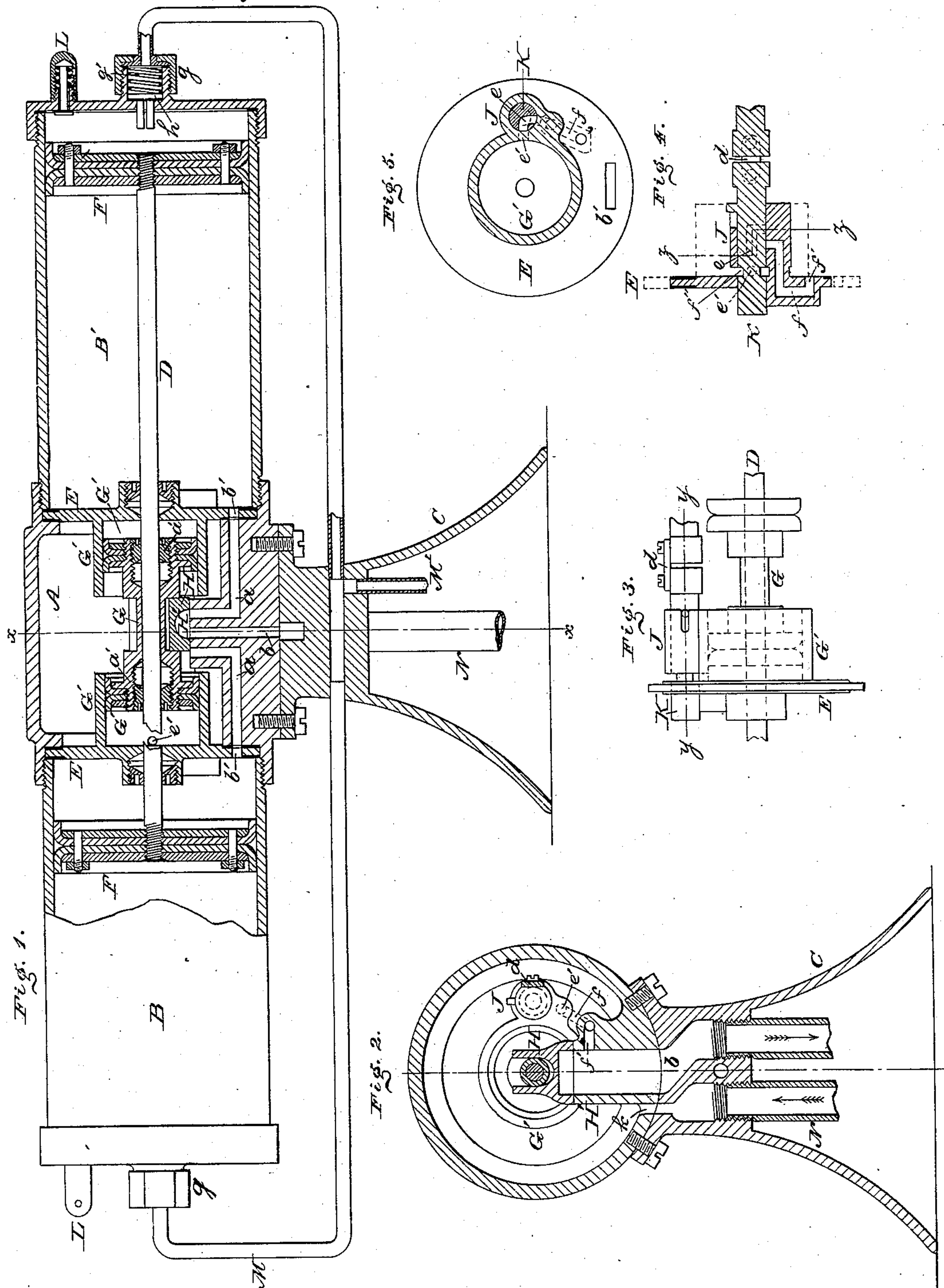


(No Model.)

