(No Model.)

C. R. COWLEY.

Water Wheel.

No. 237,170. Patented Feb. 1, 1881.

Fig. 1.

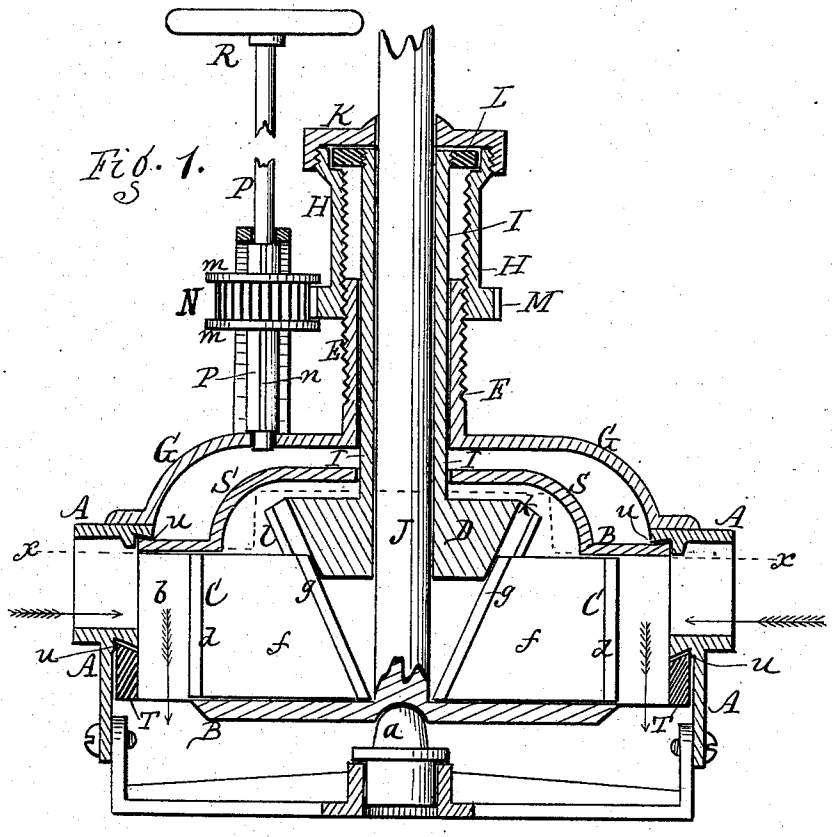


Fig. 2.

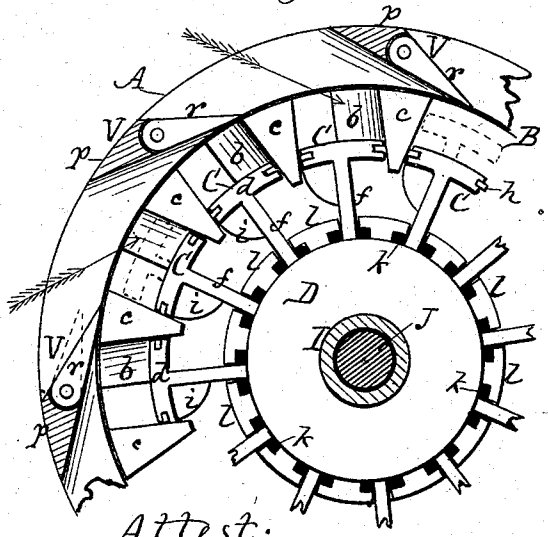


Fig. 3.

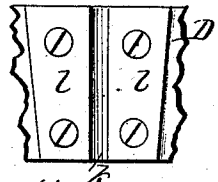
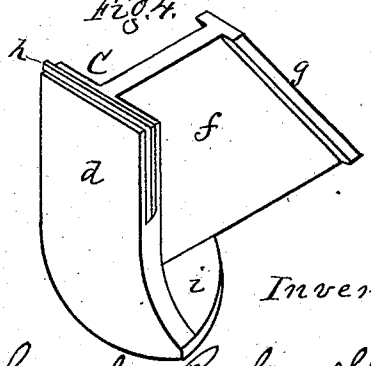


Fig. 4.



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UNITED STATES PATENT OFFICE.

COVEL R. COWLEY, OF WYOMING, NEW YORK.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 237,170, dated February 1, 1881.

Application filed June 9, 1880. (No model.)

To all whom it may concern:

Be it known that I, COVEL R. COWLEY, a citizen of the United States, residing at Wyoming, in the county of Wyoming and State of New York, have invented a certain new and useful Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of the water-wheel. Fig. 2 is a horizontal section in line *x x* looking downward. Fig. 3 is a portion of the sliding head in elevation. Fig. 4 is a perspective view of one of the followers which rest in the buckets.

My improvement relates to turbine water-wheels, and the object is to regulate the size of the buckets to the size of the stream, or the work to be done. To this end followers are employed, resting in the buckets and capable of being moved out or in to gage the size of the buckets.

In the drawings, A represents the exterior casing or curb within which the wheel runs, and B represents the wheel. The wheel is attached to a spindle or shaft, J, which rests at the bottom on a step, *a*, and at the top extends to suitable height and is provided with a pulley, a gear, or other device by which the power is transmitted.

b b are the buckets, which are curved and of ordinary form.

c c c are triangular-shaped butments or blocks between the buckets. The adjoining sides or faces of every two butments are parallel and at equal distance apart their whole extent, as shown in Fig. 2.

