No. 719,127. PATENTED JAN. 27, 1903.

W. M. MYERS.

AIR COMPRESSOR.

APPLICATION FILED DEC. 14, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

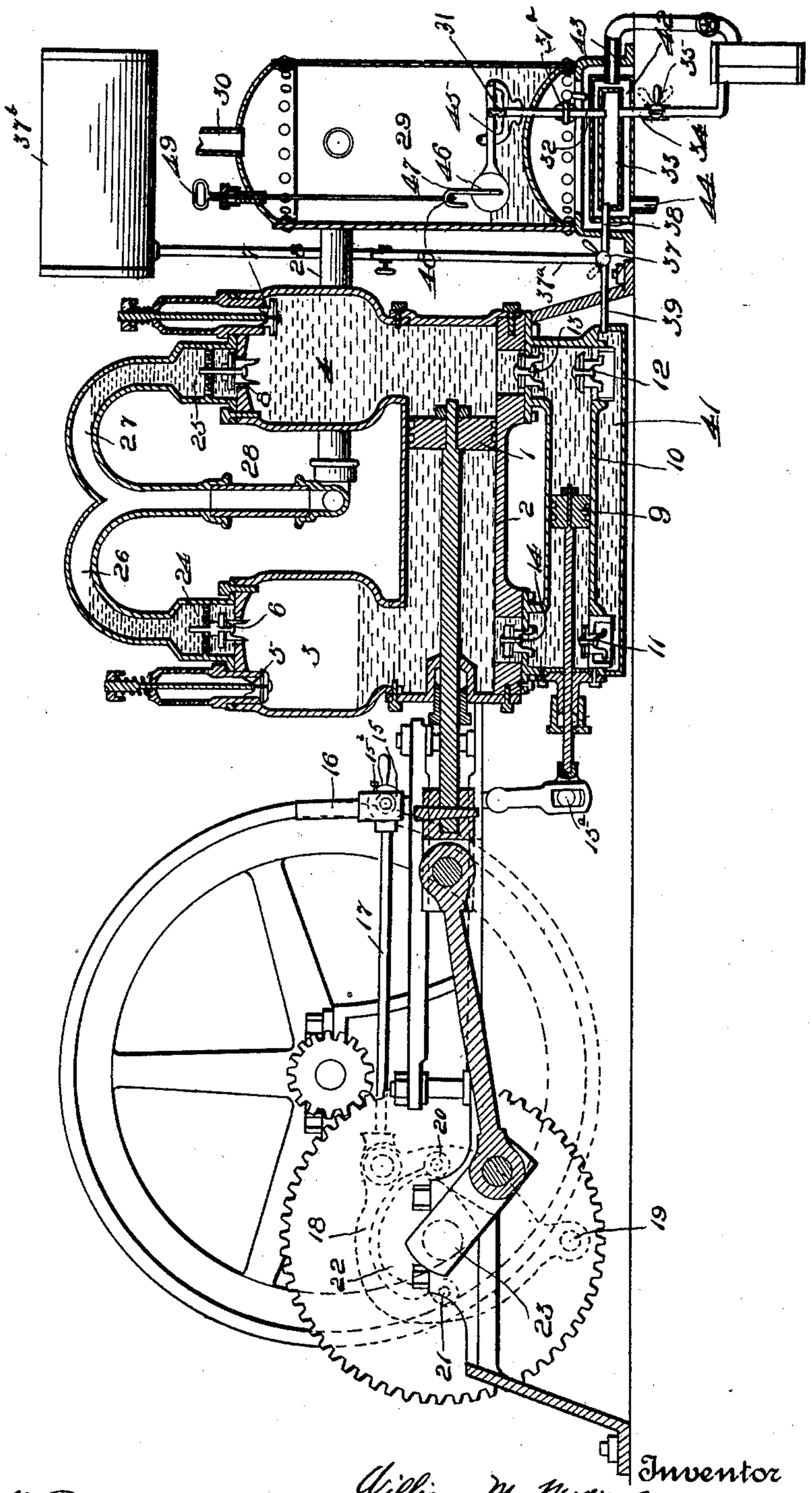


Fig. 1.

