

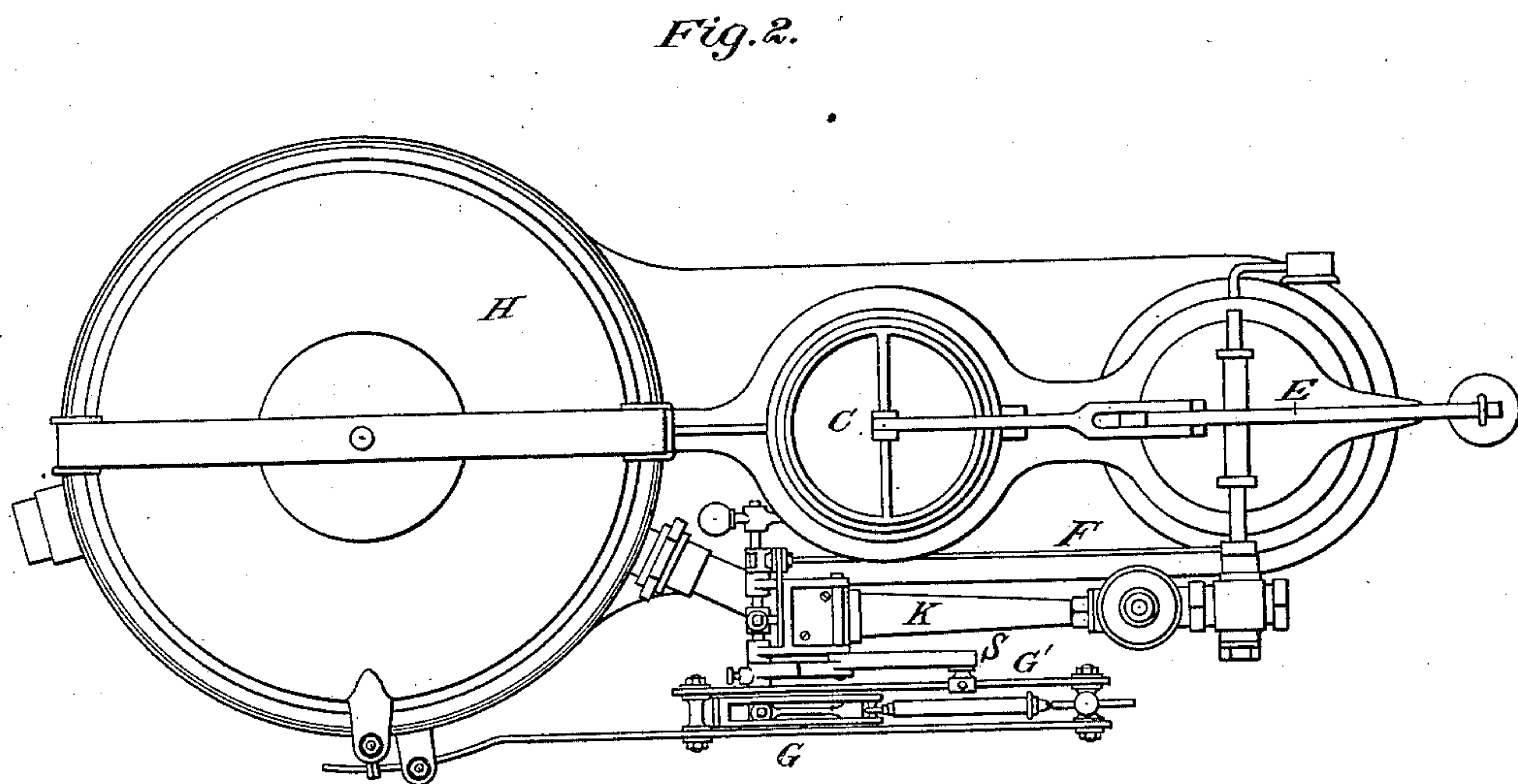
