(No Model.) 2 Sheets—Sheet 1.

H. S. HOLDER.

WATER WHEEL.

No. 265,416. Patented Oct. 3, 1882.

Fig. 1

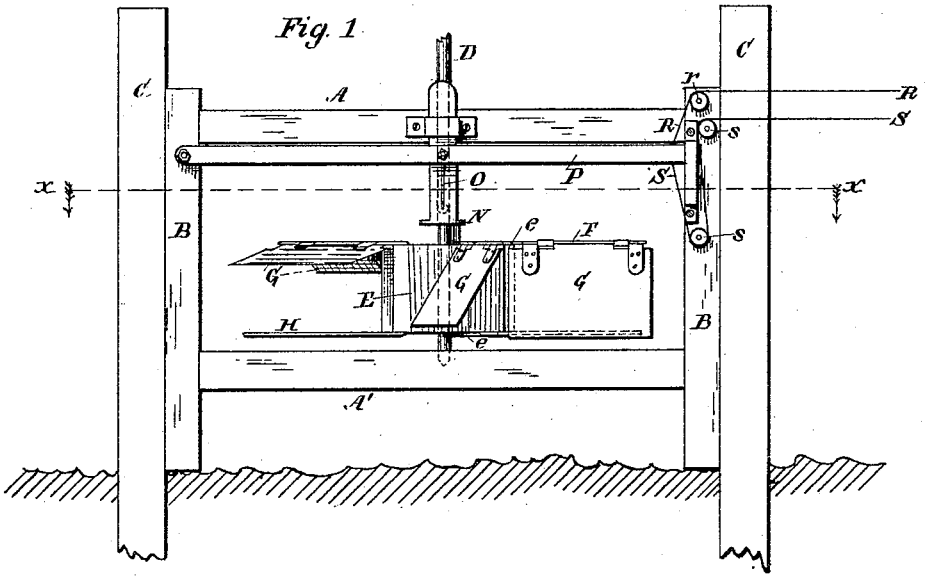
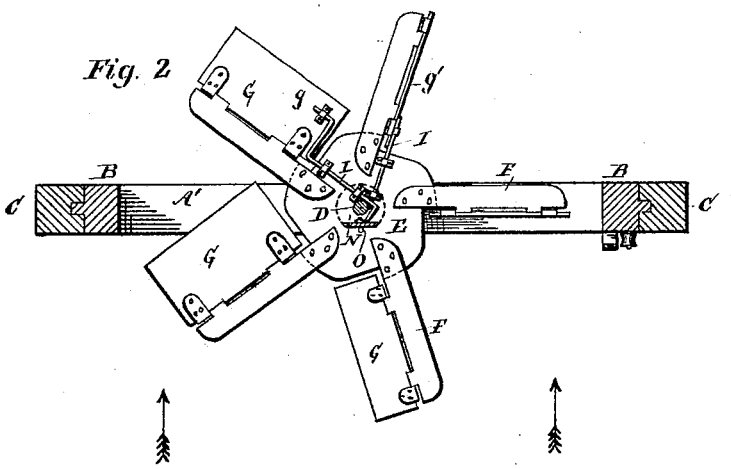


