

B. Sutherland,

Water Wheel,

N^o 81704.

Fig: 1.

Patented Sep. 1, 1868.

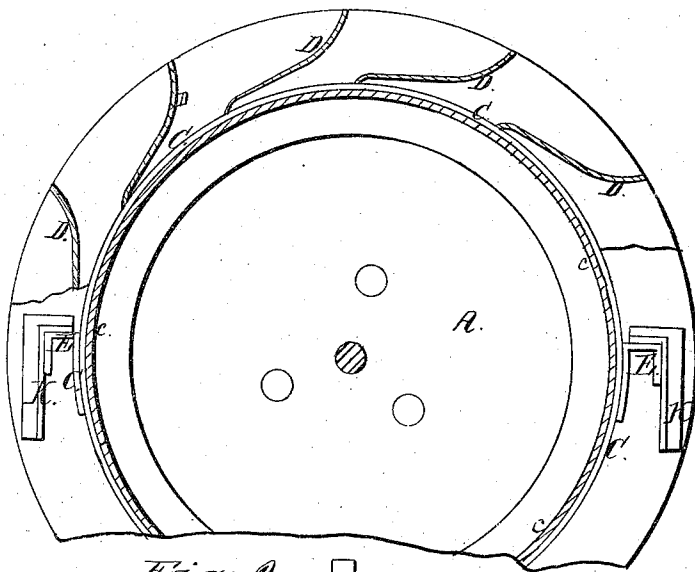
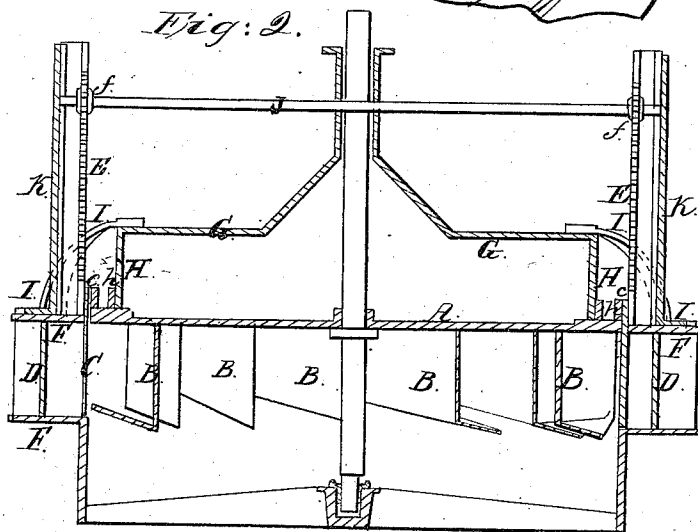


Fig: 2.



Witnesses:

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Inventor:

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B. Sutherland,

Water Wheel,

N^o 81,704.

Patented Sep. 1, 1868.

Fig: 3.

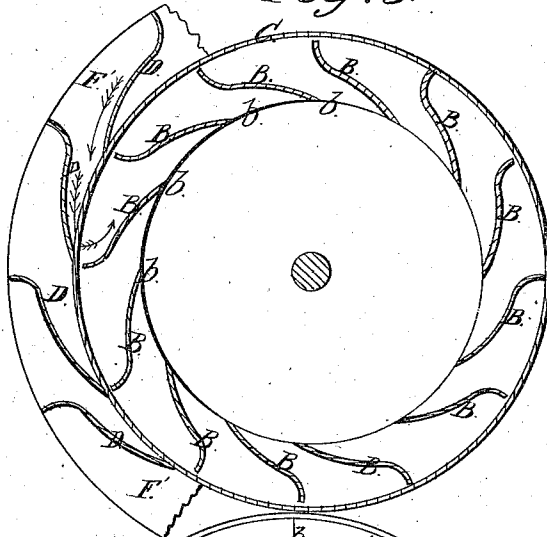


Fig: 4.

