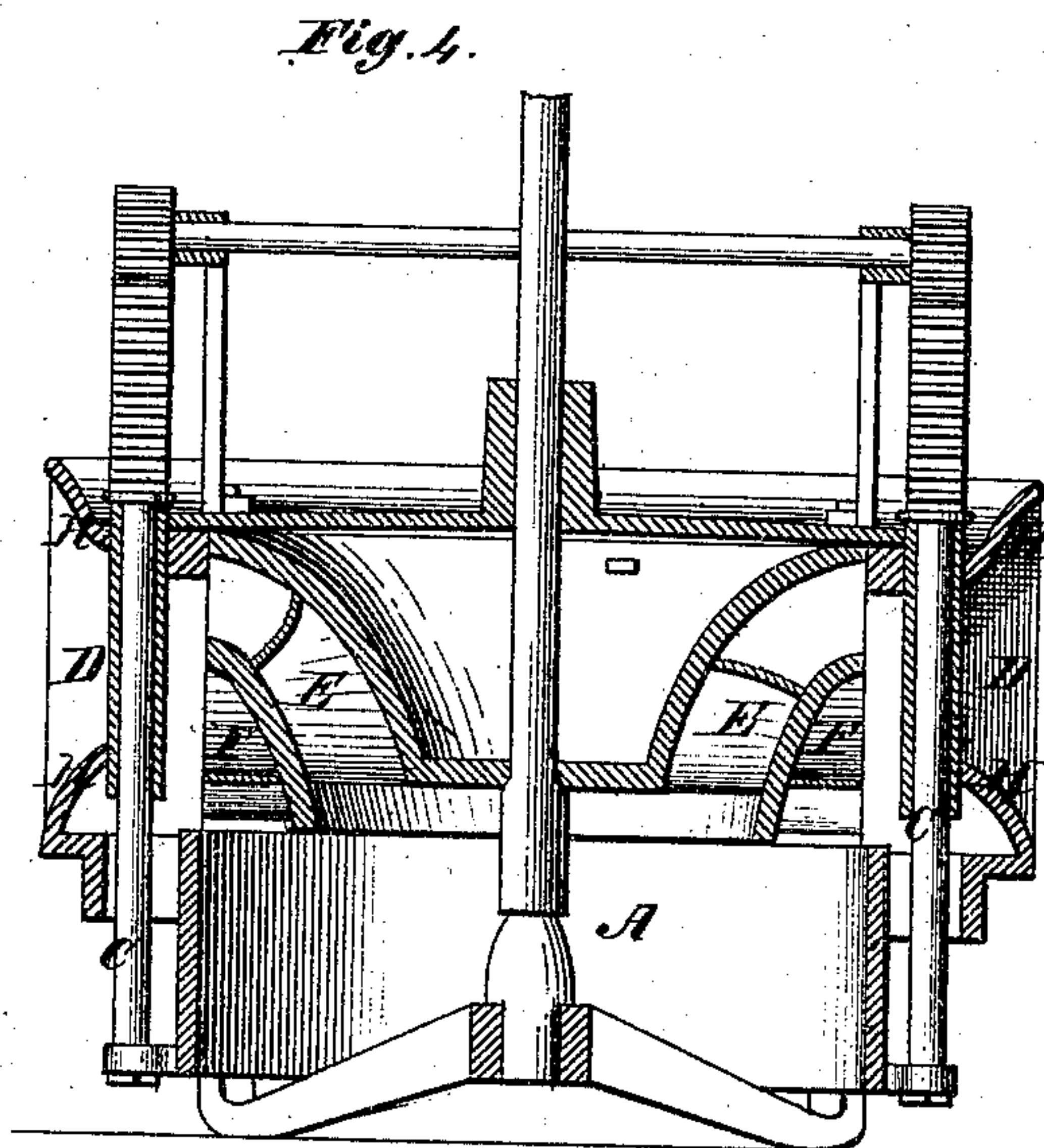
