No. 672,507. Patented Apr. 23, 1901.

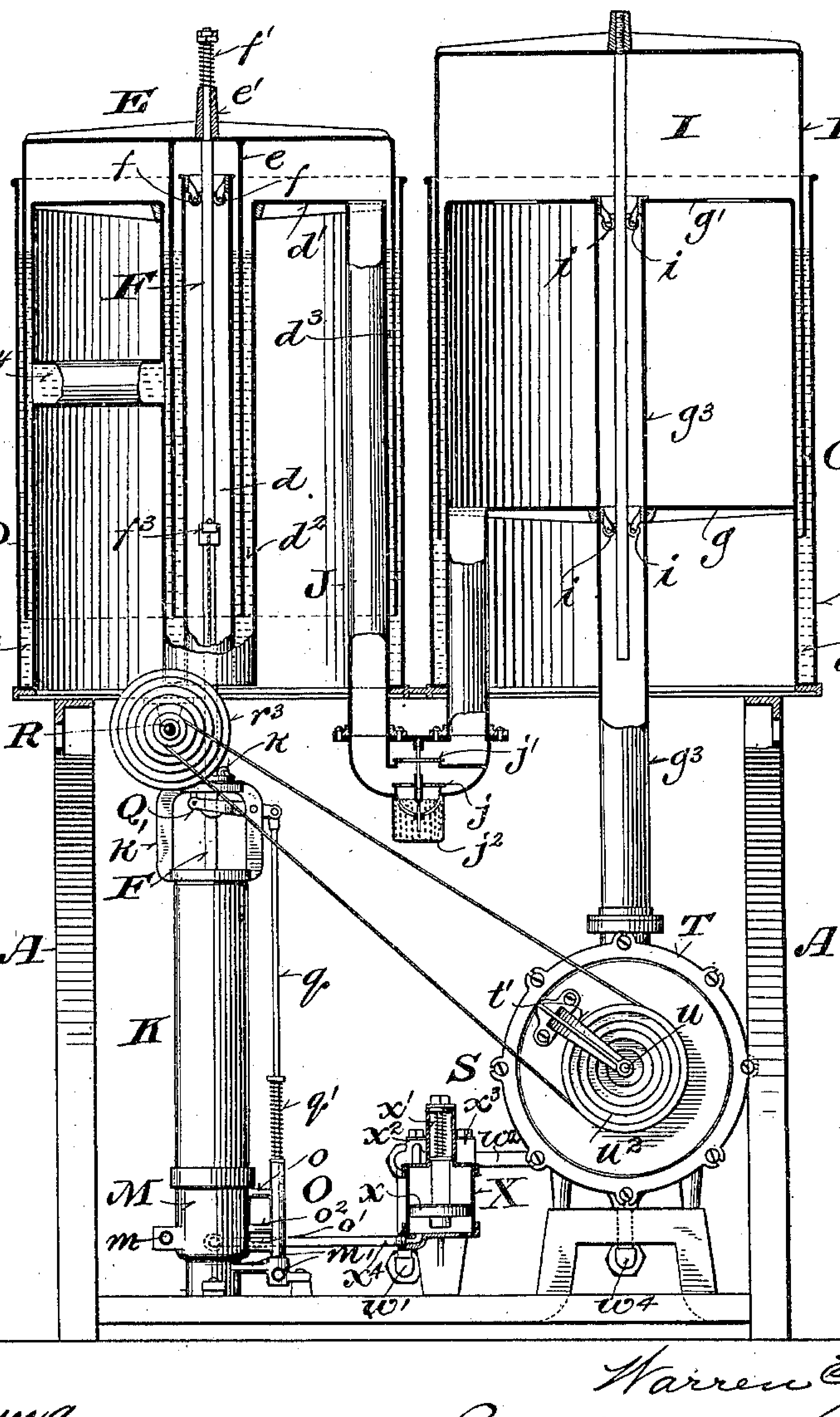
W. S. JOHNSON.

CARBURETER.

