(No Model.)

W. WADDELL.

TURBINE WATER WHEEL.

No. 322,764. Patented July 21, 1885.

Fig. 1.

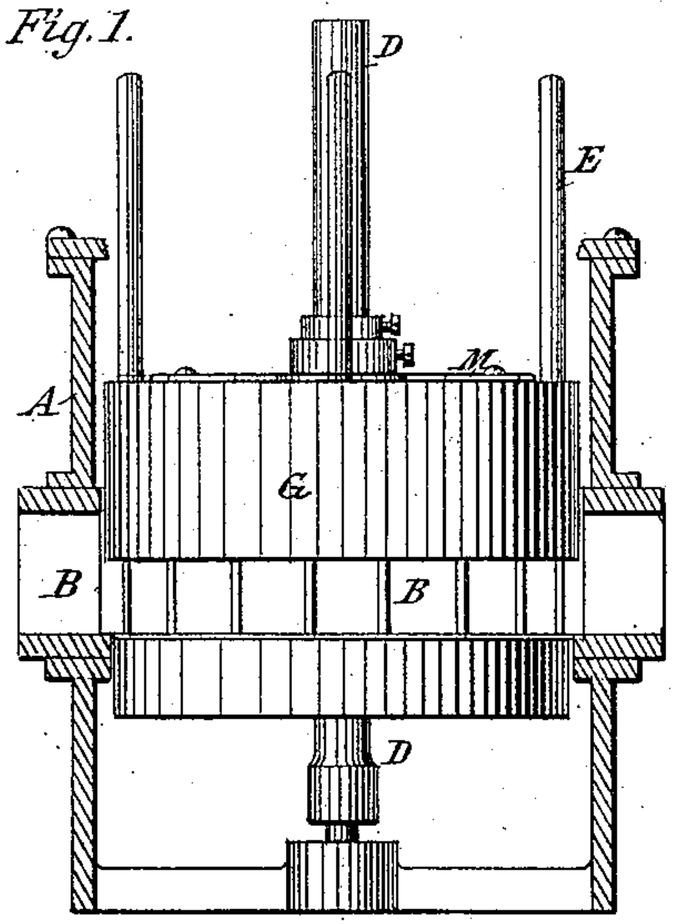


Fig. 2.

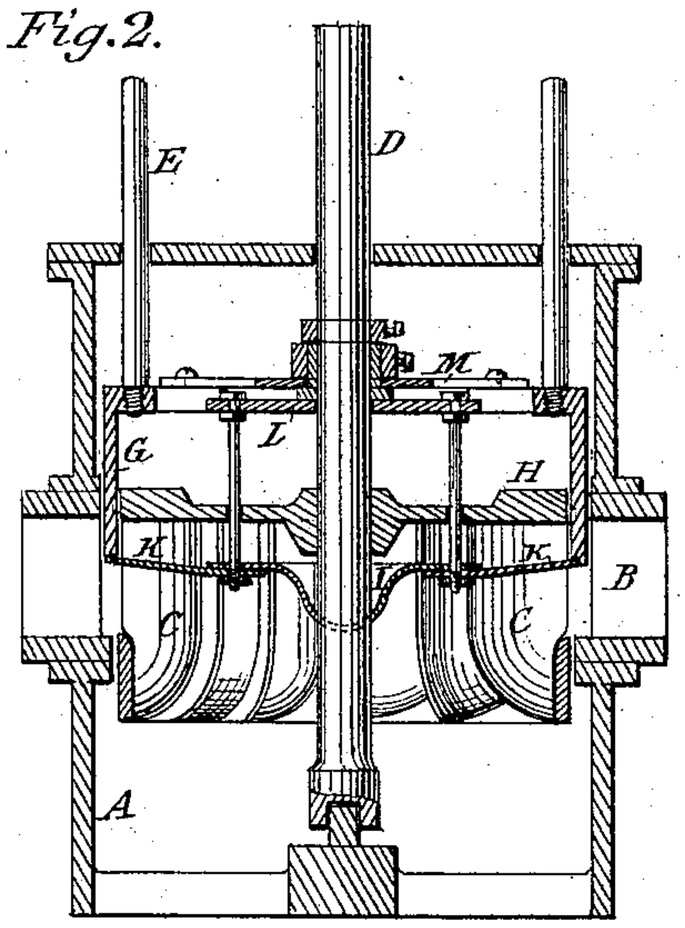


Fig. 3.

