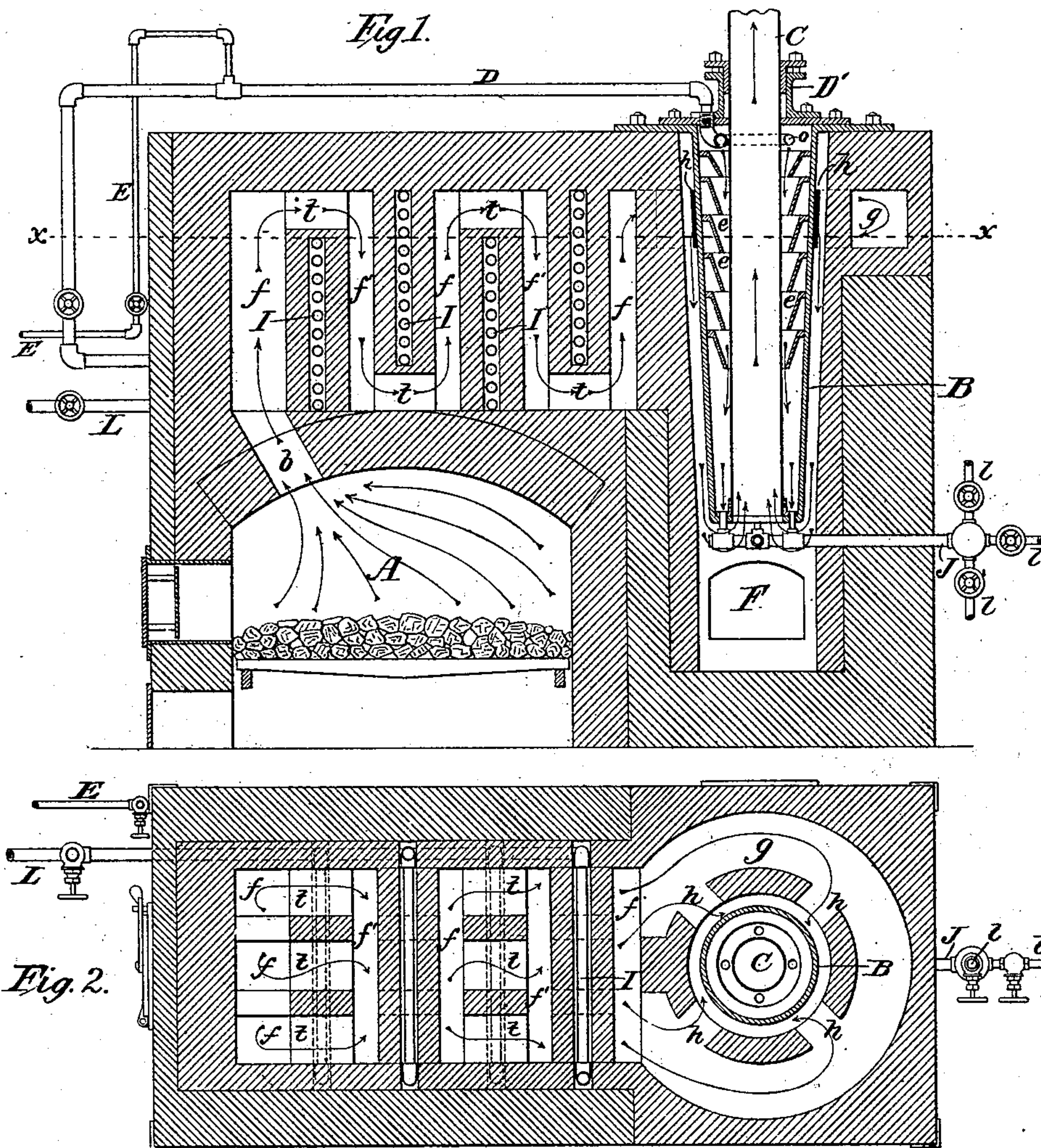


(No Model.)

