No. 637,417. Patented Nov. 21, 1899.

V. J. A. REY.

PUMP FOR GAS GENERATING MACHINES.

(Application filed Aug. 16, 1898.)

(No Model.) 3 Sheets—Sheet 1.

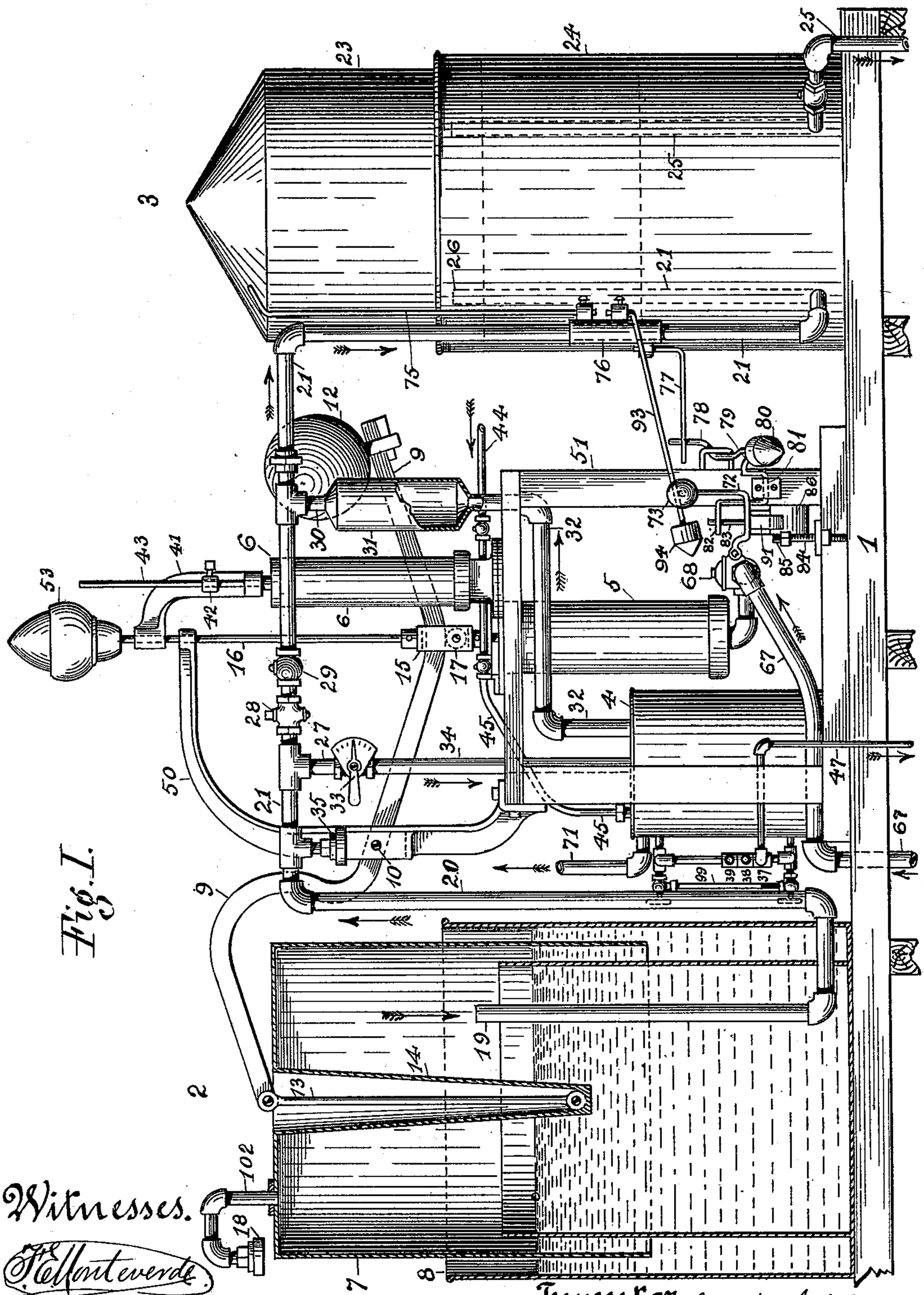

Fig. 1.

Witnesses.
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H. Sanderson.

