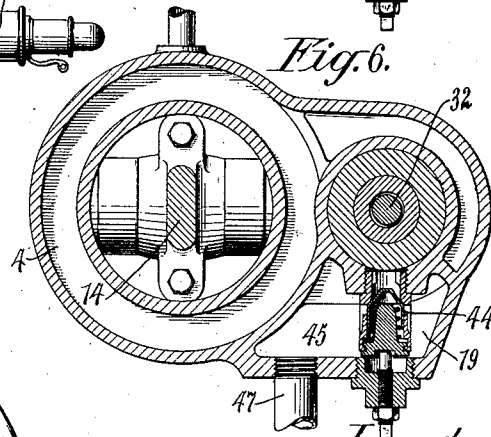
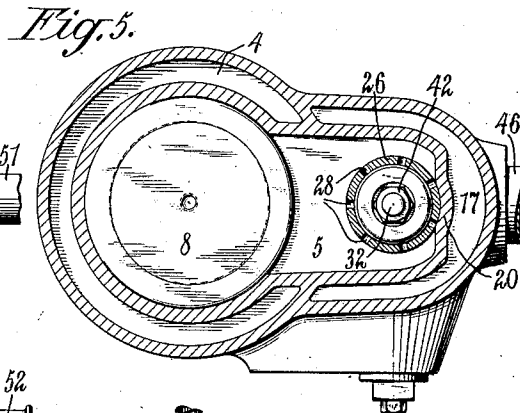
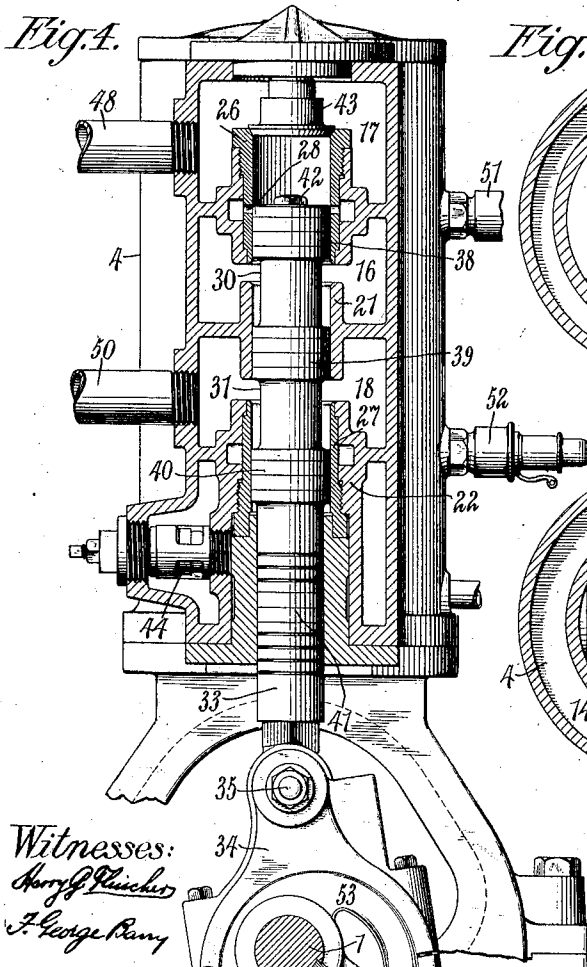
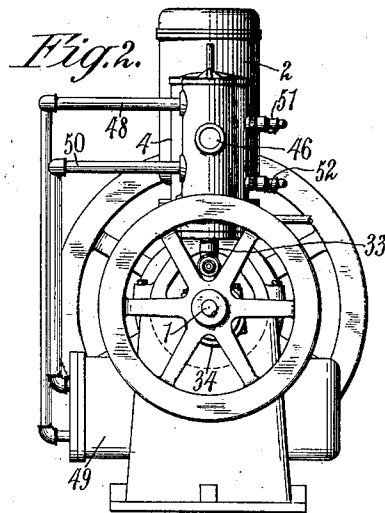
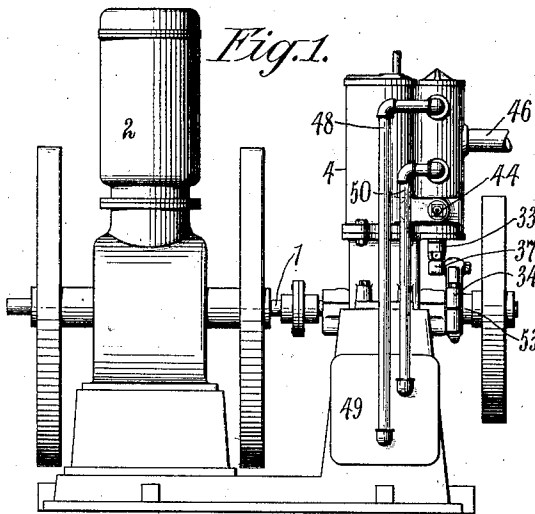


