I. GOTHARD.
Water-Wheels.

No. 198,728. Patented Dec. 25, 1877.

Fig. 1.

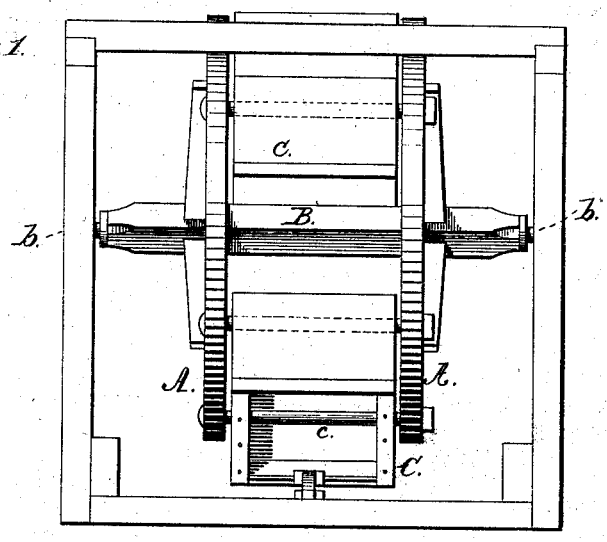


Fig. 2.

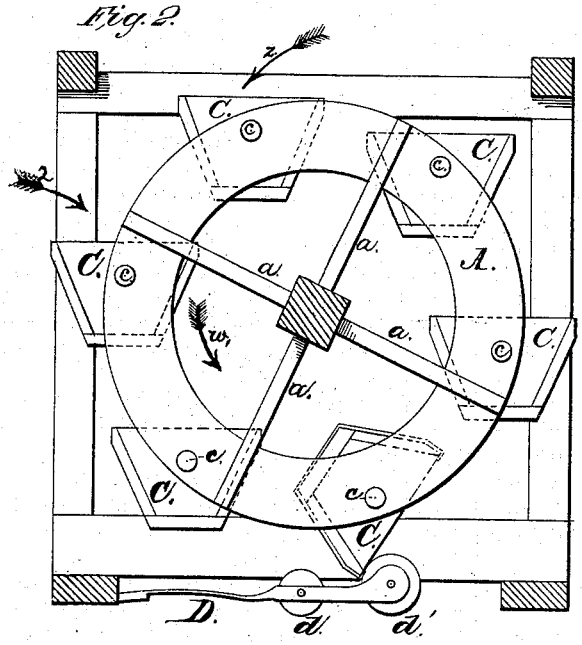


Fig. 3.

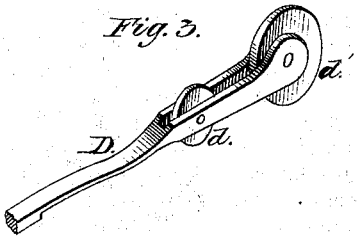
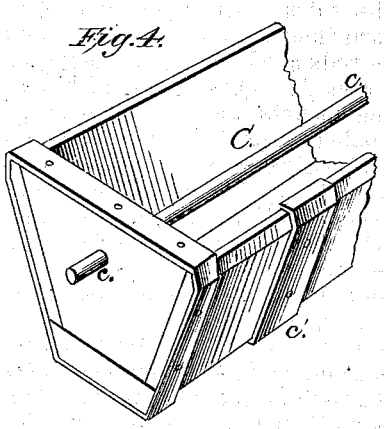


Fig. 4.



Attest:

Frank W Darby
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Inventor:

Ira Gothard

UNITED STATES PATENT OFFICE.

IRA GOTHARD, OF BAINBRIDGE, KENTUCKY.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **198,728**, dated December 25, 1877; application filed May 19, 1877.

To all whom it may concern:

Be it known that I, IRA GOTHARD, of Bainbridge, county of Christian, and State of Kentucky, have invented new and useful Improvements in Water-Wheels, of which the following is a specification:

My invention relates to improvements in overshot and breast water-wheels, having swinging buckets arranged to be automatically tilted, for the purpose of discharging water therefrom; and it consists in certain devices and arrangements thereof for gradually tilting the buckets on their approach to and at the proper point where the water should be completely discharged.

In the accompanying drawings, Figure 1 is a front view of a water-wheel constructed and arranged according to my invention. Fig. 2 is a side view of the same. Fig. 3 is a detail view of the tilting device, and Fig. 4 represents a portion of one of the buckets.

The annular rims A are connected centrally, by means of spokes *a*, to a shaft or axle, B, journaled at *b b* in a suitable frame, E.

The sides of the buckets C flare outward toward their tops, and said buckets are hung upon rods *c*, which extend between the opposite rims A. These rods may be firmly fixed to the buckets, and have their projecting ends journaled in the rims A; or the buckets may be hung loosely upon said rods, the ends of which may be firmly fixed in the said rims, and the buckets should be so hung that the center of gravity of each bucket should be on a line between its rod and its bottom, in order that when hanging freely the tops of the buckets will be upward.

D is a spring-arm projecting under the wheel, and having friction-wheels *d d'* arranged in the path of the longitudinal centers of the buckets C, each of which is provided with a protecting-plate, *c'*.

The operation of my invention is as follows: The impelling stream of water may be directed upon the wheel so that it will enter the buckets C either in the direction of the arrow *x* or *z*, to turn the wheel in the direction indicated by arrow *w*. When a filled bucket arrives nearly at its lowest position, where its propelling effect upon the wheel would cease, its lower corner next to the smaller friction-wheel *d* (or rather the lower end of protecting-plate *c'*) of arm D will strike said wheel, and be momentarily prevented from further progress; but the weight of the other filled buckets will continue the motion of the wheel, so that the bucket will be tilted so far that its top edge, protected by plate *c'*, will strike against the edge of larger friction-wheel *d'*, below a tangent line, just as another bucket at the top or breast of the wheel becomes filled, and the wheel thereby acquires further force to complete the tilting of the bucket at its bottom.

It will be seen that the bucket is thus gradually tilted, and that as the resistance occasioned by the tilting operation increases, the wheel acquires additional force by which to overcome said resistance.

It will be seen, also, that the tilting of the bucket partially compensates for the resistance of friction occasioned by its contact with the wheels *d d'*, for the moment said contact occurs the heaviest part of the bucket moves toward the center of the wheel, thus changing the proportions of the leverage in favor of the motive power, as will be understood from a knowledge of the principle of a wheel or pulley.

The spring-arm D will be somewhat depressed when a filled bucket first strikes and is passing the small wheel *d;* but as the bucket becomes emptied said spring-arm is relieved, and its resilience facilitates the complete tilting of the bucket.

Having now fully described the construction of my invention, and explained the operation thereof, I claim—

1. The combination of the swinging buckets C of the water-wheel with the wheels *d d'*, arranged in the path of said buckets, substantially as described.

2. The combination of the swinging buckets C of a water-wheel with the spring-arm D.

3. The combination of the swinging buckets C of a water-wheel with the spring-arm D, provided with friction-wheels *d d'*, substantially as described.

4. The swinging buckets C of a water-wheel, provided with protecting-plates *c'*, in combination with a tilting device, arranged to strike said plates as the wheel revolves, substantially as set forth.

IRA GOTHARD.

Witnesses:

WILEY ALEN PETTY POOL,

WILLIAM LAYFAYETT RICHARDSON.