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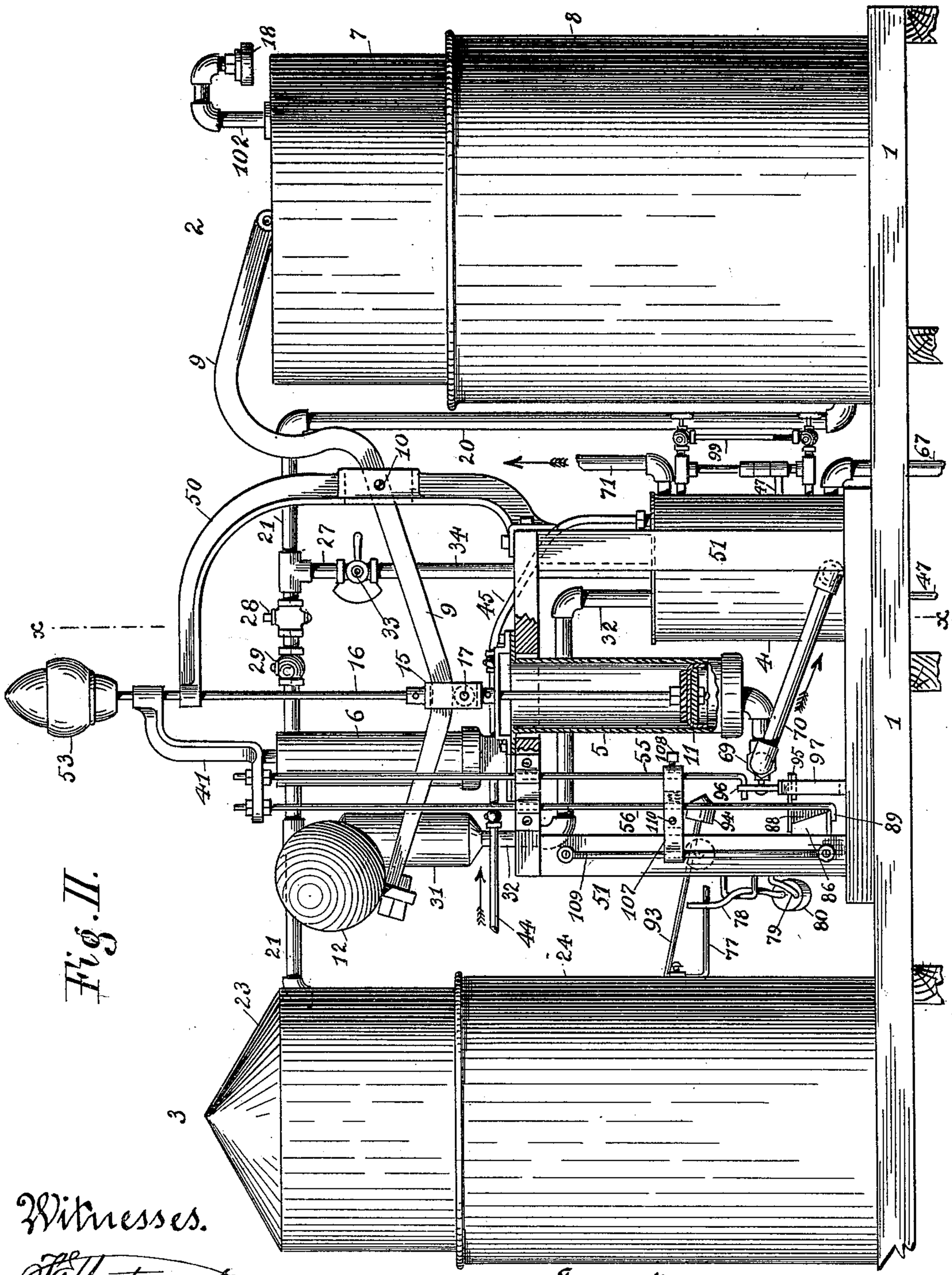

Fig. II.