Fig. 2



Witnesses:
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C. J. Belt

Inventor:
Henry S. Holder
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

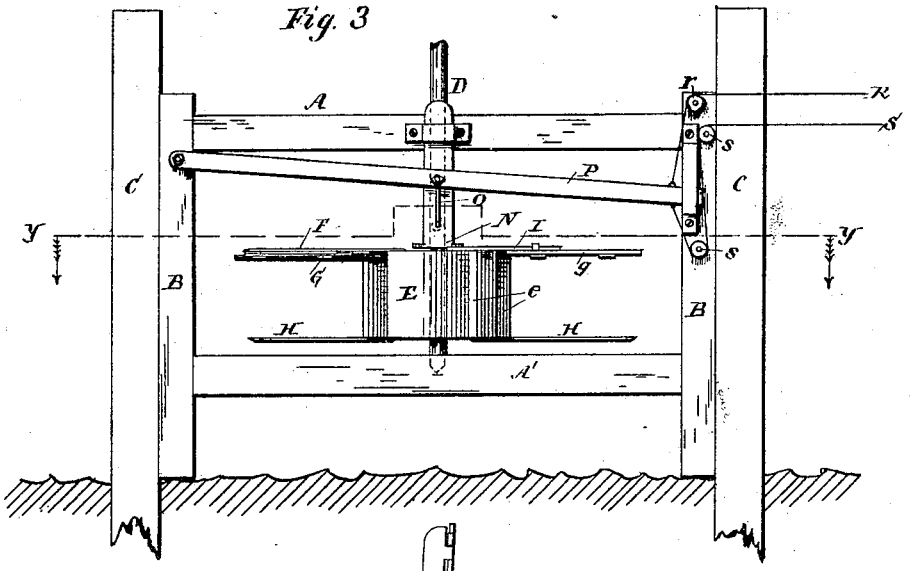


Fig. 4

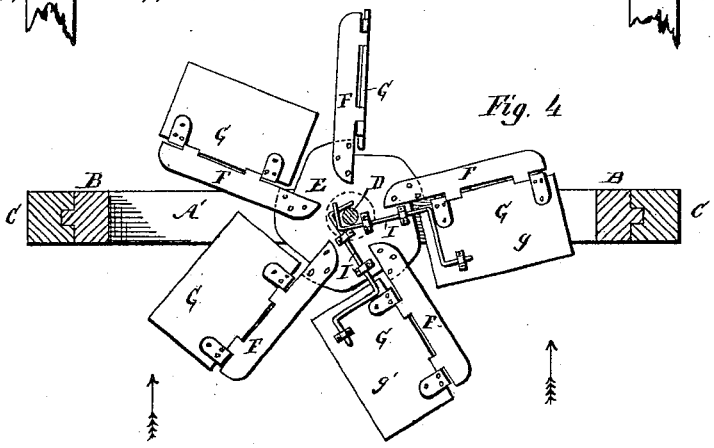
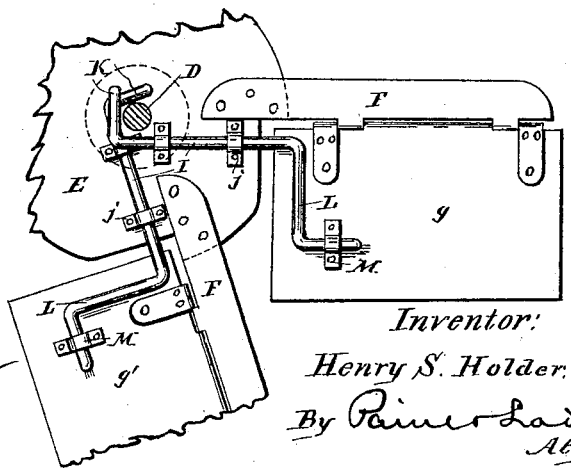


Fig. 5



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY S. HOLDER, OF MACON, GEORGIA.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 265,416, dated October 3, 1882.

Application filed July 24, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. HOLDER, a citizen of the United States, residing at Macon, in the county of Bibb and State of Georgia, 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 appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in the class of water-wheels known as "current-wheels," and more particularly to that class of current-wheels which have a vertical shaft with radial arms carrying hinged buckets.

Heretofore some wheels of this class have been constructed with devices for raising the entire wheel out of the water whenever it is desired to stop the wheel, and others with mechanism for lifting all the buckets into a horizontal position, or releasing them, so that they will all swing free with the current, or else locking all, so that they will all present a uniform resistance to the current. By means of my invention I accomplish the same result with a lifting device attached to the buckets on one side of the wheel only. If the buckets on one side of such a wheel are raised into a horizontal position and held there, the wheel will stop as soon as the raised buckets reach the resistance side of the wheel, for the buckets on the other side will be lifted by the current, and thus the mechanism will be as effectual for the purposes as if it were applied to all the buckets.

My invention consists of a lifting device attached to a part of the buckets of a current-wheel only.

It also consists of an improved device for raising the buckets of a current-wheel, consisting of a crank-lever attached to each bucket and a collar sliding on the shaft, which can be lowered to depress the short arms of the crank-lever and raise the buckets when it is desired to stop the wheel; and it further consists of certain details of construction, which will be hereinafter fully described, and set forth in the claims.

Figure 1 of the accompanying drawings is a side elevation of my water-wheel in operative position. Fig. 2 is a plan of the wheel, taken on the line *x x* of Fig. 1. Fig. 3 is a side elevation of the wheel when stopped. Fig. 4 is a plan view of the same, taken on the line *y y;* and Fig. 5 is an enlarged detail view illustrating the operation of the collar and crank-levers for raising the buckets. All of the views show the wheel as acted upon by the current.

The wheel is supported in a frame consisting of the upper and lower horizontal bars, A A′, and the side timbers, B. This frame-work is placed between two piles, C, and slides vertically between them by means of tongues and grooves, so that it can be raised for repairs.

