C. HEALY.

Turbine Water-Wheels.

No. 157,070. Patented Nov. 24, 1874.

Fig. 1.

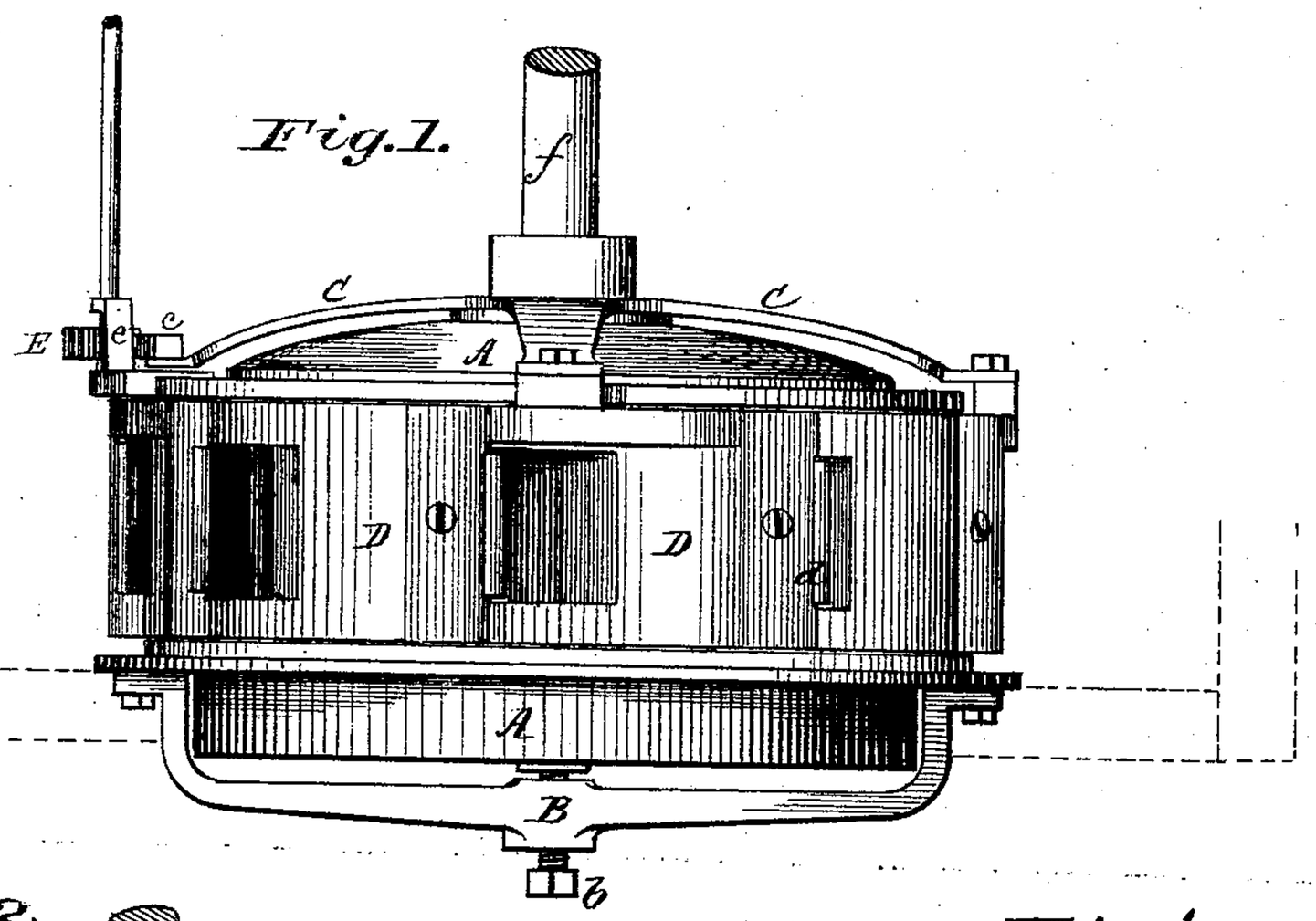


Fig. 2.

