

(No Model.)

H. E. TRUMBLE.

WATER MOTOR.

No. 395,530.

Patented Jan. 1, 1889.

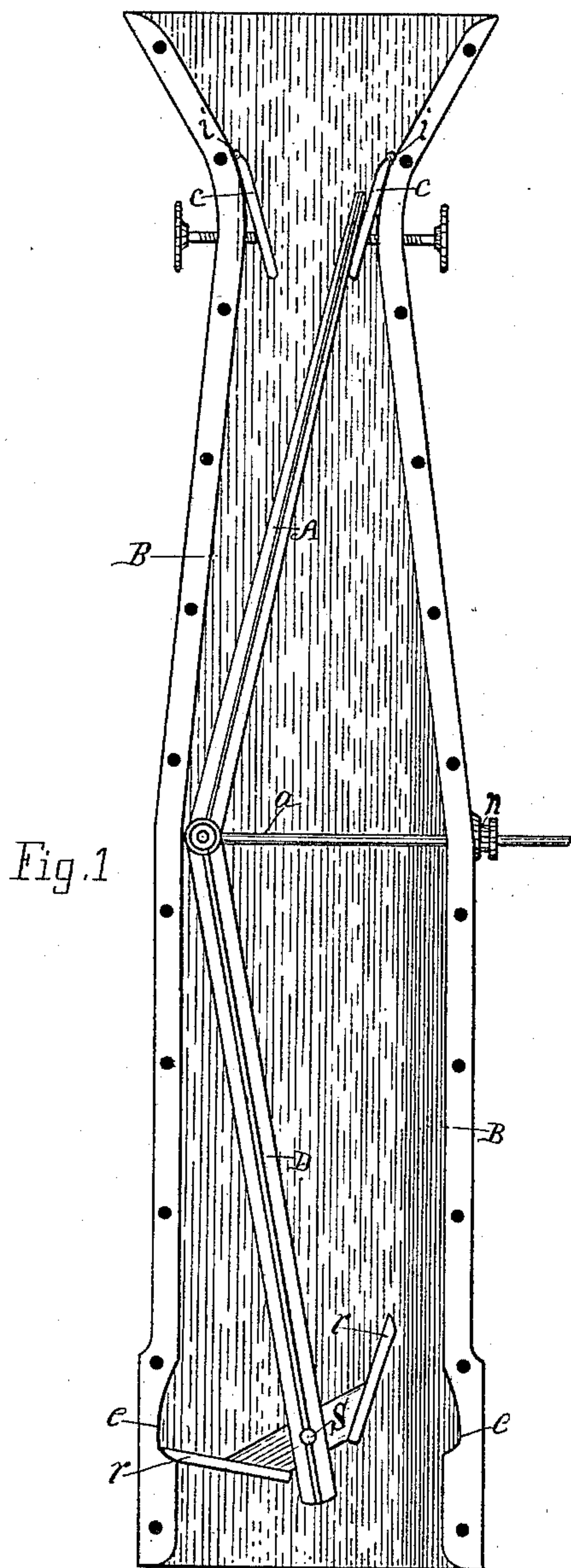


Fig. 1

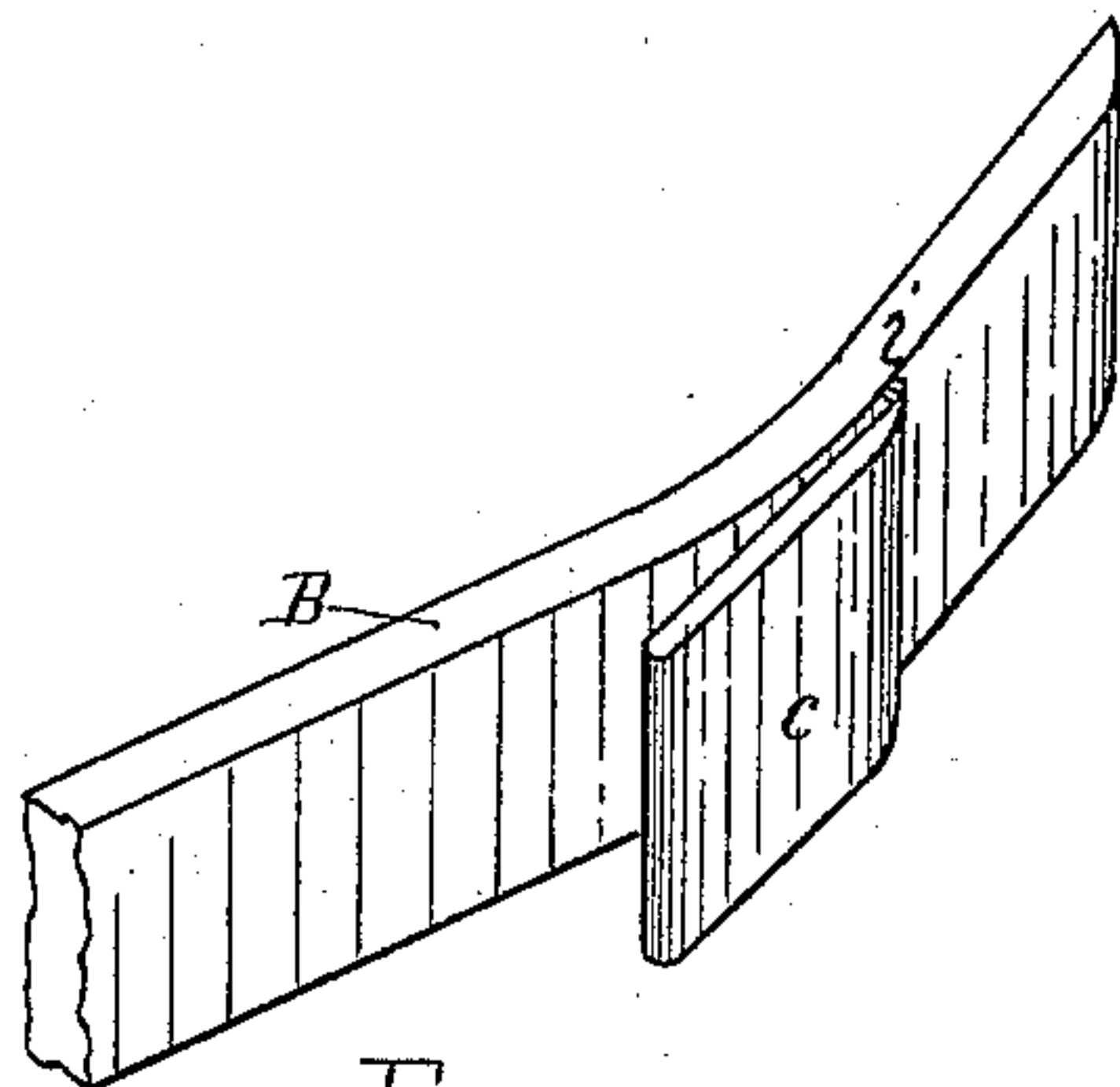


Fig. 2

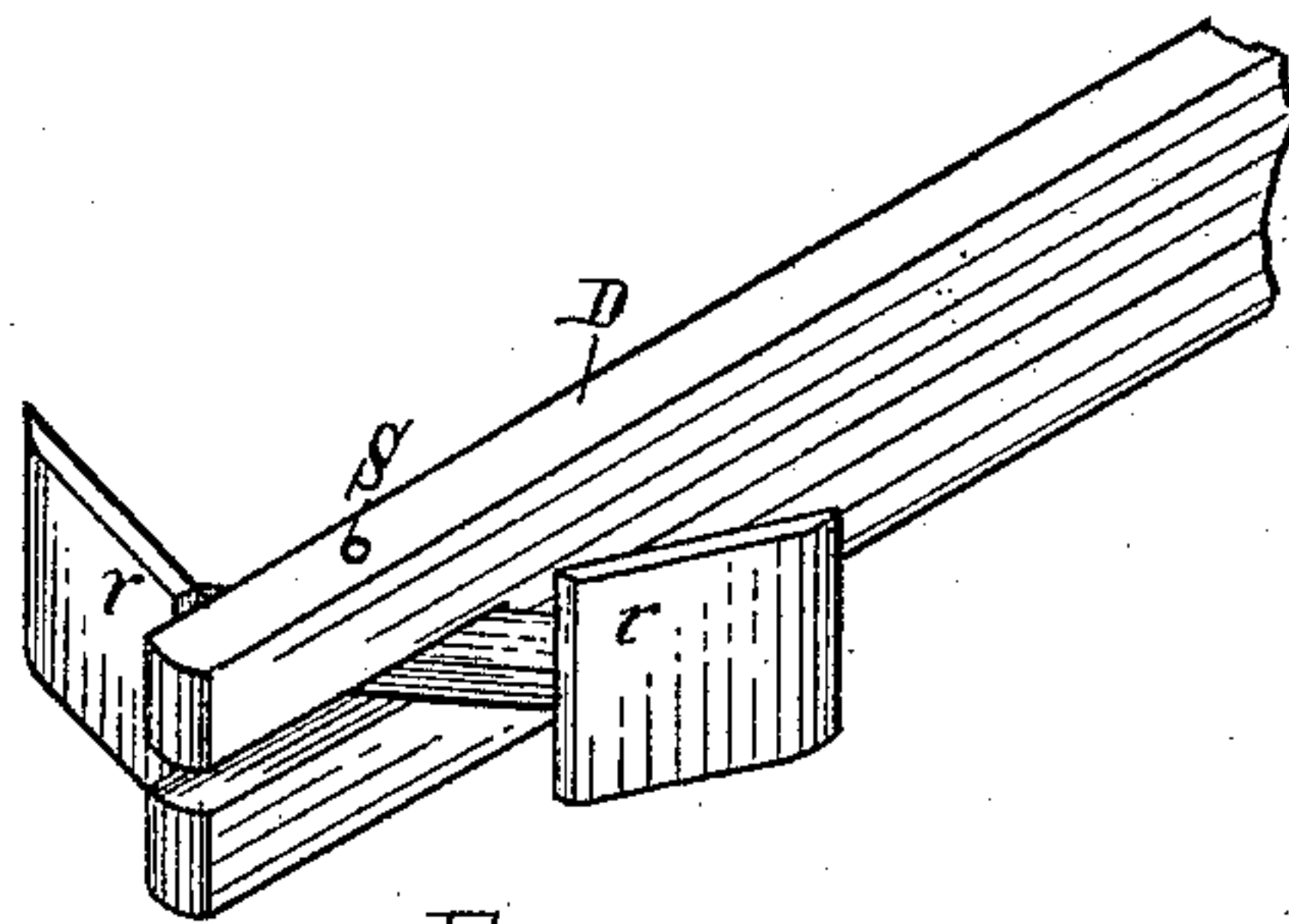


Fig. 3

Witnesses.

John C. Perkins.  
A. C. Sherwood

Inventor.

Henry E. Trumble  
By Lucius C. West.  
Atty.



# UNITED STATES PATENT OFFICE.

HENRY E. TRUMBLE, OF KALAMAZOO, MICHIGAN.

## WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 395,530, dated January 1, 1889.

Application filed August 3, 1888. Serial No. 281,872. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY E. TRUMBLE, a citizen of the United States, residing at Kalamazoo, county of Kalamazoo, State of Michigan, have invented a new and useful Water-Motor, of which the following is a specification.

This invention relates to a motor disclosed in another pending application of mine, filed March 27, 1888, Serial No. 268,668, in which a piston appears like the one herein shown, composed of two plates jointedly attached together end to end, and arranged in a flume or water-course, as below described.

The object of the present invention is to devise improvements in the stops which control and limit the movement of the free end of the piston, for the purpose which will appear farther on.

A further object is to provide the eduction of the flume or exhaust-ports with automatic valves, so as to hold the water in the flume on one side of the piston while the piston moves in one direction, and to let the water thus held exhaust before the piston moves in the other direction.

