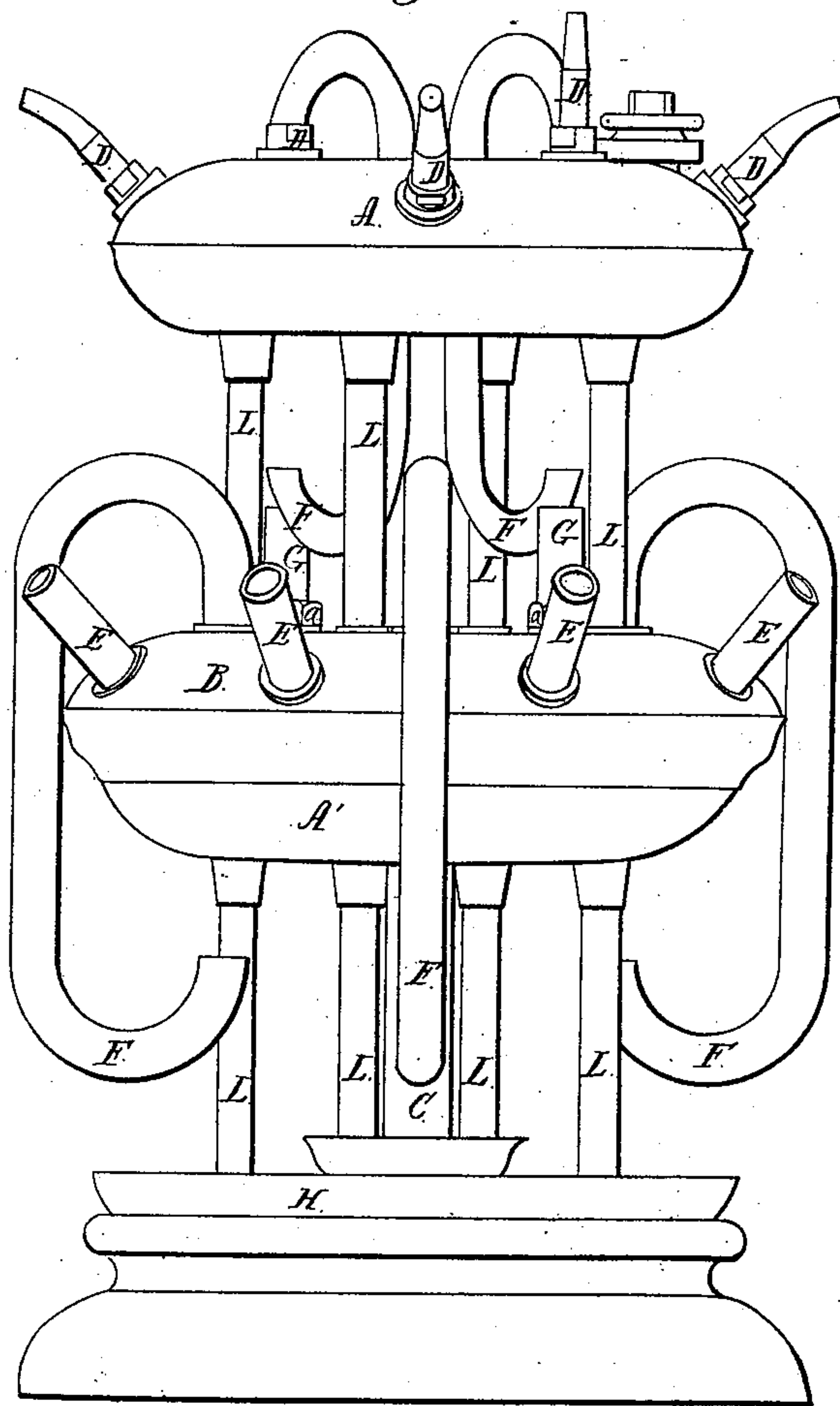


3 Sheets. Sheet 1.

F. W. Thayer,
Burning Hydrocarbon.
N^o 76,552. Patented Apr. 7, 1868.

Fig. 1.



