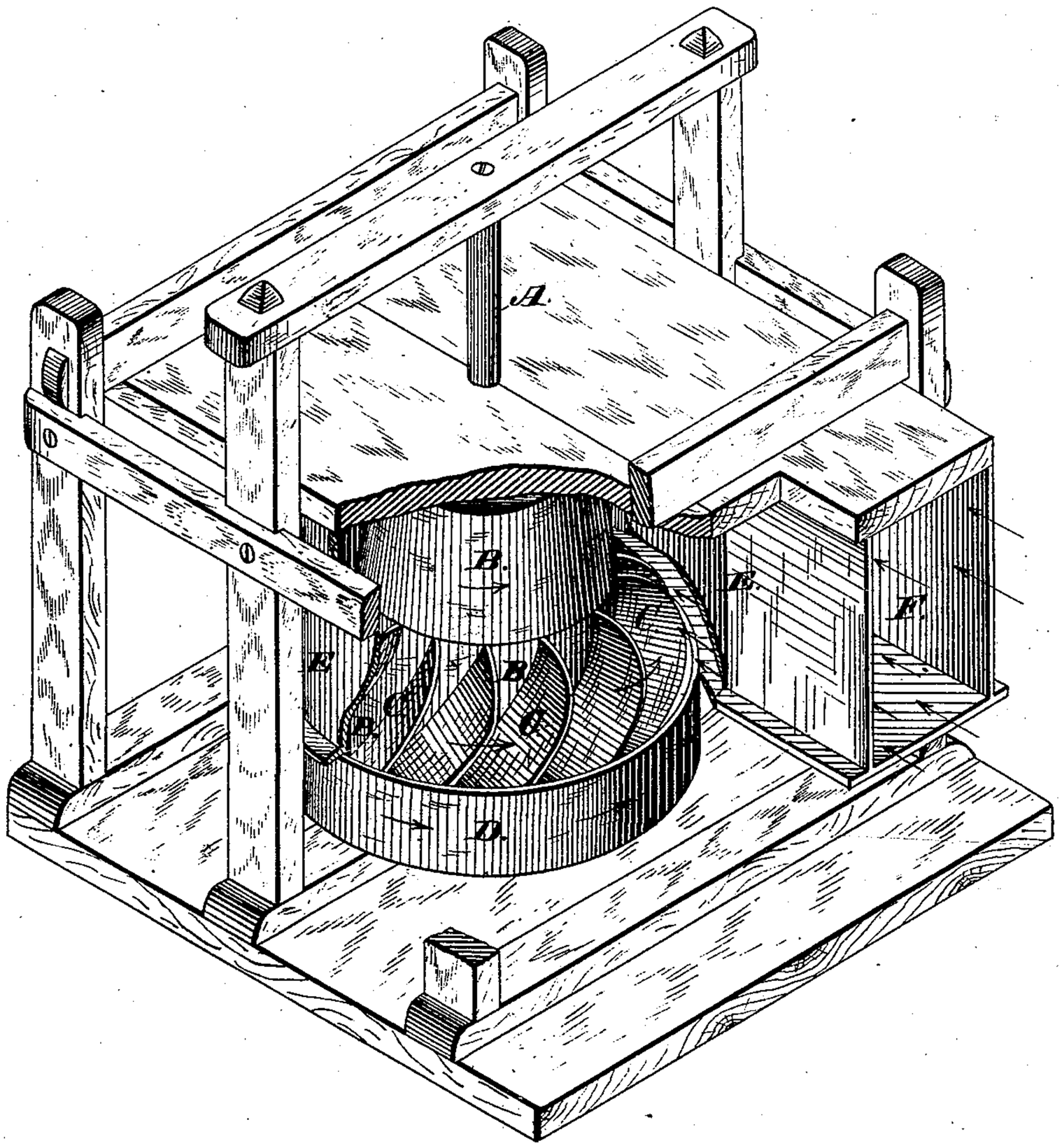
(No Model.) 2 Sheets—Sheet 1.

