(No Model.)

W. H. RIDGWAY.

WATER WHEEL.

No. 415,561. Patented Nov. 19, 1889.

FIG. 1.

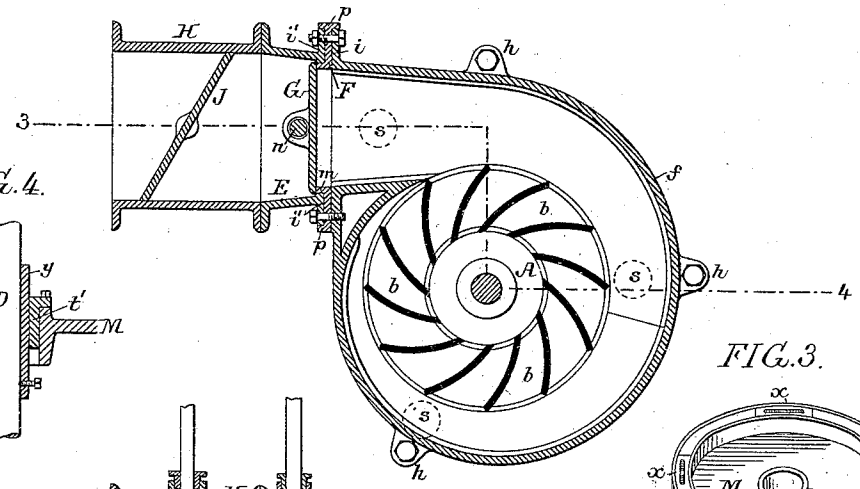


FIG. 4.

FIG. 3.

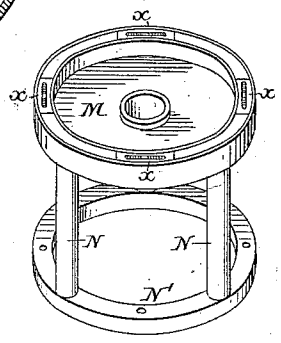


FIG. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM H. RIDGWAY, OF COATESVILLE, PENNSYLVANIA.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 415,561, dated November 19, 1889.

Application filed January 5, 1888. Serial No. 259,874. (No model.) Patented in England April 13, 1888, No. 5,486.

To all whom it may concern:

Be it known that I, WILLIAM H. RIDGWAY, a citizen of the United States, and a resident of Coatesville, Chester county, Pennsylvania, have invented certain Improvements in Water-Wheels, (for which I have obtained British Patent No. 5,486, dated April 13, 1888,) of which the following is a specification.

One of the objects of my invention is to so construct the casing of a duplex water-wheel as to simplify the same and facilitate renewals or repairs.

A further object is to so construct the water-wheel and its casing as to obtain the maximum of power under the various conditions of working; and a still further object is to protect the wheel from injury by reason of the dropping of foreign matters into the same and to prevent the splashing of the belting or gearing without checking or restricting the free discharge of water from the wheel.

These objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional plan view of a water-wheel constructed in accordance with my invention, the section being taken on the line 1 2, Fig. 2. Fig. 2 is a view, partly in elevation and partly in longitudinal section, on the line 3 4, Fig. 1. Fig. 3 is a perspective view of part of the casing-structure, illustrating features of my invention; and Fig. 4 is an enlarged view of one of the bearings for the wheel-shaft.

The wheel shown in the drawings is what is known as a "duplex wheel"—that is to say, the casing contains two wheels A and B, both secured to the same shaft B, the lower wheel B being constructed to discharge downwardly and the upper wheel A discharging upwardly. These wheels, as shown in the present instance, are of a scroll pattern, such as shown and described in my patent, No. 230,339, July 20, 1880; but each wheel has an outer set of vertically-discharging buckets *a* and a set of radial buckets *b*, discharging at the center.

The wheel-casing is made in two parts, the upper part A′ containing the wheel A and the lower part B′ containing the wheel B, and each of these sections forms in itself a complete and self-contained structure comprising the top-plate *d*, bottom plate *e*, and outer scroll-like shell *f*, each casing having also, in the present instance, an intermediate partition *g*, similar to that shown and described in my patent above alluded to. Where a partitioned casing of this character is used in combination with a wheel having two independent sets of buckets, however, the partition being in line with that between the two sets of buckets, a much better result is obtained at part gate than when the wheel has but a single set of buckets, for when the gate is raised to the level of the partition the effect produced is that of one set of buckets remaining at full gate, and hence the maximum power of this set of buckets is obtained.

