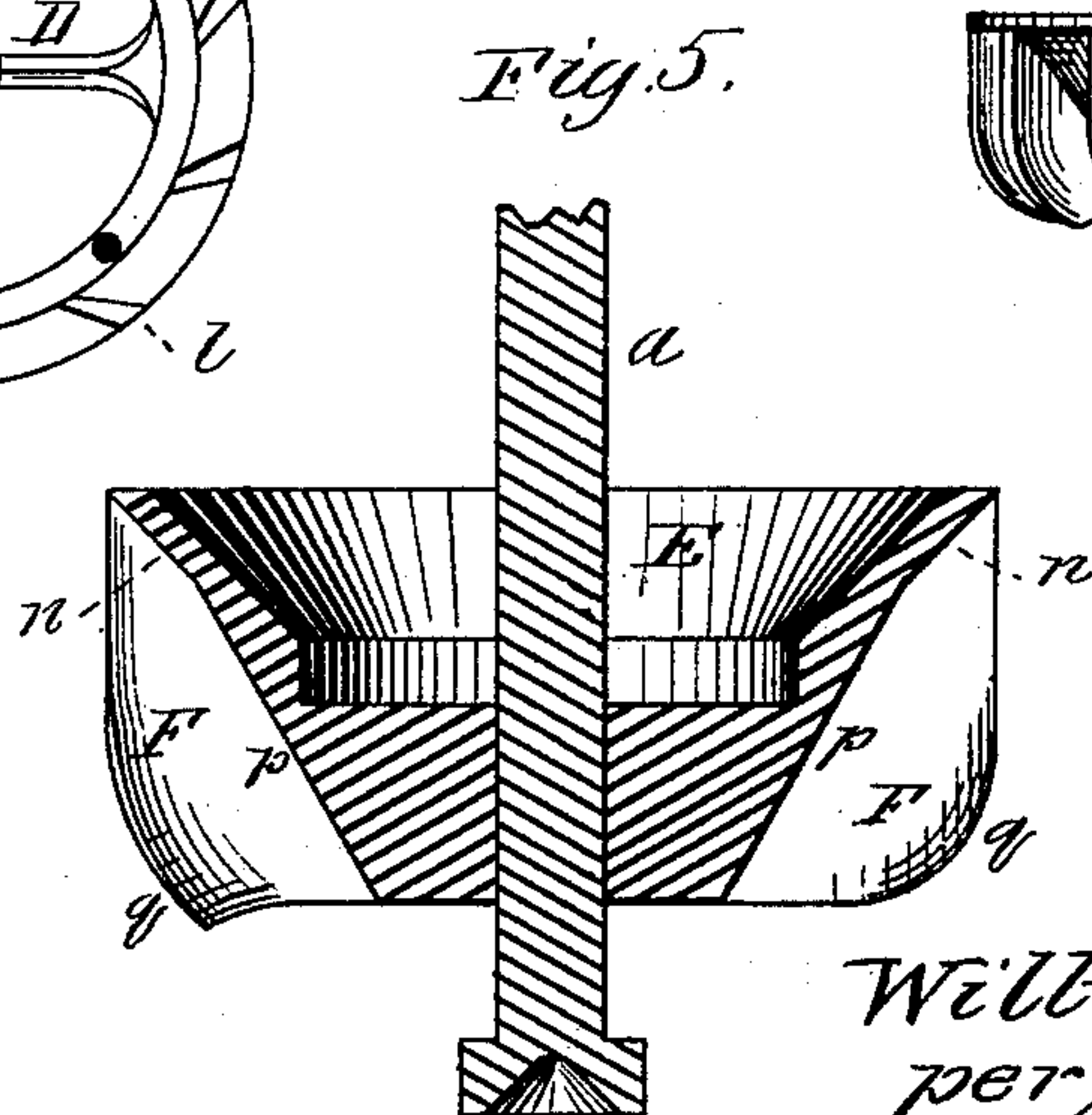
