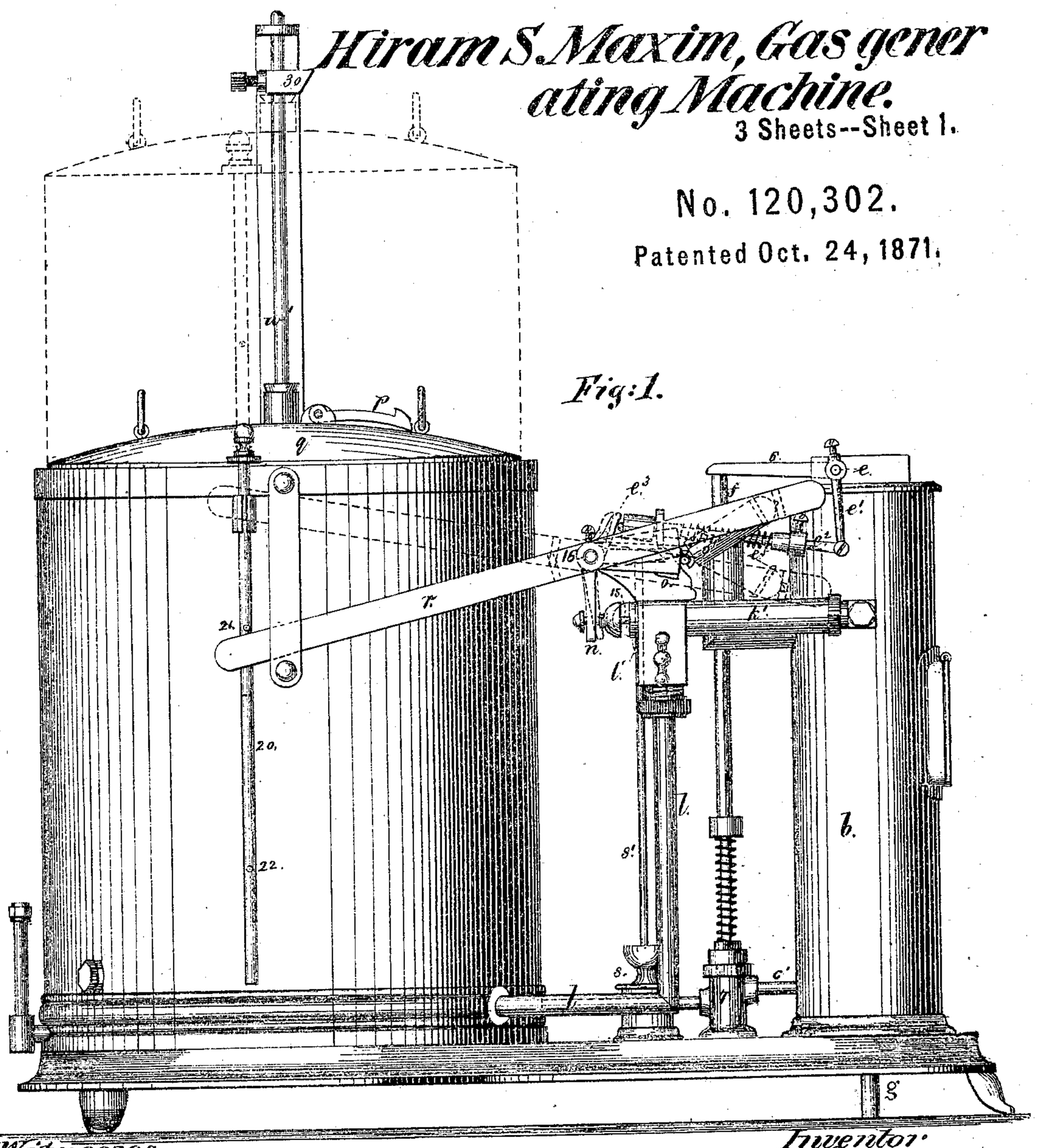
Hiram S. Maxim, Gas generating Machine.

