(No Model.) 2 Sheets—Sheet 1.

E. T. DIDEN.

TURBINE WATER WHEEL.

No. 458,336. Patented Aug. 25, 1891.

Fig. 2.

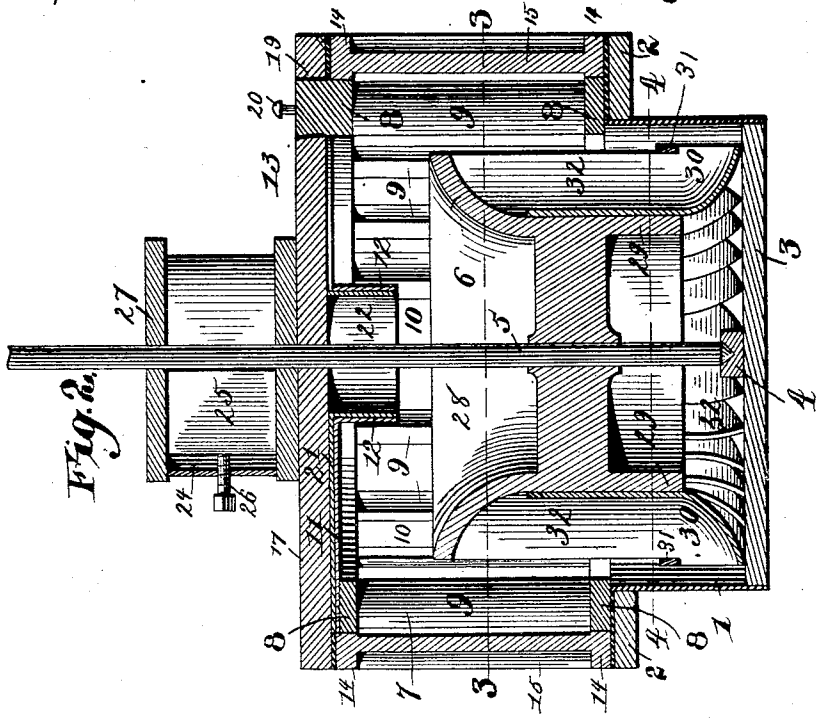
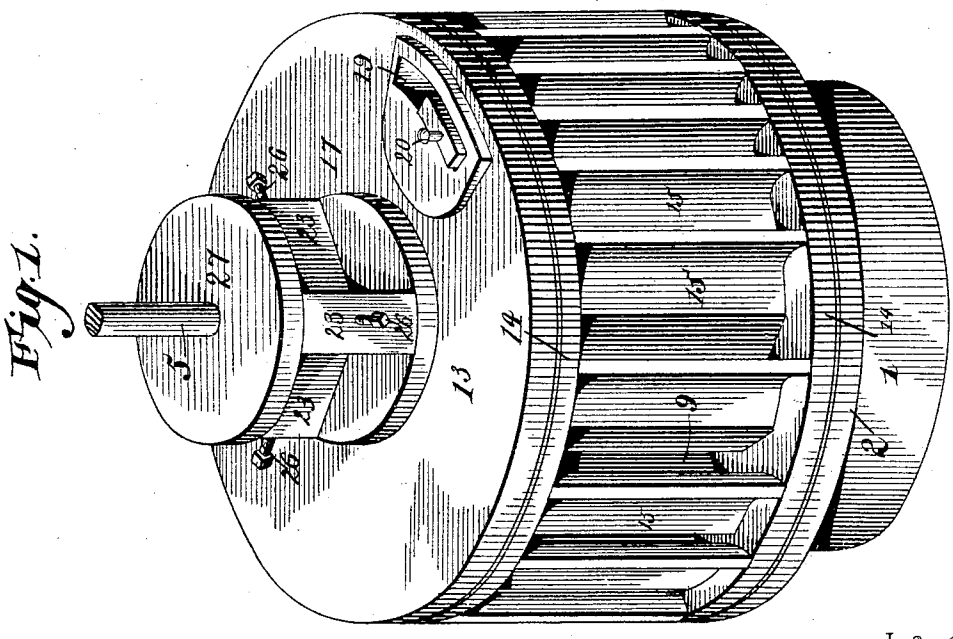


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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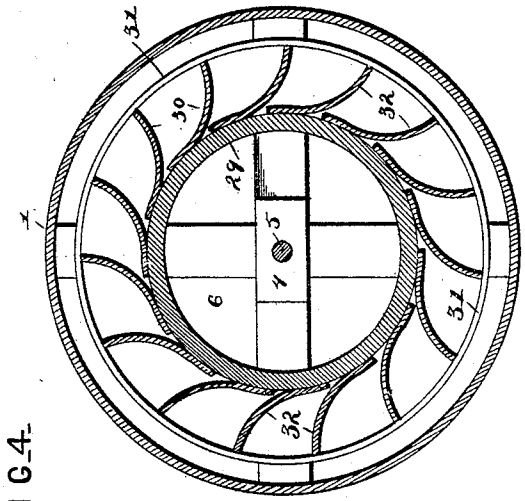


FIG 4.

