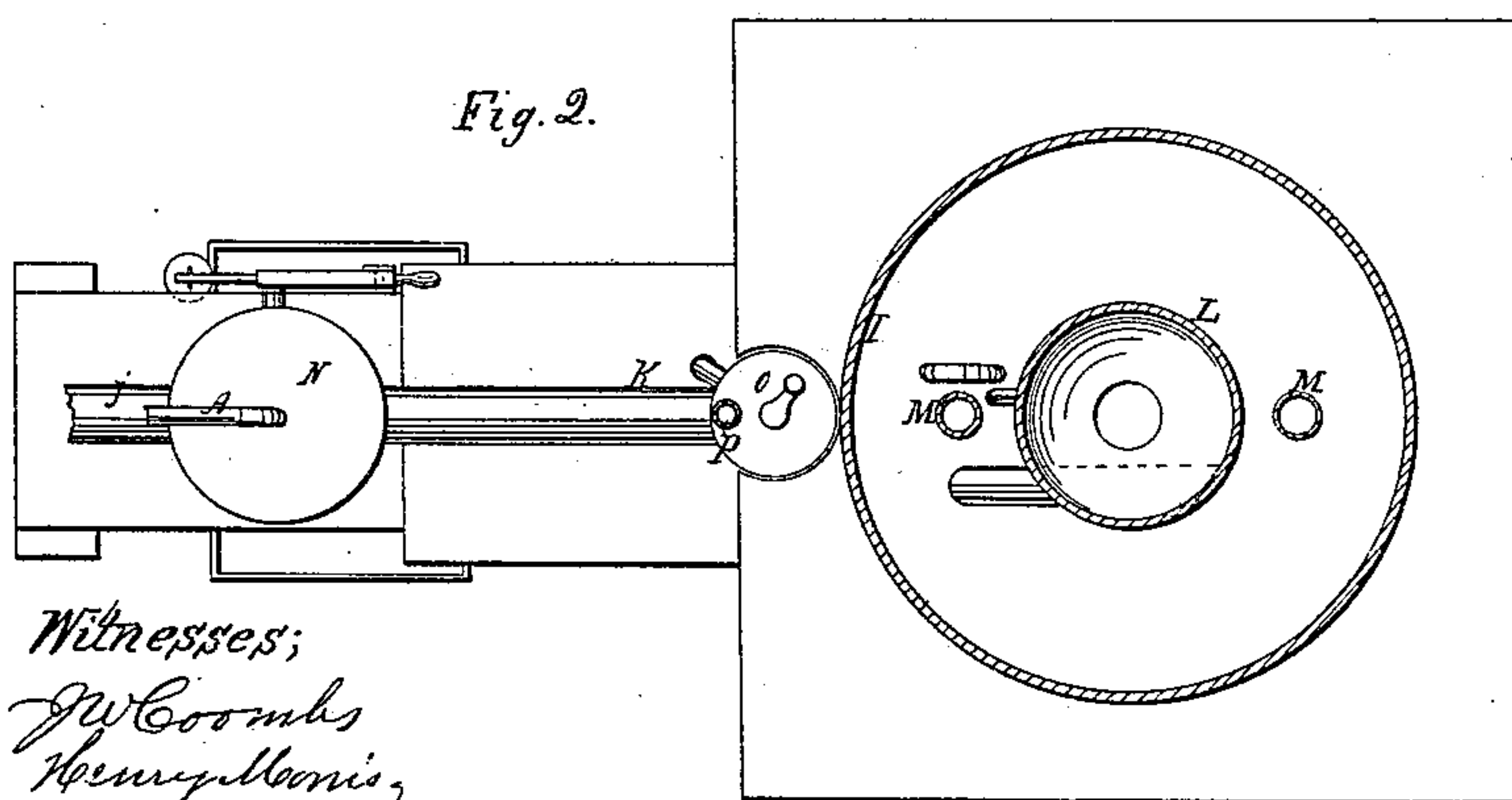