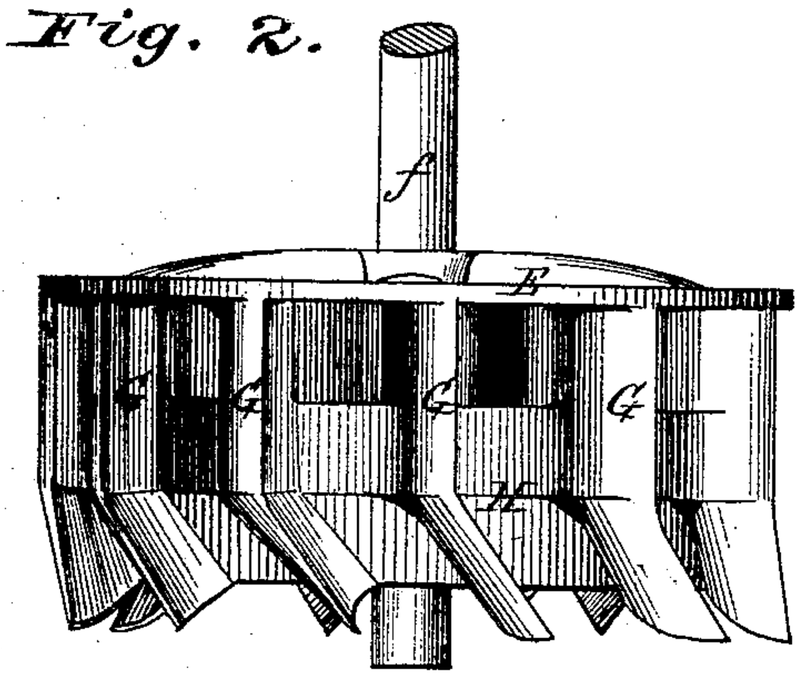


Fig. 3.

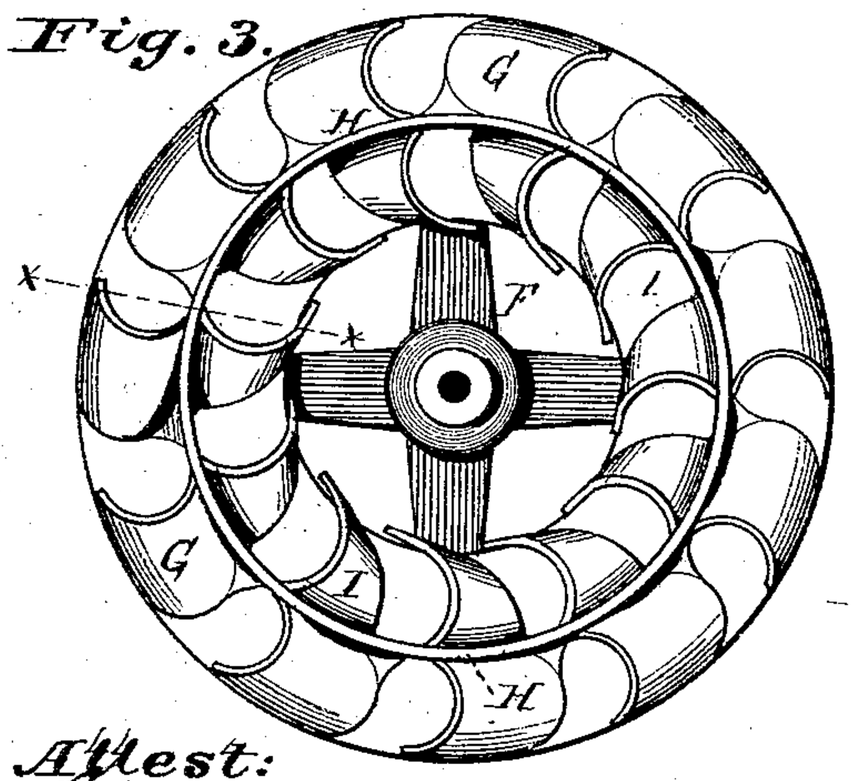


Fig. 4.

