

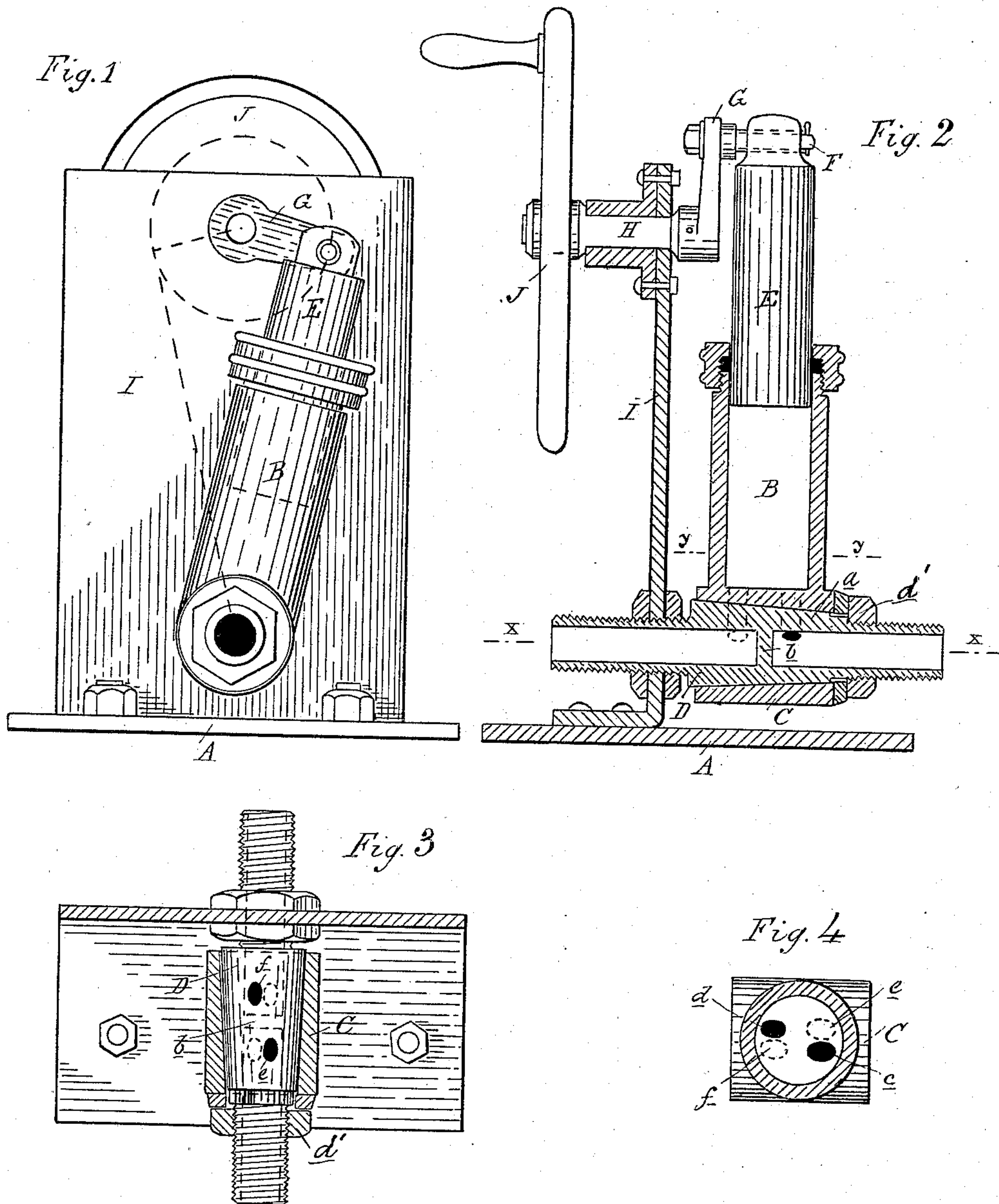
(No Model.)

G. LENHARDT.

PUMP.

No. 316,631.

Patented Apr. 28, 1885.



Attest  
J. Paul Mayer  
Att'y

Inventor  
George Lenhardt  
By W. S. Sprague Att'y



# UNITED STATES PATENT OFFICE.

GEORGE LENHARDT, OF DETROIT, MICHIGAN, ASSIGNOR OF FIVE-EIGHTHS  
TO SAMUEL G. KINNEY AND ALBERT E. PEPPERS, OF SAME PLACE.

## PUMP.

SPECIFICATION forming part of Letters Patent No. 316,631, dated April 28, 1885.