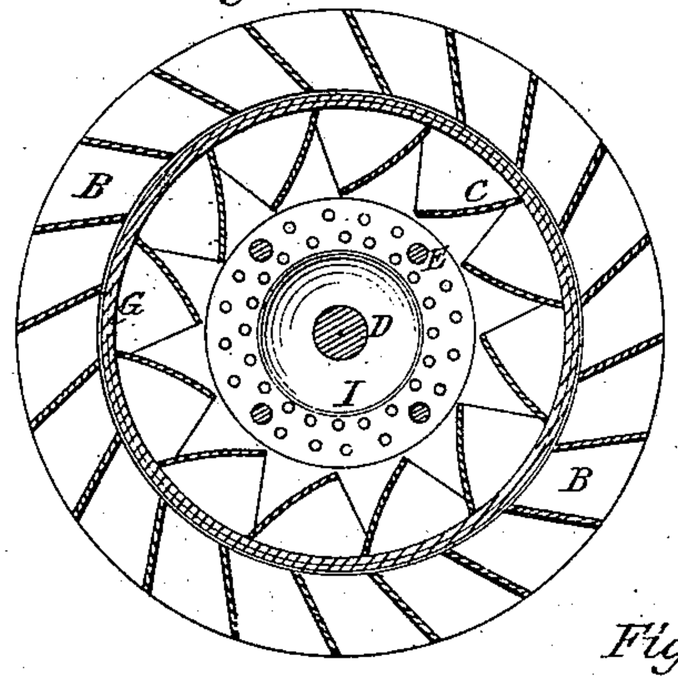


Fig. 4.

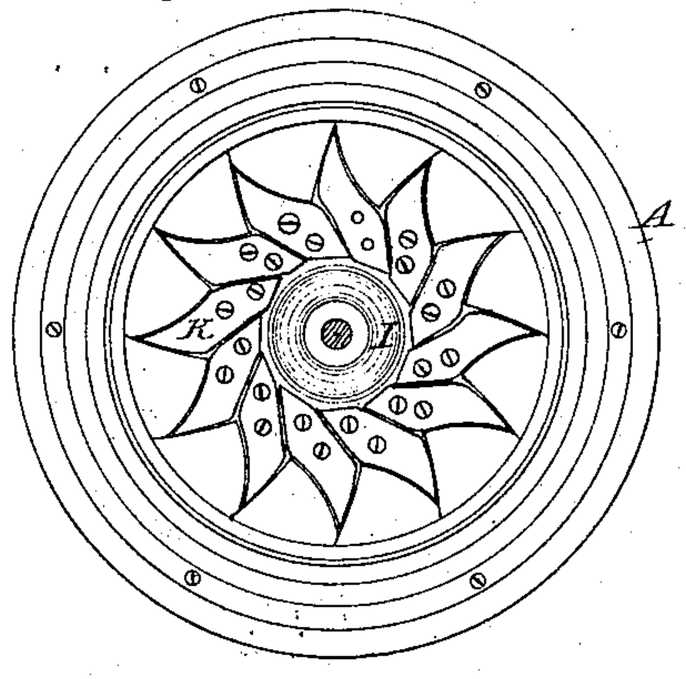
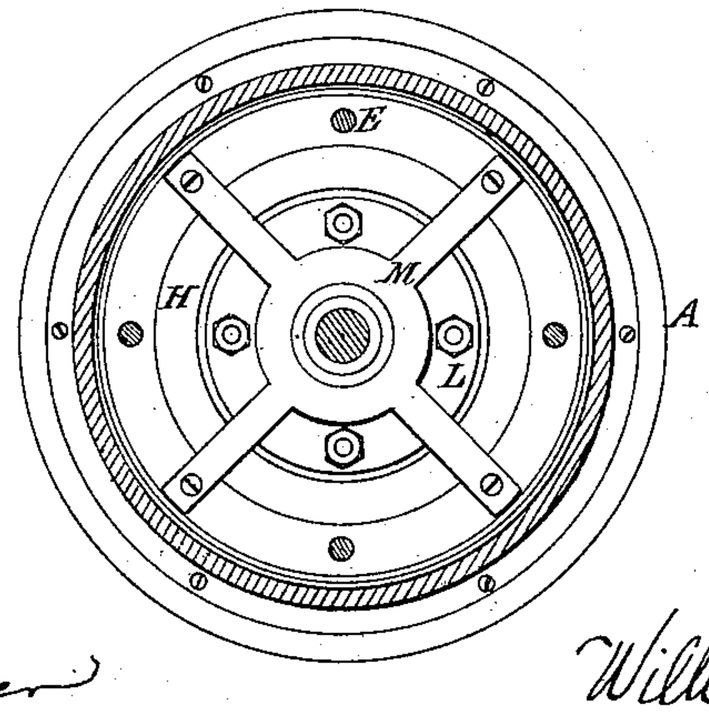


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM WADDELL, OF ORANGE, MASSACHUSETTS.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 322,764, dated July 21, 1885.

