H. H. Richardson,

Water Wheel,

No. 26,928. Patented Jan. 24, 1860.

Fig. 1.

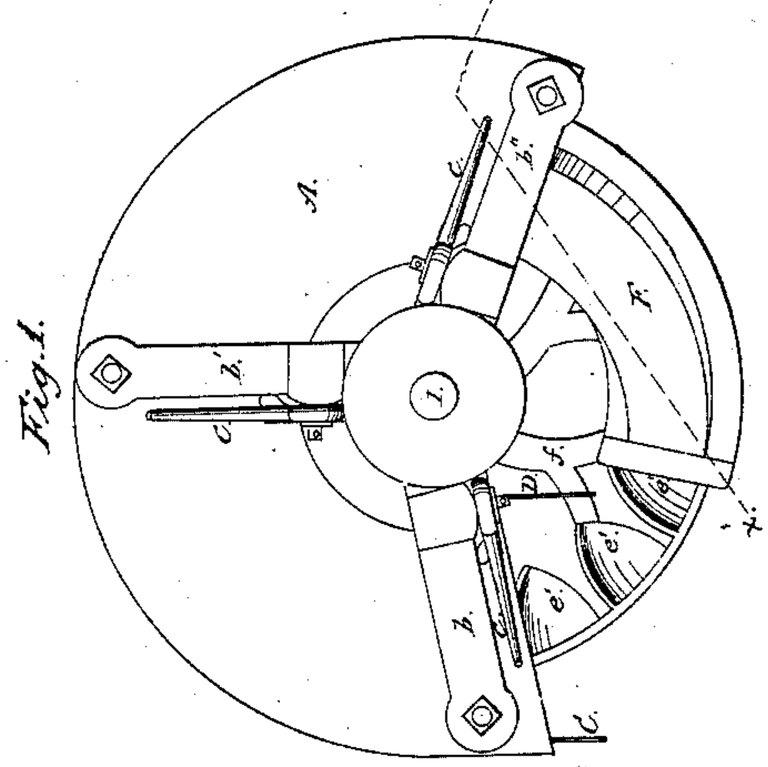


Fig. 2.

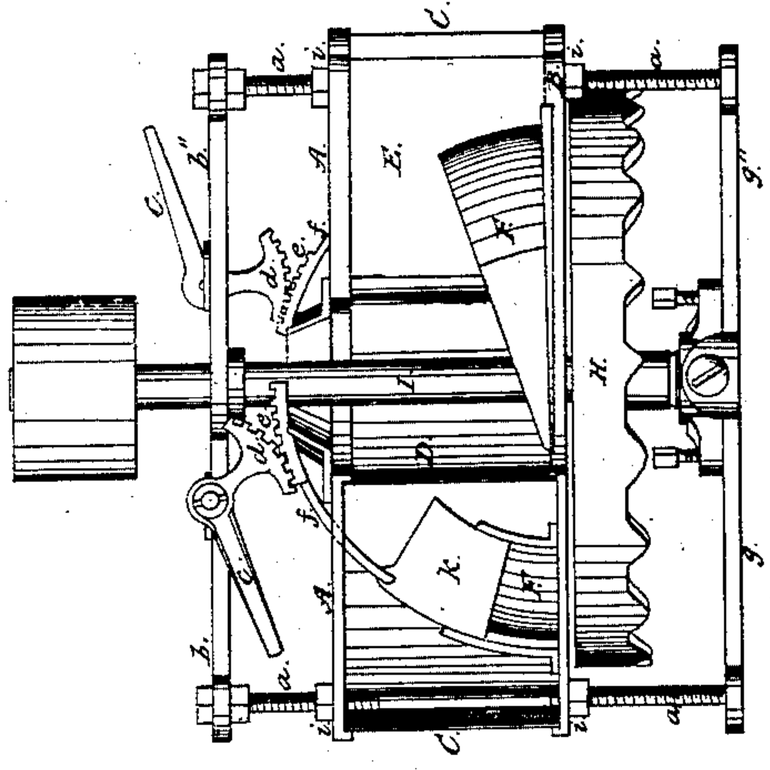


Fig. 3.