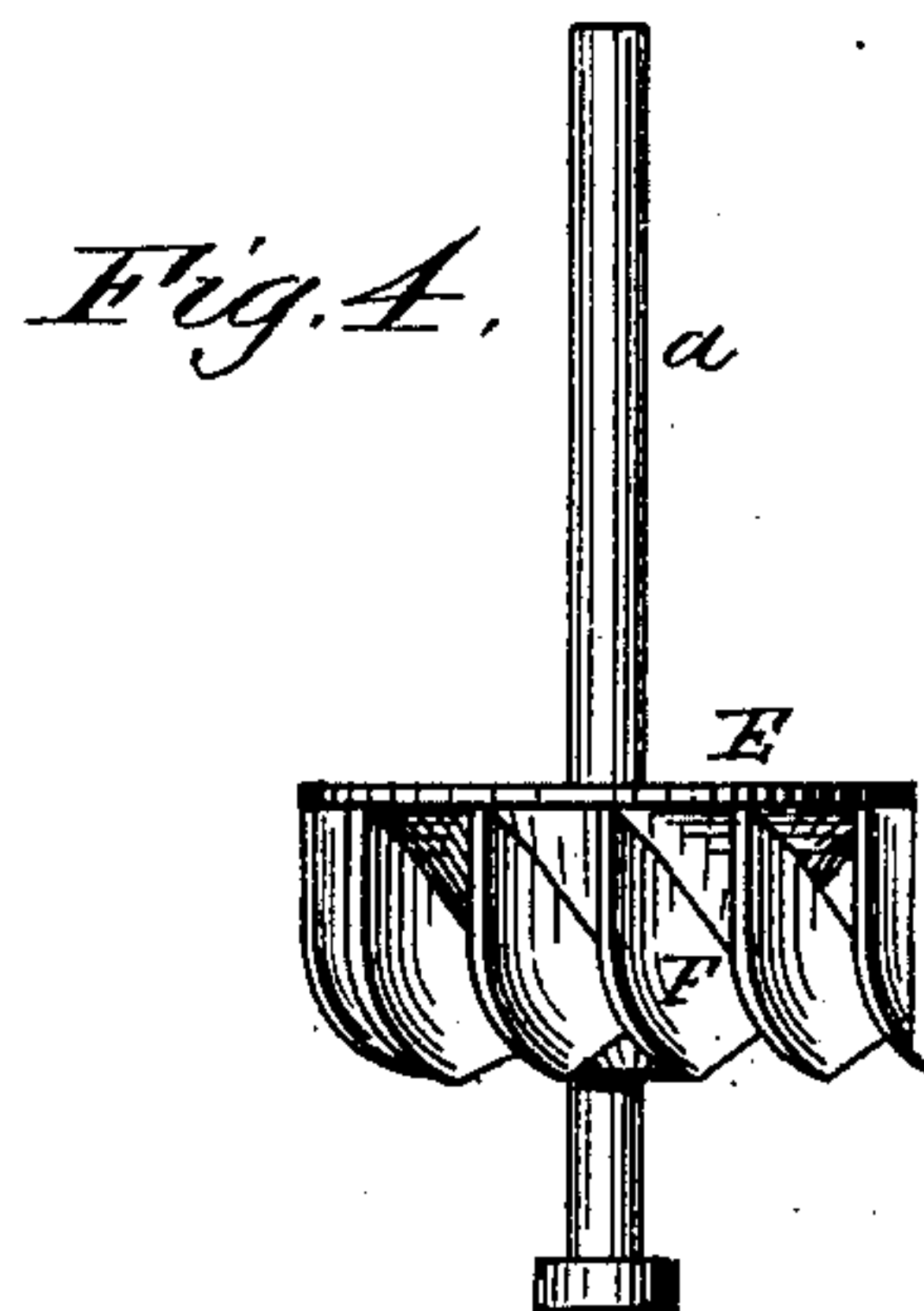
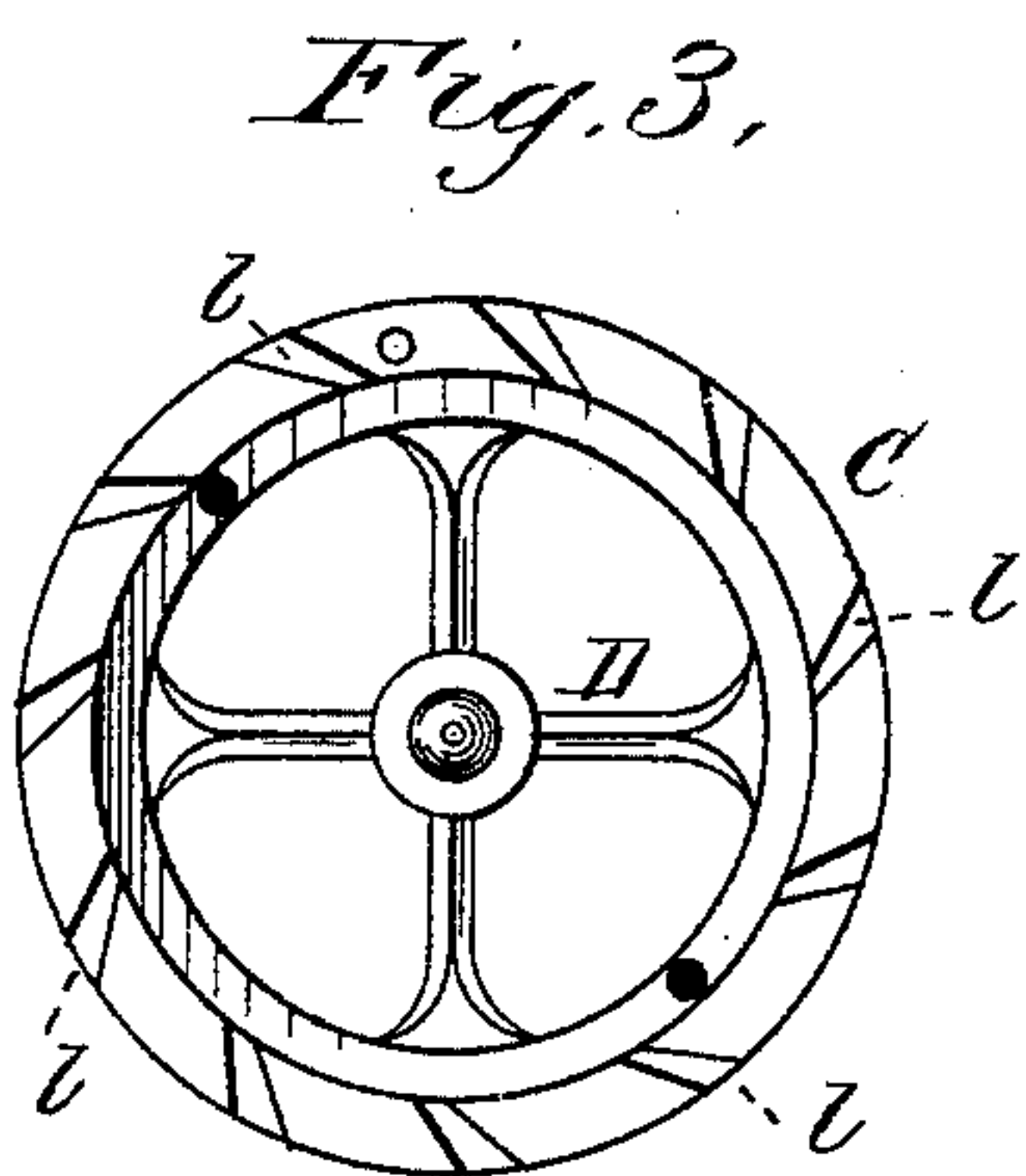