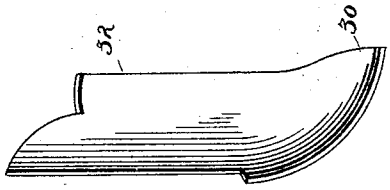


FIG 6.

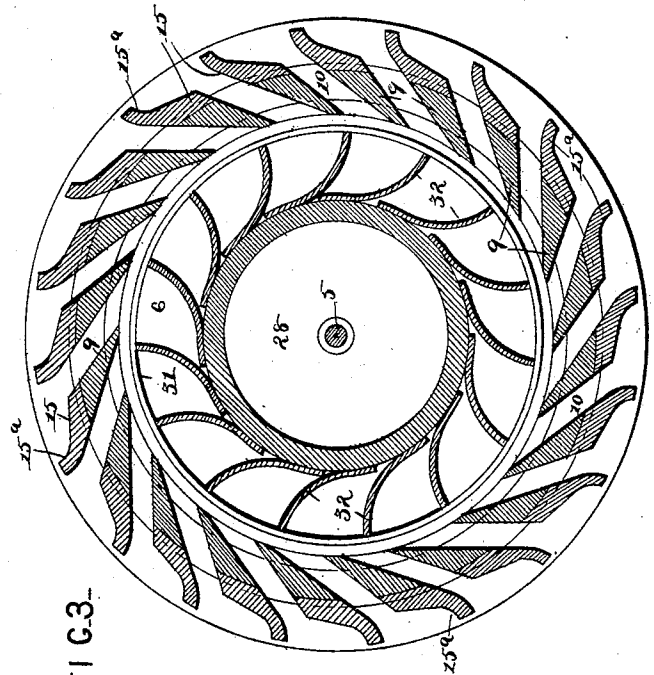


FIG 3.

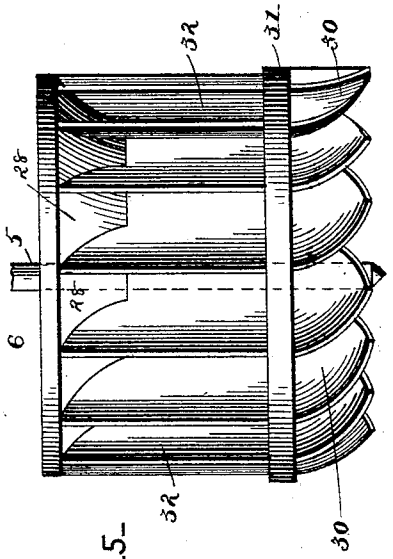


FIG 5.

Witnesses

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UNITED STATES PATENT OFFICE.

EDWARD THOMPSON DIDEN, OF ANNISTON, ALABAMA.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 458,336, dated August 25, 1891.

Application filed August 27, 1890. Serial No. 363,193. (No model.)

To all whom it may concern:

Be it known that I, EDWARD THOMPSON DIDEN, a citizen of the United States, residing at Anniston, in the county of Calhoun and State of Alabama, have invented a new and useful Turbine Water-Wheel, of which the following is a specification.

This invention has relation to turbines; and it has for its object to construct a device of this class which shall possess superior advantages in point of simplicity, durability, and general efficiency, and by means of which the maximum amount of power may be derived from the water which is utilized as the source of power.

With these ends in view the invention consists in the improved construction, arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a perspective view of a turbine embodying my improvements. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a horizontal sectional view taken on the lines 3 3 in Fig. 2. Fig. 4 is a horizontal sectional view taken on line 4 4 in Fig. 2. Fig. 5 is a detail side view of the turbine-wheel removed from the casing. Fig. 6 is a detail view showing one of the buckets of said wheel detached.

Like numerals of reference indicate like parts in all the figures.

1 designates the lower part of the casing, which is provided at its upper edge with a flange 2. The lower portion of the casing 1 is provided with a cross-brace 3, having a central step 4, forming a bearing for the shaft 5, which carries the wheel of the turbine 6. The flange 2 supports the rotary gate 7, which is composed of two rings 8 8, between which are mounted the gate-sections 9, which are approximately triangular in shape and which are set or secured between the rings 8 8 in such a manner as to leave a series of tangential openings or passages 10 between the said individual gate-sections. The upper ring of the gate has a spider 11, having a central bearing-ring 12. The entire gate rests upon the flange 2 of the lower portion of the casing. The upper portion of the casing, which is designated by 13, is composed of the rings or bands 14 14, connected by a series of vertical sections 15, which are approximately rhomboidal in cross-section and provided with outwardly-extending curved flanges 15^a to guide the flow of water, and which are placed a suitable distance apart. The bars or sections 15 are in number equal to the number of gate-bars 9 in the gate, and it will be seen that when the latter is open the edges of the bars 15 will coincide with the edges of the gate-bars 9, thus forming tangential openings for the passage of water. By rotating the gate in the proper direction said passages or openings will be closed by the gate-bars 9 being caused to register with the spaces between the bars 15. In like manner the sizes of the gate openings or passages may be conveniently adjusted to regulate the flow of water to the wheel. The upper casing 13 is mounted upon the flange 2 and is secured to the latter by means of stud-bolts or in any other suitable manner.

