

(Model.)

2 Sheets—Sheet 1.

W. LAY.
WATER MOTOR.

No. 244,628.

Patented July 19, 1881.

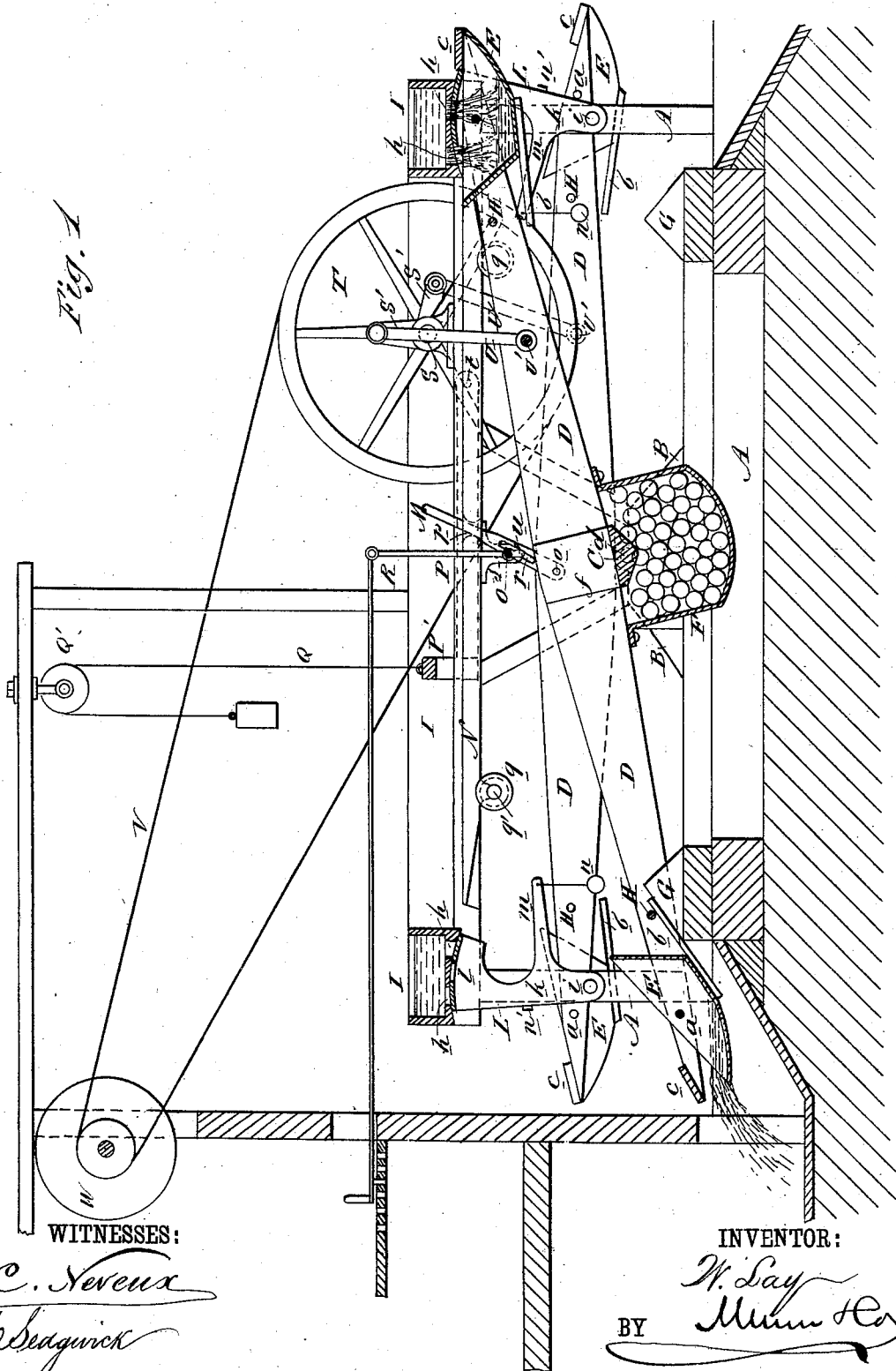


Fig. 1

WITNESSES:

C. Neveu
W. Seagrick

INVENTOR:

W. Lay

BY

Mum Co

ATTORNEYS.

