J. HOUGH.

TURBINE WATER-WHEEL.

No. 190,038. Patented April 24, 1877.

Fig. 1.

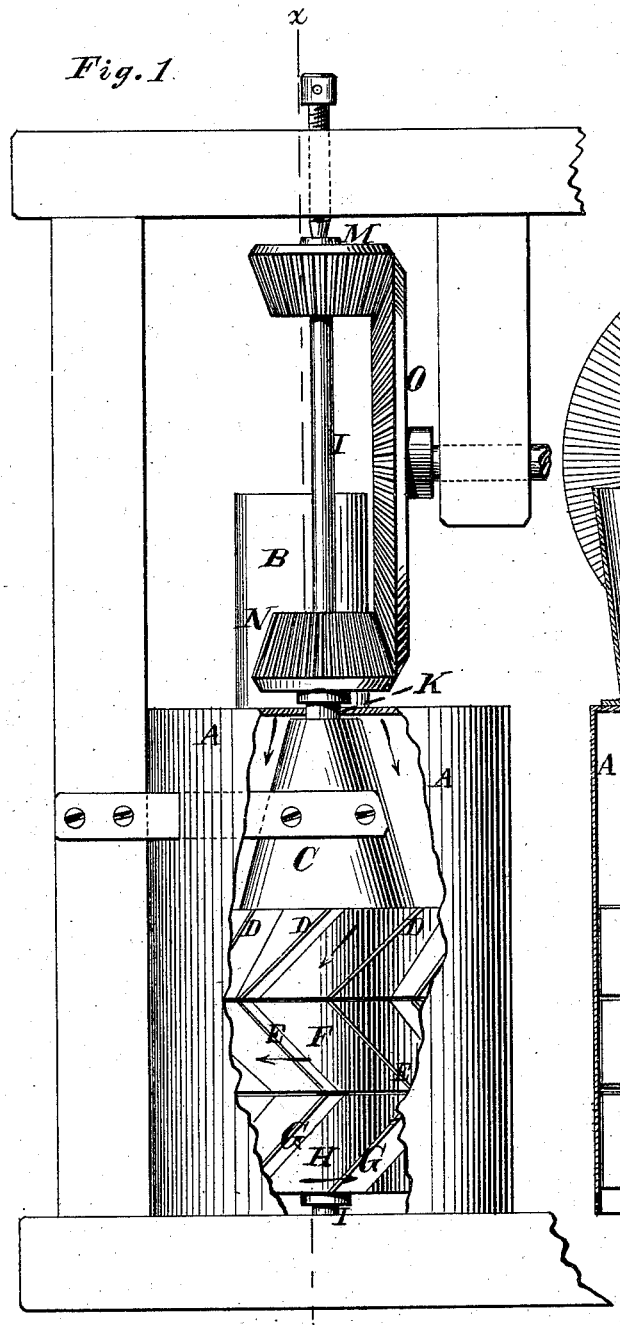
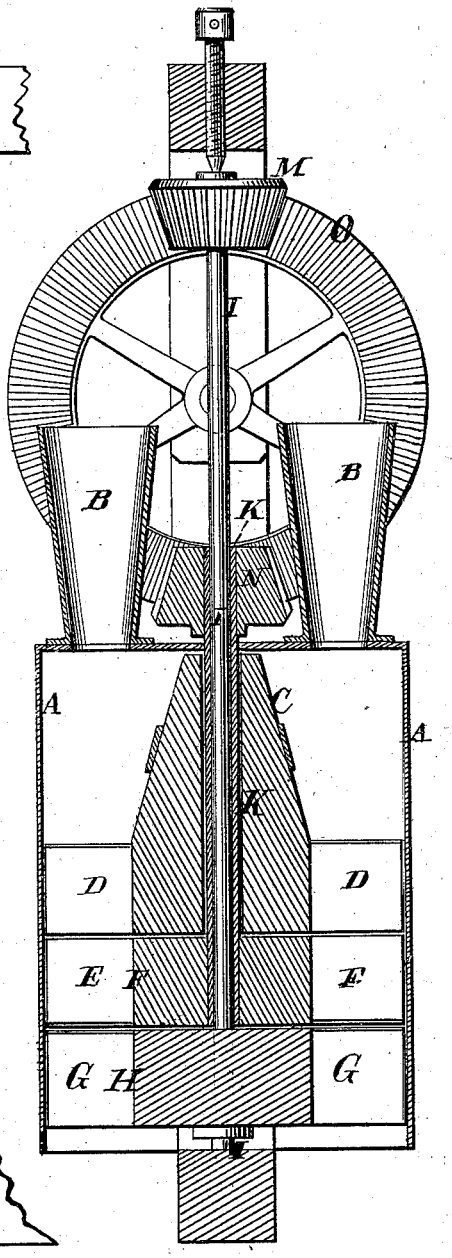


