2 Sheets—Sheet 1.

T. G. SPRINGER.
Gas Apparatus.

No. 219,318. **Patented Sept. 2, 1879**

Fig. 1.

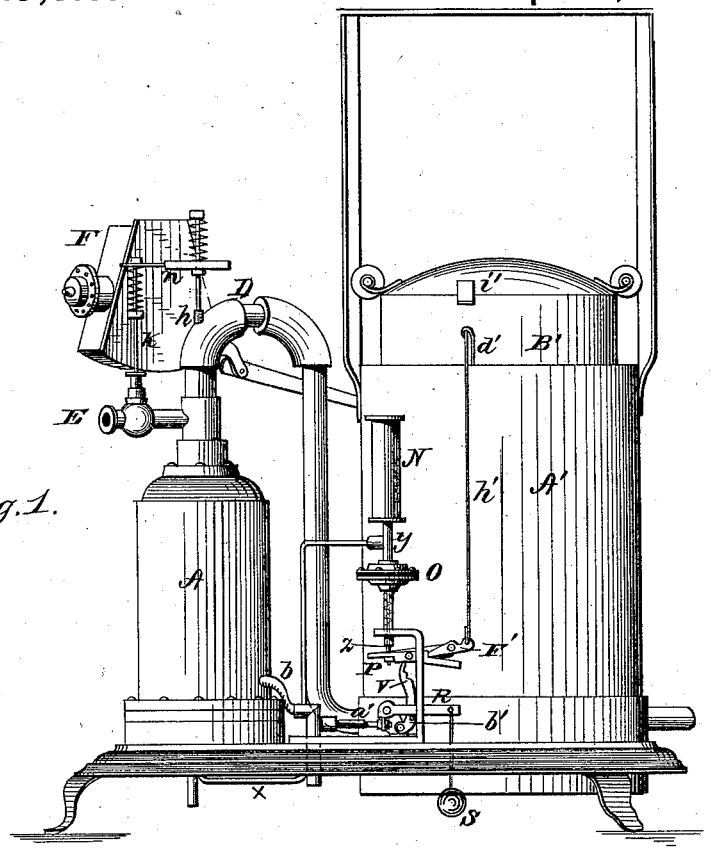
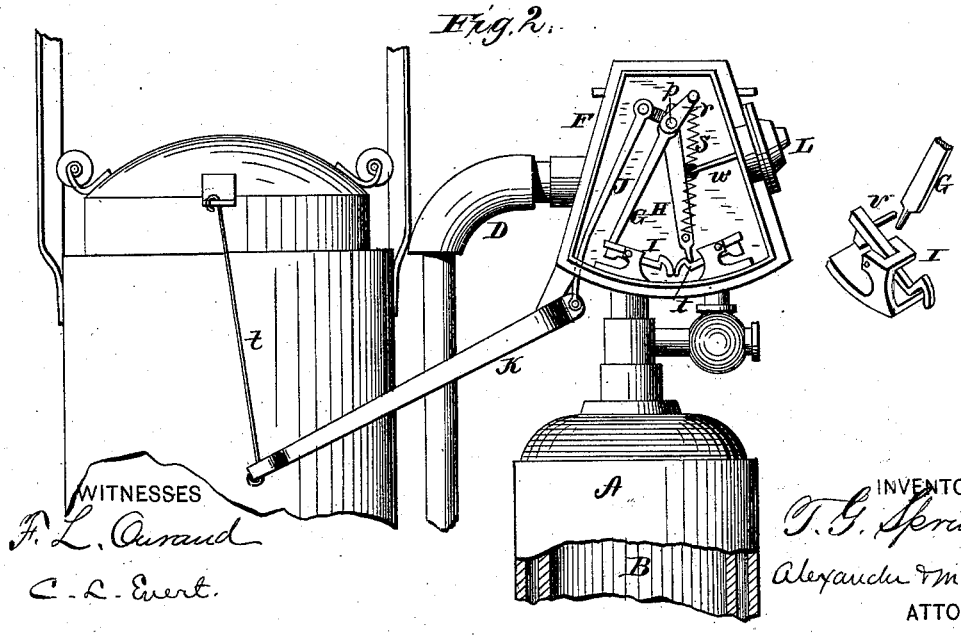


Fig. 2.



