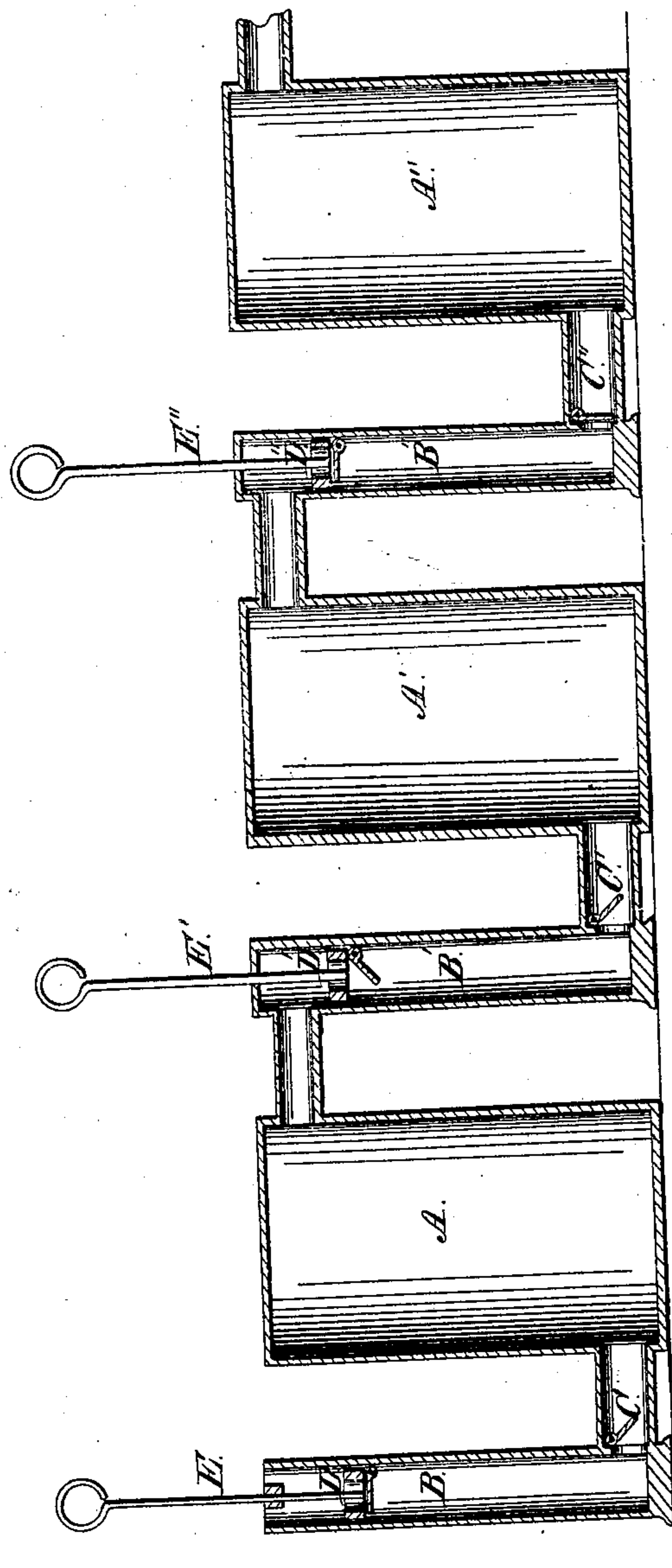


O. Ahruzzo,

Air Pump,

Nº 70,934.

Patented Nov. 19, 1867.



Witnesses.

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ONOFRIO ABRUZZO, OF NEW YORK, N. Y.

IMPROVEMENT IN APPARATUS FOR CONDENSING AIR.

Specification forming part of Letters Patent No. 70,934, dated November 19, 1867.

To all whom it may concern:

Be it known that I, ONOFRIO ABRUZZO, of New York, in the county and State of New York, have invented a new and Improved Pump for Compressing Air; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The drawing represents a sectional elevation of my invention.

Similar letters of reference indicate corresponding parts.

This invention relates to a new arrangement for compressing air in such a manner that the air can be compressed to an indefinite degree by hand, by any auxiliary small power, or by the engine in motion.

The invention consists in arranging a series of vessels and providing each one with a separate pumping apparatus. When the apparatus of the first vessel is set in motion it will compress the air in all the vessels to a certain degree, according to the power of the pumping apparatus, and to the rapport between the two volumes of air contained below the piston at the end of its upward and downward strokes, which volume determines the compressing power of pumps. If the volume below the piston, when the same is at its lowest stroke, is, for instance, the twentieth part of that volume which is below the piston at the end of its upward stroke, the pump will be able to compress twenty times the former volume at each stroke. When all the vessels are filled with such compressed air the apparatus of the second vessel is set in motion and compresses the air in all the vessels except the first, so as to divide the air which was contained in the first vessel without using any more power than was used for compressing the air by the first apparatus, as the compressed air of the first vessel presses upon the piston of the pumping apparatus.

A represents the first air-vessel, connected in any suitable manner with the lower part of a pump-cylinder, B, in which a valve, C, is arranged, said valve opening inward. The vessel A is also connected with the upper part of another pump-cylinder, B', the lower part of which

is connected with a second air-vessel, A'. The latter is again connected with the upper part of a third cylinder, B'', which, at its lower end, connects with a third air-vessel, A'', &c. As many air vessels and pumps are used as there are degrees of compression required, the division of the atmospheres required by the power of one pump giving the number of pumps and vessels. The valves C C' C'', &c., in the cylinders all open inward, so as not to let any already compressed air escape. In each cylinder is a piston, D D' D'', &c., each piston being perforated, and having a valve opening inward, as shown. Each piston is operated by means of a suitable piston-rod, E E' E'', &c., as shown.

When the operation begins the piston D is set in motion and compresses the air in all the vessels to a certain degree—say to twenty atmospheres, more or less—according to the power employed and the capacity and compactness of the pump, as before said. When the air in all the vessels A A' A'', &c., is compressed to so many atmospheres as can be compressed by each stroke of the piston—say twenty atmospheres—the second piston, D', is set in motion and will compress still further the already compressed air from the first vessel. The piston, when moving up, will not meet with any resistance from the compressed air, as the valve in it opens during the upward stroke; but as soon as the piston is moved down it will have to compress the already compressed air. The air from the first vessel, pressing upon the piston, counteracts as much of the pressure from below as its own compression amounts to—that is, if by the first pump the air was compressed to twenty atmospheres the said twenty atmospheres will press upon the second piston, and will thereby take off twenty atmospheres pressure from the work to be performed—and so the piston will compress the air to twenty atmospheres more than it was compressed by the first pump, and thus the process can be continued, *ad infinitum*, until the air is sufficiently compressed for certain purposes. Such air can be used for driving vessels or engines of any kind, and will by a less dangerous and a more convenient motion than the steam, and with insignificant cost, do better service and be more adaptable to the

requirements of the present and future generations than the motors now in use.

I claim as new and desire to secure by Letters Patent—

The arrangement of a series of vessels, A A', when the same are connected with cylinders B B', the same being provided with valves

C C', and with perforated pistons D D', having valves, substantially as and for the purpose herein shown and described.

ONOFRIO ABRUZZO.

Witnesses:

WM. F. McNAMARA,
ALEX. F. ROBERTS.