Witnesses
Bernard M. Offutt.
M. W. Johnson

Inventor
William M. Myers,
by David T. Moore
Attorney

No. 719,127. PATENTED JAN. 27, 1903.

W. M. MYERS.

AIR COMPRESSOR.

APPLICATION FILED DEC. 14, 1901.

NO MODEL. 3 SHEETS—SHEET 2.

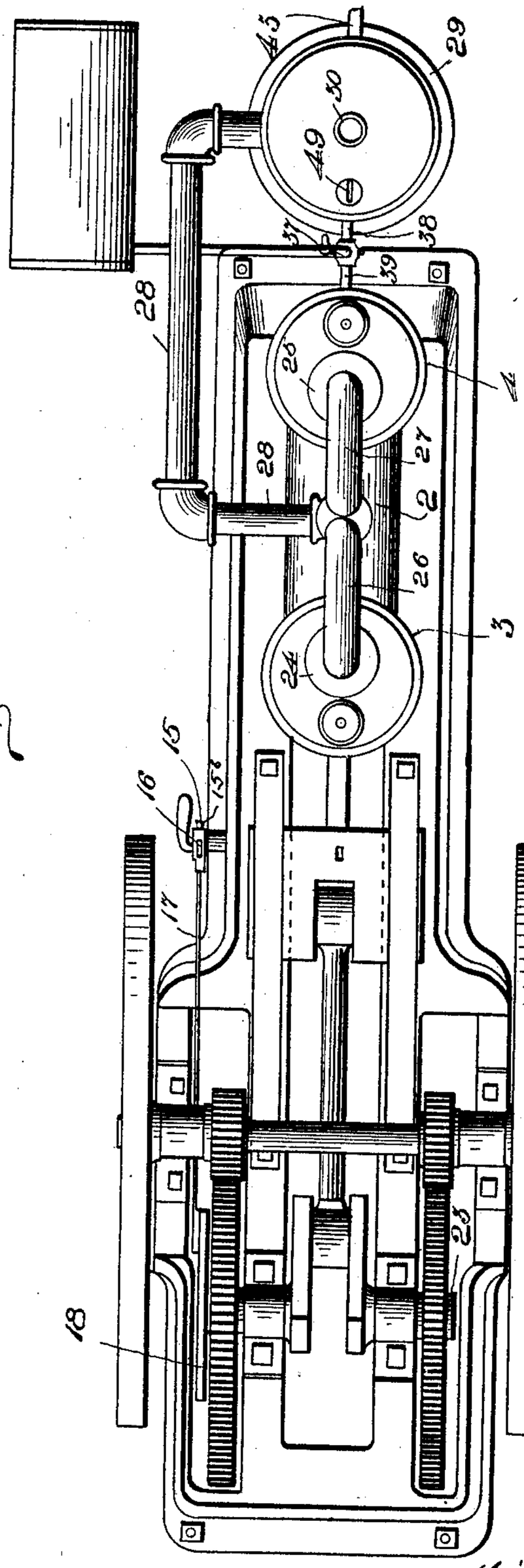


Fig. 2.

Witnesses
Bernard M. Offutt.
M. W. Johnson.

Inventor
William M. Myers
by David T. Moore, Attorney

No. 719,127. PATENTED JAN. 27, 1903.