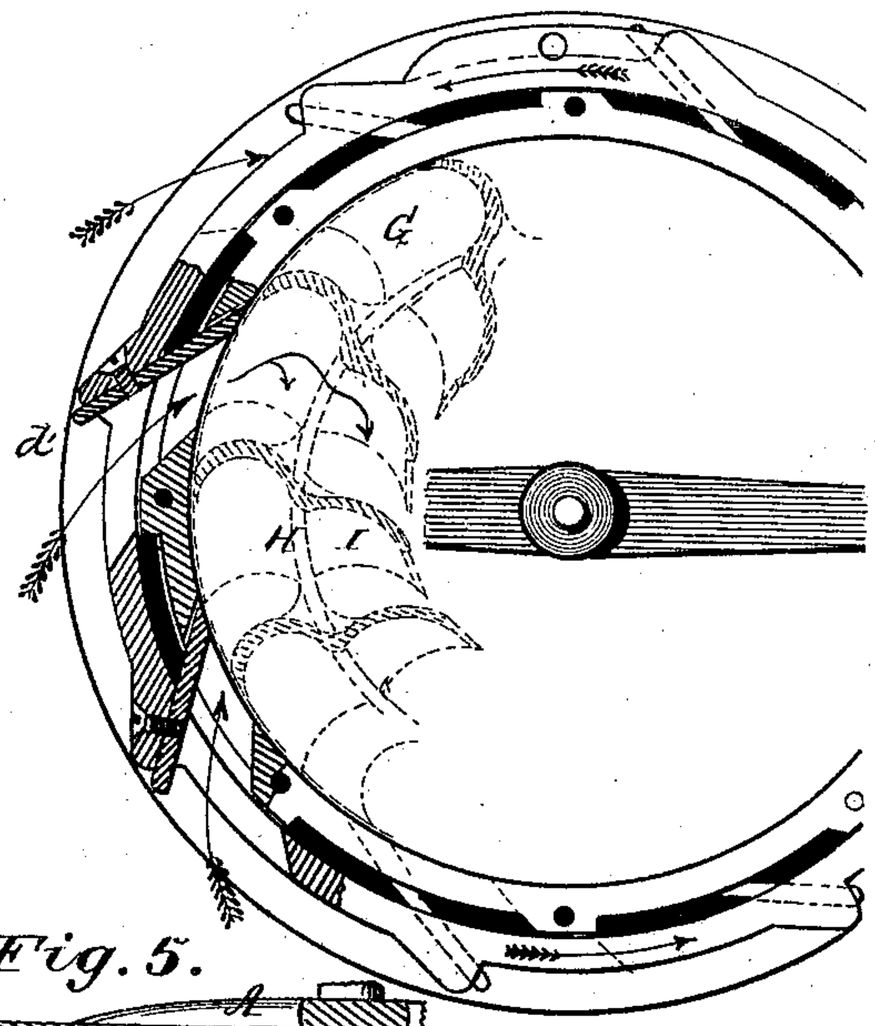
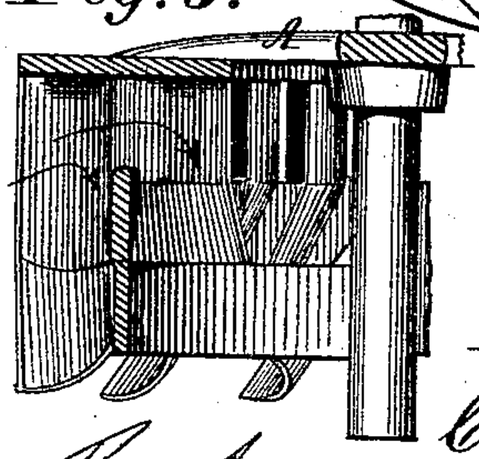


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHESTER HEALY, OF NEW HARTFORD, CONNECTICUT, ASSIGNOR OF ONE-THIRD HIS RIGHT TO CHARLES H. BOWEN, OF WASHINGTON, D. C.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **157,070**, dated November 24, 1874; application filed November 3, 1874.

To all whom it may concern:

Be it known that I, CHESTER HEALY, of New Hartford, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in Turbine Water-Wheels, of which the following is a specification:

This invention relates to a turbine water-wheel; and it has for its object to furnish such a wheel as will combine the several advantages of attaining a greater degree of speed and power from a given quantity or force of water; of presenting a greater force-receiving surface to the approaching current; of dividing the current in each flume, and having each division operate against a force-receiving surface; and of having all the parts combined to more perfectly balance the wheel than had been before known in wheels of this class.

My invention consists in arranging a series of auxiliary buckets upon the interior of the ring or partition, which supports upon its exterior the main buckets, the auxiliary buckets being of a length about equal to the height of the partition or ring, while the main buckets are of such length that their upper ends project above the ring or partition, so that when water is projected through the chutes or flumes into the main buckets it will, after exerting its force thereon, traverse such buckets, and discharge over the top of the partition, and again utilized by acting upon the interior buckets, so as to impart its remaining power to the wheel, as will appear more fully hereinafter. The buckets are secured upon the exterior and interior of the partition, so as to alternate with each other; and, by such, the main buckets will, with more certainty, discharge their contents into the buckets arranged upon the interior of the partition.