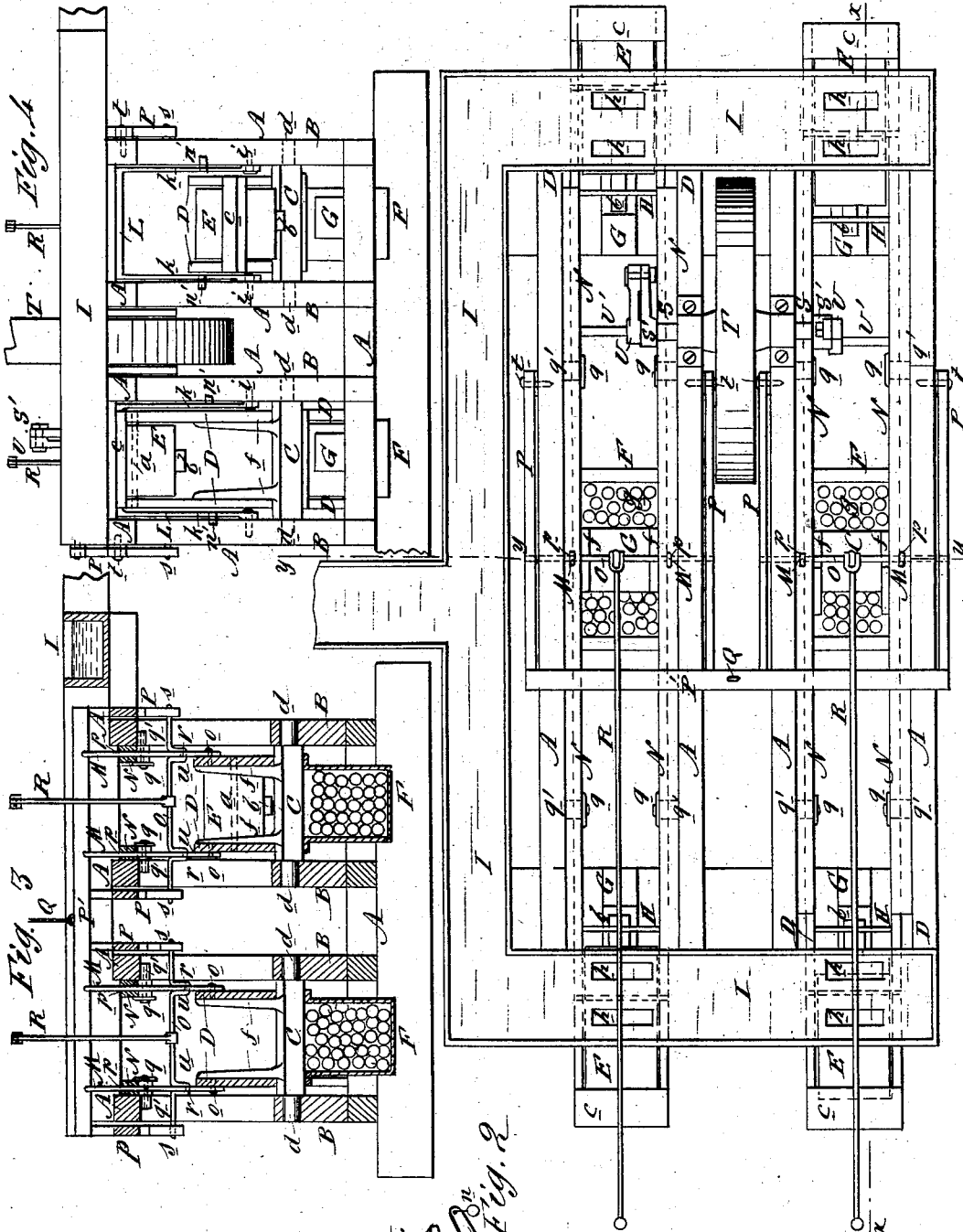
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WITNESSES:
C. Neveu
J. Sedgwick

Fig. 3

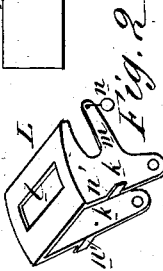


Fig. 2

INVENTOR:
W. Lay
 BY *[Signature]*
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM LAY, OF SENECA, SOUTH CAROLINA.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 244,628, dated July 19, 1881.

