

G. H. JONES. Turbine Water-Wheel.

No. 166,206.

Patented Aug. 3, 1875.

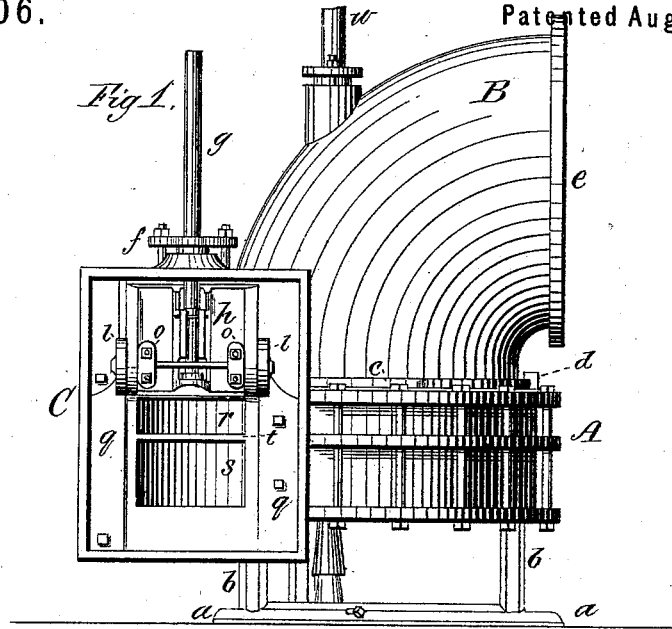


Fig. 2.

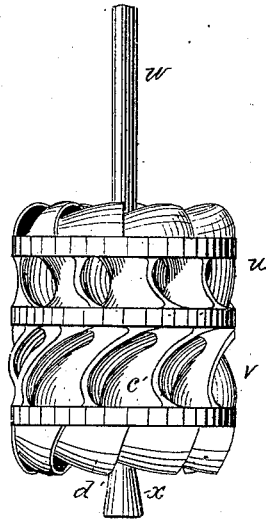


Fig. 3.

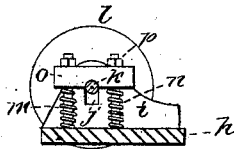
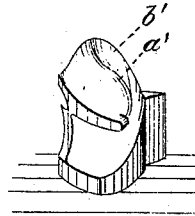


Fig. 4.



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Fig. 5

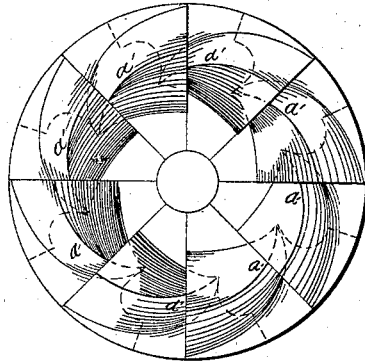
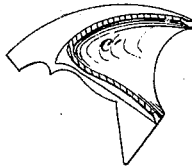


Fig. 6



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UNITED STATES PATENT OFFICE.

GEORGE H. JONES, OF ROSE, NEW YORK.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **166,206**, dated August 3, 1875; application filed May 1, 1875.

To all whom it may concern:

Be it known that I, GEORGE H. JONES, of Rose, in the county of Wayne and State of New York, 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 drawing is a representation of a perspective view of my invention, showing the water-wheel casing, gate, and siphon draft-tube. Fig. 2 is a detached view of the wheel. Fig. 3 is a detached view of one of the friction-rollers with the adjustable bearings; Fig. 4, a similar view of one of the buckets composing the wheel. Fig. 5 is a plan view of the buckets; and Fig. 6, a sectional view of one of the buckets detached from the wheel.

This invention is designed as an improvement upon my former patent dated July 26, 1870, No. 105,694, for turbine water-wheels, and consists in the peculiar shape of the buckets, the same having a greater length and a longer curve, combined with an increasing depth downward from the concave face of the bucket for holding and conveying the increase of water entering the bucket from the scroll and flowing downward, and giving a greater inclination to the curve, to insure an increasing flow in a downward direction, as will be hereinafter more fully set forth.

My invention also consists in forming the bucket with a raised dividing-edge to the water flowing back and reacting from the bucket, for the purpose of causing a smoother flow and diminishing its backward pressure.

My invention also consists in so arranging or extending the seat upon which the gate works, that, by the use of a single gate, either of the different size compartments or chambers may be used separately, or both simultaneously, for the purpose as will be hereinafter described.

My invention also consists in a slide-gate, provided with adjustable bearings or boxes.

My invention further consists in a siphon draft-tube arranged above the wheel, and con-

nected thereto in a manner that it will admit of adjustment.