(Application filed Oct. 8, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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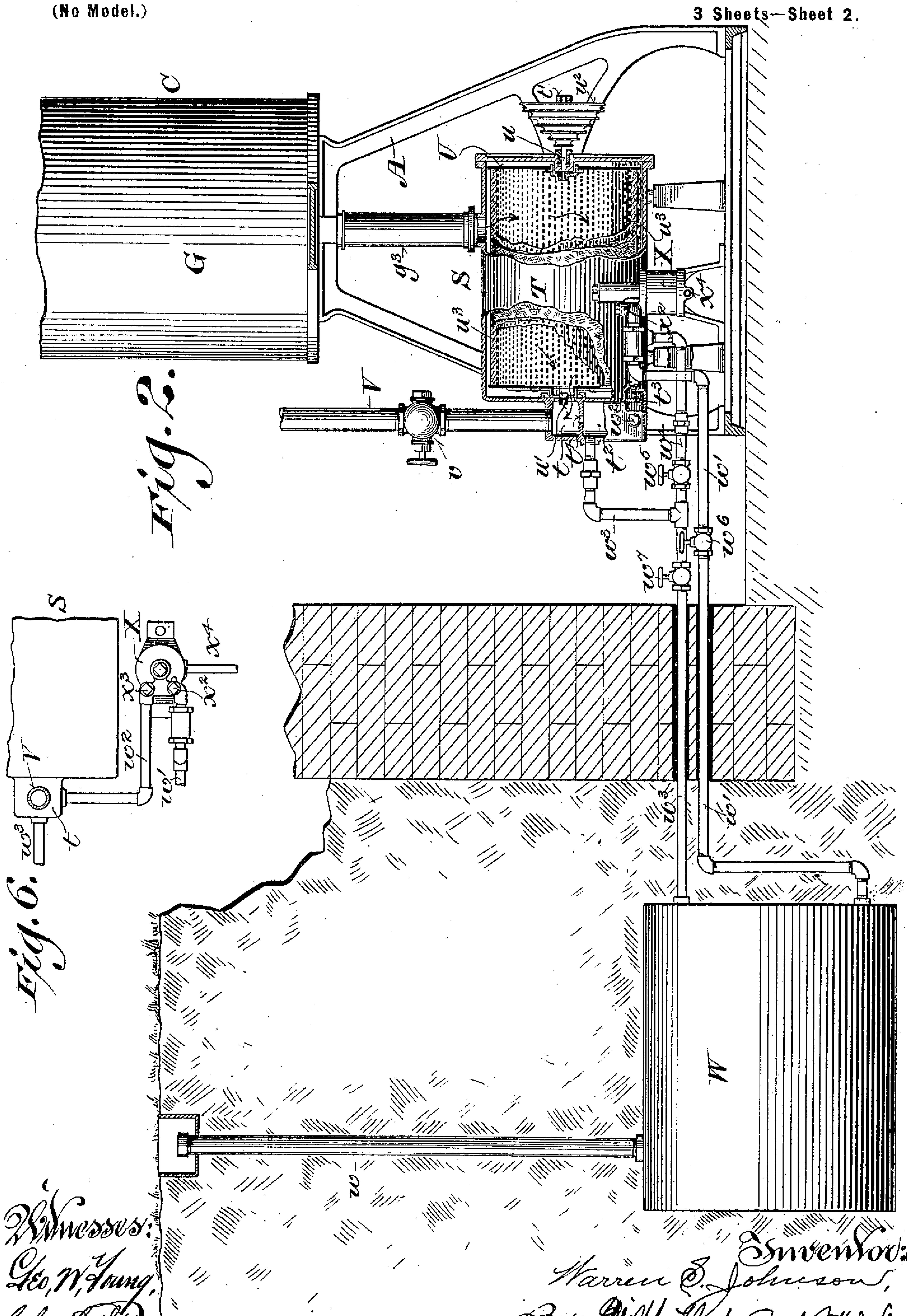
3 Sheets—Sheet 2.



