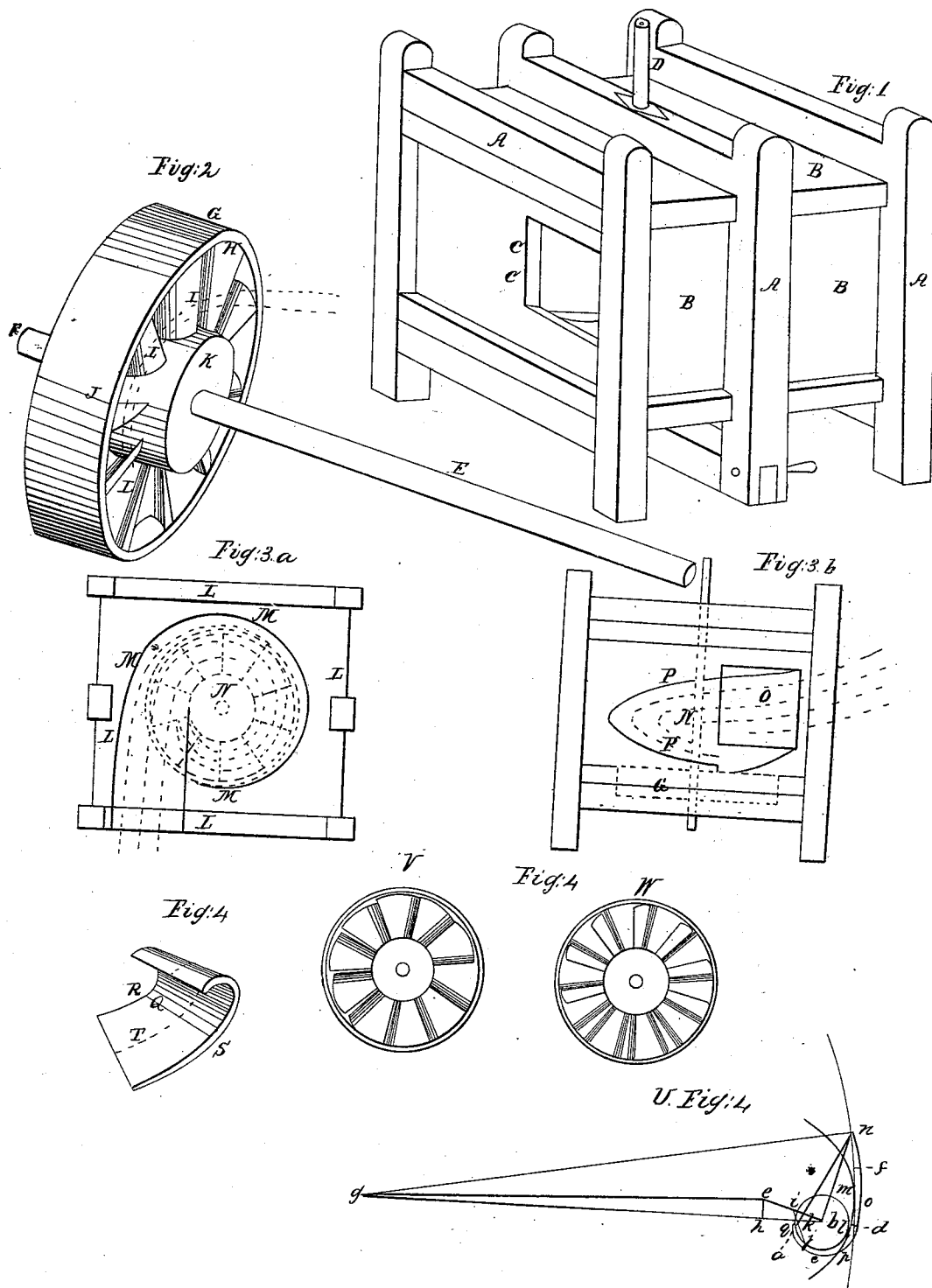


C. B. Whitney, Water Wheel,

No 19,115,

Patented Jan. 12, 1858.



UNITED STATES PATENT OFFICE.