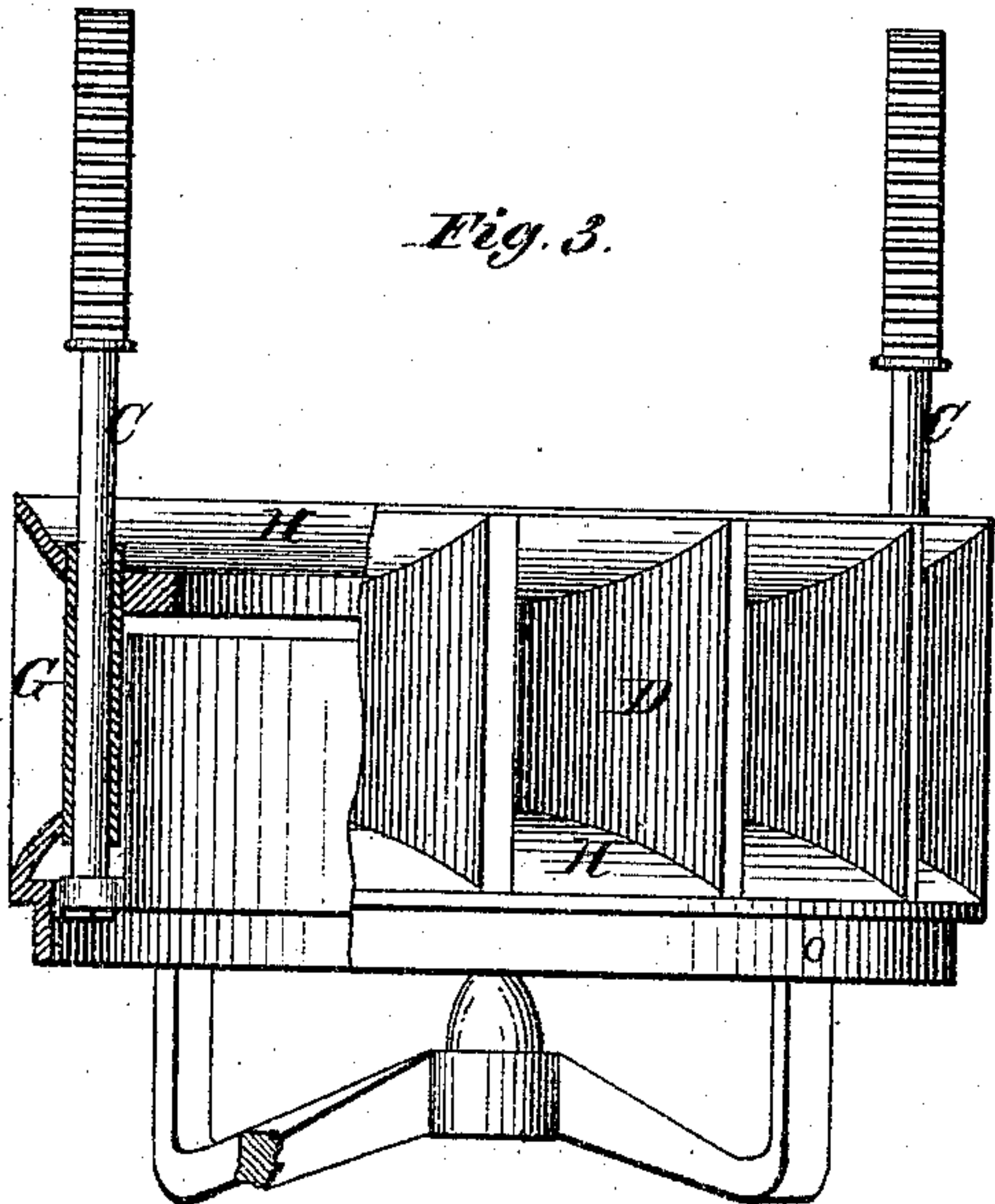
