S. L. Valentine,

Water Wheel,

No. 2,898, Patented Dec. 31, 1842.

Fig: 1.

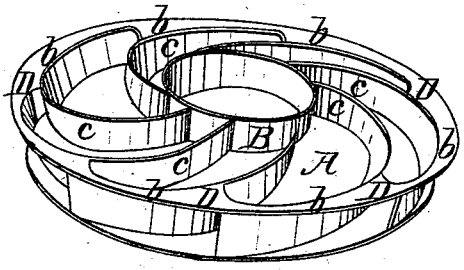
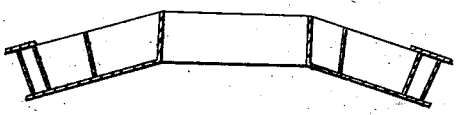


Fig: 2.



UNITED STATES PATENT OFFICE.

SAMUEL L. VALENTINE, OF BANGOR, MAINE.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **2,898**, dated December 31, 1842.

To all whom it may concern:

Be it known that I, SAMUEL L. VALENTINE, of Bangor, county of Penobscot, and State of Maine, have invented a new and useful Improvement in Water-Wheels, of which the following is a full and accurate description, reference being had to the accompanying drawings, making a part of this specification.

My improvement is in that variety of wheels commonly called "reaction-wheels;" and it consists in my peculiar manner of constructing the wheel and buckets attached to the same, to allow of the whole being cast in one piece without any injury resulting from the contraction of the metal in cooling, and also to produce a better effect, as hereinafter shown.

My wheel is of a concavo-convex form—that is, convex on its upper and concave on its lower surface—as shown in the section of the wheel at Figure 2.

In Fig. 1, A is the upper portion of the wheel of a convex form from the periphery to the center of the wheel, at which latter point there is an opening for the shaft to pass through, and to the edge of which opening the lower edge of a vertical collar B is attached. The buckets are plates cast or fastened by their lower edges on the convex surface A of the wheel, and of the same height as the collar B, to the outside of which the inner ends of the buckets are joined. These buckets extend in a curve of nearly half a circle from the collar B to the periphery of the wheel, each bucket being curved in the same direction, and forming with the periphery of the wheel at the point where they meet an angle of about fifteen degrees, more or less, the curve of the buckets being so arranged that one bucket terminates at the periphery of the wheel immediately behind the middle portion of the bucket in front of it, but leaving an opening between them for the escape of the water; or, in other words, a straight line running from the periphery of the wheel at the point where one bucket terminates to the center of the wheel would pass through near the middle of the bucket preceding it, as shown at Fig. 1, where C C are the buckets, curving from the collar B to the periphery of the wheel, and arranged as set forth, the spaces between them serving as guides for the passage of the water.

To strengthen the buckets and to increase at the same time the effect of the wheel by contracting the openings where the water escapes from it, I make use of a rim or ring placed immediately over the periphery of the wheel and resting on the buckets through the outer half of their length, which rim is scalloped on its inner edge to adapt it to the curve of the buckets, to the upper edge of each of which a scalloped edge of the rim is joined, as shown in Fig. 1, where D is the rim, placed above and parallel to or with the periphery of the wheel, but somewhat greater in circumference, and *b b* the edges of the scallops made in the rim, of the same curve as the buckets, to the upper edge of which they are joined. These wheels are applied to the perpendicular and also to the horizontal shafts, and the water conducted and applied to the wheel, as is usual with other reaction wheels now in use. When applied to the vertical shaft, a cistern may be placed round the wheel—say three feet high (more or less) from the surface of the wheel—the top of the cistern being covered with a flange, which is attached to the shaft, and of course turns with the wheel. This flange or cover not only secures the water in the cistern, but serves as a lighter, whereby the box on which the shaft rests is relieved from a part of the weight of water which presses upon the wheel. The water is conducted to the cistern from the flume through a gate sufficiently large to keep up a constant pressure in the cistern equal to the head of water in the flume, and is pitched so as to strike the wheel from the shaft to the inside of the scalloped rim and in the direction the wheel turns, and as the water in the cistern revolves with the wheel there is a constant percussion against the buckets in addition to the reacting power of the water.

When applied to the horizontal shaft, two wheels may be placed on the same shaft about four feet apart, facing each other, with about two inches of the outer edge of the scalloped rim bearing against the ends of the cistern, which is built round the shaft and between the wheels, and so well fitted that but very little water can escape, except through the issues of the wheels.

In pitching the water into the cistern I observe the same rules as I do with the perpendicular shafts—that is, to make the gate sufficiently large to raise a pressure in the cistern equal to the head of water in the flume,

and always give the water such a direction in entering the cistern as will best conform to the motion of the wheel, and so as to produce a constant percussion, as well as the reaction of the water. In consequence of the long curved buckets the water in first entering the cistern gives a sudden percussion, which instantly sets the wheel in motion, which is a great advantage over all other reaction-wheels within my knowledge. The convex form of the wheel allows of its being cast whole, as it admits of its contracting while the metal is cooling, and thus prevents any danger of its cracking, as in wheels of the old construction.

The inclined plane which is formed on every side of the wheel also assists in its action, as it offers less resistance to the passage of the water than if the wheel were flat, and allows of the weight of the whole column of water being brought to bear more directly on the buckets and vents of the wheel, producing necessarily a greater effect.

Having thus described my invention, which I denominate "concavo-convex reaction-wheel," what I claim as my improvement, and desire to secure by Letters Patent, is—

The concavo-convex construction of the wheel, being convex on one side and concave on the other side from the periphery to the shaft, in combination with the buckets and rim, constructed and arranged as herein set forth.

SAMUEL L. VALENTINE.

Witnesses:

SARAH B. VALENTINE,

MARY I. VALENTINE.