CHAUNCEY B. WHITNEY, OF ITHACA, NEW YORK, ASSIGNOR TO PHILLIP CASE, OF SAME PLACE.

IMPROVED CHUTE FOR WATER-WHEELS.

Specification forming part of Letters Patent No. 19,115, dated January 12, 1858.

To all whom it may concern:

Be it known that I, CHAUNCEY B. WHITNEY, of the town of Ithaca, in the county of Tompkins and State of New York, have invented a new and Improved Water-Wheel; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to letters of reference marked thereon, in which—

Figure I is a perspective view of the flume or water-chest containing the wheel. Fig. II is a perspective view of the wheel itself on its shaft. Fig. III represents parts of the flume or water-chest. Fig. IV represents essential parts of the wheel itself.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The nature of my invention consists in the peculiar construction and combination of my wheel and flume, as follows:

In Fig. I, A A A are the ties or wooden frame-work that holds the flume or water-chest together. B B are the boards or planking of the frame, and C C the entrance for the water. It is closed or may be closed by any convenient gate. The whole water-chest may act as a bed-piece for the wheel or only the middle ties. D is the projecting portion of the shaft of the wheel, to which suitable mechanical means may be attached for the purpose of using the power of the wheel. Although described as of wood, it is contemplated to make the flume or chest of iron; but in that case the principle and purpose will be the same, and although the drawings represent the wheel as having a perpendicular shaft it is not designed to limit the wheel to this nor to any other position.

Fig. II is a view of the wheel out of its flume or water-chest. In it E is the longer arm or end of the shaft and the end to which attachments are made for the purpose of using the power of the wheel, and F denotes the other end of the shaft, which has in it a "step." G is the wheel on the said shaft, and H is the surface of the wheel which receives the action and force of the water contained in the flume or water-chest. I I I are buckets of the wheel. J is the outer rim of the wheel, made to fit accurately to the corresponding

rim or circle attached to the flume or water-chest. K is the central portion of the wheel and is designed to support the buckets and by means of the buckets the outer rim of the wheel and give mechanical means of attaching the wheel to the shaft. The red dotted lines show the direction of the impinging current on the wheel, that it falls directly into the circular portion of the buckets.

By Fig. III it is designed to show the construction of the flume or water-chest more minutely. In Fig. III, *a* is a transverse section of the flume or water-chest. In it L L is the planking or sides of the water-chest or flume and M M the inner planking. The outer planking as to shape or size is of no particular moment; but the inner planking or cast-iron wall (when made of iron) is in the form of a helix, so that a larger surface than the surface of the wheel is covered by water at the outer portion of the helix curve; but at the smaller or inner end of the helix curve the water covers only the surface of the wheel. It will be particularly noticed how this portion of the curve aids the intensity of the action of the water. The dotted lines show the entrance and motion of the water on the upper surface of the wheel. Further, it will be particularly noticed that the helix curve is entirely above the upper surface of the wheel or surface on which the water acts. N is the shaft, and connected with it are the black dotted lines representing the hub or center of the wheel, the buckets and the rims of the wheel, one on and part of the wheel and the other immovably attached to the flume and fitted to the rim of the wheel. In Fig. III, *b* is a vertical section of the flume or water-chest at right angles to the one just described. In it O is the entrance for the water, and the lines P P continued from the entrances show the conchoidal or screw-shaped top or roof of the flume or of the inner planking. As in the other figure, N is the shaft and G is the wheel. It will be particularly noticed that the peculiar curve allows of an ample entrance for the water, that it narrows or approaches the surface of the wheel, curving at the same time around the shaft of the wheel, and at the end or nearly at the end or one spiral revolution, by an abrupt curve comes in contact with the surface of the

wheel at the entrance O. The purpose of this curve is to hold the water in contact with the wheel at the angle of impingement without a space for a counter current or tailings of the water. By Fig. III, *b*, the external view of the flume, is also shown represented by black dotted lines for the wheel and wheel-shaft. As before, O is the entrance for the water. The red dotted lines show the direction of the impinging current before it enters the water-chest, and also in Fig. III, *a*, after it enters and is acting on the wheel.