3 Sheets--Sheet 1.

No. 120,302.

Patented Oct. 24, 1871.

Fig: 1.



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Geo. T. Pinckney

Inventor:
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per L. W. Serrell
Attorney

Fig: 2.

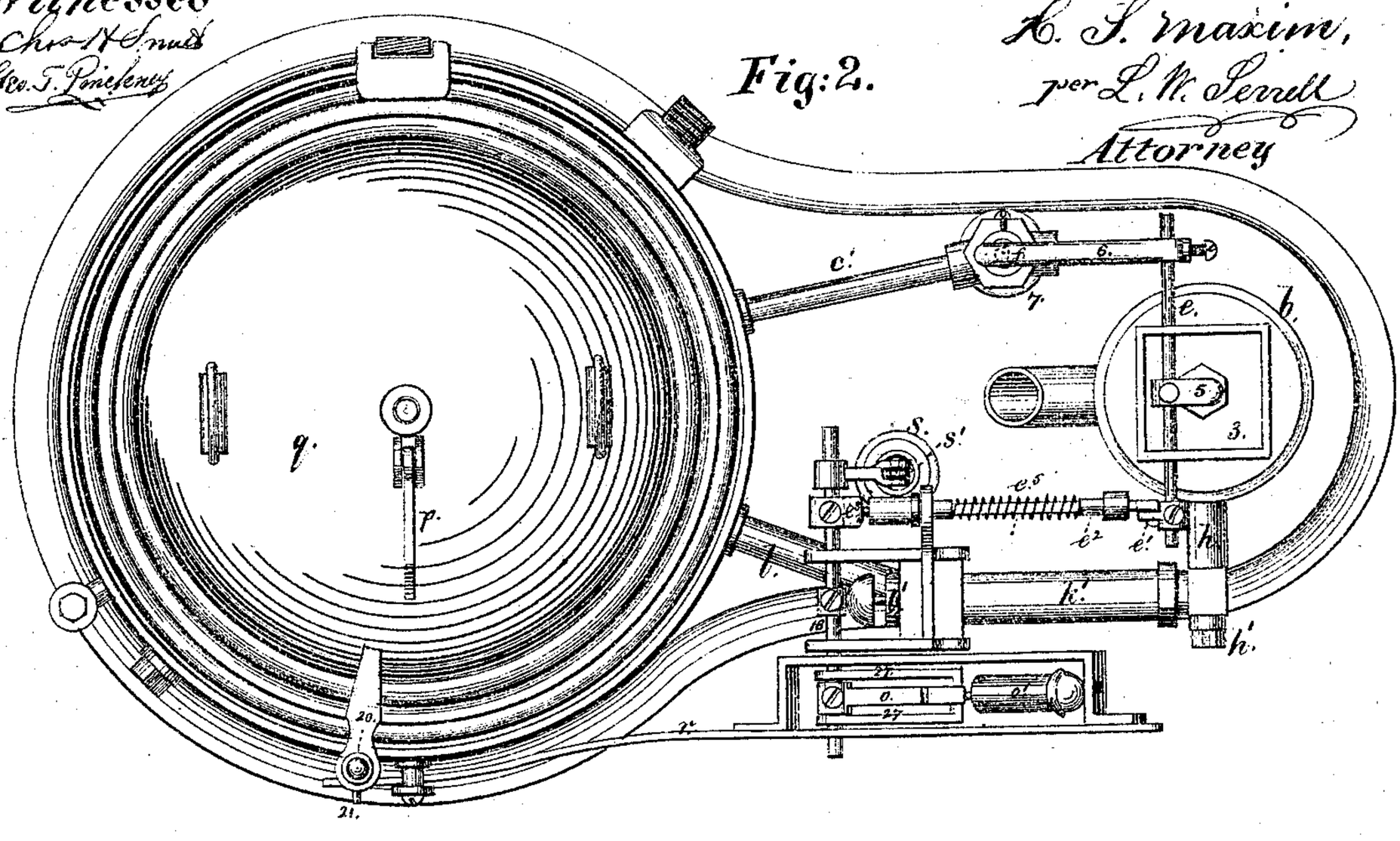

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Fig: 3.

