E. E. FLORA.

FEED DEVICE FOR VAPOR BURNERS.

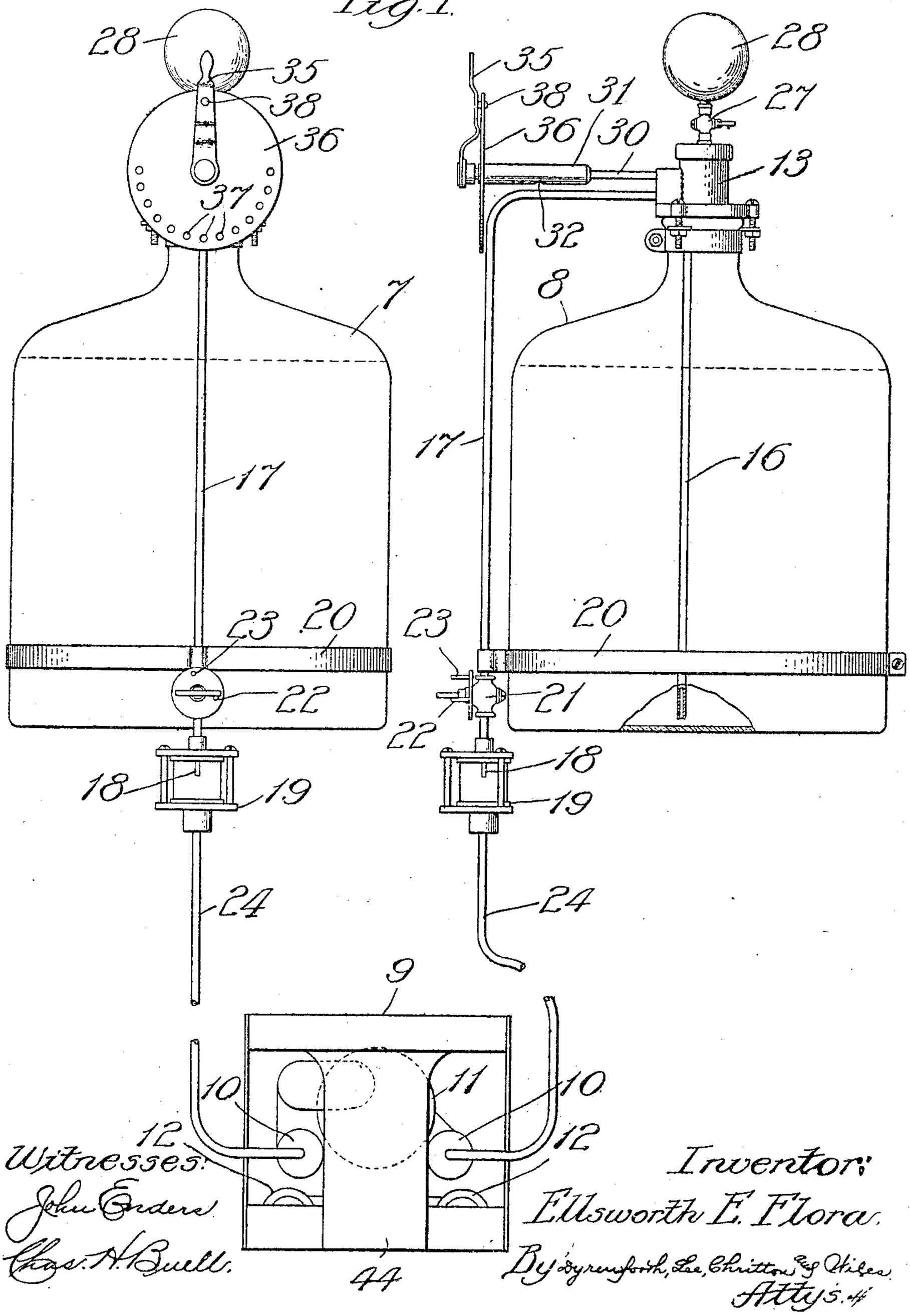
APPLICATION FILED MAY 16, 1908.

927,784.

Patented July 13, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
John Enders
Chas. A. Buell.