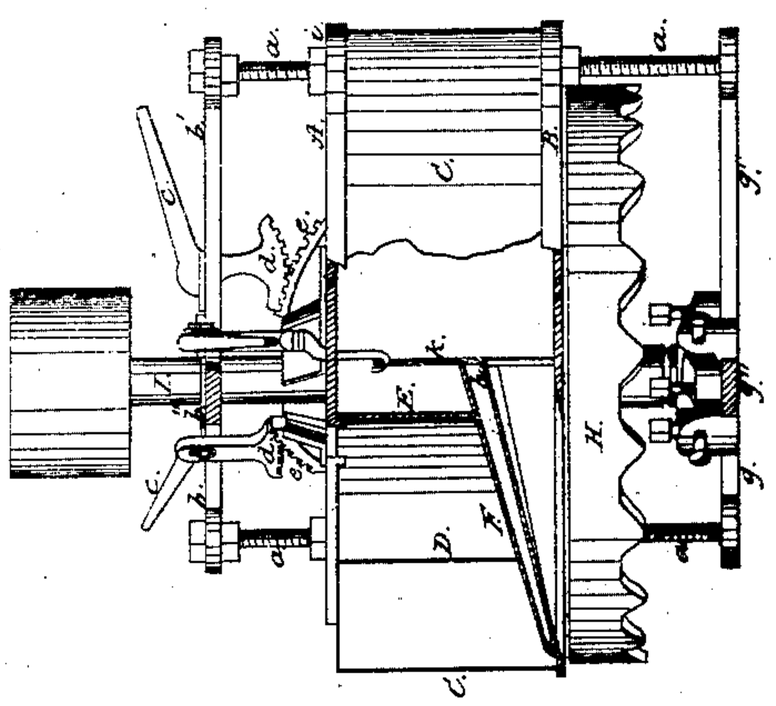
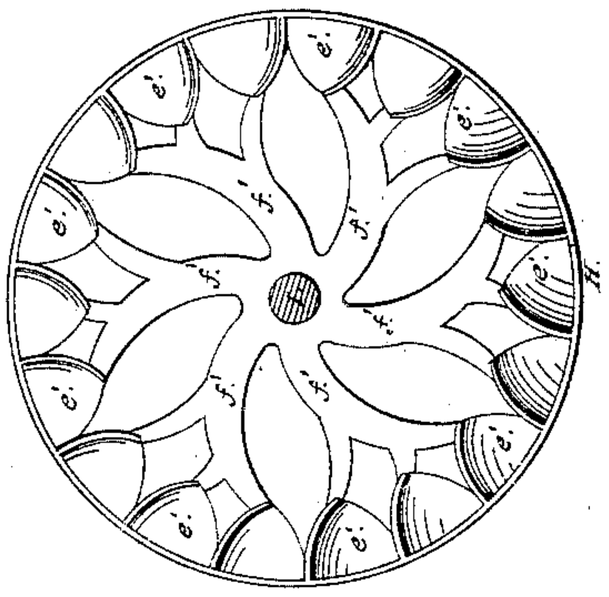


Fig. 4.



Witnesses;
Francis Curtis
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Inventor;
H. H. Richardson

UNITED STATES PATENT OFFICE.

H. H. RICHARDSON, OF BARRE, VERMONT.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **26,928**, dated January 24, 1860.

To all whom it may concern:

Be it known that I, H. H. RICHARDSON, of Barre, in the county of Washington and State of Vermont, have invented sundry new and useful Improvements in Water-Wheels; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a top view of my improved water-wheel, and Fig. 2 a side view of the same. Fig. 3 is also a side view of the main portion of said wheel from a different stand-point, a section of the same in the line *x x* of Fig. 1 being removed for the purpose of showing some of the concealed parts of said wheel. Fig. 4 is a top view of the bucket-wheel detached from its casing.

Similar letters indicate like parts in each of the drawings.

