

(No Model.)

J. M. POWELL.

WATER WHEEL.

No. 276,538.

Patented Apr. 24, 1883.

Fig. 1

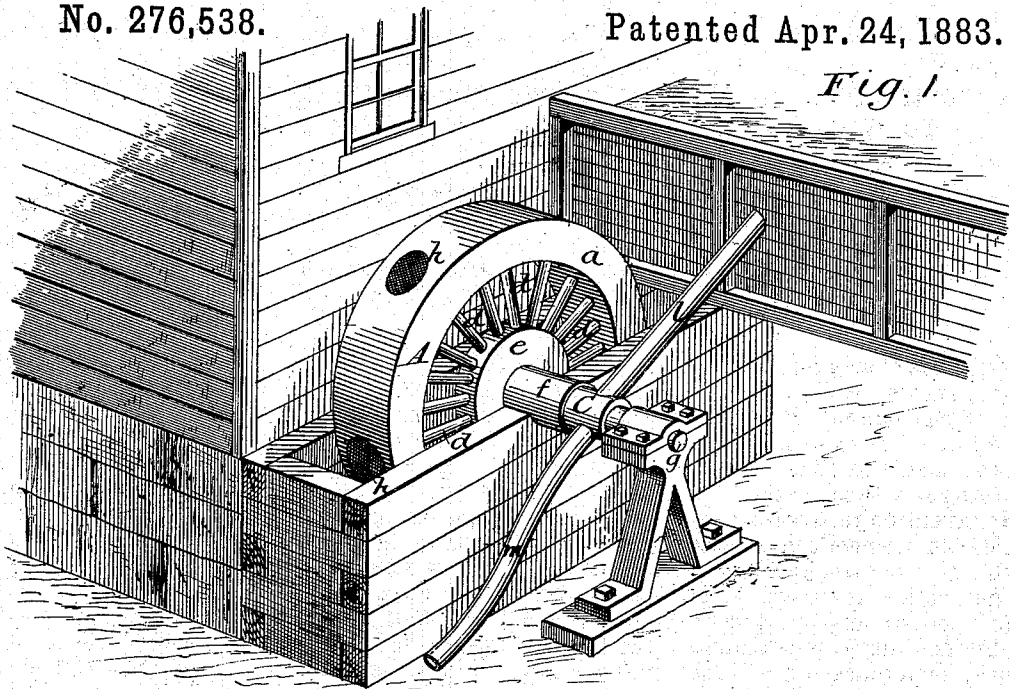


Fig. 2

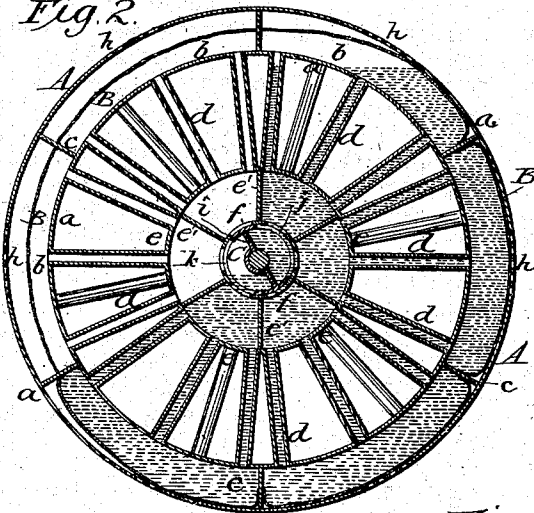


Fig. 4

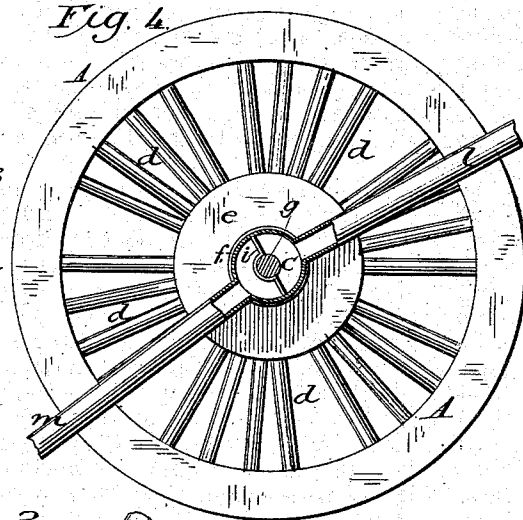
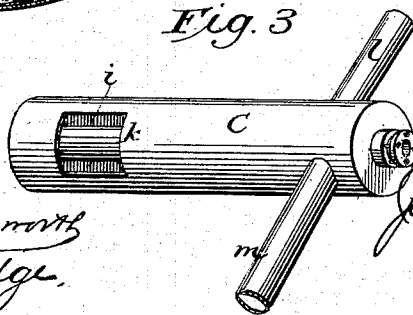


Fig. 3



Attest.

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UNITED STATES PATENT OFFICE.

JOSEPH M. POWELL, OF SPRINGFIELD, MISSOURI, ASSIGNOR OF ONE-THIRD
TO WILLIAM ANDERSON CLYDE MURPHY, OF SAME PLACE.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 276,538, dated April 24, 1883.

Application filed August 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH MARSHAL POWELL, of Springfield, in the county of Greene and State of Missouri, have invented certain
5 Improvements in Water-Wheels, of which the following is a specification.

My invention relates to water-wheels; and it consists in a wheel constructed to receive and discharge the water through a longitudinally-divided hollow shaft and an annular hub and
10 hollow spokes, and provided with an annular rim divided into compartments by radial partitions, communicating with the annular hub, and provided with elastic diaphragms which
15 are pressed outward by the water against the walls of the chambers or compartments to cover and close air-inlets, and which, as the wheel changes its position, assist in discharging the water from the chambers, the pressure
20 of the atmosphere entering through said inlets acting in conjunction with the diaphragm to this end.

The invention further consists in providing an outlet for the water lower than the hollow
25 shaft, to cause it to act upon the principle of a siphon; and thus to assist in the discharge of the water, and in other features and details, hereinafter explained.

In the accompanying drawings, Figure 1