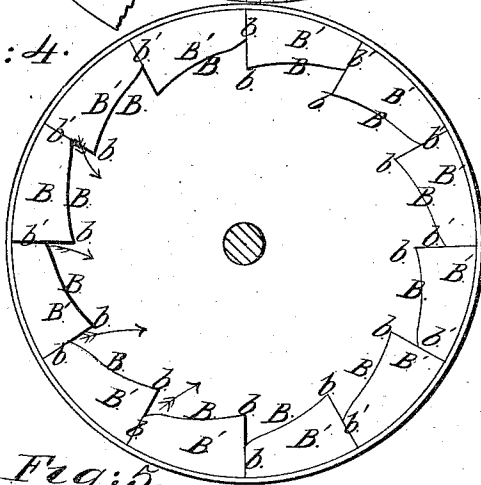


Fig: 5.

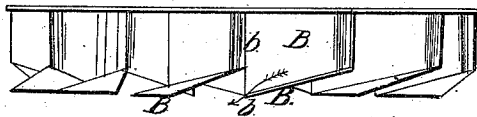
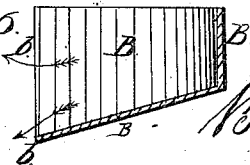


Fig: 6.



Witnesses:
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Inventor:

Burk Sutherland

United States Patent Office.

BRUSH SUTHERLAND, OF CHICAGO, ILLINOIS.

Letters Patent No. 81,704, dated September 1, 1868.

IMPROVEMENT IN WATER-WHEELS.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that I, BRUSH SUTHERLAND, of Chicago, in the county of Cook, and State of Illinois, have invented a new and useful Improved Turbine Water-Wheel; and I do hereby declare and make known that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and the letters and figures marked thereon, which form part of this specification.

My said invention consists in a novel form of the buckets of a turbine-wheel, whereby the water, in passing through the same, has both a central and a downward discharge and action upon the wheel, thereby greatly increasing the capacity and power of the same, as hereinafter more fully set forth.

My said invention further consists in the arrangement of the gate between the chutes and the wheel, so as to allow the mass of the water, and the entire weight thereof, to operate directly upon the wheel, thereby obtaining a much more powerful effect upon the wheel, than where the gate is arranged exterior to the chutes, as hereinafter fully described.

My said invention further consists in the arrangement, upon the interior face of the gate, of a band or stop-water, which fits down closely upon the top or flange of the wheel, so as effectually to prevent the leakage of the water in upon the top of the wheel, when the same is not in operation, as hereinafter more fully explained.

My invention further consists in so constructing the dome or cover over the wheel, that access may be had to the stop-water hereinbefore mentioned, and the one hereinafter to be mentioned, for the purpose of adjusting the same when required, without removing said dome, while at the same time a flange rests down upon the top of the wheel or its flange, so as to prevent the column of water from resting upon or gaining access to the top of the wheel, as hereinafter more fully described.

And my said invention further consists in providing the flange which extends from the dome, to exclude the water from the top of the wheel, with an adjustable rim or stop-water, for the purpose of more effectually excluding the water and preventing its waste, substantially as hereinafter set forth.

To enable those skilled in the art to understand how to construct and use my said improved turbine water-wheel, I will proceed to describe the same with particularity, making reference in so doing to the aforesaid drawings, in which—

Figure 1 represents a plan view of the wheel, showing also the form of the chutes for admitting water into the wheel.

Figure 2 is a vertical central section of the entire apparatus.

Figure 3 is a horizontal section, taken through the wheel-gate and the chutes.

Figure 4 is a view of the lower side of the wheel, detached from the chutes.

Figure 5 is a detached side elevation of the wheel, and

Figure 6 is a side view of one of the buckets thereof.

Similar letters of reference denote the same parts of my invention in the several figures.

A represents the upper flange of the wheel, to which the buckets are attached, which flange may consist of an annular flange of the proper width, having arms extending to the shaft of the wheel, or may be a circular plate, as shown, with openings therein, to allow the leakage-water to pass through the wheel, which might pass the stop-water hereinbefore mentioned, and gain access thereto.