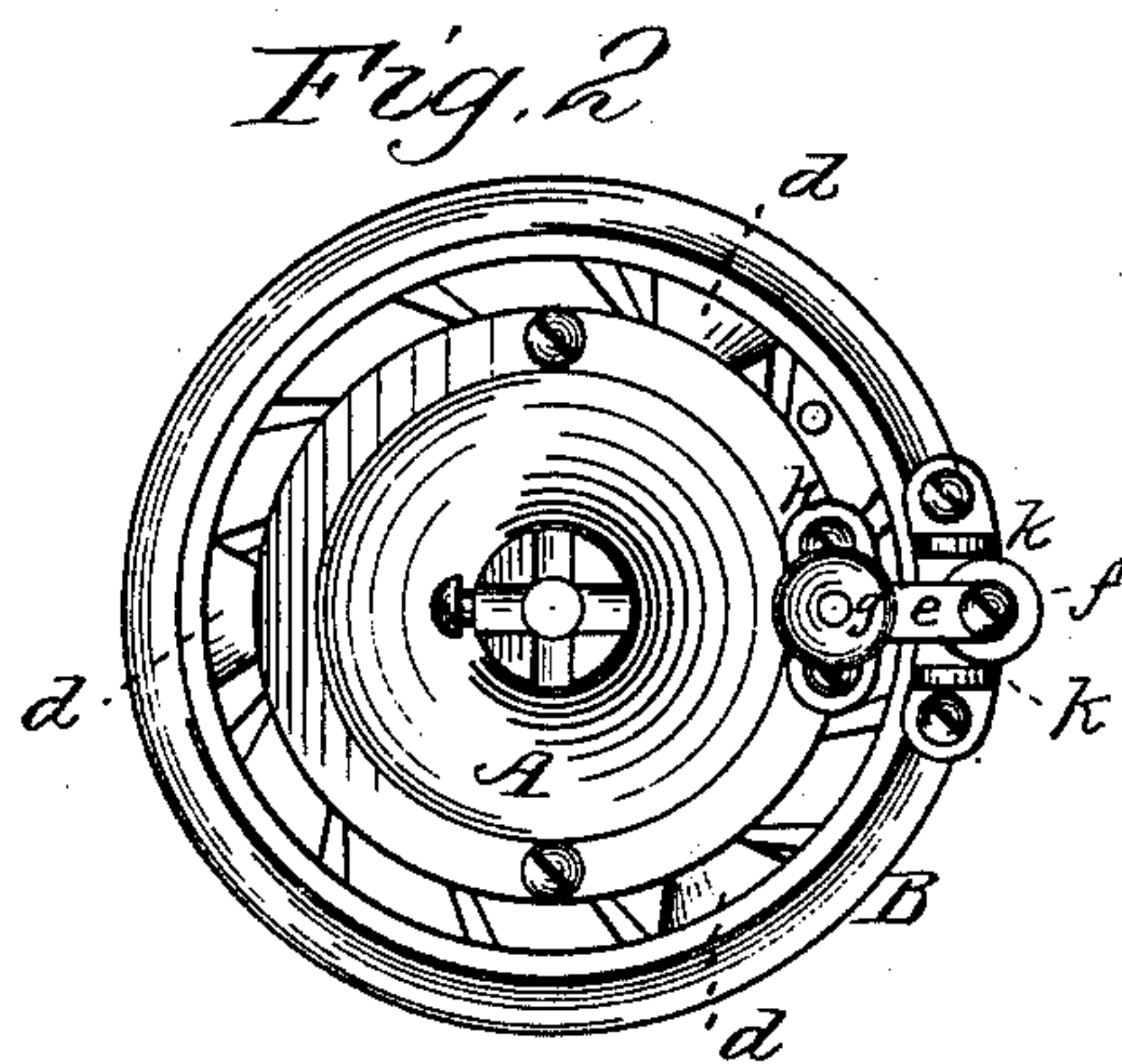