In the drawings forming a part of this specification, Figure 1 is a plan with the top wall of the flume removed—that is, if the flume laid in a horizontal position it would be a plan view, but if used in a vertical position it would be an elevation; Fig. 2, a broken part of one side of the flume and one of the stop-gates in Fig. 1, in enlarged perspective; and Fig. 3 is a broken part of the pivoted end of the piston and the exhaust-valves in Fig. 1, in enlarged perspective.

Referring to the letters marked on the drawings, B is a water-flume. For convenience, and from the fact that the motor is more especially designed for water, I use the term "water;" but any element—such as steam, air, vapor, &c.—which will operate the piston may be employed. The piston composed of parts A and D, the same being bars or plates, are jointed or hinged together end to end, Fig. 1. This piston is placed in the flume B, one end being pivoted therein by a pivot, S. The other end is left free to play between the stop-gates. These gates c c are hinged at one end to the walls of the flume at i, Figs.

1 and 2. Set-screws project through the walls of the flume, Fig. 1, to throw the stop-gates farther in, or, by screwing the set-screws outward, to allow the stop-gates to swing back nearer to the walls of the flume. Thus the free end of the piston at the induction or mouth of the flume B is limited in its movement, as in the other application above referred to; but in the present instance these stop-gates c prevent the water from flowing between the wall of the flume and the end of the piston which rests against the stop-gate. (See upper right hand in Fig. 1.) Of course if the stops c were dispensed with and the end of the piston rested against the wall of the flume, the water could not flow behind it; but it is frequently desirable that the stops should be adjustable.

The piston-rod a is attached to the pistons at the joint, as described in the above-named prior application, but claimed in this application, because the drawings clearly illustrate the motor employing this style piston-rod. The piston-rod extends through bearings n.

While the piston will work in the water flowing through the flume without any valves or gates in the eduction-ports, still greater power is secured by partially closing said ports at the time, as explained in the operation below.

A successful valve is shown in Figs. 1 and 3. It consists of the oblique wings r r, attached to the ends of a cross-piece, which is centrally pivoted in the flume by the pivot S, which pivots the end of the piston; but it may have a separate pivot, if preferred. In most cases it is desirable that the wings r be of a size to not entirely stop the flow of water, so that the free end of the piston will more promptly tilt from one stop c to the other.

In Fig. 1 the water is supposed to be exhausting from the right-hand side of the flume and flowing into the left-hand side, as the free end of the piston rests against the right-hand stop-gate c, preventing the water from flowing into this side. The water flowing through the left-hand side has tilted the valves, as in Fig. 1, closing the port at the left and opening the right-hand port. The pressure of the water against the left side of the piston forces it over to the right side of



the flume, and as soon as this action has taken place the water tilts the free end of the piston over against the left-hand stop-gate, letting the water in at the right side of the piston, which water tilts the valve the other way, closing the right-hand port and opening the left-hand port. Thus the operation continues.

The valves are limited in their movement by coming in contact with the walls of the flume or some suitable stop. In Fig. 1 the walls of the flume are hollowed out at *e e*, forming shoulders for the ends of the valves to contact with, and thus limit their movement.

My design is to employ a flume having a piston of this style for measuring liquids and fluids, thus utilizing it for a meter as well as a motor.

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

1. The combination of a suitable flume having induction and eduction ports, automatic exhaust-valves in the latter-named ports, and the jointed piston, substantially as set forth.

2. The combination of a suitable flume, the jointed piston pivoted therein at one end, and the adjustable stop-gates consisting of the wings hinged in position for the free end of the piston to contact with and the screws for adjusting the wings, substantially as set forth.

3. The combination of a suitable flume, an automatically-oscillating piston therein in the plane of the flowing water in the flume, and the adjustable stop-gates for the free end of the piston to contact with, consisting of the wings hinged in the induction-port, and means for swinging the wings in or out, substantially as set forth.

In testimony of the foregoing I have hereunto subscribed my name in presence of two witnesses.

HENRY E. TRUMBLE.

Witnesses:

JOHN C. PERKINS,  
A. E. SHERWOOD.