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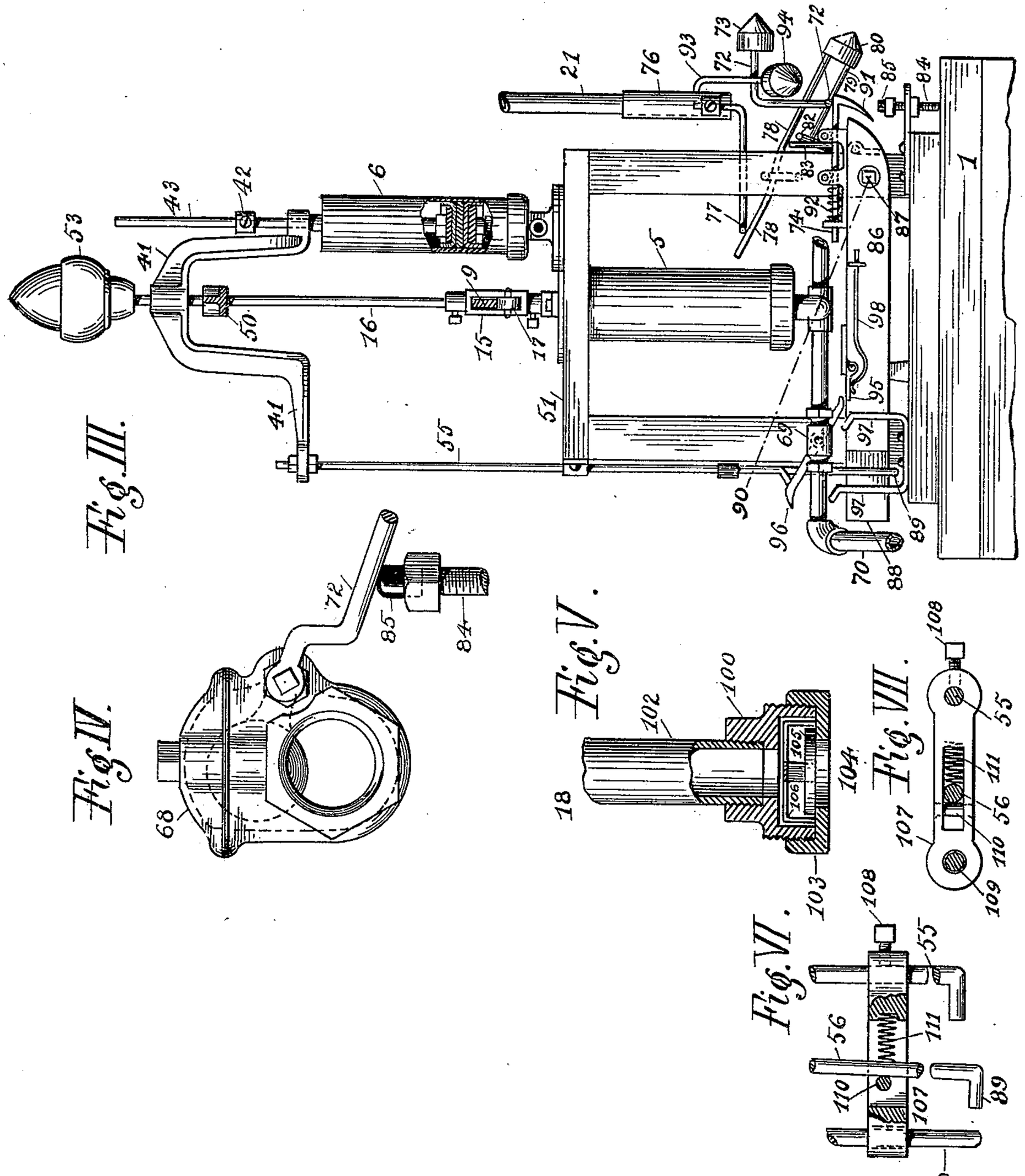

Fig. III.

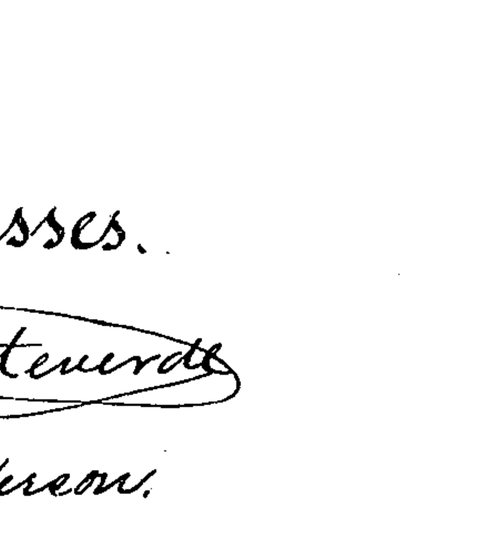

Fig. IV.