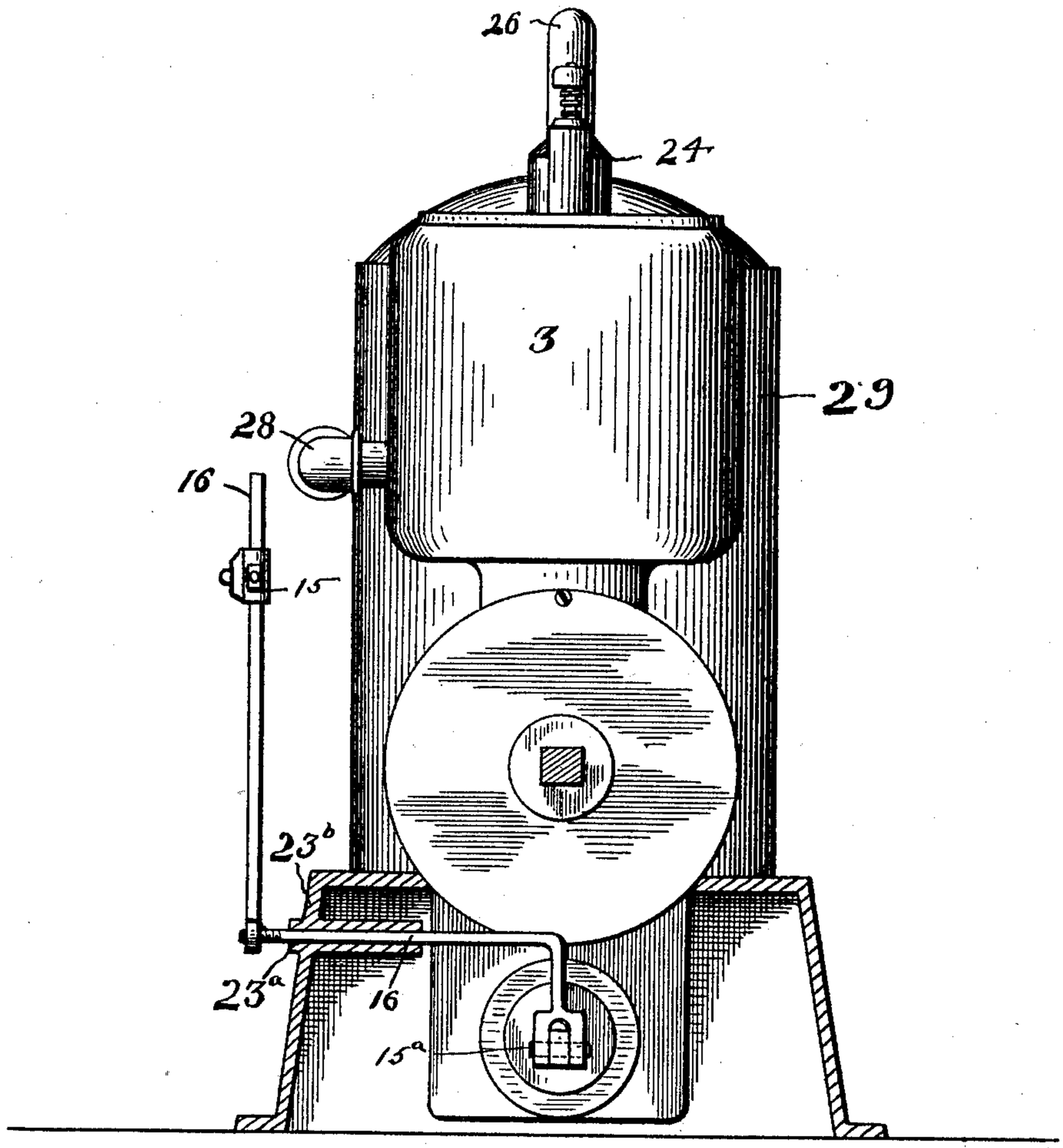
W. M. MYERS.

AIR COMPRESSOR.

APPLICATION FILED DEC. 14, 1901.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.



Witnesses

Bernard M. Offutt.

W. S. Crowley

Inventor

William M. Myers.

by David T. Moore

Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM M. MYERS, OF ST. JOSEPH, MISSOURI.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 719,127, dated January 27, 1903.

