H. Vandewater,

Water Wheel,

No. 10,080. Patented Oct. 4, 1853.

Fig. 2

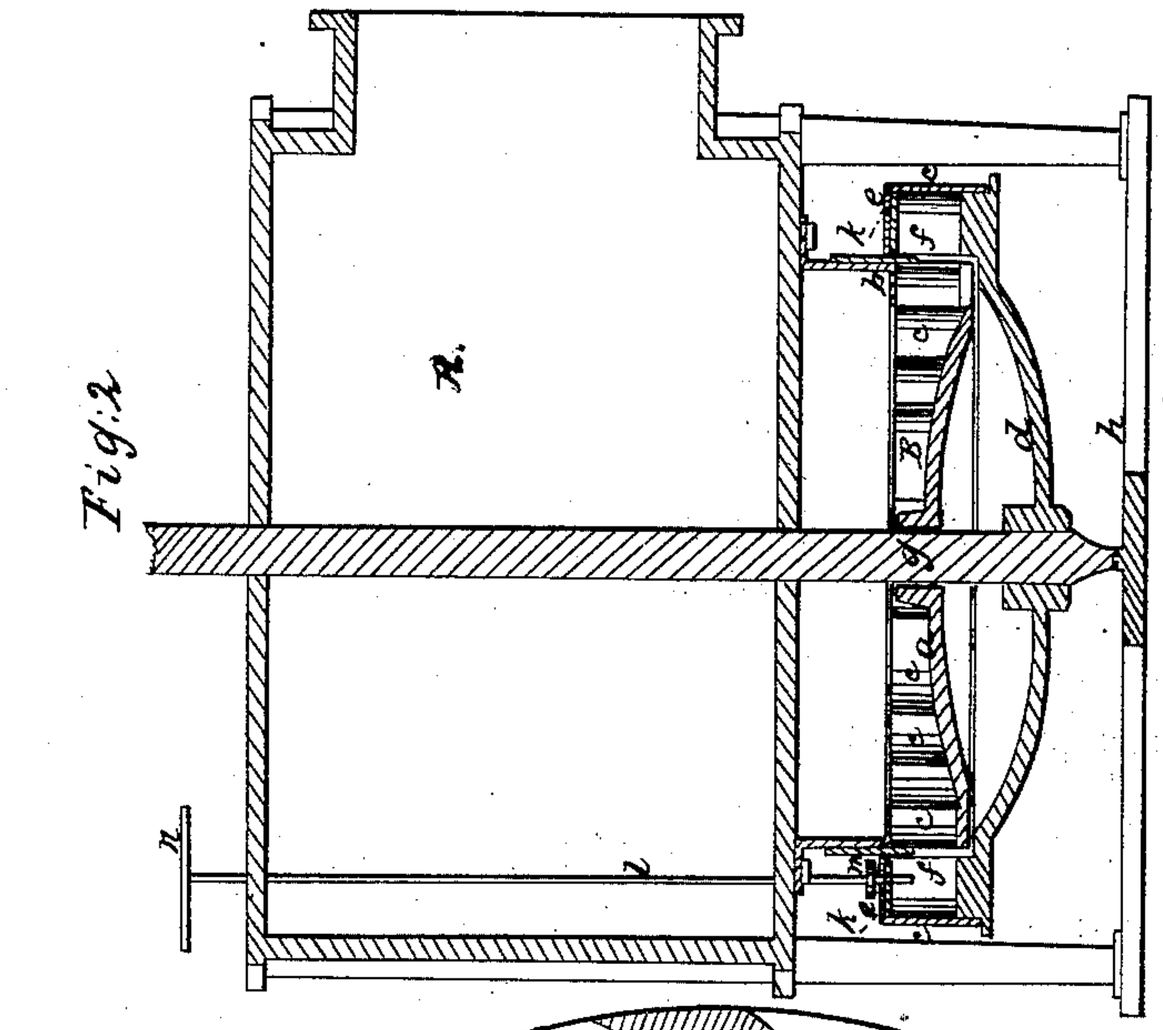
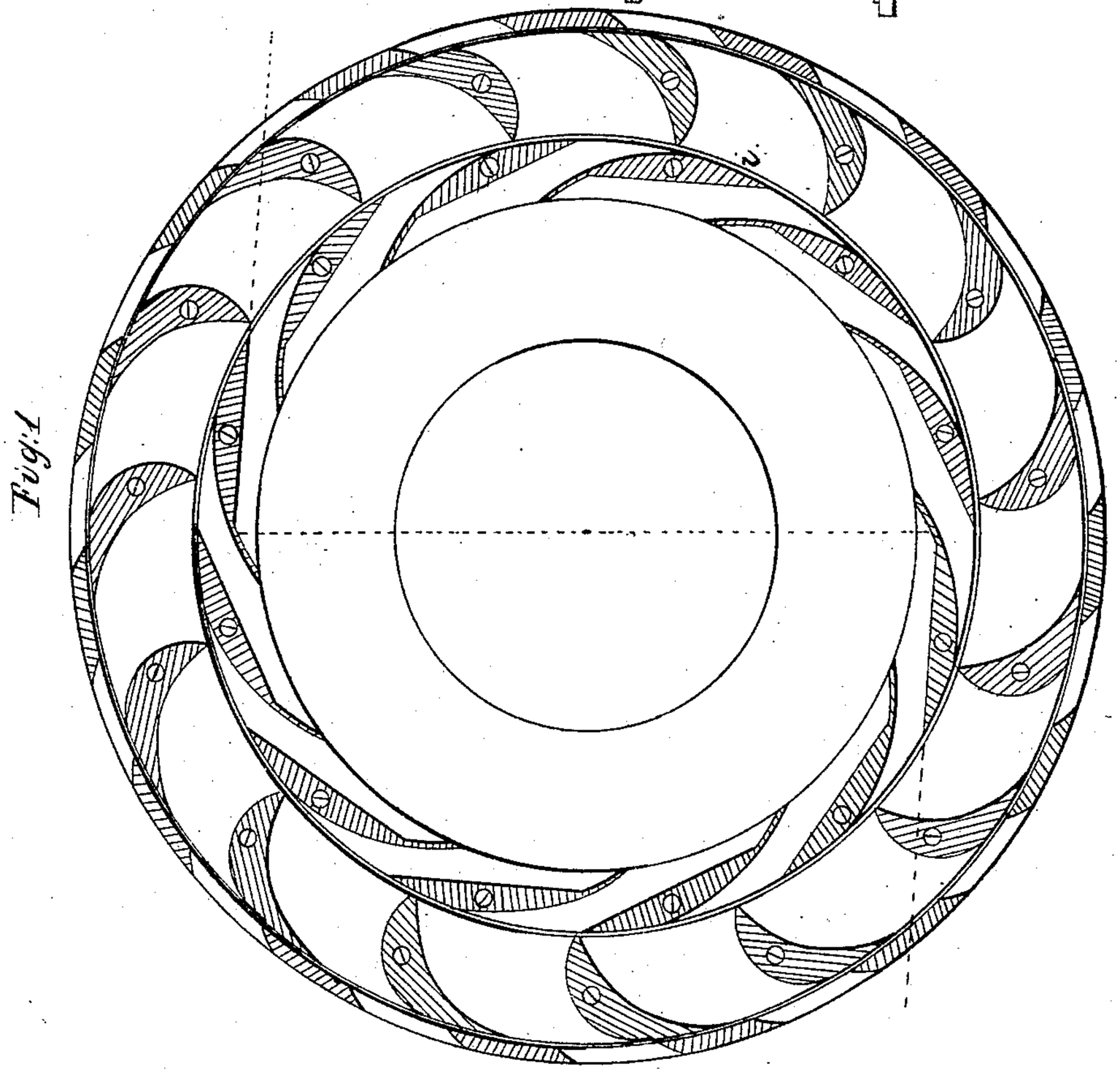


