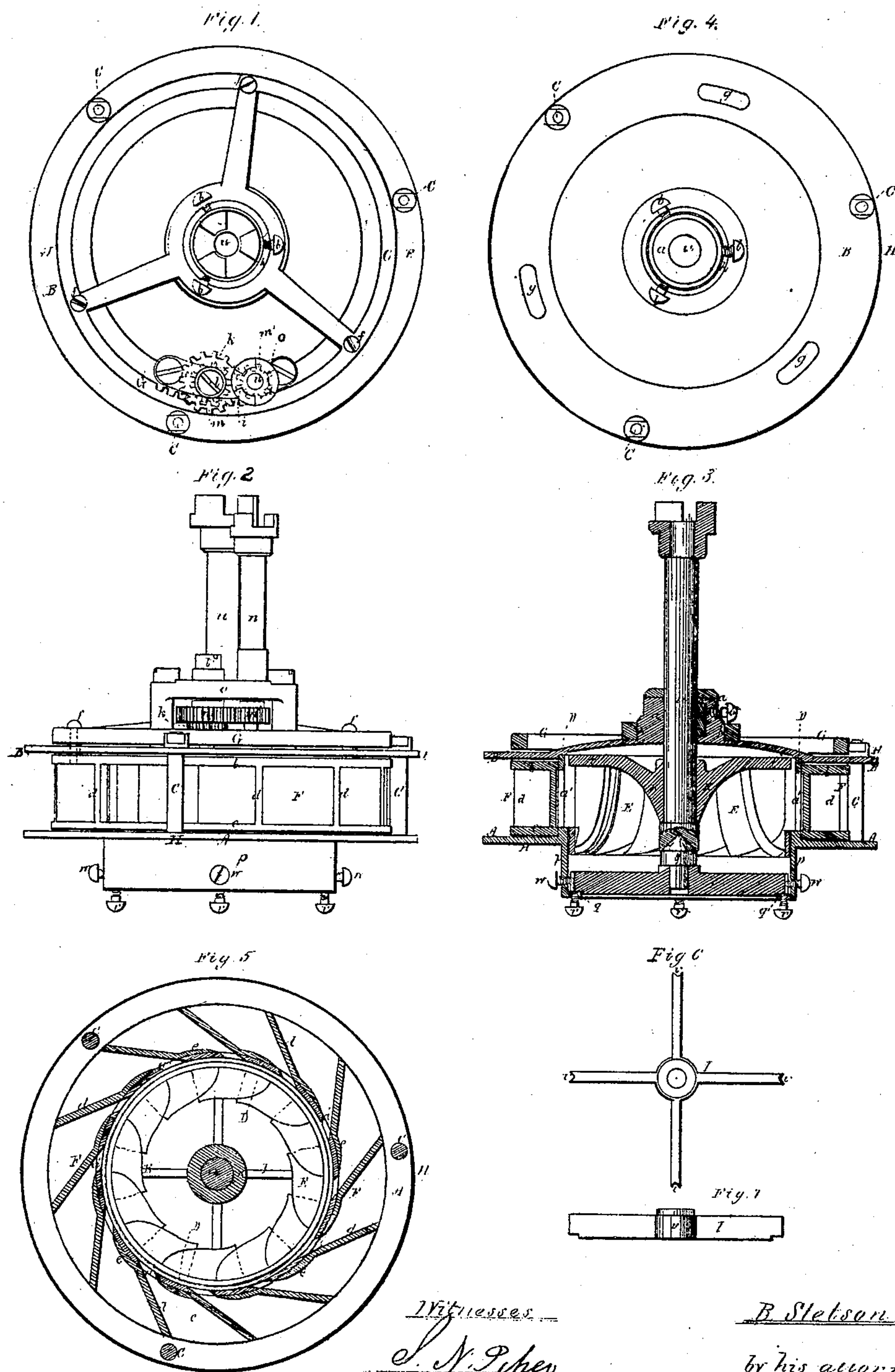


B. STETSON.
TURBINE WATER WHEEL.

No. 103,794.

Patented May 31, 1870.



Witnesses
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Letters Patent No. 103,794, dated May 31, 1870.

IMPROVEMENT IN TURBINE WATER-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same:

To all persons to whom these presents may come:

Be it known that I, BRADFORD STETSON, of Uxbridge, of the county of Worcester and State of Massachusetts, have made a new and useful invention having reference to Hydraulic Motors or Turbines; and do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawing, of which—

Figure 1 is a top view;

Figure 2, a front elevation; and

Figure 3, a vertical and transverse section of a turbine provided with my invention.

With the turbine hereinafter explained the gate opening ring is stationary, the series of guide-passages for directing the water to the gate and through the gate-ring and upon the wheel or turbine being movable with the gate around the gate opening-ring.