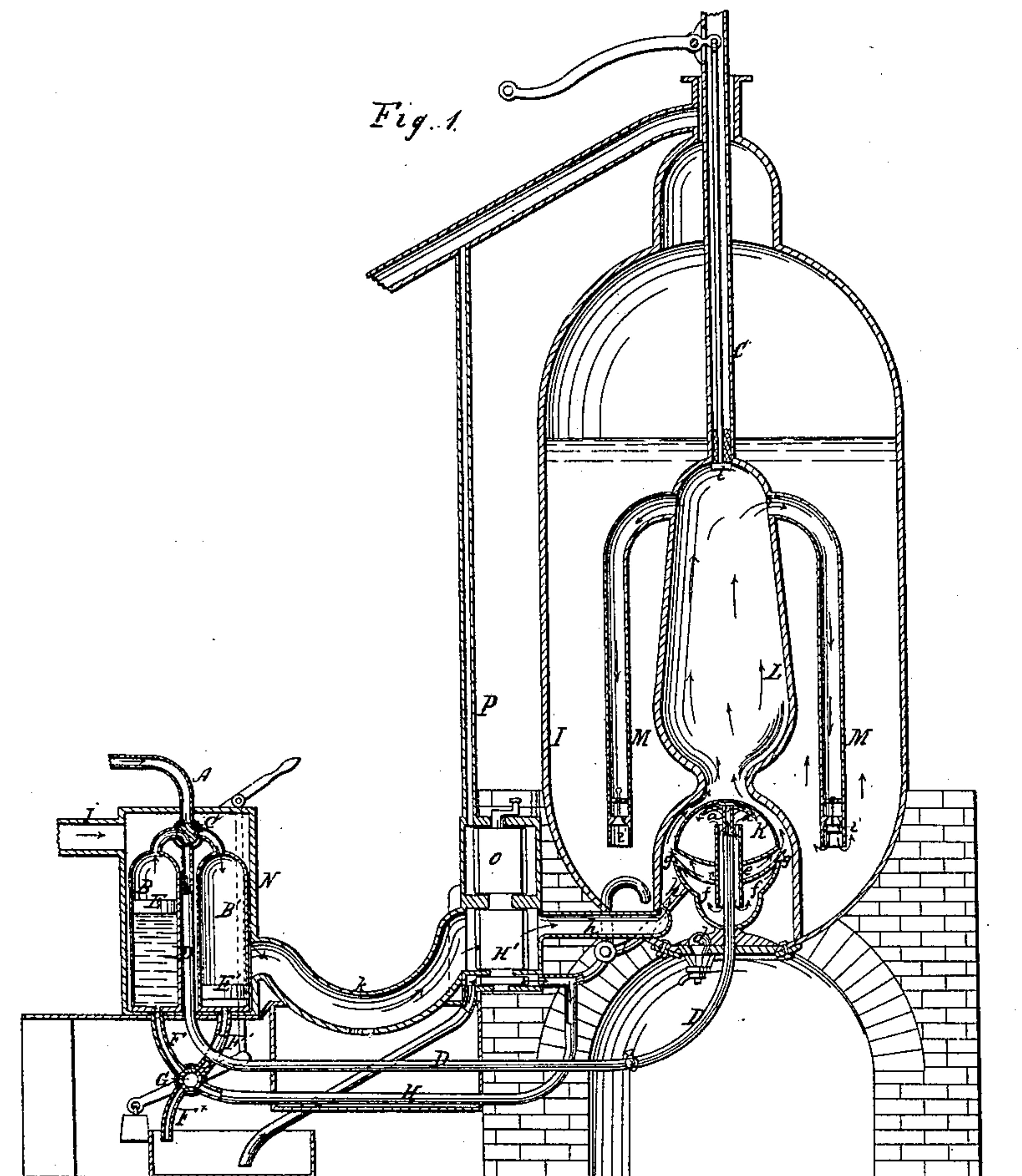


