

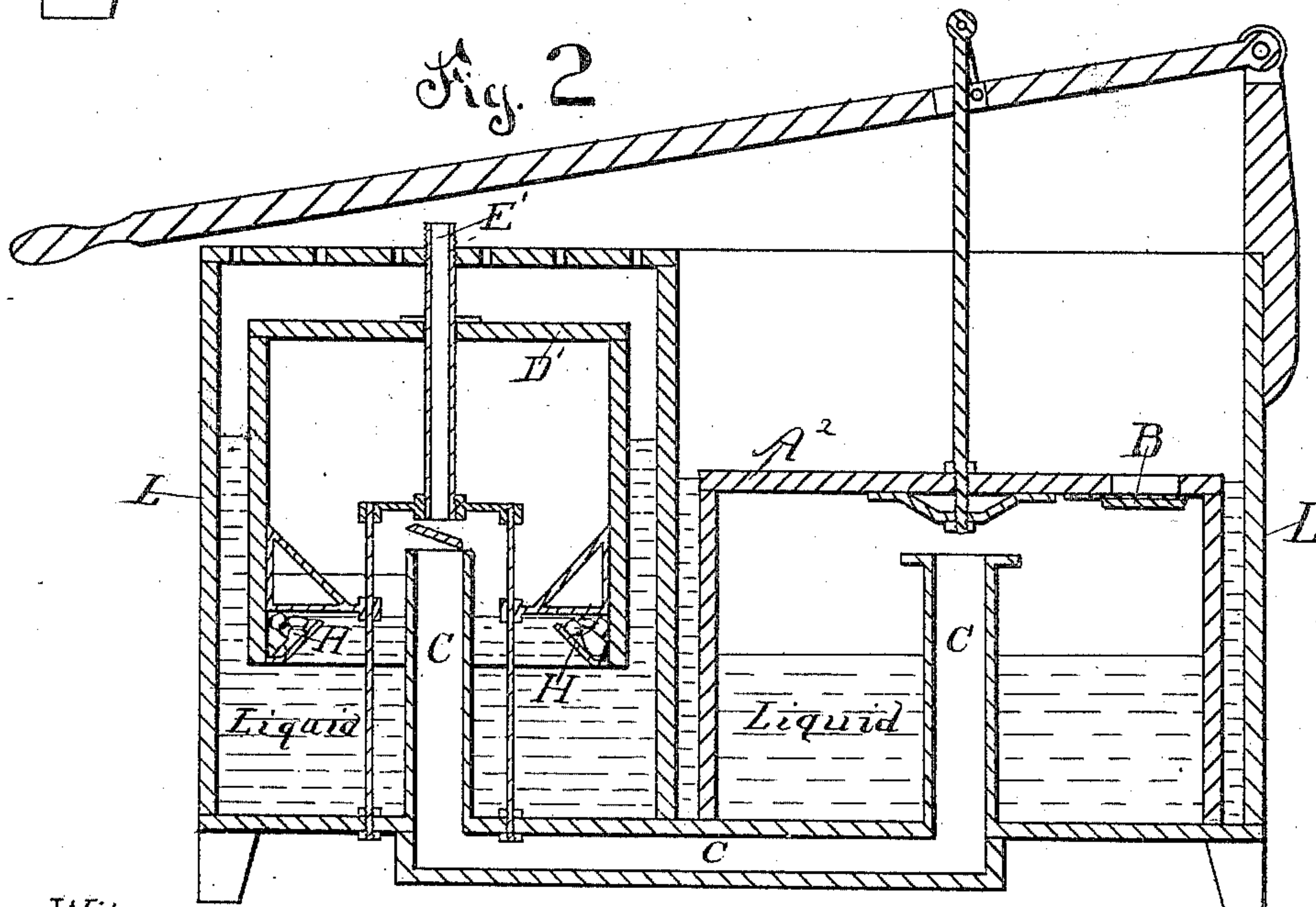
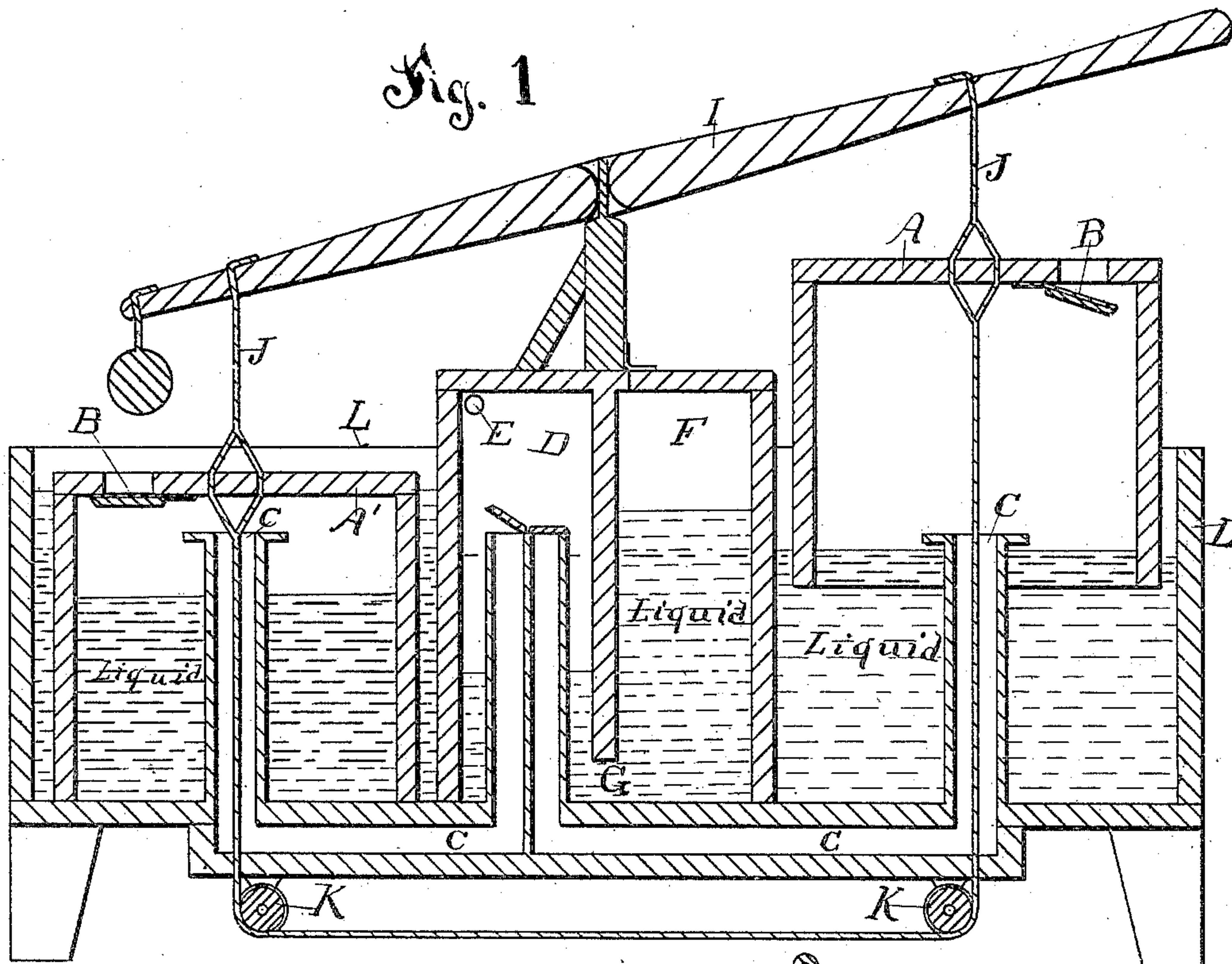
(No Model.)