The buckets are composed of a curved plate, B, of the configuration usually adopted in turbine-wheels, to provide for the central action and discharge, together with an inclined bottom plate, B', open at the discharge-end of the bucket, to permit and provide for a downward action and discharge of the water, thus producing a single wheel and a single series of buckets, in which both the central and downward action and discharge of the water are obtained, and in which the entire area of the wheel is rendered available as the area of discharge, greatly increasing the capacity and power of the wheel.

The curve of the bucket which produces the central action and discharge of the water is clearly indicated in fig. 3, while the inclined bottom of the bucket, which produces the downward action and discharge, is shown

in fig. 6; the water discharging centrally passing the vertical edge *b* of the curved side *B*, and the water discharging downwards passes down over the horizontal edge *b'* of the inclined plate *B'*.

The chutes *D* are constructed and arranged with respect to the wheel in the usual manner, between the upper and lower annular plates *F F'*, with the exception that an annular space intervenes between the chutes and the wheel, in which there is arranged a gate, *C*, which is moved down to shut off the water from the wheel, as shown in fig. 2, or raised up when desired to admit the water to the wheel, by revolving a shaft, *J*, which is provided with pinions, *j j*, engaging with vertical racks, upon the arms *E*, which are attached to said gate, as shown, the said arms *E* moving up and down, as required, in suitable ways or guides *K K*.

By this arrangement of the gate between the chutes and the wheel, instead of outside the chutes, as is the ordinary mode, the volume of water is brought to bear directly upon the wheel, instead of being admitted through the chutes before the pressure of the water can be brought upon the wheel.

Upon the interior surface of the circular gate *C* there is arranged a ring, *c*, which ring moves down upon the top of the flange of the wheel as the gate is closed, its lower edge being ground so as to fit closely and accurately upon the ground upper surface of the flange of the wheel, and thus the leakage of the water between the edge of the flange *A* and the gate, when the gate is closed, is effectually prevented.

This ring or stop-water *c* may be adjustable or movable within the gate, so as always to be kept close down upon the wheel when the gate is shut, but as there is no wear between or upon the ground surfaces of the flange *A* and stop-water *c*, this adjustability of the stop-water is not absolutely necessary, the said stop-water being raised up from the wheel when the gate is raised to set the wheel in motion.

The dome or cover of the wheel *G*, which is designed to protect the top of the wheel from the pressure of the water, and to prevent the waste and escape of the water down through the centre of the wheel, is provided with a vertical circular flange, *H*, which fits closely down upon the flange of the wheel, which flange *A*, and the lower edge of the flange *H*, being ground so as to fit substantially water-tight, a joint is made which excludes the water from the space within said flange *H*.

But inasmuch as the wheel revolves in contact with the edge of the flange *H*, the wear thereof would soon leave a space for water to enter, and therefore said flange *H* might be made adjustable vertically, to provide for such wear; or an adjustable circular stop-water, *h*, may be arranged upon the exterior of the flange *H*, at its lower edge, said stop-water having its lower edge ground to fit upon the flange of the wheel, and being susceptible of a downward adjustment when desired, so as always to render the joint between the stop-water *h* and the flange of the wheel substantially water-tight, as aforesaid.

The said dome *G* is secured to the upper flange of the chutes *F*, by means of wide arms *I*, forming a strong and secure attachment, while at the same time the spaces between said arms *I* afford an opportunity for access to the stop-waters *c h*, for the purpose of adjusting or removing the same when desired, without in any manner detaching or taking apart any of the apparatus of the wheels or the dome.

Having described the nature, construction, and operation of my improvement, I will specify what I claim, and desire to secure by Letters Patent.

1. I claim the combination of a stop-water, *c*, with the flange of the wheel and the gate *C*, arranged to operate in the manner and for the purposes shown and described.

2. I claim the dome *G*, provided with a vertical rim, *H*, and supporting-arms *I*, arranged in relation to the flange *F*, substantially as described, and for the purposes set forth.

3. I claim the combination of an adjustable stop-water, *h*, with the rim *H* and the flange of the wheel, in the manner and for the purposes specified.

BRUSH SUTHERLAND.

Witnesses:

L. L. COBURN,
W. E. MARKS.