

J. B. ARCHER.

COMBINED GAS AND STEAM GENERATOR.

No. 341,625.

Patented May 11, 1886.

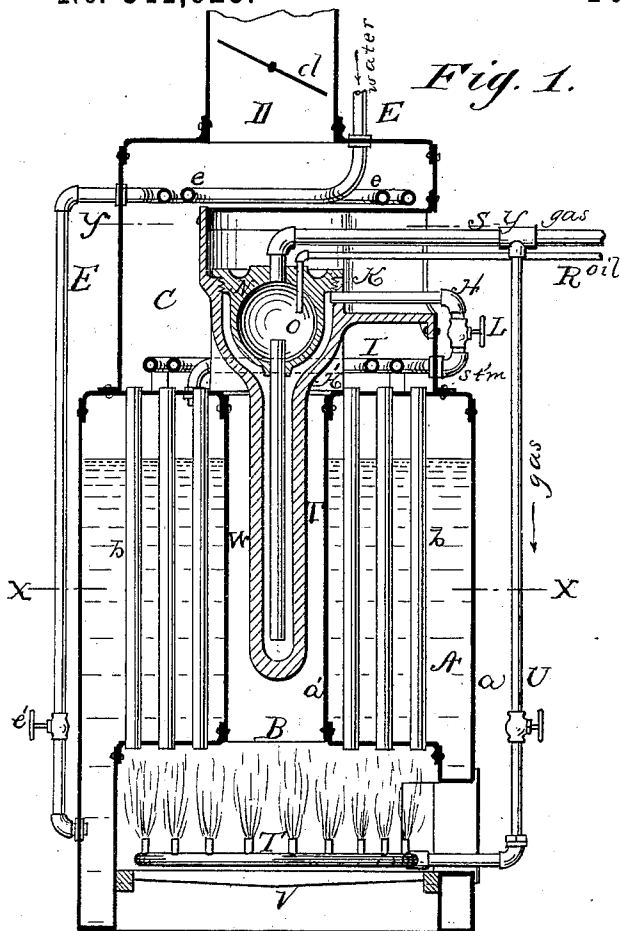


Fig. 1.

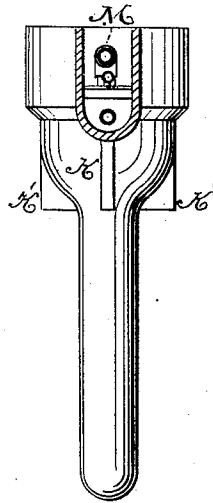


Fig. 4.

Fig. 2.

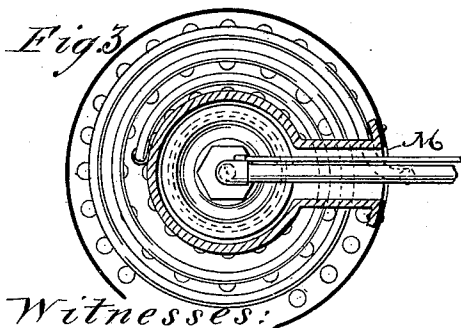
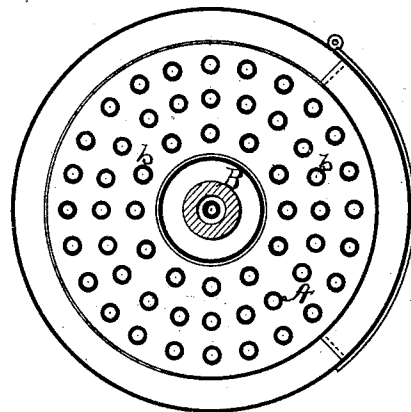


Fig. 3.