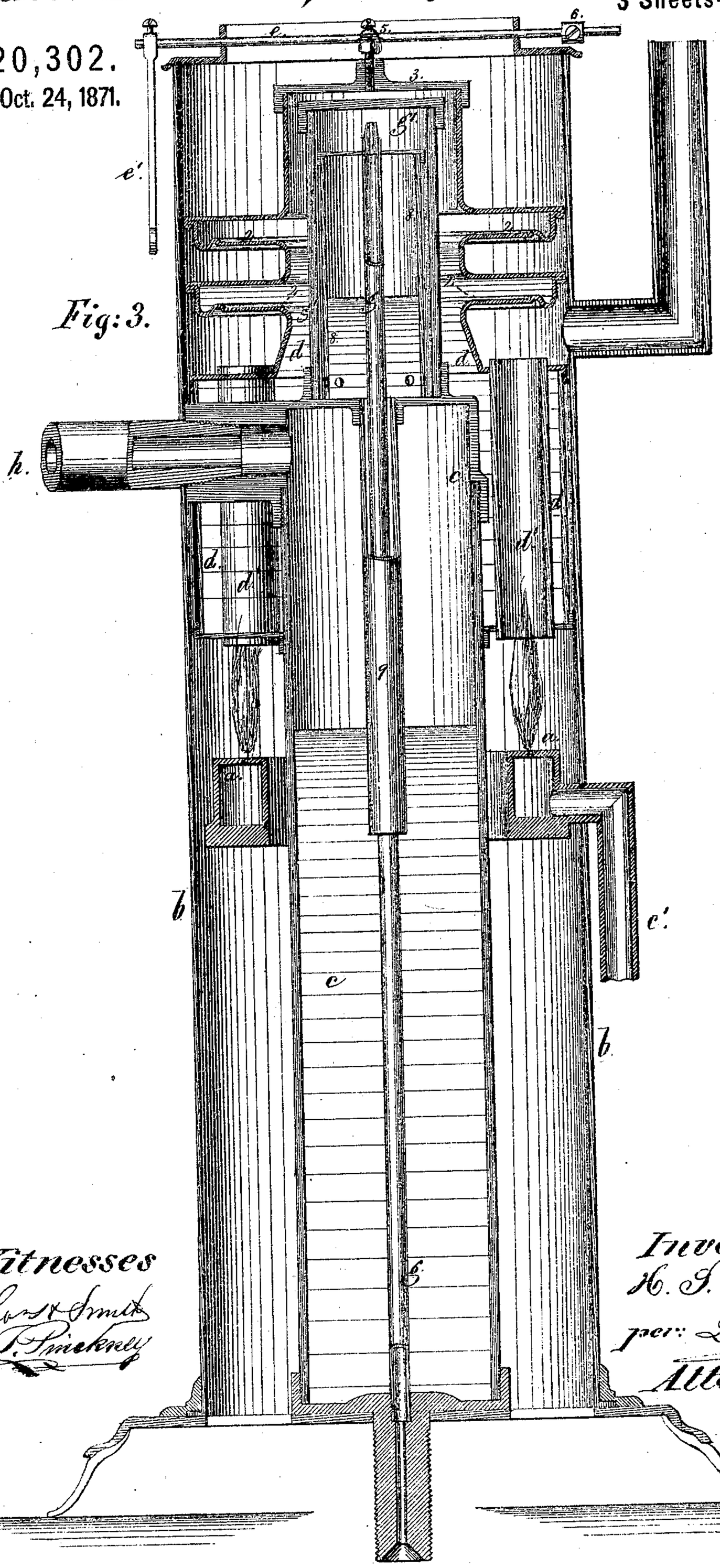

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Fig: 4.

