

I. S. ROLAND.
Water-Wheels.

No. 140,593.

Patented July 8, 1873.

Fig 1.

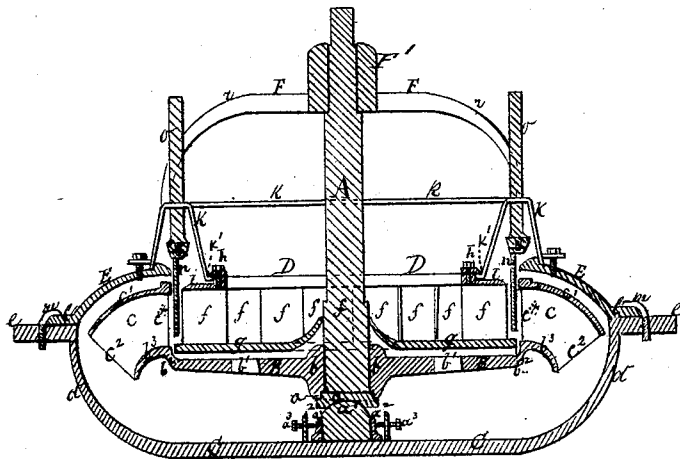
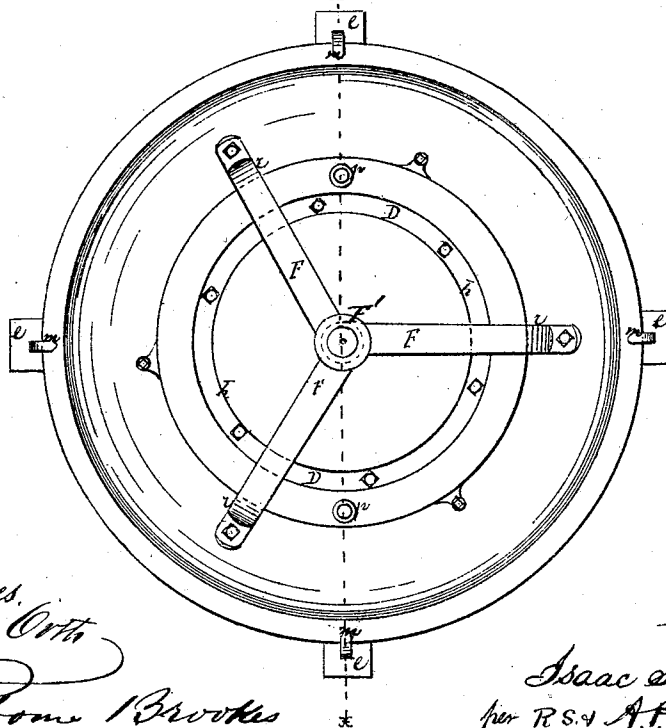


Fig 2.



Witnesses.
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FIG 4

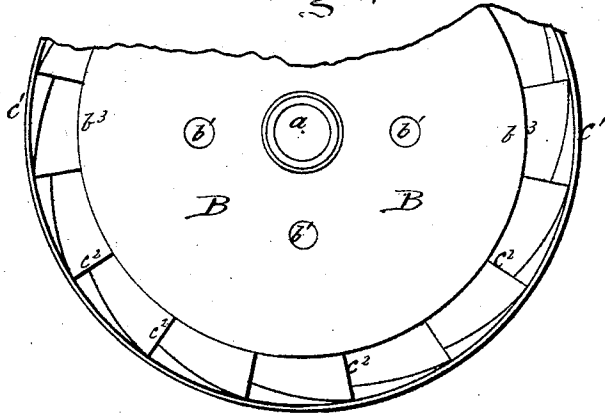
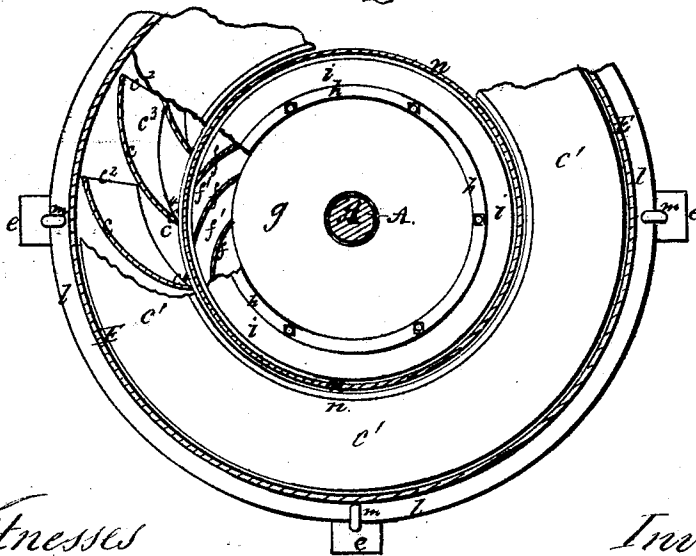