The buckets *e' e'* of the bucket-wheel of my improved water-wheel are cast in one piece with an external rim H and with the branches of a series of arms *f' f'*, which radiate from the hub of said wheel, substantially as represented in Fig. 4, or the said buckets may be riveted or bolted to the external rim and to the branching arms of a similar metallic wheel, if preferred. This bucket-wheel I combine with a sector-shaped water-box (which is supplied with the requisite number of chutes and gates) in the manner represented in the drawings. The top and bottom of the said water-box are indicated in the drawings by the letters A and B, the outer and the inner periphery of the same by the letters C and D, and the closed end thereof by E. The open mouth of the aforesaid water-box, which is shown in Fig. 2, may be connected to a flume or to a water-pipe in any suitable manner. An annular water-box supplied with the requisite chutes and gates may be substituted for the sector-shaped water-box of my improved water-wheel should that shape be preferred by the manufacturer.

The bucket-wheel is combined with the water-box of my improved water-wheel in the following manner, viz: Near the outer periphery of said water-box and at the greatest possible distances from each other three screws *a a a* pass vertically through the same and are secured thereto by means of the nuts *i i i* or by any other suitable device. The lower ends of the said screws *a a a* are united to the outer ends of the arms *g g' g''* of a frame which is placed at a suitable distance below the water-box, and the upper ends of said screws are united to the outer ends of the arms *b b' b''* of a similar frame which is placed a short distance above the said water-box. The journal-box that receives the lower end of the shaft I of the water-wheel is secured to the center of the aforesaid frame *g g' g''*, and the journal-box that receives the upper end of said shaft is combined with the perforated central portion of the frame *b b' b''*. It will therefore be perceived that by turning the nuts *i i i* on the screws *a a a* the wheel can be brought to the desired degree of proximity to the under side of the water-box.

Water is admitted from the water-box to the buckets of the wheel in the following manner, viz: Gate-chutes or recessed gate-boxes of the curved and inclined shape represented in the drawings are formed in the bottom of the water-box immediately above the buckets of the wheel, which gate-chutes receive angular-shaped gates *h k*, whose form enables them to close the mouths of said chutes, and also the sector-shaped eduction-orifices therefrom in the bottom of the water-box. The said angular gates being each composed of two sector-shaped flat plates, and they being loosely hinged to the eduction ends of the gate-chutes, the opening and closing of said gates must be in inwardly-curving lines of motion, and this is effected by means of the curved arms *f f*, the toothed segments *e e* upon the ends of the same, and the toothed segments *d d* at the inner ends of the actuating angular levers *c c*, as represented in Fig. 2. It will therefore be perceived that however small the quantity of water that may be allowed to pass through the gate-chutes it will pass in a solid body against the buckets of the wheel. Another advantage arising from the employment of this peculiar form of gate-chute in connection with an angular-shaped gate is that the said chutes are enabled to discharge a thicker stream of water upon the extreme outer portions of the surfaces of the buckets of the wheel than they discharge upon the inner portions of said buckets, which is of great importance, and especially so when the said

wheel is operated under a low head of water. The buckets *e' e'* are deepest at their outer edges, where they are united to the rim of the wheel, and therefore the shape of the buckets is perfectly adapted to the shape of the streams of water which are discharged upon them from the respective gate-chutes. The sides of the sector-shaped apertures of the gate-chutes I shall generally taper toward their front ends a sufficient degree to prevent the breaking of the water passing through the same before it strikes upon the buckets of the wheel. The under edge of the rim H of the bucket-wheel is notched out between each pair of buckets for the purpose of enabling the water to discharge itself freely from the wheel as soon as it has exerted its propelling force upon said buckets. It will also be perceived that the water is allowed to discharge itself freely from the inner edges of the buckets the instant after it strikes upon them, and therefore it is not possible for any of the water which is discharged upon the buckets from the chutes to remain in the wheel or to obstruct the movements thereof after its propelling action thereupon has ceased.

Having thus fully described my improved water-wheel, what I claim therein as new, and desire to secure by Letters Patent, is—

1. Graduating the respective streams of water and projecting the same upon the buckets from chutes of substantially the within-described shape, when the said chutes are so combined with the pivoted gates *h k* as to obtain the maximum of effect, substantially as herein described, and for the purposes set forth.

2. In combination with the above-mentioned forms of chutes and gates, constructing the bucket-wheel with the branching arms and dish-shaped floats, substantially in the manner and for the purpose herein set forth.

The above specification of my improved water-wheel signed and witnessed this 11th day of October, 1859.

H. H. RICHARDSON.

Witnesses:

A. H. CRAGIN,

JAMES RICHARDSON.