

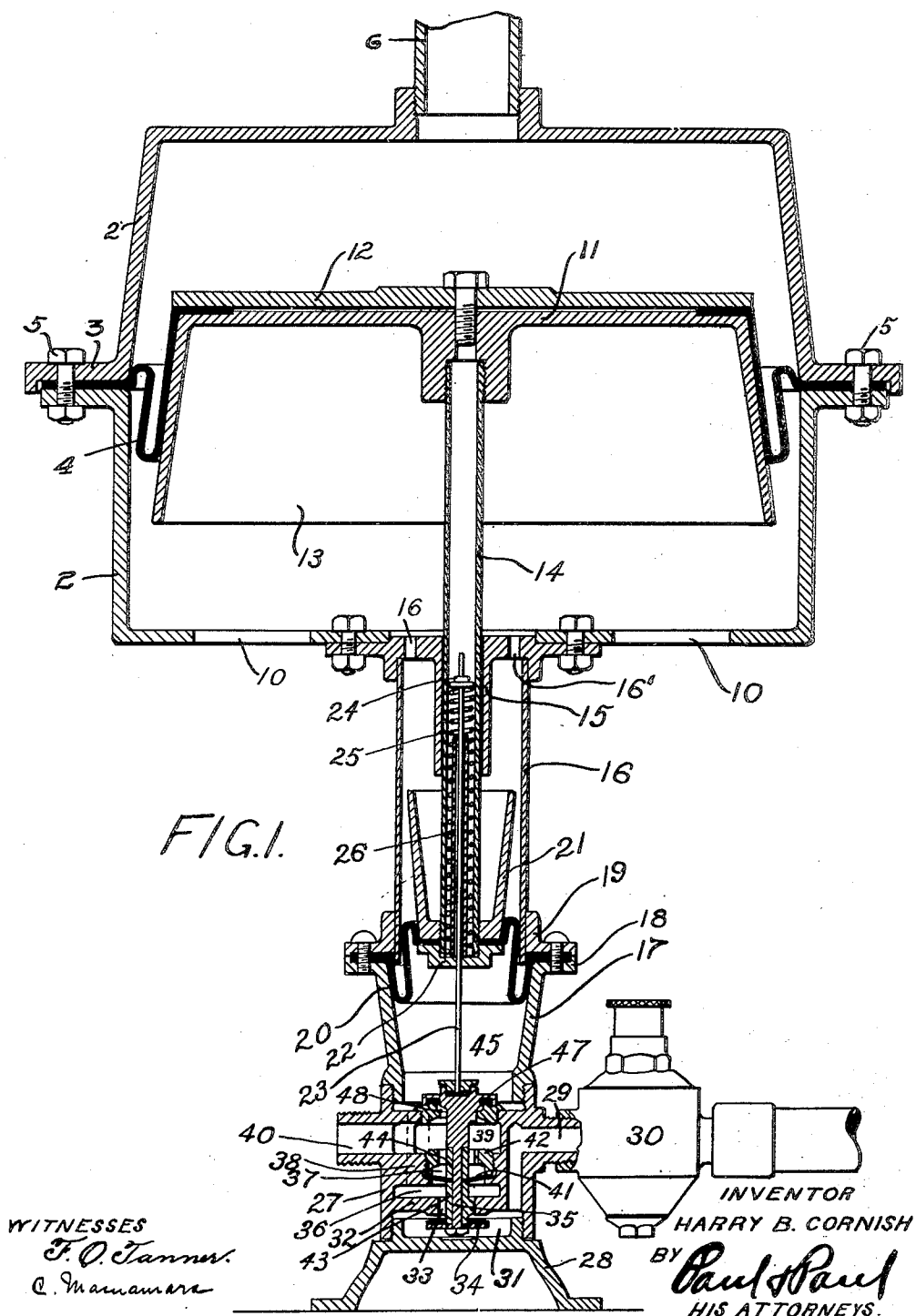
No. 821,926.

PATENTED MAY 29, 1906.

H. B. CORNISH.
AIR COMPRESSOR.

APPLICATION FILED FEB. 2, 1905.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