FIG. 3.



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UNITED STATES PATENT OFFICE.

ISAAC S. ROLAND, OF READING, PENNSYLVANIA.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **140,593**, dated July 8, 1873; application filed February 27, 1873.

To all whom it may concern:

Be it known that I, ISAAC S. ROLAND, of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Water-Wheels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

The object of my invention is to provide a substantial and durable water-wheel possessing great power, and at the same time simplicity and economy of construction, combined with non-liability of derangement by reason of substances being floated between the various parts, and thereby deranging the same.

In carrying out my invention, I arrange a supporting-frame composed of four or more arms radiating from a central portion, upon which is arranged an adjustable step, upon which the main shaft revolves. This main shaft, at its lower end, is provided with a removable cap formed of anti-friction metal. The radiating arms of the supporting-frame are bent upward, and at their upper ends are formed with extensions or bearings, upon which an inverted annular dish is placed. This annular dish is provided with a rim, which is embraced by clamps turning on centers carried by the extensions or bearings of the radiating arms. To the upper side of this annular dish a series of supports are affixed, which extend upward, and are bent over so as to support a central bearing for the upper end of the main shaft of the apparatus. A circular plate is affixed to the lower part of the main shaft, the periphery of which is provided with a dished rim, upon which is affixed the lower portion of a series of spiral vanes, which form the buckets of the wheel. These spiral vanes, on one side, are constructed vertical to the plane of the surface of the circular plate, while their other side is formed at an angle, and extends out beyond the periphery of the circular plate, and on their upper sides are formed curved, the curve of the upper surface being so formed as to be concentric with the curve of the dished rim of the circular plate. Upon the upper curved surface of

the series of spiral vanes an annular dished plate is placed, to which each of the vanes is securely fixed. The diameter and width of this annular plate is such that it shall just extend over the upper curved surface of the vanes and form the top of the buckets, while the rim of the circular plate forms the bottom of the same. Within the series of spiral vanes above referred to, another series of curved vanes, forming the chute buckets, is arranged. These vanes are placed in an opposite direction to the outer series, and are affixed at their lower ends to a circular plate, while their upper ends are affixed to, and supported by, an annular plate provided with an annular extension, to the upper end of which a flat ring is attached in such a manner as to form a groove, into which a flange is received and upon which this part of the apparatus revolves. This flange is formed on or affixed to the inner periphery of a circular chamber affixed to the upper part of the apparatus. Within this circular chamber an annular gate is arranged in such a manner that, when required, it may be lowered into position between the chute-buckets and the outer series of buckets, as to more or less close the passage for water between such buckets, and thereby control the action of the apparatus.

But that my invention may be fully understood, I will proceed to describe the same more in detail by aid of the accompanying drawings.

Figure 1 shows a vertical section; Fig. 2, a plan, and Fig. 3 a horizontal section of a water-wheel arranged according to my invention. Fig. 4 represents a detail view of parts.

