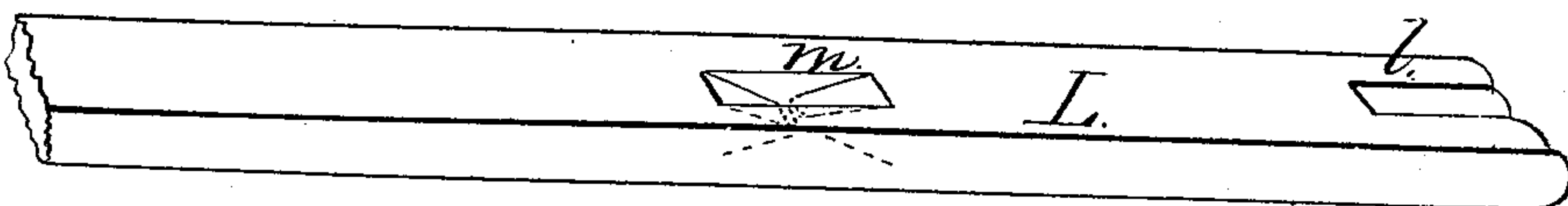
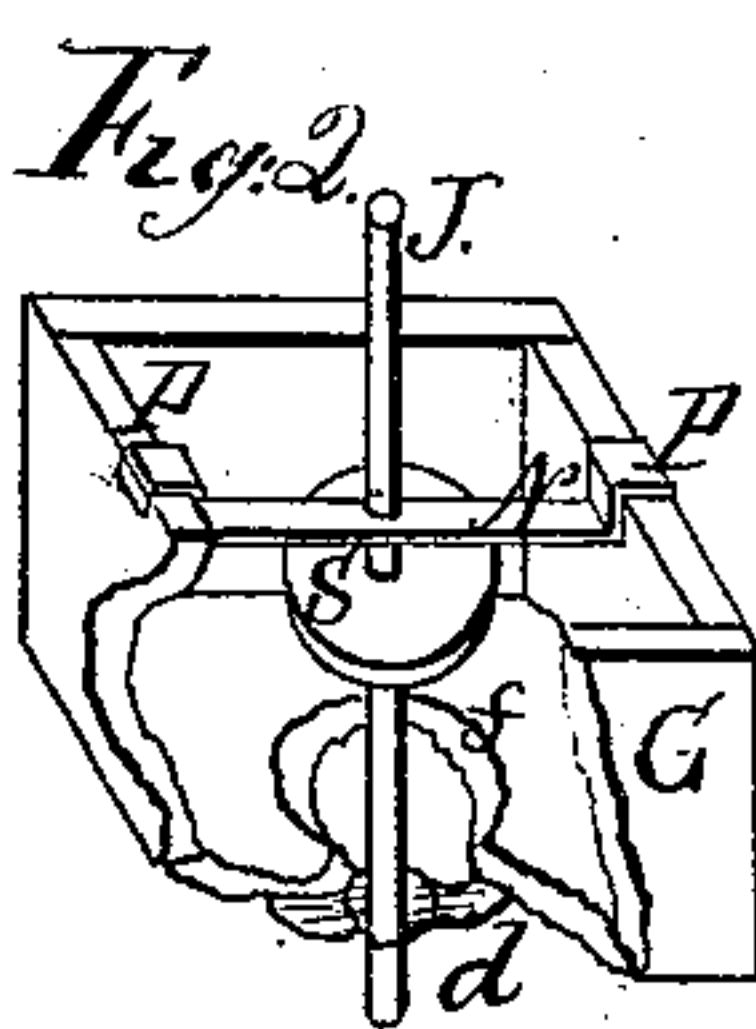
