No. 697,414 Patented Apr. 8, 1902.

F. L. REEDER & A. B. FREVILLE.

AIR COMPRESSOR.

(Application filed Feb. 6, 1901.)

(No Model.)

FIG. 1.

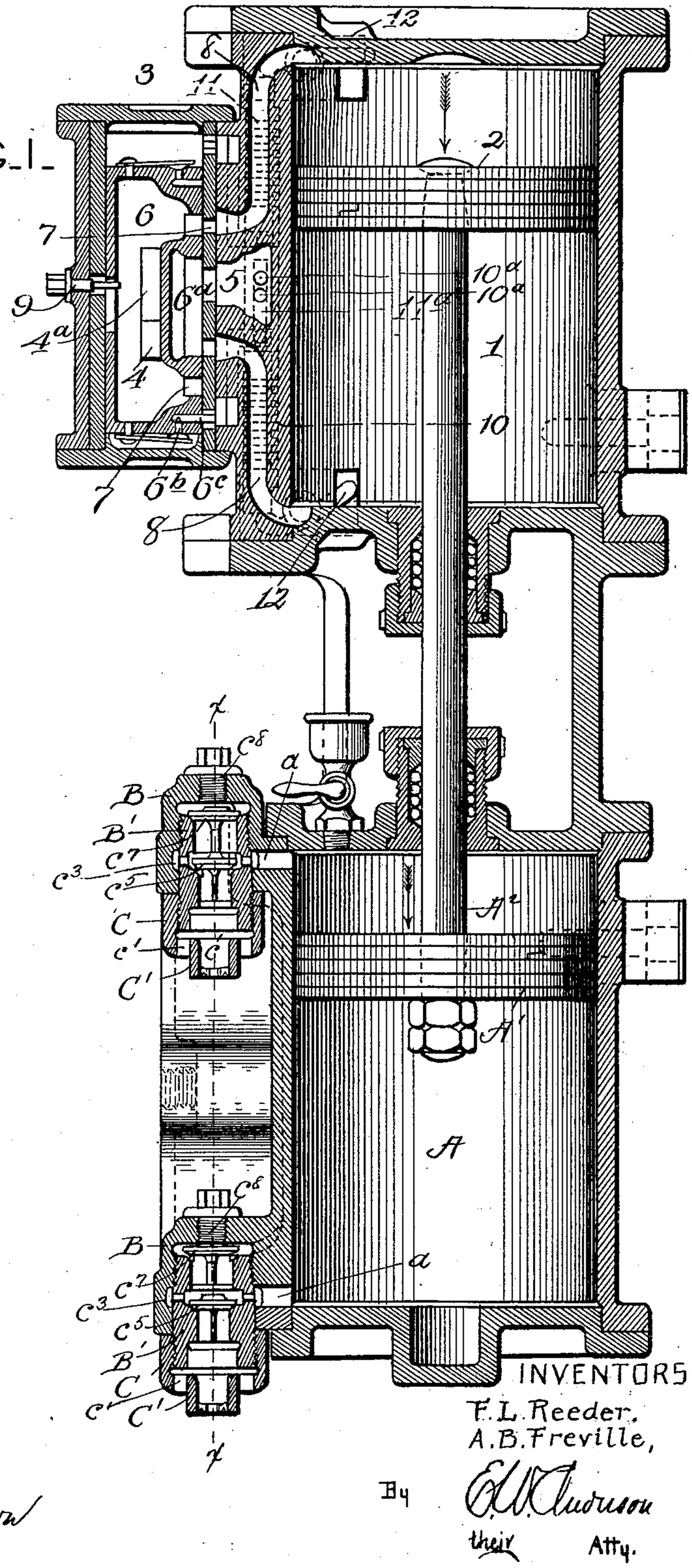

FIG. 2.

