A. B. STRAND.

WATER-WHEEL.

No. 188,979. Patented March 27, 1877.

Fig. 1.

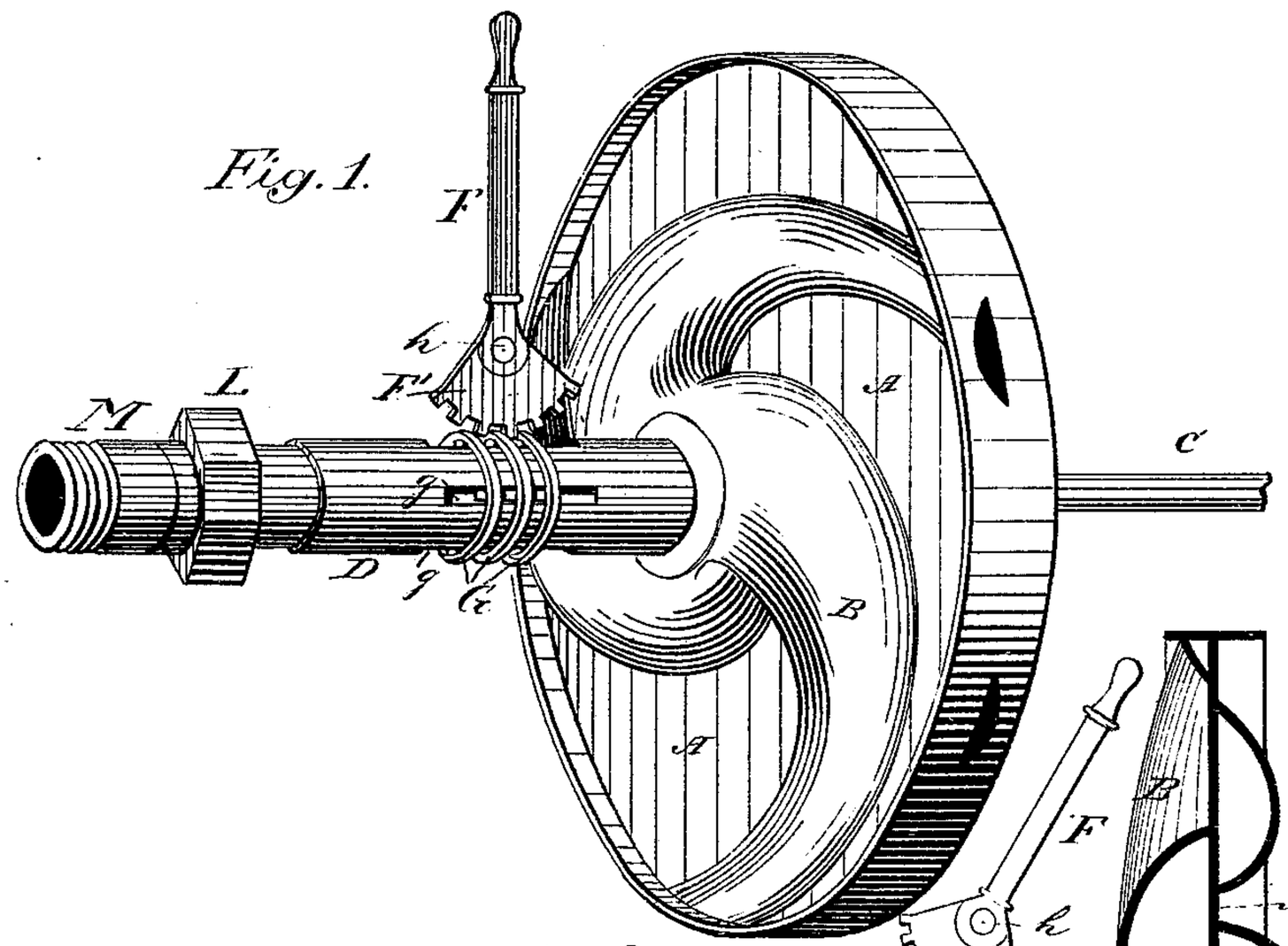


Fig. 3.