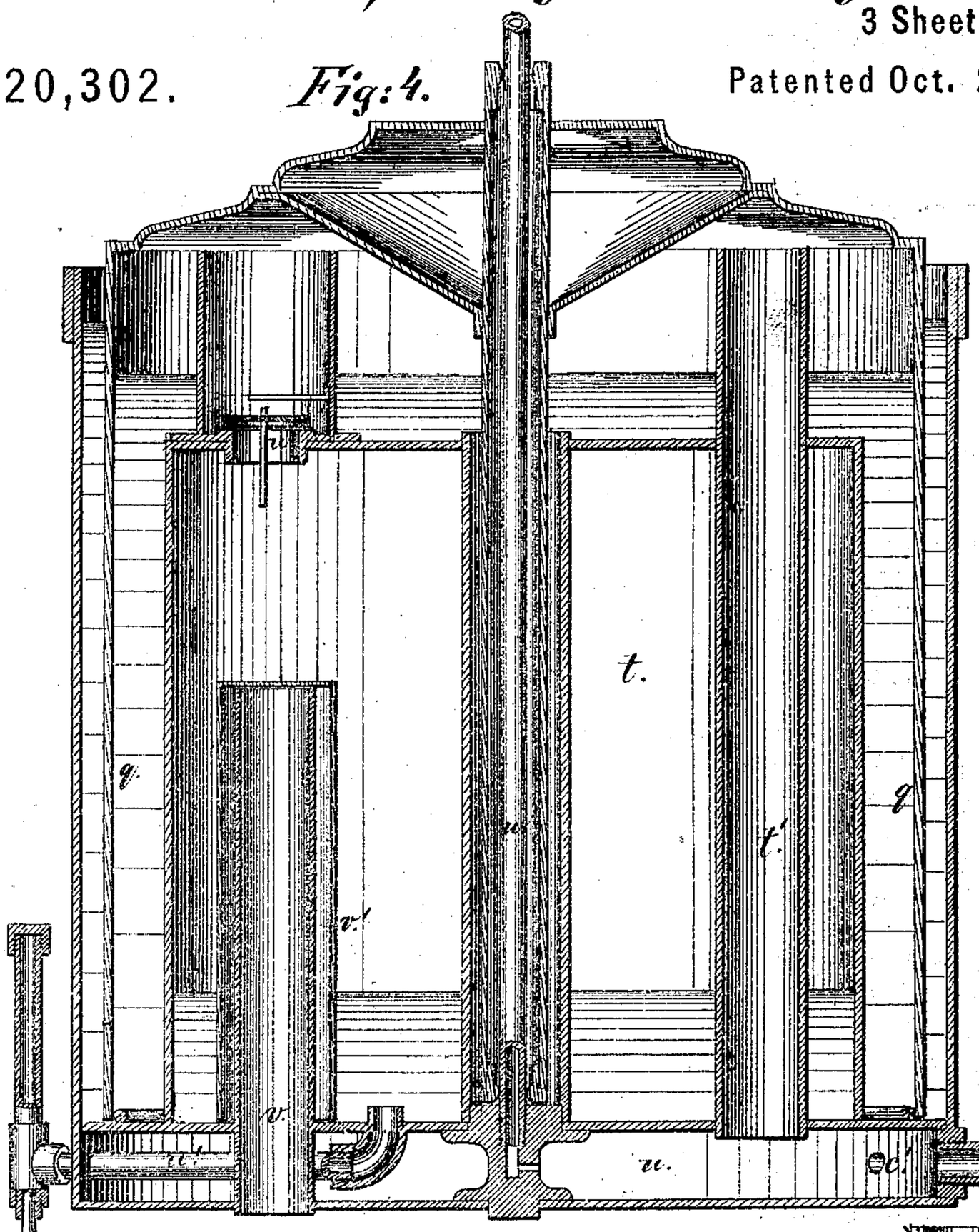


Fig: 6.