C represents the supporting-frame, composed of four arms, *d*, radiating from a central portion, upon which is arranged a step, *a*², which is adjustable by means of set-screws *a*³, and is provided with a bearing-surface, *a*¹, upon which the removable cap *a* of the main shaft A revolves. The cap *a* is formed by preference, of anti-friction metal, while the bearing-surface *a*¹ is formed, by preference, of hard wood. The radiating arms *d* are bent upward, and are formed with bearings *e*, upon which an inverted annular dish, *E*, is supported. This dish *E* is provided with a rim, *l*, which is embraced by clamps *m* which turn

on centers carried by the bearings *e*. To the upper side of the dish *E* a series of supports *r* are affixed, which extend upward and are bent over at *F*, so as to support the central bearing *F'*, in which the upper end of the shaft *A* revolves. A circular plate, *B*, is affixed to the lower part of the shaft *A* at *b*, the periphery *b*² of which is provided with a dished rim, *b*³, upon which is affixed the lower portion of a series of spiral vanes, *c*, which form the buckets of the wheel. These spiral buckets, on one side, *c*^{*}, are constructed vertical to the plane of the surface of the circular plate *B*, while their other sides, *c*², are formed at an angle, and extend out beyond the periphery of the rim *b*³ of the plate *B*, and on their upper sides are formed curved, the curve of such upper sides being such as to be concentric with the curve of the dished rim *b*³. *b*¹ are a series of holes in the plate *B* to prevent the accumulation of water upon the plate *B* between it and the plate *g*, and thereby retarding the action of the apparatus. Upon the upper curved surface of the vanes *c* an annular dished plate, *c*¹, is arranged, to which each of the vanes *c* is securely fixed. The diameter and width of the plate *c*¹ is such that it shall just extend over the upper curved surface of the vanes *c* and form the top of the buckets *c*³, while the rim *b*³ forms the bottom of the same. Within the series of spiral buckets *c*³ a series of curved vanes, *f*, forming the chute-buckets *f'*, is arranged in an opposite direction to the outer series of vanes *c*. This series of vanes *f* is affixed at their lower ends to a circular plate, *g*, while their upper ends are affixed to, and supported by, an annular plate, *i*, provided with an annular extension, to the upper side of which a flat ring, *h*, is affixed in such manner as to form a groove, into which a flange, *k'*, is received, and upon which this part of the apparatus revolves, for the purpose of protecting the two series of vanes, *c* and *f*, against being broken or damaged by sticks of wood or other ob-

structing substances which may get entangled between them. Ordinarily, this part of the apparatus remains stationary. It revolves only when caught by an obstructing substance with the vanes of the wheel, by which it will be carried around. The flange *k'* is formed on or affixed to the inner periphery of the circular chamber *k*, which is firmly screwed to the upper part of the apparatus. Within this chamber *k* an annular gate, *n*, is arranged in such manner that, when required, it may be lowered into position between the chute-buckets *f'* and the buckets *c*³, so as to more or less close the passage of water through the buckets, and thereby regulate the action of the apparatus. The annular gate is raised and lowered by means of uprights *o* affixed thereto, which pass up through the upper surface of the chamber *k*. Levers or other actuating means may be arranged to operate the uprights *o*.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the shaft *A*, plate *B*, rim *b*³, vanes *c*, plate *c*¹, plate *g*, and vanes *f*, the dish *E*, chamber *k*, flange *k'*, ring *h*, plate *i*, and annular gate *n*, when arranged and operating substantially as set forth.

2. An annular gate, *n*, operated within a chamber, *k*, and arranged between a series of buckets, *c*³, and a series of chute-buckets, *f'*, substantially as described and set forth.

3. The dish *E*, chamber *k*, flange *k'*, ring *h*, plate *i*, in combination with chute-buckets *f'*, plate *g*, annular gate *n*, when arranged and operating substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of February, 1873.

ISAAC S. ROLAND.

Witnesses:

MATTHIAS MENGEL,
WM. W. DIEHL.