T. Rose,

Water Wheel,

No. 7,674. Patented Sep. 24, 1850.

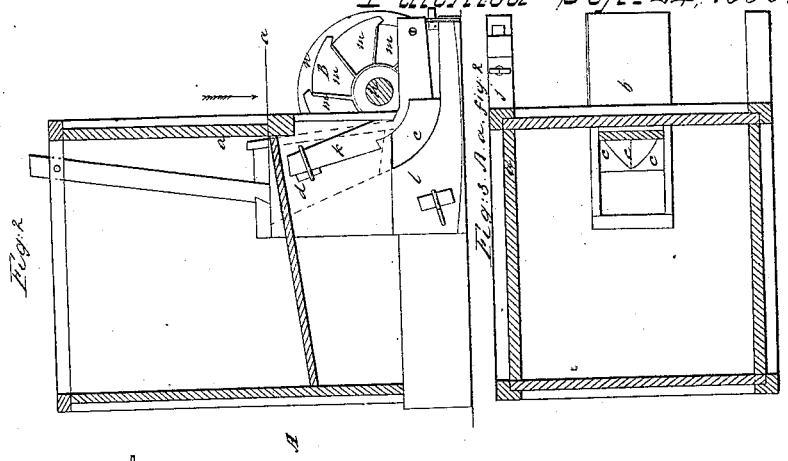

Fig. 2.

Fig. 3. a section of fig. 2

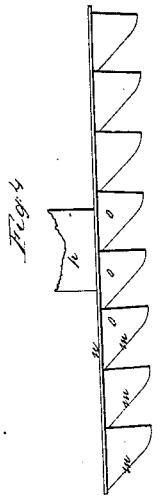

Fig. 4

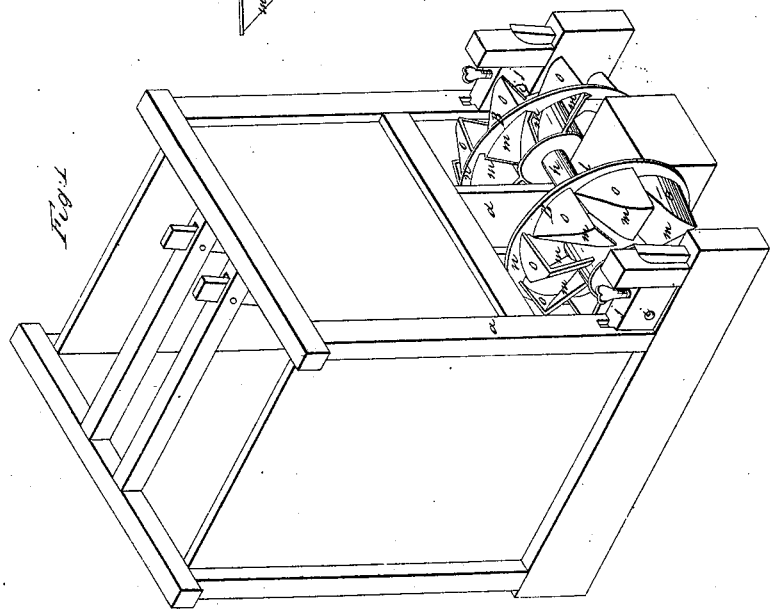

Fig. 1

UNITED STATES PATENT OFFICE.

TIMOTHY ROSE, OF CORTLANDVILLE, NEW YORK.

WATER-WHEEL.

Specification of Letters Patent No. 7,674, dated September 24, 1850.

To all whom it may concern:

Be it known that I, TIMOTHY ROSE, of Cortlandville, in the county of Cortland, and State of New York, have invented new and useful Improvements in Water-Wheels, and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of two of my improved wheels mounted on one shaft, Fig. 2 a vertical section; Fig. 3 a horizontal section taken at the line (A*a*) of Fig. 2; and Fig. 4 represents the periphery of the wheel developed to show the inclination and curve of the buckets.

The same letters indicate like parts in all the figures.

The improvements for which I claim Letters Patent are on that class of turbine wheels called the "direct action," in contradistinction to the generality of turbines which operate on the principle of the reaction. The leading characteristic which distinguishes reaction from direct action wheels, is, that the buckets of the reaction wheels are always flooded, that is, filled, whilst in the direct action they are only partly filled, the discharge of water in the former being regulated by the discharge aperture of the buckets, and in the latter by the flume or chute or some means connected therewith. The direct action turbine wheels have heretofore been so formed as to have the buckets inclined or curved first from the face of the wheel in the direction of the rotation and the current of water, so as to move before the water (as it is termed among millrights) and then the buckets are curved back in the reverse direction. This I have ascertained by experiment to be defective for the reason that the water must lose a great portion of its force in striking that part of the bucket which is inclined in the direction of the current; as for instance, if the wheel be moving with a velocity represented by (1), and the water with a velocity represented by (2), it will be evident that the buckets will only receive one-half of the force due to the momentum of the water, but if the entire surface of the buckets be inclined back in the reversed direction of the current then they will present their entire surface to the action of the water and be impelled by it. But as the velocity and momentum of the water, after its first action on the surface of the buckets is somewhat reduced, it is necessary to decrease the inclination of the buckets toward the issue that they may not leave the water before the discharge.