30 represents a perspective view of my improved wheel in position for operation; Fig. 2, a vertical central section through the same from front to rear; Fig. 3, a perspective view of the hollow stationary shaft on which the wheel rotates; Fig. 4, a cross-section of the shaft, showing the wheel in side elevation.

A represents the wheel as a whole, consisting of an annular drum, *a*, divided into segmental compartments or chambers *b* by partitions *c*, said drum or rim being carried and sustained by hollow spokes *d*, radiating from
40 a hollow annular hub, *e*, divided by partitions *e'* in the same manner as the drum or rim *a*, mounted upon a sleeve or barrel, *f*, closed at
45 one end and open at the other, and having a shaft, *g*, extending longitudinally through its center and firmly attached to or connected with its closed end. The water by which the wheel is operated passes from the barrel *f*,

through the hollow hub *e* and spokes *d*, to the
50 chambers or compartments *b*, and returns in the same manner, as presently explained. Each chamber or compartment is furnished with one or more openings, *h*, in the outer or circumferential face of the drum, which, like the open-
55 ings through which the spokes *d* communicate with said chamber, are covered with wire-gauze or grating.

B represents a flexible or elastic diaphragm, of which there is one in each compartment or
60 chamber *b*, formed of sheet-rubber or other suitable material, and running parallel with the circumferential face of the drum, as shown. As water enters the chambers of the annular drum or rim it forces back the elastic dia-
65 phragm, causing it to cover the opening *h*, thereby preventing any escape of water which might get by the edges of the diaphragm and pass to the outside thereof. When the wheel
70 has rotated sufficiently to bring such chamber or compartment to a discharging position, the diaphragm resumes its normal position, partly by reason of its elasticity, but mainly through
75 the pressure of the atmosphere, which enters through the opening *h* and acts upon the outer face of the diaphragm.

