

J. D. HALE.

Combined Turbine and Undershot Water-Wheels.

No. 154,547.

Patented Sept. 1, 1874.

FIG. I.

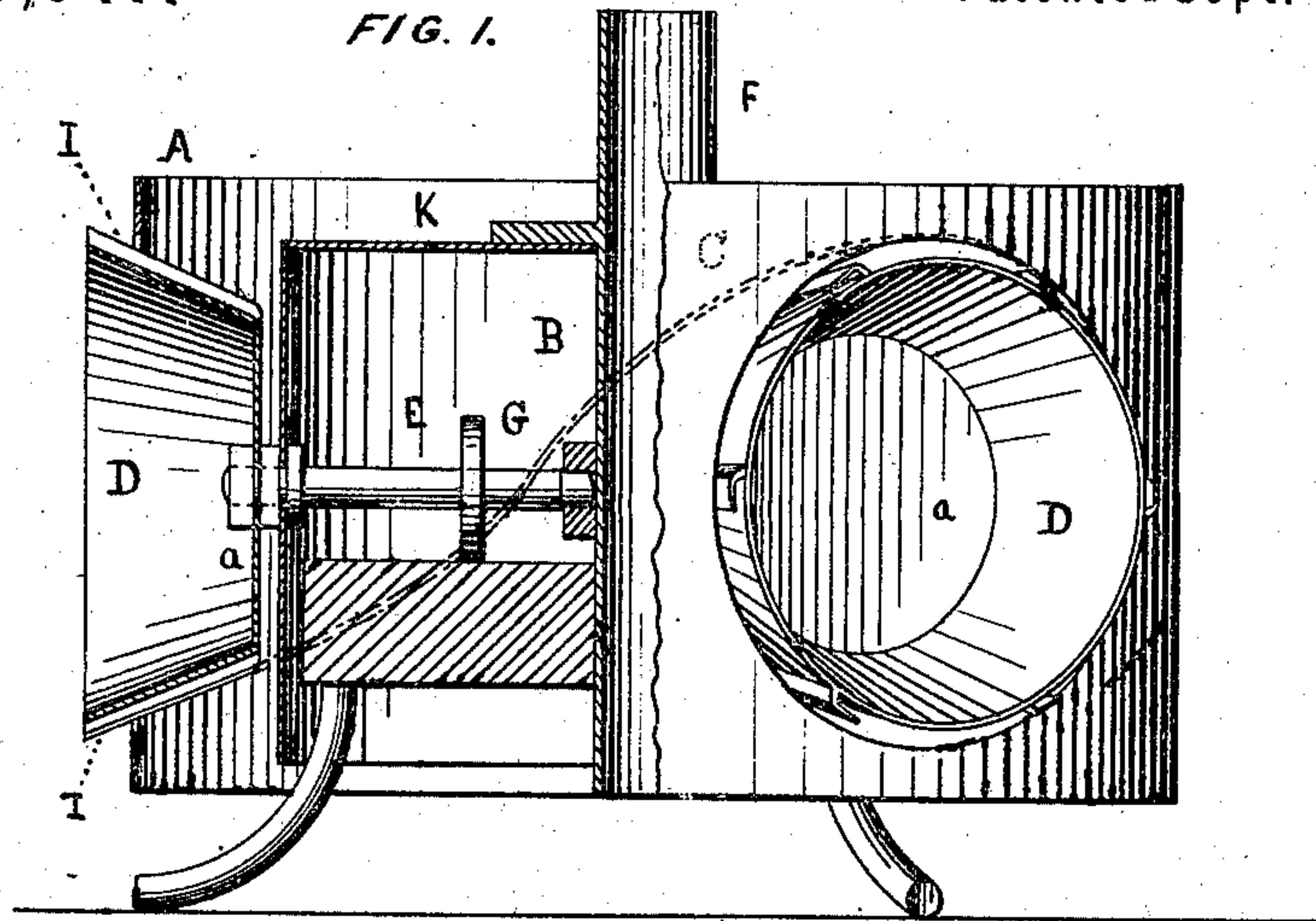
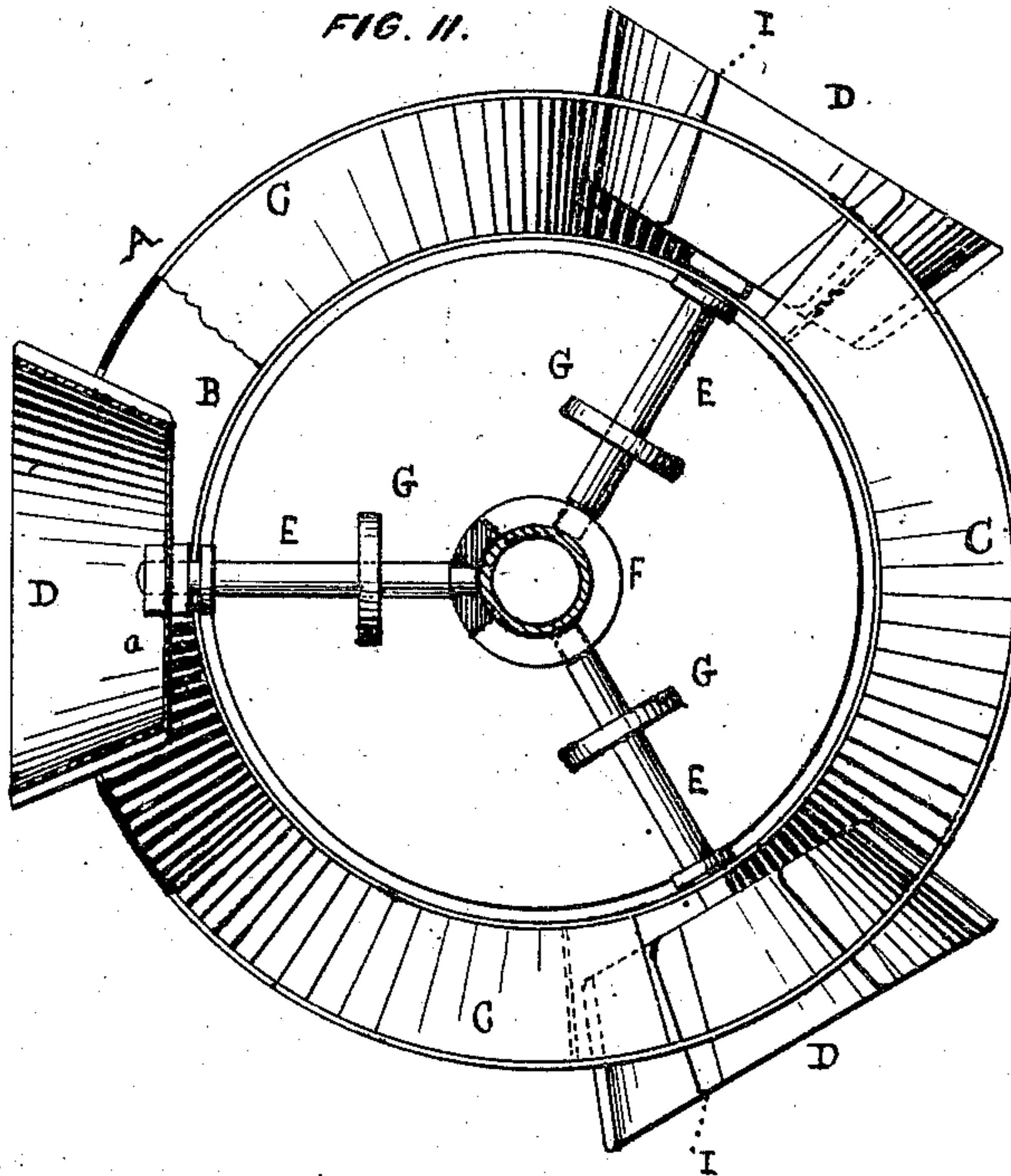


