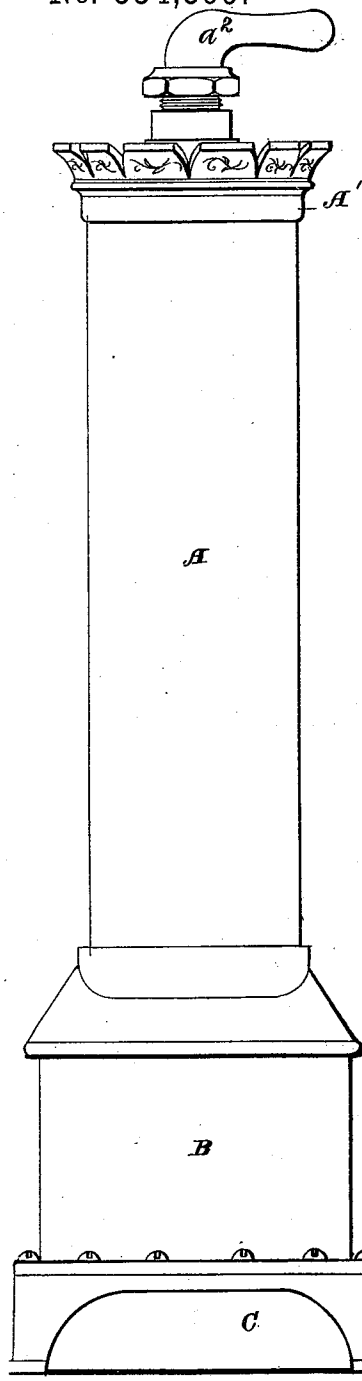
(No Model.) 3 Sheets—Sheet 1.

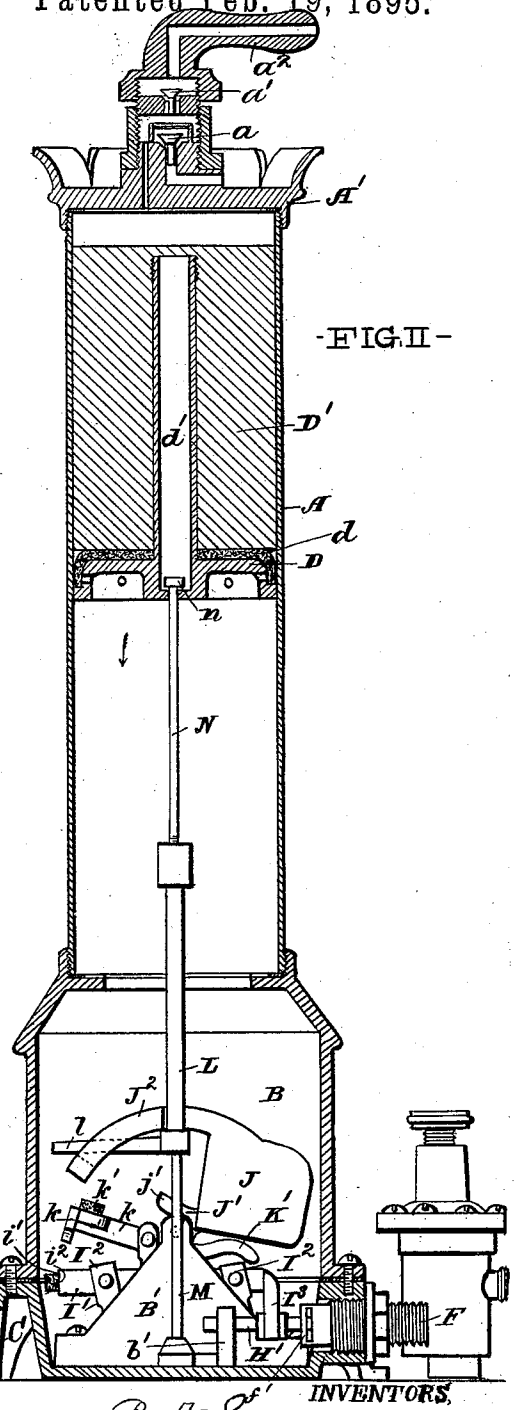
R. N. LOWE & F. C. GUYSER.

HYDRAULIC AIR COMPRESSOR.

No. 534,399. Patented Feb. 19, 1895.



