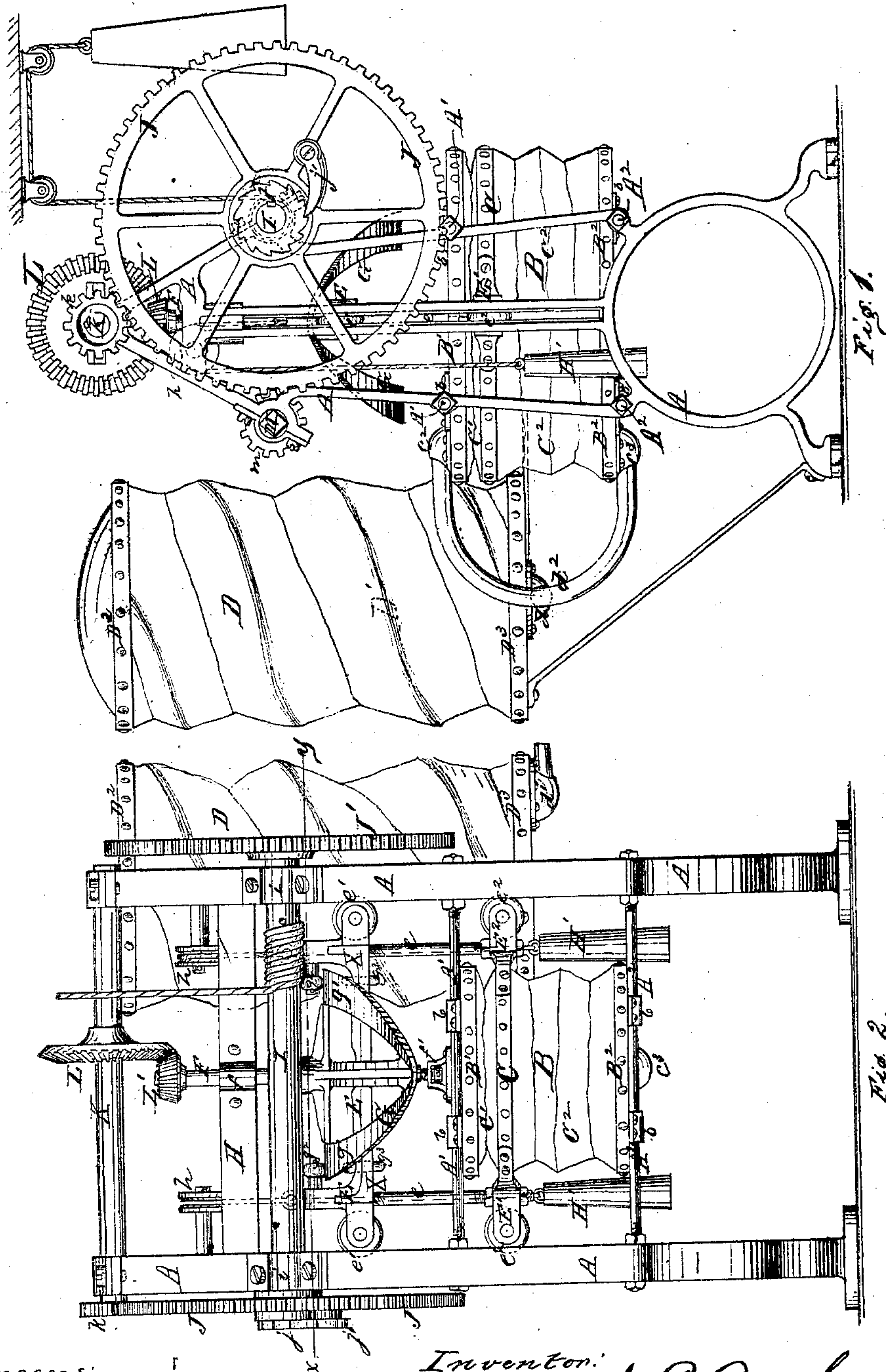


J. P. GALLAGHER.  
Improvement in Pumps.

No. 114,284.

Patented May 2, 1871.



Witnesses:

*J. M. Herthel*  
Robert Burns.