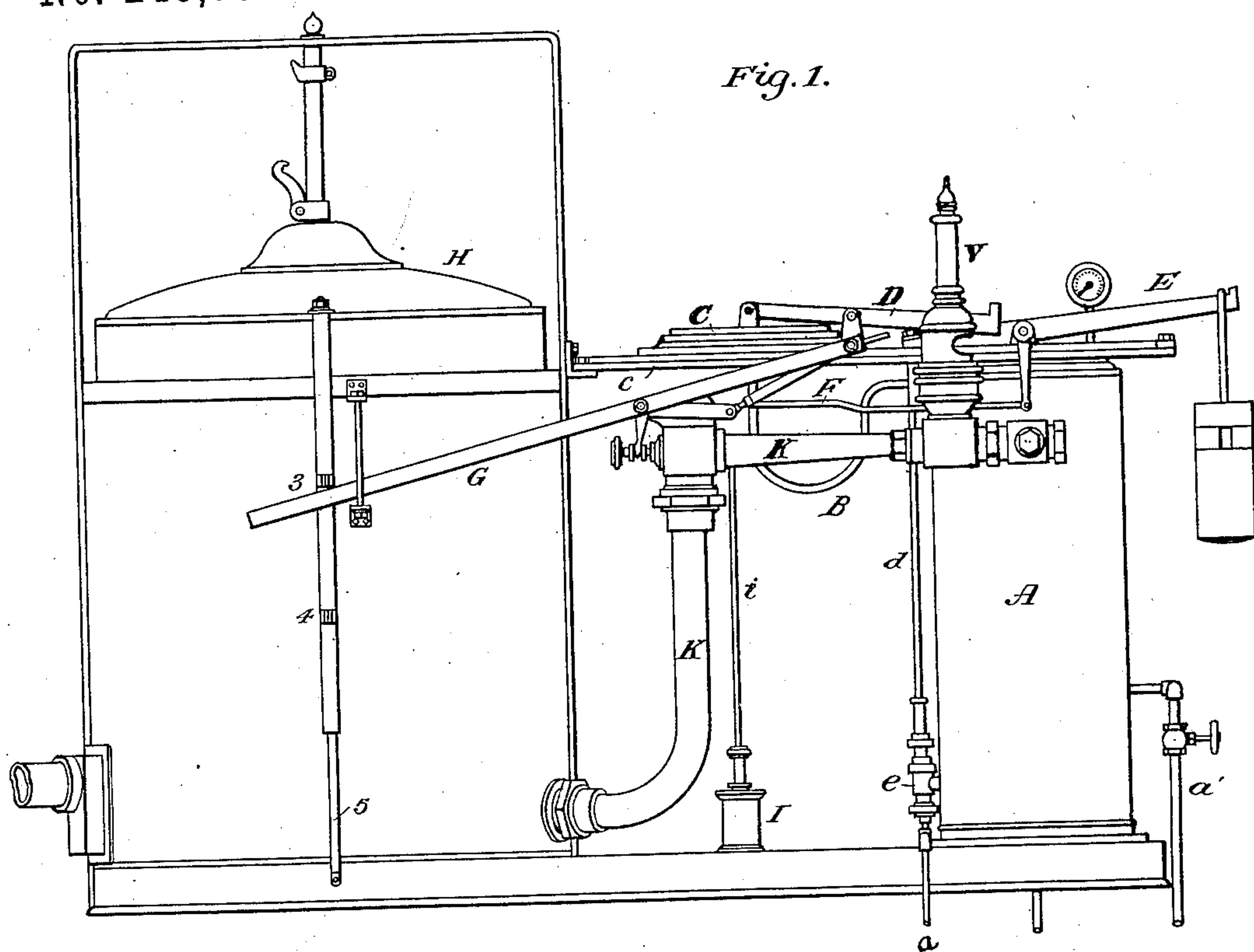
(No Model.)

