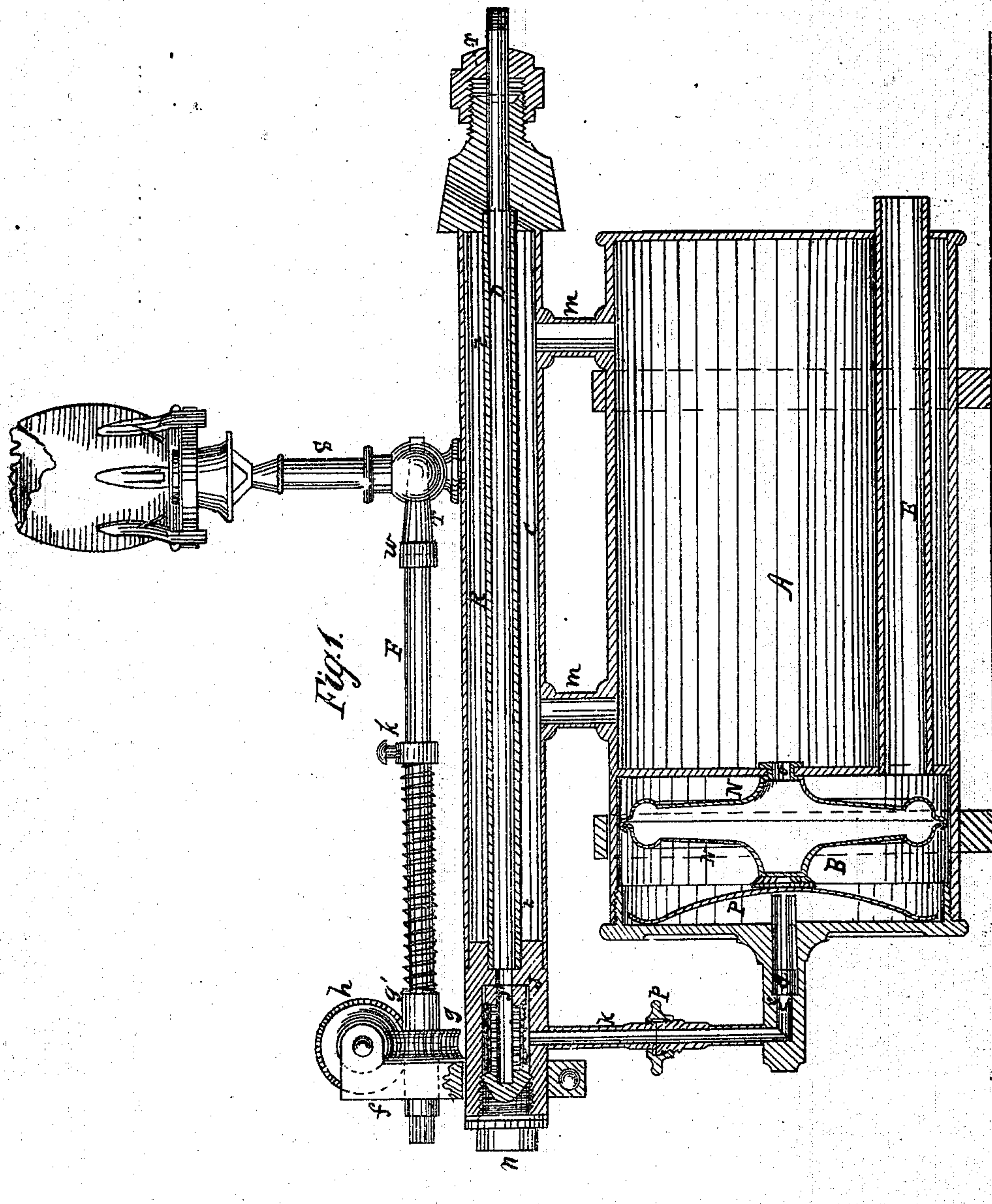


H. S. Maxim.

Steam Gas Generator.

Nº 71400

Patented Nov. 26, 1867.



Witnesses
Thos Tusche
Wm. Brown

Inventor:
H. S. Maxim
Per *Maxim & Co.*
Attorneys

H. S. Maxim.

Steam Gas Generator.

No 71400

Patented Nov. 26, 1867.