Application filed December 14, 1901. Serial No. 85,953. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. MYERS, a citizen of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

This invention relates to improvements in air-compressors, and has special reference to that class of compressors which employ a pumping mechanism.

The main object of my invention is the provision of an air-compressor which will not be heated by compressing air, thereby causing the working parts to be entirely free from heat and more durable, whose heat is absorbed entirely, thereby avoiding the compressing of heated, and consequently rarefied, air, thus adding largely to the efficiency, and whose parts are so arranged that every particle of air within its compression-chambers will be ejected at each and every stroke, thus providing a simple means by which air can be compressed to any desired pressure.

To attain the desired objects, the invention consists of an air-compressor embodying novel features of construction and combination of parts, substantially as disclosed herein.

In the drawings, Figure 1 is a longitudinal section cut vertically through the center of my compressor, and Fig. 2 is a top plan view thereof. Fig. 3 is an elevation of the compressor, taken centrally thereof looking toward the compression-chambers.

Referring by numerals to the drawings, my invention consists of a reciprocating piston 1, driven within the cylinder 2 by any suitable means. Compression-chambers 3 and 4 communicate with cylinder 2 and are provided with suitable inlet and outlet check-valves 5 and 6 and 7 and 8, respectively. The liquid-supply pump 8^a consists of a cam-actuated reciprocating piston 9, traveling within the cylinder 10, which is provided with inlet check-valves 11 and 12 and with outlet check-valves 13 and 14, opening into cylinder 2. The length of stroke of piston 9 is regulated by the pivotal connection 15^a, adjustably connecting the lower end of the rocker-arm 16, an adjustable sliding connecting-block 15 having the set-screw 15^b to regulate the adjustment with the cam-rod 17, driven by its pivotally-attached eccentric-strap 18, oscillating on pivot 19, carrying friction-rollers 20 and 21, the whole being actuated by cam 22 on and rotating with shaft 23, said rocker-arm 16 being journaled in the bearing 23^a, carried by a portion of the frame 23^b.

The outlet check-valves 6 and 8 open into the chambers 24 and 25, respectively, which in turn communicate through pipes 26 and 27 with the discharge-pipe 28, opening into the receiving-tank 29, which is provided with an air-discharge pipe 30 and with a float-operated liquid-outlet valve 31 to automatically open and close the liquid-outlet 32, which opens into the cooler 33, provided with a discharge-pipe 34, having a cock 35, a head-cock 31^a limiting the flow through pipe or inlet 32. The cooler is provided with a pipe 38, having a three-way cock 37 controlling passage from pipe 38 and pipe 39 into the chamber 41, which communicates with inlet check-valves 11 and 12. The cooler 33 is in the cooling-chamber 42, which is provided with the inlet 43 and the outlet 44.

To the inlet 43 of the cooler is connected a cold-water supply 44^a, so that a continual supply of cold water can circulate around the cooler 33, and thus insure the cooling of the water therein as it passes from the tank 29 to the chamber 41.

The float-operated valve 31 is pivotally attached to a hinged arm 45, to the free end of which is secured a float 46, provided with a tube 47, extending into the float and terminating at a point near the lower side of the float and having its outer end curved downward at 48. By manually pulling upon the handle 49 of the hand-rod the float is raised when desired in case the valve 31 should become sticky and be in such a condition as to render it impossible for the float to operate it.

In the operation of my invention the reciprocating piston is followed in its travel toward the left by liquid until said piston reaches the end of its travel, it being obvious that as liquid becomes thus lowered in the chamber 4 the outside atmosphere or air of its own pressure will force downward and open check-valve 7 and that when the piston is at the end of its travel the chamber 4 will be filled with air. At this juncture the cam 22 is so adjusted on the shaft 23 as to actuate