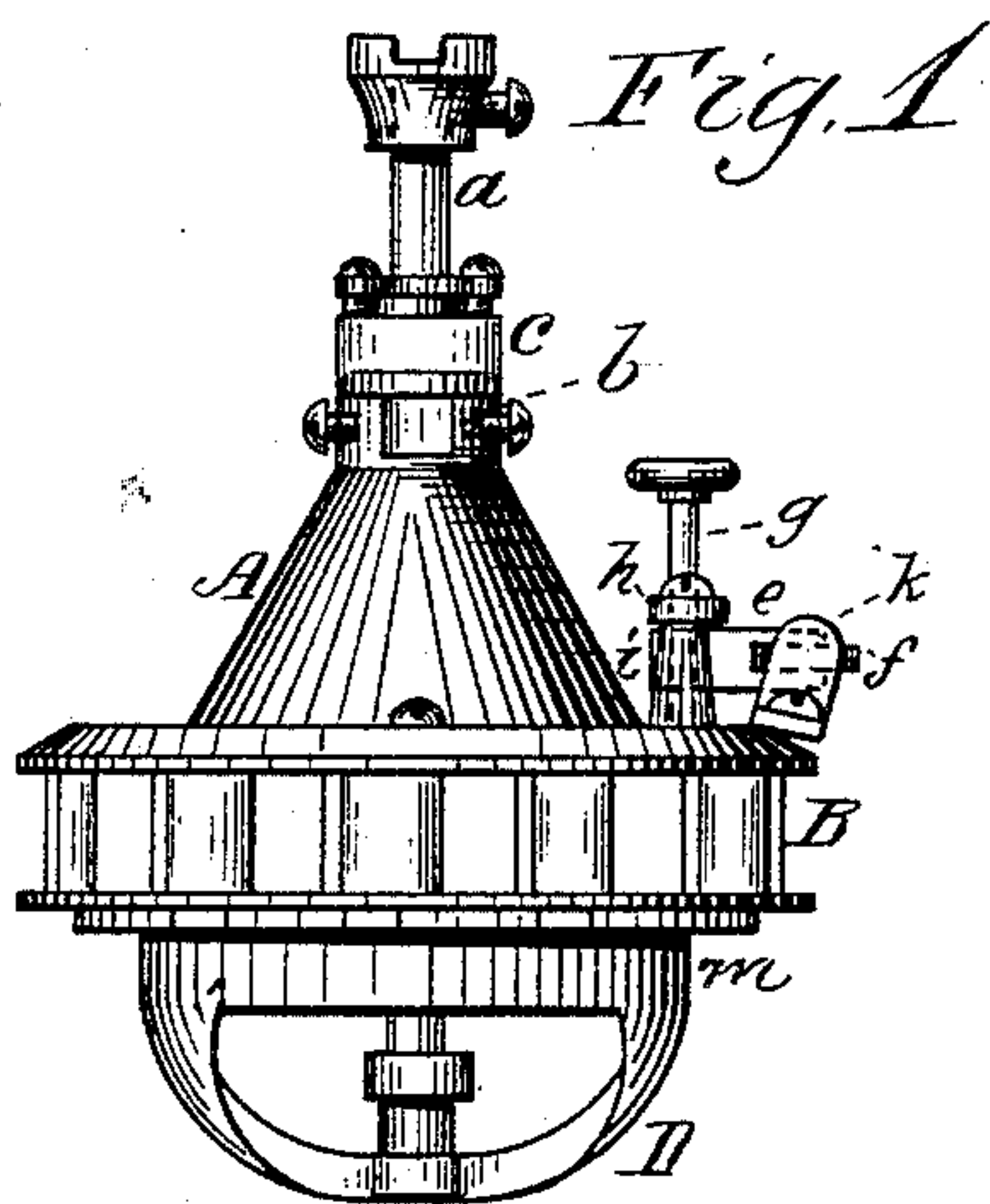


