

F. A. RAY.
 APPARATUS FOR INCREASING GAS PRESSURE.
 APPLICATION FILED JULY 23, 1904.

937,464.

Patented Oct. 19, 1909.
 3 SHEETS—SHEET 1.

Fig. 1.

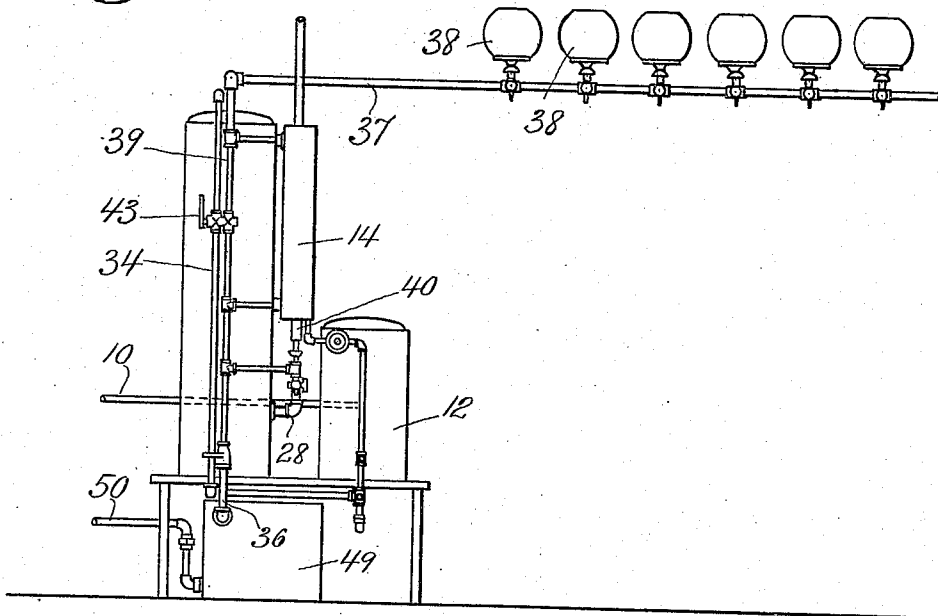


Fig. 4.

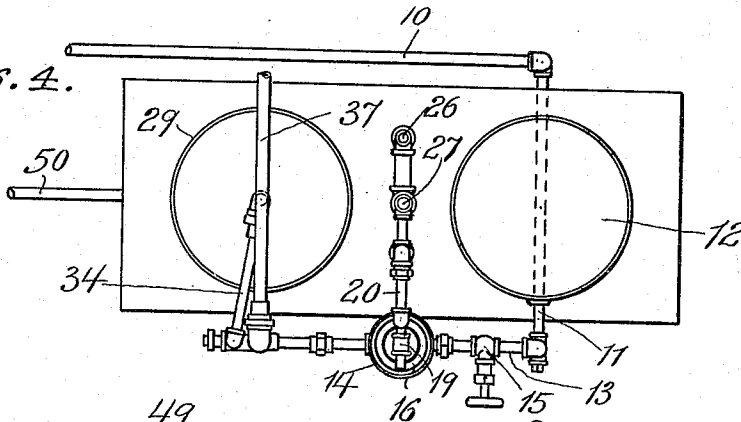
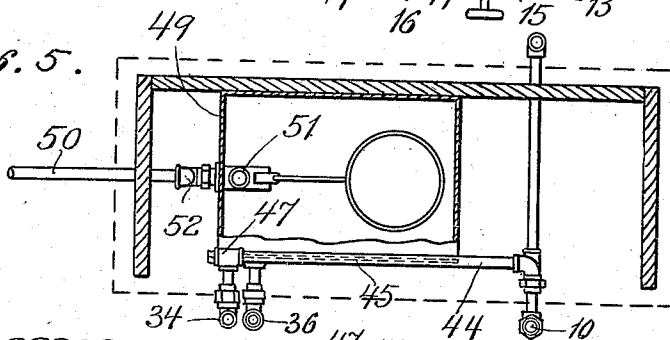
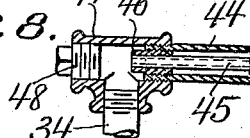


Fig. 5.



Witnesses:
 Rollin Abell
 A. C. Ratican

Fig. 8.