FIG. II.



WITNESSES:

a. H. Norris
Geo. W. Cushing jr

INVENTOR:

Jonathan D. Hale
By James L. Norris
att.

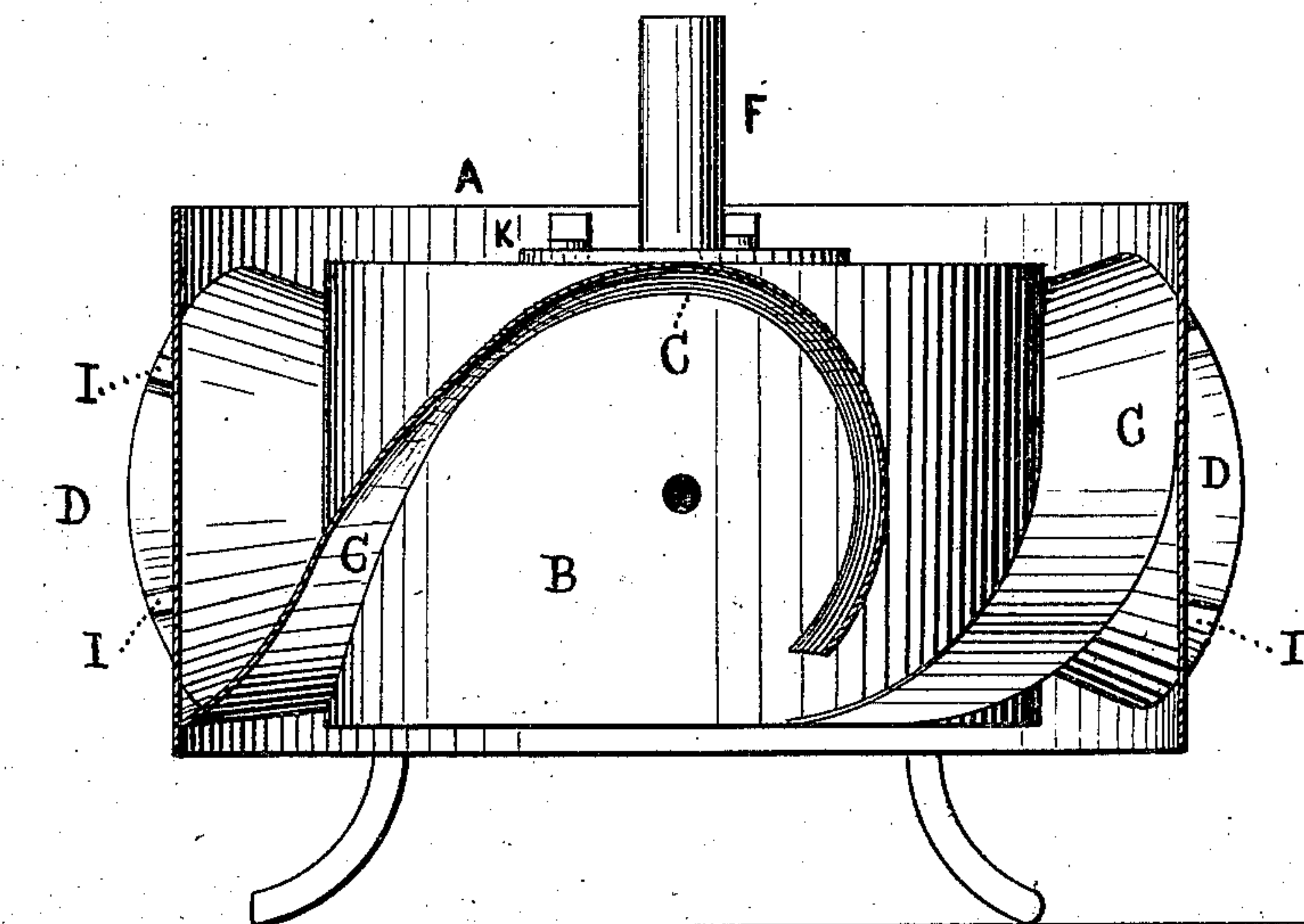
J. D. HALE.

Combined Turbine and Undershot Water-Wheels.

No. 154,547.

Patented Sept. 1, 1874.

FIG. III.



WITNESSES:
a. H. Norris
Geo. W. Rushing jr

INVENTOR
Jonathan D. Hale
By James L. Norris
Atty.

