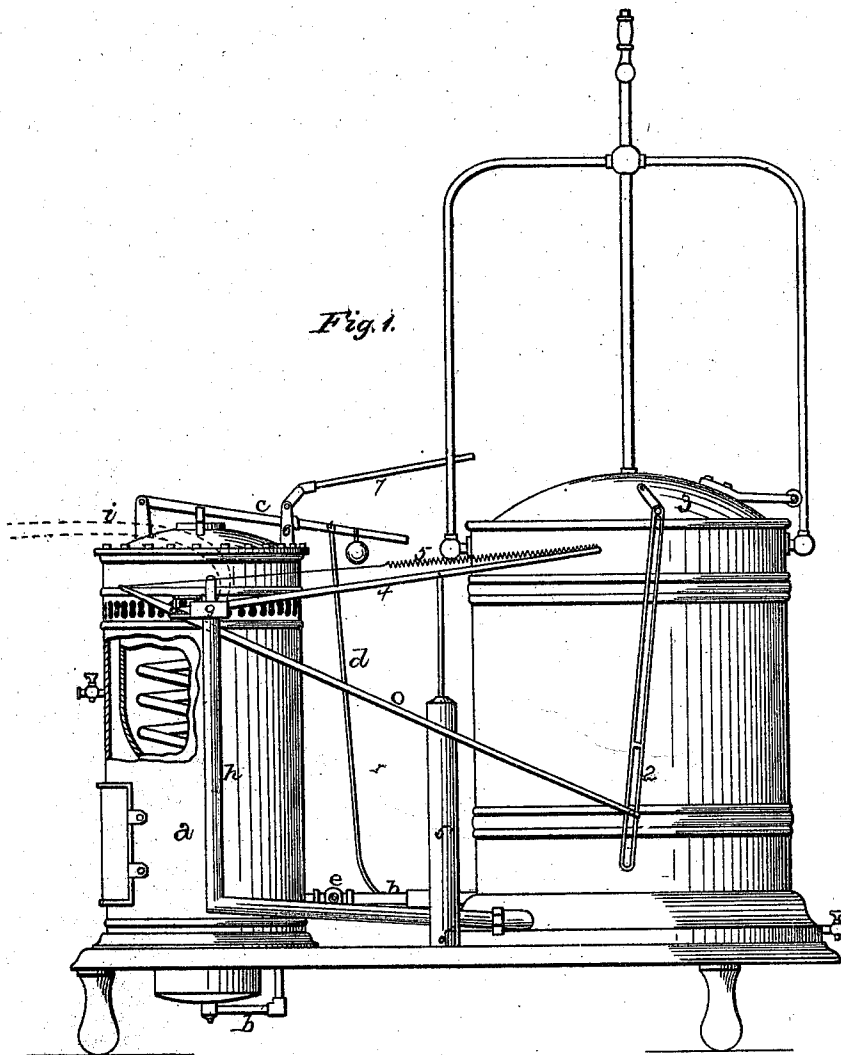


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Apparatus for Carburetting and Regulating the  
Pressure of Gases.

No. 142,525.

Patented September 2, 1873.



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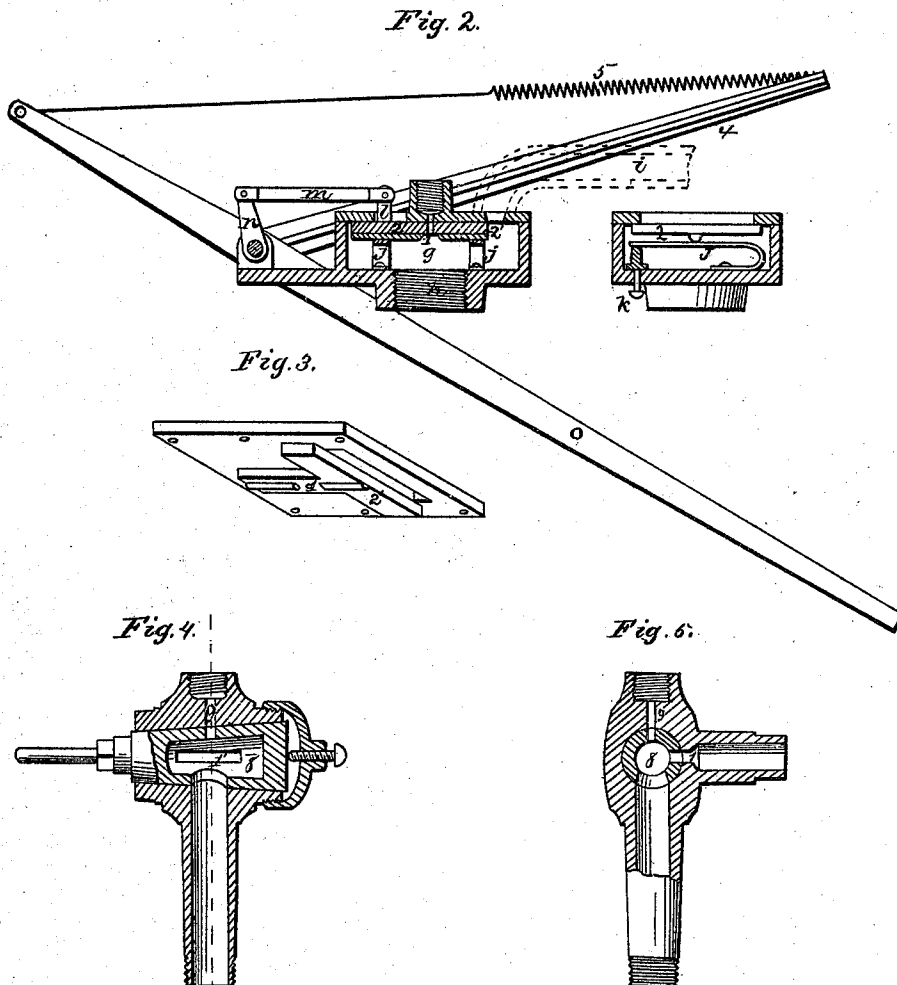
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# UNITED STATES PATENT OFFICE.