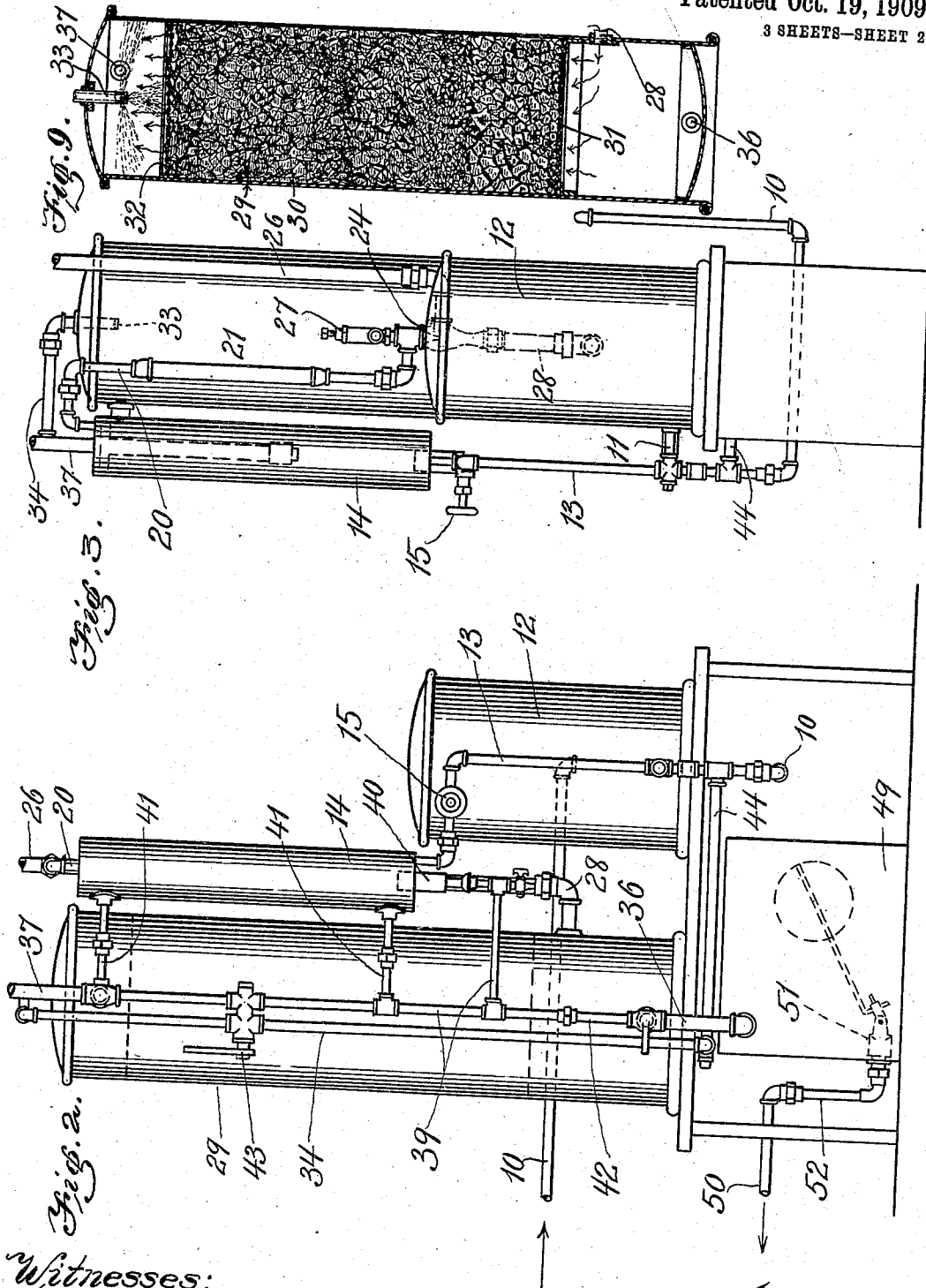


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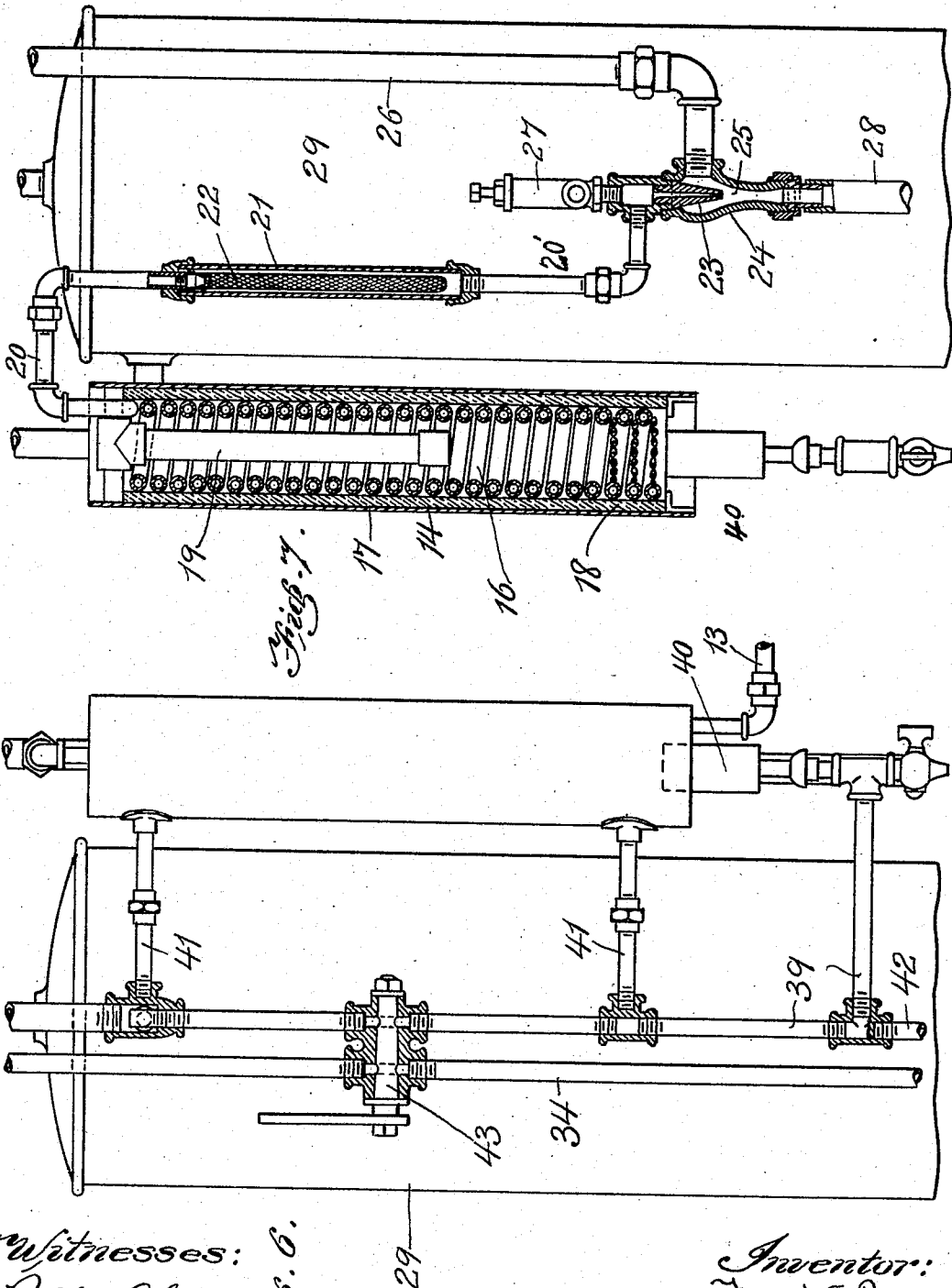
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3 SHEETS—SHEET 3.



Witnesses:
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 Fig. 6.

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UNITED STATES PATENT OFFICE.

FOREST A. RAY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO STANDARD LIGHT COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

APPARATUS FOR INCREASING GAS-PRESSURE.

937,464.

Specification of Letters Patent.

Patented Oct. 19, 1909.

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To all whom it may concern:

Be it known that I, FOREST A. RAY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Increasing Gas-Pressure, of which the following is a specification.

This invention relates to apparatus for raising the pressure of illuminating gas from street-mains in order to increase its illuminating power in burners of the incandescent-mantle type, by increasing the velocity of gas at the jet in the Bunsen tube of the burner, thereby increasing the quantity of air entrained, making a hotter flame and raising the mantle to a higher degree of temperature and incandescence.

The invention further relates to means of this character in which the gas-pressure is raised by the employment of a steam-jet for entraining the gas, the result being a mixture of steam and gas from which the steam is afterward condensed, leaving the gas at an increased pressure over that at which it was supplied to the ejector or entraining device.