Inventor:
Ellsworth E. Flora.
By Byerly, Forth, Lee, Christen & Wilcox
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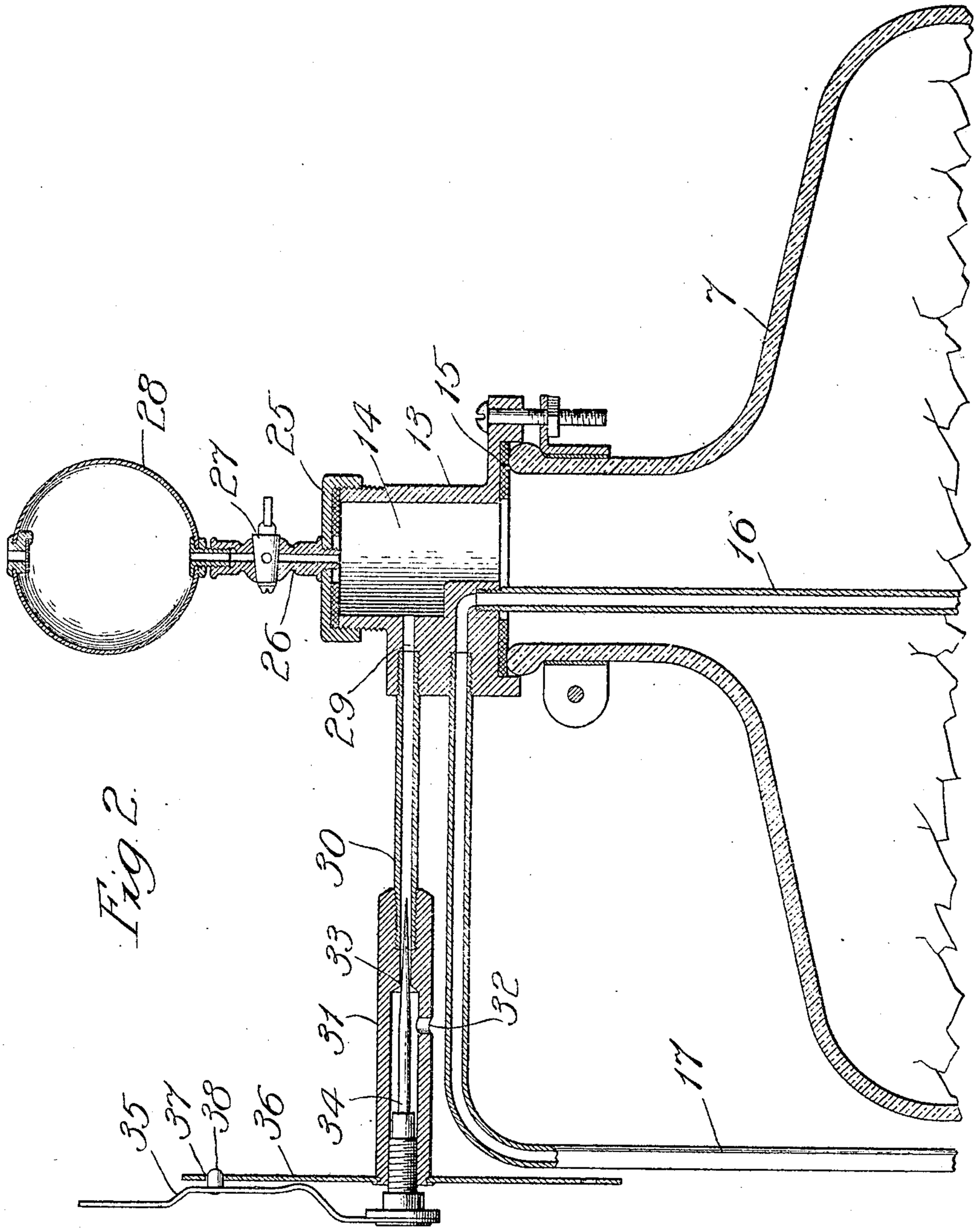

Fig 2.

Witnesses:
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UNITED STATES PATENT OFFICE.

ELLSWORTH E. FLORA, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO GEORGE H. THAYER, JR., OF PLYMOUTH, INDIANA.

FEED DEVICE FOR VAPOR-BURNERS.

No. 927,784. Specification of Letters Patent. Patented July 13, 1909.

Application filed May 16, 1908. Serial No. 433,182.

To all whom it may concern:

Be it known that I, ELLSWORTH E. FLORA, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Feed Devices for Vapor-Burners, of which the following is a specification.