Fig. 1



UNITED STATES PATENT OFFICE.

HENRY VAN DE WATER, OF ALBANY, NEW YORK.

IMPROVED TURBINE WATER-WHEEL.

Specification forming part of Letters Patent No. **10,080**, dated October 4, 1853.

To all whom it may concern:

Be it known that I, HENRY VAN DE WATER, of the city and county of Albany, and State of New York, have invented certain new and useful Improvements in Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a longitudinal section through the center of the buckets and chutes, and Fig. 2 a vertical section in the plane of the axis of the wheel.

The same letters of reference indicate like parts in each of the figures.

The nature of my invention consists in the manner or method of expanding and contracting the discharge-openings of the passages between the buckets or floats of the wheel, in combination with that for regulating the admission of the water to the same, so as to regulate the discharge according to the head under which the wheel is worked and the amount of work to be done by it, so as to obtain the maximum effect of the water.

I construct my wheel of the following proportions: In a wheel of five-foot diameter, which is the size represented in this case as an example, I have fifteen buckets to twelve chutes—that is, five buckets or floats to four chutes. This proportion or ratio of buckets and chutes applies equally well to wheels both of a less or greater diameter to the extent to which I have constructed wheels and will be found to give the best effects under varying heads.

Let A be the penstock, B the chute-chamber, and C the turbine or revolving wheel.

The chute-chamber is composed of a circular plate *a*, slightly convex on its inside to direct the water to the chutes, an annular ring *b* and the twelve partitions *c* forming the chute passages. The annular ring rises perpendicular from its upper face several inches and terminates in a flange by which the whole chute-chamber is permanently secured to the under side of the penstock. The wheel *c* is also composed of a circular plate *d*, an annular ring *e*, and fifteen partitions *f*, forming the passages of the buckets or floats, and it is permanently keyed to the shaft *g*, which passes through a box in the plate or bottom of the chute-chamber and a stuffing-box in the top-plate of the penstock, and the lower end of this shaft, which terminates in the form of a pivot, rests on its seat in the bridge-tree *h*. Thus the whole turbine or outer wheel is suspended and free to revolve around the boxed chute-chamber. The wheel in this instance is constructed to receive the water from above. A circular band *i* is placed on the outside of the circumference of the chute-chamber and between it and the inner circumference of the wheel for the purpose of regulating the size of the openings of the chute-passages, which may be constructed so as to rise and fall as represented in the drawing or in any other convenient manner.

j is the circular gate for expanding and contracting the discharge-openings from the outside, which consists of a hoop or band the height of the buckets, fitting accurately the outer perimeter of the wheel and provided with openings through it corresponding in number to the passages between the buckets. These openings are beveled to suit the curves or lines of the buckets, so that the water will leave them with comparatively little shock. This gate is about an inch thick and terminates at the top edge with a flange *k*. Resting on the upper face of the annular ring of the buckets, in the inner edge or circumference of the flange, which is about one inch broad, are cut teeth, forming a rack, and working through a stuffing-box in the upper plate of the penstock, and in the annular ring of the buckets is a rod *l*, to and near the lower end of which is attached a small pinion *m*, which has teeth corresponding in size to those of said rack. This rod is capable of being raised and lowered and turned round by means of the hand-wheel *n*, so as to gear and ungear said pinion with the rack on the flange of the circular gate at pleasure. Thus when it is desired to expand or contract the buckets so as to alter the size of the discharge-openings of the buckets, all that is necessary is to press down the rod *l* until the pinion of it meshes into the rack of the circular gate. Then turn it by means of its hand-wheel until the gate is adjusted to the position desired. A suitable scale or index can be easily applied to the rod and wheel, so as to indicate at all times the position of the gate and by which the size of the openings can be regulated to

suit the head of water and work to be done without the necessity of descending to examine the wheel or disturb it at all. This method of expanding and contracting the orifice of discharge of the wheel from the outside possesses the advantages of conveniently regulating the discharge from all the buckets at once and in a moment's time and preserving the lines of the buckets, thus enabling my wheel to be readily and in a few moments adjusted according to varying heads (which in some locations and seasons of the year are considerable) and to the amount and nature of work to be done by it. The best result is produced by my wheel when the gate is adjusted so as to run at a velocity of only one-sixth due to the head when the wheel is performing its work.

Having thus fully described the construction of my wheel, what I claim, and desire to secure by Letters Patent, is—

The manner or method of regulating the discharge-openings of the buckets from the outside, in combination with the central gate *i*, for adapting the wheel to varying heads of water and to the nature and amount of work to be done by it, consisting of the circular gate *j*, constructed, arranged, and operated with the wheel, substantially as in the manner herein fully set forth.

In testimony whereof I have hereunto signed my name before two subscribing witnesses.

HENRY VAN DE WATER.

Witnesses:

THOS. DONOHO,

GEO. R. WEST.