2 Sheets—Sheet 1.

S. T. CULP.  
BELLOWS.

No. 444,744.

Patented Jan. 13, 1891.



Witnesses

James R. Townsend.  
M. T. Brousseau.

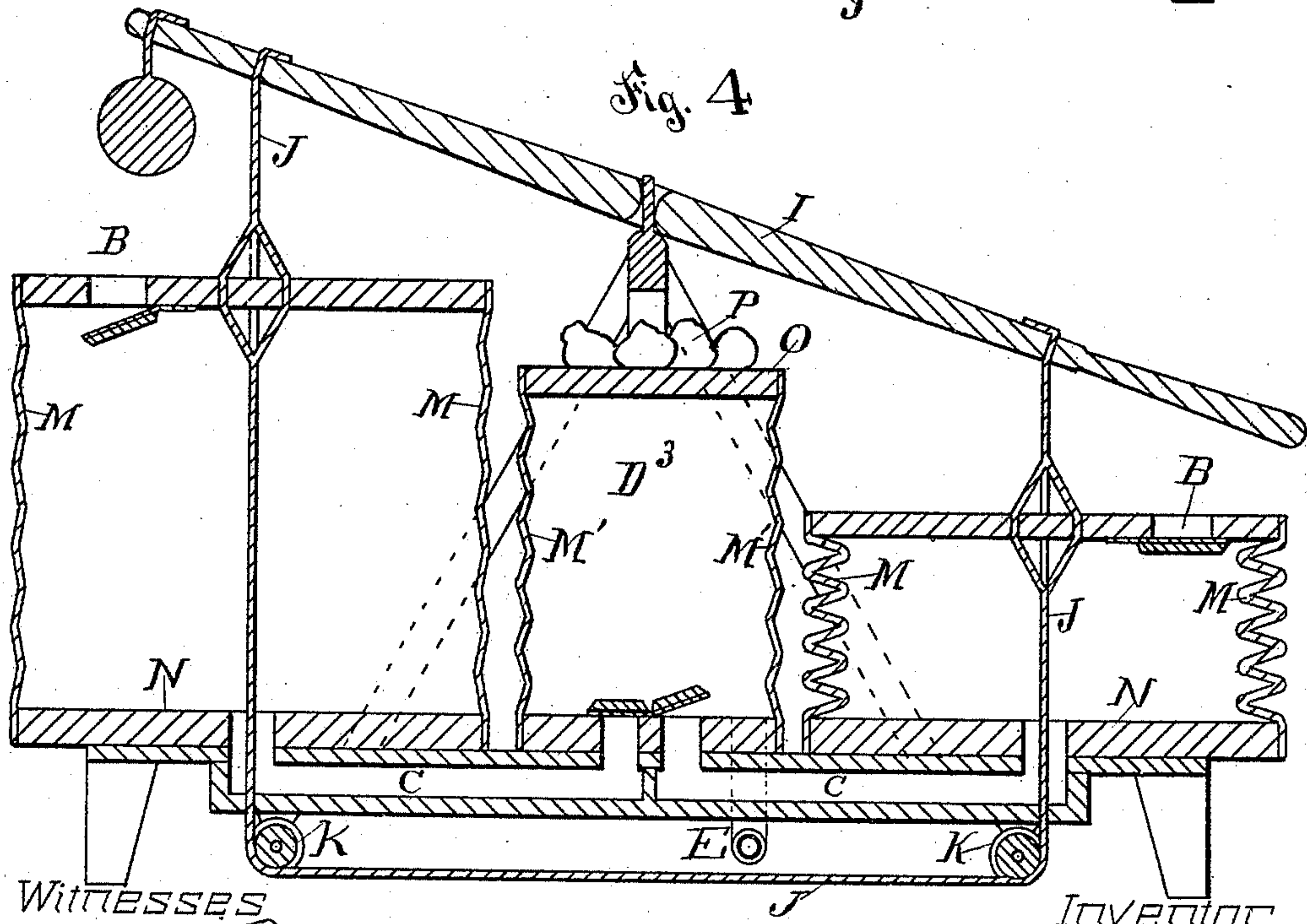
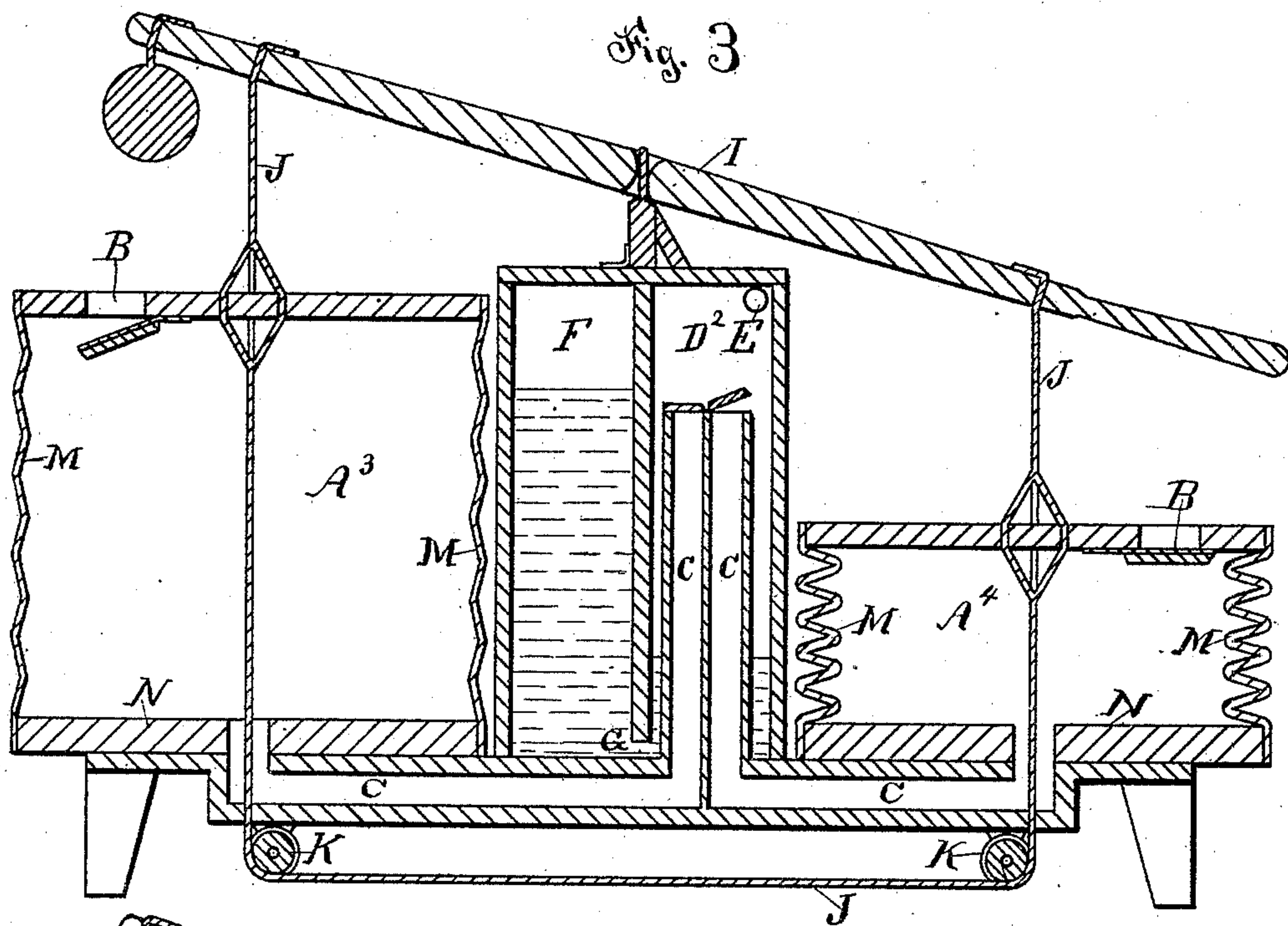
Inventor