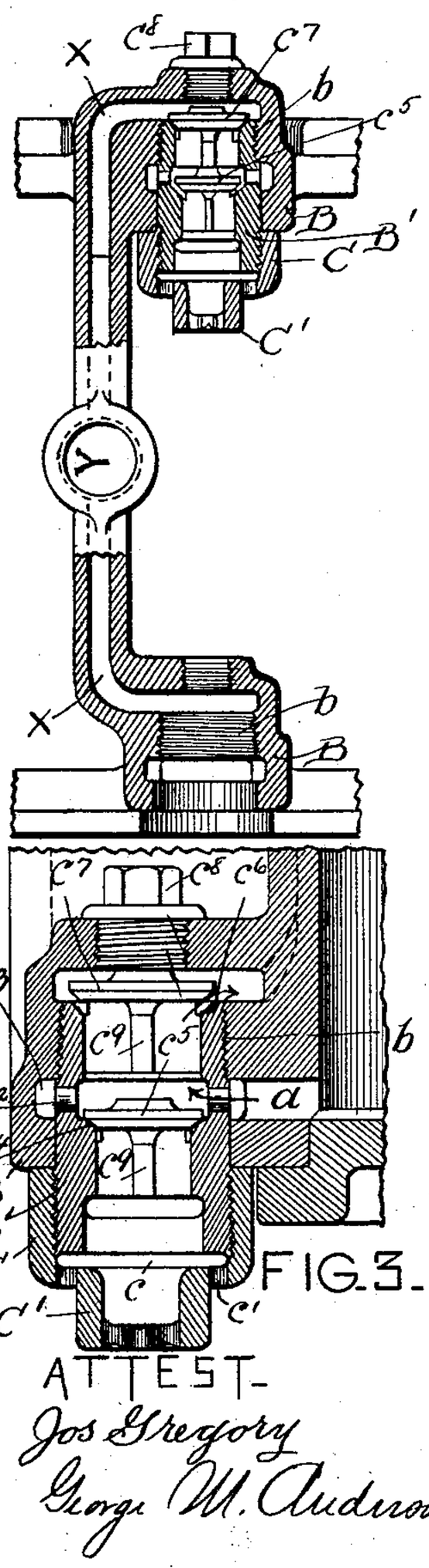

FIG. 3.

ATTEST-

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UNITED STATES PATENT OFFICE.

FRANK L. REEDER AND ALBERT B. FREVILLE, OF LOUISVILLE, KENTUCKY, ASSIGNORS TO THE NATIONAL FOUNDRY AND MACHINE COMPANY, OF LOUISVILLE, KENTUCKY, A CORPORATION.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 697,414, dated April 8, 1902.

Application filed February 6, 1901. Serial No. 46,203. (No model.)

To all whom it may concern:

Be it known that we, FRANK L. REEDER and ALBERT B. FREVILLE, citizens of the United States, and residents of Louisville, in the county of Jefferson and State of Kentucky, have made a certain new and useful Invention in Air-Compressors; and we declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

Figure 1 is a central vertical section through our air-compressor. Fig. 2 is a section on the line *x x*, Fig. 1, the bushing B′ being removed from the lower valve-chamber. Fig. 3 is an enlarged detail section of one of the valve-chambers and valves therein.

This invention has relation to air-compressors, and has for its object the improvement of the valve mechanism thereof with a view to increased simplicity and compactness, avoiding leakage, increased capacity for a cylinder of given dimensions, regulation of the lift of the valves, &c.

With this object in view the invention consists in the novel construction and combination of parts, all as hereinafter described, and pointed out in the appended claims.

Referring to the accompanying drawings, the letter A designates the air-cylinder, having piston A′, piston-rod A^2, and provided with the valve-chambers B, one at each end thereof, forming an integral part of such cylinder and directly connected with the end portions thereof by short air-passages *a* of a length equal to the thickness of the cylinder-shell at such points and having a right-angular relation to the axes of such cylinder and chambers. These valve-chambers are at their upper ends, by passages X X, connected with each other and with passage Y, providing a common exit for the air.

In chambers B are bushings or valve-cages B′, having a tapering screw-threaded engagement *b* therewith and open at both ends thereof, such bushings projecting from the chambers and having jam-nuts C engaging the projecting end portions of the bushings and provided each with a wrench-seat extension C′, a space *c* separating the inner wall of each said nut from the outer wall of the bushing, air-admission ports c' being provided in the end wall of the main portion of each said nut and communicating through space *c* with the interior of the valve-cages, and air-admission ports being also provided in the end wall of said nut extension.

The valve-bushings communicate at the inner ends thereof with passages X X and at their opposite ends with the air-admission ports aforesaid and are provided intermediately thereof with perforations c^2, communicating with passages *a* through annular grooves c^3 in the inner walls of the valve-chambers. The bushings are formed with valve-seats c^4 at the outer side of the perforations c^2, valves c^5 seating thereupon to control the admission of air to the cylinder, and at their inner extremities said bushings are formed with valve-seats c^6, back-pressure valves c^7 seating thereupon and having their lift limited by screw-plugs c^8, engaging perforations in the end walls of the valve-chambers. These valves c^5 and c^7 are of tapered disk form and have radial guide-flanges c^8 working closely in said bushings, which are of larger internal diameter at their inner end portions to allow of the insertion of the outer valves, the lift of the outer said valves being limited by the guide-flanges of the inner said valves.