Application filed March 12, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE LENHARDT, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Pumps; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

10 This invention relates to certain new and useful improvements in pumps adapted for pumping liquids of any kind, and equally well adapted for pumping gas or air.

15 The invention consists in the peculiar construction, combination, and operation of the parts, as more fully hereinafter described.

Figure 1 is a side elevation of my improved pump. Fig. 2 is a central vertical cross-section of Fig. 1. Fig. 3 is a section on the line *x x* in Fig. 2. Fig. 4 is a cross-section on the line *y y* in Fig. 2.

In the accompanying drawings, which form a part of this specification, *A* represents a suitable bed which supports my improved pump. *B* is a pump-cylinder provided with a hub, *C*, the interior bore of which is conical to fit the conical portion *a* of the hollow trunnion *D*, which is provided with a central division-wall, *b*, in the lower end of the cylinder *B*, and through the hub thereof are ports *c* and *d*, arranged with relation to each other as shown in Fig. 4. Similar ports, *e* and *f*, are formed, as shown in Fig. 3, in the conical portion of the trunnion, one on each side of the division-wall *b*, with their major or longest diameter in line with the bore of the trunnion. The two chambers of the hollow trunnion, being provided with means for coupling, form the education and induction ports.

40 *E* is a piston, which may be made in any of the known ways to tightly fit the cylinder *B*, in which it reciprocates. The upper end of this piston or piston-rod is connected with a wrist-pin, *F*, secured to the crank *G* upon the shaft *H*, which is supported by the standard *I*, and is driven by means of the crank-wheel *J*. When the cylinder stands in a vertical position, the ports *c d* stand with relation to the ports *e* and *f* as shown in Figs. 3 and 4,

the trunnion *D* acting in this case as a cut-off 50 valve, so that there is no communication between the interior of the cylinder and the induction and eduction ports. Now, by giving a rotary motion to the wheel *J* a reciprocating and oscillating motion is given to the piston, 55 which is communicated to the cylinder, causing the latter to oscillate upon its trunnion, and this oscillation gradually brings the four small ports *c d e f* into apposition gradually, so that with the ingress of the speed on one half 60 the stroke these small ports are gradually opened or placed in apposition in like ratio, and in the other half of the stroke their position is gradually changed in the opposite direction, so that in each full revolution of the 65 crank-wheel these small ports are fully opened and fully closed. It will readily be seen that by means of this construction there are no valves employed, so that the pump may be used for almost any purposes for which a pump 70 is desired. It will also readily be seen that when the crank-wheel is turned to the right the induction is from one side of the machine and the eduction from the other, and a change of direction of the crank-wheel to the left 75 reverses the operation of these induction and eduction ports. It will also be noticed that the trunnion is conical, and that the hub of the cylinder is correspondingly bored and sleeved thereon with one end of the trun- 80 nion screwed through the standard *I*, while the other end projects through the hub of the cylinder and is held in place by means of the nut *d'*, by means of which the hub can be adjusted or forced onto the trunnion as it becomes worn. 85

I am aware of the patents to Welsh, No. 134,115 and Reissue No. 4,882, and make no claim to anything shown therein. Nor do I claim, broadly, a hollow trunnion having a transverse diaphragm and a port on each side 90 of said diaphragm, as that feature is shown in my Patent No. 298,866. My present arrangement of the ports differs from that in having their major diameters running lengthwise of the bore instead of at right angles thereto, as 95 in said patent.

What I claim as my invention is—

1. An oscillating pump, the lower end of

which is provided with a conically-bored hub, which has ports *c d* formed therein upon opposite sides of a central cross-line of the cylinder, and upon opposite sides of a plane  
5 passed through its axial line of oscillation, in combination with a hollow trunnion, conical upon a portion of its surface to engage with the conical bore of the hub, and in which there is a central cross-division wall, with the ports  
10 *e f*, one on each side of the wall, each having its major diameter in line with the bore of the trunnion, and arranged on either side of said plane diagonally opposite to the ports *c d*, substantially as shown, and for the purposes specified.  
15

2. The combination, in an oscillating pump, of the cylinder B, provided with a hub, C, standard I, hollow trunnion D, having one end screwed into said standard and the other screw-threaded and provided with a nut for forcing  
20 ing said hub onto the trunnion as it becomes worn, piston E, wrist-pin F, crank G, shaft H, having a bearing in said standard, and means for driving said shaft, the parts being constructed, arranged, and operating substantially  
25 as and for the purposes described.

GEO. LENHARDT.

Witnesses:

H. S. SPRAGUE,  
E. J. SCULLY.