W. MERCER.
Turbine Water-Wheel.

No. 223,236.

Patented Jan. 6, 1880.



Witnesses

Nat. E. Oliphant
Geo. B. Porter.

Inventor
William Mercer.
per
Chas. H. Fowler,
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM MERCER, OF LANCASTER, PENNSYLVANIA, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO A. J. STEINMAN, OF SAME PLACE.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 223,236, dated January 6, 1880.

Application filed September 27, 1879.

To all whom it may concern:

Be it known that I, WILLIAM MERCER, of the city of Lancaster, in the county of Lancaster and State of Pennsylvania, have invented a new and valuable Improvement in Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a side elevation of my invention. Fig. 2 is a top-plan view of the same. Fig. 3 is a top-plan view, with the gate and dome removed; Fig. 4, a detached view of the hub and buckets; Fig. 5, a detail view, on an enlarged scale, of the hub and bucket.

This invention has reference to turbine water-wheels, and has for its object to so construct the wheel in its several details that the water will be discharged at or near the center thereof, and to prevent the water from working against the side of the casing when the wheel is running.

A further object of the invention is to so construct the buckets and hub of the wheel to which said buckets are connected as to give to the water a free discharge and guide the water to the center of the wheel, and at the same time cause the hub to run light and easy by lessening the friction.

A further object is to provide means for the escape of the sand and grit, and insure their discharge from between the flange of the dome and rim of the gate, and thereby prevent the sand and grit from choking and cutting the same.

The invention consists in the several details of construction whereby the above results are obtained, as will be hereinafter described, and subsequently pointed out in the claims.