The casing of the upper wheel is inverted, and lugs *h* on the plates *d* of the two casings are bolted together, so as to securely confine said casings together. By this means I am enabled to readily construct a duplex wheel from two single wheels without any material change in the character of either of the latter, and in case of injury to either of the wheel-casings said casing can be removed and repaired or renewed without disturbing the other casing or incurring the expense of an entirely new casing for both wheels.

Between flanges *i* on the casings A′ and B′ and flanges *i′* on the gate-box E is secured a plate F, which extends from the top of the upper casing A′ to the bottom of the lower casing B′, and is preferably provided with transverse partitions *g′* and *d′*, corresponding with the partitions *g* and plates *d* of said casings, said plate F having a projecting flange *m* extending into the gate-box and forming a seat for the valve or gate G, which is raised and lowered by means of a rod *n* and suitable mechanism common to water-wheels of this class. The plate F has around its outer edge projecting flanges *p*, which overlap and protect the edges of the flanges *i i′* of the wheel-casing and gate-box. Beyond the gate-box E is a supplementary valve-box H, containing a pivoted or "butterfly" valve J, which extends from top to bottom of the box, and by its adjustment serves to permit or to cut off the flow of water to the gate-box E, this sup-

plementary valve being of importance in cases where it is desired to frequently stop the operation of the wheel for a short time—as in saw-mills, for instance—the supplementary valve providing for the cutting off of the flow of water by a single quick movement of an operating-lever and rendering unnecessary any movement of the governing valve or gate G for this purpose, thus effecting a considerable saving of time and labor and preventing any interference with the adjustment of the gate G after the latter has once been properly set.

The lower casing B′ of the wheel is mounted upon suitable legs or standards *s*, secured to a base K, which carries the toe *t*, forming the bearing for the lower end of the shaft D, and above the upper casing A′ is a plate M, carrying the upper bearing *t′* for the shaft, and having legs N, terminating in a base-ring N′, bolted to the upper casing A′. In the plate M is formed an annular groove *w*, and inserted in this groove and securely retained therein are a series of spirit-levels X, preferably disposed at four equidistant points, as shown in Fig. 3, these levels thus forming a fixed and permanent part of the casing of the wheel, and serving either in place of or as a supplement to the ordinary spirit-level in the operation of leveling the wheel in setting or resetting the same. The walls of the grooves in which the spirit-levels are set extend up to or above the top of the glass tubes of said levels, so as to protect the same from injury. The levels may be secured directly to the casing A′, if desired, as shown, for instance, by dotted lines in Fig. 2; but the securing of the levels to the plate M is preferred.

The upper bearing *t′* for the shaft D is detachable from the plate M, and the said shaft is provided with a sleeve *y*, also detachable, so that when worn these parts can be removed without disturbing the shaft, and new parts can be inserted in place of the same, renewals being thus made readily and at slight expense. The plate M also serves as a deflector to prevent the water which is being discharged from the upper wheel A from splashing upon the belting or gearing above the wheel-casing, and it also serves to prevent the clogging of the wheel by foreign matters dropping from above the casing.

The plate M should be at such a distance above the wheel-case that it will not interfere with the free upward discharge of the water from said casing, and hence will not tend to choke the discharge from the wheel, the plate differing in this respect from the supplementary wheel, which it has been proposed to mount loosely on the wheel-shaft directly above and close to the casing of the main wheel.

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

1. The combination of the two wheels secured end to end on the same shaft with a casing comprising two parts, one for each wheel, each part being distinct and complete in itself, comprising a top plate, bottom plate, and outer wall, and inclosing a water-way independent of that of the other part of the case, the bottom plate of the top casing adjoining the top plate of the lower casing, substantially as specified.

2. The combination of the duplex wheel and the casing therefor, comprising two independent parts, one for each wheel, with a gate-box and a valve-seat plate interposed between the casing of the gate-box and the casings of the wheels and secured to all of said casings, substantially as specified.

3. The combination of a scroll water-wheel partitioned to form upper and lower sets of buckets with a wheel-casing having a partition in line with the partition between the upper and lower sets of buckets of the wheel, substantially as specified.

4. The combination of the casing of a water-wheel having an upward discharge with a fixed deflecting-plate mounted above the casing at such a height as not to obstruct the rise of the water, the space between said plate and casing being open at all sides, whereby the free lateral escape of the water is permitted, substantially as specified.

5. The combination of the water-wheel and its shaft, the wheel-casing having an upward discharge, a fixed deflecting-plate mounted above the casing, and an upper bearing for the wheel-shaft carried by said plate, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. RIDGWAY.

Witnesses:
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O. C. RIDGWAY.