WITNESSES

F. L. Ourand

C. L. Ewert.

INVENTOR

T. G. Springer

Alexander & Mason.

ATTORNEYS

2 Sheets—Sheet 2.

T. G. SPRINGER.

Gas Apparatus.

No. 219,318. **Patented Sept. 2, 1879.**

Fig. 3.

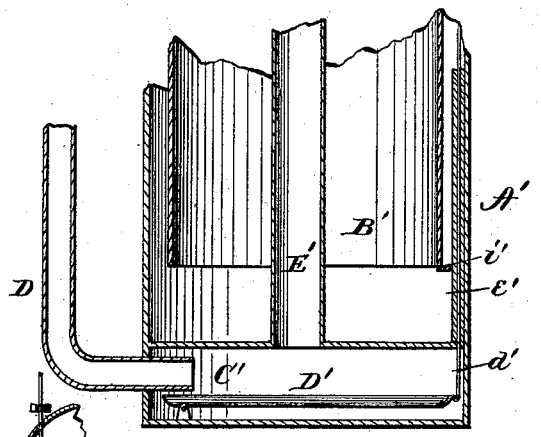
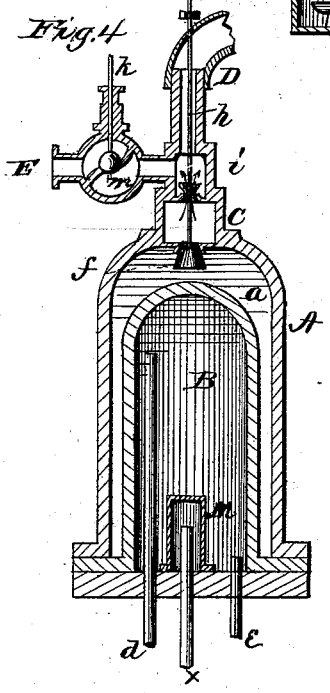


Fig. 4.



WITNESSES

F. L. Durand

C. L. Evert.

INVENTOR

T. G. Springer

Alexander Mason

ATTORNEYS

UNITED STATES PATENT OFFICE.

THEODORE G. SPRINGER, OF NEW YORK, N. Y.

IMPROVEMENT IN GAS APPARATUS.

Specification forming part of Letters Patent No. **219,318**, dated September 2, 1879; application filed June 24, 1879.

To all whom it may concern:

Be it known that I, THEODORE G. SPRINGER, of New York, in the county of New York, and in the State of New York, have invented certain new and useful Improvements in Gas Apparatus; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention relates to that class of gas apparatus which are known as "carbureters," and consists in the combination of devices, as will be mentioned in the claims.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a side elevation of my machine. Fig. 2 is a view of the upper part thereof from the opposite side. Figs. 3 and 4 are detailed sections of parts thereof.

A represents the retort, into which the hydrocarbon liquid is forced automatically, as required, by hydraulic pressure, as will be hereinafter described. The retort A is cylindrical in form, and stands in an upright position. It contains within it a steam-chamber, B, of corresponding size and shape, so as to leave a chamber, *a*, around and above said steam chamber. Into this chamber *a* the hydrocarbon liquid is admitted at or near the bottom through the pipe *b*. The steam is admitted from any suitable boiler into the steam-chamber B through a pipe, *d*, which extends nearly to the top of said chamber, and the condensation is carried off through a waste-pipe, *e*, formed or provided with a suitable trap. The top of the retort A is provided with an expansion-chamber, C, having in its bottom a suitable valve-seat, against which closes a valve, *f*. This valve is located in the top of the chamber *a*, and closes upward, as shown in Fig. 4. The top of the expansion-chamber C is formed or provided with a perforated nozzle, *i*, through the center of which the valve-rod *h* is passed, said rod extending upward through the elbow of the pipe D, which conveys the gas from the retort to the gas-holder. Directly above the nozzle *i* is the inlet E, for the air or city gas, and in said inlet is a downwardly-closing globe-valve, *m*, the stem *k* of which extends upward, as shown.