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOSEPH HOUGH, OF BUCKINGHAM, PENNSYLVANIA.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **190,038**, dated April 24, 1877; application filed November 4, 1876.

To all whom it may concern:

Be it known that I, JOSEPH HOUGH, of Buckingham, in the county of Bucks and State of Pennsylvania, have invented an Improvement in Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

My invention consists in two turbine wheels placed in a single incasement, and revolving in opposite directions, the water being delivered at right angles to the buckets of the upper wheel by means of a series of fixed chutes, and discharged from the buckets of said upper wheel upon and at right angles with the buckets of the lower turbine wheel, the shaft of the aforesaid upper turbine wheel being hollow, and inclosing the shaft of the said lower wheel, the opposite rotary motions of the said shafts being converted into rotary motion in a single shaft by means of gears meshing into the teeth on opposite sides of a master-wheel, as more fully hereinafter described.

Figure 1 is a side view of my improved turbine wheel inclosed in its encasement, a portion of the latter being broken away to show the arrangement and construction of the inclosed parts. Fig. 2 is a vertical section of the same on the line *x x*.

A represents the incasement, to the interior of which water is admitted through one or more flumes, B. The bottom of the incasement A is open, to allow the free discharge of the water after it has acted upon the inclosed turbines, and the top is, in practice, made preferably of conoidal form, corresponding with the conoidal support C of the chutes D.

In the upper part of the incasement A is placed a conoidal support, C, for a series of chutes, D, placed at equal intervals around the base of said supports, and inclined in such manner as to direct the water at right angles upon the upper faces of the buckets E of the upper turbine F. Said conoidal support C directs the water outward, and this tendency is maintained to the time of discharge of the water, thus causing the water to act more upon the outer extremities of the buckets, and thus giving the greatest power to the wheel. In practice said support C is half the size of the water-space in the upper part of the incasement.

The said buckets E perform two functions—to wit, they act both as buckets and as directing-chutes for the water as it passes through the upper wheel F upon the upper faces of the buckets G of the lower turbine wheel H, being so inclined as to pass the water at right angles upon the said upper faces of the buckets G.

The wheel H is keyed to the shaft I, which is stepped at its lower extremity, in the usual manner, and the upper wheel F is keyed to the hollow shaft K, which rests on a shoulder, L, formed on the shaft I.

To the upper part of the shaft I is keyed the bevel-gear M, and to the upper part of the hollow shaft K is keyed the bevel-gear N, said bevel-gears meshing, respectively, into the teeth on opposite sides of the master-wheel O, from which the power is taken off for impelling machinery.

When water is admitted through the flumes to the interior of the incasement, it passes downward, turning the wheels F and H in opposite directions, as indicated by the arrows, and discharges at the bottom of the incasement, as also indicated by arrows.

I thus obtain a turbine motor of superior efficiency, and which utilizes a greater percentage of the power of water falling from any given head than other turbines heretofore employed.

I claim—

The combination of the incasement A, the support C, and inclined chutes D, carried by said support, with the turbine wheel F, having the inclined chutes E, and keyed to the sleeve K, and the wheel H, having the inclined chutes G, and keyed to the shaft I, for operating the master-wheel, the whole being constructed and arranged to operate substantially as herein shown and described.

JOSEPH HOUGH.

Witnesses:

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