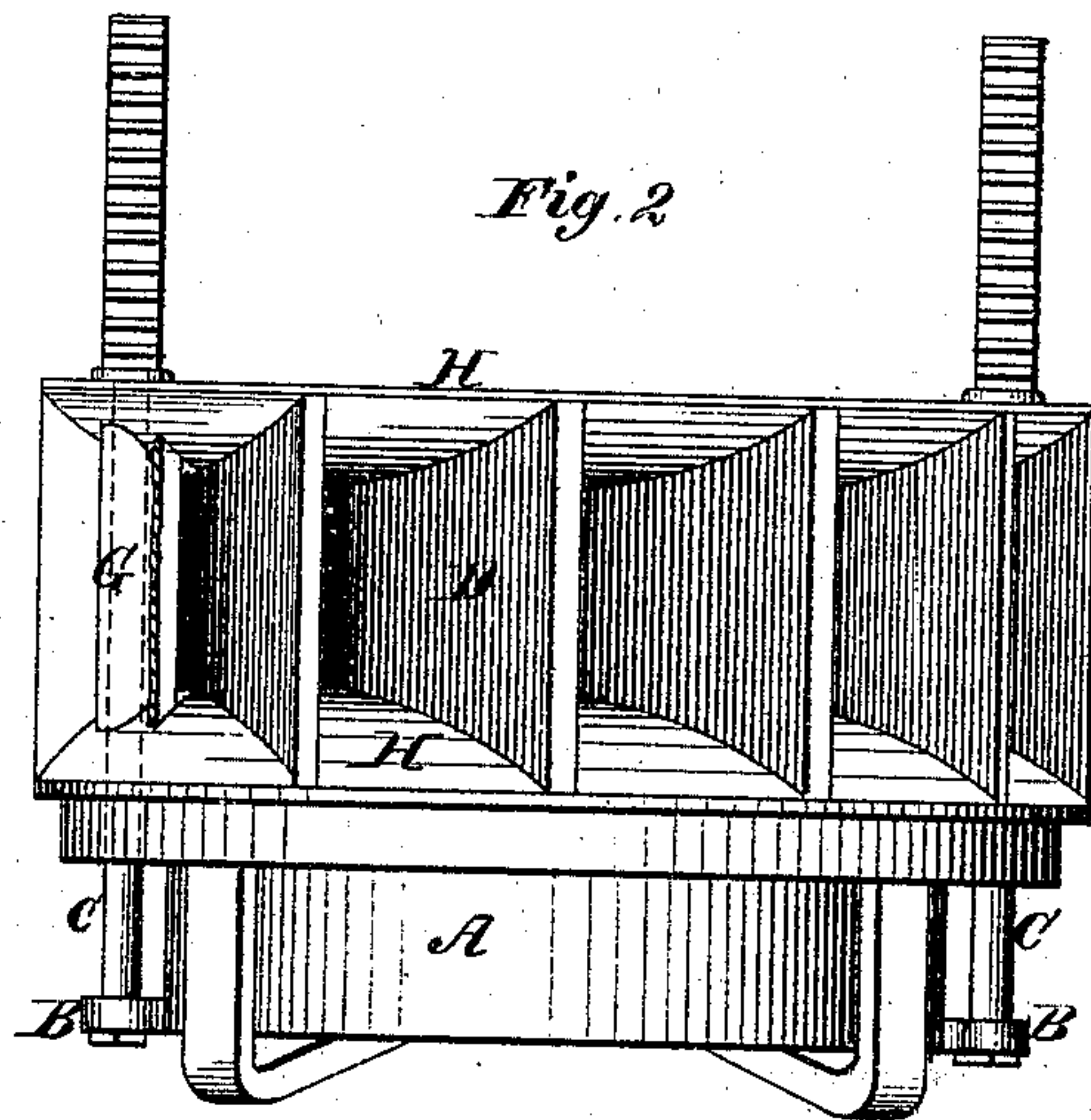
