

(No Model.)

C. M. FEVROT.

APPARATUS FOR COMPRESSING AIR.

No. 336,224.

Patented Feb. 16, 1886.

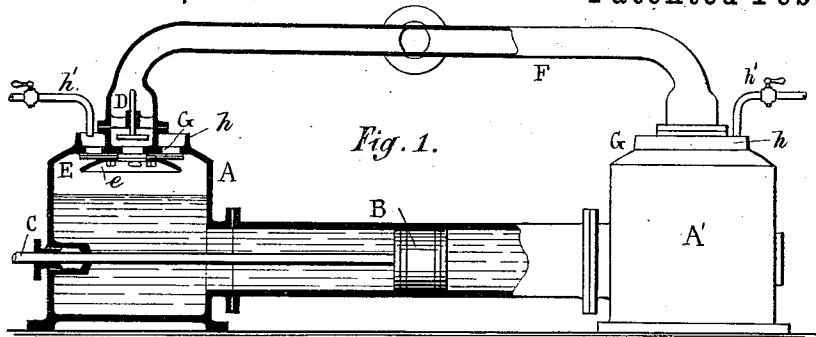


Fig. 1.

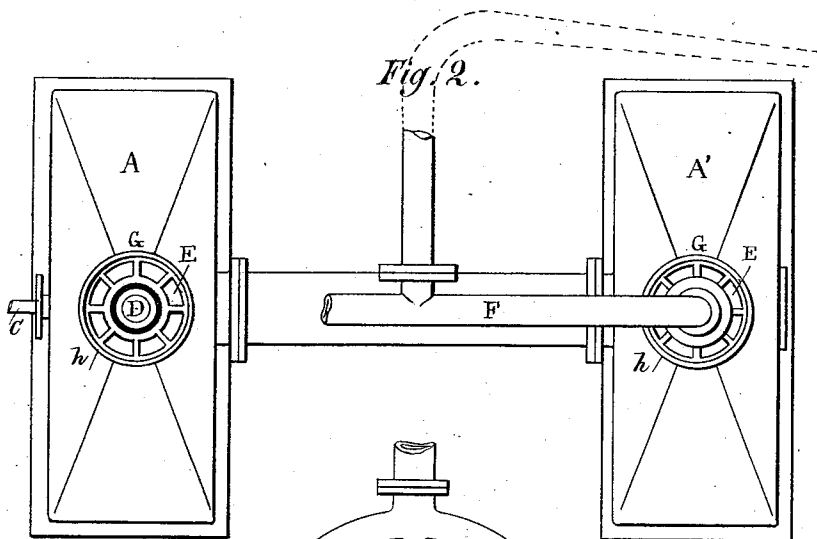


Fig. 2.

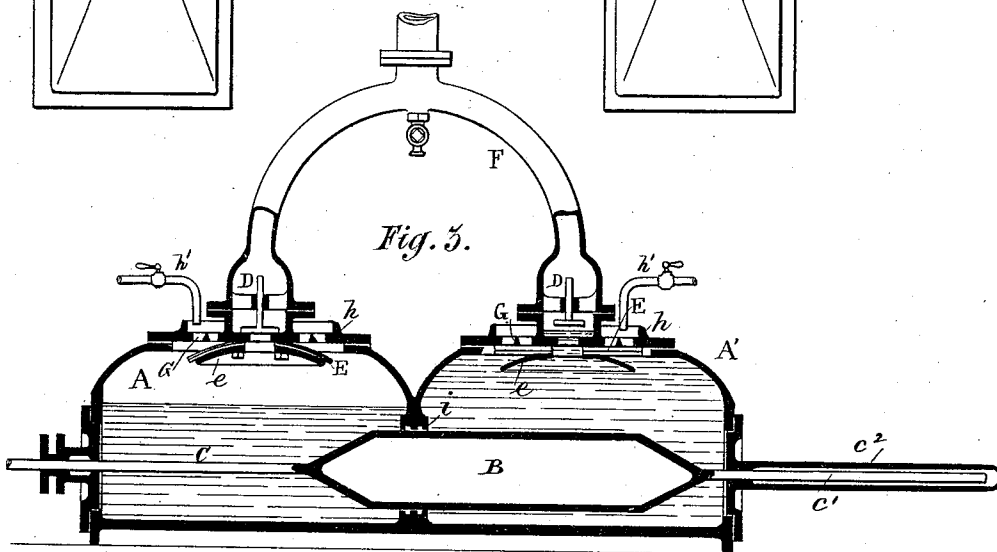


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

CLAUDE MARIE FEVROT, OF LYONS, FRANCE, ASSIGNOR TO WANNER & FEVROT, OF ST. PAUL, MINNESOTA.

APPARATUS FOR COMPRESSING AIR.

SPECIFICATION forming part of Letters Patent No. 336,224, dated February 16, 1886.

Application filed November 7, 1884. Serial No. 147,323. (No model.) Patented in France March 8, 1884, No. 160,815.

To all whom it may concern:

Be it known that I, CLAUDE MARIE FEVROT, of Lyons, in the Republic of France, have invented an Improvement in Apparatus for Compressing Air, of which the following is a specification.

