W. A. Terry,

Water Wheel

No. 109,685. Patented Nov. 29. 1870.

Fig. 1.

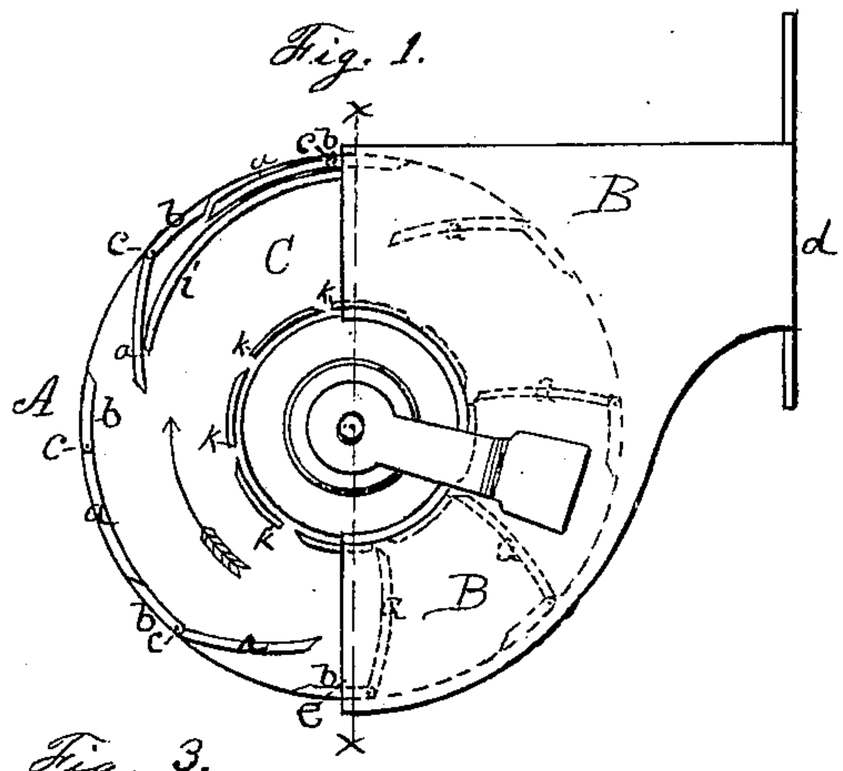

Fig. 2

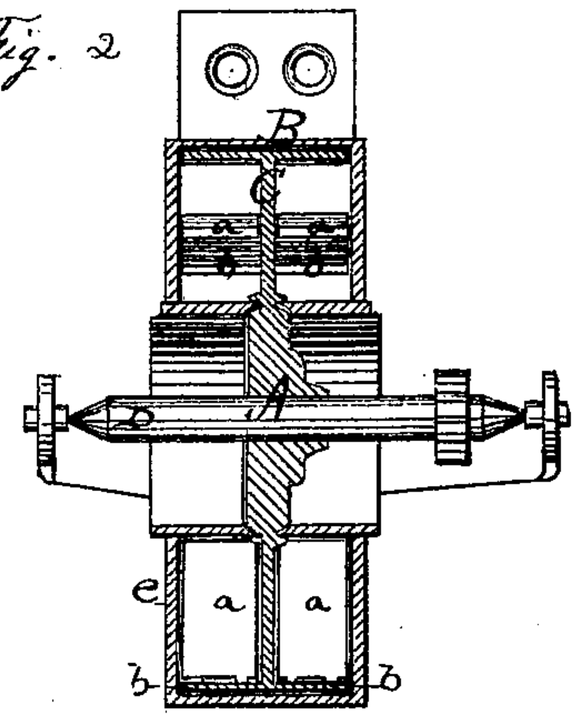

Fig. 3.

Fig. 4.