The two valves *f* and *n* are operated automatically and simultaneously by means hereinafter described. When opened, the vapor from the heated hydrocarbon liquid first passes into the expansion-chamber C, and from thence through the nozzle *i*, where it meets the air, carbureting the same, and then, as illuminating-gas, passes into the holder.

The object of the expansion-chamber C is to prevent any flickering of the lights when the valves are opened or closed. When the valve *f* first is opened the pressure enters the chamber C, and from thence gradually passes through the nozzle *i* without any sudden rush, which would interfere with the lights. In like manner, when the valve *f* is closed, pressure remains in the chamber C, which gradually passes off through the nozzle.

The valve-stems *h* and *k* are connected to a cross-bar, *n*, on a rock-shaft, *p*, and springs are suitably connected to and arranged with said stems to prevent any hard blows or jars when the valves are opened and closed. The rock-shaft *p* passes through a box or casing, F, and within said box the shaft is provided with two levers, G and H, and an arm, *r*. The arm *r* is, by a spring, *s*, connected with the lever H. In the lower end of the box are two pivoted gravitating triggers, I I, to hold the lever H first at one side and then at the other. The lever G is provided at its upper end with a short arm, which, by a link, J, is connected with the short arm of a lever, K, pivoted below the box. The long arm of this lever is, by a rod, *t*, connected with the gas-holder. As the gas-holder ascends the lever G is gradually moved to one side until the holder reaches its maximum height, when the end of said lever G will strike a pin, *v*, on the side of the trigger, which holds the lever H, and release the same. During this movement of the lever G the arm *r* has also been moved, so as to expand the spring *s*, it being understood that the arm *r* is fast to the lever G and said lever loose on the rock-shaft, while the lever H is fast on said shaft. Now, as the trigger is released from the end of the lever H, the ex-

panded spring *s* at once throws said lever over to the opposite side, where it is at once caught by the other trigger I. This movement of the lever H turns the rock-shaft *p* so as to close the valves *f* and *m*. In like manner, when the gas-holder descends and reaches its lowest position, the lever H is thrown back and the valves opened. The lever H is, by a rod, *w*, connected with a diaphragm within a casing, L, on the box F, said casing having a suitable air-inlet, whereby the movement of the lever H is sufficiently retarded so as to prevent any blows or jars on the mechanism.

The hydrocarbon liquid used is to be contained in a suitable vessel, into which water passes from an elevated tank, so as to force the liquid, by hydraulic pressure, through the pipe *b* into the retort.

The flow of the liquid is stopped in the following manner: In the bottom of the steam-chamber B of the retort is a small chamber, M, which communicates, by a pipe, *x*, with a vertical pipe, *y*, having an air-chamber, N, on its upper end. The lower end of the pipe *y* enters a casing, O, in which is a suitable flexible diaphragm, and to this diaphragm is connected a rod, *z*, passing downward through a tubular guide, and having its lower end attached to one end of a pivoted lever, P.

In the inlet-pipe *b* for the hydrocarbon liquid is a valve with rod *a'*, which rod is connected to one end of an elbow-lever, R, the other end of which has a weight, S, suspended from it. V is a trigger pivoted at its lower end, and its upper end arranged to catch on a shoulder on the lever P. From the side of the trigger V projects a pin, *b'*, which passes under the lever R.

The chamber M and pipes *x y* are to be filled with water, the water standing a certain distance up into the air-chamber N. The water in said chamber M becomes heated by the steam surrounding it in the steam-chamber B, and as said water expands it will, by the air-pressure above, force the diaphragm and rod *z* downward, turning the lever P, which will then catch on and hold the trigger V, the pin *b'* on said trigger holding up the weighted end of the lever R, so that the valve in the inlet-pipe *b* will be open, and the hydrocarbon liquid can be forced in by the hydraulic pressure. When from any cause the water in the chamber M should become cold—which will happen if the steam goes down, and the liquid would then fail to be vaporized, but pass in liquid form to the gas-holder—the diaphragm and rod *z* will draw up the lever P, releasing the trigger V, and the weight S turns the lever R to close the supply-valve and stop the flow of the liquid.