2 Sheets—Sheet 1.

H. S. MAXIM.
GAS MACHINE.

No. 245,736.

Patented Aug. 16, 1881.



Attest:
R. J. Barnes.
Cl. Rick

Inventor:
Hiram S. Maxim
per Parker W. Page
att'y.

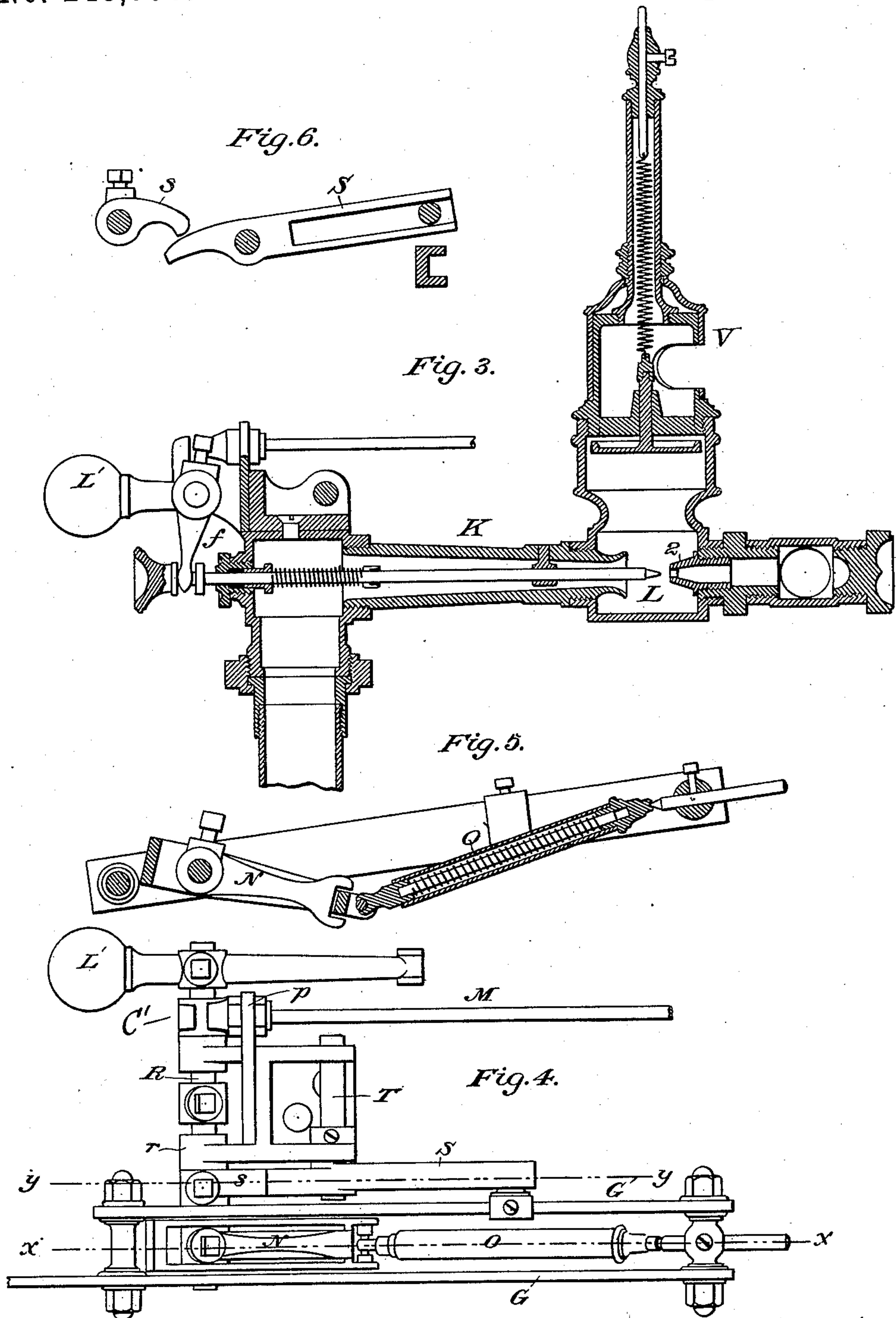
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UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF BROOKLYN, NEW YORK.

GAS-MACHINE.

SPECIFICATION forming part of Letters Patent No. 245,736, dated August 16, 1881.

Application filed June 28, 1881. (No model.)

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Gas-Machines, of which the following is a specification, reference being had to the drawings accompanying and forming a part thereof.