H. F. HAYDEN.
HYDROCARBON GENERATOR.

No. 275,207.

Patented Apr. 3, 1883.



Witnesses:
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UNITED STATES PATENT OFFICE.

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HYDROCARBON-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 275,207, dated April 3, 1883.

Application filed February 26, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. HAYDEN, of Washington, in the District of Columbia, have invented certain Improvements in Hydrocarbon-Generators, of which the following is a specification.

My present invention relates to apparatus for generating gas or vapor from liquid hydrocarbons; and the invention consists in a novel construction of the generator or retort, and in a novel construction of the furnace and superheater, all as hereinafter more fully described.

Figure 1 is a longitudinal vertical section of the apparatus, and Fig. 2 is a horizontal section on the line *x x* of Fig. 1.

The object of this invention is to produce an economical apparatus for generating vapor or gas from liquid hydrocarbon, in connection with superheated steam, and that can be run continuously for a considerable time.

To this end I construct the generator or retort B in such a manner that the heat or products of combustion from the furnace shall pass around its exterior surface, and then up through the center of the same, so as to more effectually utilize the escaping heat, and at the same time I so construct the superheater and the furnace-flues as to utilize the heat in its passage from the furnace to the generator in a most effective manner for superheating the steam.

In the accompanying drawings, A represents a furnace, which is arched over, as shown in Fig. 1. Near the front the arch is pierced with a number of openings, *b*, of suitable size for the passage of the products of combustion, these openings connecting with a vertical flue, *f*, which at its upper end is connected by transverse passages *t* with a descending flue, *f'*, this latter being connected at its lower end by similar passages *t* with another ascending flue, *f*, and so on to any extent desired, these several passages thus forming one continuous flue from the furnace A to the flue or chamber in which the generator or retort B is located, as clearly shown in Figs. 1 and 2. At the point where this alternately ascending and descending flue terminates it enters a horizontal circular flue, *g*, which surrounds the generator B near its top, and has a series of openings, *h*,

through which the heat enters the chamber in which the generator is suspended, as shown in Figs. 1 and 2.

It will be seen from this construction that a vertical wall or partition of fire-brick is located between each of the ascending and descending flues *f* and *f'*, and within these walls or partitions I arrange my superheater, which consists of one or more coils or manifolds of pipe, I, as shown in Figs. 1 and 2, there being but one shown, but more being used, if desired.

A pipe, L, serves to supply free steam from a boiler (not shown) to the superheater, and a pipe, D, conveys the superheated steam to the generator B, where it terminates in or is connected with a coiled pipe or ring, *o*, located within and at the top of the generator B, as shown in Fig. 1, this ring or coiled pipe *o* being provided on its lower side with a series of small perforations, through which the mingled steam and oil is sprayed upon the cones or nozzles *e*, located within the generator.

The oil is fed by any suitable means through a pipe, E, into the steam-pipe D, at some distance from the generator, as shown in Fig. 1, so that the two shall be thoroughly intermingled, and the oil be more or less vaporized before entering the generator.

The generator or retort D consists of an elongated metallic vessel or body, having a central metallic pipe or flue, C, extending vertically through its center, as shown in Fig. 1, it being secured to the bottom by means of a flange and bolts, or in any suitable manner, and there being a stuffing-box, D', arranged at the top of the generator, through which this pipe or flue C passes, to allow for the expansion and contraction of the parts, and still keep the joint steam-tight. This central pipe or flue, C, is to be made of sufficient size to serve as a flue or chimney for the furnace, as whatever smoke or gases pass the generator must pass up through this central tube, C, which may enter a separate chimney, or may itself be extended sufficiently high to form the necessary chimney, in which latter case the extended portion will be made of plate-iron of the proper thickness, and will be provided with suitable means of support.