Samuel Shaddens Culp

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INVENTOR

Samuel Hadden Culp



# UNITED STATES PATENT OFFICE.

SAMUEL THADDEUS CULP, OF DENVER, COLORADO.

## BELLOWS.

SPECIFICATION forming part of Letters Patent No. 414,744, dated January 13, 1891.

Application filed February 24, 1890. Serial No. 341,600. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL THADDEUS CULP, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Bellows, of which the following is a specification.

The object of my invention is to devise a bellows which may be manufactured by ordinary mechanics of material easily procurable, and which bellows will produce a constant forcible blast of air.

Figures 1 and 2 illustrate the principal features of my invention. Figs. 3 and 4 are modifications.

My invention embraces two principal features or combinations of parts, which may be used in combination with each other or in combination with equivalents of each other.

The drawings are in vertical longitudinal mid-section and illustrate my invention as it may be employed in the construction of four different styles of bellows.

Figure 1 represents a bellows in which both the principal features of my invention are employed in combination with each other. Fig. 2 represents a bellows in which the feature or combination of parts which I consider most important is employed without the other feature herein claimed. Figs. 3 and 4 represent forms of bellows in which such other feature is employed without the feature shown in Fig. 2.

The feature I consider of most value consists of the combination of a vertically-reciprocating inverted tank having its upper end provided with a valved inlet and having its lower end open and immersed in liquid, a discharge-chamber, a valved pipe opening into the discharge-chamber from the chamber formed within the inverted tank between the head of such tank and the surface of the liquid, means for producing a constant pressure upon the air within the discharge-chamber while the bellows is being operated, and a discharge-pipe opening from the discharge-chamber.

In Figs. 1 and 2, A, A', and A<sup>2</sup> represent the vertically-reciprocating tanks. B is the valved inlet-opening. C is the valved egress-pipe opening into the discharge-chamber from the chamber formed within the inverted tank.

D is the discharge-chamber. E is the discharge-pipe. The means employed for producing a constant pressure within the discharge-chamber may be varied. The means for this purpose (shown in Fig. 1) consists of the combination, with the discharge-chamber D, of an auxiliary air-chamber F, connected with D by a free passage-way G at the bottom of the chambers, and a liquid filling in such chambers extending above such connecting passage-way. When air is forced into D through C more rapidly than it escapes through E, the air in D becomes compressed and forces the liquid up into F, and the weight of the column of liquid in F, together with the expansion of the air in the top of F, tends to produce a constant pressure upon the air in D and will drive the air out at E for a short time after the blasts through C have ceased. This arrangement prevents any variation of the blast which might be caused by intervals between the blasts through C.