17 designates the top plate, which is mounted upon and suitably secured to the upper ring 14 of the upper section of the casing. The top plate 17 is provided with a segmental slot 19 to receive a pin or screw 20, which extends upwardly from the upper ring 8 of the gate. By this means the gate may be rotated to the necessary extent, suitable operating mechanism being preferably employed to effect the desired adjustment. Such operating mechanism, however, is common and well known and need not be further described.

Attached to the under side of the top plate 17 or suitably secured between said top plate and the upper portion of the casing is a spider 21, provided with a central ring 22 to afford a bearing for the bearing-ring 12 of the spider 11, which is attached to the gate. The latter is in this manner at all times guided and held concentric with the wheel and the upper portion of the outer casing. The top plate 17 is provided with a central upwardly-extending boxing 23, having a series of three or more radial chambers 24, in which are seated bearing-blocks 25, which are radially adjusted by means of set-screws 26. The shaft 5 of the wheel extends vertically through the boxing 23 and may be readily centered by means of the bearing-blocks 25, which lat-

ter may also be adjusted when necessary to compensate for wear. The boxing 23 is covered by means of a cap-plate 27.

The wheel 6 is composed of a casting having an upper cup-shaped portion 28 and a downwardly-extending flange 29. Cast or formed integrally with the said flange are a series of buckets 30, which are curved in an outward direction, and the upper outer edges of which are connected by the integral annular re-enforcing band 31. The vertical buckets 32 extend upwardly from the buckets 30 and are provided with outwardly-curved wings or flanges, and their upper edges are suitably recessed or indented to correspond with the configuration of the bell-shaped mouth of the upper cup-shaped portion of the body of the wheel.

From the foregoing description, taken in connection with the drawings hereto annexed, the construction, operation, and advantages of my invention will be readily understood by those skilled in the art to which it appertains. It will be seen that the upper or vertical buckets 32 are of considerable height, their height corresponding with that of the gate-bars 9. Hence a considerable volume of water may be passed through the wheel, and yet without wastage, the water being directed through the passages between the gates directly against the faces of the buckets, which receive the full impact thereof. As the water passes downwardly between the buckets it exerts a very considerable downward pressure upon the rearwardly-curved lower buckets, so that it is practically a second time utilized. Hence my improved turbine may be said to effect a considerable saving of water over others which are practically provided with but a single set of buckets.

In the manufacture of my improved wheel I provide the wheel with a less number of buckets in each circumferential series than there are water-passages in the gate. Owing to this arrangement I insure a steady motion of the wheel, for the reason that the buckets on opposite sides of the wheel will at all times be equally operated upon. I also secure an additional advantage in this, that obstructions to the operation of the wheel of a size sufficient to prevent them from escaping may not enter through the gate-openings.

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

1. In a turbine, the casing comprising the lower section having a flange at its upper edge and the upper section consisting of an upper and a lower ring connected by a series of suitably-spaced bars, the top plate having a spider provided with a central depending bearing-ring, the cross-brace in the lower casing-section having a step, the shaft mounted in said step and having the wheel, and the rotatable gate mounted upon the flange in the lower casing-section and having a spider provided with a central depending bearing-ring, said gate being provided with openings or water-passages in excess of the number of buckets in the wheel, substantially as set forth.

2. In a turbine, the herein-described wheel, composed of a cup-shaped casting having a downwardly-extending flange, the lower series of buckets 30, provided at their upper outer edges with shoulders supporting an annular re-enforcing band 31, and the upwardly-extending vertical buckets 32, having their upper edges shaped to the contour of the bell-shaped mouth of the casting, in combination with the lower casing 1, having flange 2, cross-brace 3, and step 4, the gate supported upon said flange and having spider 11, provided with the central circular depending bearing 12, the upper casing consisting of rings 14, connected by vertical plates 15, and the top plate having a bearing for the upper end of the shaft of the turbine and provided with spider 21, having the central depending bearing-ring 22, the gate being provided with openings or water-passages in excess of the number of buckets in the wheel, all combined and operating substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

EDWARD THOMPSON DIDEN.

Witnesses:
E. L. TURNER,
R. GOODWIN.