the piston 9, causing it to travel toward the right and expel a proper amount of liquid from the cylinder 10 through its valve 13 into the cylinder 2 and to cease operation before much compression of air takes place. This proper amount of liquid is adjusted by lengthening or shortening the stroke of piston 9 by adjusting the pivot 15 on the rocker-arm 16. Since the liquid most generally used for absorbing heat of compression is water and since the service of such water-supply is always of lower temperature than the surrounding atmosphere and also that with my supply-pump a sufficient quantity of said water will be supplied to absorb all the heat generated in chamber 4, I have provided a means to allow the proper amount of water to be supplied, and have thus provided against the waste of energy which would arise from supplying more than the required quantity of water. By this means the chamber 4 has all of its heat absorbed by the water, this having been actually demonstrated by moisture of atmosphere surrounding chamber 4 being visibly condensed and deposited upon the outer surface of said chamber. It is further obvious that as piston 1 travels toward the right check-valves 7 and 13 will automatically close by the internal pressure of the liquid and air, and the check-valve 8 will be forced upward and open, allowing free discharge of air through said valve and its proper pipe connections into the tank, and it is also obvious that an equal amount of liquid to that injected into the chamber 4 by piston 9 will follow the last particle of air through valve 8, hydraulically ejecting the air from chamber 4, after which valve 8 will automatically close, piston 1 having started toward the left. The chamber 24 and pipe 26 will (after closing the valve 8) retain the amount of liquid injected during one entire movement of piston 1 and will in that time absorb all heat in the valve 8 and the chamber and its pipe 26 imparted by the compressed air passing therethrough. Upon a repetition of the above-described operation the liquid in chamber 24 and pipe 26 will be driven into tank 29 and there remain until released by the float-valve and discharged through the pipe and cock. Cylinder 10 is supplied with liquid from any suitable source through its pipe, the three-way cock 32, pipe 40, and chamber 41. The operation is identical in chamber 3 and its relative parts, it being, however, upon the reverse movement of the piston 1. By interposing a liquid between said piston and air the supply of said liquid is so maintained as to provide a sufficient amount at each piston-stroke to expel every particle of air from the compression-chambers and to discharge such quantity of liquid as is required to absorb all the heat caused by compression of said air. Since the piston 1 is always submerged in liquid, the leakage of air past the piston as found in the usual style of compressors in use is completely obviated, and since my compressor will frequently be used for obtaining high pressures of air in the tank it is necessary that a float must be constructed to operate in a high pressure to avoid extraordinary weight, the form shown and described being the most desirable. This float is provided with an opening through the pipe-crook 48 and pipe 47 into the interior of said float, thus equalizing at all times the internal pressure with the external pressure. Should any water accumulate in the float, it will be expelled through the pipe 47 and its crook 48 whenever the air-pressure in the tank is reduced below that in the float. The water which may accumulate in float 46 will never be expelled therefrom by a standing or an increasing pressure of air in tank 29; but the standing or increasing pressure will equalize the pressure in float 46 by reason of its communication through crooked pipe 47. Since tank 29 is simply a storage-tank to supply compressed air for use, it is obvious that the use of the air will cause the pressure to fluctuate, and since the water accumulated in float 46 will by reason of its gravity lie in the lower part of the float 46 and in and surrounding the lower and inner extremity of the crooked pipe 47 it is evident that whenever the fluctuating pressure of the air in tank 29 falls below the pressure of air in the float the excessive pressure of air in the float will pass downward upon the surface of the water in said float and expel said water therefrom through the pipe 47. The cooler 33 is so arranged that either oil or water may be used in the compressor. By turning the cock 37 so as to assume the position shown in dotted lines, Fig. 1, oil is allowed to flow through pipe 37^a from the tank 37^b, and as the pipe 34 is cut off by the cock 35 the surplus oil passing into the tank 29 is allowed to flow into the cooler 33 and thence through the pipe 38 to the chamber 41, the oil from pipe 37^a also passing through pipe 39 into chamber 41. When water is used, if it is not desired to use it in the compressor the cock 37 is closed and 35 is opened.

While I have shown and described my invention in the foregoing and at present as being the preferred form and manner of operation, I do not desire to limit myself to the structural details illustrated, but reserve the right to change, modify, or vary such details as I may from time to time find necessary or convenient without departing from the spirit of my invention.