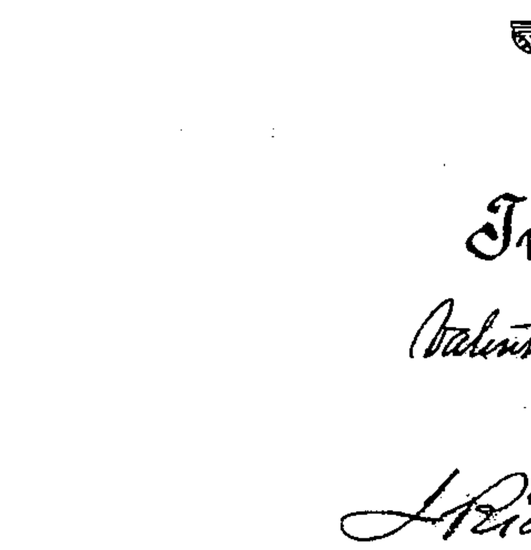

Fig. V.

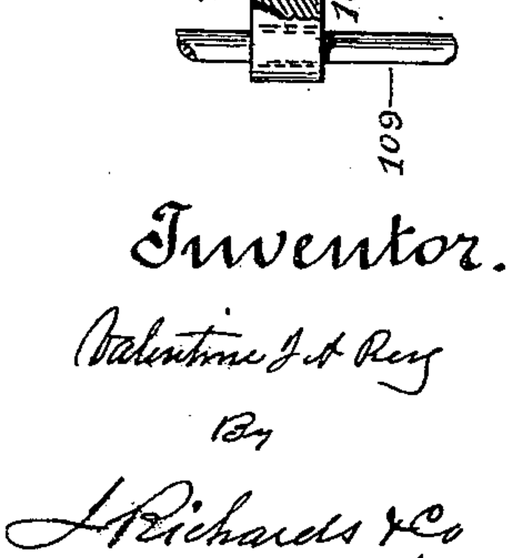

Fig. VI.

Fig. VII.

Fig. VIII.

Witnesses.

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UNITED STATES PATENT OFFICE.

VALENTINE J. A. REY, OF SAN FRANCISCO, CALIFORNIA.

PUMP FOR GAS-GENERATING MACHINES.

SPECIFICATION forming part of Letters Patent No. 637,417, dated November 21, 1899.

Application filed August 16, 1898. Serial No. 688,694. (No model.)

To all whom it may concern:

Be it known that I, VALENTINE J. A. REY, a citizen of the United States, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Fluid-Forcing Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a fluid-forcing apparatus in conjunction with a water-motor for actuating the same, an expanding fluid-reservoir for containing the aeriform fluid operated upon, and various details of mechanism for rendering the apparatus automatic and intermittent in its action as the circumstances under which it is operated may demand.

The improvements consist in devices to regulate and control the fluid-actuating mechanism and to improve and perfect the operation of the automatic apparatus, as hereinafter more fully explained in connection with the drawings forming a part of this specification.

Referring to the drawings, Figure I shows a front elevation of a carbureting-machine, partially in section, constructed according to my invention. Fig. II is another elevation of the same machine obverse to Fig. I. Fig. III is a sectional view taken on the line $x\,x$ in Fig. II, looking to the left. Fig. IV is a side elevation of the induction-valve for the hydraulic actuating-cylinder. Fig. V is a section of the inlet-valve through which the supply of air is drawn. Fig. VI is a view, partially in section, of a guide and support for one of the tripping-rods of the machine; and Fig. VII is a plan view of Fig. VI.

Similar numerals of reference are applied to corresponding parts in the different figures of the drawings.

In fluid-forcing apparatus when employed in connection with apparatus for aerifying the vapor from volatile liquids of the hydrocarbon class the most essential coöperative elements are a motive power to operate the air-compressor, an expanding and contracting vessel for holding the aeriform fluid, and a vessel in which the air is commingled with the vapor from the volatile liquid, which necessary coöperative elements I have shown in the accompanying drawings.

In the present apparatus to which my invention pertains the motive power is obtained from water-pressure acting intermittently on a piston, as will be hereinafter explained.

The principal parts of my improved apparatus are a main frame or platform 1, on which the whole apparatus is mounted, an air-compressor 2, gas-holding vessel 3, a carbureting vessel 4, an actuating hydraulic cylinder 5, and a pump 6 for gasolene or other hydrocarbon oils.