W. S. FAIRHURST.
AIR COMPRESSOR.
APPLICATION FILED JAN. 17, 1911.

1,057,135.

Patented Mar. 25, 1913.

2 SHEETS—SHEET 1.



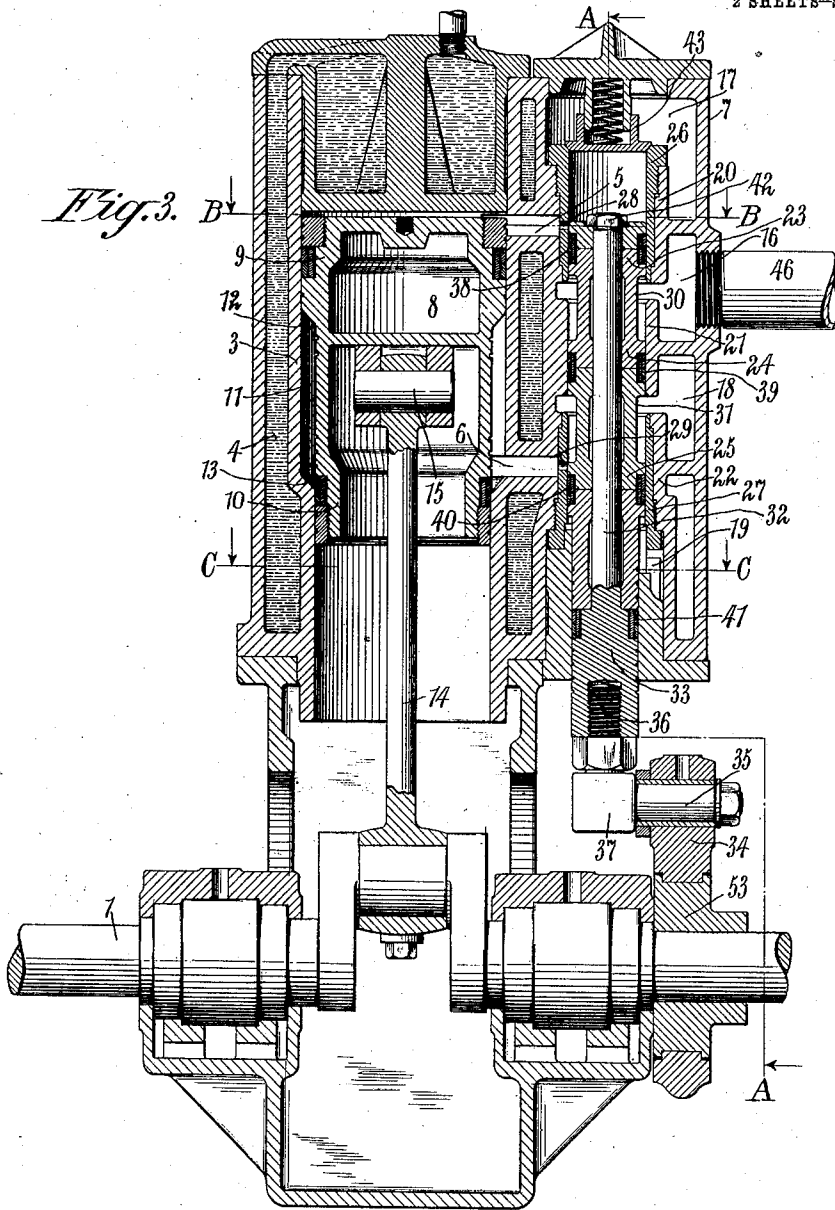
Inventor:
W. S. Fairhurst
By Edward
his Attorney