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

## IMPROVEMENT IN APPARATUS FOR CARBURETING AND REGULATING THE PRESSURE OF GAS.

Specification forming part of Letters Patent No. **142,525**, dated September 2, 1873; application filed August 22, 1873.

*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 State of New York, have invented certain new and useful Improvements in City Gas-Utilizer and Pressure-Regulator; 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.

The nature of my invention relates to an improved apparatus for enriching city gas and regulating its pressure; and it consists in, first, the mode of mingling with the ordinary city gas the vapor of any suitable carbonaceous oil, so as to enrich the gas and give it a greater illuminating power, and to regulate its pressure; second, the arrangement and combination of devices, which will be more fully described hereafter.

Figure 1 is a side elevation of my apparatus complete. Fig. 2 is a sectional view of one of the valves used. Fig. 3 is a perspective of a part of the same. Figs. 4 and 5 are sectional views of the rotary valve.

*a* represents the jacket which surrounds the retort in which the carbonaceous oil is vaporized, and which has the gas-pipe *b* extending up through its bottom, which has a burner upon its upper end for heating the water in the retort. Passing up through the retort in the form of a coil is the pipe through which the carbonaceous fluid is forced under hydraulic power, applied in any suitable manner. Where the requisite pressure can be obtained from the water-mains this power will be utilized for this purpose; and where there is no water-main, then the power may be obtained from an elevated tank. The oil will be placed in a tank capable of standing a high pressure, and then the water admitted through a pipe into its bottom. Leading from this tank will be a pipe, which will conduct a portion of the water out under a diaphragm upon which a weighted lever bears. The shorter end of this lever is connected by suitable devices to a cock placed in a water-pipe, so that the slightest movement of the diaphragm, either up or

down, will either open or close the cock, and thus regulate the pressure upon the oil. The retort is partially filled with water, which, as soon as it begins to boil, will vaporize the oil in the coil. As the pressure of the steam continues to increase in the retort, it presses up against a rubber diaphragm placed in its head, and acts upon the weighted lever *c*, which is connected by a rod, *d*, to a cock, *e*, in the gas-pipe, and thus regulates the amount of gas fed to the burner for heating the water in the retort. This cock is so constructed that it will never entirely close so as to extinguish the gas, and thus after having been once lit it will continue so as long as may be desired. As the vaporized gas passes from the pipe in the retort, it passes into the valve-chamber *g* under considerable pressure, and, escaping downward into the conducting-pipe *h*, it creates a downward suction so as to draw in the common gas from the pipe *i* to mingle with it. The aperture through which the vapor passes into the chamber is only about one-eighth of an inch in size, while the pipe *h* is about one inch in diameter. Moving back and forth in the top of the chamber is a T-shaped valve, *2'*, having an opening, *1*, through which the vapor passes, and suitable ribs or flanges formed upon its under side, so as to reduce the friction of the two springs *j*, which hold the valve upward against its seat. The valve and its seat are nicely ground to each other, so that the valve will move as freely as possible, its pressure being regulated by the springs which are adjusted by the set-screws *k*. To the top of the valve is secured an arm, *l*, which extends up through the top of the chamber, and is connected by a connecting-rod, *m*, to a crank, *n*. As the crank turns it acts upon the valve very suddenly, causing it to shut off both the vapor and the gas at once, so that while the vapor is passing through it must move with sufficient pressure to suck in the common gas, which it would not do if the closing was gradual. The lever *o* is pivoted upon the end of the crank-shaft, and has its longer end provided with a roller, which catches in a slot in the arm *2*, pivoted to the side of the gasometer *3*. Secured to the end of the crank-

