(No Model.)

H. E. TRUMBLE.

WATER MOTOR.

No. 395,529. Patented Jan. 1, 1889.

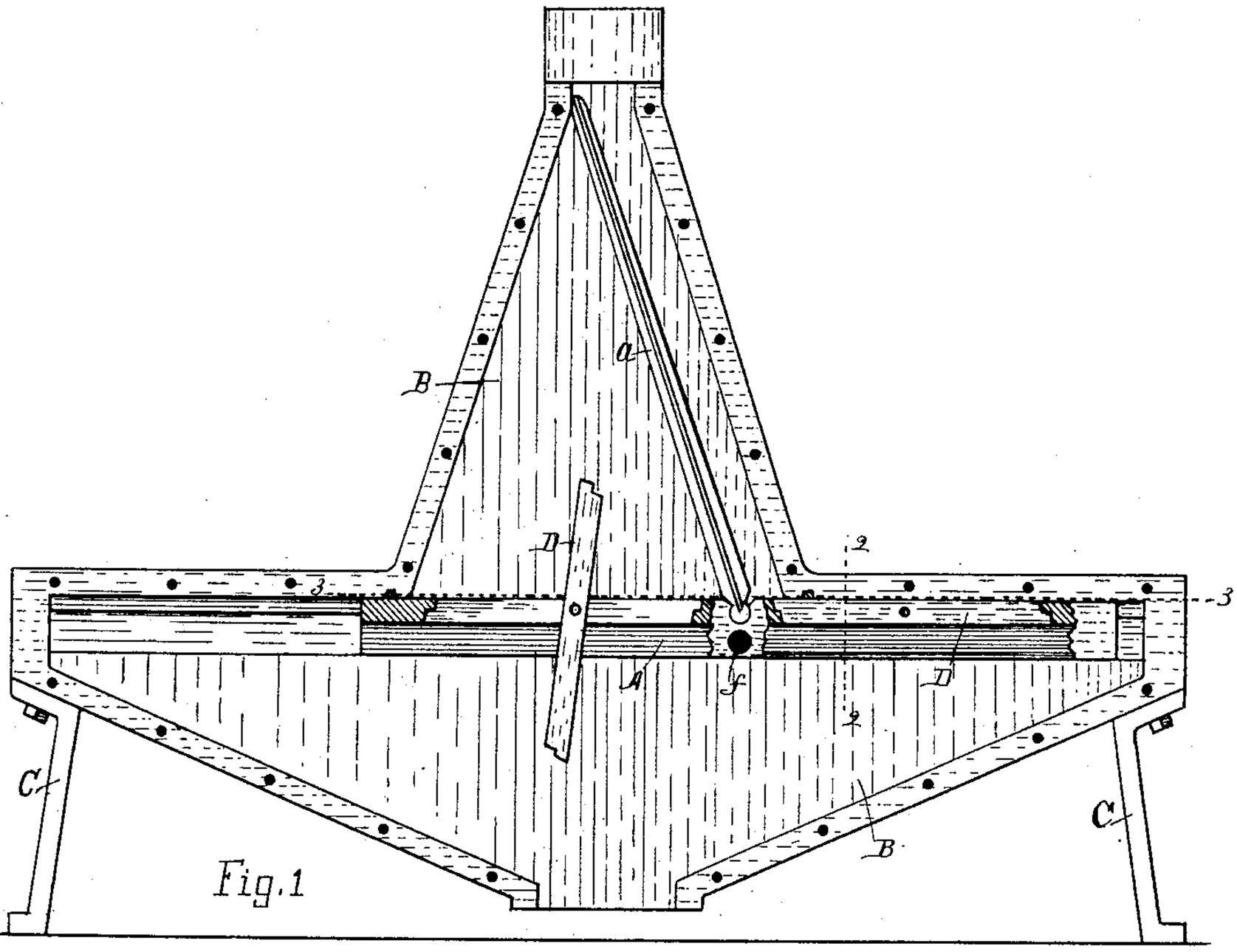
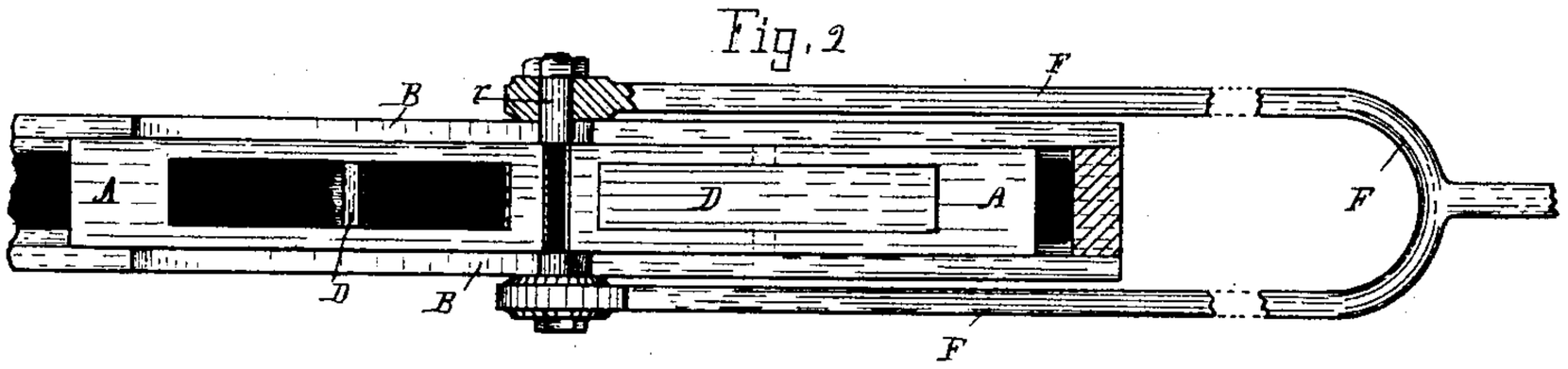