The wheel thus constructed is mounted upon a hollow stationary axle or cylinder, *C*, which is closed at both ends, and longitudinally divided through the middle, as shown in Figs.
80 2, 3, and 4, by a partition, *i*, which is curved to pass around shaft *g*, and is furnished with openings *j k*—one on each side of the partition—the former serving to admit water to the wheel, and the latter to receive the waste water there-
85 from. The cylinder or axle *C* is provided with an inlet-pipe, *l*, and an outlet-pipe, *m*, the latter carried down to the lowest practicable water-level, in order that the water may be siphoned off from the wheel, and thus the full force of the
90 water utilized without necessarily placing the wheel at a low level. The inlet-pipe is preferably provided with a wire-gauze covering or grating to exclude debris, foreign matters, &c., which might injure the wheel or interfere with
95 its operation.

The wheel may be placed within a pit or casing or left exposed, as desired.

By referring to Fig. 2 the operation of the wheel will be readily understood. The water entering through pipe *l* passes through the hollow axle or cylinder C until it reaches outlet *j*, through which it passes into hub *e*, and thence to the spokes *d*, and through them to such of the chambers *b* as are in position to communicate with said opening *j*. The water entering said chambers presses back the elastic diaphragms B, closing the openings *h*, and causing the wheel by reason of the weight of water to fall on that side to which the water is admitted. As the wheel revolves, the partitions *e'* of the hub *e* pass the side or edge of the opening *j*, and cut off the further supply of water to one after another of the chambers *b*, which are carried by the rotation of the wheel around to the opposite side of the axle or cylinder C, and as said chamber rises above the lower edge of opening *k* the water flows from the chambers back through the spokes *d*, and through the corresponding chamber or section of hub *e*, into the axle or cylinder C, through said outlet *k*, passing through the said cylinder or axle on the opposite side of the partition from that on which it entered, and finally escaping through the outlet-pipe *m*. The siphoning action, owing to the downward extension of said pipe, causes the water to be drawn off rapidly, thus relieving the ascending side of the wheel of its water in great measure before it has been carried upward any considerable distance; and hence the flowing of the water through the spokes back to the center, by reason of being raised above the level of the outlet of the wheel through the rotation thereof, applies only to a comparatively small portion of the water, most of which is removed by the siphoning action when the spokes are in a substantially vertical position.

Instead of employing the flexible diaphragms, flap or puppet valves, bags, or sacks may be substituted, as will be readily understood, and in other details the machine may be modified.

Special spokes may be employed, independent of the tubular spokes, to sustain the rim.

Having thus described my invention, what I claim is—

1. The herein-described water-wheel, consisting of an annular hub and an annular rim or drum, both divided into compartments, and

connected by hollow spokes, and a central hollow axle or cylinder divided through the middle, and having an opening on each side of the dividing-partition, whereby water may pass from the shaft to the rim or drum when the wheel is in one position, and return from the drum to the cylinder when the wheel is in another position.

2. In combination with a longitudinally-divided hollow axle or cylinder provided with a supply-opening on one side and a discharge-opening on the other, and having also inlet and outlet openings independent of the supply and discharge openings, a wheel mounted upon said axle or cylinder, and having a hollow rim and hollow spokes, whereby water is permitted to enter at the center of the wheel, pass to the rim, and thence back to and discharge at the center.

3. In combination with the longitudinally-divided hollow cylinder C, the wheel A, consisting of partitioned annular drum *a*, spokes *d*, and partitioned hub *e*, all constructed and arranged substantially as shown and described.

4. In a water-wheel substantially such as shown and described, the combination of a hollow annular rim or drum divided into compartments, communicating with a central water supply and outlet, and having openings in their outer walls or circumference, and flexible or elastic diaphragms extending across said compartments, and adapted to be pressed outward by the water in the compartments, as and for the purpose explained.

5. In combination with the wheel A, constructed substantially as shown and described, a longitudinally-divided hollow shaft or axle provided with an inlet and with an outlet pipe extending downward, so as to cause the water to be siphoned off from the wheel, substantially as set forth.

6. In combination with wheel A, consisting of drum *a*, spokes *d*, hub *e*, and diaphragms B, the longitudinally-divided axle or cylinder C, having openings *j k*, inlet-pipe *l*, and outlet-pipe *m*, all arranged substantially as shown and described.

JOSEPH MARSHAL POWELL.

Witnesses:

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A. F. INGRAM.