In the operation of the invention upon the downstroke of the piston valve c^5 at the lower end of the cylinder will close to its seat, cutting off admission of air, and its companion valve c^7 will open to allow egress of the air in the cylinder, which passes through short passage *a* into annular groove c^3, through perforations c^2 into the interior of the valve-bushing, the valves at the upper end of the cylinder having a reversed action to admit air through the perforations in the jam-nut, through perforations c^2 of the valve-bushing into annular groove c^3, and passage *a* to the cylinder.

The tapering screw-threaded engagement of the valve-bushings and their chambers in

connection with the jam-nuts for said cages admits of a slight variation in the comparative diameter of bushings and chambers at such points without interfering with the tight character of the joint. The jam-nuts also serve the purpose of guarding against leakage of air through the joints between valve bushings and chambers. The lift of the inner valves may be regulated by the screw-plugs in case of variation in the length of the bushings.

Referring to the steam side of our pump, the numeral 1 indicates the steam-cylinder; 2, the piston thereof; 3, the steam-chest, and 4 and 5 the induction and eduction passages, respectively, of steam to and from the cylinder.

6 is a balanced piston slide-valve reciprocating in the steam-chest, of hollow cylindrical form throughout, the interior of which valve is in constant communication with the passage 4 at 4^a, having steam-ports at 7 7 in alternate communication with passages 8 8 to admit steam to the cylinder, the chamber 6^a in the lower wall of which valve is in alternate communication with passages 8 8 to exhaust steam from the cylinder through passage 5, with which said chamber 6^a is in constant communication. 9 is a pin engaging groove 9^a of such valve to prevent turning thereof, and ports are provided at both sides of said valve, so that no matter which way it is inserted in place there will be no blocking of induction-passage 4.

In each end wall of the piston-valve 6 is a steam-port 6^b to passage 6^c, extending downwardly into communication with a cylindrical chamber 10, extending longitudinally of the cylinder at one side of the steam-induction passage 4, said ports 6^b being controlled in the vertical engine shown by valves carried by flat springs secured to the valve end walls. Reciprocating in the said chamber 10 is a cylindrical valve-rod 11, having passage 11^a alternately connecting passages 6^c with passages 10^a 10^a, leading from eduction-passage 5 into chamber 10. This valve-rod is reciprocated by means of short intermediately-pivoted levers 12 12, having the working arms thereof acting against the end walls of such rod and the power-arms thereof extended downwardly and projecting through the end walls of the cylinder to a slight extent in the path of the moving piston when it has about completed the stroke.

The taper threaded engagement of valve chamber and bushing allows adjustment for a tight fit to prevent back pressure of the air, while the jam-nut forms an adjustable joint between the cylinder and the atmosphere, the adjustment of the two joints being independent of each other. The screw-plug engages a perforation in the end wall of the valve-chamber, thereby providing a passage entirely through said chamber in a straight line, which is convenient for cleaning and other purposes.

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

1. In an air-compressor, the combination with the taper threaded valve-chamber, having an annular interior groove, and a passage connecting chamber and cylinder, of a taper-threaded double, valve-seat bushing, having a projecting threaded end portion, the valves in said bushing, the perforated jam-nut engaging said projecting portion of the bushing, and the threaded plug engaging a threaded opening in the end wall of the valve-seat chamber, substantially as specified.

2. An air-compressor having valve-chambers at each end of the cylinder thereof, and having passages connecting each end of the cylinder with said chambers, and having a passage connecting said chambers, said chambers having each an interior annular groove registering with the passage connecting chamber and cylinder, and integral double valve-seat bushings having a tapered threaded engagement with said chambers, said bushings having perforations registering with said interior grooves, and having portions thereof projecting from the chambers, the valves in said bushings and jam-nuts engaging said projecting portions of the bushings and having air-inlet perforations, substantially as specified.

3. An air-compressor having valve-chambers at each end of the cylinder thereof, and having passages connecting each end of the cylinder with said chambers, and having a passage connecting said chambers, said chambers having each an interior annular groove registering with the passage connecting chamber and cylinder, and integral double valve-seat bushings having a tapered threaded engagement with said chambers, said bushings having perforations registering with said interior grooves, and having portions thereof projecting from said chambers, the valves in said bushings, jam-nuts engaging the projecting portions of said bushings, and having air-inlet perforations, and screw-plugs engaging perforations of the end walls of said chambers, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK L. REEDER.
ALBERT B. FREVILLE.

Witnesses:
F. M. LOSEY,
CHARLES H. FREVILLE.