2 Sheets—Sheet 1.

B. T. BABBITT.

Air-Compressors.

No. 198,067. Patented Dec. 11, 1877.

Fig. 1.

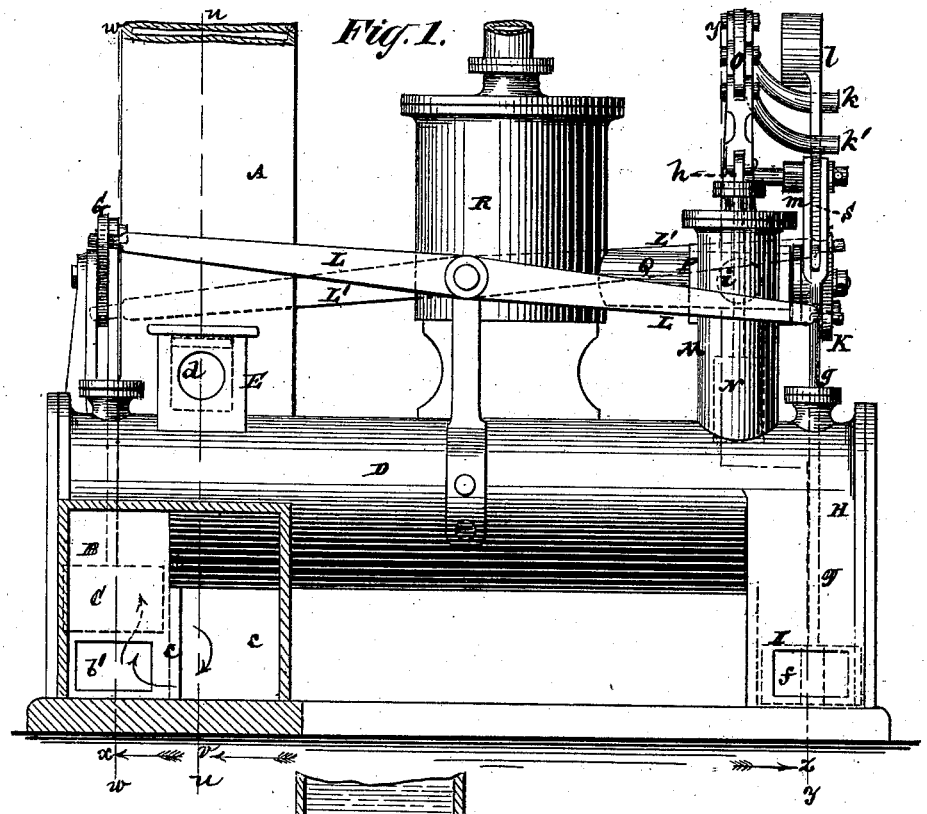

Fig. 2.

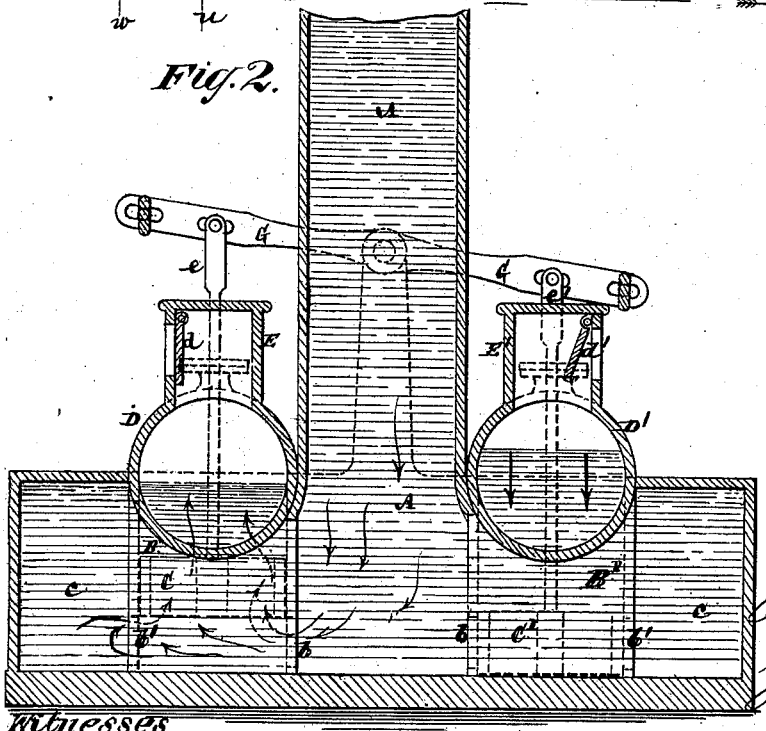

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Fig. 3.