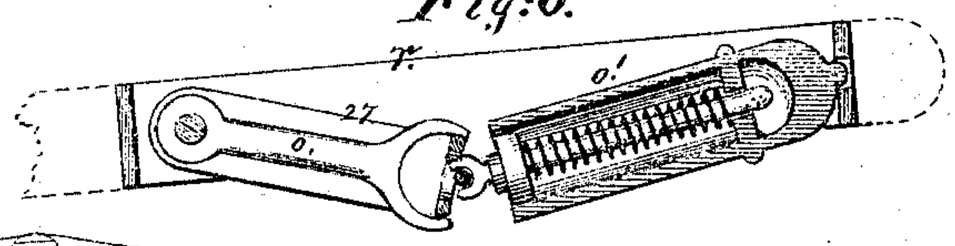
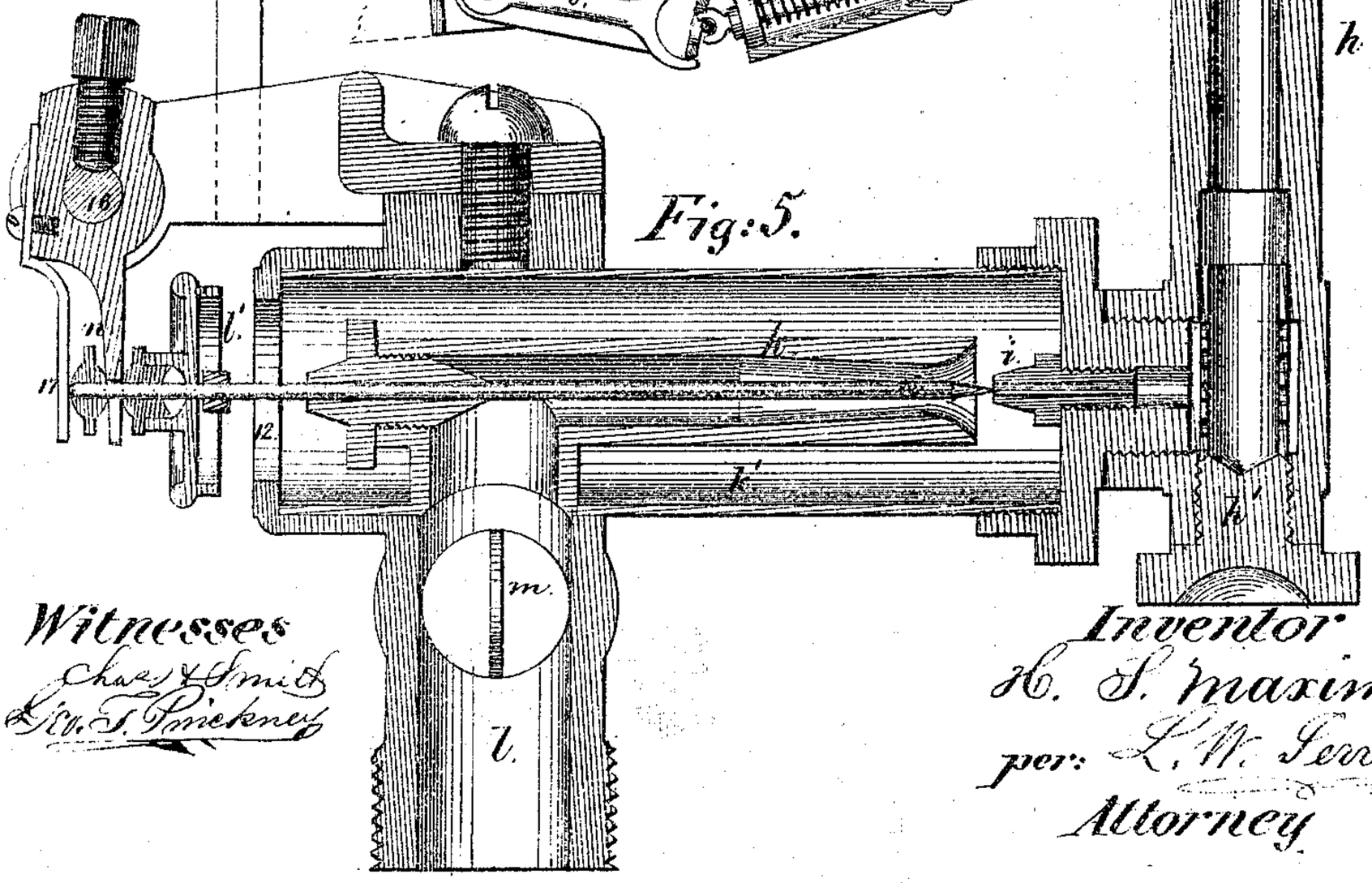