In the drawings, A is designed to represent the scroll or casing of the water-wheel, of the ordinary form and construction, and having upon its under side the bridge-tree, consisting of the bars *a*, and connected to the casing by short supporting arms or legs *b*. Upon the upper part of this casing A is a siphon draft tube, B, having an annular shoulder, *c*, and held thereon by suitable clamps *d*, said tube being capable of adjustment at any angle to the gate, for the purpose of making it available to any position in the flume; its purpose being to remove the water discharged from the upper section of the wheel, and making the full fall of water available thereto, without submerging the same. To the open end *e* of the tube is connected a suitable pipe extending to the tail-race, which carries off the discharged water by suction. At the mouth of the scroll or casing A is formed a gate-box, C, provided at its upper end with a suitable stuffing-box, *f*, through which the stem *g* of the gate passes. This gate, to which the stem *g* is connected, consists of a flat-faced plate, *h*, formed with ears *i i*, having elongated slots *j*, through which a shaft, *k*, passes, carrying upon its ends wheels or friction-rollers *l*. Upon each side of the plate *h* are two bolts, *m*, carrying suitable springs *n*, and boxes or bearings *o*, the latter composed of suitable elastic material, and capable of adjustment thereon by screw-nuts *p*. It will be seen that the ways *q q*, upon which the gate works, are slightly inclined.

By this arrangement the friction between the gate face and seat, caused by the pressure of water on the gate, is reduced by converting sliding into rolling friction by removing the pressure from the gate onto the rollers, leaving only sufficient to insure the gate closing tightly by the full pressure of the water; but when partially opened, and consequently reduced pressure, the elastic bearings will take all the remaining pressure and friction.

The gate-seat is extended above and below the chambers *r s* formed by the partition *t*, sufficiently so that when the gate is lowered to its greatest extent, or raised either to the partition-plate or above the upper chamber, either of the different size chambers may be

used separately, or both simultaneously, by one and the same gate.

The wheel, as shown at D, is composed of two sets of buckets, $u v$, of equal or unequal size, attached to the shaft w and step x .

The object and purpose of such a wheel are to produce one of its class that shall receive the water without shock, and flow into the wheel in a smooth body when the revolution of the same is increased or diminished, and discharging the water without velocity. For this purpose the buckets are made concave in two directions, so as to pass the water toward the discharging ends. The wheel revolving at a less velocity than the water in the casing, it enters the buckets at a moderate velocity and passes through the wheel. The centrifugal force generated from the curve of the buckets causes the water to act on the concave faces of the bucket, and diminishes the pressure upon the backs of the same. The size of the water-passages between the buckets must be uniform throughout their entire length, without enlargement or any sudden contractions, and the curves of as long a radius as is consistent with the size of the wheel. Also, all dividing of the water should be by means of sharp inclined edges, and this is of double importance if the water impinging on the dividing-edges is in a direction to retard the wheel instead of assisting its revolution. This part of my invention, therefore, consists in forming the buckets with a raised edge, a' , for the purpose of guiding the water over and around the back of that part of the bucket, as shown at b' , Fig. 4, and also serves to fill up the cavity that would at this point, producing an even flow of the water, and the least possible resistance to the backs of the buckets.

In these buckets the sharpness of the edge a' depends upon the depth of the buckets, it being increased as the bucket increases in depth.

The second important feature of my bucket consists in deepening the concave face of the

same in a horizontal direction, near the bottom of the part c' , thereby increasing the depth in a downward direction, so as to increase the flow and quantity of water at that point, and in connection with an increased length of that part of the bucket, as shown at d' , in a perpendicular direction, or parallel with the shaft w , for the purpose of using a larger quantity of water without increasing the angle of discharge or velocity of water.

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

1. The water-wheel bucket, substantially as herein described, having the increased depth downward from the concave face of the same, for the purpose specified.

2. The water-wheel bucket, formed with a raised dividing-edge, a' , to the water flowing back and reacting from the bucket, for the purpose of causing a smoother flow and diminishing its backward pressure, substantially as described.

3. The combination, with a suitable gate, and the different size compartments $r s$, of the seat extended above and below said compartments in a manner that will admit of either being used separately, or both simultaneously, by the use of a single gate, substantially as and for the purpose set forth.

4. The combination, with a water-wheel, of a siphon draft-tube, arranged above the same and connected thereto in a manner that will admit of adjustment, substantially as and for the purpose set forth.

5. The gate h , provided with friction-rollers l , and adjustable bearings k , substantially as and for the purpose set forth.

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

GEORGE H. JONES.

Witnesses:

NAT. E. OLIPHANT,
E. B. HAY.