The air-compressing devices consist of an inverted open-mouthed vessel 7, arranged to move upward and downward in a tank 8, being water-sealed therein, as seen in Fig. I. The vessel 7 is raised and depressed by means of a bent lever 9, fulcrumed at 10, raised at its outer end by the piston 11 and depressed by a weight 12 on the lever 9 when the piston 11 is relieved of pressure. The lever 9 is connected to the vessel 7 by a link 13, attached at the bottom of a conical sleeve 14, which permits lateral vibration of the link 13 to accommodate the arc described by the end of the lever 9. This lever passes loosely through a yoke 15 in the piston-rod 16 and bears upon a roller 17 to prevent sliding movement. When the vessel 7 makes an upward stroke, air is drawn in through an automatic check-valve 18, (shown enlarged in Fig. VI,) also may in part enter through a check-valve 35 in the pipe 21, filling the vessel 7 at atmospheric pressure. When this vessel 7 descends, the contained air is expelled through the pipes 19, 20, and 21, from where it may pass down through the carbureting-chamber 4 to the gas-holder 3 or may flow to the latter direct, as will be hereinafter explained. The gas-holding chamber 23 being of the usual inverted type, sealed by water in the tank 24 and provided with the usual service-pipe 25, (shown in dotted lines in Fig. I,) does not require further description.

Referring still further to the air or gas, the pipe 21 continues to the gas-holder 3, discharging at 26 above the water-level in the tank 24, and is provided with an air-inlet valve 35, a

branch pipe 27, a stop-cock 28, a check-valve 29, and a second branch pipe 30, the latter connecting to a moisture-trapping vessel 31, and from there by the pipe 32 to the carbureting-chamber 4, constituting, with pipe 34, a shunt or circuit from the main pipe 21 through the carbureter. The check-valve 29 is to prevent gas from flowing back from the gas-holder 3 to the compressor 2. By opening the cock 33 and closing the one 28 all the air expelled by the compressor 2 is sent through the chamber 4, and after being carbureted there passes as gas through the pipe 32 into the pipe 21 and on to the gas-holder 3, as before explained. If, on the contrary, the cock 33 is closed and the one 28 is opened, air will pass from the compressor 2 through the pipe 21 to the gas-holder 3 without being carbureted. By partially closing the cock 28, which for convenience can be provided with an indicating-scale the same as the one 33, so as to offer some resistance to the flow of air in the pipe 21, then any desired portion of the air can be sent down the pipe 34 to the carbureting-chamber 4. Regulation is performed by the cocks 28 and 33, these being set relatively so as to divide the air, one or both having an index, as at 33, to indicate the adjustment and division of the air.

Reverting now to the operating elements or parts, the present apparatus is adapted for the use of water-pressure derivable from a public supply or other source of water under pressure, such pressure acting under the piston 11 and raising the piston-rod 16 with its connected parts. The upper end of the piston-rod 16 is supported by a bracket 50, attached to a frame 51, that is set on the main or base frame 1. On the top of the piston-rod 16 is a weight 53, that assists in depressing the piston 11 and the lever 9, and below this weight is a cross-bracket 41, that operates the hydrocarbon-pump 6, and at the other end the rods 55 and 56, the purpose of which will be presently explained.

When water is used for power, it is supplied through the pipe 67, passes through a valve 68, enters the cylinder 5 at the bottom, and after acting on and raising the piston 11 is discharged by means of the valve 69 and the pipe 70 into the annulus or water-jacket around the carbureting vessel 4, and is from there finally discharged by a waste-pipe 71.

To control the induction-valve 68, which is by preference of the lever type, as shown in the enlarged view in Fig. IV, I employ a bent lever 72, provided with a weight 73, the valve being held shut by means of a sliding detent 74, that engages and holds the lever 72 when that is raised and the valve 68 is shut. The action of this valve 68 and of the piston 11 or the stroke of the air-compressor 2 is made contingent upon the supply in the gas-holder 3, so the valve 68 is operated from the vessel 23 by means of a rod 75, attached to the top of this vessel 23 and to a sliding sleeve 76 on the pipe 21, as seen in Fig. I. As this sleeve 76 descends with the vessel 23 the bent lever 77 attached thereto comes in contact with a second lever composed of two members 78 79, connected by the weight 80, and fulcrumed at 81, as seen in Fig. I, and beyond the fulcrum has a bent extension 82, that engages a pin 83 in the sliding detent 74, pushing it back and permitting the lever 72 to drop and open the valve 68, the lever 72 cushioning upon the adjustable stop-screw 84, provided with a rubber tip 85. This describes the method of opening the induction-valve 68 by descent of the vessel 23, but not fully, because the movement of the valve 68, which requires to be abrupt, may be retarded at starting by friction of the valve, and I provide an additional opening force by the combination of weight and a cumulative pressure in the following manner:

Attached to the sliding sleeve 76 on the pipe 21 is an elastic rod 93, having on its outer end a weight 94, and as the sleeve 76 descends this rod 93 comes in contact with the lever 72, as seen in Figs. I and III, the weight 94 first acting on the lever, and as movement goes on the bending of the rod 93 causes a cumulative downward force that can be adjusted to the requirements and will forcibly cause the valve 68 to start when it has been released by the devices before described, after which it will continue and be completely opened by reason of the weight 73, as has been explained, the lever 72 coming in contact with the stop 85, which governs the downward range of the lever 72. It will be understood that when the lever 72 falls and the valve 68 is opened the vessel 23 and the lever 93 will follow downward for some distance, but will complete their downward stroke and recede upward before the valve 68 has to be closed.

To close the valve 68 at the end of the upward stroke of the piston 11 requires that the motion be derived from the piston or its connected parts and is as follows: The detent-slide 74 is mounted on a movable bar 86, pivoted at 87 and arranged to be lifted at the end 88 by means of the rod 56, attached to the bracket 41, as seen in Fig. II. This rod 56 has at its bottom a hook 89, that when the rod rises with the piston-rod 16 and bracket 41 engages and raises the end 88 of the lever 86 up nearly to the top of the stroke or to the dotted lines 90, for example. Then the hook 89 slips off, disengaging the bar 87, permitting it to fall again to its horizontal position, as shown in Fig. III. When the pivoted bar is raised by the rod 56 in the manner just described, the curved extension 91 on the outer end of the detent-rod 74 comes in contact with the lever 72, that operates the valve 68, and by its curved form presses back the sliding detent-rod 74 until this curved end 91 passes the lever 72, when the spring 92 causes the rod 74 to slide forward and pass beneath the lever 72, so that when the bar 81 is disengaged by the hook 89

and falls the lever 72 is thereby again raised to the position shown in Figs. I and III, shutting the valve 68 and arresting the movement of the piston 11, the pump 6, air-compressor 2, and other parts connected to the piston-rod 16.

To reverse the movement of the piston 11 and permit it to descend, I employ an eduction or release valve 69, operated in the following manner: On the bar 86 is a hinged trip 95, that when this bar falls, as before described, catches the cross-arm 96 on the stem of the valve 69, turning and opening this valve simultaneously with the closing of the induction-valve 68. This permits the water in the cylinder 5 under the piston 11 to escape through the pipe 70 to the carbureting vessel 4, as before explained. Then the piston 11 and its connected parts descend by reason of the weights 12 and 53. As this valve 69 must be closed before the one 68 opens, or before another stroke begins, I provide for this purpose a rod 55, attached to the bracket 41, which on its descent and near the bottom of the stroke comes in contact with the cross-arm 96, turning that and closing the valve 69. 97 is a stop for the cross-arm 96 to regulate its stroke or range each way. When the bar 86 is raised by the rod 56 and the hinged trip 95 comes in contact with the cross-arm 96, the trip yields downward so it will pass the cross-arm 96 and will then be reset in its normal position by a spring 98, as seen in Fig. III, ready to engage and move the cross-arm 96 when the bar 86 is released by the hook 89 and falls.

To guide and support the rod 56 and insure its engagement of the lever 86, I provide a device (shown enlarged in Figs. VI and VII,) consisting of a slotted bar 107, that is attached at one end by a screw 108 to the rod 55 and slides at the other end on a guiding-rod 109, attached to the frame 51, as seen in Fig. II. The rod 56 passes loosely through the slot in this bar 107 and is held against a stop-pin 110 by a spring 111, as seen in Fig. VI. When the bent extension 89 of the rod 56 comes in contact with the beveled face 88 on the lever 86, the rod 56 moves laterally, compressing the spring 111 until the end 89 of the rod passes beneath the lever 86, when the spring will push the rod against the pin 110, insuring its engagement at the bottom.