The nature of this part of my invention therefore consists in making about two-thirds of the surface of the buckets of the wheel at an inclination of about 45° from the face of the wheel, and in a direction the reverse of the inclination of the chute, and thus giving them, down to the issue, a gradual curvature toward the plane of the wheel that they may pug the water, as it is termed, when this is combined with the outer rim of the buckets made of a gradually enlarged diameter that by centrifugal force the water may spread out and act thereon, and at the same time obtain an enlarged aperture for the discharge. Regulating the velocity of direct action water wheels has heretofore been attended with much difficulty, and until the production of my invention I am not aware that any plan was devised for this purpose that did not depend upon the mere increase or reduction of the height or volume of the column of water and which would therefore at the same time increase or decrease the power of the wheel, but as it is highly important for many purposes to vary the velocity and retain the same power the modes heretofore adopted will not effect the purpose contemplated by me; this part of my invention consists in making the issue of the chute movable relatively to the axis of the wheel, or vice versa, that the discharge of the water on to the wheel may at pleasure be made farther from or nearer to the axis of the wheel to increase or decrease the acting diameter and thus with the same effective force obtain a greater or less velocity to avoid the necessity of varying or shifting the gearing that communicates motion.

In the accompanying drawings (*a*) represents the framing which supports the wheel, and (*b*) a block in which is formed the chutes (*c*, *c*), which, as shown in the drawings, are segments of spirals leading down from the flume (*d*). The chutes commence at the bottom of the flume, and are cut out of the solid block (or otherwise made

of separate pieces), leading a wedge like block (*e*) in the middle of the upper edge of which divides the column of water into two. The top of this wedge like projection is on a level with the upper extremity of the chutes and its sides gradually approach the sides of the block where they form the lower extremity; and the front faces of the chutes are in the form of a segment of a circle or nearly so, and the back faces are concentric therewith or nearly so.

There are two wheels (B, B) each on one end of a horizontal shaft (*h*) and therefore on opposite sides of the flume and so located as to face the chutes which are below the axis of the wheels. The journals (*i*, *i*) run in movable boxes (*j*, *j*) in the frame that the wheels may be elevated or depressed, and thus admit of moving the axis of the wheel from or toward the chutes, that the water may act on a greater or less diameter of the wheel to increase or decrease the effective velocity thereof with the same column and power of water, but instead of this may be substituted two movable plates or gates (*k*, *l*,) on each side they are hinged at one end, and both keyed at the other end to admit of adjustment whereby the position of the chutes may be shifted relatively to the axis of the wheel, and at the same time enlarged or diminished in capacity if desired. The apertures for the discharge of the water onto the wheels should be of less area than the cross section of the chutes that the water may with the more certainty be discharged onto the wheels in solid columns. When the plates or gates are used as the means of varying the capacity of effective diameter of the apertures, it is only necessary to make the curved or spiral chutes of greater capacity than the apertures, but when these are not used then the chutes should be provided with projecting lips corresponding with the plates or gates.

The wheel is formed with a series of buckets (*m*) which extend radially from a hub on the shaft and about two thirds of their surfaces from the face of the wheel are at an angle of about 45 degrees with the face, and therefore in part, plano-curvilinear, and then the remaining portion is made with a gentle curve toward the plane of the wheel to hug the water as stated above.

At the receiving face of the wheel the outer edge of the buckets are attached to a flat ring (*n*) the inner periphery of which is scalloped out to correspond with the outer face (*o*) of the buckets, which instead of being concentric are eccentric, that is, of a gradually enlarged diameter from the commencement to the end of the bucket, that the water may act thereon by centrifugal force and give an enlarged outlet for the free discharge of the water. It will be seen that when the wheel is in place that the plane of the buckets relatively to the plane of the wheel is inclined the reverse of the direction of the current of water in the chutes and that as a necessary consequence the water in issuing from the chutes will strike the inclined face of the buckets at a right angle, or nearly so, and therefore exert its whole or nearly its whole force to impel the wheel, and that as the extremity of the buckets would leave the water by reason of the retardation due to the resistance produced by the wheel, the curve given to farther end of the buckets will avoid this and cause the water to impinge on their entire surface; this however will occasion a slight accumulation of the water which renders an enlarged issue such as described necessary.

It will be obvious from the foregoing that any mode of shifting the axis of the wheel relatively to the chute, or the chute relatively to the axis of the wheel will effect the purpose of one of my improvements and be on the same principle. I do not wish to limit my claim to the precise arrangements described as these may be varied; and I have therefore described some variations of the mode of applying my principle to distinguish the principle from the mere mode of applying it. As regards the structure of the wheel I do not wish to confine myself to the precise angles or curves as these may be slightly changed without materially affecting the principle of my invention.

What I claim therefore as my invention and desire to secure by Letters Patent is—

Making the discharge aperture of the chutes movable relatively to the axis of the wheel, or the axis of the wheel movable relatively to the aperture of the chute, substantially as described, for the purpose of varying the effective diameter of the wheel, and thereby increasing or decreasing the velocity thereof, substantially as described.

TIMOTHY ROSE.

Witnesses:

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EDWARD A. PETERS,
H. C. BUNDY.