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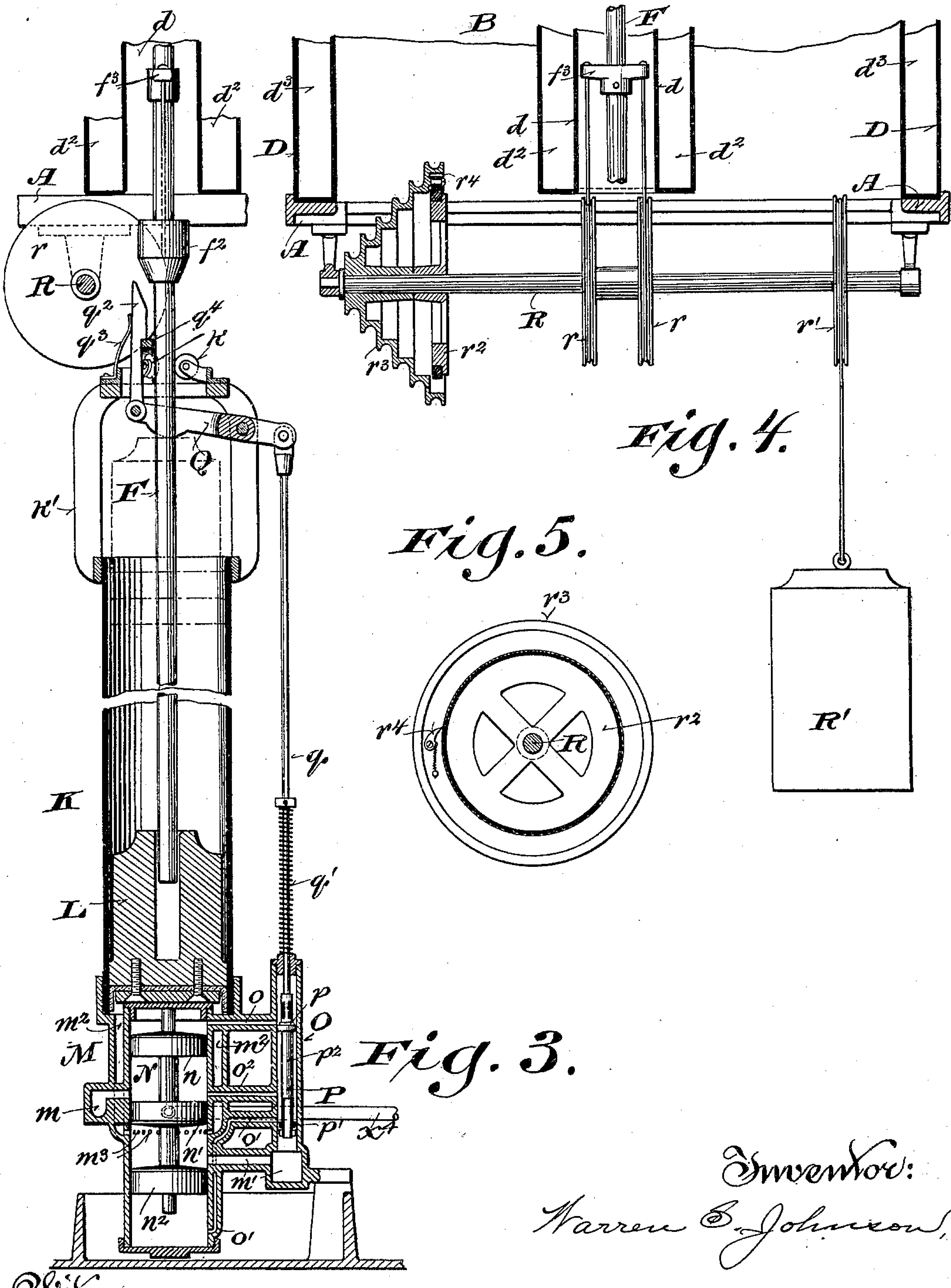

Fig. 3.

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

WARREN S. JOHNSON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO JOHNSON ELECTRIC SERVICE COMPANY, OF SAME PLACE.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 672,507, dated April 23, 1901.

Application filed October 8, 1898. Serial No. 693,002. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. JOHNSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Gas-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to that class of machines or apparatus in which gas for illuminating and other purposes is produced by mixing air with the vapor of gasolene or of a volatile hydrocarbon or by carbureting air. Its main object is to provide a machine of this class that will be simple, compact, and durable in construction and automatic, noiseless, economical, and reliable in operation, that will supply at a comparatively small cost gas of uniform quality and at a uniform pressure under all conditions, that will utilize all of the oil without leaving a residuum, and that will require no care or attention, except to supply oil at long intervals.

It consists of certain novel features of construction and combinations of parts hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is an elevation, partly in vertical medial section, of a gas-machine embodying my improvements. Fig. 2 is a partial elevation and vertical section of the machine as viewed from the left with reference to Fig. 1 and showing the carbureter partially in vertical medial section and the oil-reservoir and its connections in side elevation. Fig. 3 is a vertical axial section, on an enlarged scale, of the motor for operating the air-compressor. Fig. 4 is a medial vertical section, on an enlarged scale, of the lower part of the air-compressor, showing in side elevation the weighted pulley-shaft and its connections through the medium of which the carbureter is operated. Fig. 5 is a detail view of the pawl-and-ratchet connection between said shaft and the cone-pulley mounted thereon, and Fig. 6 is a plan view of the pump and its connections for supplying the carbureter with oil.

Referring particularly to Figs. 1 and 2, A designates a frame or floor-stand, which may be conveniently made of cast-iron, to support in an elevated position thereon the air-compressor B and the expansible air-reservoir C, hereinafter described. The air-compressor comprises a cylinder or vessel D, open at the top and stationarily supported upon the floor stand A, and a cylinder or vessel E, open at the bottom and loosely fitting within the other cylinder or vessel. The cylinder D has a central hollow column d, which is open at both ends, and a raised bottom d', which is connected with the walls of said column and vessel at their lower ends by walls, forming therewith annular spaces d^2 and d^3, that are open at the top and adapted to contain a sealing liquid. A cross pipe or passage d^4, connecting said annular spaces, maintains the liquid at the same level in both. The cylinder E fits loosely in the annular space d^3, and it has attached to its head a central hollow column e, which is open at its lower end and fits loosely in the annular space d^2 of the cylinder D.