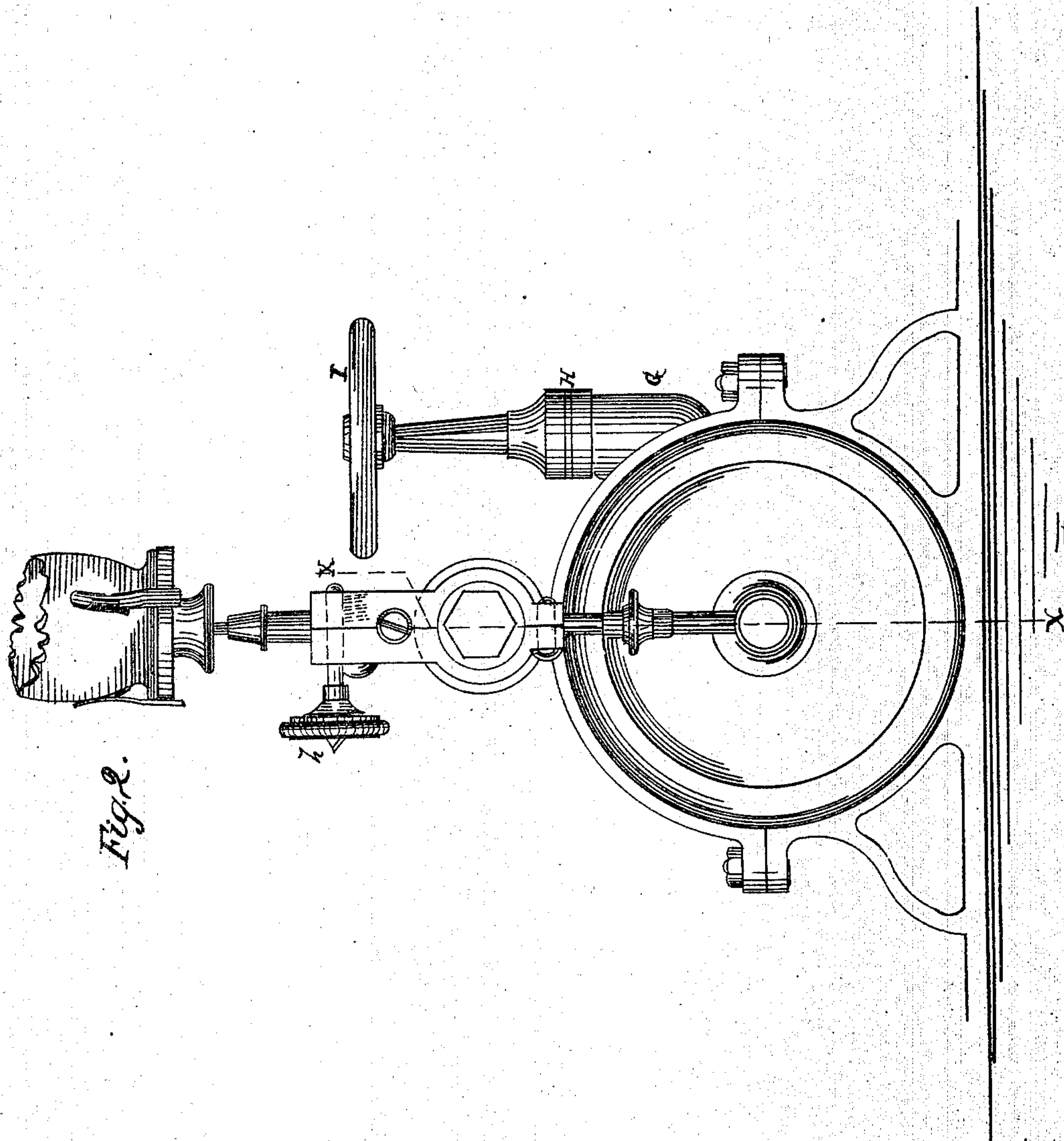


Fig. 2.

Witnesses.
Thos. Giese
Wm. Brown

Inventor
H. S. Maxim
Per *Munroe*
Attorneys

UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF NEW YORK, N. Y.

IMPROVED STEAM GAS - GENERATOR.

Specification forming part of Letters Patent No. 71,400, dated November 26, 1867.

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of the city, county, and State of New York, have invented a new and Improved Steam Gas-Generator; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a new and improved method of generating gas from volatile oils for illuminating purposes, superheating the same, and regulating the flow of steam by the pressure of the gas; and the invention consists in generating and superheating the gas by a current of steam from a steam-boiler, and in an arrangement of flexible diaphragms, which are expanded or operated upon by the pressure of the gas generated, whereby the flow of steam is regulated, as will be hereinafter more fully described.

Figure 1 represents a sectional elevation of the apparatus, showing the various parts in their proper positions, the section being through the line *xx* of Fig. 2. Fig. 2 is a front or end elevation.

Similar letters of reference indicate corresponding parts.

