(No Model.)

L. W. SWEM.

HYDRAULIC AIR PUMP.

No. 556,220. Patented Mar. 10, 1896.

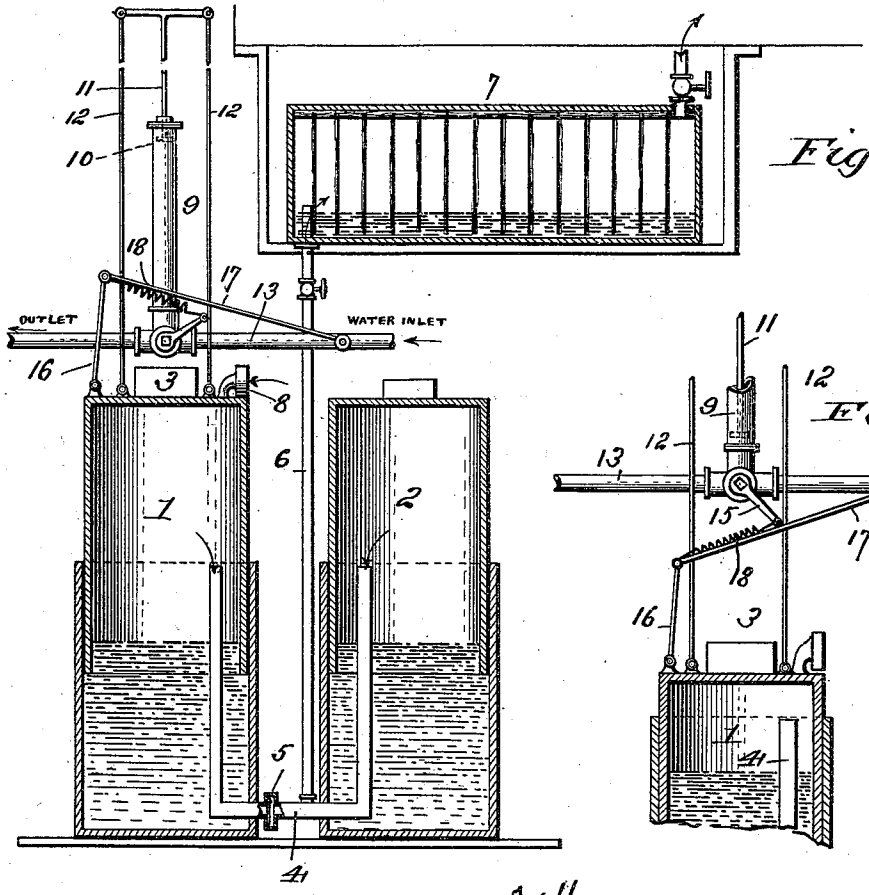

Fig. 1.

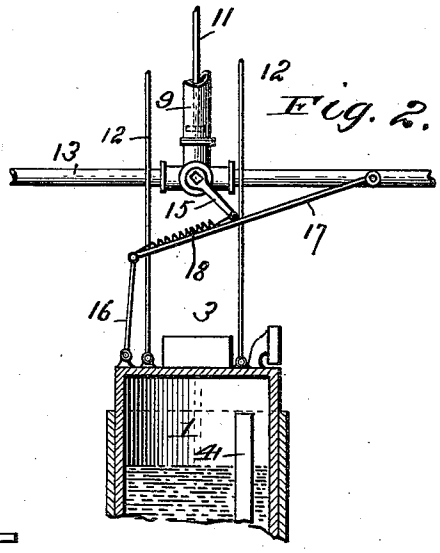

Fig. 2.

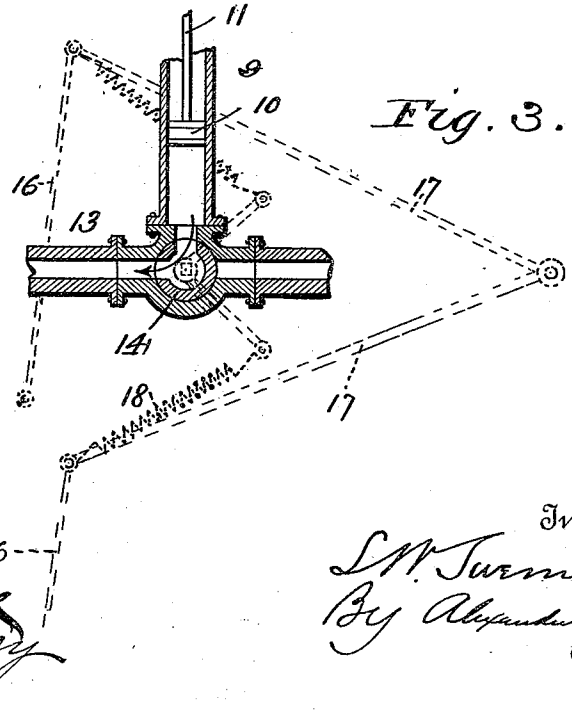

Fig. 3.

Witnesses
G. M. Lamesure
Chas. W. Murphy

Inventor
L. W. Swem
By Alexander & Davis
Attorneys

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

UNITED STATES PATENT OFFICE.