F is a stem or rod yieldingly secured at its upper end in the head of the cylinder E and extending downwardly therefrom through the hollow column d, in which it is guided by antifriction-rollers ff. The yielding connection between said rod or stem and the cylinder E may be formed by reducing the upper end of said rod and fitting it loosely in the sleeve e' in the cylinder-head and by placing a spiral spring f' upon the upwardly-projecting end of said rod between said sleeve e' and a nut or collar upon the end of the rod, as shown in Fig. 1.

The air-reservoir C comprises a cylinder or vessel G, which is open at the top and stationarily supported upon the floor-stand A, and a cylinder or vessel H, which is open at the bottom and loosely fitted within the cylinder G. The cylinder G has an air-tight bottom g, preferably located at about one-third the height of the cylinder from its lower end, and a perforated head or spider g', located above the bottom g at or near the upper end of the cylinder to support the upper end of the air-delivery pipe and afford a guide for the stem of the movable cylinder H. The

bottom g and head g' are attached at their peripheries to an imperforate cylindrical wall which is connected with the lower end of the cylinder G and forms therewith an annular space g^2, open at the top and adapted to contain a sealing liquid.

g^3 is a hollow column or pipe extending centrally within the cylinder G downward from the head g' and serving as the air-delivery connection of said reservoir.

The cylinder H fits loosely in the annular space g^2 of the other cylinder, and it has a central stem or rod I, attached at its upper end to the head of said cylinder and extending downward therefrom into the column or pipe g^3, in which it is guided by rollers i i. Both the air-compressor B and the reservoir C may be conveniently constructed of sheet metal or other suitable material.

The reservoir C is connected with the compressor B by a U-shaped pipe J, which communicates with the compressor B through the bottom d' and with the reservoir C through the bottom g. This pipe is provided in the bend connecting its two vertical branches below the top of stand A with an air-intake opening normally closed by an inlet-valve j, which opens inwardly, and with a partition having an opening normally closed by the discharge-valve j', which opens toward the reservoir C. The intake-opening is protected by a screen j^2 to prevent dust and other impurities from being carried into the machine.

K is a fluid-motor for operating the air-compressor. It consists generally, as shown in detail in Fig. 3, of a vertical cylinder open at its upper end and closed at its lower end and of a piston L, fitted to work in said cylinder. The motor-cylinder is supported upon the base of the floor-stand or frame A below and in line with the stem or rod F, which is attached to cylinder E of the air-compressor. Said stem or rod is guided axially in said cylinder by rollers k k, carried by a frame k', attached to the upper end of the cylinder. To the lower end of the cylinder is attached in line therewith the main-valve case M, which has a supply connection m, an exhaust or waste connection m', and an annular service passage or connection m^2, opening at its upper end into the lower end of the cylinder and at its lower end into the valve-chamber through a port or ports m^3.

N is the main valve, controlling the supply and release of the actuating fluid to and from the motor-cylinder below the piston L. It has three heads n, n', and n^2, connected with each other by a stem the ends of which project beyond the outer heads and serve as stops for limiting the movement of the valve in both directions.

O is an auxiliary-valve case and chamber connected with the main-valve chamber at or near its ends by passages o and o' and at an intermediate point by a passage o^2.

P is the auxiliary valve, which consists of two heads p p', connected with each other by a tubular stem p^2, which opens into the valve-chamber above the head p and below the head p'.

Q is a lever fulcrumed to the frame k' at the upper end of the motor-cylinder and having its shorter arm pivoted to the upper end of a rod q, which passes through the upper head of the valve-case O and is attached to the valve P, said rod forming an extension of the valve-stem. A spiral spring q', surrounding the rod q and bearing at its lower end against the upper end of the valve-case and at its upper end against a collar on said rod, tends to move the valve into and hold it in its upper position. The other arm of the lever Q is forked and projects on opposite sides of the stem or rod F into the path of the piston L. To this arm of said lever is pivoted a catch q^2, which is pressed toward the stem F by a spring q^3 and is adapted to slip over and engage with a cross-piece q^4, attached to frame k', as shown in Fig. 3, when the inner arm of said lever Q is carried upward by the piston L. The stem F is provided with a collar or shoulder f^2 so located thereon that it will disengage the catch q^2 from the cross-piece q^4 when the cylinder E of the air-compressor approaches the limit of its downward movement.

It is the intention ordinarily to operate the motor by water, and when a water-supply having the requisite pressure is available a supply-pipe is attached to the connection m and a waste-pipe to the connection m'.