Inventor:

*Joseph P. Gallagher*  
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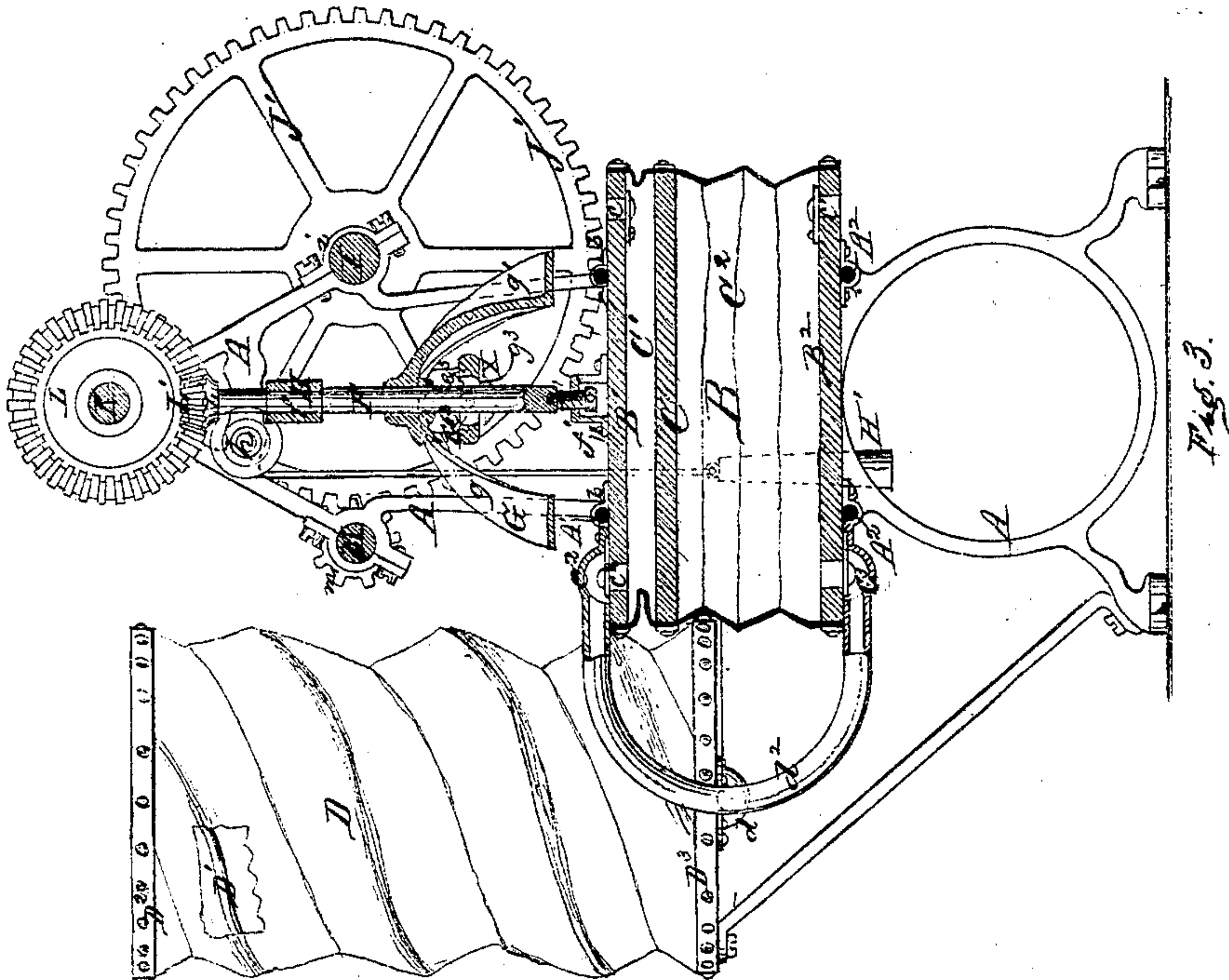


Fig. 3.