I. HOLMES.

Turbine Water-Wheel.

No. 227,253. **Patented May 4, 1880.**

Fig. 1.



WITNESSES:

Jas. E. Hutchinson.

Henry C. Hazard.

INVENTOR.

Ira Holmes, by

Geo. B. Prindle, his Atty

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

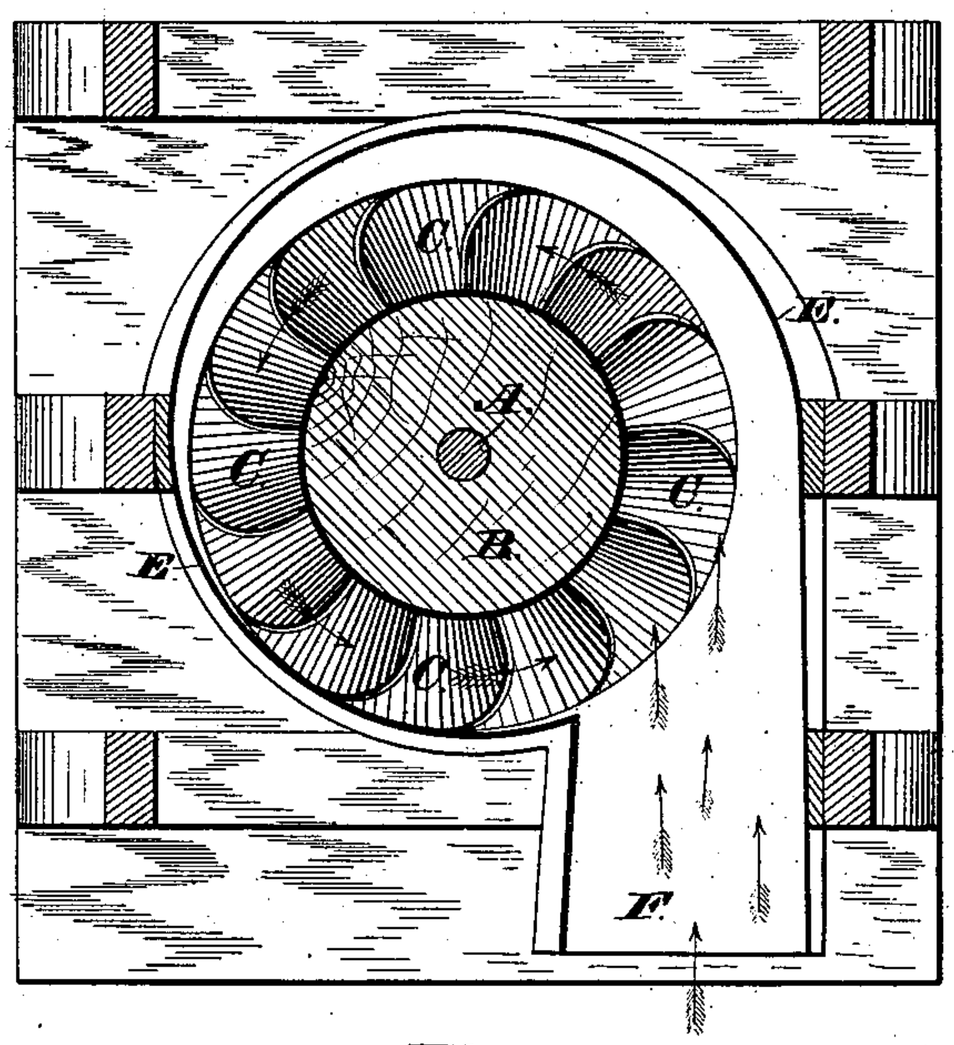

Fig. 3.

WITNESSES=

Jas. E. Hutchinson.

Henry C. Hazard.

INVENTOR.

Ira Holmes, by

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UNITED STATES PATENT OFFICE.