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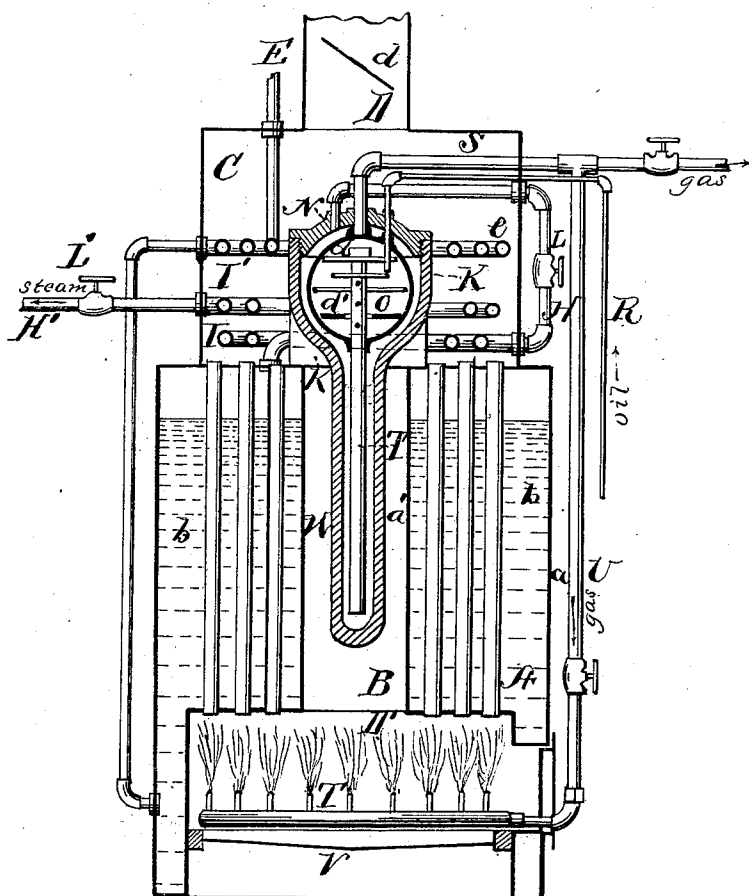
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Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN B. ARCHER, OF WASHINGTON, DISTRICT OF COLUMBIA.

COMBINED GAS AND STEAM GENERATOR.

SPECIFICATION forming part of Letters Patent No. 341,625, dated May 11, 1886.

Application filed April 23, 1885. Renewed April 12, 1886. Serial No. 138,646. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. ARCHER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Combined Gas and Steam Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the art of generating gas from petroleum and other hydrocarbons, and to that class of boiler-furnaces in which gas is used as the fuel, and the object of my invention is to combine in one and the same apparatus a vertical or other boiler, a boiler-furnace, and a gas-generator.

In the accompanying drawings, Figure 1 is a vertical section. Fig. 2 is a horizontal section on the line *xx* of Fig. 1; Fig. 3, a horizontal section on the line *yy* of Fig. 1, and Fig. 4 illustrates the gas-generator detached from the apparatus. Fig. 5 is a vertical section illustrating a modification of the invention.

The vertical boiler *A* is substantially of annular form, having a central vertical passage, *B*, which leads upward from the fire-box *D'* to a chamber, *C*, arranged on the top thereof.

Between the exterior cylindrical shell, *a*, and the interior cylindrical shell, *a'*, are arranged a number of upright tubes, *b*, which connect the fire-box with the heating-chamber *C*, having a chimney, *D*, provided with a damper, *d*. A water-pipe, *E*, having any number of coils, *e*, and furnished with a valve, *e'*, is led into the heating-chamber, and from thence passes downward to the boiler, in the outer shell of which a hole is cut for its reception. A steam-pipe, *H*, provided with a valve, *L*, and having any required number of coils, leads upward from the steam-room of the boiler, through the heating-chamber *C* to the exterior thereof, from whence it passes inward through the passage *M* to a hole cut for its reception in the exterior casing of the gas generator *K*. This exterior casing is extended downward through the central vertical passage, *B*, in such a manner as to form an annular flue for the escaping products of combustion around its exterior surface and between itself and the inner cylindrical shell, *a'*, of the boiler.

Within the casing of the gas-generator is

arranged a shell having an inner spherical or spheroidal chamber, *O*, and an upright tube, *T*, which extends downward within the depending part *W* of the outer casing in such a manner as to form around itself an outer steam-passage. The upper part of the shell *O* is screw-threaded to fit a corresponding thread formed upon the interior surface of the casing *K*, and is also furnished with a circular flange, which rests upon a shoulder formed on the said casing. The casing *K* is imperforate at all points where it is subjected to the direct action of the heated products of combustion, and the holes drilled for the reception of the steam-pipe *H*, oil-induction pipe *R*, and vapor-education pipe *S* are all in that part of the casing which borders upon the passage *M*, leading to the outer atmosphere, through which pass the said pipes. Upon the casing are formed four lugs or projections, *K'*, which rest upon the top of the boiler, and thus form a support for the gas-generator. A branch pipe, *U*, is joined by a *T*, connected to the vapor-education pipe, and leads downward to the burner *T*, which is arranged upon the grate *V* in the fire-box, so that it may be detached or removed when not in use.

The operation of the apparatus will be quite obvious to those skilled in the arts to which the invention relates from the foregoing description of its component parts. The heated gas arising from the fire-box, in which a fire may be started, when necessary, upon the grate *V*, pass upward through the tubes *b*, and passage *B* into the chamber *C*, and from thence to the chamber *D*, impinging on their way upon the casing *K* of the gas-generator, the coil *I* of the steam-pipe, and the coil *e* of the water-pipe, thus simultaneously heating the water flowing into the boiler and the steam flowing into the gas-generator chamber. The steam generated from the steam-room of the boiler passes through the coils *I* and pipe *H* to the passage between the casing *K* and the shell *N*, provided with the pipe *T*, thence downward through this passage and upward through the tube *T* to the spherical chamber *O*, where it meets the oil flowing in a regulated quantity through the pipe *R*, and transforms it into vapor or gas, according to well-known principles.