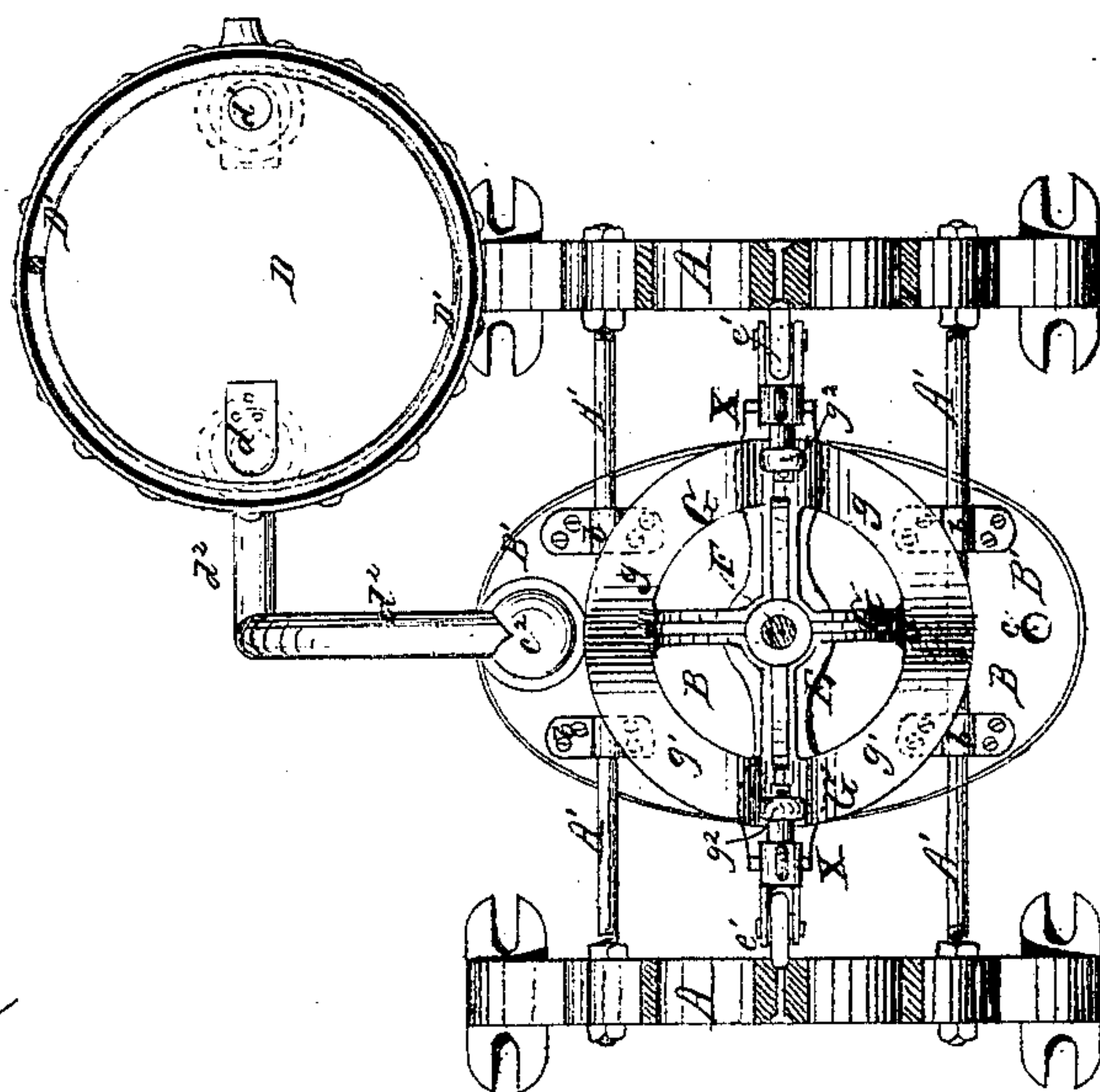


Fig. 4.

Witnesses:

*J. W. Kerthel.*

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*Joseph P. Gallagher*  
*by* *Wm. P. Kerthel & Co.*



# United States Patent Office.

JOSEPH P. GALLAGHER, OF ST. LOUIS, MISSOURI.

Letters Patent No. 114,284, dated May 2, 1871.

## IMPROVEMENT IN PUMPS.

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, JOSEPH P. GALLAGHER, of St. Louis, in the county of St. Louis and State of Missouri, have made certain new and useful Improvements in Air-Pumps; and I do hereby declare that the following is a full and true description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

This invention relates to an improved construction of air-pumps operating automatically; and

The nature thereof consists—

First, in the construction of a double-acting rubber air-pump, arranged in combination with a peculiar-constructed air-receiver or aerometer, also formed of rubber.