Fig. 1

Fig. 2



Witnesses.
John. C. Perkins.
A. E. Sherwood

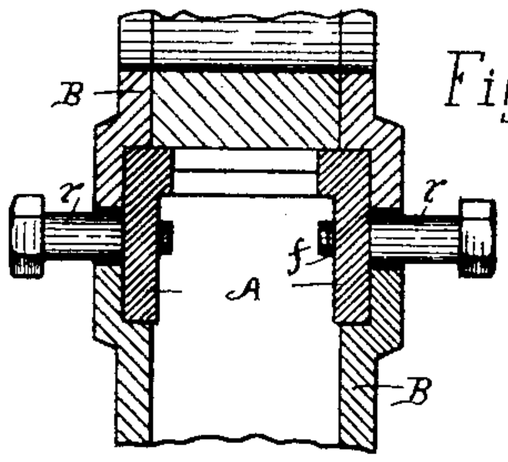


Fig. 3

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UNITED STATES PATENT OFFICE.

HENRY E. TRUMBLE, OF KALAMAZOO, MICHIGAN.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 395,529, dated January 1, 1889.

Application filed August 3, 1888. Serial No. 281,871. (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 motors in which a piston is employed, which piston is automatically oscillated by the flowing current of water, or other element of power, through the flume in which said piston is located. This idea is illustrated in a pending application of mine, dated March 27, 1888, Serial No. 268,668, in which application the piston as disclosed is composed of a bar pivoted at one end in the flume and another bar jointedly attached to the free end of the pivoted bar.

The object of the present invention is to construct a motor of this class employing only a single bar pivoted at one end so as to oscillate, and constituting the piston.

Referring to the drawings forming a part of this specification, Figure 1 is an elevation, parts being broken and one wall of the flume or water-chest being removed; Fig. 2, a plan showing parts in section on line 3 3 in Fig. 1, looking from a point above; and Fig. 3 is a section of parts on line 2 2, looking from a point at the right.