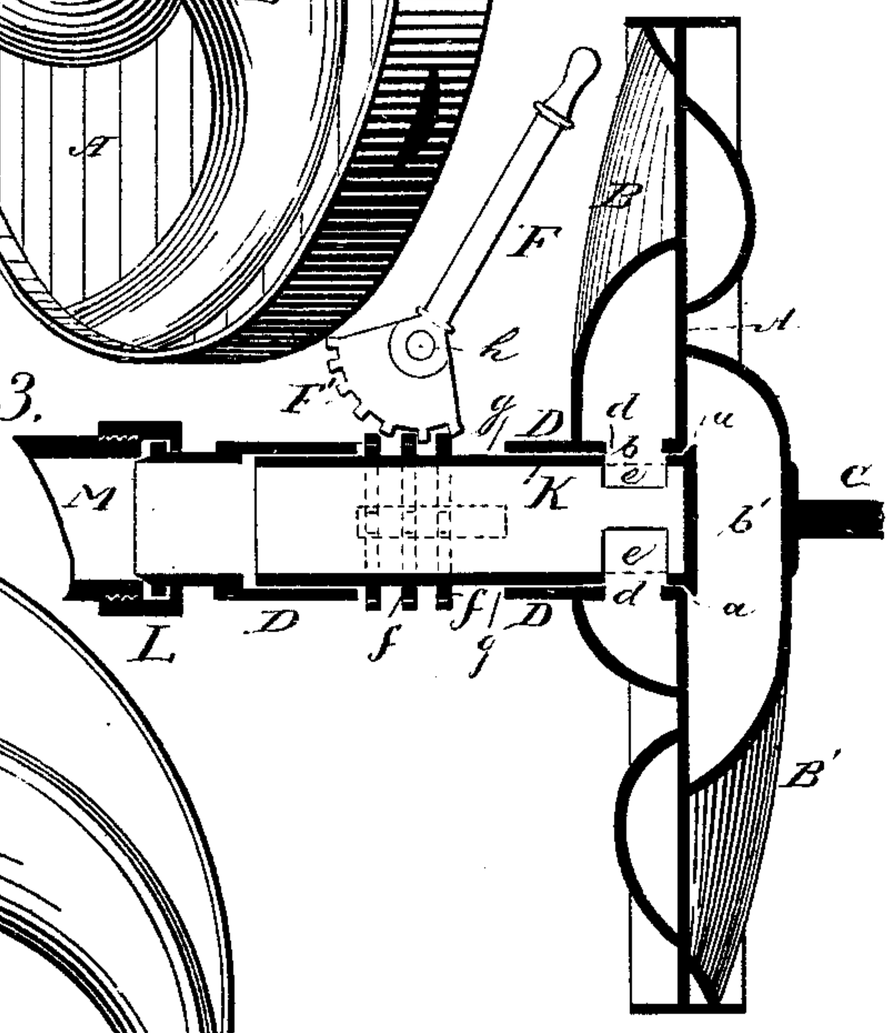
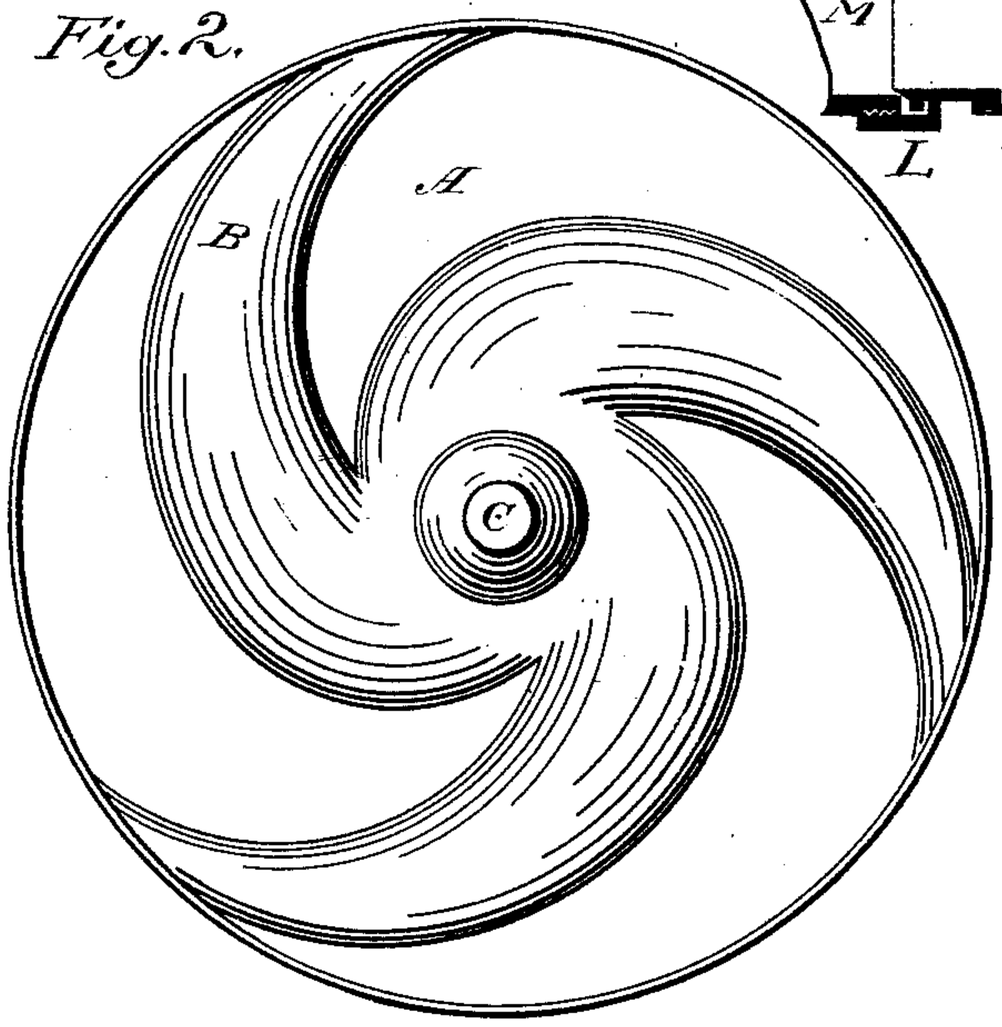