-FIG. I-



-FIG. II-

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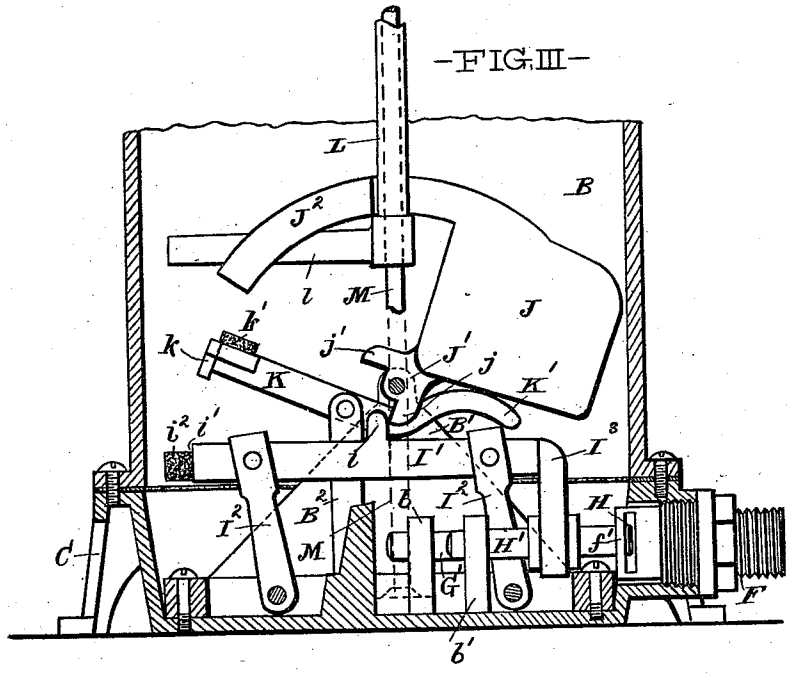
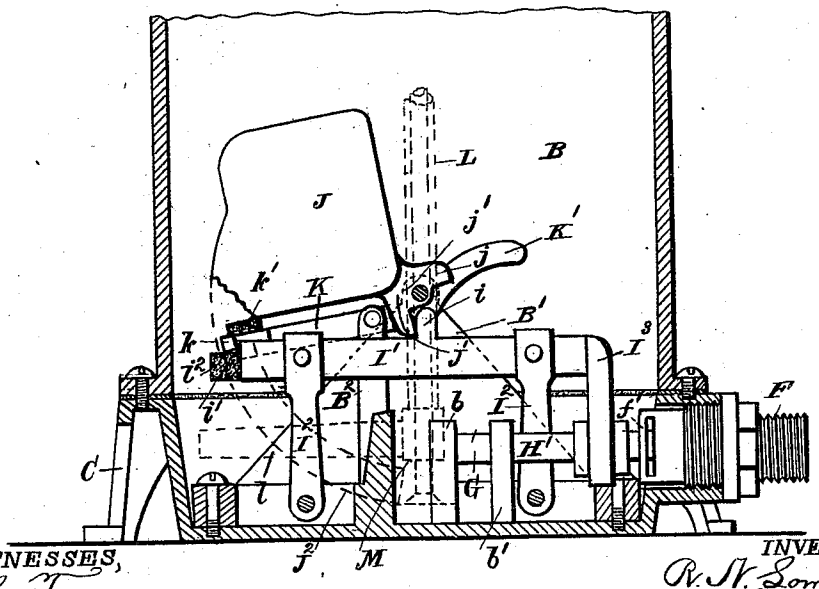
-FIG. III-



-FIG. IV-



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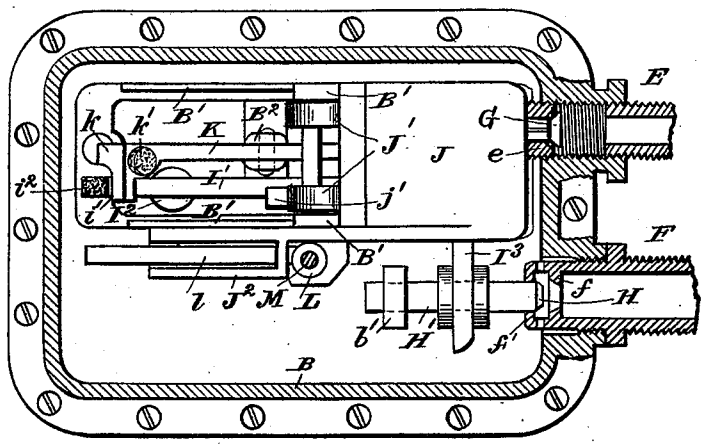
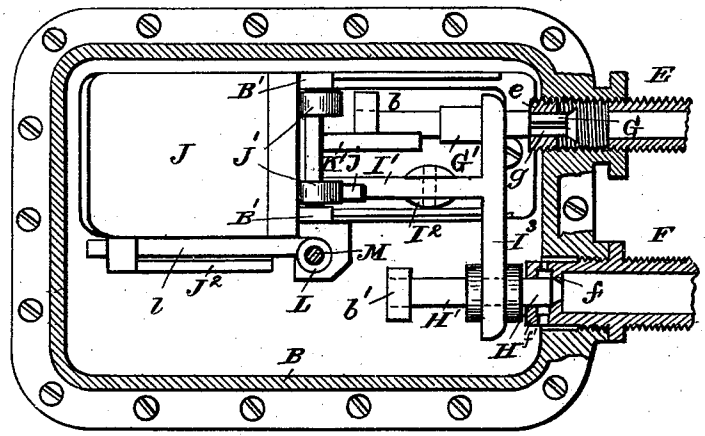
-FIG. V-