The vertical shaft D of the wheel has a proper step or bearing in the center of the lower bar, A′, and also a bearing on the upper bar, A, above which it extends, and is provided with any suitable bevel gearing or pulley for communicating the power to the shore.

The wheel consists of the hub E, having the radial arms F extending outward from the top of the hub, the buckets or blades G, hinged to said horizontal arms, the vertical shoulders *e*, projecting from the hub, and against which the inner edges of the buckets bear when they are acted upon by the current, and the lower radial arms, H, extending outward from the bottom of the wheel to sustain the pressure of the buckets along their lower edges.

For small wheels the arms H may be omitted, the shoulders *e* being sufficient to sustain the buckets, and for very large wheels the ends of the arms F and H are properly connected and braced to give the necessary strength.

I preferably construct the wheel with an odd number of buckets, and in such cases one-half of the whole number of buckets less one are provided with the lifting device. If the wheel has an even number of buckets, one-half of them are thus provided, in both cases the buckets to be raised being contiguous. In the present case two of the buckets, *g* and *g′*—the wheel illustrated having five—are provided with the crank or rock lever I, the center part or axis of which turns in bearings *j* on the top of the hub. The lever is set so that its axis is parallel to the upper edge and hinge of the bucket, but slightly offset, so that its inner end, which is made with the short arm K, passes by the shaft in order to bring the arm K on

the opposite side of the shaft from the bucket. The long arm L of the lever extends downward along the side of or behind the bucket, and the end of it moves in a guide, M, on the back of the bucket. Both arms of the crank-lever are in the same plane.

Sliding on the shaft D above the wheel is a collar, N, having a broad horizontal flange which comes just above the ends of the crank-arms K. This collar is held up, when the wheel is running, by the connecting-rod O, pivoted at one end to the collar and at the other to the lever P. The lever P is pivoted at one end to one of the side bars, B, and has at the other end the ropes R S, fastened to said lever. These ropes pass round proper guide-pulleys *r s* to the shore, and may be carried into the mill or wherever desired.

The operation of the wheel is as follows: If it is set for running, the rope R is drawn taut, holding the collar N up free from the crank-lever arms K, and the wheel will then run like others of its class. When it is desired to stop the wheel the rope R is loosened and the rope S is pulled, which pulls the lever P and the collar N down. The latter rests against the ends of the short arms K of the crank-levers until the buckets *g g'*, which are operated by said crank-levers, reach the upstream side of the wheel and are raised by the current. The raising of the buckets by the current depresses the short arms K of the levers and allows the collar to fall or be pulled down onto them. The wheel then turns until its momentum is exhausted, and finally stops with the raised buckets *g g'* on the downstream side, as shown by Figs. 3 and 4.

The object of extending the crank-lever I beyond the shaft D is to use the rotation of the wheel and the friction between the arms K and the collar N to assist in raising the buckets and holding them up when raised. As the collar is stationary, the force generated by the friction of the arms against it tends to depress the levers, while if the arm K were between its bucket and the main shaft the same force would tend to raise the lever-arm, and consequently lower the bucket.

The axes of the crank-levers are adjusted by bearings *j* of different heights, so that their ends can cross or lap over each other without interfering.

If the crank-levers do not pass by the shaft to the opposite side, then an arm fastened to the bucket in line with the axis of the hinge and having an upturned end will answer in place of the crank-lever described.

It will be evident that the wheel will operate and can be stopped and started if entirely submerged or if set with only the buckets under water, thus making it safe from damage by freshets or high water.

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

1. A water-wheel having hinged buckets, and mechanism for throwing only a part of the buckets out of action, so that the wheel can stop by reason of the non-resistance of the hinged buckets swinging free on their hinges on the upstream side of the wheel, and the non-resistance of the buckets held out of action by said mechanism on the downstream side of the wheel, substantially as set forth.

2. In a water-wheel, the combination of a vertical shaft having horizontal arms carrying hinged buckets with mechanism for raising a part only of the buckets, as and for the purpose set forth.

3. In a water-wheel having a vertical shaft, hub, and horizontal arms with hinged buckets, the combination, with one or more of the hinged buckets, of a crank-lever having axis I, journaled to the hub, arm L, attached to the bucket, and arm K on the opposite side of the shaft from the bucket, in combination with a collar on the shaft, as and for the purpose set forth.

4. The combination of the end-pivoted lever P, ropes R S, pulleys *r s*, connecting-rod O, and sliding collar N with the crank-arms K, hinged buckets G, radial arms F, shaft D, and a suitable frame-work, as and for the purpose herein set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY S. HOLDER.

Witnesses:
C. S. BUNDY,
STORY B. LADD.