IRA HOLMES, OF HOLMESVILLE, NEW YORK.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 227,253, dated May 4, 1880.

Application filed March 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, IRA HOLMES, of Holmesville, in the county of Chenango, and in the State of New York, have invented certain new and useful Improvements in Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my improved wheel as arranged for use, the curb or casing being broken away so as to show the form of said wheel. Fig. 2 is a horizontal section of the same upon a line immediately above the buckets of the wheel, and Fig. 3 is a vertical central section of said parts.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is to increase the efficiency and power of turbine water-wheels and to enable them to operate under backwater; and to this end it consists in a turbine water-wheel partially inclosed within a horizontal scroll casing or curb and provided within said casing with a central hub that projects above the buckets and directs water thereon, and extends radially to direct-action buckets, which buckets below said casing become reaction-buckets, and are inclosed by means of a peripheral band, the whole being so arranged as to cause the current of water to operate by direct action as it enters said casing and by reaction as it leaves said wheel, and within said casing to be confined directly over said buckets, substantially as and for the purpose hereinafter specified.

In the annexed drawings, A represents a shaft, which is suitably journaled within vertical bearings and has secured near its lower end a cylindrical hub, B, that has any desired dimensions, and is preferably constructed from wood, and is either hollow or solid.

Upon the hub B are secured a number of radial metal buckets, C, that are arranged at equidistant points around its periphery and have a spiral form longitudinally, which increases regularly in pitch from their upper to their lower ends, so that while the upper portion of each bucket is nearly vertical its lower portion has considerably more of a horizontal pitch. The upper ends of said buckets have their outer corners formed upon curved lines, while their lower half is inclosed by means of a peripheral metal band, D, which operates as a brace and insures the relative positions of their outer edges.

From the band D to the upper end of the hub B the wheel thus constructed is inclosed by means of a casing, E, which has vertical side walls, a horizontal top and bottom, and from a side entrance, F, inward has a scroll shape, as seen in Fig. 2.

The opening within the bottom of the casing E has just the dimensions necessary to enable the wheel to turn freely without binding, while at its upper end it is fitted as closely around the shaft A as is consistent with freedom of motion of the latter.

The device is now complete and operates as follows, viz: Water being admitted to the casing E through the passage or flume F passes horizontally inward around the wheel, and coming into contact with the upper portion of the buckets C imparts motion, by direct action, to the same, after which said water passes downward between said buckets and within the band D and escapes in an annular nearly vertical stream, during which downward movement said water, by reaction, imparts its force to the lower portion of said buckets, its operation being first by direct action, and lastly by reaction.

The scroll shape of the casing E causes the water-way around the wheel to regularly diminish in radial dimensions, so that an equal volume of water is supplied to each bucket, while, in consequence of the hub B, which extends to the inner edges of said buckets, the full downward pressure of the water is exerted upon the latter, and no unnecessary friction is caused to the lower bearing or step of said wheel.

In consequence of the construction of the central portion of the wheel B from wood the weight of the latter is diminished, and the buoyancy of said material operates to relieve the lower bearing of a further amount of downward pressure.

The upper portion of the wheel being en-

tirely inclosed, and its lower portion being practically frictionless at its periphery and relieved from friction at its lower end by the annular current of water discharged therefrom, said wheel will operate when submerged by back-water to any depth less than the source of its supply—a result not attainable with any other form of wheel.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

A turbine water-wheel partially inclosed within a horizontal scroll casing or curb, and provided within said casing with a central hub that projects above the buckets and directs water thereon and extends radially to direct-action buckets, which buckets below said casing become reaction-buckets, and are inclosed by means of a peripheral band, the whole being so arranged as to cause the current of water to operate by direct action as it enters said casing and by reaction as it leaves said wheel, and within said casing to be confined directly over said buckets, substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 12th day of February, 1880.

IRA HOLMES.

Witnesses:
GEO. S. PRINDLE,
JAS. E. HUTCHINSON.