Referring to the letters marked on the drawings, B is an upright flume or chest, having an induction-port at the upper end and an eduction-port at the lower end, or, more properly speaking, as here shown, the eduction or exhaust ports are at the lower end of the upper part of the chest, as will appear farther on. The flume or chest B, as here shown, is supported in an upright position by legs C; but it may be located in any position desirable.

At A is a transverse slide, which has slide-bearings in the flume B, in which bearings the slide plays laterally during the operation. Figs. 2 and 3 show this clearly. This slide has two exhaust-ports through it, which ports are closed by doors D. These doors are pivoted in the ports at a point a little off from the center of said doors, so that when they are released they will be swung open by the pressure of water, as will more clearly appear in the description of the operation.

The piston *a*, consisting of a bar or plate, is pivotally attached at one end to the slide A at a point between the exhaust-ports. (See Fig. 1.) The other end of the piston is left free to oscillate from one side of the flume B to the other near the induction-port.

In Fig. 1 the water or other element of power is supposed to be flowing into the flume B at the right side of the piston *a*, the water on the left side having exhausted by forcing the door D of the left-hand exhaust-port open, which action took place as soon as the door was released from the horizontal part of the left-hand wall of the flume or chest—that is, as soon as the slide A and piston *a* assumed the position they occupy in Fig. 1 the water pressing on the door tilted it open, because the left-hand end of said door has a greater surface at the left of the pivot of said door than at the right of said pivot. It will be observed that when the slide A and piston *a* move to the right the right-hand door automatically closes by coming in contact with the right horizontal wall of the chest, and will thus be held closed until the slide moves far enough to the left to release the door, the same as the left-hand door was released, as above described. To return to the action of the water which has entered at the right of the piston *a*. The pressure of the water will oscillate the pivoted end of the piston over to the left side of the flume, and of course will carry the slide A with it, automatically closing the left-hand door and releasing the right-hand door in like manner as above described in relation to the movement of parts in the other direction. When the pivoted end of the piston *a* reaches the left side of the flume, the upper end of said piston tilts over against the right side of said flume at the upper end, the same as said upper end tilted to the position here shown when the lower end oscillated to the right side. Thus the upper tilting end of the piston directs the current of water first to one side of the piston and then to the other, thus automatically keeping up an oscillation of the piston and a reciprocating movement of the slide by the action of the water flowing through the flume B. This action would take place if the exhaust-ports were left open, and the motor may be so used by dispensing with

the doors D and making the slide A skeleton in form, so that the water will not be retarded by it; but by having the exhaust-ports alternately open and close greater power is secured from a given amount of water.

A motor of this kind is equally applicable for a meter for measuring liquids and fluids passing through it by associating a register with the device. To transmit motion to other machinery, a piston-rod may be attached at any suitable point to the slide A. A good plan is to use a piston-rod, F, having a forked end astraddle of the flume and pivotally attached to projections *r*, extending laterally from the slide at *f*. Thus arranged the piston-rod reciprocates with the slide A.

Having thus described my invention, what I claim is—

1. The combination of a suitable flume having induction and eduction ports, a piston consisting of an oscillating bar or plate in the plane of the flowing water through the flume, and a slide reciprocating transversely in the flume and to which one end of the piston is pivoted, substantially as set forth.

2. The combination of a suitable flume, a slide reciprocating transversely in said flume, having exhaust-ports, automatically-operative doors pivoted in said ports, and a single plate pivoted at one end to said slide and constituting an oscillating piston in the plane of the flowing water through the flume, substantially as set forth.

3. The combination of a suitable flume, a single-plate oscillating-piston in the plane of the flowing water in said flume, a slide reciprocating transversely to the flume, and to which slide said piston is pivoted at one end, and a piston-rod attached to said slide, substantially as set forth.

4. The combination of a suitable flume or chest, a reciprocating slide having exhaust-ports, said slide having bearings near the horizontal branches of the flume-walls, doors pivoted in the exhaust-ports off from the center of said doors, and a piston oscillating in the plane of the flowing water in said flume and pivoted to said slide between the exhaust-ports, 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.