In Fig. 2 the discharge-chamber is a vertically-movable tank D', having one end open downward and immersed in liquid. The weight of the tank produces an approximately constant pressure upon the air in D' when the bellows is operated. H H are weights to increase the pressure upon the air in D'. The column of liquid around D' rises as the pressure within D' is increased, and its weight tends to give constancy to the stream of air passing out through the discharge-pipe E'.

The other feature of my invention (illustrated in Figs. 1, 3 and 4) consists of the combination of a discharge-chamber provided with a discharge-pipe and with means for producing a pressure upon the air within such chamber when the bellows is operated, two extensible bellows-boxes having valved inlets and being connected with the discharge-chamber by valved outlet-pipes, a walking-beam, a cord attached by its ends to the ends of the walking-beam and in its intermediate length attached to the heads of the bellows-boxes and passing over pulleys, and said pulleys respectively arranged opposite to and in line with the attachments of the cords with the walking-beam and the heads of the bellows-boxes, whereby when the walking-beam is operated the heads of the bellows-boxes will be positively and forcibly reciprocated.



In Fig. 1 the extensible bellows-boxes are formed of the inverted tanks A A', having their lower ends immersed in liquid. In the drawings, I is the walking-beam. J is the cord. K K are the pulleys. L represents the water-box partially filled with liquid, in which the inverted tanks are immersed. The pipes C extend upward through the bottom of the water-box directly beneath the center of the bellows-boxes A A' and extend above the level of the liquid, so that the cord can pass therethrough without causing leakage. In cold climates it is well to use some liquid, such as oil, which does not easily congeal; but in warmer climates water is preferable.

In operating the form of bellows shown in Fig. 1 the walking-beam is moved up and down, and the tanks A A' are thereby alternately raised and lowered in the water. As the tank raises, it receives air at B. As it is lowered, it discharges air through C into D. The liquid in which the lower end of A A' is immersed forms a perfect packing to prevent the escape of air from A A'. When A descends, the air is compressed and drives a portion of the water in A down, thus raising the level of the liquid surrounding A. When the upstroke begins, the liquid surrounding A falls and causes the liquid within A to rise, thus forcing air out through C during the first part of the upward stroke of A. This tends to produce a constant pressure in D, for the reason that the blast from one tank continues through all the time the other tank is filling and until it has begun to discharge. In this way I avoid the interval between blasts at the moment the walking-beam stops to begin its return-stroke. Where only one bellows-box, as A<sup>2</sup>, is used, the discharge-chamber should be movable and weighted, as D' H in Fig. 2. Then D' serves the office of the bellows-box A' in Fig. 1 and descends while A<sup>2</sup> is ascending.

In Fig. 3 the bellows-boxes A<sup>3</sup> A<sup>4</sup> are provided with leather or other flexible walls M, attached to the base N. The discharge-chamber D<sup>2</sup> is similar in construction to that of D. (Shown in Fig. 1.)

In Fig. 4 the discharge-chamber D<sup>3</sup> is provided with flexible walls M', and the head O is weighted to compress the air in the chamber D<sup>3</sup> when the bellows is operating. P represents the weights.

Similar letters refer to similar parts.

The forms shown in Figs. 1 and 2 can be constructed of wood or of sheet metal by ordinary mechanics at a slight cost, the joints, excepting that made by the liquid packing, being straight and not difficult to make tight.

Now having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a bellows, the combination set forth of a discharge-chamber provided with a discharge-pipe and with means for producing a pressure upon the air within such chamber, two extensible bellows-boxes having valved inlets and being connected with the discharge-chamber by valved outlet-pipes, the walking-beam I, and a cord attached by its ends to the ends of the walking-beam and in its intermediate length attached to the heads of the bellows-boxes and passing over pulleys, said pulleys respectively arranged opposite to and in line with the attachments of the cords with the walking-beam and the heads of the bellows-boxes.

2. The combination set forth of the water-box L, partially filled with liquid, the inverted tanks A A', provided with valved inlet B, the walking-beam I, the pulleys K K, the cord J, attached by its ends to the walking-beam and in its intermediate length attached to the heads of the tanks A A' and passing over said pulleys, the valved outlet-pipe C, discharge-chamber D and auxiliary chamber F, connected at the bottom by passage G and partially filled with liquid, and the discharge-outlet E.

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Witnesses:

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M. T. BROUSSEAU.