L. J. JOHNSON.
Turbine Water-Wheel.

No. 205,392. Patented June 25, 1878.

Fig. 1.

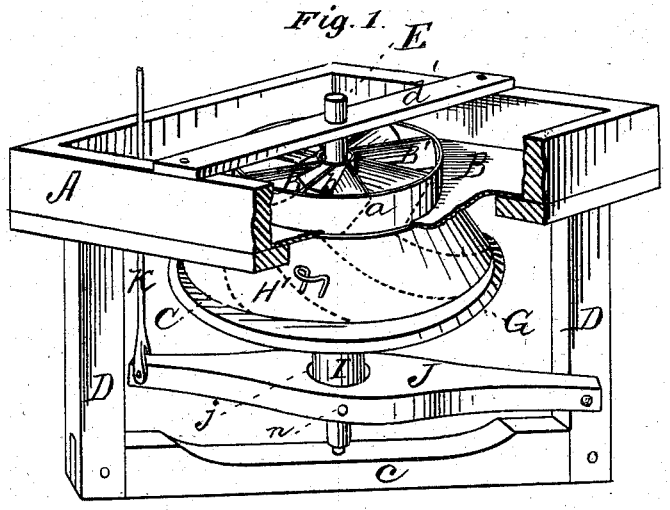
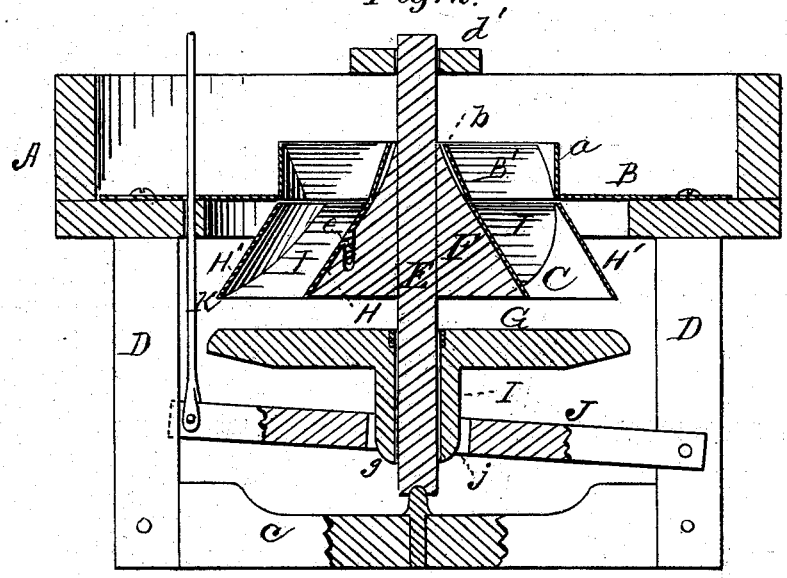


Fig. 2.



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UNITED STATES PATENT OFFICE.

LOUIS J. JOHNSON, OF ELK FALLS, KANSAS, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOSEPH ROOT, OF SAME PLACE.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **205,392**, dated June 25, 1878; application filed December 15, 1877.

To all whom it may concern:

Be it known that I, LOUIS J. JOHNSON, of Elk Falls, in the county of Elk and State of Kansas, 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 perspective view of my invention, with part of the flume broken off; and Fig. 2 is a vertical sectional view of the same.

My invention has relation to improvements in water-wheels.

The object of my invention is mainly to devise a horizontal water-wheel wherein the centrifugal motion imparted to the water by its rotation will be prevented from expending its force against the outer wall or casing of said wheel, thereby preventing the space between the buckets from becoming choked up by the foaming of the water and its downward course over said buckets from being unduly delayed, and preventing the wheel from being retarded, and consequently losing power, by the forcible impact of the water against the said outer wall; to prevent undue waste of water and loss of power by leakage through the "water-joint," and to devise means for taking up said waste, should it occur from wear, without unshipping said wheel from its shaft; to do away with the vibratory guide-chutes which direct the water to the buckets at a variable angle when regulating the supply thereto, and to devise means in lieu thereof whereby I can regulate the supply and direct the current to the buckets at that fixed angle that will be productive of the maximum of power, whether the water-supply be large or small; to devise means whereby the wheel may be securely attached to the main shaft and raised vertically thereon independently thereof and of its bridge-tree, gate-flume, or other attachments, and thus to render said wheel easily and expeditiously accessible for repairs, and as expeditiously replaced after being repaired.

The nature of my invention will be fully understood from the following description:

In the accompanying drawings, the letter A designates an ordinary rectangular flume, having raised sides and a circular opening in its bottom, that is covered by a metallic plate, B. This plate has an orifice concentric to that of the flume-bottom, and bordered by an annular vertical flange, *a*, to the inner wall of which the guides B′ for the descending head of water are rigidly secured. The inner ends of these guides are rigidly secured to a conical metallic ring, *b*, the smaller end of which is uppermost, and they bear a fixed relation to each other and to the wheel C below.

D represent strong hangers depending from the flume, and connected at their lower ends by the lower bridge-tree *c*, in which the lower end of the main shaft E is suitably stepped. This shaft extends from the bridge-tree *c* up through ring *b* aforesaid, and is journaled at its upper end in a second tree, *d*′, extending across the flume, and, if necessary, readily removable therefrom.