shaft is a lever, 4, which is connected to the lever *o* by a spring, 5, and which operates the valve. As the gasometer moves upward from the pressure of the gas, the arm 2 draws up the end of the lever *o* until it passes the center of the lever 4, or rock-shaft, when the spring draws it downward with a jerk, or quick movement, and instantly shuts off the supply of gas. As the gas is burned the gasometer gradually sinks, letting the end of the lever *o* fall until it again passes the center of the rock-shaft, when the spring instantly opens the valve. Should the burner which heats the retort ever become extinguished, as soon as the heat of the water falls below  $212^{\circ}$  the hydrocarbon fluid will no longer be vaporized. Pivoted to a short standard, 6, on top of the retort is a lever, 7, long enough to reach over to the side of the gasometer, and having its short end bent so as to catch under the weighted lever *c*, and raise it upward with it. As the gasometer rises upward, a catch on its side catches under the end of the lever 7, and raises it upward until the end of the lever drops off the catch. When the gasometer descends, this catch strikes upon the top of the lever and prevents the gasometer from descending any lower, and again opening the valve to admit more gas. While the burner remains lit, the pressure of the steam keeps the weighted arm *c* raised upward, and this holds the lever 7 up so that the catch will not strike it. Upon the opposite side of the retort from the valve and mechanism just described is placed a rotary valve, 8, shown in Figs. 4 and 5, which is about one-half the capacity of the slide-valve. The vapor passes from the pipe in the retort through the small opening 9, while the gas passes in through the opening 1' and mingles with it, as already described. This valve is intended to be operated by hand or automatically, and may remain constantly open, if so desired, and may either be used to enrich the city gas, or to admit air to mingle with the vapor. When more gas is needed than the slide-valve will supply, the rotary valve will be kept constantly open, and increase the supply of gas about one-half. The valve 8 consists of a conical hollow plug which is held to its seat by a set-screw, 3', passing through the cap 4'. The opening 1', through which the gas passes, is a long slot, so that its closing and the closing of the small hole 9 will be simultaneous. As the sudden movements of the rock-shaft would have a tendency to jar and shake the machine and loosen the joints, I attach to it a piston which fits nicely in the cylinder 5', having a small opening through its base for the passage of air. When the shaft descends its movement is made slow and easy by the backward pressure of the air in the cylinder, which escapes through the hole very slowly, and in the same manner its upward movement is controlled by the slow entrance of the air to fill the vacuum.

Early in the evening, when the gas is first being lit, those near the gasometer have a greater pressure upon their burners than is necessary, while those at a distance have trouble to get enough to supply their actual wants.

Many devices have been applied to the pipes for regulating the pressure, which act well enough as long as the pressure is too great; but, when there is not pressure enough, they are worthless.

By the method described of forcing some hydrocarbon vapor into the pipes under pressure, not only is the gas increased over fifty per cent. in illuminating power, but, where the pressure is too low, by the suction of the vapor the gas is drawn from the street-mains and forced into the gasometer, thereby enabling the consumers to use it at the pressure which is most economical to them, giving them the greatest amount of light from a given quantity of gas.

In places where there is a steam-boiler, the steam may be introduced into the retort and vaporize the hydrocarbon instead of having to boil the water to do so, and thus save the expense of gas for heating it.

Having thus described my invention, I claim—

1. The process described of inducing the flow of gas from the city mains into a holder, and regulating the pressure thereof by the escape of hydrocarbon vapor under pressure, said hydrocarbon mingling with the gas and increasing its illuminating power, substantially as specified.

2. The combination of the gas-pipe *i* with a suction-chamber, *g*, and a retort or coil in which the hydrocarbon fluid is vaporized, substantially as described.

3. The valve 2', provided with the opening 1 for the passage of the vapor, and arranged to cut off the gas and vapor simultaneously, substantially as specified.

4. The T-valve 2', having ribs or flanges upon its under side, in combination with the springs *j* and set-screws *k*, substantially as shown.

5. The combination of the valve 2', connecting-rod *m*, crank *n*, lever *o*, rock-shaft 4, and spring 5, when arranged to operate substantially as specified.

6. The manner described of regulating the movement of the rock-shaft by attaching an air-piston to it, substantially as shown and described.

7. The rotary valve 8, having the openings 9 1' for the passage of both vapor and gas, and held to its seat by a set-screw, substantially as shown.

8. In combination with the gasometer and weighted lever *c*, a device, 7, for stopping the descent of the gasometer in case the light should become extinguished, substantially as described.

9. The combination of the jacket *a*, retort

or coil, weighted lever *c*, and connecting-rod *d* for operating the cock *e*, all substantially as set forth.

10. The valve 8, having both ends solid and a chamber in its center, and a small opening for the vapor, an elongated opening for the gas, and a circular discharge for both the vapor and gas, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of August, 1873.

THEODORE G. SPRINGER.

Witnesses:

A. N. MARR,

EDM. F. BROWN.