(No Model.)

O. F. BURTON.

WATER ELEVATING DEVICE.

No. 395,482. Patented Jan. 1, 1889.

Fig. 3.

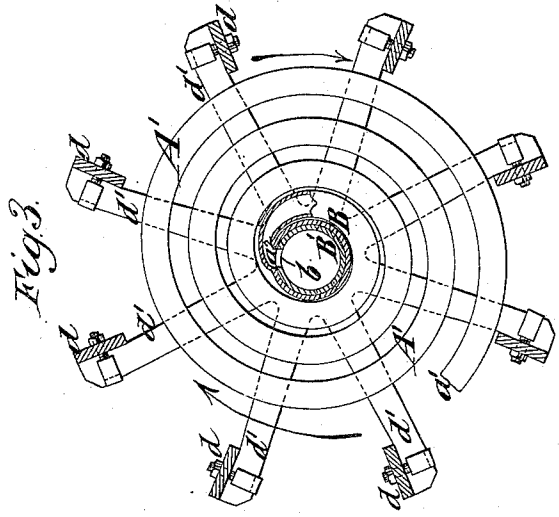


Fig. 2.

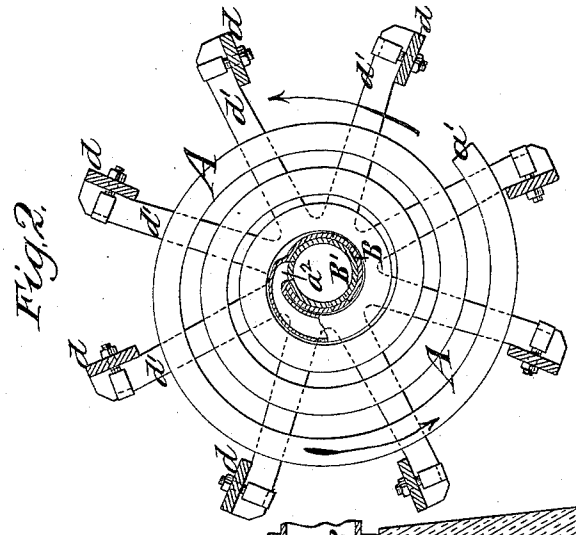
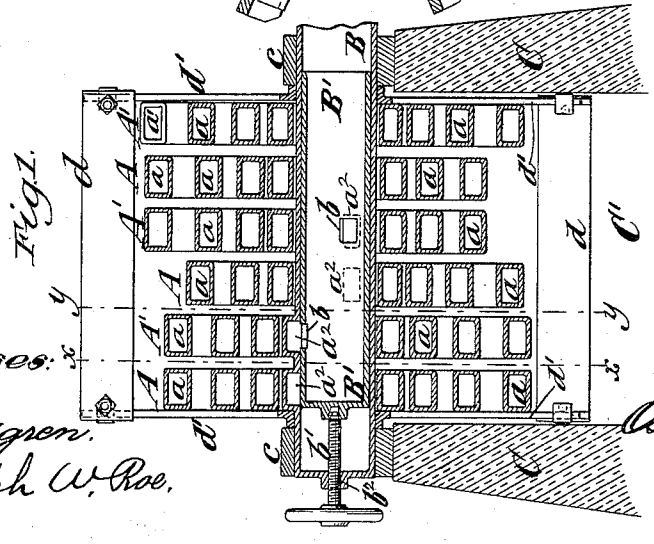


Fig. 1.



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WATER-ELEVATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 395,482, dated January 1, 1889.

Application filed February 7, 1888. Serial No. 263,223. (No model.)

To all whom it may concern:

Be it known that I, OSCAR F. BURTON, of Brooklyn, in the county of Kings and State of New York, a citizen of the United States, have invented a new and useful Improvement in Water-Elevating Devices, of which the following is a specification.

An important object of my invention is to provide a simple rotary device, which, when arranged in suitable bearings so that radial floats or blades with which it is provided will dip into a stream or tideway of running water, will be caused to rotate, and caused to elevate water from such stream or tideway.

The invention will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of a water-elevating device embodying my invention, and including, also, two walls, which constitute a tideway, and between which the current flows in one or other direction, the plane of the section being lengthwise of the hollow discharge-pipe or shaft on which the device turns. Fig. 2 is a transverse section upon about the plane indicated by the dotted line *x x*, Fig. 1, showing the pump-wheel, which has its convolute passage leading in one direction toward the shaft; and Fig. 3 is a similar section upon about the plane indicated by the dotted line *y y*, Fig. 1, showing a pump-wheel, the convolute passage of which leads in the opposite direction.

Similar letters of reference designate corresponding parts in the several figures.

A A′ designate a series of pump-wheels, (here shown as six in number,) although one or a greater number of the wheels may be employed. Each wheel forms a convolute passage, *a*, having a receiving-mouth, *a′*, at the outer periphery of the wheel, and thence being coiled inward in convolute form toward the center, at which is the discharge-pipe B. As here represented, the discharge-pipe B constitutes a hollow shaft, which is mounted to rotate in bearings *c* and with which the convolute passage *a* of each wheel communicates at its inner end by an opening, a^2, as is shown in Figs. 2 and 3.

C designates walls which support the bearings *c*, and which afford between them a space or tideway for the flow of water. Where this space C′ between the walls C contains a stream or current always flowing in one direction, but a single pump-wheel, as A, or a set of wheels with their passages *a* leading in the same direction, may be fixed upon the shaft B, so as to rotate therewith; but where the device is arranged so that the space C′ between the walls C constitutes a tideway or passage through which the tide may ebb and flow, moving alternately in opposite directions, two pump-wheels or two sets of pump-wheels may be employed, one wheel or one set of wheels being reversed in position on the shaft B relatively to the other wheel or set of wheels. I have here represented two sets of wheels, A A′, each set having three wheels arranged upon the shaft B; and, as here shown, the wheels A of one set are alternated with the wheels A′ of the other set. The wheels A have their convolute passages *a* each leading in a left-hand convolute from the shaft B outward, as shown in Fig. 2, and the wheels A′ have their passages leading from the shaft outward in a right-hand convolute, as shown in Fig. 3.