W. WANG.
AIR COMPRESSOR.

No. 255,222.

Patented Mar. 21, 1882.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM WANG, OF PHILADELPHIA, PENNSYLVANIA.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 255,222, dated March 21, 1882.

Application filed January 7, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WANG, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Air-Compressors, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a partial side elevation and longitudinal vertical section of the air-compressor embodying my invention. Fig. 2 is a transverse section thereof in line *x x*, Fig. 1. Fig. 3 is a top view of the central portion of the interior thereof. Fig. 4 is a longitudinal section in line *y y*, Fig. 3. Fig. 5 is a transverse section in line *z z*, Fig. 4.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists in improvements in automatically-acting air-compressors, as will be hereinafter fully set forth.

Referring to the drawings, A represents a horizontally-arranged valve-chamber; and B B' represent horizontally-arranged cylinders, which are connected to the ends of the chamber A, the latter being properly supported on a base or stand, C.

D represents a piston-rod, which is passed through the plates or caps E, which separate the chamber A from the cylinders B B', the ends of the rod in the cylinders B B' carrying pistons F F'. On the piston-rod, within the chamber A, is loosely fitted a balanced piston, G, which moves in cylinders G', which are cast with the plates or caps E and project horizontally toward each other, as shown in Fig. 1.

H represents a slide-valve, which is fitted to the neck of the balanced piston G, and its seat H' is at the base of the chamber A, the seat having ports *a*, which lead to openings *b'* in the caps E, said openings communicating with the cylinders B B' and an exhaust-port, *b*, opening outwardly. The piston G is hollow, the inner walls of the ends being threaded, so that packing *a'* may be screwed into said ends, the rod D passing through the center of the packing, by which provision water is prevented from passing from one cylinder G' through the piston to the opposite cylinder G'.

Cast with each cylinder G' is a valve chamber, J, within which is a plunger-valve, K, the

two plunger-valves being coupled by a link, *d*. (See Figs. 3 and 4.) In each plunger-valve is an exhaust-port, *e*, which communicates with a port, *e'*, in the cylinder G', (shown full in the left-hand side of chamber A, Fig. 1, and dotted in Figs. 2 and 4,) said port *e* also communicating with a port, *f*, formed in the cap E, said port *f* communicating with a port, *f'*, which is formed in the seat of the valve H and leads to the exhaust-port *b* of the apparatus. (See Fig. 2.) The outer ends of the plunger-valves project into the cylinders B and B', and said ends are formed with grooves or necks *f''*, so located that when the valves are moved to their full stroke the spaces of the grooves are in communication with the ports *e'*.

At the outer ends or heads of the cylinders B B' are air-receiving valves L, which open inwardly and close outwardly, so that when a piston, F, is advancing the valve L closes, and when said piston recedes the vacuum thereby created opens the valve and supplies the cylinder B' with air, this operation of closing and opening of the valve being alternate, the closing motion being assisted by springs suitably applied.

In the outer ends or heads of the cylinders B B' are also connections or couplings *g* for the feed-pipes M, which convey the compressed air to the place of service by means of a pipe, M', which connects the two pipes M.

In the cap to which the coupling *g* is screwed is a spring-pressed valve, *h*, said valve closing inwardly, the object of which is that when the compressed air leaves the cylinder B or B' it opens said valve and passes into the feed-pipe M, and when the piston which has just forced out the air recedes the back pressure of compressed air in the pipe M and the spring *g'* closes the valve *h* and holds it on its seat.

The chamber A is supplied with water by means of the pipe N, which communicates with an inlet, *k*, formed in the bottom of the wall of the chamber A, said chamber being thereby filled throughout with water.