Fig. 2.



Attest:

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UNITED STATES PATENT OFFICE.

AUGUST B. STRAND, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF HIS RIGHT TO LAURITZ THOEN, OF SAME PLACE.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **188,979**, dated March 27, 1877; application filed March 6, 1877.

To all whom it may concern:

Be it known that I, AUGUST B. STRAND, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to that class of vertical water-wheels in which the water is fed into the center or core of the wheel and discharged at its periphery; and it consists, first, in the improved construction of the wheel, by which the water, which is fed under pressure, is caused to yield the greatest possible percentage of power; and, second, in the construction and arrangement of parts by which the wheel may be reversed or made to revolve in the opposite direction at any time, and without stopping it, all in the manner hereinafter more fully shown and described.

In the accompanying drawing, Figure 1 is a general perspective view. Fig. 2 is a side view, and Fig. 3 is a section through the wheel and axle.

Similar letters of reference indicate corresponding parts in all the figures.

A is a circular plate or disk, which forms the body of my improved water-wheel. It has a central perforation, *a*, forming the core at which the discharge pipes or channels converge. These present the appearance of conical pipes or tubes B B′, flattened on one side and bent eccentrically, as shown in Fig. 2. They are disposed on the two sides or faces of disk A, in the manner shown in the drawing—that is, with the wide ends of the pipes converging at the center around perforation *a*, so as to form a chamber or reservoir, *b b′*, on each side of the disk, the two chambers being united by the central perforation *a*, and the narrow ends of the pipes extending to the periphery of the disk A, where they are open for the discharge of water. In the drawings, the pipes on one side of the disk are indicated by the letter B, and those on the opposite side by B′. They are alike in all respects, except in this, that on opposite sides they are bent or curved in opposite directions. This construction causes the water, when expelled through the pipes B, to rotate the wheel in one direction, while, when expelled through the pipes B′, it revolves the wheel in the opposite direction. This necessitates the construction of a mechanism for regulating the flow of water into only one series of pipes at a time, as I shall now proceed more fully to describe.