The invention has for its object, first, to provide an improved apparatus for condensing the steam out of the gas; second, to insure the flow of the condensing-water whenever steam production is taking place; third, to provide means for regulating the flow of the condensing-water; fourth, to provide for the outflow of water from the condenser without permitting the escape of gas either during those times when the apparatus is operated under steam-pressure or when operated without steam-pressure; and, fifth, to provide improved means for filtering the steam which passes to the ejector.

Of the accompanying drawings,—Figure 1 represents a front elevation of a pressure-raising apparatus constructed according to my invention. Fig. 2 represents an enlarged elevation of the main working parts thereof. Fig. 3 represents a side elevation looking from the right in Fig. 2. Fig. 4 represents a top plan view. Fig. 5 represents a section through the base of the apparatus and the tank. Fig. 6 represents a view of parts shown in Fig. 2, partly in section. Fig. 7 represents a view of parts shown in Fig. 3, partly in section. Fig. 8 represents a detail

horizontal section of a part of the device for throttling the condensing water. Fig. 9 represents a vertical section of the condenser.

The same reference characters indicate the same parts in all the figures.

In the drawings, 10 represents a water-main piped in branch connection at 11 into an air-pocket or chamber 12, which tends to equalize the pulsations in the water-supply and continuing through an extension-pipe 13 into a steam-generator 14, being controlled by a stop-valve 15. This generator consists of a coil of pipe 16, an outer sheathing or tubular shell 17, and a lining 18 of asbestos or other refractory material. Resting on the lining and extending part way down through the coil is a plugged or stopped section of pipe 19 constituting a baffle to direct the flame from the burner against the coil 16. From the upper end of the generator an outlet-pipe 20 leads to a chamber or casing 21 containing an elongated tubular filter 22, which may be made of wire-gauze, and serves to arrest any sediment in the steam and prevent it from choking the fine aperture of the steam-nozzle 23 with which the pipe 20' connects beyond chamber 21. This nozzle constitutes part of an ejector 24 having a combining-tube 25 and supplied with gas at street-main pressure through a pipe 26. The steam-pipe 20 is provided with a safety-valve 27 immediately above the ejector.

From the ejector 24 a pipe 28 leads to the lower part of a condenser 29, shown in section in Fig. 9. The latter is filled with comminuted material 30 of a suitable nature, such as hard-wood charcoal contained between two foraminous partitions 31 32. Water is supplied to the top of the condenser through a spraying nozzle 33 at the end of a pipe 34 and passes downwardly through the charcoal to an outlet-pipe 36 at the base of the condenser. The pressure gas is taken out from the top of the condenser through a pipe 37, whereby the lamps 38 (Fig. 1) are supplied, said lamps being preferably of the Bunsen burner and incandescent-mantle type and adapted to be located in the usual positions throughout a building or elsewhere. From the pressure-gas main 37 a branch 39 leads to a Bunsen burner 40 for heating the steam-generator 14. The branches 41 42

from this pipe are merely blind pipes affording support to the generator and to the condenser-outlet 36.

In the pipe 39 for supplying the boiler burner 40 and in the pipe 34 for supplying condensing water to the condenser 30 is interposed a double plug-valve 43 controlling both of said pipes and serving to open or close them simultaneously. The object of this is to insure a supply of condensing water to the condenser whenever the burner 40 is started, since it would be detrimental to pass uncondensed steam through the condenser with the gas into the house-pipe. This steam would eventually condense in the house-pipe and probably cause trouble by collecting in pockets and stopping the flow of gas.

Pipe 34 for supplying the condenser with water is connected with the water-main 10 through a throttle-chamber 44, best seen in Figs. 5 and 8. This chamber contains a throttle-tube or friction-tube 45 having a threaded head 46, whereby it screws into one end of chamber 44 and removable through an opening in the T 47 closed by a screw-plug 48. This throttle or friction-tube offers such resistance to the flow of water as to give the desired pressure or head at the sprinkling nozzle 33 in the condenser. The tubular chamber 44 acts as a support or connection of adequate strength. This device is superior to an adjustable stop-valve for throttling the flow of water in that it has less liability to clogging from sediment and cannot be easily tampered with. For different water-pressures or different desired flows to the condenser, throttle-pipes 45 of different lengths may be employed.