C C are followers, which rest within these parallel sides of the butments, occupying the whole cross area of the buckets and conforming to the shape of the buckets. These followers are movable in and out, thereby enlarging and contracting the size of the buckets. When thrown fully back, as indicated by the full lines, Fig. 2, the whole bucket is open to receive a full head of water. When thrown out, as indicated by dotted lines, only a small space is left in the bucket to receive the water. The followers can be moved out or in to any desired degree. The followers each consist of a face-plate, *d*, a central vertical web, *f*, and a beveled or inclined T-shaped flange, *g*, which connects with the operating-head by which the followers are moved out or in. The edges of the followers are also preferably provided with packings *h h*, which extend part the way down, and by resting against the sides of the butments prevent escape of water around the followers. The bottoms of the followers are also provided with horizontal wings *i i*, which form feet or guides as the followers adjust out or in.

D is a conical head, provided with T-shaped grooves *k* on its periphery, in which rest the T-shaped flanges *g* of the followers. The grooves are preferably formed by screwing or otherwise attaching separate bars or lugs *l l* on the periphery of the head, as shown in Figs. 2 and 3; but, if desired, the grooves may be made by planing or milling out the solid head. As the head is moved up or down it will be seen that the followers will be correspondingly moved out or in. The followers are all arranged radially, connecting with the head, so that a single movement of the head will operate them all and to an equal degree.

The sliding head is operated by the following means.

E is a hollow standard on top of the covering-plate G, said standard being threaded on its exterior, as shown.

H is a tubular cylinder, threaded internally and engaging with standard E.

I is a hollow sleeve attached to the sliding head D, and inclosing the water-wheel shaft J, which runs loosely through it.

K is a cap or cover which screws upon the upper end of the screw-cylinder H, and L is a small circular disk or ring which screws on the upper end of the hollow sleeve I and rests loosely between a shoulder of the cylinder H and its cap K. As the cylinder or nut H is moved up or down by turning on the threaded standard E, it will be seen that the disk L will be carried with it, thereby correspondingly moving the sliding head D.

M is a spur-gear rim, solid on the screw-cylinder H; and N is a pinion which engages therewith, said pinion having flanges *m m* at top and bottom, which overlap the gear M. The pinion slides up and down free on a shaft, P,

but has a spline or feather which rests in a vertical slot, *n*, of the shaft, so that the pinion will turn with the shaft. The shaft is operated by a band-wheel or other fixture, R, at the top, which is under control of an operator. By turning said band-wheel it will be seen that the cylinder H can be moved up and down, thereby operating the sliding head and followers, as before described.

S is a cover or plate which forms the top of the wheel, and T is a rim or ring around the bottom of the wheel. The outer edges of these two parts are dovetailed or inclined to rest under and in close contact with the connecting parts of the curb or case, as shown at *n n*, Fig. 1, by which means a close fit is made, which prevents escape of water at those points and also directs the water upon the buckets without overflow or impediment.

V V are chutes in the water-way of the inclosing-curb, arranged in an inclined or tangential direction and serving to direct the water upon the wheel. Each of these chutes consists of a stationary part, *p*, at the outer side, and a pivoted or hinged part, *r*, at the inner side, which is brought to a point as it reaches the wheel. These portions are pivoted so as to swing off away from the wheel when any obstruction comes between them and the wheel, as indicated at the left in Fig. 1 by dotted lines.

The advantage of this invention will be readily perceived. The area of the buckets can be gaged exactly to the amount of water used, whether large or small. If the amount is large the followers are thrown back; if it is small they are thrown forward. The full pressure is allowed to come directly upon the buckets whether large or small, as by the use of this arrangement the usual cut-off chutes outside the wheel are avoided. Where the flow of water to the wheel is controlled by exterior chutes the water is broken and diffused in passing the chutes and before it reaches the wheel, and much of its power is lost. In this invention the whole power is retained and applied directly to the wheel. In this invention when it is desired to use only a small amount of water it is applied only to the outside of the buckets, and not over their whole surface, by which means the power is more effective and much friction is saved.

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

1. In a water-wheel, the triangular butments *c c*, forming divisions between the buckets of the wheel, said butments having their adjoining sides parallel and equidistant at all parts for the movement of the followers between them, as herein shown and described.

2. In a water-wheel, the combination, with the buckets of the wheel, of followers resting in the buckets and adjustable out and in to increase or lessen the area of the buckets, adapting the same thereby to different volumes of water, as herein shown and described.

3. In a water-wheel, the combination of the adjustable followers C C and the conical sliding head D, the followers being provided with inclined flanges *g g*, resting in corresponding grooves of the sliding head, as herein shown and described.

4. The combination of the threaded standard E, cylinder or nut H, disk L, cap K, spur-gear M, and sliding pinion N, as and for the purpose specified.

5. The combination, with the follower C, of the packing *h*, set into its edge and serving to pack the follower and prevent loss of water in the buckets, as herein shown and described.

6. The combination, with the water-wheel B, of the chutes V, having pivoted inner ends, *r*, capable of swinging outward away from the wheel when any impediment comes between them and the wheel, as herein shown and described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

COVEL R. COWLEY.

Witnesses:
R. F. OSGOOD,
C. N. WHITE.