My improvements have special reference to such an arrangement of parts, and consist in the combination and arrangement of vertical and horizontal sets of adjusting screws and their supports with the wheel-frame and the step or pivot-supporter or cross made with grooves in its ends, as set forth; also, in the arrangement and combination of an operative gear and sundry connections, as hereinafter explained, with the turbine, the stationary gate-ring, the water-directing wheel, and the wheel-supporting frame, having slots in its cap-plate to receive such connections.

Figure 4 is a top view of the wheel and gate-supporting frame without the gear, and its connections for operating the water-directing wheel and gate, and the series of guide-passages.

The wheel-frame H is composed of a base-plate or part, as shown at A in the drawing, and a cap-plate, B, arranged as represented, connected by a series of standards, C C C, which are provided with screws and nuts at their upper ends.

The said cap-plate serves to support the upper box *a* of the wheel-shaft, such box being provided, as usual, with sectional bearings to be forced up to the shaft by adjusting screws *b b b*.

The wheel-frame is concentric with and supports the gate-opening ring D, which rises up from the base part A, and is generally to be cast in one piece therewith, and is to extend from the base-plate or part A to the cap-plate B.

The ring D is a tube arranged to surround the turbine or water-wheel E, and it has a series of apertures, *a' a'*, extended through it at equal distances apart.

Encircling the gate-ring D is the gate or water-directing wheel F, which is composed of two flat plate-rings *b c*, and a series of deflecting or directing-plates *d d*, shaped and arranged relatively to each other and the plate-rings *b c* in manner as represented particularly in Figure 5, which is a horizontal section of the gate or wheel F and the parts surrounding it.

A portion, *e*, of each of these directing plates *d* is wider than each of the apertures *a'* of the gate-ring D, and is curved to a radius equal to or a very little greater than that of the outer periphery of the said gate-ring.

The water-directing wheel F is connected by a series of connection-pins or screws, *f f*, to a gear-wheel, G, disposed above the wheel-frame H, each screw passing through one of a series of curved slots, *g g*, made in the cap-plate of the said wheel-frame, (see fig. 4.)

The said gear-wheel G revolves on the hub *h* of the cap-plate, which serves as a journal to such gear-wheel.

Furthermore, the said gear-wheel has an arc of teeth, *i*, formed on its internal periphery.

This arc of teeth engages with a pinion, *k*, carried by a vertical shaft, *l*, on which is another gear, *m*, that engages with a pinion, *m'*, carried by a vertical shaft, *n*.

The two shafts *l* and *n* are supported by a frame, *o*, raised on the cap-plate of the wheel-frame.

By revolving the shaft *n*, the gate or directing wheel F will be put in revolution about the perforated gate-ring, so as to cause the gate portions *e* of the directing or gate-wheel F to open or close the passages of the gate-ring, as circumstances may require.

By employing the gear G and the connections *f*, we are saved the necessity of forming the gate-wheel F with gear-teeth on its periphery, and arranging outside of such periphery a gear or gears and a shaft to operate such gate-wheel F, all of which would be impediments to the passage of water to the gate-wheel F, and are objectionable in other respects.

The lower part of the wheel-frame H is formed with a cylindrical tubular extension *p*, which surrounds the turbine and is open at bottom except in having an annular flange, *q*, projecting from such bottom in manner as represented.

A series of adjusting screws, *r r r r*, are screwed vertically into and through the said flange and against the under sides of the four arms of a cross, I, serving to support the pivot or step *s*, on which the shaft *u* of the turbine E is sustained.

The said turbine is provided with a conical or inverted bell-shaped deflector, K, which is extended down from the cap-plate *t* and around the shaft *u* of the turbine and within its series of buckets in manner as represented. This deflector serves to greatly facilitate the escape of water from the wheel and between the arms of the cross I.

Furthermore, each arm of the cross I is grooved vertically, as shown at *v*, in Figure 6, (which is a top view of the cross,) and also in Figure 7, which is an edge view of it, and there is screwed through the sides of the extension *p* a series of horizontal adjusting

screws, *w w*, each being made to bear against one of the grooved ends of the arms of the cross.

This latter series of screws serves to effect the lateral adjustments of the spindle or wheel-shaft pivot, or "step," as it is generally termed, the other or lower series of screws answering to effect the necessary vertical adjustment of such pivot or step as it or the wheel-shaft may become worn. Were it not for the grooves in the ends of the arms of the cross, the said cross would be liable to be turned or get out of place relatively to the adjusting screws, and could not well be moved vertically.

What I claim as my invention in the apparatus hereinbefore described is as follows:

I claim the combination and arrangement of the vertical and horizontal sets of adjusting screws *r w* and their supports *p q* with the wheel-frame H, and the step-supporter or cross I, made with grooves, arranged in its ends, as set forth.

Also, the arrangement and combination of the operative gear G and its gate-connections *f* with the turbine E, the gate-ring D, the water-directing wheel F, and the wheel-frame H, having a slotted cap-plate, as described.

BRADFORD STETSON.

Witnesses:

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