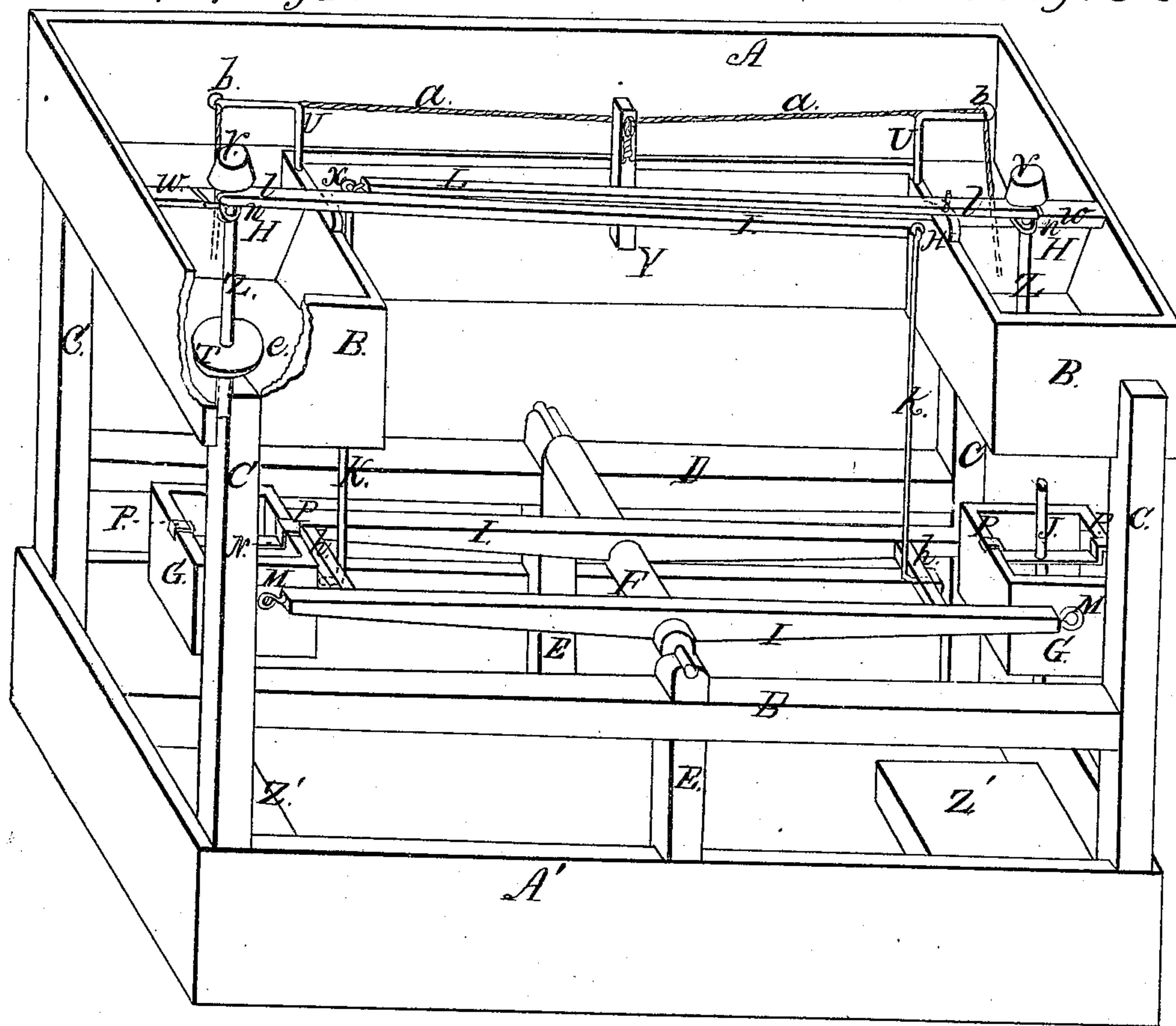