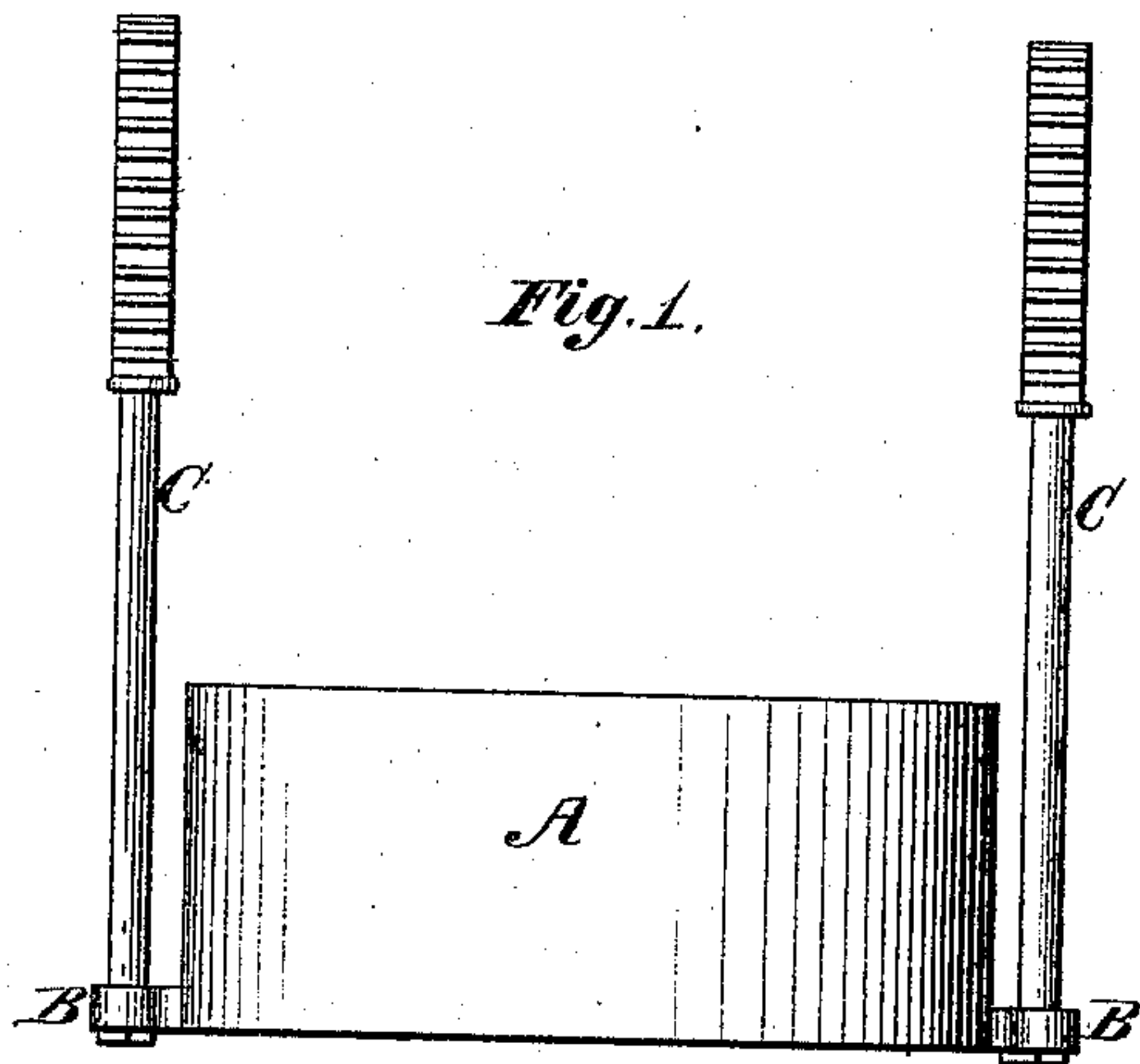