Fig. 5

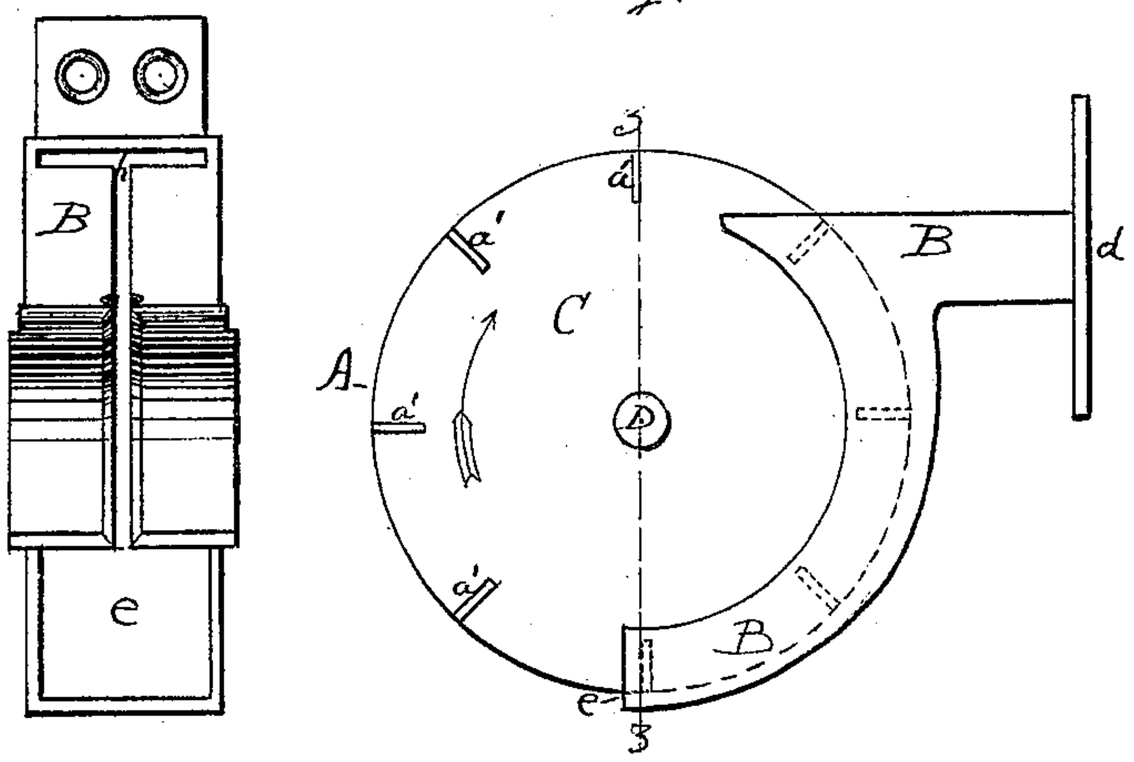

Fig. 6

Fig. 7.

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IMPROVEMENT IN WATER-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

I, WILLIAM A. TERRY, of Bristol, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Water-Wheels, of which the following is a specification.

My invention consists of the employment of a single disk, provided with axle and buckets, so as to form a motor-wheel, in combination with a slotted wheel-race, as hereinafter described; also, in the construction and combination of the various parts, as hereinafter described.

In the accompanying drawing—

Figure 1 is a side elevation of a wheel and wheel-race of my invention;

Figure 2, a vertical section of the same, on line *x x*, fig. 1;

Figure 3, a front elevation of the race, with the wheel removed;

Figure 4, a side elevation of a modification of the same;

Figure 5, a vertical section of fig. 4, on line *z z*;

Figure 6, a side elevation of another modification of the same; and

Figure 7, a top view of one of the buckets used in the modification shown in fig. 6.

A designates the wheel, and

B, the wheel-race.

The wheel is composed of a disk, C, provided on both sides with buckets or pistons *a*. These buckets are curved, their outside being a sector of the periphery of the disk C.

Arms *b*, of sufficient strength to support the buckets *a*, and extending an equal distance with said buckets from each side of the disk C, are rigidly secured to said disk. The arms *b* are also sectors of the same circle as the buckets *a*, and when taken together, as the buckets are thrown outward, form an annular rim upon each side of the disk C.

The buckets *a* are pivoted or hinged upon one end or side to the arms *b*, as shown at *c*, fig. 1, while the other end of the buckets *a* and the adjacent sides of the arm *b* are beveled to prevent the buckets being swung outward beyond the edge of the disk C.

The pen-stock or wheel-race B, which, when combined with wheel A, is inclosed upon all sides, except at its mouth *d* and discharge *e*, is provided with a T-shaped slot, *h*, upon its front side or end, immediately above its discharge *e*, (see fig. 3.)

The wheel A, hung by its shaft D in any proper manner, revolves through the wheel-race B and operates as follows:

When revolving rapidly, the centrifugal force will throw the buckets which are outside of the wheel-race outward, so as to meet the arms *b;* but when the wheel moves slow, as in starting, the upper buckets may fall, as shown in fig. 1.. I therefore place the guard *i*, fig. 1, upon the front of the wheel-race in such manner as to engage the under side of each bucket *a*, and cause them to close upon the arms *b* and enter the T-shaped slot *h* as one continuous rim.

The wheel should be true and round, and fitted so closely to the T-shaped slot *h* that but little water will escape thereat.