-FIG. VI-



WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT N. LOWE AND FRANK C. GUYSER, OF CLEVELAND, OHIO, ASSIGNORS TO THE VULCAN BRASS COMPANY, OF SAME PLACE.

HYDRAULIC AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 534,399, dated February 19, 1895.

Application filed February 11, 1893. Renewed September 12, 1894. Serial No. 522,806. (No model.)

To all whom it may concern:

Be it known that we, ROBERT N. LOWE and FRANK C. GUYSER, citizens of the United States, and residents of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Hydraulic Air-Compressors, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following description set forth in detail, one mechanical form embodying the invention; such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings—Figure I represents a side elevation of our improved hydraulic air compressor; Fig. II, a vertical section of the same; Fig. III, a vertical section of the valve casing,—on an enlarged scale,—illustrating the position of the several parts of the valve mechanism when the inlet valve is closed and the outlet valve open; Fig. IV, a vertical section of the valve casing, illustrating the position of the several parts of the valve mechanism when the inlet valve is open and the outlet valve closed; Fig. V, a horizontal section of the valve casing, illustrating the position of the several parts of the valve mechanism when the inlet valve is closed and the outlet valve open, and Fig. VI a horizontal section of the valve casing, illustrating the position of the several parts of the valve mechanism when the inlet valve is open and the outlet valve closed.

An air and water cylinder, A, is suitably secured, at its lower end, to a valve casing, B, suitably supported upon a base, C. The upper end of the air and water cylinder is closed by a suitable cap, A′, provided with an air inlet valve, *a*; an air outlet valve, *a′*, and a nipple, a^2,—connected to the air outlet and adapted to have a hose or pipe connected thereto, to convey compressed air to whatever receptacle or place of destination is provided.

A piston, D, fits and slides in the air and water cylinder, and has a weight, D′, secured to its upper side. Suitable packing, *d*, is secured to the piston and forms a tight joint between the latter and the air and water cylinder. The weight serves to return the piston, after the latter has been raised to its uppermost position by the actuating water,—as will hereinafter be more fully described;—but a spring or any other suitable returning mechanism may be substituted for the weight, which forms no part of our invention, being old and well known in this and kindred arts.

The valve casing B has a water inlet, E, and a water outlet, F; and suitable pipe connections, respectively with the water supply and water waste, may be attached to said inlet and outlet. The water inlet has an outwardly facing valve seat, *e*, and the water outlet has an inwardly facing valve seat, *f*, and a guide portion, *f′*, for the outlet valve.

An inlet valve, G, plays against the inlet valve seat *e*, and has that portion, *g*, of its stem, G′, which slides within the central perforation of the valve seat, cut away or grooved in such manner as to form free passage for the inlet water. The other end of the valve stem G′ slides in a suitable bearing, *b*, in the bottom of the valve casing.

An outlet valve, H, fits and has play upon the outlet valve seat *f*, and its stem, H′, slides in the guide portion *f′* and in a bearing, *b′*, upon the bottom of the valve casing.

A valve operating bar, I′, is pivotally supported in the upper ends of two links, I^2, which are pivoted at their lower ends upon the bottom of the valve casing; and one end of said valve operating bar has a transverse yoke, I^3, which is connected to the two valves, in such manner that said valves may be simultaneously moved by said valve operating bar and yoke. The valve operating bar has a lug, *i*, upon its upper side, and has furthermore a shoulder, *i′*, at its rear end, and a yielding bumper, i^2, at said end, by means of which bumper the rearward throw of the valve operating bar may be cushioned and prevented from doing injury to the wall of the valve casing.