Application filed November 26, 1880. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM LAY, of Seneca city, in the county of Oconee and State of South Carolina, have invented a new and improved Water-Motor, of which the following is a specification.

The object of this invention is to provide a cheap, simple, and economical water-motor that can be operated with a small quantity and but slight fall of water.

The invention is designed as an improvement on the water-motors for which Letters Patent No. 223,930 and No. 227,023 were issued to me January 27, 1880, and April 27, 1880, respectively; and it consists in doubling the number of parallel arms and attached buckets; of novel devices for tipping the buckets and for preventing the too early discharge of water therefrom; of improved automatically-closing valves, and of novel valve operating and regulating devices, all of which will be hereinafter described.

Figure 1 is a sectional side elevation on line *x x*, Fig. 2. Fig. 2 is a plan of the device. Fig. 3 is a sectional end elevation on line *y y*, Fig. 2. Fig. 4 is an end elevation of the same. Fig. 5 is a perspective view of a valve.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the frame supporting the mechanism. B B are the pillow-blocks, secured upon the base of the frame A, and serving as supports for the rocking shafts C C, that are set in line with each other a suitable distance apart.

D D represent four parallel arms or beams, firmly fixed in pairs upon their respective shafts C C, each pair of arms D D carrying pivoted between their ends on transverse pivots *a* the buckets E E, on whose bottoms are secured the rearward-projecting plates or bars *b b*, that are designed to come in contact, on the downward stroke, with the triangular blocks G, which are secured on the base of the frame A, and thereby tip said buckets E E so that their contents may be discharged. In rear of the buckets E E rods H H are passed transversely through each end of each pair of arms D D, so that when a downward stroke is made the tip of the said buckets E E is limited by the contact of the bars *b b* with the rods H H.

Premature escape of water from the descending buckets E E is prevented by the broad bars *c c*, that are secured across the ends of each pair of arms D D and serve as covers for the lips of the buckets E E, and said covers *c c* also serve to retain the weight of the water at the extreme ends of the arms D D and in a position for quick discharge.

The shafts C C are of triangular cross-section, and are held in the pillow-blocks B B by means of their trunnions *d d*. Said shafts C C are provided with end flanges, *f*, projecting upward from their broad horizontal faces, and the arms D D are secured midway of their lengths on the outside of these flanges *f* by bolts or other suitable fastenings.

Secured to the under sides of the arms D D, immediately beneath the shafts C C, are boxes F for the reception of ballast or weights *g*, that may be disposed in such a manner as to contribute to the steady running of the machine.

The water-reservoir is represented at I, provided with ports *h h*, located above the buckets E E.

Beneath the ports *h h*, on the upright of the frame A, are pivoted the gravity-valves L, with their convex faces in contact with the corresponding concave seats about the ports *h h*. Said valves L are provided with openings *l* in their faces corresponding with a port, *h*, and have two downward-projecting side lugs, *k*, through whose ends are passed the bolts *i i* that pivot them to the frame A, and from the inner edges of these lugs *k* arms *m* project inward at right angles, and have suspended from the extremities weights *n*, that serve by their gravity to swing said valves L inward, and thereby close them after each opening; and at the outer edges of these valves L are fixed stops *n'*, that engage against the uprights of the frame A as the valves L are swung inward and prevent them from being moved past their seats. These valves L have their lugs *k* set sufficiently apart from each other to admit of the passage between them of the buckets E E as the latter move up and down.

The valve-operating devices consist of the valve-levers M, that are pivoted by studs *o* on the upper edges of the arms D D midway of their length, and are extended upward through slots *p* in the horizontal slide-bars N, which are

supported on rollers *g*, that revolve on pins *g'* projecting laterally from the frame A in such a position that their ends may be pushed in contact with the valves L to open the same by the motion of the valve-levers M, which move with the arms D D. In this instance the said valve-levers M are longitudinally slotted from side to side, as shown at *r*, though these slots may be dispensed with, and in lieu thereof the pivoting-studs *o* be set in suitable slots in the arms D D.