The rod *z* is, within its tubular guide, provided with a spring for raising the same after the pressure runs down in the chamber M and its connections.

To further insure the stoppage of the flow of hydrocarbon liquid, I have arranged the following devices: A' is the gasometer, with the rising and falling gas-holder B' therein. The gasometer A' is formed at the bottom with a chamber, C', into which the pipe D enters from the retort. E' is a pipe leading from the chamber C' into the gas-holder, as shown in Fig. 3. The pipe D enters the chamber C' at one side, and its inner end is directly above the edge of a pan, D', which is pivoted at this side to suitable posts in the bottom of the chamber. At the opposite side the pan D' is connected a rod, *d'*, which passes upward through a tube, *e'*, formed on or attached to the inside of the gasometer A'. To the upper end of the rod *d'* is attached another rod, *h'*, which passes down on the outside of the gasometer and connects with a trigger, F', pivoted above the lever P, above described.

A spring should be arranged in any suitable manner to hold the pan, when empty, in a level position.

As long as gas only passes from the retort into the chamber C', and from thence into the gas-holder, the pan D' remains in the horizontal position; but if at any time the hydrocarbon liquid should pass in that form from the retort it will of course flow into the pan D' and tilt the same. The rods *d' h'*, then acting upon the trigger F', cause the same to turn the lever P and release the trigger V, when the weight S will cause the lever R to close the valve in the fluid-inlet pipe *b*.

In case the valves *f m* should fail to work it would be necessary to provide some means for automatically shutting off the flow of the hydrocarbon liquid to the retort. This is accomplished by providing the gas-holder B', at or near the top and bottom, with projections *i'* in such positions as to come in contact with the point of connection between the rods *d'* and *h'*.

Supposing, for instance, that when the gas-holder is descending, and as it reaches the point when, as above described, the valves *f m* should open, the said valves should fail to operate, the gas-holder would continue its descent and the upper projection *i'* will then strike the rods *d' h'* and force the same down, causing the trigger F' to operate on the lever P, in the same manner and for the same purpose as above described. In like manner, if the valves should fail to operate when the gas-holder is ascending, the lower projection *i'* will lift the rods *d' h'* and cause the same result.

It will be understood that this case is intended simply to embody improvements in construction, including many things in the different combinations which are already in use and previously patented to me.

I am, however, aware that an expansion-chamber with perforated nozzle arranged on top of the retort is not of itself new.

I am also aware that a gas-holder has been provided with a separate chamber in the bottom; and, further, that a casing with diaphragm and rod in connection with the lever H, as herein described, are not new; and I do not claim such features, broadly, as my invention.

Having thus fully described my invention,

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

1. The combination of the retort A, steam-chamber B, expansion-chamber C, valve *f*, nozzle *i*, and inlet E with valve *m*, substantially as and for the purposes herein set forth.

2. The combination of the valves *f m*, cross-bar *n*, rock-shaft *p*, levers G H, triggers I I, with pins *v v*, and the link J, lever K, and rod *t*, connecting with the gas-holder, substantially as and for the purposes herein set forth.

3. The combination, with the valves in the inlet-pipe *b*, of the rod *a'*, weighted lever R, trigger V, with pin *b'*, and shouldered lever P, with a mechanism for releasing the same, substantially as herein set forth.

4. In combination with the retort A B, the water-chamber M, pipes *x y*, air-chamber N, and casing O, with diaphragm and rod *z*, and mechanism connecting with the valve in the inlet-pipe *b*, substantially as and for the purposes herein set forth.

5. The tilting pan D', arranged in a separate chamber in the bottom of the gasometer, and connected with the valve for shutting off the flow of the hydrocarbon liquid, substantially as herein set forth.

6. The combination of the tilting pan D', rods *d' h'*, trigger F', and lever P, substantially as and for the purposes herein set forth.

7. The gas-holder provided with projections *i'* at top and bottom, in combination with the rods *d' h'* and mechanism for closing the supply-valve, substantially as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of June, 1879.

THEODORE G. SPRINGER.

Witnesses:
C. L. EVERT,
H. J. ENNIS.