R is a shaft supported horizontally below the air-compressor B and provided with grooved pulleys r r and r', which are fixed thereon, a ratchet-wheel r^2, also fixed thereon, and a cone-pulley r^3, loosely mounted upon said shaft with its larger end next to said ratchet-wheel, as shown in Fig. 4. The pulleys r r are connected by cords or belts with a cross-head f^3 on the stem or rod F, and a weight R' is connected by a cord or belt with the pulley r', the weight-cord being wound on the pulley r' in a direction opposite to the winding of the cords on the pulleys r, so that said weight tends to pull the cylinder E downward. The cone-pulley r^3 is provided with a pawl r^4, pivoted thereto and held by a spring in yielding engagement with the ratchet-wheel r^2, as shown in Fig. 5. The toothed periphery of the ratchet-wheel is preferably formed of rubber or other elastic or non-resonant material that will prevent noise when it is turned backward and said pawl slips over its teeth.

S is a carbureter which is supported upon the base of the frame or stand A below the reservoir C. It consists generally of a closed case or cylinder T and an oil evaporating or vaporizing drum U, fitted to turn in said cylinder on trunnions u u', as shown in Fig. 2. The delivery-pipe g^3 of the reservoir C leads into the top or upper part of the case or cylinder T, and a gas delivery or service pipe V, provided with a cock v, is attached to the delivery connection t, which opens out of the

cylinder T through one end thereof around the bearing of trunnion u'. The opposite end or head of the cylinder T is made detachable and is formed with a bearing and stuffing-box for the trunnion u, which projects through it, and is provided outside of the carbureter with a cone-pulley u^2. The outer end of this trunnion is supported by a bracket t', attached to the removable cylinder-head. The pulley u^2 is connected by a belt with the cone-pulley r^3. By removing the detachable head, with the pulley u^2 and the trunnion u, access is had to the interior of the carbureter for inspection and repairs.

The rotary vaporizing-drum U is preferably formed of sheet metal with closed ends and a perforated cylindrical shell, around which is wrapped a screen u^3, preferably of fine wire-cloth, although other materials, such as felt or wicking, that will take up the oil contained in the lower part of cylinder T and expose it to the air passing through the carbureter may be used. I prefer to employ the wire-cloth, since the oil is not absorbed by it and readily drains therefrom when the vaporizing-drum is at rest or running very slowly, and thus avoids overcarbureting when the flow of gas from the carbureter is reduced. An opening is made through the head of drum U around its trunnion u', next to the opening into the gas-delivery passage t.

W is a closed oil tank or reservoir, which to insure safety may be buried in the earth outside of the building containing the gas-machine and provided with a filling-pipe w, leading to the surface and furnished with a cap or stopper at its upper end, as shown in Fig. 2.

X is a pump for supplying oil from tank W to the carbureter as it is required. It consists of a cylinder and a piston x, which is held normally at the lower limit of its stroke by a spring x', as shown in Fig. 1. The pump-cylinder is connected at its upper end through the suction-valve x^2 with the lower part of tank W by a pipe w' and through the discharge-valve x^3 with the lower part of the feed-regulating chamber t^2 by a pipe w^2. This chamber t^2, which may be cast integrally with the cylinder T and delivery passage or connection t of the carbureter, communicates at or near the bottom through a small opening t^3 with the mixing-chamber of the carbureter and at or near the top through an opening t^4 with the delivery-passage t. The upper part of the feed-chamber t^2 is connected by a pipe w^3 with the upper part of tank W, and a branch pipe w^4, provided with a cock w^5, connects the bottom of the cylinder T with the pipe w^3. The pipes w' and w^3 are provided inside of the wall of the building with cocks w^6 and w^7 for disconnecting the machine from the oil-tank W, particularly while the latter is being filled. The pump-cylinder is connected at its lower end by a pipe x^4 with the service-passage m^2 of the main valve N.