A valve actuating weight, J, has ears, J′,

which are pivoted between two bearings, B′, projecting upward from the bottom of the valve casing. One ear of the weight J has two lugs, *j* and *j′*, which may engage the lug *i* upon the valve operating bar and, by their engagement with such lug, throw the valve actuating bar either rearward or forward as the weight is tilted either forward or rearward. The terms "forward" and "rearward" are arbitrarily used in this connection, forward being indicated as in a direction toward the inlet and outlet, and rearward being indicated as in a direction away from the inlet and outlet.

A latch, K, is pivoted upon a suitable upright, B^2, projecting from the bottom of the valve casing; and said latch has an upwardly curved forward arm, K′, and a laterally projecting catch portion, *k*, which may engage the shoulder *i′* of the valve operating bar, preventing said bar from sliding rearward when said latch engages said shoulder. The upper side of the rear end of the latch has a yielding cushion, *k′*, against which the weight may strike when the latter is tilted rearward. The weight is provided with a longitudinally slotted, segmental arm, J^2, and the slot in said segmental arm is engaged by a finger, *l*, projecting laterally from the lower end of a sleeve, L, which slides upon an upright rod, M, upon the bottom of the valve casing. The upper end of the sleeve is secured to a shifting rod, N, projecting up into the air and water cylinder; and the upper end of said shifting rod has an enlarged head, *n*. The weight D′ of the air and water piston is formed with an axial bore, *d′*, into which the shifting rod may project, and the lower end of said axial bore is sufficiently contracted to engage the head of the shifting rod and thus raise the latter and the sleeve when the air and water piston arrives at the upper end of its stroke.

If we assume the parts of the air compressor as being in the position illustrated by Figs. II, III and V, such position indicates that the air and water piston has reached the upper end of its stroke, has tilted the actuating weight of the valve mechanism, and has shifted the inlet and outlet valves in such manner as to close the inlet and open the outlet. The weighted air and water piston will therefore be at the beginning of its gravitating down-stroke as indicated in Fig. II. The rising of the shifting rod and sleeve at the upper end of the up-stroke of the air and water piston has caused the finger at the lower end of the sleeve to move upward in the slotted segmental arm of the tilting weight, and has caused said weight to be thrown over in its forward position. As the weight dropped over in its forward position, it struck the curved arm of the latch, and raised the catch portion of the latter from its engagement with the valve operating bar, thus releasing the latter and allowing it to be shifted rearward by one of the lugs upon the ear of the weight. The rearward motion of the valve operating bar caused the inlet valve to be closed and the outlet valve to be opened. As the weighted air and water piston descends by gravity, and reaches the lowermost end of its stroke, the piston will strike the upper end of the shifting sleeve, force the latter down upon its upright guide rod, and cause its finger to bear against the lower end of the slotted segmental arm of the valve actuating weight, tilting the latter from its forward position to its rear position. As the valve actuating weight tilts rearward, the lug upon the ear will engage the lug upon the valve operating bar, and will throw said bar,—and the inlet and outlet valves with it,—forward. As the valve operating bar is thrown forward, the valve actuating weight forces the catch end of the latch downward to engage the shouldered end of the valve operating bar, preventing the latter from being forced rearward by the pressure of the inlet water upon the inlet valve and upon the yoke on the forward end of the valve operating bar. The inlet valve will now be open and the outlet valve closed, as shown in Figs. IV and VI, and the pressure of the inlet water will raise the weighted air and water piston, forcing air under pressure out through the outlet valve and nipple.

It will be observed that the inlet valve and outlet valve both close against their seats with the pressure of the water, so that, as soon as the valve operating bar has received its initial movement, the pressure of the in-rushing or out-rushing water will carry the valve with it to its seat. As the inlet valve thus has a tendency to automatically close under the pressure of the in-rushing water, it is necessary to provide the latch mechanism for the valve operating bar, to prevent premature closing of the inlet valve.

Other modes of applying the principle of our invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

We therefore particularly point out and distinctly claim as our invention—

1. In a hydraulic air compressor, the combination of a valve operating bar, a latch having a catch end engaging a shoulder upon said bar and having a projecting end, and a tilting, valve actuating weight engaging the projecting end of said latch at one portion of its throw to disengage the latch from the valve operating bar, substantially as set forth.

2. In a hydraulic air compressor, the combination of a valve operating bar formed with a shoulder and with a projecting lug, a latch having a catch end engaging said shoulder

and a projecting end, and a tilting valve actuating weight provided with lugs engaging the lug upon the valve operating bar,—said weight engaging the projecting end of the latch at one end of its stroke, substantially as set forth.

In testimony that we claim the foregoing to be our invention we have hereunto set our hands this 7th day of February, A. D, 1893.

R. N. LOWE.
F. C. GUYSER.

Witnesses:
WM. SECTUR,
J. C. TURNER.