Inside of the body or case of the generator

I arrange a series of nozzles, *e*, as shown in Fig. 1, they being of such a diameter as to leave an annular space between them and the central tube, C, for the passage of the oil, steam, and vapor from the top, where they enter, to the bottom, where they escape in the form of a vapor or gas.

The pipe J, through which the vapor or gas is taken from the generator, is connected to the bottom thereof by a series of short vertical pipes—four (more or less) in number—all of which enter from below, as shown, so as to draw equally from all sides of the generator at the bottom, and thus prevent the tendency of the hydrocarbon to form a deposit at any point therein, which tendency to form deposits has hitherto been one of the most serious difficulties with this class of apparatus. Outside of the wall I have shown several pipes, *l*, branching from this main pipe J, for conveying the vapor or gas to different points, where it is to be burned or otherwise used. I prefer this plan rather than to have each pipe lead directly from the generator, because, if separate pipes were used, whenever any one or more of them was closed there would be a liability of its becoming clogged or stopped up with the carbonaceous deposit, more especially at the point where it was connected with the bottom of the generator, whereas in this case, no matter how many or how few of the branch pipes be in use, whatever vapor leaves the generator must pass through the several outlets arranged at uniform distances around the bottom, and through the main pipe J, thus keeping them open and preventing the formation of a deposit either in the bottom of the generator or in the pipe J.

By making the generator in the form of a comparatively long vessel, and arranging it in a vertical position, it will be seen that the hydrocarbon or oil entering at the top will be drifted or forced directly down through it and out at the bottom, thus greatly aiding to prevent the formation of any deposit therein, and by shutting off the oil and turning on the steam alone just as work is stopped for the day the generator can be left thoroughly cleaned.

By means of the central tube or flue, C, it will be seen that the heating-surface of the generator is largely increased, and that the heat is brought in closer contact with the material in the generator.

By the arrangement of the generator in relation to the heat-flues it will be seen, also, that the heat entering through the circular flue *g* and the passages *h* will be delivered uniformly, or practically so, on all sides of the generator B, and, passing down the outside of the same, will then pass up through the center, thereby utilizing the heat to a much greater advantage than usual in hydrocarbon-generators.

The entire body of the furnace, with the exception of the outside, is to be built of fire-brick or similar refractory material, and a door, F, should be provided, as shown at Fig. 1, at the lower end of the generator, to afford access to the pipes there. The nozzles *e* are designed to be of a continually-decreasing diameter from the top downward, and are to be so held in place that they can be easily removed whenever desired by simply taking off the top of the generator and without removing the latter from its position.

This apparatus is designed more especially for generating hydrocarbon vapor to be used as a fuel for heating-furnaces or for any other purpose for which it may be desired, and the heat of the vapor should be about 1,000° in order to give the best results. If it be desired to convert the vapor into a fixed gas, the heat must be increased, the degree of heat being regulated by the management of the furnace.

Having thus fully described my invention, what I claim is—

1. A generator for hydrocarbon vapors, consisting of a vertical conical body, B, with a vertical flue, C, extending up through the same, substantially as shown and described.

2. The combination, in a hydrocarbon-generator, of the case or body B, having a series of nozzles, *e*, arranged therein, and the central tube or heat-flue, C, passing through the same, substantially as described.

3. In combination with a vertical generator or retort, B, two or more vertical pipes arranged to take the contents out through the bottom of said retort, substantially as and for the purpose set forth.

4. In combination with the generator-body B and central heat tube or flue, C, the stuffing-box D', arranged to operate substantially as set forth.

5. The combination of the furnace A, having the ascending and descending flues *f* and *f'*, with the superheater I, arranged in the partition-walls between said flues, and the generator B, all arranged to operate substantially as set forth.

6. In combination with the generator B, provided with a central heat-flue, C, and set in a heat flue or chamber, as shown, the circular flue *g*, provided with openings *h*, whereby the heat is made to impinge upon the exterior of the generator on all sides and pass down outside of and up through the same, as set forth.

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Witnesses:

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