C. BARBER.

TURBINE WATER-WHEEL.

No. 187,083. Patented Feb. 6, 1877.

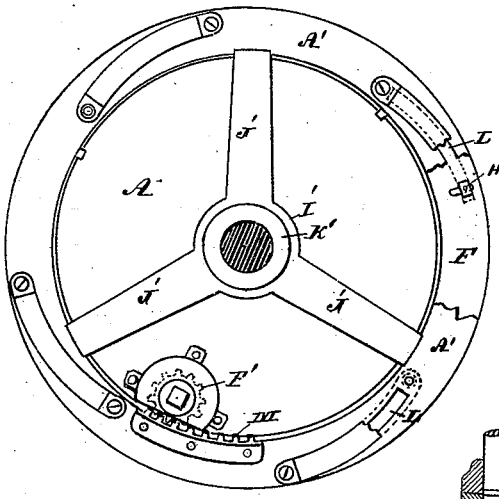

Fig. 1.

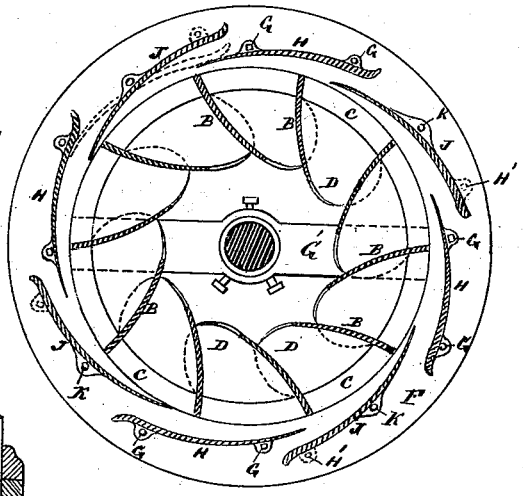

Fig. 2.

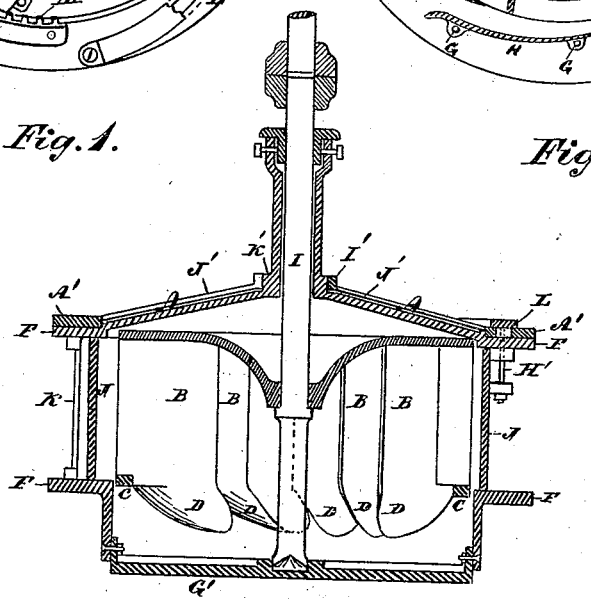

Fig. 3.

Witnesses.
John Grist
F. J. Rofs.

Inventor
Charles Barber
By Henry Grist
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES BARBER, OF MEAFORD, ONTARIO, CANADA.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **187,083**, dated February 6, 1877; application filed August 23, 1876.

To all whom it may concern:

Be it known that I, CHARLES BARBER, of Meaford, in the county of Grey, in the Province of Ontario, Canada, have invented certain new and useful Improvements on Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of this invention is to communicate the full momentum of the water to the wheel without compressing or wedging within the same, and to control the ingress of water thereto; and it consists in the combination, with the top ring of the cover or casing of the wheel, a concentric movable ring having eccentric slots, in which friction-blocks on the pin-heads of the movable gates engage, said slots formed in a manner to open the gates equally on all proportions of gate-opening, thus making the gate to register the amount of water used. Said movable ring is held in position by radial arms and hub fitting on a collar or neck of the wheel-case, so that when the ring is partially rotated by means of a pinion on the case meshing with a rack on the movable ring, the movable gates are closed on the fixed chutes, thus controlling the volume of passing water, or totally excluding it, as may be desired.

My invention further consists in combining, with eccentric chutes, buckets whose outer ends will be perpendicular, or nearly so, to the tangents of the inner ends of the curved chutes, and whose inner ends are inclined inward seventy degrees, or thereabout, from the radii of the wheel.