The air-inlet valves 18 and 35, especially the former, which admits the main part of the air to the compressor 2, when of metal, are liable to cause difficulty by intermittent action or chattering that sets up vibration in the lever 9 and other parts in contact. To obviate this, I provide a valve of simple construction, as seen in the sectional view, Fig. V, where 100 is a shell screwed on the pipe 102 in a pendent position and provided with a removable cap 103, having at its bottom an inlet-way 104 for air, also forming a seat for the valve 105, which is a soft disk of rubber or other impermeable material of a flexible nature. The valve 105 is held in a central position by a cage 106, that is loosely set over the valve, so the latter is free to rise with the least external pressure but forms a complete check-valve in the opposite or outward direction. With a valve of this kind the vessel 7 will fill steadily with air when raised and the valve will not produce noise or cause vibration.

I am aware that gas-generating machines for like purposes and in many respects of analogous construction have been made and used. I do not claim as a whole the apparatus organized and illustrated in the drawings, nor do I confine myself to the precise arrangement shown. For example, the cylinder 5 can be placed above or beneath the air-compressing vessel 7 and act directly thereon, or the carbureting vessel 4 can be set beneath the vessel 24 to render the whole machine more compact; but

What I do claim, and desire to secure by Letters Patent, is—

1. In a fluid-forcing apparatus, the combination with an air-compressor of an expanding fluid-reservoir, a water-motor to operate the compressor, an inlet-valve to said motor, a movable sleeve carried on the movable part of said reservoir, a weighted lever 72 to operate said valve, a detent to hold said valve closed, trip mechanism between said detent and said movable sleeve, and a resilient weighted auxiliary rod 93 carried by said sleeve, operating to start the valve by cumulative pressure, substantially as specified.

2. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor, an inlet-valve to said motor, weighted lever 72, detent 74, sliding sleeve 76, bent lever 77 on said sleeve, fulcrumed members 78, 79, weight 80, resilient rod 93, and weight 94, substantially as specified.

3. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor, having piston 11, and piston-rod 16, an inlet-valve to said water-motor, weighted lever 72, pivoted bar 86, sliding spring-detent 74, hooked rod 56, bracket 41 on said piston-rod, moving with the latter, and carrying said hooked rod 56, substantially as specified.

4. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor, an inlet-valve thereto, an outlet-valve therefrom, cross-arms 96 to operate said outlet-valve, pivoted bar 86, hinged spring-trip 95, on said pivoted bar, hooked rod 55 for operating said outlet-valve by means of said cross-arms, piston-rod 16, and bracket-arm 41 on said piston-rod, carrying said hooked rod 55, substantially as specified.

5. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor, an inlet-valve

to said motor, rising-and-falling hooked rod 56, rising-and-falling hooked rod 55, beveled pivoted bar 86, guiding-rod 109, slotted bar 107, stop-pin 110, and spring 111, substantially as specified.

6. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor to operate the compressor, an inlet-valve to said motor, an outlet-valve, a sliding sleeve moving with the movable part of said reservoir, a vertical member 21 for the sleeve to slide on and means between said sleeve and said inlet-valve whereby the latter is opened by the contraction of the said fluid-reservoir, substantially as specified.

7. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor to operate the compressor, having a piston and piston-rod, an inlet-valve to said motor, with intervening mechanism whereby said valve is opened by the contraction of said reservoir, an outlet-valve to said motor, hooked rods 55, 56, moved by said piston-rod, intervening mechanism between hooked rod 55 and outlet-valve 69 whereby the latter is closed automatically by the water-motor, and intervening mechanism between hooked rod 56 and inlet-valve 68 whereby said valve is closed automatically by the movements of the motor, and the outlet-valve is opened, substantially as specified.

8. In a fluid-forcing apparatus, the combination of an air-compressor, an expanding fluid-reservoir, a water-motor to operate the compressor, a sleeve moving with the movable portion of the reservoir, a bent lever 77 carried by said sleeve, a resilient weighted rod 93 carried by said sleeve, an inlet-valve 68, valve-lever 72, fulcrumed lever 78, operated by said bent lever 77, and sliding detent 74, substantially as specified.

9. In a fluid-forcing apparatus, the combination of an air-compresser, a water-motor, having piston and piston-rod, bracket 41 on said piston-rod, vertical rods 55, 56, carried by and moving with said bracket, guide-rod 109, slotted bar 107, attached to and moving with rod 55, spring 111, and stop-pin 110 for engaging and supporting rod 56, substantially as specified.

10. In a fluid-forcing apparatus, an air-inlet valve 18, consisting of the pendent shell 100, removable cap 103, inlet-way and valve-seat 104, valve-disk 105, and loose cage-check 106, substantially as specified.

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