W. S. FAIRHURST.
AIR COMPRESSOR.
APPLICATION FILED JAN. 17, 1911.

1,057,135.

Patented Mar. 25, 1913.

2 SHEETS—SHEET 2.



Witnesses:
Harry J. Plücker
J. George Barry

Inventor:
W. S. Fairhurst
By Brown & Howard
his Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM S. FAIRHURST, OF NEW YORK, N. Y.

AIR-COMPRESSOR.

1,057,135.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed January 17, 1911. Serial No. 603,151.

To all whom it may concern:

Be it known that I, WILLIAM S. FAIRHURST, a citizen of the United States, and resident of the borough of Brooklyn, in the city and State of New York, have invented a new and useful Improvement in Air-Compressors, of which the following is a specification.

My invention relates to air compressors with the object in view of providing an air compressor which shall have high efficiency and which shall be economical in power consumption, durable and compact.

A practical embodiment of my invention is represented in the accompanying drawings, in which,

Figure 1 is a view in side elevation of the compressor and a source of power for operating it. Fig. 2 is an end view of the same. Fig. 3 is an enlarged vertical section. Fig. 4 is a vertical section in the plane of the line A—A, Fig. 3. Fig. 5 is a transverse section in the plane of the line B—B, Fig. 3, and Fig. 6 is a transverse section in the plane of the line C—C, Fig. 3.

The crank shaft for operating the piston of the compressor is denoted by 1 and is driven by a suitable source of power indicated at 2.

The compressor cylinder is denoted by 3 and is provided with a water jacket 4. Ports 5 and 6 lead from the side of the cylinder 3 to a valve box 7 in which a piston valve provided with several coves works, as will hereinafter appear, to control the admission of air to and its discharge from the interior of the compressor cylinder 3.

The compressor piston, denoted as a whole by 8, is provided with two heads 9 and 10, the head 9 working air-tight in a part of the cylinder 3, having a bore somewhat larger than the bore of that part of the cylinder 3 in which the head 10 works, and the body of the piston 8, between its heads having a diameter materially less than the bore of that portion of the cylinder 3 in which the head 9 works, forming an annular chamber 11 between the body of the piston and the wall of the cylinder. The under side of the head 9 of the piston is preferably beveled, as shown at 12, to seat when the piston is at the limit of its return stroke, on a beveled seat 13 formed at the point where the larger and smaller bores of the cylinder 3 meet. The port 5 is preferably located at or near the outer end of the bore of the cylinder 3,

and the port 6 at or near the beveled seat 13. The piston 8 is made hollow and its rod 14 is connected with it about midway of the length of the piston by a coupling pin 15 in a well known manner. The valve box 7 is divided into four compartments denoted by 16, 17, 18, and 19, by valve seats 20, 21, and 22, in which the several piston valve sections 23, 24 and 25 are mounted. The seats 20 and 22, which occupy positions in the valve box opposite the ports 5 and 6 respectively, are provided with bushings 26 and 27 in which the valve sections 23 and 25 slide, the said bushings being each provided with several holes each smaller than the port 5 or port 6, the holes in the bushing 26 being denoted by 28 and the holes in the bushing 27 by 29. This structure materially reduces the tendency of the valve sections to wear or cut out against the sharp edges of the walls of the ports 5 and 6 and these bushings may be renewed at small expense if occasion requires.