Shaft E is provided with a conical metallic hub, F, that is cast with or otherwise rigidly secured to it, which hub is the seat of the wheel C. This latter is composed of two spaced conical rings, H H′, between which are rigidly secured the curved buckets I, and it is secured to the hub, with its smallest end uppermost, by means of the usual keying devices, or by means of spurs *e*, projecting from the inside of the inner ring H, that are received in corresponding recesses in the hub aforesaid. The wheel is thus prevented from rotating independently of the shaft.

As shown in Fig. 2, the upper edge of the wheel is in sufficiently snug contact with the under side of the flume-bottom plate to prevent undue escape of water, and at the same time avoid friction and the upper end of the hub is received snugly in the conical ring *b* of the guides B; consequently all the water discharged into the flume is directed by the guides against the upper concave surface of the buckets without waste, and the full power of the head is obtained.

In all center-feed wheels the water is driven by centrifugal force, occasioned by the rotation of the wheel outward against the casing or outer wall of the same, and rebounds therefrom when it meets the descending current, and foaming takes place, which is practically a complete condition of rest, which must be

broken by the force of water descending afterward. This creates a loss of power in the head, which I obviate by causing the outer casing or wall of the wheel to flare outwardly, as above set forth, when, as the water in its descent is whirled outward by centrifugal motion, it will be allowed free passage downward by the receding wall aforesaid. The inner wall being also conical, and parallel, or nearly so, to the outer one, the general course of the water downward will be in an incline outward, and after passing out of the wheel the combined momentum and centrifugal force will cause the water to be carried outward beyond the perimeter of a gate at the under side of the wheel. It will thus be prevented from accumulating at any part of the wheel and obstructing its passage.

Gate G may be either of wood or metal, as I may elect, and will be slightly rounding upon its upper edge to correspond to the slight dish of the under side of the wheel. It is of the following construction: A strong tubular collar, I, projects centrally from its under side, through which the main shaft extends, thus allowing the said gate free parallel movement to or from the under side of the wheel. The lower end of the collar I is semicircular, as shown at *g*, and is journaled by means of suitable pins, *n*, in an oblong slot, *j*, formed at the middle of the length of a vertically-vibrating lever, J, that extends obliquely across the bridge-tree *c*, and is operated by means of a metallic rod, K. This rod extends up through the flume, and when drawn up by a suitable mechanism will raise the gate, and either close the lower end of the wheel entirely or partially, according to the extent to which the said rod is actuated. If the wheel be entirely closed, it will cease rotating at once, and if partially, only to some extent—that is, the speed of rotation will be lessened. The slotted lever and the rounded end of the collar on the gate permit the said gate to have free movement without binding on the shaft.

In practice, the lower bridge-tree will be vertically adjustable with reference to the flume, so that as the water-joint between the wheel and flume-bottom becomes unduly enlarged by wear the former may be raised and the defect remedied without taking up the said wheel. Should the wheel become injured through any cause and need repairs, the sluice or shuttle will be entirely closed, thus cutting off the water-head. I then remove the upper bridge-tree and guide-plate or flume-bottom, when the wheel will be entirely exposed, and may be raised vertically by a suitable tackle upon the shaft E without unshipping said shaft or disturbing the relative line position of its axis and that of the wheel.

By this means the tedious and repeated efforts required to secure the adjustment of ordinary wheels upon their shafts are obviated, it being only necessary to lower my wheel to the hub, upon which it will automatically adjust itself. The guides B′ being fixed, it is evident that the water will be directed against the surface of the buckets at the same angle whatever be the quantity of water in the head.

As shown in Fig. 2, the natural outward flow of the water causes its force to be exerted at or near the outer edge of the bucket. Consequently, whether the full or part of the head be used, the power exercisable by said head will be attained.

The under side of the wheel is slightly concave, as shown in Fig. 2, so that when the gate aforesaid is completely raised the outer conical ring comes snugly in contact therewith, arrests the flow of water through the wheel completely, and causes it to stop.

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

1. The water-wheel herein described, consisting of the spaced conical rings H H′ and the buckets connecting the rings to the same, substantially as specified.

2. The main shaft E, provided with recessed hub F, in combination with the water-wheel C, having a spurred central conical aperture adapted to receive said hub, substantially as specified.

3. The main shaft E and its conical hub F, in combination with a water-wheel having a central conical aperture and the conical ring *b* of the guides, adapted to receive said hub, substantially as specified.

4. The combination, with the dished conical wheel C, of the under gate G, having a rounded or beveled edge, adapted to conform to the dish of said wheel, vertically adjustable to or from the said wheel, substantially as specified.

5. The gate G, having tubular collar I, the vibrating lever J, having oblong slot *j*, and the operating-rod K, in combination with the main shaft E and wheel C, substantially as specified.

6. The main shaft E, having a conical hub, F, adapted to enter a conical aperture in the water-wheel, substantially as specified.

7. The vertically-adjustable water-wheel, in combination with a flume, its metallic bottom plate, and the fixed guides B′ erected on said plate, substantially as specified.

8. The flume-bottom plate B, having vertical flange *a* and fixed inclined guides B′, in combination with a water-wheel rotating below said plate, substantially as specified.

9. The fixed inclined guides B′, in combination with a water-wheel having conical concentric inner and outer annular walls and radial curved buckets between said walls, substantially as specified.

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

LOUIS J. JOHNSON.

Witnesses:

W. M. CUMMINGS,

G. B. LUIMBENE.