

(No Model.)

W. GALBRAITH.
WATER WHEEL.

No. 463,792.

Patented Nov. 24, 1891.

Fig. 2.

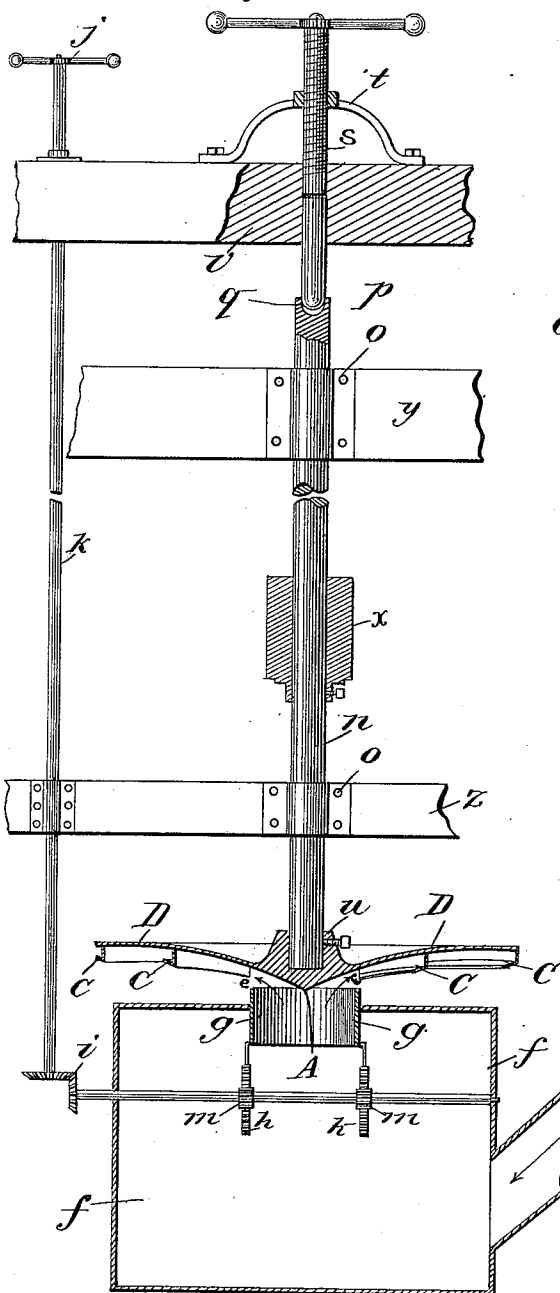


Fig. 1.

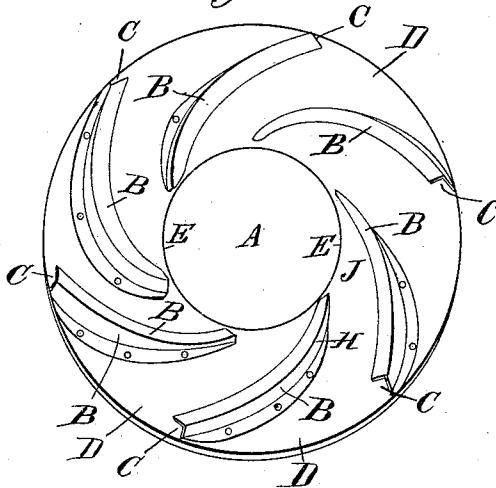
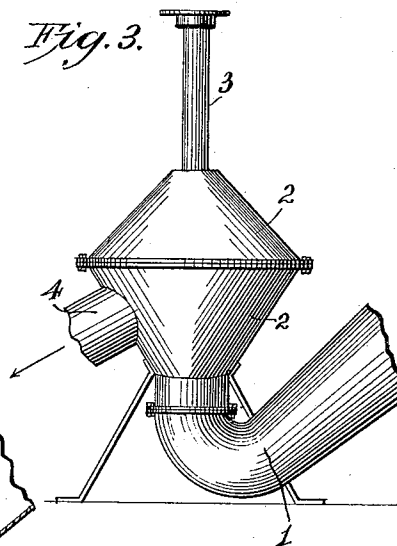


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

WALTER GALBRAITH, OF SANTA CRUZ, CALIFORNIA.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 463,792, dated November 24, 1891.

Application filed June 5, 1890. Serial No. 354,409. (No model.)

To all whom it may concern:

Be it known that I, WALTER GALBRAITH, a citizen of the United States, residing at Santa Cruz, in the county of Santa Cruz and State of California, have invented a new and useful Water Wheel or Motor, of which the following is a specification.

My invention relates to improvements in water-wheels, in which I seek, first, by the arrangement of the step to avoid friction to the greatest possible extent; second, by the arrangement of the buckets to avoid interference with the water when applied to the wheel; third, by the shape of the buckets to utilize the greatest possible percentage of the force of the water; fourth, by a screw in conjunction with the step to make the wheel itself act as a gate, thus avoiding wear and tear from the effects of sand and rubbish, and, fifth, by the simplicity of the combination of the wheel disk or shell and buckets to reduce to the smallest extent the loss from friction and the attrition of all substances that may be carried in the water. I attain these objects by the mechanism illustrated by the accompanying drawings, in which—

Figure 1 is a view of the bottom of the wheel; Fig. 2, a vertical section of the entire machine, and Fig. 3 a small wheel set upon the end of a water-pipe and inclosed in a case.