D. S. WALSH.
TURBINE WATER-WHEEL.

No. 182,296.

Patented Sept. 19, 1876.



Witnesses.

J. W. Smith
Byron H. Sanford

Inventor.

David S. Walsh

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Fig. 5.

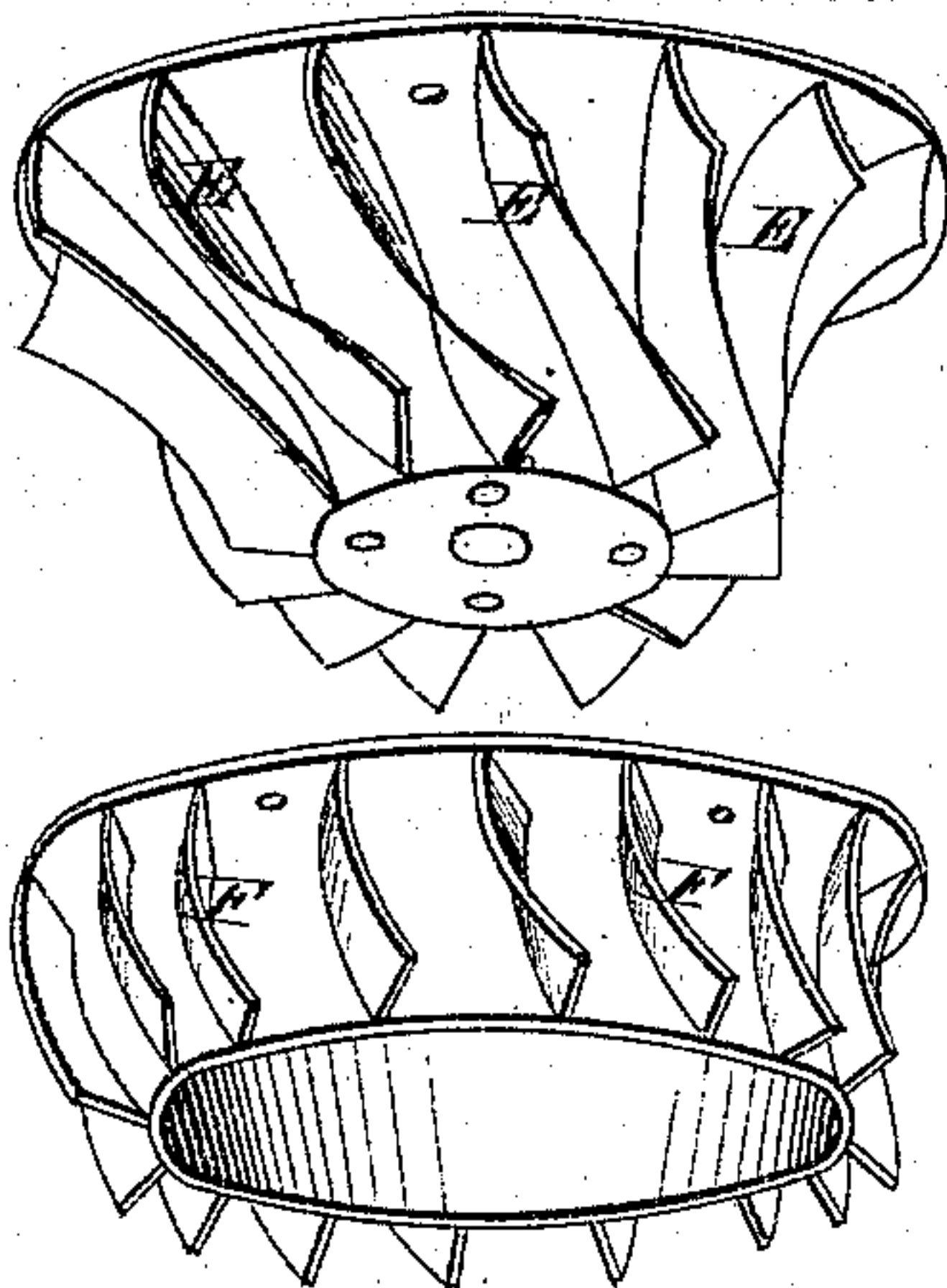


Fig. 6.