The pistons F are shown moved to the right, and the exhaust-port *b* is in communication with the right-hand cylinder B', the water in said cylinder thus exhausting or being discharged, the balanced piston G being also to the right, and the left-hand piston having

moved the plunger-valve likewise to the right, the left-hand port *a* being in communication with the chamber A. Water in the chamber A now flows through the left-hand port, and reaches the left-hand cylinder and acts on said cylinder so as to move it to the left. The air in the left-hand cylinder in front of the piston is forced out into the pipe M, and meanwhile the valve L of the right-hand cylinder opens and replenishes the latter cylinder with air. When the pistons F have made their full stroke the right-hand piston F strikes the right-hand plunger-valve K and moves it to the left. This brings the groove or neck *f''*, which was covered by the cap E, into position directly aside of the opening port *e'* of the right-hand cylinder G', whereby water enters said cylinder from the chamber A, and thus moves the balance-piston G to the left, and also shifts the valve H to the left. This closes the left-hand port and opens the exhaust, so that the latter is in communication with the left-hand cylinder A, whereby the water in said cylinder may exhaust, and the right-hand port *a* is uncovered, so as again to supply the right-hand cylinder; but the water in the right-hand cylinder G', that has shifted the balance-piston, requires to be discharged. Now, as soon as the pistons F move to the right the left piston strikes the adjacent plunger-valve K and moves both valves K to the right. This causes the groove or neck of the right-hand plunger-valve to be covered by the cap E, and the right-hand port *e'* is also cut off by the solid part of the right-hand plunger-valve. This causes the port *e* of the right-hand plunger-valve to be in communication with the right-hand cylinder, whereby the water in the latter immediately enters said port, and, flowing through the port *f*, reaches port *f'*, and consequently the exhaust-port *b*. Meanwhile the groove or neck of the left-hand plunger-valve is uncovered and water enters the port *e'* of the left-hand cylinder G', and so presses on the balanced piston as to shift it to the right, and the other operations are similar to those above described, and therefore repeated as long as the apparatus is required to render service. The caps E having chambers and cylinders J G' cast with them render the parts strong and avoid joints, which are liable to break.

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

1. Stationary cap E, cast in one piece with a cylinder, G', and a valve-chamber, J, in com-

bination with a plunger or valve moving in said chamber and recessed to afford a passage, said cap closing said passage in one position of said plunger, substantially as set forth.

2. The caps or plates E, each having a valve-chamber, J, and a cylinder, G', cast with it on its inner side, the inner ends of said cylinders being open, in combination with a piston working in said cylinders, substantially as set forth.

3. In combination with chamber A and the two compressing-cylinders, the independent valve-cylinders G', arranged within said chamber and opening inwardly, and the hollow balanced piston G, reciprocating in said cylinders, substantially as set forth.

4. The piston-rod D, having hollow balanced piston G fitted to slide thereon and passing through stationary caps E and open-end cylinders G', in combination with said piston, caps, and cylinders, and the central packing, *a'*, substantially as set forth.

5. In combination with chamber A and the cylinders B B', arranged at the ends thereof, the caps E, having inwardly-opening cylinders G' on their inner faces, the piston-rod D, passing through the said chamber, caps, and cylinders, and the pistons F and G, carried by said rod, arranged and operating substantially as set forth.

6. The plunger-valve K, with port *e* and neck *f''*, the valve-chambers J, the cylinders G', with ports *e'*, the caps E, with ports *f*, the seat with port *f'*, and the exhaust-port *b*, combined and operating substantially as and for the purpose set forth.

7. The cylinders B B' and chamber A, in combination with the separating-caps E, having openings *b'*, the valve H, and valve-seat H', with ports *a a b*, substantially as and for the purpose set forth.

8. The plunger-valves, with ports *e*, the cylinders G', with ports *e'*, the caps E, with ports *f*, the balance-piston G, the cylinders, and chamber, combined and operating substantially as and for the purpose set forth.

9. The chamber A and cylinders B B' at the ends thereof, in combination with the piston-rod D, provided with balanced piston G within said chamber, and pistons F within said cylinders, and the outwardly-opening valves *g* in the ends of said cylinders, substantially as set forth.

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Witnesses:

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 W. F. KIRCHER.