Similar letters refer to similar parts in Figs. 1 and 2.

To the solid iron disk or shell D D, Fig. 1, are attached the solid iron buckets B B, &c.—six in number, more or less—by means of bolts. The disk D D is either flat or somewhat conical, coming to a point at the center *a*, as represented in Fig. 2. The buckets B B, &c., extend from the rim of the shell D D toward the center in the form of a scroll, as represented in Fig. 1, each bucket reaching to a point equally distant from the center A. The bucket B rises vertically from the disk D D a few inches, more or less, according to the size of the wheel, and then bends over at a right angle to the vertical portion of the bucket, the top extending out in a horizontal direction sufficiently to prevent the escape of any water except at the end of the bucket, at G, upon the rim of the wheel.

When put in position, the buckets B B are on the bottom or under side of the disk *d d*,

as shown in Fig. 2. The buckets B B extend toward the center of the disk D D to points within working distance of the circle E E, Fig. 1. This circle corresponds in diameter to the diameter of the tube *g g*, Fig. 2.

ff, Fig. 2, is the wheel-box, into which the water enters through the pipe *l*. The ordinary supports of the wheel-shaft are shown at *y* and *z*. In the top of the box *ff* is firmly fixed the tube *g g*, which rises a little above the top of the box and may extend a little below the inner surface, as represented in the diagram. The shaft *n* is joined to the wheel at *u* and extends up through the boxes *o o* to the inverted step *p* at the point *q*. The step *p* is made to fit into the concave extremity of the shaft *n* at *q*. This step *p* is made to move freely in a mortise or other device in the stationary timber *v*. Above the step *p* is the screw *s*, which works in a nut in the arched support *t*. The lower end of the screw *s* extends down into the same mortise or device in which the step *p* moves, but is not necessarily attached to it.

In this description when the wheel is at rest the screw *s* is turned down by the lever *r*, the pressure being transmitted by the step *p* to the shaft *n*, which, having no shoulders at the boxes *o o*, moves freely up or down. The downward pressure causes the disk D D to fit closely down upon the tube *g g* at E E.

When the wheel is to be set in motion, the screw *s* is raised. The pressure of the water in the box *ff* through the tube *g g* forces the wheel upward, causing the upper end of the shaft to press constantly against the step *p*, which rises to the same extent that the screw is elevated. As the wheel is raised from the circular tube *g g*, Fig. 2, the water escapes equally in every direction through all the buckets at the same time, as represented at *e e*. The water striving to escape in straight lines is turned from its course by the curvature of the buckets, and thus imparts motion to the wheel. The buckets are so arranged with a view to the direction that the water takes as it escapes from the tube *g g* that they offer little or no resistance to the water until it fairly strikes the buckets upon their curved sides, thus securing the full force of the water to impart motion to the wheel. The inner end of the bucket is made quite sharp, as

shown at E, Fig. 1, so that the water divides readily upon it. The inner end of the bucket approaches the circumference of the circle E at so small an angle that it is impossible for the back side of the bucket, as at H, Fig. 1, to strike the water as it enters the next bucket, as at J, Fig. 1, thus avoiding all impediment from the back action of the bucket against the water. The shape of the bucket is such that the water has an opportunity to expend nearly or quite its whole force by the time it leaves the wheel, the length of the bucket being about two-thirds the diameter of the disk of the wheel. The water also strikes the bucket at quite a large angle and quite near the inner extremity of the same.

The wheel is loaded at the point X, so that there is barely upward pressure enough against the step *p* to hold the wheel steady. Thus the column of water in the tube *g g* under the wheel virtually becomes the support of the entire weight of the wheel and its appurtenances, and friction is reduced to the minimum.

The above description applies to the wheel when the power is to be transmitted by means of a belt connected to the wheel-shaft. When, however, gearing is to be used in transmitting the power and no vertical motion allowed the shaft, the following device is used, as represented in Fig. 2. The tube *g g* is then made to move freely in the top of the box *f f*

and is worked up and down by means of the racks *h h* and pinions *m m*, the latter being turned by means of the bevel-gear *i*, connected with vertical rod K.

Fig. 3 represents a small wheel simply set over the end of a water-pipe to be operated the same as in Fig. 2, and having around it a case, through the outlet 4 of which the water is conducted away as far as desired.

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

1. In a water-wheel, a vertically-adjustable shaft having a water-wheel fixed to its lower end and supported by the column of water, a vertically-adjustable tube immediately below the wheel for directing the water thereto, and means for adjusting said tube, substantially as herein described.

2. In a water-wheel, a casing into which the water flows, having a discharge-tube *g* therein, a vertical shaft carrying a horizontal water-wheel mounted directly over said tube and supported by the column of water, curved buckets on said wheel for discharging the water outwardly, means for adjusting the tube, and a shaft on which the wheel is mounted, substantially as herein described.

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Witnesses:

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