

R. M. CATLIN.
Apparatus for Compressing Air.
No. 231,007. Patented Aug. 10, 1880.

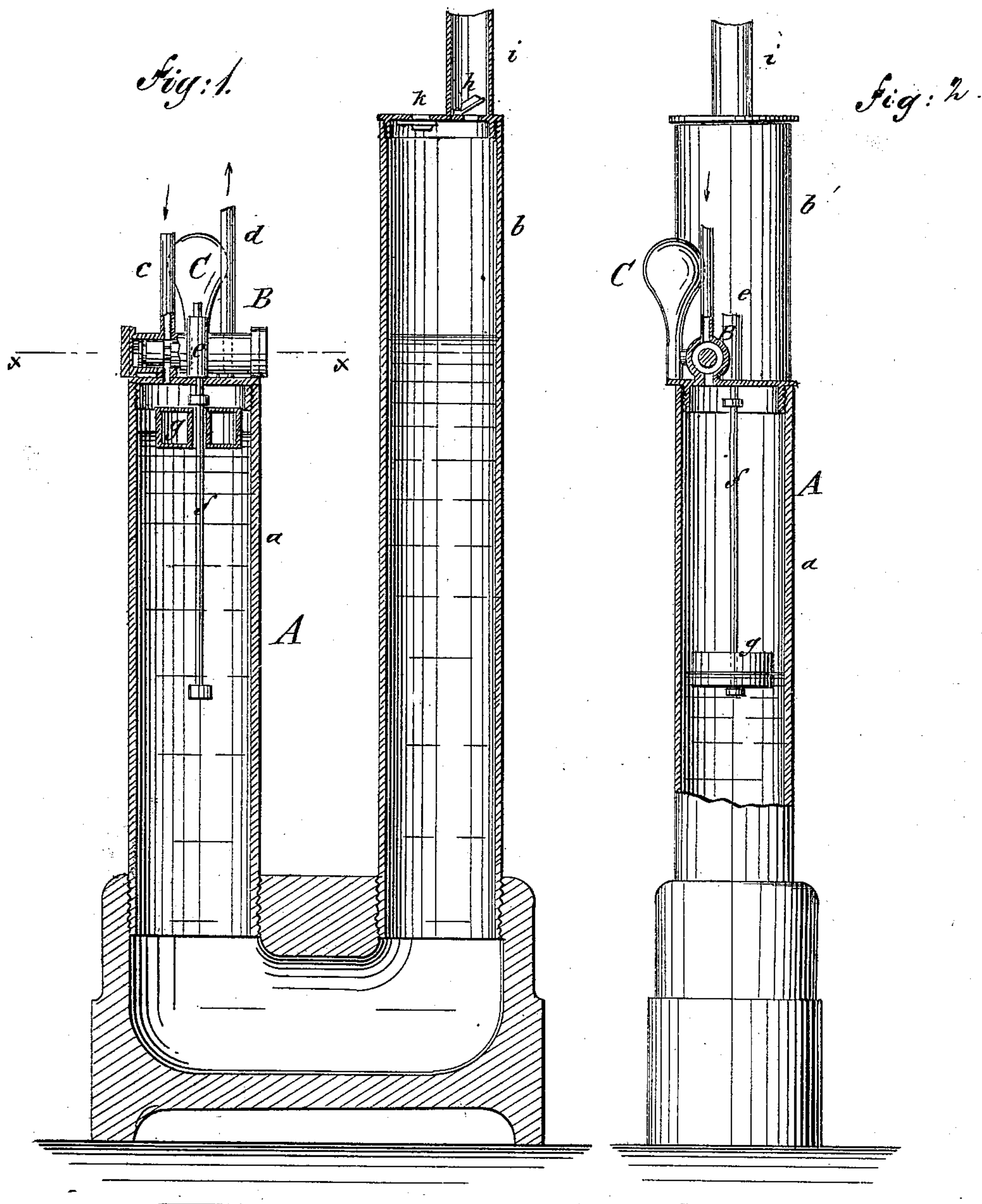
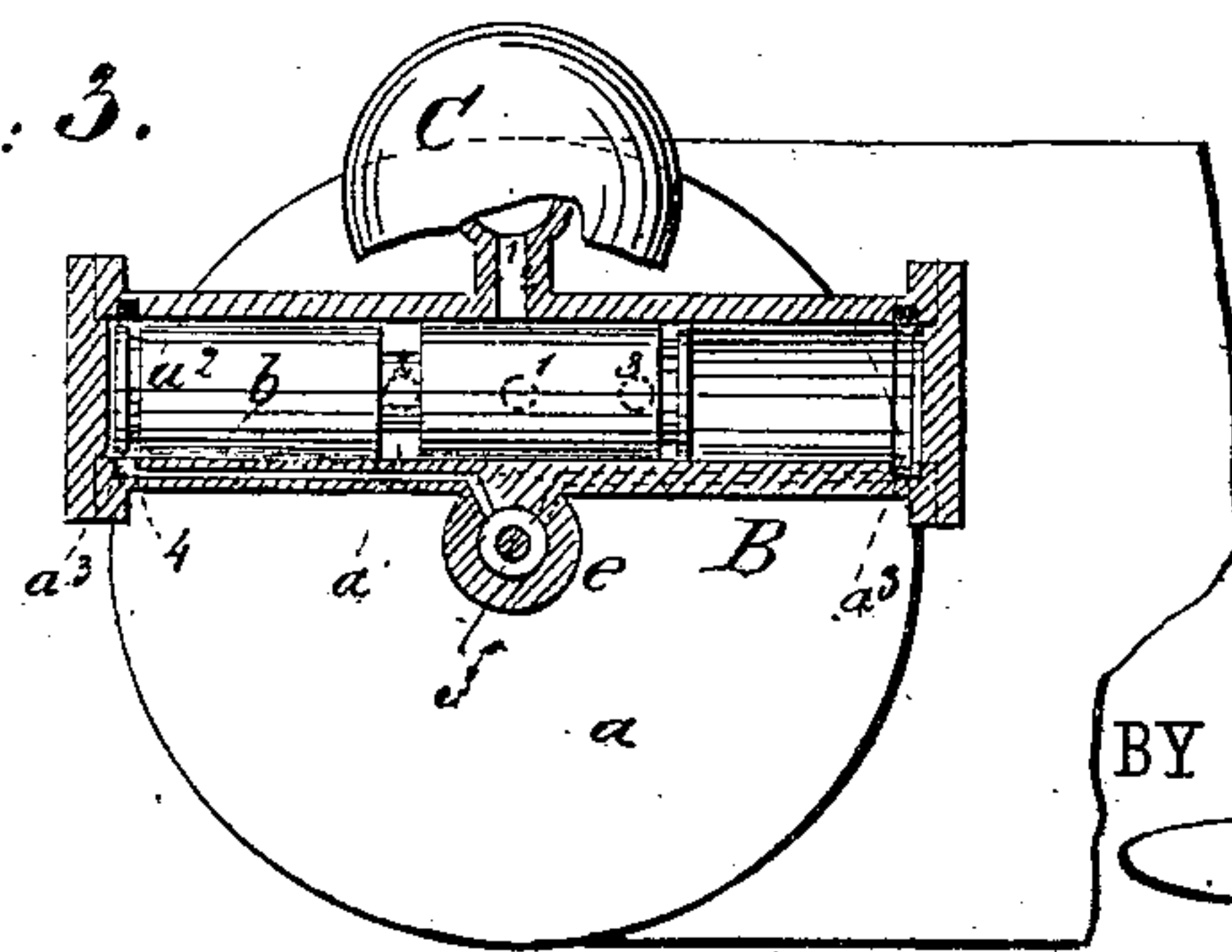