The regulating devices consist of transverse crank-rods O, whose ends are journaled in the lugs *s*, that depend from the adjusting-bars P, which are pivoted at *t* on the frame A, while the crank-pins of said rods O are engaged in the slots *r* of the valve-levers M. These crank-rods O serve as the fulcrums for the valve-levers M, and accordingly as they are elevated or depressed is the throw of the said levers M and slide-bars N shortened or lengthened and the opening of the valves L made correspondingly partial or complete. These bars P are connected at their unpivoted ends by a cross brace or bar, P', to the center of which is attached a cord, Q, that is passed upward over a pulley, Q', and has a weight on the other end. By pulling on this cord Q the adjusting-bars P and crank-rods O can be raised, and the throw of the levers M be thereby shortened, with the result of diminishing the flow of water into the buckets E E. A suitable automatic governor may be attached to the cord Q, if desired.

For the purpose of stopping the machine at any time, elbow-rods R are firmly attached to the crank-rods O, and are carried to within easy access of the operator. By pulling on these rods R the crank-pins *u* of the rods O—the fulcrums of the levers M—may be elevated so as to limit the throw of the levers M and slide-bars N to such a degree that the latter will fail to move the valves L, and consequently the supply of water to the buckets E E will be cut off, and by the same means the openings of the ports *h h* may be regulated to any desired degree.

The power of the machine is transferred to the crank-shaft S of the driving-wheel T by pitmen U, that are pivoted on rods U', which pass transversely through the arms D D near one end thereof. The cranks S' S' of the crank-shaft S are set at right angles to each other, after the manner of cranks on locomotives, whereby dead-centers are avoided.

The power may be transmitted from the driving-wheel T by belt and pulleys V W, as indicated in Fig. 1, or by any other well-known devices.

The buckets E E are constructed and arranged so as to secure the greatest economy in water and certainty in movement. Each bucket E to load is brought alternately close up to the

under face of a valve, L, and receives its load or supply of water without leak or spatter, and the bars *cc* prevent all loss of water by spilling as said buckets E E descend. By the alternate filling and emptying of the alternate buckets E E the desired motion is given to the machine.

I do not strictly confine myself to the precise construction and parts herein shown, for I am aware that considerable modification may be made in both without departing from my invention.

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

1. An improved water-motor, constructed as herein shown and described, consisting of the flanged rocking shaft C C, pairs of parallel arms D D, carrying buckets E E, pivoted gravity-valves L, slotted valve-levers M, slide-bars N, and fulcrum crank-rods O, arranged and adapted to operate as set forth.

2. In a water-motor, the combination, with the arms D D and buckets E E, of the bars *cc*, substantially as herein shown and described, whereby the water is prevented from escaping from the descending buckets, as set forth.

3. The combination, with the buckets E E, provided with plates *b b*, of the blocks G, substantially as herein shown and described, whereby the said buckets are tipped, as set forth.

4. The combination, with the arms D D and buckets E E, provided with plates *b b*, of the rods H H, substantially as herein shown and described, whereby the tipping of the buckets is limited, as set forth.

5. In a water-motor, the combination, with the water-reservoir I, of the pivoted valves L, provided with arms *m* and attached weights *n*, substantially as herein shown, and for the purpose specified.

6. In a water-motor, the combination, with the valve L and the arms D D, provided with studs *o*, of the valve-levers M and slotted slide-bars N, substantially as herein shown and described, whereby the valves are opened, as set forth.

7. In a water-motor, the combination, with the valve L, the slotted valve-levers M, and slotted slide-bars N, of the pivoted adjusting-bars P and fulcrum crank-rods O, substantially as and for the purpose described.

8. In a water-motor, the combination, with the valve L, the slotted valve-levers M, bars N, and fulcrum crank-rods O, of the rods R, substantially as herein shown and described, whereby the machine may be regulated as set forth.

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Witnesses:

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W. L. HARBIN.