As the wheel A enters the wheel-race the water causes the buckets *a* to swing inward until their ends strike the stops *k*, (see broken lines, fig. 1,) in which position said buckets will fill the discharge end of the wheel-race B, the whole weight of the water forcing them through the same.

As each bucket passes out of the wheel-race the weight of said bucket and the centrifugal force causes them to again close upon the arm, *b*, and so on, as before described.

The number of buckets should be so proportioned to the size of the wheel and the length of that portion of the wheel-race near the discharge end which the buckets fill as to insure said portion of the race being filled by at least one bucket in any position that the wheel may assume.

The wheel-race B from its mouth *d* is widened as it approaches the wheel A, in order that the agitation of the water may be less at the point by which the buckets enter than at the other parts of said race, whereby the buckets *a* will assume their position before entering the main current, and thus avoid a violent concussion in striking the stops *k*, which would otherwise occur.

The interior of the wheel-race B, from its discharge *e* inward, should be of such size as to be filled by the buckets for a distance a little greater than the distance from bucket to bucket of the wheel used.

In the modification shown in figs. 4 and 5, stationary buckets a^1 are attached to the disk C, which disk C fills the straight slot *h'* of the wheel-race B. This style of wheel should be of such size that its buckets will enter the race above the level of the water. These buckets enter through an opening in the top of the race and pass on through the inclosed portion of the same, being forced by the whole weight of the water.

The modification shown in figs. 6 and 7 is another style of oscillating buckets or pistons, in which the disk C and slotted wheel-race B are retained.

Circular openings are formed through the disk C, in which openings bucket-disk a^2, of the same thickness as disk C, are pivoted in such manner that, when turned parallel with disk C, they will the circular openings in the same and thus form it into a solid disk.

Upon the inner end of the shaft or pivot on which the piston or buckets a^2 oscillate is a cam, *m*, of the form of a quarter-circle, fig. 7, which cams strike alternately against guides (not shown) upon both sides of the disk C in such manner as to cause the buckets

a^2 to be parallel with the disk C as they enter the wheel-race B, and to be transverse with said disk a little previous to their discharge from said wheel-race, as shown respectively at 1 and 2. Only four buckets a^2 are shown, but in use a greater number would be desirable, unless the race was made longer.

The wheel-race B in this figure is a curved cylinder, the interior of which is the same size as the periphery of the buckets a^2, and on its front is a straight slot, which is filled by the disk C.

My improvement, when arranged with either style of oscillating buckets above described, may be run either wholly or partly submerged, and upon a horizontal or vertical shaft, as may be desired.

By constructing the wheel of a single disk, as described, I am enabled to cause the buckets to run through an inclosed wheel-race, whereby the whole weight of the water is directly applied.

By the oscillating buckets I produce a wheel having but little back action, and which may be driven by water or steam, especially a modification similar to that shown in fig. 6, or for the purpose of transmitting power at a distance by compressed air.

In case of either style, figs. 1 or 6, is propelled by an elastic fluid, it would be best to regulate the supply by a cut-off, operated from the wheel in such manner as to bring the full pressure to bear on each bucket or piston in succession as it enters that part of the race which it fills or closes on assuming its transverse position, and, after forcing the piston along the race or cylinder a proper distance, cut off the supply, when the piston will be driven from such point outward by the expansion of the motive fluid.

To equalize the pressure and give perfect steadiness of power and motion, the size of wheel and number of pistons might be such as to allow the use of more than one race or cylinder, so arranged that while the piston in one is subject to direct pressure in another, it will be driven by expansion, and *vice versa*.

In the forms of wheel in which oscillating buckets are used, if run with a rapid motion, it might be desirable to increase the number of buckets, either by making them smaller or by enlarging the wheel, so that the power may be applied by means of two or more races at equi-distant portions of the wheel, to balance the power and equalize the wear of the journals; and in case more-than one race is used with a wheel similar to that shown in fig. 1, the circular portion of the side of the race toward the wheel might be formed of the axle of the wheel made of suitable size and furnished with stops for the buckets, the pressure upon one side of said axle being counterbalanced by a similar pressure upon the other side, thus preventing undue strain upon the journals.

I claim as my invention—

1. The combination of the disk C, provided with buckets *a*, with the slotted wheel-race B, combined and operating together, substantially as described and for the purpose set forth.

2. The combination of the wheel-race B, provided with its T-shaped slot *h*, disk C, stops *k*, buckets *a*, and arms *b*, the whole combined and operating together, substantially as described.

3. So combining the disk C and oscillating buckets *a* that said buckets, with their adjacent parts and the disk C, shall enter the slot in the wheel-race as one continuous solid piece, substantially as described and for the purpose set forth.

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