Fig: 5.



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UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF BROOKLYN, NEW YORK, ASSIGNOR TO MYRON H. STRONG, OF SAME PLACE.

IMPROVEMENT IN GAS-MACHINES.

Specification forming part of Letters Patent No. 120,302, dated October 24, 1871.

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of Brooklyn, Kings county, New York, have invented an Improvement in Hydrocarbon Gas Apparatus; and the following is declared to be a correct description thereof.

In my apparatus the liquid hydrocarbon, such as gasoline, is supplied at the top of the evaporating retort by a novel arrangement of holding chambers and pipes, so that the gases generated regulate the admission of the fresh liquid. A water vessel surrounds the retort, and it is constructed so that the pressure gives motion to the head of the vessel, corrugated rings being provided in such vessel to allow of the same, and this motion is employed to regulate the vapor passing to the burners of the retort; thereby the heat becomes self-regulating. The mixture of air with the gasoline vapors is proportionate, and when the supply of vapor is shut off the air-inlet is simultaneously closed. The filling of the gas-holder causes the gas to be shut off, and also the air-inlet, thereby preventing any escape; and if in this position the gas-holder is hooked up, the parts are ready for instantaneous use after the burners of the retort are relighted. I employ a carbureting bellows in connection with the gas-holder, so that the gas-holder will be filled with the necessary inflammable vapor by simply lifting up the holder and thereby drawing in air through said bellows, and thereby the necessary gas will be found for the burners that heat the retort. The movements of the rock-shaft and spring-toggle that control the valves are prevented from being too sudden by a dash-pot and piston moving therein.

In the drawing, Figure 1 is a side view of the apparatus. Fig. 2 is a plan of the same. Fig. 3 is a section vertically of the generating retort. Fig. 4 is a section of the gas-holder and bellows. Fig. 5 is a section of the jet-nozzle, air-valve, and parts connected therewith; and Fig. 6 is a section of the spring-toggle valve mover.