My invention relates to an improved device for regulating the delivery of fluid from a reservoir or supply-tank, though it has more particular reference to improvement in fluid-supplying devices for use, more especially, in connection with vapor-stoves of the class in which hydro-carbon oil and water are separately fed by gravity, in fine streams or drop by drop, to vapor-generators and thence through a common mixing-chamber to the burner-openings.

In stoves of the class mentioned, to insure substantially perfect combustion and cause the flame at the burner-openings, when once adjusted, to remain substantially uniform, an approximately uniform feed both of the oil and of the water must be maintained. Hitherto it has been usual to feed each liquid to the stove from an elevated supply-tank, by gravity, through a pipe containing a needle-valve by which the feed was controlled; but this has proved unsatisfactory in practice, for the reasons that any change in level of the liquid in the tank would tend to vary the head of pressure and consequently the rapidity of flow through the needle-valve, and any impurities in the liquid would tend to clog the needle-valve.

My object is to provide a simple and improved construction of feeding device whereby the flow of liquid by gravity from an elevated supply-tank may be adjusted with great accuracy and maintained without material variation as long as the supply in the tank holds out.

In practicing my invention, in connection with a vapor-stove, two similarly-constructed feeding-devices may be employed, one for the oil and the other for the water. Each device, as I prefer to construct it, has an elevated tank or receptacle into the top of which extends the short leg of a siphon. The long leg of the siphon extends down the outside of the tank, terminating in a plane below the tank, and having a small discharge outlet which may be, and preferably is, exposed within a sight-feed. A pipe extends from the lower part of the sight-feed to one of the vapor-generators of the burner. At the top of the tank is a pump, which may be of the rubber-ball type and mounted on the removable stopper of the tank, to communicate with the upper part of the interior of the latter. Interposed between the pump and the tank is a stop-cock. Also communicating with the interior of the tank at its top is an air-inlet tube containing a needle-valve.

In operation when the tank has been filled, say, with oil, and closed by the stopper, which renders it air-tight, the pump is actuated to force air into the tank and exert pressure upon the oil to fill the siphon. When the oil commences to run into the sight-feed the operator ceases pumping and closes the said stop-cock. The oil will continue to flow into the sight-feed, and thence into the burner, until the oil thus withdrawn from the tank commences to cause a vacuum in the top of the tank. Obviously when the weight of oil in the siphon below the liquid level in the tank can no longer overcome the relative vacuum in the top of the tank, oil will cease to flow into the sight-feed. When these generators have become heated, the needle-valve is opened to admit air in limited and controlled volume to the top of the tank, and the flow of oil to the burner will be governed entirely by the inflow of the air through the needle-valve. When the burner has been started, as described, the water-supply from the other tank may be turned on in the same manner and similarly regulated by means of its needle-valve. The oil and water are fed drop by drop to the burner, and as the number of drops per minute or second in each instance is governed by the inflow of air through a needle-valve the feeds may be regulated with great accuracy and are not materially affected by the change in the level of the liquids in the supply-tanks. Furthermore, as the liquids do not pass through needle-valves or through openings liable to clog, there is no danger of either of the feeds becoming obstructed.

The accompanying drawings show my improved apparatus as I now prefer to construct it for controlling the feeds of oil and water to a vapor-stove.

Referring to the drawings—Figure 1 is a partly broken diagrammatic view showing the feed-devices, one in front and the other in side elevation, and a vapor-burner in end

elevation; and Fig. 2, an enlarged broken section of the upper portion of one of the feed-devices.

7 and 8 represent supply-tanks, which may be of glass, as indicated, one for oil and the other for water; and 9 a vapor-burner of which 10, 10 are the vapor-generating tubes, 11 the oil-vapor and water-vapor mixing-chamber, and 12, 12 the perforated burner-tubes. As the construction and operation of vapor-burners of this type are well known, a more detailed description thereof in the present connection is deemed unnecessary.

Fastened upon the top of each supply-tank is a head 13 containing a chamber 14. Interposed between the head and mouth of the tank is a gasket 15 to render the joint between them air-tight. Fastened in and passing through the head 13 is a siphon having a short leg 16, passing downward in the tank nearly to the base thereof, and a long leg 17 terminating in a small outlet nozzle 18 in the chamber of a sight-feed 19 below the plane of the base of the tank. A strap 20 engaging the siphon leg 17 and passing around the tank holds the leg steady. 21 is a stop-cock interposed in the leg 17 and provided for convenience with stops 22, 23 which limit the turning of the valve to one opening and one closing position. A pipe 24 extends from the sight-feed directly below the outlet 18 to the respective vapor-generator 10.