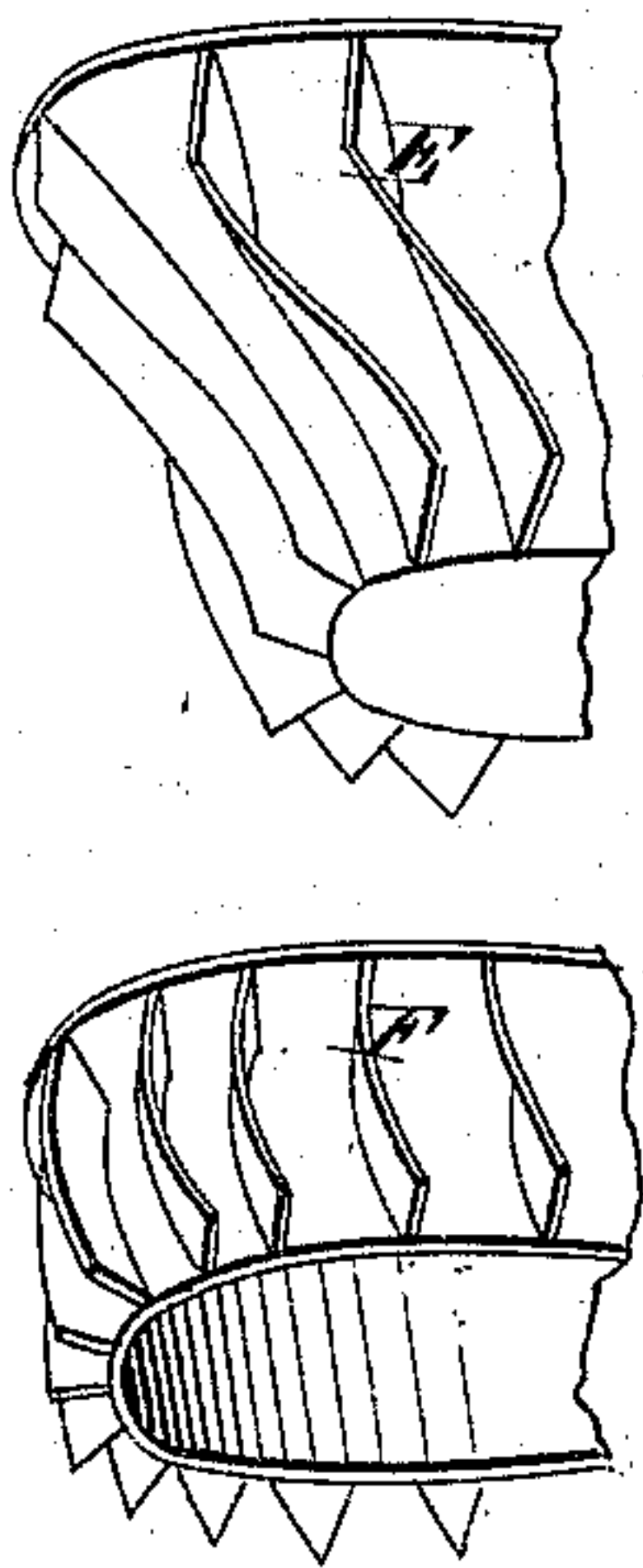
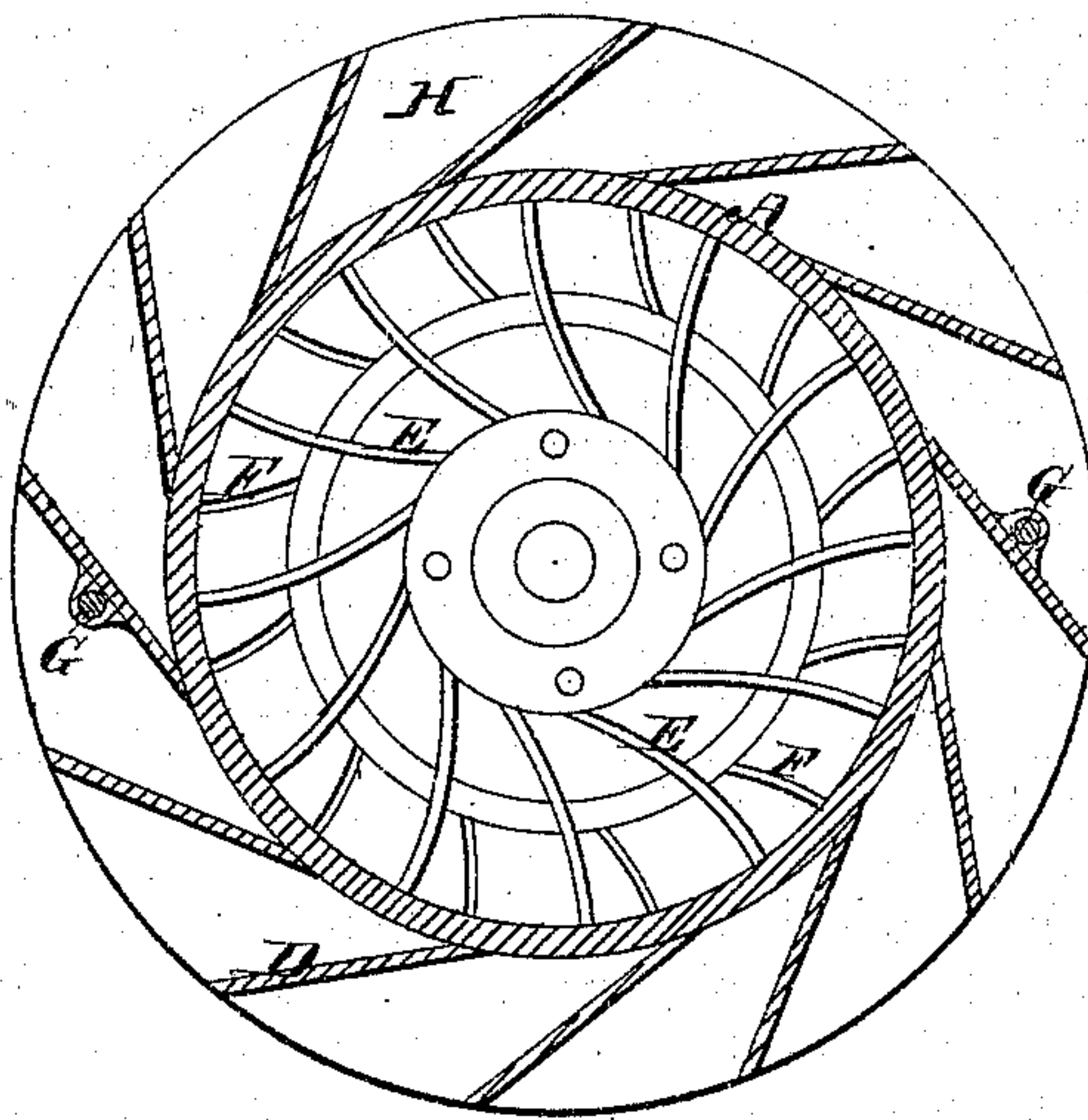