The pipe 36 from the bottom of the condenser leads into a trap-tank 49 having an outlet-pipe 50 controlled by a float-valve 51, the object of which is to drain off the water in the tank 49 down to a predetermined level without permitting escape of the gas to the external air. When the apparatus is operated under steam pressure, water is constantly flowing into the tank 49, but at times when the generation of steam is suspended and gas flows through the apparatus at ordinary pressure, a slight leakage in the valve 51 would allow the water to drain off through the tank 49 and permit the escape of gas. To prevent this, the pipe 50 has an upwardly-extending offset 52 from its inlet end.

It will be noted that the courses of the water of condensation and the gas-and-steam mixture in the condenser are opposite in direction, the water entering at the top and flowing downwardly through the body of comminuted material 30, while the gas-and-steam mixture enters at the bottom and passes upwardly. In this way the warmest water comes in contact with the most saturated mixture at the bottom of the con-

denser, and the least saturated mixture, from which it is most difficult to remove the last particles of steam, is subjected to the coldest and most efficient water. I have found that in order to condense steam out of a fixed gas, there is required a very extensive mechanical surface for the particles of vapor to condense upon and cling to, which surface is afforded by the body of comminuted material 30. The amount of condensing water required is comparatively small.

I claim:—

1. An apparatus for raising gas pressure for local use, comprising a condenser constructed to contain a quantity of comminuted material and having in its lower portion a gas-and-steam inlet and a water outlet, and in its upper portion a water inlet and a gas outlet; a steam generator having a water inlet and a steam outlet; an injector piped to said steam outlet; a gas conduit leading from a main to the space in the injector surrounding the steam nozzle thereof whereby the gas is entrained and raised in pressure; a pipe leading from the injector to the gas-and-steam inlet of the condenser; and a burner for heating the generator piped to receive gas under pressure from the gas outlet of the condenser.

2. An apparatus for raising gas pressure for local use, comprising a condenser constructed to contain a quantity of comminuted material and having in its lower portion a gas-and-steam inlet and a water outlet, and in its upper portion a water inlet and a gas outlet; a steam generator having a water inlet and a steam outlet; an injector piped to said steam outlet; a gas conduit leading from a main space in the injector surrounding the steam nozzle thereof whereby the gas is entrained and raised in pressure; a pipe leading from the injector to the gas-and-steam inlet of the condenser; a burner for heating the generator piped to receive gas under pressure from the gas outlet of the condenser, a tank to which the cooling water and condensed steam flow from the condenser, a valve operated by the water level in the tank for permitting escape of the water and retaining the gas, and provisions for nullifying the effect of leakage of said valve.

3. An apparatus for raising gas pressure for local use, comprising a water supply pipe, an air pocket in branch connection with said pipe for maintaining a constant pressure, a steam generator to which said supply pipe is connected, a condenser containing a mass of comminuted material, an injector, pipes leading to the injector from the generator and a gas main and from the injector to the condenser, whereby gas is entrained and forced into the condenser at an increased pressure, a water inlet to the top of the condenser for wetting the comminuted material

and condensing the steam, a gas outlet from the condenser, and a burner for heating the generator connected with the outlet for receiving gas therefrom.

5 4. In an apparatus for raising gas-pressure, the combination of a condensing chamber having gas and water inlets and outlets, a trap connected with the water outlet and having an eduction conduit rising higher
10 than its inlet end to effect a seal, and a valve controlling the outflow through said conduit and controlled by the level of water in the trap.

15 5. In an apparatus for raising gas-pressure, the combination of a condenser, means to supply a mixture of gas and steam thereto, a water-supply conduit leading to said condenser, and a throttle chamber having means for throttling the flow of water included in said conduit.

20 6. In an apparatus for raising gas-pressure, the combination of a steam-generator

having heating means, gas and steam entraining means, a condenser to receive the gas-and-steam mixture, and means for
25 jointly controlling the operation of said condenser and said heating means.

7. In an apparatus for raising gas-pressure, the combination of a steam-generator, a heating burner therefor, gas-entraining
30 means connected with the outlet of said generator, a condenser to receive the mixed gas and steam, a pipe to supply condensing water to said condenser, a fuel-pipe for said burner, and valves controlling said fuel and water
35 pipes and connected for joint opening and closing.

In testimony whereof I have affixed my signature, in presence of two witnesses.

FOREST A. RAY.

Witnesses:

R. M. PIERSON,
A. C. RATIGAN.