In the accompanying drawings, Figure 1 is a side elevation of my improved water-wheel; Fig. 2, a detached side view of the buckets and shaft; Fig. 3, a bottom view of the same; Fig. 4, a transverse section of Fig. 1, and Fig. 5 a detached sectional view of the buckets.

A represents the frame, made of metal, or built in any suitable manner. It consists of a circumferential upright portion, which is provided with suitable openings, forming the flumes, and also with a flanged bottom. Transversely across the lower portion, and rigidly attached to this frame, is a strap, B, and through a suitable opening in its center, which is provided with a screw-thread, I place a pivot-pin, *b*. This pin is furnished with a male thread, its lower extremity with a nut-head, and its upper extremity formed as a pivot, so as to afford but a small amount of frictional surface to the revolving wheel, which will be hereinafter described. The upper portion of this pin is adapted to enter into, and operate with, the socket on the vertical shaft of said revolving wheel. The upper surface of this frame is formed of a metal plate, suitably attached to the vertical portion, and this plate is provided with a single opening, which is adapted to receive the vertical shaft. C represents the bridge, and rigidly attached thereto is a ratchet-plate, *c*. This bridge is secured to the gate D, which revolves in suitable bearings in the periphery of the frame, and this gate is provided with a number of openings corresponding to those in the frame, which form the flumes. On the outer surface of these flumes I attach a plate, *d*, which is made removable at will, being secured by screws which pass through projecting flanges of the gate. These plates *d* are, preferably, made of a metal dissimilar to that of which the frame is formed, to facilitate their removal, if desired. The ratchet-plate *e* is adapted and designed to operate by engagement with a cog-wheel, E, which is placed in suitable bearings in a frame which is rigidly attached to the frame A, and is provided with a handle or other desirable means which will allow of the ready and efficient operation of the cog-wheels E, and by means of this operation, and the engagement of these cogs in this ratchet-plate, the gates may be opened or closed, as is obvious.

I will now proceed to describe what I consider the important part of my invention. F represents the frame of my water-wheel, and to this frame is rigidly attached both series of buckets, in a manner which I will hereinafter explain. *f* represents the vertical shaft which forms the axle of the wheel, and this shaft is provided with a socket at its lower extremity, which receives the pivot-pin *b*. G represents a

series of buckets, which are rigidly secured to the lower surface of the frame F, in position nearly at right angles to an imaginary straight line drawn through the center of the diameter of said frame, and in such a manner that one edge of these buckets will be flush with the periphery of the frame. These buckets are so curved as to furnish a concave surface to the flumes, and are bent on themselves at a point near their center, so as to form an obtuse angle, and are so attached to the frame that the upper portion will stand vertical, and the lower portion incline toward the flumes. H represents a vertical circular partition, which extends upward about two-thirds of the length of the buckets G, and to this partition the buckets G are rigidly attached. I represents a series of auxiliary buckets, which are also rigidly attached to the partition H, and are of similar construction as the buckets G, except as to their length and position.

With the partition H, which divides the two series for a portion of their length, and the series of buckets G, this portion of my machine is so rigidly attached as that they can be said to be one.

The series of auxiliary buckets I are much shorter in length than the series G, and their position on the partition H is such that they stand, relatively to the series G, a short distance behind. The object of this arrangement will be readily understood when it is taken into consideration that this series of buckets I catch and utilize the force of the stream entering from the flume immediately between two of the series G, and also to utilize any force arising from portions of the stream which is not caught by the series of buckets G. The stream entering from the flume acts upon the buckets G, and also upon the buckets I, which, being a little in the rear, takes so much of the volume of water as escapes from the outside series. Thus I prevent a greater force-receiving surface to the force-giving medium, and attain a maximum force and speed from a minimum supply of water.

What I claim is—

1. The combination of the exterior and interior buckets G I with the partition H, said buckets being made of unequal length, and secured upon the partition so as to alternate with each other, substantially as described.

2. The gate formed as described, in combination with the removable plate *d*, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

CHESTER HEALY.

Witnesses:

JAMES L. NORRIS,

JOS. L. COOMBS.