G. TRUE.
STEAM GENERATOR.

No. 42,904.

Patented May 24, 1864.



Witnesses;
J. W. Coombs
Henry Morris

Inventor;
George True
per *Wm. H. G.*
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE TRUE, OF FUNCHAL, MADEIRA.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 42,904, dated May 24, 1864.

To all whom it may concern:

Be it known that I, GEORGE TRUE, of Funchal, in the Island of Madeira, have invented a new and Improved Steam-Generator; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable any person skilled in the art to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a vertical central section of my invention. Fig. 2 is a horizontal section of the same.

Similar letters of reference in both views indicate corresponding parts.

The object of this invention is to combine with a boiler an apparatus capable of converting suitable substances—such as petroleum or other hydrocarbon liquids—into gas within the boiler, and burning the gas so formed at a pressure as high or higher than that of the steam, in such a manner that the heated products of combustion are forced through the water and caused to mingle with the steam, and thus the entire heat evolved, as nearly as may be, is usefully applied.

The nature of my invention and its peculiar advantages will be readily understood from the following description.

The petroleum or other hydrocarbon liquid used in this operation is introduced through a pipe, A, in two cylinders, B B', which communicate with said supply-pipe by means of a four-way cock, C, and the passages of this four-way cock C are so arranged that if one of the cylinders is in communication with the supply-pipe the other communicates with the discharge-pipe D. The cylinders B B' are provided with plungers or followers E E', and they communicate by means of pipes F F' with a four-way cock, G, and pipe H, leading to the force-pump H', which serves to introduce water in the boiler I. The pipes F F' emanate from the bottoms of the cylinders, and by the action of the water which is alternately forced into them by the force-pump the followers are caused to rise and the hydrocarbon liquid introduced in the upper parts of the cylinders through the pipe A passes into the boiler under a pressure equal to that of the steam within said boiler.

It is obvious that the four-way cocks C and

G have to be operated in such a manner that the communication between the pipe H with one of the cylinders is opened simultaneously, or nearly so, with that between the same cylinder and the pipe D, and at the same time the pipe F', emanating from the bottom of the cylinder which is in communication with the supply-pipe A, is made to communicate with the waste-pipe F*, and the water from the lower part of said cylinder is allowed to discharge.

The pipe D, which conducts the hydrocarbon liquid to the steam-boiler I, terminates in the interior of a retort, K, which is lined with fire-brick, and the liquid being distributed by a disk, a, on top of the pipe D is caused to flow down the sides of the dome-shaped retort, which at the beginning of the operation has to be heated by a fire introduced through the opening d. In running down over the heated sides and touching the bottom of said retort the hydrocarbon liquid is converted into gas, which rises and descends through the pipe e into the receiver f, as clearly indicated by black arrows in Fig. 1. This receiver is made in the shape of the double cup of an acorn, and it is provided with an annular opening or gap, g, through which the gas oozes out and is ignited in contact with two or more currents of air which are introduced through pipes h. The flame thus formed surrounds the retort K and heats the same to such a temperature that the transformation of the hydrocarbon liquid in the gas continues and the combustion of the gas is completed in the chamber L. The products of combustion and heated gases descend from this chamber through the branch pipes M, which are provided with check-valves i, to prevent the entrance of water, and on leaving these pipes said gases rise through the water in the steam-boiler and mingle with the steam formed by their action on the water. The heat radiated from the sides of the chamber L and pipes M assists in the formation of steam, and all the heat employed in the operation is thus rendered effective in the production of steam. The air requisite for the combustion of the gas which emanates from the receiver is drawn from a jacket, N, which surrounds the cylinders B B', and which communicates with the open atmosphere by a pipe, j. A pipe, k, leads from said jacket to the

force pump H', and by the action of this pump the air is forced into the boiler with the requisite pressure.

The force-pump, is either operated in the usual manner by suitable connections with the crank shaft of the engine, or it may be operated by a separate little donkey-engine, O, which is supplied with steam through the pipe P.

In order to prevent accidents, the chamber L communicates with the open atmosphere through a pipe, Q, which may be closed by a safety-valve.

If desired, the exhaust steam from the engine may be collected and condensed to save

the combustible parts that may still be mixed with it.

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

The within described apparatus, consisting of the cylinders B B', force-pump H', retort K, receiver f, and chamber L, in combination with a steam-boiler, I, constructed and operating substantially as and for the purpose specified.

GEO. TRUE.

Witnesses:

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