When steam or superheated steam is to be supplied to any suitable engine or apparatus

in which steam is used, an additional pipe, H', illustrated in Fig. 5, is made use of. This pipe, which is provided with a valve, L', and any desired number of coils, I', passes upward from the steam-room through the heating-chamber C, and a hole drilled in the casing thereof to the outside of the apparatus, where it may be suitably connected with an engine or apparatus in which it is to be used. It will thus be noted that the superheating of the steam is accomplished by merely placing over the top of the boiler a coiled or spiral pipe, one end of which leads to the engine and the other of which communicates with the interior or steam-space of the boiler.

In Fig. 5 is also illustrated a gas-generating chamber or retort, which I prefer in some instances to use. The exterior casing of the generator K' is extended downward through the central vertical passage, B, in such a manner as to form an annular flue for the escaping products of combustion around its exterior surface and between itself and the inner cylindrical shell, a', of the boiler. Within this casing is arranged a spherical shell, N, having an inner chamber, O, and upright tube T, which extends downward within the depending part W of the outer casing in such a manner as to form around itself an outer steam-passage. The tube T extends upward within the spherical shell, and is provided with a number of holes for the escape of the steam, a deflecting-disk, d, which closes its top, and two or more annular deflecting-plates, d'. The oil enters through the pipe R, which extends downward below the disk d, and becomes vaporized by the steam passing in through the holes in the tube T, with which it is thoroughly intermixed. The disk d prevents unvaporized oil from passing to the gas or vapor eduction-pipe S, and the annular plates d' expand the current of steam before they reach the oil, and also serve to spread any part of the oil which is not immediately vaporized after passing from the oil-induction pipe.

In other respects the apparatus shown in Fig. 5 is similar to that illustrated in Figs. 1, 2, 3, and 4, and the language used in describing the latter figures is applicable to the former.

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

1. The combination of a steam-induction tube projecting downward from a gas-generating chamber, a jacket or casing surrounding the tube and forming therewith a steam-space, a steam-generator having a central flue into which the jacket or casing extends, and a spiral or coiled superheating-pipe arranged above the steam-generator and around the gas-generating-chamber, one end of which communicates with the steam-space and the other end of which communicates with the gas-generator, as and for the purposes described.

2. The combination of a steam-generator having a central flue, a gas-generator extend-

ing downward within the central flue, having a downwardly-projecting steam-induction pipe, surrounded by a jacket, a spiral or coiled superheating-pipe, one end of which communicates with the steam-space of the generator and the other with a pipe leading to an engine, and a superheating-pipe connecting the vapor-generator with the gas-generator, as and for the purposes described.

3. In a gas-generator, the combination of a spherical chamber provided with a gas-eduction and oil-induction pipe, a steam-induction pipe projecting downward from the spherical chamber, and provided with holes for the escape of steam, and annular deflecting-plates, and a casing surrounding the spherical chamber and the steam-induction pipe, as and for the purpose described.

4. In a gas-generator, the combination of a steam-induction tube projecting downward from the generating-chamber, with a jacket or casing surrounding the tube and forming therewith a steam-space below the point at which the steam enters the generating-chamber.

5. The combination of a vertical boiler provided with a central flue for the passage of the products of combustion, and a gas-generator resting upon the boiler and having a downwardly-projecting steam-induction pipe, surrounded by a depending casing, which projects downward into the central flue, as and for the purposes described.

6. The combination of the shell N, provided with inlet and outlet pipes, the downward-projecting tube T, the casing K, having a depending part, W, and the steam-inlet pipe H, as and for the purpose described.

7. The combination of the chamber M, incasing the oil and steam induction pipes, and the vapor-eduction pipes, the shell N, the downwardly-projecting tube T, the casing K, having a dependent part, W, and the steam-inlet pipe H, as and for the purpose described.

8. The combination of the boiler having a vertical passage, B, the gas-generator having a downwardly-projecting steam-induction pipe surrounded by a casing depending within the central passage, the chamber C, the water-pipe E, and the steam-pipe H, as and for the purposes described.

9. The combination of the vertical boiler, the pipe H, having a coil, I, and the gas-generator having a downwardly-projecting steam-induction pipe surrounded by a casing extending downward within the flue in the center of the boiler, as and for the purposes described.

10. In a gas-generator, the combination of the shell N, provided with a vapor-eduction pipe and oil-induction pipe, the tube T, and the casing K, having a downward-projecting jacket, W, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN B. ARCHER.

Witnesses:

W. F. RICHIE,
GEO. H. MORRISON.