My improved machine operates as follows: Assuming the movable parts of the machine to be in the positions in which they are shown in the drawings, and particularly in Figs. 1 and 3, when the cock v in the gas main or delivery pipe V is opened and gas is taken from the carbureter the cylinder E in the air-compressor will be drawn down by the weight R' and will force air through the pipe J and discharge-valve j' therein into the reservoir C and thence through the pipe g^3 into the carbureter at the rate that the gas is taken therefrom. When the cylinder E approaches the limit of its downward movement, the collar f^2 comes into contact with the catch q^2 and disengaging it from the cross-piece q^4 releases the lever Q. The spring q' thereupon moves the auxiliary valve P into its upper position, carrying the head p above the passage o and the head p' above the passage o'. The passage o' is thus brought into communication with the waste connection m' and the passage o into communication with the passage o^2. The water held in the main-valve chamber below the head n^2 now escapes through the passage o' into the waste connection, and water under pressure from the supply connection m flows through the main-valve chamber between the heads n and n' of the main valve, the passage o^2, the auxiliary-valve chamber O, and the passage o into the main-valve chamber above the head n. The main valve will thus be shifted into its lower position, the head n' being carried below the port m^3. Water under pressure will now pass from the supply connection m through said port m^3 into the service-passage m^2 and thence into the lower end of the motor-cylinder under the piston L. Said piston being forced upward engages with the stem or rod F and lifts the cylinder E. The inlet-valve j in pipe J is opened by the upward movement of the cylinder E, thus admitting air through the intake-opening into the compressor, and the discharge-valve j' is closed, preventing the escape of air from the reservoir C back into the compressor. The shaft R is turned to the left, as shown in Fig. 1, by its connections with the rod F, and the weight-cord is thus wound up on the pulley r', the teeth of the ratchet-wheel r^2 slipping by the pawl r^4 and the pulley r^3 remaining stationary. While the cylinder E is being lifted to take in a charge of air into the compressor B, the carbureter S will be supplied with air from the expansible reservoir C, the cylinder H, which is properly weighted to maintain the desired pressure, descending during the ascent of the cylinder E. When the cylinder E approaches the limit of its upward movement, the piston L engages with and raises the inner arm of lever Q, compressing the spring q' and shifting the auxiliary valve P into its lower position, as shown in Fig. 3. At the same time the catch q^2 is carried into engagement with the cross-piece q^4, thus locking and holding the auxiliary valve in its lower position until it is again released, as above explained. When moved

into its lower position, the auxiliary valve establishes communication between the upper end of the main-valve chamber above the valve-head n and the waste connection m' through the passage o and the tubular stem p^2. It also establishes in this position communication between the supply connection and the lower end of the main-valve chamber below the valve-head n^2 through the passage o^2, the auxiliary-valve chamber, and the passage o'. The main valve will thus be shifted into its upper position, as shown in Fig. 3, in which its middle head n' cuts off communication between the supply connection m and the service-port m^3 and establishes communication between said service-port and the waste connection m'. The water contained in the motor-cylinder now escapes therefrom, allowing the piston L, which is made heavy or is weighted, to descend to its original position, as shown in Fig. 3, in the lower end of the motor-cylinder. As soon as the piston L leaves the rod F the cylinder E will descend, at first quite rapidly, closing the inlet-valve j, opening the discharge-valve j'', and forcing the cylinder H of reservoir C upward until the air taken therefrom during the ascent of cylinder E has been restored. Every time the piston L is lifted by the admission of water or other fluid under pressure into the lower end of the cylinder K the actuating fluid is admitted through pipe x^4 into the cylinder of pump X below its piston x and said piston is driven upward, forcing the oil above it through pipe w^2 into the feed-chamber t^2 of the carbureter. When the actuating fluid is released by the valve N from the motor-cylinder, it is also released from the pump-cylinder, and the piston x is forced downward by spring x', drawing oil through pipe w' from tank W into the upper end of the pump-cylinder, to be forced therefrom into the carbureter when the pump-piston is again driven upward. The pump is made of such size that by operating at intervals corresponding with the intermittent operation of the compressor-motor K a sufficient supply of oil to the carbureter will be insured. When a charge of oil is forced by the pump into the feed-chamber t^2, a portion of it will gradually flow into the carbureting or mixing chamber through the small opening t^3 until the level is restored therein, any surplus over what is required to fill the feed-chamber t^2 up to the opening therefrom into the return-pipe w^3 flowing back through said pipe into tank W. By means of the opening t^4 the same pressure, and consequently substantially the same level of oil, is maintained in the feed and carbureting chambers. The chamber t^2 serves as a feed-regulator to keep the quality or condition of the oil in the carbureting-chamber uniform or constant and to prevent the fluctuations in the carburization of the air that would occur if the consumption of oil, which gradually takes place in the carbureting-chamber by continuous vaporization when the machine is in operation, were suddenly supplied at intervals by the intermittent action of the pump without the intervening regulating-chamber t^2 and its connections. As the cylinder E descends the weight R' turns the shaft R, as seen in Fig. 1, to the right, and in this direction, through the pawl and ratchet-wheel, turns the cone-pulley r^3 with it. The vaporizing-drum U of the carbureter is thus slowly turned through its connections, hereinbefore described, with the pulley r^3 at a rate corresponding with the downward movement of the cylinder E, which in turn is governed by the rate of delivery of gas from the carbureter into the main or service pipe V. Thus oil will be taken up from the lower part of the carbureter-cylinder T more or less rapidly and a greater or less surface exposed to the air contained in the carbureter, according to the rate of flow of air into the carbureter and the rate of delivery of gas therefrom. In this way the air is supplied with the proper proportion of oil-vapor, and gas of nearly constant quality or richness is produced at whatever rate it may be consumed or delivered by the machine. The oil being taken up from the bottom of the cylinder T by the rotary drum or cylinder U, the less volatile portions are not left in the carbureter to form a thick sediment or residuum, but are taken up and carried off with the air-current passing through the screen with the more volatile and easily-vaporized portions. In this way the quality or condition of the oil in the carbureter is kept constant. By taking the gas directly from the carbureter and providing the machine with an expansible air-reservoir for maintaining the supply of air to the carburetor at a constant pressure, gas is produced only as it is required and the danger of maintaining a considerable volume of gas in the machine is avoided.