LAWRENCE W. SWEM, OF WEST LIBERTY, IOWA.

HYDRAULIC AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 556,220, dated March 10, 1896.

Application filed September 16, 1895. Serial No. 562,696. (No model.)

To all whom it may concern:

Be it known that I, LAWRENCE W. SWEM, a citizen of the United States, residing at West Liberty, in the county of Muscatine and State of Iowa, have invented certain new and useful Improvements in Gas-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

In the drawings, Figure 1 represents a vertical section showing the form of apparatus I prefer in carrying out my invention; Fig. 2, a detail view showing the hydraulic valve in a different position, and Fig. 3 a detail section showing particularly the construction and arrangement of the hydraulic valve.

This invention relates to that class of apparatus in which the gas is produced by forcing atmospheric air through a carburetor, and the present improvements relate particularly to the mechanism employed for continuously forcing the air through the carburetor as fast as it is drawn off at the burners, as more fully hereinafter set forth.

In the drawings, the numerals 1 and 2 designate, respectively, the main and supplemental air-accumulators of my air-pump, each of which consists of two telescoping cylinders, the lower one being nearly filled with water and the upper one having its lower open end closely fitting within the lower cylinder and immersed in the liquid. Each of the accumulators is provided on its top with a weight 3 to assist in depressing the upper section, the weight on the main accumulator being heavier than the weight on the other accumulator. Connecting the two accummulators near their lower ends is a pipe 4, whose respective ends extend up into the respective accumulators above the water-line, and at a point between the two accumulators said pipe is provided with a check-valve 5 which is adapted to open toward the supplemental accumulator. Connected to the pipe 4 between the valve and the supplemental accumulator is a pipe 6, which leads to the carburetor. Carried by the upper section of the main accumulator is an inwardly-opening valve 8, which is adapted to admit air when the upper section is raised.

Mounted above the main accumulator is a cylinder 9, in which works vertically a piston 10, said piston being connected to the upper section of the main accumulator by the piston-rod 11 and the vertical rods 12. Connected to the lower end of the cylinder is a water-pipe 13, which is adapted to be connected at one end to the water-service pipes and at the other end to the waste-pipes. Inserted in the pipe at its junction with the cylinder is an ordinary two-way valve 14, by which the lower end of the cylinder may be thrown into communication with either the water-supply or the waste-outlet, and which has secured to its stem at one side a radial arm 15, by which the valve is shifted, the valve being opened when the arm is swung down and closed when it is swung up. Pivotally connected to the top of the main accumulator is a rod or link 16, and pivotally connected to the upper end of this link is another rod or link 17, whose free end is pivoted to a stationary part on the opposite side of the valve 14, these two links thereby forming a sort of toggle. This toggle is connected at its pivotal joint to the free end of the valve-arm 15 by means of a retracting coil-spring 18.

In operation it will be observed that when the upper section of the main accumulator is lowered the valve 14 will be opened and the pressure from the water-main (or any other source of fluid pressure employed) will force the piston up and thereby raise the upper cylinder of the accumulator, air being drawn in through valve 8 as the section rises. When the piston reaches the predetermined desired height, the toggle and retracting spring will have been raised sufficiently high to carry the line of retraction above the dead-center of rotation of the valve, and the arm 15 will be quickly drawn up to close the water-inlet and put the cylinder in communication with the outlet, whereby the piston will be free to fall again as fast as the air is forced out of the accumulator. When the upper section of the main accumulator falls by the expulsion of the air therein to a point where the line of retraction of the spring passes over the dead-center, the arm of the valve will be quickly thrown down to the position shown in Fig. 2 and thereby again put the cylinder in communication with the source of pressure and the operation of raising the upper cylinder be repeated.

It will be observed that the function of the supplemental accumulator is to maintain the

pressure in the gas-supply pipe while the upper section of the main accumulator is being elevated for a new supply of air, the upper section of the supplemental accumulator being held up during the discharging of the main accumulator by reason of the heavier weight carried by the latter.

It will be observed that this simple apparatus keeps up a constant and practically uniform pressure in the service-pipes and that its action will be entirely automatic so long as the pressure in the water-main continues. An essential feature is in the peculiar mechanism for quickly shifting the hydraulic valve at the extremities of movement of the movable section of the main accumulator.

Having thus fully described my invention, what I claim is—

In a carbureting apparatus, the combination of a carburetor, an air-pump connected thereto, said pump consisting of the main and supplemental accumulators arranged as described, a valved pipe connecting said accumulators, a vertical water-cylinder and a supply-pipe connected to its lower end, a valve in the supply-pipe at its connection with the water-cylinder and connecting therewith, a piston in the water-cylinder, a piston-rod connected therewith and connected to the main accumulator of the pump, an arm on the stem of the valve in the water-supply pipe, a movable part on the main accumulator of the air-pump, a coiled spring connected to said movable part and to the arm on the valve, and a pivoted arm connected at one of its ends to the outer end of the movable part carried by the cylinder, its other end being pivoted on a rigid part, substantially as described and for the purpose set forth.

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

LAWRENCE W. SWEM.

Witnesses:
J. W. McELVARY,
HOWELL HISE.