Fig: 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT M. CATLIN, OF TUSCARORA, NEVADA.

APPARATUS FOR COMPRESSING AIR.

SPECIFICATION forming part of Letters Patent No. 231,007, dated August 10, 1880.

Application filed December 13, 1879.

To all whom it may concern:

Be it known that I, ROBERT MAYO CATLIN, of Tuscarora, in the county of Elko and State of Nevada, have invented a new and useful Improvement in Apparatus for Compressing Air, of which the following is a specification.

My present invention is primarily an improvement in apparatus for elevating water by the direct action of compressed air, such as shown in Letters Patent granted to me, No. 221,778, November 18, 1879, but contains features that are applicable in connection with any steam or air engine.

The object of the invention is, first, to utilize a portion of the exhaust without back-pressure or the use of compound cylinders; second, to prevent loss of power by condensation of the steam and to obtain a more perfect valve action.

In the drawings, Figure 1 is a vertical section of the air-compressing apparatus with the valve and the exhaust chamber. Fig. 2 is a similar section at right angles to Fig. 1. Fig. 3 is a horizontal section on line *x x* of Fig. 1.

Similar letters of reference indicate corresponding parts.

In the apparatus, A is a U-shaped pipe, fitted at the upper end of its shorter leg *a* with a valve-case, B, that contains a cylindrical slide-valve, *b*, to which case is connected the inlet-pipe *c*, for steam under pressure, and exhaust-pipe *d*. At the side of case B is a case, *e*, fitted with an auxiliary valve at the end of the rod *f*, that extends into tube A, upon which rod *f* is a float, *g*, that by its movement up and down, with a liquid in tube A, operates the auxiliary valve to start the main valve. This feature is similar to the device shown in my previous patent, and need not be further described.

At the side of case B, and opening into the same by a port, 1, is a hollow case, C, which I term the "exhaust-chamber." From the valve-chamber a port, 2, opens to the leg *a*, to supply steam or air from pipe *c*, and a port, 3, opens from leg *a* to the valve-chamber and exhaust-pipe *d*. The valve *b* is formed as a cylindrical plunger, with a central annular groove, *a'*, that opens connection between ports 2 and 3 and pipes *c d*, and between the middle pipe, 1, and exhaust-chamber C.

The valve-case B is elongated, so that an air-cushion is formed at each end of valve *b*, and to start the valve in case it passes beyond the port 4, that supplies air or steam to move the valve, the valve is formed near each end with a narrow annular groove, *a''*, and the inner surface of case B at the port 4 is formed with an annular groove, *a'''*, that is wider than the space between the groove *a''* and the end of valve *b*, so that the pressure will act in groove *a''* to move the valve until its end returns over the port 4.

The operation of the described parts is as follows: Supposing the valve *b* be in position to admit air or steam from pipe *c* to leg *a*, the liquid in *a* is forced down by the pressure, as described in my said patent, or as hereinafter described, and the float *g* falling shifts the auxiliary valve, which admits air or steam to the port 4 to shift valve *b*. The valve *b*, in moving, first opens exhaust-port 1 to the chamber C, so that the chamber becomes filled with air or steam under pressure. The further movement of the valve *b* opens port 3 and allows the final exhaust by pipe *d*. The liquid then again rising in pipe *a* shifts the auxiliary valve by means of the float, and the first movement of valve *b* back opens the port 1, and the air or steam in chamber C rushes into pipe *a* and exerts its force previous to the main pressure, that enters from pipe *c* by port 2. Thus a portion of the exhaust is utilized at every stroke without back-pressure, and it will be seen that this device may be used wherever air, gas, or steam are used under pressure for any purpose.

The longer leg *b'* of the U-shaped pipe A is fitted with a valve, *h*, opening into a pipe, *i*, that will lead to a storage-reservoir. In the top of *b'* is an opening, *k*, to admit atmospheric air. Within the U-shaped pipe, to about the level of the top of leg *a*, a fixed oil is to be placed, to serve as a liquid piston, against which the steam entering from pipe *c* will act to force the air above the oil in leg *b'* out by pipe *i* and compress the same. The steam cannot evaporate the oil, and the oil will become heated, so that condensation of the steam and loss of pressure are thereby avoided.

I do not limit myself to the details of construction exactly as shown, as they may be

varied without departing from my invention. For the purpose of varying the size of the opening a' in valve b the said valve may be in two pieces, united by a screw-rod. A condenser
5 may also be used in connection with the exhaust-pipe d in any usual manner.

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

- 10 1. In an apparatus for compressing air by the direct pressure of steam, the liquid piston consisting of a column of oil within a tube that is connected to the air-tube and steam-chest, substantially as shown and described.
- 15 2. In an air-compressing apparatus, the U-shaped pipe A, having its longer leg connected to the air-receiver and its shorter leg with the valve and steam-chest, and containing oil, substantially as and for the purposes specified.
- 20 3. In an apparatus for using air, gas, or steam under pressure, the combination therewith of an exhaust-reservoir connected by a

port with the valve-chamber, and a valve that opens communication between the reservoir and the cylinder intermediately of the main
25 inlet and exhaust ports, substantially as described and shown, whereby a portion of the exhaust is utilized.

4. In an apparatus for using air, gas, or steam under pressure, the combination, with
30 the steam-chest and valve-chamber, provided with the ports 1 2 3 and valve b , of the reservoir C, connected by a port with the valve-chamber, substantially as and for the purposes set forth.

5. The piston-valve b , formed with the annular groove a^2 at each end, combined with the elongated valve-case B, having the annular inlet-groove a^3 , as and for the purposes specified.

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Witnesses:

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