UNITED STATES PATENT OFFICE.

JONATHAN D. HALE, OF STODDARD, NEW HAMPSHIRE, ASSIGNOR OF ONE-HALF HIS RIGHT TO PHEROBA ANN HALE, OF SAME PLACE.

IMPROVEMENT IN COMBINED TURBINE AND UNDERSHOT WATER-WHEELS.

Specification forming part of Letters Patent No. 154,547, dated September 1, 1874; application filed June 29, 1874.

To all whom it may concern:

Be it known that I, JONATHAN D. HALE, of Stoddard, in the county of Cheshire and State of New Hampshire, have invented certain new and useful Improvements in Combined Turbine and Undershot Water-Wheel, of which the following is a specification:

This invention has for its object to furnish a water-wheel of the turbine class, which has also an undershot action or base discharge, so as to increase the power of the wheel and to augment its efficacy in other respects. The invention consists in mounting in a revolving wheel-case, having curved chutes extending from the top to the bottom and open at both ends, a series of conical or tapering buckets which operate in openings formed in the outer rim or periphery of the wheel-case, the rotary movement of the buckets being obtained by means of friction-wheels or rollers on their shafts, traveling on a fixed platform or table inclosed by the wheel-case, and also by the reaction of a portion of the water escaping through the periphery, the remainder of the water being discharged at the base of the wheel.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of a water-wheel constructed according to my invention. Fig. 2 is a top view of the same, with a portion of the wheel-case removed; and Fig. 3 represents a side elevation partly in section, showing the chutes.

The case of the water-wheel is composed of two concentric cylindrical shells, B, and a top or covering plate, K, for the inner shell. In the space between the two shells are located a series of curved chutes or buckets, C, the curvature of the same being in the direction in which the wheel is to rotate. The rear portion of each chute or bucket extends downward in a nearly straight or vertical line to the front or lower discharge end of a succeeding bucket or chute, so as to form a throat or mouth at the junction of each pair of buckets or chutes, for the concentrated discharge of the water. In the outer shell of the wheel are formed a series of openings,

which are designed for the reception of a corresponding number of independently-revolving buckets, D. Said buckets are composed of a conical or tapering outwardly-projecting rim and a rear head or disk, *a*, to which is attached a horizontal shaft, E, having its inner end journaled in the main shaft F of the wheel-shaft. Friction wheels or rollers G are mounted on the shaft of each revolving bucket, so that when the water-wheel revolves said rollers will travel on a fixed or stationary platform or table, H, inclosed by the wheel-case, and thus serve to rotate the buckets in the same direction as the main wheel. The buckets D are provided with peripheral wings or blades I, against which the water impinges as it is discharged from the fixed buckets of the wheel-case. The entire, or nearly the entire, column of water discharged from the fixed buckets or chutes is brought to act upon the revolving buckets, and the same are thus revolved with great velocity, causing a portion of the water to be discharged through the periphery of the wheel-case, while the remainder is discharged at the base of the wheel.

The combined rim and base discharge of the water and the velocity of rotation imparted to the buckets D will tend to impart a corresponding degree of speed to the water-wheel, so as to augment its capability of driving heavy machinery without waste of water. The shafts of the revolving buckets may be made adjustable by means of a screw-thread formed thereon, so as to enable the buckets to be set outward or inward from the wheel-case.

A water-wheel in which the water acts upon the same in the manner proposed by me, will be preferably balanced, so as to relieve the bearings of the center or driving shaft from all strain.

What I claim is—

1. A water-wheel having a series of independently-revolving buckets located in its rim or periphery, substantially as herein described.

2. The combined turbine and undershot

water-wheel herein described, consisting of the wheel-case A B, curved chutes or buckets C, having base discharge-throats, the independently-revolving buckets D, operating in openings in the rim of the wheel-case, and located in respect to the discharge-openings of the wheel chutes or buckets, substantially as herein described.

In testimony that I claim the foregoing I have hereunto set my hand.

JONATHAN D. HALE.

Witnesses:

JAMES L. NORRIS,
JNO. D. PATTEN.