The burners *a* of the retort are within the case *b* and arouud the retort *c*, and supplied with gas from the gas-holder *q* by the pipe *c'*. Around and above the retort *c* is the water-chamber and vessel *d*, through which the heating tubes *d'*, over the burners *a*, pass, and the upper part of this water-vessel is made with concentric flanges or corrugated rings 2 2, in order that the top 3 of said vessel may yield and rise with too great heat and pressure or descend with the minus pressure due to a decrease of temperature. This motion is availed of to move the rock-shaft *e* by the toe 5, and by the arm 6 to act upon the rod *f* to a valve in the case 7 in the pipe *c'*, and regulate the flow of gas to the burners *a* in proportion to the heat required and consumed in the apparatus. The supply of gasoline or liquid hydrocarbon passes from a suitable reservoir (elevated, or under pressure by compressed atmosphere) through the stand-pipe *g* in the retort *c* to the cylinder *g'* that is above said retort *c*, and the pipe *g* passes nearly to the top of the cylinder *g'*. Around the pipe *g*, and within the cylinder *g'*, is a tube, 8, closed at the top and with holes near the bottom, and from the bottom of *g'* a dip-pipe, 9, leads down into the retort *c* to a point below the burners *a*. The gasoline or liquid hydrocarbon passes in through the pipe *g* and the jet thereof falls upon the tube 8 and thence runs into the retort *c*, and the warmth of the parts causes the production of the vapors required for mixing with the air, and these go by the pipe *h* to the jet-nozzle *i*, hereafter referred to. If there is an accumulation of vapors in *c* the liquid will be drawn through the dip-pipe 9 up into the tube 8, and from there up between the outside of 8 and the inside of *g'*, and back to the pipe *g* to the reservoir. In this manner the gaseous vapors are prevented from passing to the gasoline-holder, and the gasoline in passing into or out of the retort is sufficiently mixed and agitated to insure the evaporation of the same with uniformity, and any thick or tarry liquid subsides in the retort instead of being evaporated and condensing upon the valves and pipes and obstructing the same. In the pipe *h* is a screw-plug, *h'*, having a perforated tube or strainer extending therefrom into the pipe *h* so as to arrest any particles of red lead or other substances that may remain in the pipes and that would obstruct the jet *i*. This plug and strainer can be easily removed and cleaned. In line with the jet *i* is the mixing-tube *k*, opening to the gas-pipe *l* that leads to the gas-holder, and around

this tube *k* is the case *k'*, with an opening, 12, for the admission of air. The needle-valve 15 for the jet *i* passes through the mixing-tube *k*, and its stem carries the air-valve *l'*, that is allowed to slide on said stem, and a gland forms a tight packing. The toe *n* of the rock-shaft 16 acts against this valve *l'*, and the spring-finger 17 acts against the stem of the valve 15; hence these valves move in the same direction, and when the air-valve *l'* is closed the jet *i* is also closed, thereby effectually preventing the escape of gas. The spring-finger 17 yields to any inequality in construction or adjustment, so that both valves take a proper bearing. When the rock-shaft is moved and the valves opened the air is admitted and the vapor-jet draws the air into the mixing-tube *k*. The valve *m* in the gas-tube *l* serves to regulate the quantity of air mixed with the gasoline-vapors by producing a greater or less reactive pressure in the mixing-chamber, and hence lessening or increasing the vacuum action of the jet to draw in the air. The rise and fall of the gas-holder *q* operates the rock-shaft 16. I make use of a slide-rod, 20, and pins 21 22, to act near the extremes of motion upon the lever *r;* said lever swings upon the rock-shaft 16, and upon said rock-shaft 16 is an arm, *o*, between a shackle, 27, that forms one part of the toggle, and the cylinder *o'* and spring-plunger (Fig. 6) forms the other part of the toggle. The end of the arm *o* has two forks at the end, coming at the sides of the shackle, but rather further apart than the width of said shackle, so that the toggle will be sure to pass the center and act upon said arm *o* with a slight blow and insure the moving of the same and the rock-shaft and valves. It is to be understood that the lever *r*, as it swings, carries the outer end of *o'*, the spring is compressed, and as the parts pass the center line the spring expands, bending the toggle in the opposite direction to the movement of the lever *r*, and opening the valves *l'* and 15 as the gas-holder descends, and closing them as the gas-holder reaches its upward movement; hence, if the gas-holder is held up by the hook *p* and catch 30, or similar device, the operations of the gas-apparatus will be suspended, the burners *a* will cease to burn, the valves will be closed, and the appatatus will remain in readiness for use by simply unhooking *p* and lighting the burners. The dash-pot *s*, in which is a loose piston fastened on the rod *s'* that passes to an arm of the rock-shaft 16, is employed to prevent sudden concussion and noise in opening or closing the valves. The apparatus might cool down in consequence of the burners *a* being extinguished, either accidentally or by design, in which case the gasoline liquid might flow through the retort and jet *i* and escape. This is prevented by the rock-shaft *e*, arm e^1, rod e^2, and toe e^3 on the rock-shaft 16. When there is any heat, so that the apparatus is kept warm and the gasoline vapor generated, then the heat of the water in *d* will keep the head 3 sufficiently elevated to draw back the rod e^2 against the action of the spring e^5 and leave the valves *l'* and 15 to be opened or closed by the movement of the gas-holder; but if the water in *d* cools, the atmospheric pressure moves the head 3, leaving the spring e^5 free to force the rod e^2 forward and move the rock-shaft 16 and toggle, and effectually close the valves *l'* and 15, so that the apparatus can remain in this condition and there will not be any opportunity for leakage. Within the gas-holder *q* is a tight cylinder, *t*, that is immersed in the water of said holder, as seen in Fig. 4, and through this the gas-pipe *t'* passes from the gas-space *u* in the bottom of the holder, to which the gas-pipe *l* leads, and from which the pipe *c'* leads to the burners *a*. Within this cylinder *t* gasoline is introduced through the pipe *w'*, and there is an inlet air-pipe, *v*, rising within this cylinder *t*, over which is a loose tubular sleeve, *v'*, closed at the top, and there is also a valve, *w*, opening upward within a surrounding case.