Secondly, in supporting and connecting the piston of said pump to a slide attachment, having anti-friction rollers operating in grooves in the frame.

Thirdly, in arranging, in combination with clock-work gearing, a peculiar-constructed cam-shaped device for converting the rotary motion of said gearing to the required reciprocating motion for operating said slide and piston of the pump.

Lastly, said invention relates to certain detail construction and arrangement of parts hereinafter to be more fully described.

To enable those herein skilled to make and use my said invention, I will now more fully describe the same, referring to the accompanying—

Figure 1 as a side elevation;

Figure 2 as a front elevation;

Figure 3 as a sectional side elevation; and to

Figure 4 as a sectional top plan at line *x y*.

The operative mechanism I support in a suitable metallic frame, A.

The air-pump B I construct of any convenient shape, by preference of rubber, secured air-tight to top and bottom plates B<sup>1</sup> B<sup>2</sup> by proper bands and fastenings, forming a vibrating interior air-reservoir, similar to the movable portion of a common bellows.

Similarly secured, I arrange a center plate forming a solid piston, C, within said pump, dividing the same into the respective top and bottom air-chambers C<sup>1</sup> and C<sup>2</sup>, as clearly shown in fig. 3.

Within said air-chambers are suitable flap-valves secured to the plates B<sup>1</sup> and B<sup>2</sup>. Said valves are arranged to open and close alternately, forming the receiving-valves *c c'* and discharge-valves *c<sup>2</sup> c<sup>3</sup>*, as shown in said fig. 3.

The air-pump B thus constructed I arrange within the frame A, its top and bottom plates B<sup>1</sup> B<sup>2</sup> being secured stationary by bearing-plates *b* to connecting-rods A<sup>1</sup> A<sup>2</sup> of the frame A, and so as to allow free reciprocating movement for its piston C.

In combination with the pump B I have arranged an

aerometer, D, supported upon a proper standard forming part of the frame A. Said aerometer I also construct of India rubber, having arranged within the same a spiral spring, D<sup>1</sup>, and properly secured and closed air-tight by top and bottom plates D<sup>2</sup> D<sup>3</sup>.

Within said aerometer, at its bottom, I arrange suitable valves, to open and close in opposite directions, forming the receiving and discharging-valves *d d'*, indicated by dotted lines in fig. 4.

The aerometer D thus constructed and arranged I connect in communication with the respective air-chambers C<sup>1</sup> C<sup>2</sup> of the air-pump by suitable branch tubing *d<sup>2</sup>*, secured to the valve-ports. The valve *d'* has a discharge-nozzle, to which the distributing-pipes are connected.

By thus arranging said valves *d d'* to open in opposite directions a reflow of air from the air-receiver to the pump is prevented; at the same time a ready discharge of air is effected by the weight pressure upon said air-receiver D. Similarly as the operation of the respective valves in the pump B is alternate in receiving and discharging, it is plain a constant current of air at all times is communicated to the air-receiver or aerometer when the pump is in motion.

The air-pump piston C I connect to a slide, X, consisting of the upper cross-head E, connected by vertical rods *e* to lower cross-heads E<sup>1</sup> E<sup>2</sup>, secured to the transverse sides of said piston.

The slide X has its cross-heads at each end provided with anti-friction rollers *e' e<sup>2</sup>* working against and guided by suitable vertical grooves or slots in the frame A, as shown in figs. 1 and 2.

To operate the piston and slide *x* I have arranged a vertical shaft, F, carrying a cam-device, G, and operated by clock-work gearing, hereafter to be described.

The shaft F (passing through a hole, *e<sup>3</sup>*, in the cross-head E) I support in a thrust-journal, *f*, of the upper cross-bar H of the frame A, and at bottom resting in a slotted screw-socket, *f'*, secured to the pump-plate B<sup>1</sup>, the arrangement of said shaft being such as to follow up all rear and vertical play, in manner clearly indicated in fig. 3.

To the shaft F I secure the cam device G. In order to convert the rotary motion of said shaft to a reciprocating motion required for operating the slide X, carrying the piston, said cam G is so constructed as to have right-and-left spiral cam surfaces *g g'* of the peculiar shape shown in figs. 2 and 4.