By constructing the outer cylinders D and G of the air-compressor B and reservoir C with elevated bottoms the quantity of water or other liquid required for sealing the lower ends of the inner movable cylinders E and H is reduced, and by providing the cylinder D of the air-compressor with a hollow column, through which the actuating connection of the movable cylinder E passes, I am enabled to dispense with outside levers or other cumbersome connections, which are not only unsightly, but are in the way and more liable to be disturbed and to get out of order.

To secure satisfactory results, especially in the production of gas for lighting purposes, it is not only essential that the gas be uniformly carbureted, but also that it be delivered at a constant pressure, whether more or less is used, and to this end it is essential that the moving parts of the machine in contact with the air-supply or gas operate with uniform freedom and without shock, as any slight increase of pressure or sudden impulse imparted to the air-supply or gas causes the lights supplied thereby to burn up and smoke

or vary in intensity. In my machine the cylinders E and H, which produce and maintain the air-supply to the carbureter and the pressure under which the gas is delivered from the carbureter, move with perfect freedom and the work to which the cylinder E is subjected of turning the vaporizing-drum U of the carbureter is light and practically constant. While the cylinder E controls the operation of the motor K, it is not subjected to the work of shifting the valve mechanism which controls the supply and release of the actuating medium to and from said motor. When gas is being produced and delivered by the machine at such a rate as to accelerate the operation of the machine, the weight R′, by which the cylinder E is drawn downward, is prevented from imparting a sudden increase of pressure or shock to the air contained in the machine by the yielding connection, hereinbefore described, between said cylinder and its stem or rod F.

Under certain conditions a portable oil-tank may be mounted upon the floor-stand or frame A and detachably connected with the carbureter S in place of the permanent tank W. The oil-tank may also be located above the carbureter and oil supplied to the latter by gravity, thus dispensing with the pump X, suitable provision being made in the arrangement of the connections or otherwise to maintain the required constant level of oil in the mixing-chamber of the carbureter.

The small quantity of water which collects in the carbureter during the constant operation of the machine may be drawn off, by opening the cock w^5, through the pipes w^3 and w^4 into the tank W, from which it may be pumped out if it accumulates in sufficient quantities.

Various changes in the details of construction and arrangement of parts of the machine may be made without affecting its operation and are contemplated as within the spirit and scope of my invention.

I claim—

1. In a gas-machine the combination of an air-compressor, a motor for operating the same, means for automatically controlling the operation of said motor according to the rate of delivery of air by the compressor, a separate carbureter-chamber connected with said air-compressor and with a source of oil-supply and having a movable part for exposing oil to the air passing through said chamber, and an adjustable actuating connection between said movable part and the air-compressor whereby more or less air is uniformly carbureted according to the rate of consumption of gas, substantially as and for the purposes set forth.

2. In a gas-machine the combination of an air-compressor, a motor for operating the same, means for automatically controlling the operation of the compressor according to the rate of delivery of air therefrom, an oil-tank, a carbureter having air and oil supply connections with said compressor and tank and a movable part having an actuating connection with said compressor for taking up the oil and exposing it to the air in said carbureter, means for automatically maintaining a constant level or supply of oil in the carbureter, and an expansible air-reservoir communicating with the air connection between the compressor and carbureter, substantially as and for the purposes set forth.

3. In a gas-machine the combination with an air-compressor and an oil tank or reservoir, of a carbureter having an air-supply connection with said compressor and an oil-supply connection with said tank or reservoir, and a rotary oil-evaporating screen having an adjustable actuating connection with the air-compressor, substantially as and for the purposes set forth.

4. In a gas-machine the combination with an oil tank or reservoir of a carbureter comprising a cylinder or casing which has air-supply and gas-delivery connections and is connected at two points one above the other, but both below the gas-delivery connection, with the upper and lower parts of said oil tank or reservoir, substantially as and for the purposes set forth.

5. In a gas-machine the combination with a source of air-pressure and an oil-supply of a carbureter comprising a casing the upper part of which is connected with the source of air-pressure and the lower part of which is connected with said oil-supply, a gas-delivery connection leading out of one end of said casing, a perforated drum fitted to turn in said casing, dipping on its lower side into the oil contained therein and communicating through one end with the gas-delivery connection, means for maintaining oil at a certain level in the cylinder and means for turning said drum according to the rate of delivery of air to the carbureter, substantially as and for the purposes set forth.