It will now be understood that when the apparatus is not in operation and the gas-holder is at its lowest point the said holder can be filled with carbureted air for the burners *a* by simply drawing up the holder *q*, which acts like a bellows, drawing the atmosphere through the pipe *v* and down through the sleeve *v'*, and out in bubbles through the gasoline, thereby impregnating the same sufficiently to burn; the valve *w* lifting and then closing, retains all the gasoline and vapors for future use. The vertical tube *w'* forms a guide for the gas-holder, and also receives at its upper end a test-burner to examine the quality of the light.

I claim as my invention—

1. The retort for vaporizing the liquid hydrocarbon, made with a water-jacket surrounding such retort and heated by the burners *a*, substantially as specified.

2. A water-vessel interposed between the retort for liquid hydrocarbon and the heating flame, in combination with the mechanism, substantially as specified, for regulating the supply of inflammable material to the flame in proportion to the heat and pressure, substantially as set forth.

3. The supply-pipe *g* for liquid hydrocarbon passing through the retort into the vessel *g'*, in combination with the tube 8 and dip-pipe 9, for the purposes set forth.

4. The plug *h'* and strainer, removable, as shown, and applied between the generating retort and the jet *i*, for the purpose set forth.

5. The air-valve *l'* upon the stem of the jet-valve 15, and allowed a slight movement, so that the two valves act together in the manner set forth.

6. The rock-shaft 16, arm *n*, and spring-finger 17, in combination with the air-valve *l'* and jet-valve 15, substantially as and for the purposes set forth.

7. The valve *m* in the gas-pipe *l* leading from the mixing-chamber *k*, for the purposes set forth.

8. The lever *r*, arm *o*, and toggle 27 *o'*, con-

structed and applied substantially as set forth, to give motion to the rock-shaft 16, as specified.

9. The dash-pot *s* and rock-shaft 16, in combination with the valves *l'* and 15 and actuating-toggle and lever *r*, as and for the purposes specified.

10. The gasoline-vessel *t* in the gas-holder, and an air inlet-pipe and outlet-valve for filling the gas-holder with inflammable gas by drawing the same up, substantially as set forth.

Signed by me this 4th day of September, A. D. 1871.

HIRAM S. MAXIM.

Witnesses:
CHAS. H. SMITH,
GEO. T. PINCKNEY. (66)