What I claim as new is—

1. In an air-compressor, the combination with two vertically-arranged compression-chambers in which liquid is adapted to be reciprocated, a horizontal chamber in communication with said chambers, a horizontal reciprocating piston in said chamber, a smaller horizontal chamber below the said chamber and in communication therewith to supply liquid to the compression-chamber, a piston mounted so as to reciprocate in said

smaller horizontal chamber to force the liquid into the pump-chamber, an adjustable reciprocating lever connected with said last-mentioned piston, a rod operated by an eccentric adjustably connected with said lever so as to limit the throw of the piston, and a motive power for operating the lever and the horizontal reciprocating piston, of a tank to receive the compressed air and means to cool the liquid before it is supplied to the small horizontal chamber.

2. In an air-compressor, the combination of a series of compression-chambers, means to supply liquid thereto, of a tank to receive the compressed air and overflow of liquid, and a water-supply for supplying water to the compression-chambers, an oil-supply in communication with the compression-chambers, and means for connecting the water-supply or the oil-supply with the compression-chambers, substantially as set forth.

3. In an air-compressor, the combination of a series of compression-chambers, a horizontal liquid-chamber in communication with said chambers, means for supplying the liquid thereto as it is needed, and a source of water-supply and an oil-supply for the compression-chambers, and means for admitting either oil or water to the compression-chambers, substantially as set forth.

4. In an air-compressor, the combination of a series of compression-chambers, a horizontal chamber in communication with said chambers, means for supplying a liquid thereto as it is needed, and a source of water-supply and an oil-supply for the compression-chambers, and means for admitting either oil or water to the compression-chambers, of means for cooling the liquid located intermediate of the horizontal chamber and the source of supply as the liquid flows therefrom, comprising a surrounding casing having an inlet and outlet for the cooling liquid and an interior casing adapted to receive the liquid from the source of supply and also the overflow from the compression-chambers and allow the liquid to flow to the compression-chambers.

5. In an air-compressor, the combination of a series of compression-chambers, a horizontal chamber in communication with said chambers, means for supplying the liquid thereto as it is needed, and a source of water-supply and an oil-supply for the compression-chambers, and means for admitting either oil or water to the compression-chambers, of a tank to receive the compressed air and overflow liquid, comprising a casing having an inlet for the air and overflow liquid and the outlet for the air and the outlet for liquid, and a float-controlled device mounted within the casing to limit the amount of liquid in the casing and allow it to flow through the liquid-outlet.

6. In an air-compressor, the combination with a compressing mechanism in which the liquid is adapted to be reciprocated and supplied thereto, of a water-supply and an oil-supply, a short pipe leading to the compressor, and pipes leading from the water-supply and oil-supply in communication with the short pipe, and means for connecting the oil-supply or water-supply with said short pipe.

7. In an air-compressor, the combination of two vertically-arranged compression-chambers, a substantially T-shaped pipe in communication with the upper ends of said compression-chambers, valve-controlled inlets in the upper ends of said compression-chambers for admitting air to the chambers, and valve-controlled outlets interposed between the T-shaped pipe and the compression-chambers for checking the flow of fluid backward into the chambers, a reciprocating pump mounted below said chambers and adapted to be reciprocated to reciprocate a liquid alternately in said compression-chambers, a chamber located below the pump-chamber and communicating therewith through the valve-inlets, a reciprocating piston mounted in said chamber adapted to feed the liquid through said valved inlets to the chamber, a supply of liquid in communication with said chamber in which the piston is mounted, a rock-shaft having its lower end connected with said piston, a motive power, a rod connected to the upper end of the rock-shaft and the motive power to operate the shaft and reciprocate the piston, and a crank-arm connected to the pump.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM M. MYERS.

Witnesses:
ROBERT E. LEE WHITE,
GEORGE W. HINTON.