Application filed April 29, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WADDELL, a subject of the Queen of Great Britain, residing at Orange, in the county of Franklin and Commonwealth of Massachusetts, have invented a new and useful Improvement in Turbine Water-Wheels, of which the following is a true and full specification.

My invention relates to that class of water-wheels known as "turbine wheels," and is calculated to reduce the friction of the water after it has entered the wheel, and so to promote its greater efficiency.

It is often the case that it is desirable to use only a part of the water which would come into the buckets through the ports, but to run the wheel with only part of the water at "half-gate," or "quarter-gate," as it is called. This is done by raising the gate within the wheel to such a position as to allow the proper flow of water to attain the desired power. When this is done with the turbine wheels in common use, however, the rush of water is so strong that when it pours in at this contracted opening it dashes up in the interior of the wheel and the inside of the gate, losing much of its intended force and retarding the action of the wheel. Attempts to correct this by placing a finger or stop partially across the opening and by other means have not been successful.

My invention is calculated to remedy this difficulty and to give full efficiency to all the water which enters the wheel when the gate is only partially raised. The construction of the wheel in the main is not changed by my invention, and one important feature in it is that it can, without great expense, be added to a great number of the turbine wheels in common use.

In the accompanying drawings, which illustrate my invention and form a part of this specification, Figure 1 is a sectional view showing the gate in elevation. Fig. 2 is a vertical central section of the turbine wheel. Fig. 3 is a horizontal section taken through the ports of the wheel. Fig. 4 is a plan or bottom view of the wheel and gate. Fig. 5 is a plan or horizontal section looking downward.

A is the outside case of the turbine wheel; B, the ports through which the water enters and strikes the buckets C. D is the shaft on which the wheel turns, pivoted at the bottom in the usual way; E, the gate-rods which hold the gate G and by which it is raised or lowered in the usual way. H is the upper or true head of the wheel, and I is the false head.

When the water is let into the wheel at an open or full gate, it has a free and ready exit down after striking the buckets, because the ports admitting the water are of the same size with the opening into the buckets, and the water expending its force against the buckets has no course but down and out at the bottom. When, however, in ordinary turbine wheels, the water is let in at, say, half gate—that is, the gate raised half the perpendicular diameter of the port—it strikes against the side of the bucket with a vacant space above it just as large as the opening which admitted it. The consequence is that a large part of the water, (perhaps half,) dashing up from the side of the bucket and coming back onto the stream flowing in with what may be called a "back-lash," greatly diminishes the force of the incoming stream. To prevent this I place upon the shaft D what I call a "false head," I, which is held by four bolts passing through the true or upper head into a flange, L, around the shaft D. This flange has a neck surrounding the shaft and passing up through a spider, M, which is fastened to the upper edge of the gate and extends across its diameter both ways. Encircling this neck above the spider is a collar with a set-screw, which regulates the vertical motion of the false head, which moves with the gate and is controlled by it, while the true head of the wheel remains always in the same fixed position.

The false head moves within the line of the buckets, its diameter being just to that extent. Fastened on the under side of this false head are diaphragms of metal, K, so shaped as to fill all the space between the buckets, between which they move up or down as the gate to which this head is attached is raised or lowered. These diaphragms K, having their narrow ends bolted to the head I, have their outside and broad ends supported in the lower

inside edge of the gate, which is recessed out just far enough to give them a firm bearing. It is apparent, therefore, that as the water enters at the ports, whether fully or especially partially opened, it must be all restrained in the spaces within the buckets and the diaphragm on the false head, exerting its full power on the bucket and no portion dashing up and over to retard the incoming flow and delaying the action of the wheel, as is the case with those in common use, especially when run at half-gate, or at any rate less than at full gate.

I claim—

The combination, with the gate G, provided with means for lowering same, as described, of the false head I, the diaphragm K, and flange L, provided with a neck, as described, to surround the main shaft of a turbine water-wheel, all arranged and secured substantially as and for the purpose set forth.

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