By Fig. IV the minuter parts of the buckets are represented. Q is a bucket detached from the wheel. The side R is attached to the center piece of the wheel, which is marked as K in Fig. II. It will be perceived that the upper half of the bucket commences by a straight portion, which is intended to be parallel to the direction of the impinging current. This is succeeded by a circular portion, which gently changes into a larger curve, and which larger curve becomes more expanded and is continued to the lower edge of the bucket. More particularly, R is the side attached to the hub or center of the wheel, and S the side of the bucket attached to the outer circumference or rim of the wheel, and T is the line of longitudinal section marked in red dotted lines. This last longitudinal section of the bucket (represented by the dotted line T) is laid out on a scale at U. In it the space *a* is the straight portion of the upper edge of the bucket and occupies thirty-five degrees of the circle, whose center is at *b*; and *c* is the circular portion next adjoining to the part *a*, and said part *c* occupies eighty-seven degrees of the circle, whose center is at *b*; and *d* is the next succeeding portion and occupies fifteen degrees of the circle, whose center is at *e*; and *f* is the lower portion of the bucket and it occupies eight and one-half degrees of the circle, whose center is at *g*. The edges of the bucket, both upper and lower, are rounded and made thinner than the middle portions of the bucket. The purpose of this shape and thickness is as follows: To receive the current of water and allow it to impinge fully and freely on the part *c*, and reflect its action on the surfaces *d* and *f*, and at the lower edge obtain the reaction of the water as it escapes from the wheel. V is a view of the upper surface of the wheel, showing the setting of the buckets in the wheel and the shape of the inlets of the water, and W is a view of the lower surface of the wheel, showing the lower setting of the lower edge of the buckets and the shape and relation of the outlets of the water.

The mode of using the wheel is plain to any one familiar with water-wheels.

It only remains to add a little more on the exact construction of the bucket of my wheel. First, the line *g b* is laid out or drawn forty-four units or parts long. This unit or part is

found by dividing the diameter of the wheel into any of the well-known parts. Say the wheel is thirty-four inches in diameter. An inch, for example, can be a unit or part. So of any other given length. Now mark one end of the line as *g* and the other as *b*. Let *g* be the center of the angle *b g e*, which angle shall measure about four degrees. Draw the line *g e* thirty-eight parts or units long from *g*. By the line *e b* from the center *b* make the angle *g b e* about seventeen degrees. The line *b e* should be six parts or units long. In order to be sure that the triangle *g b e* is correctly drawn, drop a line from *e* at right angles to *g b* upon said line *g b*. This line *e h* should be two units or parts long. Bisect the line *e b* at *i* so that the part *e i* shall be two and three-fourths units or parts in length and the part *i b* shall be three and one-fourth units or parts long. The data for laying out a bucket is now complete. Now from the center *b* with a radius of two and three-fourths parts describe a circle. From the point *i* draw a line three units or parts long and touching the circle about the center *b* at *j*. Bisect the line *i j* at one and one-half unit or part from *j* and mark it as *k*. Then *k j* is the upper part of the bucket or the first portion. From the center *e* describe a portion of a circle touching the circle about *b*. The two curves will touch at *l*. The portion *j l* is the second part of the bucket. Next around the center *g* draw a portion of a circle touching the circle drawn about *e* at *m*. From *g* drop the line *g n* forty-seven units or parts in length, when it should meet the curve described from the center *g*. Make the line *b n* nine units or parts long. Cause the lines *g n* and *b n* and the curve described from *g* to meet at the point *n*. The point *n* is the lower edge of the bucket, and the curve *m n* is the fourth portion of the bucket, while the curve *l m* is the third portion. Thus the inner part of the bucket is laid out. Gently blend the curves at the points *j* and *l* and *m* and *n* and make the outer line of the bucket to correspond, as represented by the line *n o p q*.

Although thus particular in the description, it is not meant that the useful principles involved are invalidated by a deviation somewhat therefrom. The proof-line *k n* is ten and one-half units or parts long.

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

The double helix or scroll or curved funnel-shaped flume or water-chest, when combined with the described bucket in the said water-wheel.

Ithaca, September 11, 1855.

CHAUNCEY B. ^{his} × WHITNEY.
mark

Witnesses:

SAMUEL J. PARKER,
CALEB B. DRAKE.