In former patents granted to me I have shown machines for the manufacture of gas from liquid hydrocarbons—such for instance, as gasoline—said machines consisting, in the main, of a retort, into which the gasoline is admitted, by a suitably-arranged pipe leading from a receptacle containing a supply of the liquid, and in which it is volatilized by the heat from a surrounding steam-jacket. With the retort is connected a gas-reservoir, by peculiarly-constructed devices, through which the vapor is forced, and by which it is mixed with a predetermined quantity of air. Such machines, being automatic in their action, necessarily involve the employment of several regulating devices—for instance, with the volatilizing-retort, a means of controlling automatically the degree of heat to which the retort is subjected; and so, also, for the other portions of the machine, there must be mechanism for regulating the amount of air which is mixed with the vapor, for stopping the supply of gas or air when the containing-reservoir is filled to a certain point, and, finally, for closing the gas-valves, shutting off the supply of liquid hydrocarbon, or both, when such a point is reached.

To the instrumentalities effecting these results my present invention relates, and more especially to the first and last named, or those which are employed in connection with the retort for controlling the temperature, and those whose functions are to shut off the supply of gas when the reservoir is full, or when a predetermined quantity of gas has been introduced therein, or when the steam has ceased to enter the devices for heating the hydrocarbon liquid.

In the accompanying drawings, Figure 1 is a side view of the complete machine embodying my improvements; Fig. 2, a top view of the same; Fig. 3, a detailed view, in section, of the devices for connecting the retort with the reservoir, and for mixing the gasoline-vapor

with air; Fig. 4, a detailed view of the devices for stopping the supply of gas and shutting the valves at the desired moment. Fig. 5 is a sectional view on line *xx* of Fig. 4, and Fig. 6 another section, taken on a line *yy*.

A is the steam-jacket surrounding the retort, and into which steam is admitted by pipe *a* and valve *e*. *a'* is the usual escape-vent for steam or the water of condensation.

From the upper portion of steam-jacket A leads a pipe, B, to a pressure-diaphragm, C, of rubber or corrugated plates. The pipe B is is made with an elbow or trap, as shown, in which the water of condensation accumulates, thus preventing the heating of the diaphragm by the access of steam thereto.

Immediately above the retort is a lever, E, connected by rod *d* with the steam-valve *e*, and weighted for the purpose of keeping the rod, &c., in its most elevated position and the valve open. The pressure-diaphragm C is on a platform or bridge extending from the top of jacket A to the stationary frame of reservoir H. To this platform the diaphragm is secured, so that it occupies a position above the steam-jacket; and midway, or thereabout, between said diaphragm and the vessel A is pivoted a lever, P, one end being secured to the top of the diaphragm, the other bifurcated and adapted to engage with and press upon the lever E, as shown in Fig. 1.

It will be understood from the foregoing that when the valves are first opened for the admission of steam to volatilize the liquid in the retort, the diaphragm is in its normal condition, and the engaging ends of levers D and E raised. As the pressure and consequent temperature of the steam increase, however, the diaphragm is expanded and depresses the long arm of said lever D, that now operates to control the admission of steam by closing more or less the valve *e*. The position of the diaphragm, it will be seen, is attended with many advantages, among them that the direct access of steam is prevented by the trap or elbow in pipe B, and also that the water of condensation driven up into the diaphragm from pipe B runs back into the jacket when the steam is shut off, thus preventing the diaphragm from being frozen up in cold weather when not in use. The volatilized liquid in the retort is forced through a tube and nozzle into

the tube K in the manner described in my former patents, receiving in chamber L an admixture of air, which is determined in amount by a valve, V, closed and adjusted by a tension-spring. From tube K the commingled gases enter the receiver H, which, as it fills, gradually rises. The mixing-tube K, communicating with the gas-reservoir H, contains the usual jet, 2, closed by a needle-valve operated by a toe, *f*, on a rock-shaft, R, journaled in bearings *rr*, provided therefor in a frame mounted upon tube K. C' is a collar, also carried by the rock-shaft, and provided with a projecting lug, against which a rod, F, acts. The latter is connected by a crank with lever E, and is carried forward against this lug on collar C', when for any cause the steam has been cut off or a sufficient pressure ceases to exist in the jacket A. When this occurs the rock-shaft is turned and closes the valve, thus preventing the flooding of the machine by the liquid.