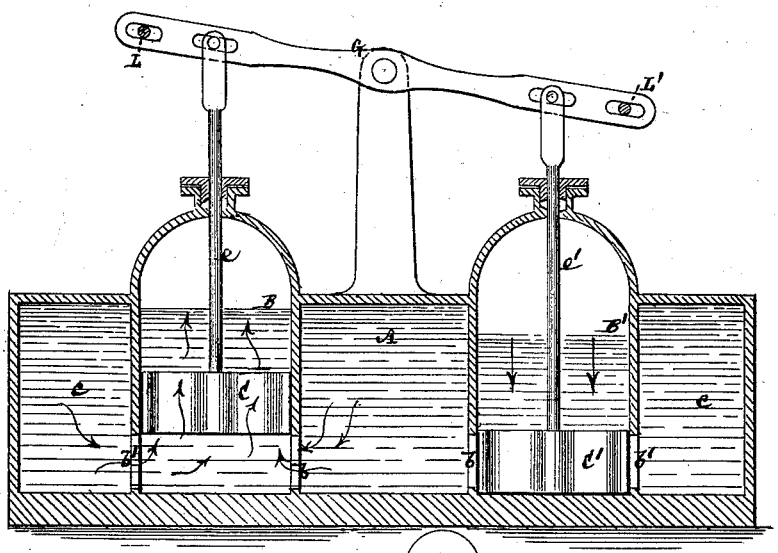
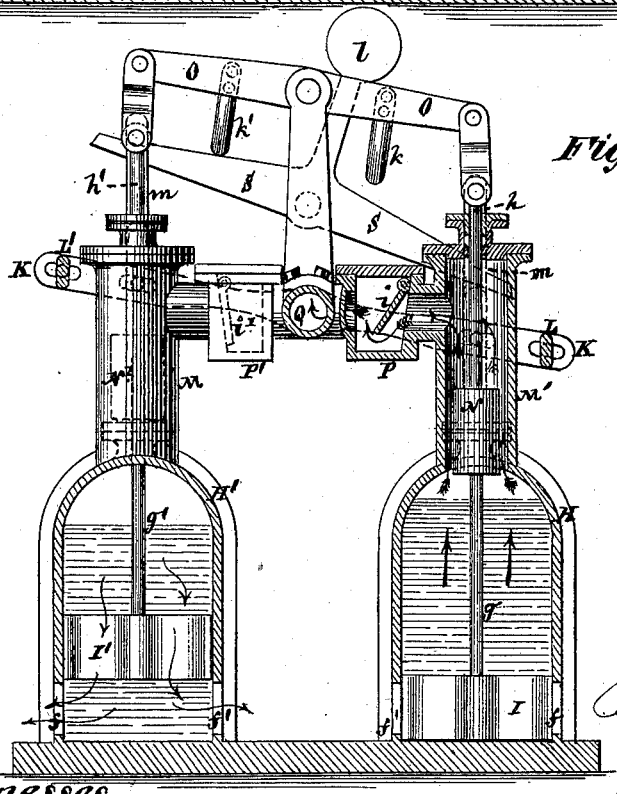


Fig. 4.



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UNITED STATES PATENT OFFICE.

BENJAMIN T. BABBITT, OF NEW YORK, N. Y.

IMPROVEMENT IN AIR-COMPRESSORS.

Specification forming part of Letters Patent No. **198,067**, dated December 11, 1877; application filed August 20, 1877.

To all whom it may concern:

Be it known that I, BENJAMIN T. BABBITT, of the city and State of New York, have invented certain new and useful Improvements in Air-Compressors, of which the following is a description, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to apparatus for condensing or compressing air to be used as a motive agent or for ventilating shafts and mines by hydrostatic pressure as derived from a column or head of water—as, for instance, from a water-fall or natural stream.

The invention consists in various novel constructions and combinations of parts in such an apparatus or engine, whereby a very efficient and automatic action is obtained and a continuous supply of compressed air is kept up, the same comprising duplicate air-compressing cylinders or tubes, controlled by balance-valves, to alternately admit the water into them from a trunk or chute, duplicate balanced discharge-valves for the water at the opposite ends of said cylinders or tubes, duplicate floats in chambers or ducts, mounted on and communicating with the discharge ends of said cylinders, and serving to pass the air as compressed through delivery-valves to a compressed-air receiver, a rocking beam actuated by said floats, and a weighted trip mechanism controlled by said beam, and having combined with it mechanism for controlling the valves which admit and discharge the working-column or body of water to and from the air-compressing cylinders or tubes.

Such apparatus constitutes a very convenient means of utilizing a copious supply of water to the compression of air, which may be transmitted to any desired distance from the water-supply.

Figure 1 represents a side elevation of an air-compressing apparatus constructed in accordance with my invention. Fig. 2 is a vertical section on the line *u u*, looking in direction of the arrow *v*; Fig. 3, a transverse section on the line *w w*, looking in direction of the arrow *x*; and Fig. 4, a further transverse section on the irregular line *y y*, looking in direction of the arrow *z*.