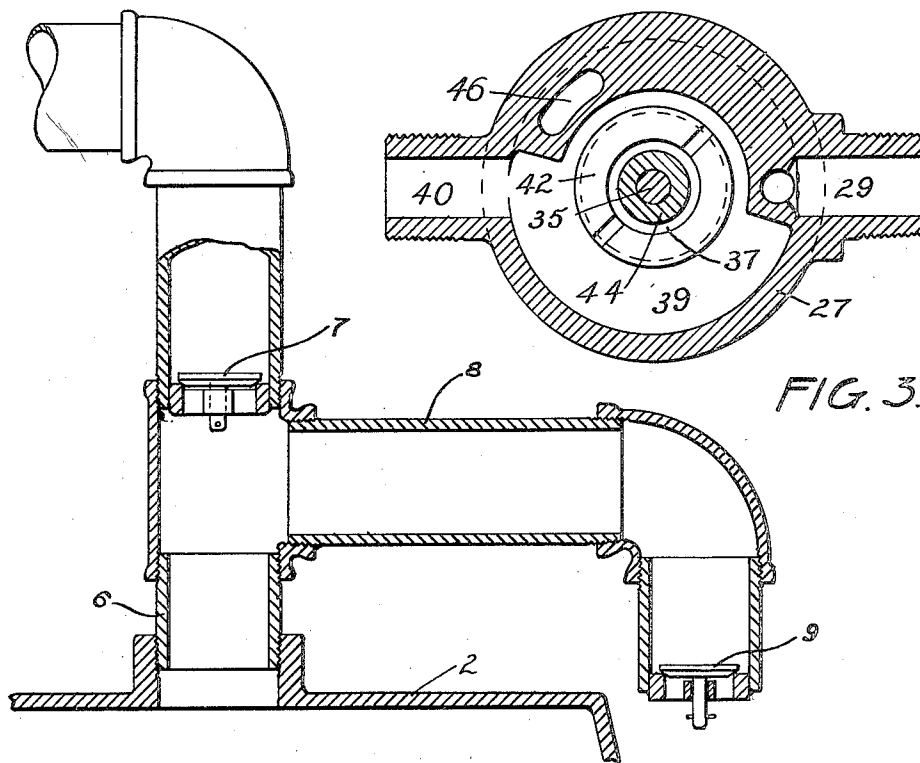


FIG. 4.

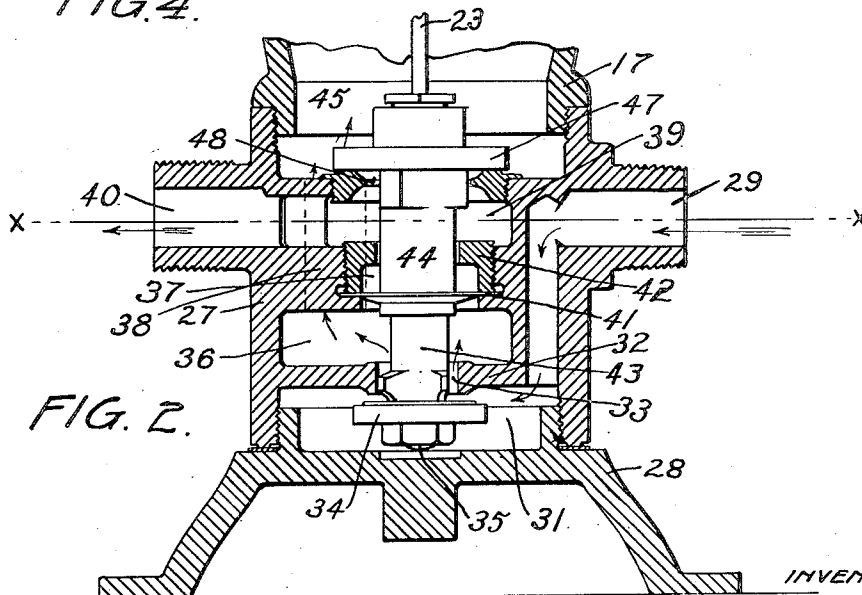


FIG. 2.

WITNESSES
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UNITED STATES PATENT OFFICE.

HARRY B. CORNISH, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF TWO-THIRDS TO P. PETERSON, OF GLENWOOD, MINNESOTA.

AIR-COMPRESSOR.

No. 821,926.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed February 2, 1905. Serial No. 243,799.

To all whom it may concern:

Be it known that I, HARRY B. CORNISH, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

My invention relates to air-compressors designed particularly for use in connection with a carbureter for supplying compressed air thereto; and the object of the invention is to provide a positive and reliable compressor and one that is easily operated, of simple construction, and strong and durable.

A further and particular object of the invention is to provide a compressor wherein all leaking and sticking joints and packing are entirely eliminated.

The invention consists generally in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of an air-compressor embodying my invention. Fig. 2 is a vertical sectional view of the lower or valve portion of the compressor. Fig. 3 is a horizontal section on the line *x x* of Fig. 2. Fig. 4 is a detail sectional view of the pipes leading from the upper part of the compressor to the carbureter.

In the drawings, 2 represents a casing composed of two sections having their contiguous edges provided with flanges 3, between which a diaphragm 4, of any suitable material, preferably rubber, is secured by bolts 5. A pipe 6 leads from the top of the casing above the diaphragm to a carbureter (not shown) and is provided with a check-valve 7 and a branch pipe 8, having an air-inlet valve 9. The bottom of the casing has openings 10, through which air is admitted to the space beneath the piston.