# *S. W. Broadwell* *Hydraulic Engine.*

*No. 92,789 Fig. 1.*

*Patented Jul. 20, 1869.*



*Witnesses.*

*E. L. Kelley.*  
*L. W. Moody.*

*Inventor.*

*S. W. Broadwell*  
*By his attorney*  
*Geo. Chapin.*



# United States Patent Office.

S. W. BROADWELL, OF LOGAN, IOWA.

Letters Patent No. 92,789, dated July 20, 1869.

## IMPROVEMENT IN WATER-MOTOR.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, S. W. BROADWELL, of Logan, in the county of Harrison, and State of Iowa, have invented an Improvement in the Construction of Water-Motors; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings and letters marked thereon, making a part of this description, in which—

Figure 1 is a perspective representation of a motor, showing my improvement.

Figure 2, a perspective representation of one of the lower buckets, removed from the walking-beam.

The present invention relates to an improvement in that class of motors which has buckets hung to an oscillating walking-beam, which operates levers for opening and closing valves in the flume above; and

Its nature consists in the novel construction of parts as hereinafter fully shown.

A represents a flume, which is to be placed in the bed of a creek or stream, where there is a fall sufficient to clear the buckets G G, and which has bulkheads B, extending down-stream far enough to provide room for valves T, which operate therein, to have seat-room below the gates H.

The flume and bulkheads are supported with posts C, which have a firm support in the tail-race A' below, or bed of the stream, as the case may be.

Beams D are rigidly fastened to the posts C and to short posts E, (the latter, also, being supported in the race A') in order to provide a firm support for the shaft F of the walking-beam.

This beam consists of a shaft, F, two bars, I, so placed on the shaft as to have their ends balanced, and two ties, h, fastened to the bars in such position as to be directly under the gate-rods K.

To the ends of the bars I are hung buckets G, which alternately catch water discharged from the bulkheads B, and discharge it by means of valves S, fig. 2, fastened to rods J, which strike against bumpers Z', in the bottom of the race A', and raise said valves off from their seats f; the lower ends of the rods having bearings in guide-plates d, attached to and projecting below the buckets, and their upper ends having bearings in guide-plates N, fastened to the top edge of the buckets, and projecting down into them, and so held in place as to have an easy vertical motion as the valve S is opened and closed.

The object of placing the plates N below the tops of the buckets, is to prevent them from turning the water over their top edges, when falling from the bulkheads B.

This arrangement requires that the plates d be

made to project below the valve-seats f, in order to place the bearings of the rod J the proper distance apart, and also for the free escape of the water.

The valves T, fig. 1, have seats in the bottoms of the bulkheads B, and are so weighted as to keep the rods Z, to which they are attached, in an upright position.

These rods have bearings in plates n, attached to bridges W, which are fastened to the bulkheads B, and to their upper ends are fastened adjustable nuts V, by means of which the slotted ends l of the levers L are made to raise the valves T.

These levers have slots m, as shown in an enlarged drawing, made vertically through them, to receive pins projecting up from bearings x, which are attached to the bulkheads B.

By this means, the levers L are so held in place as to oscillate without binding or cramping in any part.

To the opposite ends of the levers L are fastened, by hooks and eyes, gate-rods K, which are so bent at right angles, at their lower ends, as to catch under the ties h, and alternately so draw the levers L down as to open the valves T of bulkheads B.

Two gates, H, are pivoted to the bridges W, and so inclined as to be closed by the pressure of the water when the motor is at rest, and to be raised up by ropes or chains a when it is to be put in motion, said ropes or chains being attached to the lower edges of the gates, and brought through eye b in the arm-standards U, and through a hole in a standard, Y, are both raised at the same time.

The adjustment of the valves T on seats e is made by turning the nuts V on rods Z; and all that is required to start the motor, is to simply raise the gates H, by means of ropes a, and so bring down one of the levers, L, as to raise one of the valves, T.

This will fill the bucket G underneath, and, as its weight carries it down, the tie h will strike the bent part of the rod K, and raise the valve in the opposite bulkhead, and fill the opposite bucket while the one first filled is discharging.

It is not, however, necessary, after the buckets have been once filled, to move either of the levers to start the motor, as one of the buckets is then full enough with water to move so soon as the gates are raised.

The mechanism for so changing the oscillating motion of the shaft to rotary or reciprocating motion, as to apply the motor to a practical purpose, is not shown, from the fact that such a device is well understood, and is no part of the present invention.

Having thus described my invention,

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The weighted valves T, provided with adjustable nuts V, in combination with the slotted levers L, depending gate-rods K, oscillating walking-beam I F, provided with ties h and buckets G, as described.

2. The buckets G, provided with valves S, attached to rods J, which are made to discharge water

by striking bumpers Z, in the bottom of the race, and provided with plates N, which project down into them, to prevent water from being splashed over their edges, and with plates A, which project down to form suitable bearings, as set forth.

S. W. BROADWELL.

Witnesses:

E. L. KELLEY,  
L. W. MOODY.