Letters Patent for this invention have been granted in France June 5, 1884, No. 160,815, pursuant to an application deposited March 8, 1884.

This invention relates to that class of air-compressors from which the air is conveyed to a distance by pipes and used as a motive power.

Difficulties have heretofore existed in compressors from the heat developed as the air is compressed, and from the friction of the piston within the cylinder, and from the air remaining in the pump or the ports to the valves and not expelled at each stroke. In air-pumps a liquid such as water has been introduced into the cylinder to fill up the passage-ways; but the same has been subjected to violent agitation, and often the air-bubbles in the water do not have time to rise to the surface, and the air is not all expelled.

The object of my invention is to expel the air by a rising column of water, which is but little agitated, and the whole of the air-spaces are gradually filled with the water and the air under pressure is ejected at the top. The valves are simple, and a small amount of water is admitted with the air as the column of water descends, so as to make up for any loss of water by evaporation or otherwise.

In the drawings, Figure 1 is a section of one end of the air-compressor and an elevation of the other end. Fig. 2 is a plan of the same. Fig. 3 is a vertical section of the air-compressor in the form which I prefer.

The air-compressor is composed of the water-vessels A A' and the piston B, which is reciprocated by the piston-rod *c*, to which competent power is applied. The piston B may be of a form to fit the pump-cylinder shown in Fig. 1 as connecting the water-vessels A A'; but I prefer to place such water-vessels close together, as seen in Fig. 3, the partition *i* between them being perforated for the passage of the piston B, which is in the form of an elongated hollow cylinder, and preferably with conical ends, as shown, to lessen the resistance

as it is moved back and forth in the water. This cylindrical piston is hollow and made sufficiently light to float in the water, so that it may be moved back and forth without friction against the edges of the partition *i*, where it passes through such partition, and at this place there should be peripheral grooves in the partition to lessen leakage. The rod *c* in the tube *c*² serves to guide the parts and keep the hollow cylindrical piston in its proper position. It will now be understood that the reciprocations of the piston B cause the water to rise in one vessel, A, as it descends in the other vessel, A', or vice versa, and the piston being entirely immersed, there is no tendency to agitate the water and mix air-bubbles into the same, and the water, as it rises, expels the air from above it, and as it descends the air is drawn in. The air-valves are placed in the top of the vessels A A', the inlet-valve E is below the seat G, and it is preferably of a sheet of flexible material—such as rubber—and *e* is the convex disk supporting the same. The eduction air-valves are shown at D. They are within the ends of the pipe F, that leads the compressed air to a reservoir, from which it passes to the distant engine or other working device. The covers of the water-vessels A A' are convex or arching, so that there may be no pockets in which air may lodge and not be expelled by the rising water, and around the openings for the valve-seat of the valve E there is a rim, *h*, and at *h'* there is a pipe, through which a small quantity of water is allowed to run. This water passes with the atmosphere into the air-vessels A A', to supply any loss from leakage or surface evaporation.

In the operation of this air-compressor the large extent of water-surface in contact with the atmosphere and acting to compress the same takes up any heat that is developed by the compression of the atmosphere, and prevents the pump becoming hot, and the water keeps the valves and their seats wet, so that there is no leakage, and the heat is conveyed away by the vapor rising from the water or by the surplus water that passes off with the air. It will be apparent that the surface of the water is the most influenced by the heat developed by the compressed air, and this surface-water passes off with the air through the

valves D; hence the water remaining in the vessel A is kept cool. Large valves can be used to advantage, especially for the induction-valves, so as to lessen noise.

5 I claim as my invention—

1. The combination, in an apparatus for compressing air, of the water-holding vessels A A', placed end to end, and having a common dividing-partition, a cylindrical hollow
10 piston pointed at each end and passing through said partition, a piston rod and guide-rod connected to the respective ends of said piston, a circular perforated cap-piece to each of said
15 water-vessels, a convex disk, e, and pipe F, connected to each of said cap-pieces, and the valves E and D, substantially as specified.

2. In an air-compressing apparatus, two water-holding vessels, with an opening between them, a plunger in the said opening,
20 with a rod by which it is reciprocated, an arched top to each vessel, with inlet air-openings in said arched top, a flexible valve in such vessel beneath said openings and closing upwardly, a central discharge-opening, a pipe

above the same, and a valve closing downwardly over the said opening, whereby the inlet and discharge of the air are at the highest point of each vessel and agitation of the water is prevented, substantially as specified. 25

3. The combination, with a water-holding vessel and piston in an air-compressing apparatus, of an arched top, a circular range of openings through the level portion of the top, a valve below the said openings closing upwardly, a rim around the openings, and a pipe
35 for supplying water, whereby the water reaches all portions of the openings with uniformity, and a central opening, pipe, and valve for the discharge of the compressed air, substantially as specified. 40

The foregoing specification of my improvement in apparatus for compressing air signed by me this 9th day of October, 1884.

M. FEVROT.

Witnesses:

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YVIN RABILLOU.