The rise and fall of the gas-receiver H operates the rock-shaft in the following manner: Stops 3 4 on a slide-rod, 5, raise or lower the lever G when the reservoir reaches its highest or lowest piston. Said lever G swings upon the shaft R, upon which latter is an arm, N, between a shackle forming one part of a spring-toggle, of which spring-cylinder O and a spring-plunger forms the other. The end of the arm N has two forks coming at the sides of the shackle, but slightly farther apart than the width of the shackle, so that the toggle, when it passes the center, will act upon the arm N with a slight blow, and move the same, and with it the rock-shaft, when the requisite degree of movement is imparted to rod G. The action of these parts, as will be understood by reference to my patent No. 120,302, is to close the gas-valve 2 when the reservoir H has reached its highest point, and to open the same when it has reached its lowest position. It sometimes happens, however, that the toggle-lever alone is not sufficient to move the rock-shaft and close the valves, and to provide against this contingency I have combined with the lever G a device which is adapted to act on the shaft R and turn it when for any cause the toggle has failed to perform its allotted functions. Said device consists of a lever, S, fixed to a rock-shaft, T, the long arm of which is moved by one branch, G', of the lever G, with which it is connected by a pin on G', which slides in a slot cut along one side of the long arm S, the short arm being rounded off and extending under an arm or a simple lug, *s*, on the rock-shaft R. The lever is set in such a position that when the extreme of upward motion of the reservoir H is reached it will be brought by the depression of the long arm against the under side of arm *s*, turn the shaft, and thus close the valves.

To prevent too sudden concussion and noise in opening or closing the valves, the dash-pot I, in which is a piston connected by rod *i* to an arm, L', on the rock-shaft, is employed.

The character and functions of many of the parts forming the above-described apparatus have been described only so far as is necessary to an understanding of the present invention, since they already form the subject-matter of a former patent, No. 120,302, and enter only incidentally into a consideration of the present case. It will be understood, therefore, that the character of said devices may be greatly varied without affecting in any way the present object in view, which is to provide a more efficient means of regulating the heat effecting the volatilization of the hydrocarbon liquid than has been heretofore known, and also to guard against accident and insure the action at the proper time of the valves, and preventing the flooding of the said valves by combining with the devices hitherto employed other and more reliable mechanism whose functions are called into play on the failure of the others to act.

I am aware that pressure-diaphragms have been used in connection with machines of this description for regulating the heat applied to the vaporization of the contents of the retorts. Such, therefore, I do not claim; but

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

1. The combination, in an apparatus for the volatilization of liquid hydrocarbon with the steam chamber or jacket inclosing the retort, of an expansible diaphragm connected therewith by a pipe having an elbow or trap for retaining water, said diaphragm being fixed to a rigid support above or on a level with the top of the jacket and operating by the pressure of the steam therein to control the action of the valve mechanism, as and for the purpose set forth.

2. The combination, with steam-jacket A, gas-reservoir H, and support or platform *c*, placed on a level with the top of the jacket, of an expansible pressure-diaphragm, C, pipe B, having an elbow or trap, and levers D E and rod *d*, connecting the diaphragm with valve mechanism, as described, whereby an automatic regulation of the admission of the steam into the jacket is effected, as set forth.

3. The combination, with the rock-shaft R, lever G, and toggle mechanism, substantially as described, operating at predetermined positions of the lever to turn the said shaft, of a supplementary lever raised or depressed by the lever G, and operating by engagement with an arm or lug on rock-shaft R to turn the same when the toggle has failed to act or the lever G has been raised beyond a predetermined limit, as set forth.

In testimony whereof I have hereunto set my hand this 15th day of June, 1881.

HIRAM S. MAXIM.

Witnesses:

PARKER W. PAGE,
W. W. CONKLIN.