This apparatus is mainly composed of a gas-generating cylinder, marked A, which is connected with a regulating-chamber, B, with regulating-diaphragms therein, a superheating-tube, C, a steam-pipe, D, and a pipe, marked E, for the discharge of the water of condensation, together with a rod, F, and an arrangement for regulating the flow of gas to the burner connected therewith. In this apparatus gas is generated from gasoline, naphtha, benzine, or other hydrocarbon liquids of a volatile nature, and the liquid is introduced into the generator A through the pipe G, (seen in Fig. 2,) which pipe is provided with a screw-valve at H, operated by the hand-wheel I, as seen in the drawing.

The steam from a steam-boiler is conveyed through the superheating-tube C by the steam-pipe D into a section of a tube seen at the end of the superheating-tube, marked J, which section contains a fine wire-gauze screen which surrounds a perforated section of a tube, J', at *a*. The steam passes from the tube through

the small orifices or perforations in the tube J', and through the gauze into the vertical pipe K, downward through the valve L into the regulating-chamber B and pipe E. This pipe E, as will be seen, is surrounded by the fluid, which will be converted into vapor or gas with a rapidity proportioned to the temperature of the pipe E. This pipe, when the apparatus is in operation, will contain steam or water of condensation, or both combined, at a temperature far above the boiling-point of the volatile or gas-producing liquid in the generator; consequently the liquid will boil and gas will be evolved or generated therefrom, which will fill the cylinder A, and be discharged, not only into the superheating-tube C, through the stands *m m*, but in between the regulating-diaphragms N N' in the chamber B, through the aperture *o*.

P is a flexible diaphragm, to which the valve *d* is attached. The valve *d* is conical in form, with its seat at *e*, which, when closed, effectually stops the flow of steam into the generator. Whether the valve is closed or open depends upon the pressure of the gas between the regulating-diaphragms N N', for as they are expanded or forced asunder by the pressure of the gas the diaphragm N' will be pressed against the diaphragm P, which will force the valve to its seat or toward its seat, thus cutting off, or partially cutting off, the current of steam. It will thus be seen that the generation of the gas is automatically controlled by its own pressure.

After being discharged into the tube C the gas occupies the annular space R, where its temperature is increased to any required degree by absorbing heat from the steam in pipe D. The gas is conducted to the burner through the stand S.

T is a valve-cock on the end of the rod F, which passes through the globe *u* on the stand. The flow of gas to the burner V is regulated by this cock, which is connected with the rod F by a square socket at *w*. *f* is a stand which supports the other end of the rod F. *g* is a worm-wheel on a sleeve, *g'*, (through which the rod F passes,) which wheel engages with a perpetual screw on the shaft of the finger-wheel *h*, as seen in the drawing. *j* is a spiral spring on the rod F, which bears against the end of the sleeve *g'* at one end and against the ad-

justable collar *k* at the other end. It will be seen that the tension of this spring keeps the valve-cock *T* constantly to its seat.

By the use of the worm-gear before mentioned the valve-cock is adjusted, and the flow of the gas to the burner is regulated with the greatest nicety.

The section of a tube, *J*, with the wire-gauze screen *J'*, is confined in a chamber at the end of the superheating-tube *C* by the screw-plug *n*, which allows the screen to be taken out and cleaned as often as may be necessary. The steam, in passing through this wire-gauze screen, is cleansed from any dirt or foreign substances which it may contain before it is discharged into the pipe *K*. The pipe *K* is in two parts, which are connected by a screw-coupling, *p*, as seen.

r is a stuffing-box on the steam-pipe *D*.

In using this apparatus for generating gas for the head-light of a locomotive the steam-pipe is rigidly attached to the boiler by some proper steam-connection; but to properly adjust the burner or light to the reflector, and for facility in igniting the gas, the apparatus itself must not be rigidly fixed, but be arranged so that it may be drawn forward while the steam-pipe remains stationary. For this purpose there is a supplementary or guiding tube fixed in the superheating-tube *C*, which surrounds the steam-pipe *D*, as seen in the drawing in yellow. This tube is marked *t*. It is fixed steam-tight at both of its ends, so that

the apparatus may be drawn from the steam pipe or moved forward or back, as may be desired, without interfering with the current of steam into the generator, or with the flow of gas to the burner.

I do not confine myself to any particular method for making the joints and connections, nor to any particular construction of the parts of the apparatus, so that the essential features of my invention are preserved. The details may be varied, perhaps, in many ways by other mechanical devices essentially the same; but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for generating gas by steam from gasoline, naphtha, benzine, or other hydrocarbon oils where the flow of the steam into the generator is governed and controlled by the pressure of the gas so generated.

2. In combination with a steam gas-generating apparatus, the screen *J'*, substantially as and for the purposes described.

3. In combination with a steam gas-generating apparatus, the superheating-tube *C* and the interior supplementary tube *t*, substantially as and for the purposes herein shown and specified.

HIRAM S. MAXIM.

Witnesses:

WM. F. MCNAMARA,
ALEX. F. ROBERTS.