The axle of the wheel is formed on one side by a solid shaft, C, secured to the solid outer wall of the chamber *b′*, formed by the converging pipes B′ on one side of disk A. On the other side it is formed by a heavy tube, D, passing through chamber *b*, where it has slots or openings *d*, through which water may pass into pipes B, and terminating in chamber *b′*, into which it barely projects. In tube D slides another tube, K, closed at the end, and having slots *e*, corresponding to slots *d* in tube D. The tube K must fit closely, like a piston, in tube D. It has near its open end, which projects into tube D some distance beyond the wall of chamber *b*, several studs, *f f*, projecting through slots *g g* in tube D. G G are rings, secured to studs *f f* parallel to each other, and sliding on the outside of tube D. F is a lever, having its fulcrum at *h*. At its lower end it has a segmental rack, F′, the teeth of which engage with the rings G. Thus, when the wheel is in operation, and the rings G revolve with the tubes D and K, the rings slide between the teeth of the segment F′. When this is moved sidewise, by operating the lever F it presses against the rings, thus forcing these and the tube K, to which they are attached, sidewise. Now, if the tube K before this operation was in the position shown in Fig. 3—that is, with its closed end projecting only as far as the disk—the water, when let into tube D, will pass through perforations or slots *e* in tube K, and slots *d* in tube D, (which, at the time, are outside slots *e*,) and into the discharge-channels B, through which it is ejected. The end of tube K being closed, no water can pass into channels B′. In the instant the position of tube K is reversed by the operation of the lever F, the slots *d* in

tube D are closed by the solid walls of tube K, the end of which having the slots *e* is now pushed into chamber *b'*, into which the water is thus conducted, and from whence it is ejected through channels B'. These, being curved in the opposite direction of channels B, cause the instantaneous reversion of the wheel.

The tube D is connected by a loose joint or coupling, L, with the flume or conduit-pipe M, through which water is conducted, under suitable pressure, from the reservoir or stream, the water of which drives the wheel. The pipe M has a stop-cock or gate, by which the water can be shut off and regulated at any time. The wheel is arranged in suitable bearings, and its axle C connects it, by a gear-wheel, drum and belt, or otherwise, with the machinery which the wheel is to drive. The entire wheel is also preferably inclosed in a box or casing. (Not shown in the drawing.)

The operation and advantages of my improved water-wheel will be readily understood from the foregoing description. The water, when fed into the core of the wheel, which is formed by the converging wide ends of the eccentrically-curved conical discharge-tubes, will, when discharged through the tubes, press against the walls of these with considerable force, thus causing the wheel to rotate, not only from the weight of the water, (which accumulates in the bucket-shaped curves of the tubes as the wheel rotates, and is discharged as soon as the opening of each tube is at the lowest point,) but also from the pressure, which acts directly upon the tubes with great force.

The disk A, being solid, acts as a fly-wheel.

Aside from the improved construction of my wheel, an important feature is the facility with which it may be reversed, as already described. In construction it is compact and simple, and, owing principally to the conical shape of the discharge-tubes, the consumption of water is very limited.

It is obvious that the construction of my improved water-wheel may be varied in a multitude of ways without changing, in the main, the principle of my invention. Thus, for instance, may the discharge-tubes on both sides of the disk A be curved in the same direction, or only one set of tubes may be used, in both of which cases the device for reversing the flow of water is dispensed with, since the wheel then can revolve only in one direction; or, instead of the precise device herein described for reversing the flow of the water, (when two sets of differently-curved discharge-tubes are used,) any other suitable device may be used without changing the spirit of my invention.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The solid vertical disk A, having on one or both sides conical eccentrically-curved tubes, converging at the center, and having for axle on one side the solid shaft C and on the other side the tube D, through which water is fed into the wheel, substantially as and for the purpose herein shown and specified.

2. The disk A, having on each side a set of conical eccentrically-curved discharge-tubes, B B', converging at the center so as to form chambers *b b'*, united by a central perforation, *a*, the tubes on the two sides being curved in opposite directions, substantially as and for the purpose hereinbefore set forth.

3. The combination of the disk A, having tubes B B', arranged as herein described, with the inlet-tube D, having slots *d*, and the tube K, closed at one end, and having slots *e*, the tube K sliding inside tube D, substantially in the manner and for the purpose herein shown and specified.

4. The combination of a water-wheel, consisting of a solid vertical disk, A, having pipes B B', curved in opposite directions, with a device, substantially as herein described, for cutting off the flow of water into either set of pipes at any time, thus reversing the wheel, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

AUGUST B. STRAND.

Witnesses:

CHR. RASMUSSEN,

L. BRATSON.