A represents a trunk, chute, or water-receiving duct, which may be of any desired height and capacity, and which serves to conduct the water from a natural stream or fall alternately to duplicate valve-chambers B B′ on opposite sides of, and at the base of, said chute by means of apertures *b b′*, arranged on opposite sides of each of said valve-chambers, and communicating, not only directly with the chute A at its base, but also indirectly therewith, by connecting chambers or passages *c*, to produce an opposing or counterbalancing lateral pressure on the valves C C′, which have an alternately reverse up-and-down movement within the chambers B B′ to control the apertures or ports *b b′*. This combination of ports and passages serves to relieve the valves of friction. The valve-chambers B B′ are in free communication with the forward ends of duplicate horizontal air-compressing mains, cylinders, or tubes D D′, which may be of any desired length and capacity, and which, when either valve C or C′ is operated to uncover the ports *b b′*, which it controls, receive water under pressure from the chute A to compress the air within them.

Mounted on the air-compressing mains or cylinders D D′ are boxes or ducts E E′, provided with valves *d d′*, opening inward to admit air to the interior of said mains; but which close when the air is being compressed within the mains by the action of the water as it is admitted alternately to either main by the valve C or C′.

G is a rocking beam, to opposite ends of which the up-and-down reciprocating or sliding valves C C′ are connected by means of rods *e e′*.

At the back or opposite ends of the air-compressing mains or cylinders D D′ are valve-boxes H H′, in which are arranged slide-valves I I′, for controlling the discharge of the water alternately from the mains D D′, after it has done its work in the latter. These valves also have an up and down movement, and are counterbalanced as regards lateral pressure, and control opposite end outlets *f f′* for the water.

K is a rocking beam, to opposite ends of which the rods *g g′* of the water-discharge valves I I′ are connected. The rocking beams G and K are connected at their opposite ends

by duplicate side rocking beams or levers L L′, to insure a proper relative action of the inlet-valves C C′ and outlet-valves I I′, so that when either inlet-valve C or C′ is open the discharge-valve I or I′, at the opposite end of the same main D or D′, is closed, and vice versa, and so that each main is filled and emptied alternately.

Mounted on the mains D D′, near their back ends, are chambers or ducts M M′, which contain loosely-fitting floats N N′, and are in free communication at their lower ends with the mains D D′. These floats are connected by rods *h h′* with opposite ends of a rocking beam, O, to secure their joint action in reverse directions. The upper end portions of the chambers or ducts M M′ connect with valve-boxes P P′, which are fitted with air-delivery valves *i i′*, opening inward, and connected by a branch, Q, with a compressed-air receiver, R, from which the air, compressed by the apparatus, may be taken or conveyed by pipe to its place or places of use.

Attached to the rocking beam O, on opposite sides of its center of motion, are toes *k k′*, which, as said beam is rocked, alternately rub over or act upon opposite ends or arms of an independent rocking beam, S, which carries or has mounted on it, over its center of motion, a tripping or tilting weight, *l*. This weighted tripping or tilting beam S is free to move at its outer ends in slotted upper extensions *m* of the valve-rods *g g′*.

The operation is as follows: Supposing water under a head or pressure, as from a running stream or water-fall, to be freely supplied to the trunk, chute, or receiving-duct A from above, and the valve C to be open and the valve C′ closed, and the valve I to be closed and valve I′ to be open, the said water will rush into the main cylinder or tube D at its forward end, and filling said main, also rising within the chamber or duct M, will compress the air previously received within the main D by its valve *d*, and drive out said air through the valve *i* into the compressed-air receiver R. During this operation the float N rises in the chamber or duct M, and, rocking the beam O, causes the toe *k′* on the latter to bear on and move the weighted tripping or tilting beam S till the weight *l* of the latter passes its center of gravity, and the beam S is suddenly tripped or tilted, so as to close, by its action on the slotted extension *m* of the rod *g′*, the water-discharge valve I′, and at the same time, by means of the connected rocking beams K G and L L′, to open the water-discharge valve I, to close the valve C, and to open the valve C′. This reverses the action of the apparatus or causes the main D′ to become charged with water, and to drive out the air which it compresses therein through the valve *i′* into the receiver R until the float N′, rising in its chamber or duct M′, operates through the toe *k* of the beam O on the tripping or tilting weighted beam S to reverse the position of the latter, and by its action on the slotted extension *m* of the valve-rod *g* and the beams K G L L′ causes the valve C again to be opened, the valve C′ closed, the valve I closed, and the valve I′ opened. This runs out the water, which has done its duty from the main D′, and resupplies the main D with a fresh charge of water to keep up the air-compressing action, which is thus made continuous and automatic.

I claim—

1. The combination, with the duplicate air-compressing cylinders or mains D D′, of the water-trunk or receiving duct A for supplying said mains, the valve-chambers B B′, having ports *b b′* in their opposite sides, the connecting chambers or passages *c*, and the slide-valves C C′, substantially as specified.

2. The combination, with the air-compressing cylinders or mains D D′, which operate by alternately charging them with water to compress the air within them, of the upright chamber or ducts M M′, near the discharging ends of said mains, the floats N N′, the tripping or tilting weighted beam S, set in motion by said floats, inlet and outlet valves for the water at opposite ends of said mains, and the mechanism connecting said valves and actuated by the tripping or tilting weighted beam, essentially as and for the purpose herein set forth.

3. The combination of the side rocking beams L L′ with the end rocking beams G K and the water inlet and outlet valves C C′ I I′ of the apparatus, substantially as specified.

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Witnesses:

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