11 is a casting centrally arranged with respect to the diaphragm and fitting within an opening therein and secured to the edge of the diaphragm around the opening by a plate 12. This casting and the diaphragm form the piston of the compressor. The casting 11 has depending walls 13, forming an inverted-cup-shaped device, to act as a backing for the diaphragm during the movement of the piston in one direction. A hollow depending stem 14 is centrally mounted

in the casting 11, and a mechanism operated by fluid-pressure, hereinafter described, is provided for raising this stem and the casting thereon to compress the air in the upper part of the casing and force it past the check-valve to the carbureter. The stem 14 has a long bearing-surface 15 in the bottom of the casing, and a pipe 16, secured to the bottom of said casing, incloses the lower end of said stem. Port-holes 16' lead from the interior of said pipe into the casing 2 to allow the free passage of air from one to the other. A casting 17 is provided below the said pipe, having a flange 18 at its upper end, between which and a ring 19 the edge of a diaphragm 20, also of suitable material, preferably rubber, is secured. The lower end of the pipe 16 fits within the ring 19 above the diaphragm. A cup 21 is screwed onto the lower end of the stem 14 and is provided with a cap 22, between which and the cup the edge of the diaphragm 20, around a central hole therein, is secured. This cup and its diaphragm form a second piston of less area than the one first described and upon which the fluid acts direct.

A rod 23 extends through the cap 22 up into the stem 14 and is provided at its upper end with a button 24, between which and said cap a coil-spring 25 is arranged. This spring is put under compression by the initial upward movement of the diaphragm 20 to aid in seating the inlet-valve and holding the same on its seat until the pressure is relieved below the diaphragm. A tube 26 is interposed between said spring and the rod 23 and adapted to rest at its lower end upon said cap. The walls of the cup 21 are of sufficient area to form a backing for the diaphragm 20 during the downward movement of the operating mechanism.

Below the casting 17 is a shell 27, supported on a base 28 and having an intake-port 29 for air or water communicating with a governor 30 and leading to a chamber 31 in said base. A wall 32 is provided in the shell 27, having a port 33 adapted to be closed by a valve 34, carried by the lower end of a stem 35. The port 33 leads to a chamber 36, and a port 37 extends through the wall 38 to a chamber 39, that communicates with the exhaust or discharge pipe 40. The valve-stem projects through the port 37, and in place of

providing a packing-box at this point I use a diaphragm 41, of suitable material, preferably rubber, secured at its outer edge between the wall 38 and a cap 42 and having a central opening to receive the valve-stem and secured thereto between the collars or sleeves 43 and 44 on said stem. An absolutely-tight joint is thus provided at this point which will prevent the escape of water or air, but permit the free vertical movement of the valve and stem. A chamber 45 is provided within the casing 17 in communication with the chamber 36 through a vertical port 46. Water or air pressure is thus allowed to pass around the diaphragm 41 into the chamber 45 and act upon the diaphragm 20 to raise the pistons and compress the air in the upper part of the casing 2. The lower end of the rod 23 is connected to the upper end of the valve-stem, and a valve 47 is provided at this point to normally close an opening 48, leading to the exhaust-chamber 39.

The operation of the compressor, assuming the parts to be in the position shown in Figs. 1 and 2, is as follows: Air or water being admitted through the port 29 will flow up through the valve 34, past the diaphragm 41, into the chamber 45, and raise the diaphragm 20, and with it the piston 11, which having a much greater area than the lower one will compress a larger volume of air. During the initial upward movement of the diaphragm 20 the spring 25, as before described, will be compressed, and when the parts have been elevated a certain predetermined distance the tube 26 will engage the button 24 and, aided by the tension of the spring 25, lift the rod 23 to unseat the exhaust-valve 47 and close the intake-valve 34. When the intake-valve is closed, the passage of fluid into the chamber 45 will be checked and the exhaust-valve being opened will relieve the pressure in said chamber beneath the diaphragm 20, and when the pressure has been reduced sufficiently the diaphragms will descend by gravity and allow the rod 23 and the valves connected therewith to return to their normal position. As soon as the intake-valve has been opened the fluid will flow through again into the chamber beneath the diaphragm 20 and the operation described repeated.

I claim as my invention—

1. The combination, with a casing having intake and exhaust ports arranged one above another and intake and exhaust valves, said intake-valve being normally open and said exhaust-valve closed, and said valves having a rod or stem, of a diaphragm within said casing above said valves and having an opening to receive said rod, means interposed between said diaphragm and the upper free end of said rod for raising said rod to close said intake-valve and open the exhaust, and a spring put under tension by the initial move-

ment of said diaphragm to aid in seating said intake-valve, substantially as described.