Fig. 7.



Witnesses.

J. W. Smith
Byron H. Sanford

Inventor.

David S. Walsh

UNITED STATES PATENT OFFICE.

DAVID S. WALSH, OF SHEBOYGAN FALLS, WISCONSIN, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO B. E. SANFORD, OF SAME PLACE.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **182,296**, dated September 19, 1876; application filed April 29, 1876.

To all whom it may concern:

Be it known that I, D. S. WALSH, of Sheboygan Falls, State of Wisconsin, have invented Improvements on Turbine Water-Wheels, of which the following is a specification:

The nature of my improvements is fully represented in the accompanying drawings. I claim as an improvement the gate A, Fig. 1, as gate and suction-tube combined, thus dispensing with the extra weight of a suction-tube, as shown at A, Fig. 2, and used as a gate, as shown, drawn upward nearly to a close at A, Fig. 3.

The rod C, Fig. 1, is connected to the lower end of the gate by a strong lug, as shown at B, Figs. 1, 2, 3, and 4. The lug is cast to the gate to which the rod C, Fig. 1, is connected, close to the gate-ring, thus making the lug B, Fig. 1, stronger than used in other wheels, which project too far from the side of the gate, and are too frequently broken.

The protectors G, Figs. 2, 3, and 7, through which the rods pass, are cast to the back of two or four guides at equal points around the wheel, and are lined with Babbitt metal to prevent the rods from rusting, and leakage of water. At H, Figs. 2, 3, 4, and 7, is a curved

or ogee shaped flange at the top and bottom, thus making a tunnel-shaped chute, guiding the water to the wheel without friction.

The buckets at E and F, Figs. 4, 5, 6, and 7, are an improvement on C. B. Walsh's Patent No. 95,292, dated September 28, 1869. Said wheel has the crooked S-shaped buckets screwed to each bell-shaped ring, and are liable to get loose and fall out, while my improvement consists of the buckets starting from the margin of the wheel at right angles with the center of the wheel, as shown at E and F, Fig. 7, running on a one-fourth circle to the margin of the smallest diameter of each ring at the bottom, thus forming double reaction buckets, cast into rings, and are not liable to get loose, and dispensing with the ring on the outside of the lower buckets used in No. 95,292.

I claim as my invention—

The combination, in a turbine water-wheel, substantially as described, of a gate and draft-tube combined, double buckets quarter turned, tunnel-shaped chutes, and protected gate-rods.

D. S. WALSH.

Witnesses:

JAMES W. SMITH,
BYRON H. SANFORD.