To facilitate rotary reciprocating motion of the cam G with least friction, I have provided the cross-head E of the slide X with additional anti-friction rollers *g<sup>2</sup> g<sup>3</sup>*, so arranged as to engage top and bottom upon the cam surfaces *g<sup>1</sup> g<sup>2</sup>* of said cam G, and as shown in figs. 2 and 4. Also the slide X, to gain uniformity of operation, is properly balanced by the counterpoise H',



secured to its cross-head E, passing over pulleys *h* secured to the frame A, as in figs. 1, 2, and 3.

The clock-work gearing to operate and regulate the action of the mechanism described to operate the air-pump piston is as follows:

On the main shaft I, secured in bearings *i* to the frame A, I have arranged at each end thereof the large spur-gears J and J'. The gear J, however, is secured loosely to said shaft by a ratchet-wheel, *j*, having as follower a click or spring pawl, *j'*, secured to said gear J. When operated the spur-gear J imparts motion to a small gear, *k*, secured on end of the shaft K, operating in proper bearings secured on top of the frame A. The rotary motion thus achieved is furthermore communicated to the vertical shaft F by bevel-gears L L', secured respectively to said shafts F and K, figs. 1, 2, and 3.

The motive power to operate said clock-work gearing is by a suitable weight suspended on a pulley acting by a cord secured and wound around the drum or shaft I, clearly indicated in fig. 1.

To wind said clock-gearing for automatic action, I have furthermore arranged in gear with the large spur-gear J', a small gear, *m*, secured to the shaft M, properly operating in journal-bearings secured to the frame A. At its opposite end said shaft carries a proper hand-crank, wherewith the operation of winding is readily achieved.

The air-pump and aerometer, constructed and arranged in combination with clock-work gearing, operates, therefore, as follows:

By the automatic action of said clock-gearing (the suspended weight acting as motor) a rotary motion is imparted to the vertical center-shaft F. Said motion so achieved is converted by its cam device G into a rectilinear reciprocation motion and communicated to the slide and piston C of the air-pump.

The air-pump being double acting; utilizing the up-and-down stroke of its piston, a continuous current of air is therefore discharged from the air-chamber C<sup>1</sup> and C<sup>2</sup>, and fed or forced into the air-receiver or aerometer D.

To effect a steady discharge from said aerometer I place on top the same a suitable weight, fig. 1, sufficient to overcome the tension of the spiral spring D<sup>1</sup>; the said weight acting to relax the aerometer while it is receiving its supply of air from the pump B when

operating, it is plain an equalization of pressure occurs, counteracting any irregularities of supply from said pump, and necessarily rendering the discharge of said aerometer to be of a steady, equal, and non-fluctuating character.

It will be observed that the action of the air-receiver with its weight is not effected by any sudden stoppage or irregularities of action on part of the pump, and also that the air-pump can readily be wound to resume automatic action, if necessary, before the complete exhaustion or discharge of air from the aerometer takes place.

My improved automatic air-pump is adapted for all purposes for which an air-pump is generally applicable, operating with perfect ease and uniformity, and by its use a continuous and regular discharge of air is at all times obtained.

Having thus fully described my said invention,

What I claim, and desire to secure by Letters Patent, is—

1. The air-pump B, constructed as described in combination with the elastic air-receiver D, constructed as described, for the purpose set forth.

2. The slide X, consisting of the upper cross-head E, rods *e*, lower cross-heads E<sup>1</sup> E<sup>2</sup>, secured to piston C, said slide, as described, having end rollers *e'* *e''* and arranged substantially as and for the purpose set forth.

3. The shaft F, cam-device G, as described, arranged to operate between anti-friction rollers *g'* *g''*, cross-head E, in combination with the slide X and piston C, to operate substantially as set forth.

4. The gearing devices J J' *k* *m*, ratchet and pawl *j* *j'*, shafts I K M, bevel-gears L L', when arranged substantially as and for the purpose set forth.

5. The air-pump B, piston-slide X, as described, counterpoise H', shaft F, right-and-left cam device G, when arranged in combination with the air-receiver D and clock-work gearing, to operate as and for the purpose described.

In testimony of said invention I have hereunto set my hand in presence of—

JOSEPH P. GALLAGHER.

Witnesses:

WILLIAM W. HERTHEL,  
ROBERT BURNS.