Between the valve sections 23 and 24, the piston valve is provided with a cove 30, and between the valve sections 24 and 25 the said valve is provided with a cove 31. Particular attention is called to the structure of the several valve sections of the piston valve. A central bolt 32 terminates in an enlarged stem 33 connected to an eccentric strap 34, by means of a rocking pin 35 and screw 36 emanating from a common head 37. The bolt 32 extends through the several valve sections and the sections are so subdivided as to locate piston rings 38, 39, 40 and 41 in rabbets formed at the ends of the sections, the several subdivisions being drawn tightly together into assembled adjustment by a nut 42 screwed onto the end of the bolt.

A spring actuated valve 43 normally closes the compartment 17 to the interior of the bushing 26 and hence to the port 5, and a spring actuated valve 44 (see Fig. 6) normally closes the compartment 19 and hence the port 6, to the discharge chamber 45. Air is admitted through a pipe 46 into the compartment 16 and compressed air is discharged through the outlet pipe 47. Air under low compression passes from the compartment 17 through pipe 48 to intercooler 49 and back from the intercooler to compartment 18 through pipe 50.

Safety valves 51 and 52 are located on the cylinder 3 at the low pressure and high pressure sides of the piston head 9, to guard

against injury in the event the valve motion fails to work as intended.

A cam 53 on the shaft 1 works in the eccentric strap 34 to impart to the piston 5 valve its proper motion.

In operation; as the piston 8 recedes from its position shown in Fig. 3, it will, during its early movement, tend to form a vacuum in the cylinder, while the port 5 remains closed by the piston valve. The piston valve is, however, at this time, moving in a direction to open the port 5 to the air inlet compartment 16, by means of the cove 30, and as soon as the cove 30 comes opposite the openings 28 leading to the port 5, the air will rush into the cylinder space in front of the piston head 9. The advance stroke of the piston 8 will compress the air in front of it and, when the piston valve has traveled on its return movement a distance sufficient to open the port 5 to the space in front of the piston valve, the compressed charge will be forced past the valve 43 into the compartment 17 and thence along the pipe 48 to the inter-cooler 49 and back through the pipe 50 to the compartment 18 and through the port 6 into the space 11 between the piston heads 9 and 10, the cove 31 in the piston valve being at this time in position to open the compartment 18 to the port 6. As the piston 8 makes its return stroke to draw in a new charge of air, as above explained, it will further compress the compressed air in the space 11, the piston valve having now moved into position to close the port 6, and this highly compressed charge will be delivered, when the piston valve reaches or approaches the limit of its advance movement, into the compartment 19, and thence past the valve 44 (see Fig. 6) into the discharge chamber 45 and outlet pipe 49. This arrangement provides for utilizing the piston head 9 to both compress and super-compress the air in the same cylinder, rendering it feasible to set up the compressor in a compact and efficient manner.

It is obvious that changes might be re-

sorted to in the form and arrangement of the several parts without departing from the spirit and scope of my invention; hence I do not wish to limit myself strictly to the structure shown and described, but

What I claim is:

1. In an air compressor, a cylinder, an air compressing piston arranged to reciprocate within the cylinder, a valve chamber located in proximity to and communicating with the cylinder through suitable ports, bushings seated in the said chamber opposite the ports and provided with openings of less diameter than the ports, a piston valve mounted to reciprocate in said bushings, a spring actuated bypass valve seated in the end of one of the said bushings and suitable conduits for the admission and discharge of the air.

2. In an air compressor in which the admission of the air to a compression cylinder and from the compression cylinder to a discharge is controlled by a piston valve, a piston valve composed of superposed tubular sections having their adjacent ends rabbeted to receive piston rings, piston rings seated in said rabbeted portions and a through bolt common to the said sections for holding them assembled.

3. In combination with the cylinder, its piston, the valve chamber and its piston valve composed of tubular sections, a through bolt for holding the sections assembled, the said bolt being provided with a screw threaded socket in its end, an eccentric for operating the valve and a part provided with a pin engaged with the eccentric and with a screw connected with the bolt.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this tenth day of January 1911.

WILLIAM S. FAIRHURST.

Witnesses:

F. GEORGE BARRY,
HENRY C. THIEME.