The top of the chamber 14 is closed by a screw-cap 25 which fits air-tight upon the head 13. Extending through the cap 25 to the chamber 14 is a tube 26 containing a stop-cock 27 and carrying a rubber-bulb pump 28. Entering the chamber 14 is a passage 29 to which extends a tube 30 provided at its outer end with a needle-valve shell 31. The shell 31 has an air-inlet opening 32, a needle-valve seat 33, communicating with the tube 30, and a threaded needle-valve 34 working in the shell and provided with a pointer 35. On the end of the shell is a flow-indicator comprising a dial 36 provided with a series of notches or perforations 37 to receive a stud 38 carried by the pointer.

The supply tank may be filled with liquid by removing the screw-cap 25. When the burner is not in use the stop-cock 21 is closed and the needle-valve 34 is closed by turning the pointer to the top notch 37. To start a fire at the burner the valves 21 and 27 at the oil-tank are opened and the pump 28 worked to compress the air in the chamber 14 and in the space above the oil in the tank to exert pressure upon the oil and force it upward through the siphon-leg 16 into the siphon-leg 17. When the oil is seen to run through the sight-glass 19 the valve 27 is closed, and the oil will continue to run to the burner until it commences to cause a vacuum in the top of the tank and an equilibrium is thus established. The pointer 35 is then turned to one of the notches of the lower series 37 to open the needle-valve more or less slightly and permit air to be slowly drawn into the top of the tank. The parts may be so constructed that when the pointer is turned to the first of the lower series of notches 37 air will be admitted to the tank at a rate which will permit the siphon to deliver, say, ten drops of oil per minute to the pipe 24, and each succeeding notch will mark progressively an increase of five drops per minute when the pointer is caused to register therewith. The oil thus caused to run drop by drop to the respective vapor-generator is vaporized therein and flows to the mixing-chamber, thence to the burner-openings of both burner-tubes where it is ignited, soon burning with a bright yellow flame. The valve 27 of the water-tank is then opened and the pump 28 thereon worked merely to start a flow of water drop by drop. This valve 27 is then closed and the needle-valve opened to cause the discharge of the desired number of drops per minute of water into the other vapor-generator. Here the water becoming vaporized flows into the mixing-chamber where it mixes with the oil-vapor and the mixture flowing to the burner-openings produces the desired blue-flame. The size of the flame at the burner is regulated by the supply of oil and water, which in turn is regulated by the inflow of air at the needle-valves. The flame at the burner may be extinguished by closing the valves 21.

If the oil employed for first heating the burner is otherwise provided, it may be unnecessary to work the pump on the oil-tank except when the tank is filled after it has been emptied and the long leg of the siphon has been emptied. At other times, the mere manipulation of the valves 21 and needle-valves 34 will start the proper flow of oil and water to the burner.

I wish it understood that my improved feed device may be employed for feeding any liquid, and for delivering kerosene, gasolene, and the like, to any type of burner, where desirable.

What I claim as new and desire to secure by Letters Patent is—

1. In a device for the feeding of liquid in controlled drop by drop supply, the combination of an air-tight liquid container, a siphon therein, an air chamber formed in the closure therefor and opening into said liquid container, means for filling said air chamber with air under pressure, an air supply tube connecting with said air chamber, and means in said tube for controlling the induced current of air therethrough.

2. In a device for controllably feeding liquid drop by drop, the combination of an air-tight liquid-supply tank, a siphon in the

tank and an air-admitting flow-regulating needle-valve on the tank, the whole being constructed and arranged to permit free passage of the liquid through the siphon to avoid danger of clogging the same and to control the drop-by-drop flow of the liquid through the siphon by regulating the inflow of air to the tank by means of the said needle-valve.

3. In a device for controllably feeding liquid drop by drop, the combination of an air-tight, liquid-supply tank, a siphon in the tank, an air-admitting flow-regulating needle-valve on the tank, and a flow indicator on the needle-valve, the whole being constructed and arranged to permit free passage of the liquid through the siphon to avoid danger of clogging the same, and to control the drop-by-drop flow of the liquid through the siphon by regulating the inflow of air to the tank by adjusting the said needle-valve with reference to the said indicator.

ELLSWORTH E. FLORA.

In the presence of—
CHAS. E. GAYLORD,
RALPH SCHAEFER.