6. In a gas-machine the combination with an air-compressor and an oil tank or reservoir of a carbureter comprising a casing the upper part of which is connected with the air-compressor and the lower part by pipes with the upper and lower parts of the oil-tank, a gas-delivery connection leading out of one end of said casing, a drum fitted to turn in said casing and provided with closed ends one of which has an opening next to the opening into the delivery-pipe, and with a perforated periphery or screen which is interposed between the air supply and delivery connections, and an actuating connection between said rotary drum and the air-compressor whereby more or less oil is exposed to the air in the carbureter according to the rate of delivery of air thereto by the air-compressor, substantially as and for the purposes set forth.

7. In a gas-machine the combination with the carbureter having air-supply and gas-delivery connections and a rotary vaporizing

drum or screen, of an oil tank or reservoir the upper and lower parts of which are connected with the carbureter by pipes leading into it one above the other and provided with stop-cocks and a filling-pipe leading into said oil-tank and provided at its upper end with a stopper, substantially as and for the purposes set forth.

8. In a gas-machine the combination with an air-compressor comprising a cylinder or vessel and a movable part adapted to reciprocate therein, of a winding drum or pulley and weight connected with the movable part of the compressor for moving the same in one direction, a fluid-motor for raising the weight, a carbureter comprising a closed casing the upper part of which is connected with the compressor and the lower part with an oil-supply, a gas-delivery pipe leading out from one end of said casing and a rotary oil-vaporizing drum or screen fitted to turn in said casing between its air-inlet and gas-outlet, and having an actuating connection with the movable part of said compressor, substantially as and for the purposes set forth.

9. In a gas-machine the combination of an air-compressor comprising a cylinder or vessel and a movable part adapted to reciprocate therein, a fluid-motor arranged to raise the movable part of the compressor, a horizontally-disposed shaft having a flexible connection with the movable part of the compressor, a weight suspended from said shaft and tending to carry the movable part of the compressor downward, a carbureter comprising a casing which has an air-supply connection with said air-compressor, a gas-delivery connection and an oil-supply connection, a perforated drum or screen fitted to turn in said casing and provided on one of its trunnions with a cone-pulley, a cone-pulley loosely mounted upon the aforesaid shaft and connected with the pulley of the carbureter, and a pawl and ratchet for imparting the movement of said shaft to the pulley thereon in one direction only, substantially as and for the purposes set forth.

10. In a gas-machine the combination with an air-compressor and an oil-reservoir, of a carbureter consisting of a casing having air-supply and gas-delivery connections and of an oil-vaporizing device inclosed in said casing, and an oil-feed-regulating chamber communicating with the mixing-chamber through openings one above and the other below the oil-level to be maintained therein, and having oil supply and return connections with said oil-reservoir, substantially as and for the purposes set forth.

11. In a gas-machine the combination with an air-compressor and an oil-reservoir of a carbureter comprising a mixing-chamber and mixer, and an oil-feed-regulating chamber having supply and return connections with the oil-reservoir and communicating below and above the said return connection with said mixing-chamber through openings, the lower of which is restricted, substantially as and for the purposes set forth.

12. In a gas-machine the combination with an air-compressor and an oil-reservoir, of a carbureter comprising a mixing-chamber and mixer, an oil-feed-regulating chamber having supply and return connections with said oil-reservoir and communicating with the mixing-chamber through openings one above and the other below the return connection with the tank, and a pump in the supply connection for forcing oil at intervals from the tank into the carbureter, substantially as and for the purposes set forth.

13. In a gas-machine the combination with an air-compressor and an oil-reservoir, of a carbureter having air and oil supply connections with said compressor and reservoir, a fluid-motor for operating said compressor, a valve controlling the admission and release of the fluid medium to and from said motor, a pump in the oil-supply connection of the carbureter, and a fluid-actuating connection with said pump also controlled by said valve, substantially as and for the purposes set forth.

14. In a gas-machine the combination with an air-compressor and an oil-reservoir, of a carbureter having air and oil supply connections with said compressor and reservoir, a fluid-motor for operating said compressor, a valve controlling the admission and release of the fluid medium to and from said motor and arranged to be operated by a movable part or adjunct of the compressor, a pump cylinder and piston for supplying the carbureter with oil, the cylinder having at one end suction and discharge valves communicating respectively with the oil-reservoir and with the carbureter, and at the other end a fluid connection controlled by the valve which controls the fluid-supply of said motor, and an oil-overflow connection leading from the carbureter back into the oil-reservoir, substantially as and for the purposes set forth.

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

WARREN S. JOHNSON.

Witnesses:
T. C. LUND,
CHAS. L. GOSS.