In the accompanying drawings, A represents the dome of the wheel, through which passes the shaft *a*, and above the dome, and resting thereon or on the follower-box *b*, is a packing-box, *c*, which forms or makes a lid or cover for said follower-box, and at the same time prevents the leakage or wasting of water.

The dome A is cast in a tapering form, which prevents any trembling of the shaft when the wheel is in motion, and the follower-box *b* is cast with the dome and at the top thereof.

The gate B rides on the case or curb C, and is cast with three or more lugs, *d*, upon the upper rim thereof, and projecting inward in a direction near the center of the wheel. These lugs *d* give the gate a central bearing and prevent it from sticking when operated.

The gate B is operated by means of an arm, *e*, bifurcated at its outer end to receive a friction-roller, *f*, said arm being rigidly secured to an operating-rod, *g*, having its bearing at the lower end thereof in the circumferential flange of the dome A, and its upper end passing through a cross-bar, *h*, secured to short posts *i* cast on the flange of the dome.

The friction-roller *f* lies between two bearing-plates, *k*, secured to the upper flange or rim of the gate B, by which arrangement the gate is operated.

The slots or open spaces between the rim or flange of the dome A and the inner edge of the rim of the gate B are to prevent sand from choking the gate, which has long been a great trouble in register-gates.

The case or curb C is formed with V-shaped slots *l* to lighten the casting; also, to let sand or grit pass out from the space between the inner edge of the rim of the gate and the flange or rim of the dome. The case or curb C is cast with a circumferential flange, *m*, and spider or bridge-tree D.

The wheel proper is rigidly connected to the shaft *a*, and consists of a hub, E, formed with a miter, *n*, said hub being of tapering form. This miter is about one-eighth of an inch to the inch of diameter of the wheel, and the taper of the hub, as shown at *p*, is one inch, or nearly so, to the diameter of the wheel, which gives every wheel the same form or shape.

The inner parts of the buckets F are cast or otherwise connected to the hub E, while the outer and lower points of the buckets are curved inward, as shown at *q*, which makes the water discharge at the center of the wheel and take the pressure off the outer surface of the buckets. The buckets are made flat upon

their inner sides to give the water a free discharge, and the curve at the outer point of the buckets guides the water to the center of the wheel.

5 It will be seen, therefore, that a decided advantage is gained by forming the hub E with a miter, *n*, and having the hub tapering from the miter the entire length of the hub or to the bottom thereof, as the miter deflects the
10 water onto the incline face *p* of the hub, thereby taking the water or weight of discharge thereof off the outer surface of the bucket, thus greatly increasing the power of the wheel, and the hub, being tapering the entire length from
15 the miter, has a greater tendency to lessen the friction on the step as the water discharges.

The peculiar form of the buckets, the miter, and incline or tapering form of the hub co-operate in insuring a more perfect operation of
20 this class of water-wheels.

The lugs *d* upon the upper rim of the gate B bear against the circumferential rim or flange of the dome, in order to take the entire circumference of said flange or rim of the dome from
25 contact with the rim of the gate, and thereby lessen the friction and insure its working easier.

The V-shaped slots or openings only extend partially through the case or curb C—that is to say, a sufficient distance to come down to
30 the lower rim of the gate B, so as to allow the sand and grit to pass out over the flange or rim of the gate, thereby giving the curb a better foundation to rest on.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The gate B, having lugs *d* formed on its upper rim, in combination with the dome A, substantially as and for the purpose set forth.

2. The tapering dome A, cast with the lower-box *b*, and having the packing-box *c*, in combination with the gate B, having lugs *d*, against which the base of the dome bears, substantially as and for the purpose set forth.

3. The case or curb C, formed with V-shaped slots or openings *l*, to allow the escape of the grit or dirt from the space between the flange or rim of the dome and that of the gate, substantially as and for the purpose specified.

4. The hub E, cast with miter *n* and taper *p*, extending the entire length of the hub from the miter to the bottom thereof, and having buckets F, with their outer and lower points curved inward, as and for the purpose set forth.

5. The gate B, with lugs *d* and plates *k*, in combination with the dome A, rod *g*, bifurcated arm *e*, and roller *f*, substantially as and for the purpose specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM MERCER.

Witnesses:

ZURIEL SWOPE,
J. K. BARR.