2. The combination, with a casing having intake and exhaust ports and valves therefor provided with a stem or rod, the intake-valve being normally open and the exhaust-valve closed, of a diaphragm within said casing having an opening to receive said rod, means interposed between said diaphragm and the free end of said rod for causing the longitudinal movement of said rod and the closing of said intake-valve and the opening of the exhaust when said diaphragm is raised, and an air-compressing diaphragm connected with said first-named diaphragm and of greater diameter whereby a larger volume of air will be compressed.

3. The combination, with a casing having intake and exhaust ports and valves therefor, the intake-valve being normally open and the exhaust-valve closed by gravity, of a diaphragm located within said casing, a valve stem or rod projecting through said diaphragm and provided with a stop, a coil-spring provided on said rod between said stop and diaphragm and put under compression by the initial upward movement of said diaphragm, and a tube carried by said diaphragm within said spring and arranged to engage said stop during the final upward movement of said diaphragm to close said intake-valve and open the exhaust.

4. The combination, with a casing having intake and exhaust ports and valves therefor, said valves having a common stem and one being normally open and the other closed, of a diaphragm provided on said stem between said ports and separating one from the other, and said casing having a port leading from said intake-valve around said diaphragm and said exhaust-valve, a second diaphragm provided in said casing above said exhaust-valve, means arranged to operate said valves when said second diaphragm has moved upward a certain predetermined distance, and a third diaphragm of greater area than said second diaphragm and located above the same and connected therewith whereby a larger volume of air will be compressed, substantially as described.

5. The combination, with a casing having intake and exhaust ports one above the other and valves therefor provided with a stem or rod, said intake-valve being normally open and said exhaust-valve normally closed, and the exhaust-passage communicating with said exhaust-port being located between said valves, of a diaphragm within said casing above said valves, means arranged to be actuated by the upward movement of said diaphragm for moving said rod to close said intake-valve and open said exhaust, and said casing being provided with a port leading from said intake-valve to a point beneath said diaphragm around said

exhaust-passage and said exhaust-valve, substantially as described.

6. The combination, with a casing having intake and exhaust ports and valves therefor, said intake being normally open and said exhaust-valve closed, the said casing having an exhaust-passage communicating with said exhaust-port and being between said valves, and a port leading from said inlet-valve around said exhaust-valve, said valve having a stem connecting them one with another, and a rod forming a continuation of said stem, of a diaphragm inclosing said stem between said valves, a second diaphragm within said casing above said valves, and means arranged to be actuated by the upward movement of said second-named diaphragm to impart a longitudinal movement to said rod to seat said inlet-valve and open the exhaust, substantially as described.

7. The combination, with a casing having intake and exhaust ports and valves therefor, said intake-valve being normally open and said exhaust-valve normally closed by gravity, and said valves being provided with a stem or rod, of a diaphragm having an opening through which said rod extends, a coil-spring provided on said rod and arranged to be compressed by the initial upward movement of said diaphragm to aid in seating said intake-valve when said diaphragm has moved to a predetermined point, and a second diaphragm of greater area than said first-named diaphragm and connected therewith, whereby a larger volume of air will be compressed.

8. The combination, with a casing having intake and exhaust ports and valves therefor provided with a stem or rod, said intake-valve being normally open and said exhaust-valve closed by gravity, of a diaphragm having an opening through which said rod extends, a spring provided on said rod and arranged to be put under tension by the initial upward movement of said diaphragm, and means operated during the final movement of said diaphragm for positively actuating said

rod to seat said inlet-valve and open said exhaust-valve, substantially as described.

9. The combination, with a casing having intake and exhaust ports and valves provided with a rod, the intake-valve being normally open and the exhaust closed, of a diaphragm located within said casing above said valves and having an opening to receive said rod, means operated by the upward movement of said diaphragm for seating said intake-valve and opening said exhaust, a second diaphragm above and connected with said first-named diaphragm and operating simultaneously therewith and of greater area, whereby a larger volume of air will be compressed, the said diaphragms being provided with cups or castings whereby when the pressure is relieved beneath them said diaphragms will drop by gravity and open said intake-valve and close said exhaust-valve, substantially as described.

10. The combination with a casing having intake and exhaust ports and valves therefor provided with a stem or rod, said intake-valve being normally open and said exhaust-valve closed, the said casing having an exhaust-passage communicating with said exhaust-port between said valves, a chamber above said exhaust-valve and a chamber above said intake-valve, the said casing having a port leading from said chamber 36 to said chamber 45, of a diaphragm inclosing said stem between said valves and separating said chamber 36 from said exhaust-passage, a second diaphragm located in said chamber 45, and having a sliding connection with said rod, and means actuated by the upward movement of said second diaphragm for imparting a longitudinal movement to said rod to seat said inlet-valve and open the exhaust, substantially as described.

In witness whereof I have hereunto set my hand this 26th day of January, 1905.

HARRY B. CORNISH.

Witnesses:

RICHARD PAUL,
C. MACNAMARA.