The invention further consists in constructing the buckets with scoop-shaped lower ends, inclining downward, and terminating at an angle of about twenty degrees from a horizontal plane.

Figure 1 is a top view of my improved water-wheel. Fig. 2 is a horizontal section, and Fig. 3 a vertical section, of the same.

A is the body or cover of the wheel, which may be cast with buckets B, ring C, and heel-buckets D entire, or each part may be made separate, and secured to the cover A by bolts or other fastenings, in the respective positions shown. The form and position of the buckets B toward each other and to the guide-chutes H are shown in Fig. 2. The buckets B are described from the tangent of the chutes H, which tangents they intersect at right angles, thence curving back as they pass in, and discharging the water in lines inclining inward at seventy degrees, or thereabout, from the radius of the wheel, or twenty degrees from the line of the motion. The buckets preferably extend inward about half-way to the center of the wheel. The cover or body A is adjusted to the shaft I, and both it and the ring C are accurately turned and fitted to revolve inside of the rings F F, and thus prevent the escape of water. The ring C should be about the width of one throat of the chutes H, and to it and to the bottom of the buckets B are attached or cast therewith heel-buckets D, which are formed of curved chutes, inclining downwardly, and terminating at an angle of twenty degrees, or thereabout, from a horizontal line. The rings F F and the fixed chutes H may be cast integrally, or, if separately, they are united by bolts G, passing through lugs on the chutes and fastened by nuts to the rings. The chutes H and gates J are described of a single curve from points concentric with the center of the wheel, and are tangentially at right angles with the buckets B, so as to guide the water into the wheel, and to form openings or throats where they overlap each other, as shown in Fig. 2. The wheel A is set within the rings F F, and its shaft I stepped by a pivot-center into a bridge-tree, G′, which is bolted to the lower rim F of the wheel-casing. The upper part of the shaft is journaled in a hollow neck of the cover A. The movable gates J alternate with the fixed chutes H, and are centrally pivoted to the rings F F at the top and bottom of the case by rods K, passing through lugs in the gates, so as to balance and close against the fixed chutes H, and thus exclude water from entering the wheel; or, by partially opening the gates, a volume of water can be limited to the power required.

The movable gates are operated simultaneously by means of a movable ring, A′, lying on the upper ring F of the case, and held concentrically by radial arms J′ and hub I′, fitting over the neck K′ of the case A. The ring A′ is flat and broad, and in it are eccen-

tric slots L, in which the controlling-pins H′ of the gates, fitted with friction-blocks, work slidingly. The pins pass through the upper ring F of the case, in slotted holes, and are secured to lugs on the movable gates. The ring A′ is operated so as to partially rotate on its axis by means of a pinion, F′, on a shaft engaging with a rack, M, on the ring, so that by turning the shaft the ring is made to partially rotate and slide the pins H′ and their friction-blocks in or out, as the case may be, and thus move the gates on their pivot-centers, thereby opening or closing the same to the required extent.

The advantages obtained by my improvements are: the heel-buckets take the surplus water as it loses velocity, and use its remaining momentum; the wheel is less liable to break than wheels having the whole of the chutes movable, as only a moiety of the chutes or gates are movable, the fixed ones being perfectly tight; that in all positions of the gates the water is always applied at the same angle, all the water being carried into the wheel by the stationary chutes or guides, when the movable gates are swung out as shown in Fig. 2, thus preserving the original relation of guides to buckets, and securing the immediate action of the water; that by the above combination a greater percentage of useful effect is produced from a given volume of water than has heretofore been accomplished, as both the wasting and wedging of water are avoided.

I claim as my invention—

1. The movable ring A′, rotating on its axis on top ring F of the casing, and having eccentric slots L, engaging with the friction-blocks of the controlling-pivots H′ of the movable gates J, for simultaneously opening and closing the gates by partially rotating the ring, as set forth.

2. The combination, with the eccentric chutes H, of buckets B, intersecting the inner ends of the chutes perpendicularly to the tangents of the latter, extending backward and inward about half-way to the center of the wheel, and terminating in tangents inclined inward about seventy degrees from the radii of the wheel, or twenty degrees from the line of motion.

3. The combination, with the upper buckets B, of concave or scoop-shaped heel buckets or extensions D, inclining downward, and terminating at an angle of about twenty degrees from a horizontal line.

C. BARBER.

Witnesses:
JOHN KINNON,
JNO. S. WILSON.