It will be understood that when the pump-wheels A A′ are rotated in the direction indicated by the arrow shown in Fig. 2, the wheels A will take up water each time their receiving-mouths *a′* pass through the water, while the wheels A′ will be inoperative; but when the shaft B and the wheels thereon are rotated in the reverse direction to that before described, as shown by the arrow in Fig. 3, the wheels A′ will be operative to lift water, while the wheels A will be inoperative. The wheels A of the one series have the inner openings, a^2, of their convolute passages *a* arranged at equidistant points around the shaft B, while the wheels A′ may likewise have their discharge-openings a^2 arranged at equidistant points around the circumference of the shaft B. This is desirable, so that the load will be more evenly distributed and the wheels of either series will not take up and deliver charges of water in unison, but will so take up and deliver water intermittently and progressively in their rotation.

It will be observed from Figs. 2 and 3 that the convolute passage *a* of each wheel hugs the shaft very closely throughout the first con-

volution, and this is desirable to avoid back pressure during the operation of the wheels. As the shaft B and the wheels thereon are rotated in one direction to render one set of wheels operative, it is necessary, when both sets of wheels deliver into the same hollow shaft, to provide valves for shutting the discharge-openings a^2 of the wheels which are not operative. Thus when the shaft B is turned in a direction to render the wheels A′ operative, the discharge a^2 of the passages a of the wheels A, which are inoperative, should be closed.

As here represented, the valves for all the discharge-openings a^2 are formed by a single tube, B′, sliding within the hollow pipe or shaft B, and having ports b, through which certain of the discharge-openings a^2 may be placed in communication with the hollow shaft, according to which way the tube or valve B′ is adjusted. An adjusting-screw, b', which may engage a nut, b^2, in the closed end of the shaft or pipe B, may be employed for shifting the valve-tube B′ endwise.

In the drawings, Fig. 1, the valve-tube B′ is supposed to be shifted so as to place the discharge-openings a^2 of the several wheels A′ in communication with the shaft B, and so as to close the discharge-openings from the several wheels A to said shaft, and the two sets of wheels and the shaft B are supposed to be rotating in the direction indicated by the arrow in Fig. 3, rendering all the wheels A′ operative, while at the same time all the wheels A are inoperative.

When the device is to be rotated in the reverse direction to that just described, the valve-tube B is shifted so as to place its ports b in coincidence with the discharge-openings a^2 from the several wheels A, and so as to close the corresponding openings from the several wheels A′ to the shaft B, and then the device is adapted for operation in the direction indicated by the arrow in Fig. 2, so as to render the wheels A operative and the wheels A′ inoperative.

Although the main shaft or discharge-pipe of my water-elevating device may be driven by power applied from an engine or water-wheel arranged at a short distance from the water-elevating device, I prefer to combine with the pump-wheels A A′ and their shaft B a water-wheel, which, by dipping into the very current or stream from which the pump-wheels take water, will be driven so as to actuate said pump-wheels.

I have here shown a water-wheel composed of floats or blades d and arms d', secured to and projecting from the shaft B, and to which said floats or blades are secured. The floats or blades d have, in this example of my invention, a radial projection beyond the pump-wheels A A′, and consequently dip deeper into the stream or current flowing through the space or tideway C′.

It is obvious that if the device be arranged so that the space C′ constitutes a tideway through which the tide ebbs and flows alternately in opposite directions, the water-wheel will be rotated for a part of the time in one direction and for the remainder of the time in the other direction, and consequently one set, as A, of the pump-wheels will be operative to raise water during the ebb-tide, and the other set, as A′, will be operative during flood-tide. When, however, the device is to be arranged in a stream which always flows in one direction, but a single pump-wheel, as A, or a single set of wheels all leading in the same direction from the center shaft outward, may be employed.

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

1. The combination, in a water-elevating device, of two or more pump-wheels each forming a convolute passage having a receiving-mouth at its periphery and a substantially central discharge, said wheels being connected in reverse positions and having a common center of rotation, and a water-wheel concentric with said wheels and having floats or blades which by dipping into a tideway serve to rotate the wheels and to elevate water through one or the other of them according as the tidal flow is in one or other direction, substantially as herein described.

2. The combination, with a central hollow shaft or pipe, of pump-wheels fast thereon, and each forming a convolute passage having a receiving-mouth at the outer end and delivering at the inner end into said shaft or pipe, the wheels being reversed in position on said shaft or pipe, of valves in said shaft or pipe for closing the communication of one or other of said convolute passages therewith, and a water-wheel upon said shaft or pipe having floats or blades which, by dipping into a tideway, impart rotary motion to said pump-wheels in one or other direction, and elevate water through one or other of them according to the direction of the tidal flow, substantially as herein described.

3. The combination, with a hollow shaft, B, of one or more pump-wheels, A, and one or more pump-wheels, A′, reversed in position on said shaft relatively to each other, each wheel forming a convolute passage open at its outer end and communicating with the shaft at its inner end, and having its inner convolution closely hugging the shaft, an inner tube, B′, adjustable in the shaft and having ports for controlling the communication of the inner ends of said passages with the shaft, and a water-wheel on the shaft having its floats or blades projecting radially beyond the pump-wheels, substantially as herein described.

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