Witnesses:

N. C. Lombard
J. M. C. Hibbard

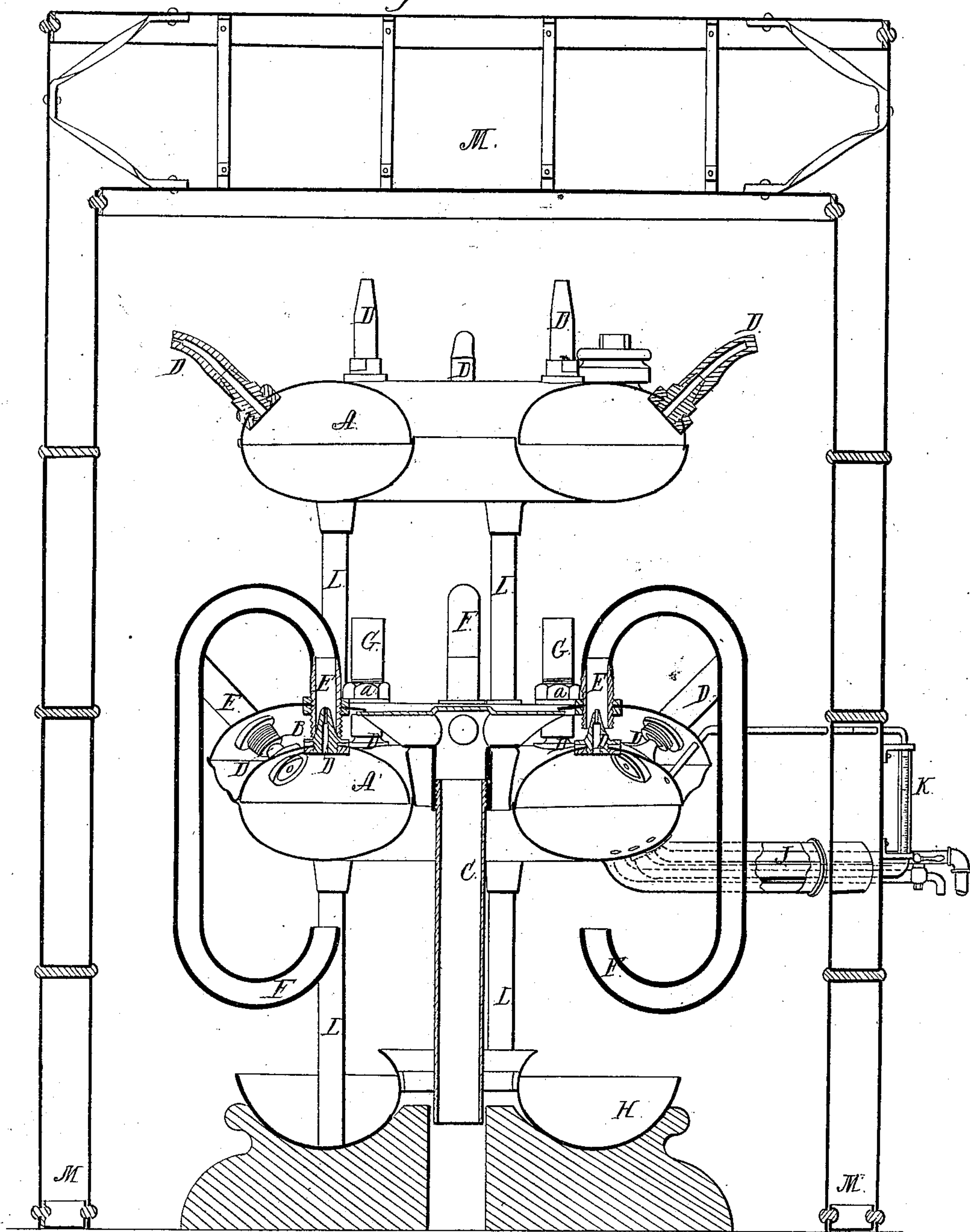
Inventor:

F. W. Thayer.

3 Sheets, Sheet 2.

F. W. Thayer,
Burning Hydrocarbon.
N^o 76,552. Patented Apr. 7, 1868.

Fig. 2.



Witnesses: { *N. C. Lombard*
Wm. C. Hubbard

Inventor:
Fred. Wm. Thayer

F. W. Thayer,

Burning Hydrocarbon.

N^o 76,552.

Patented Apr. 7, 1868.

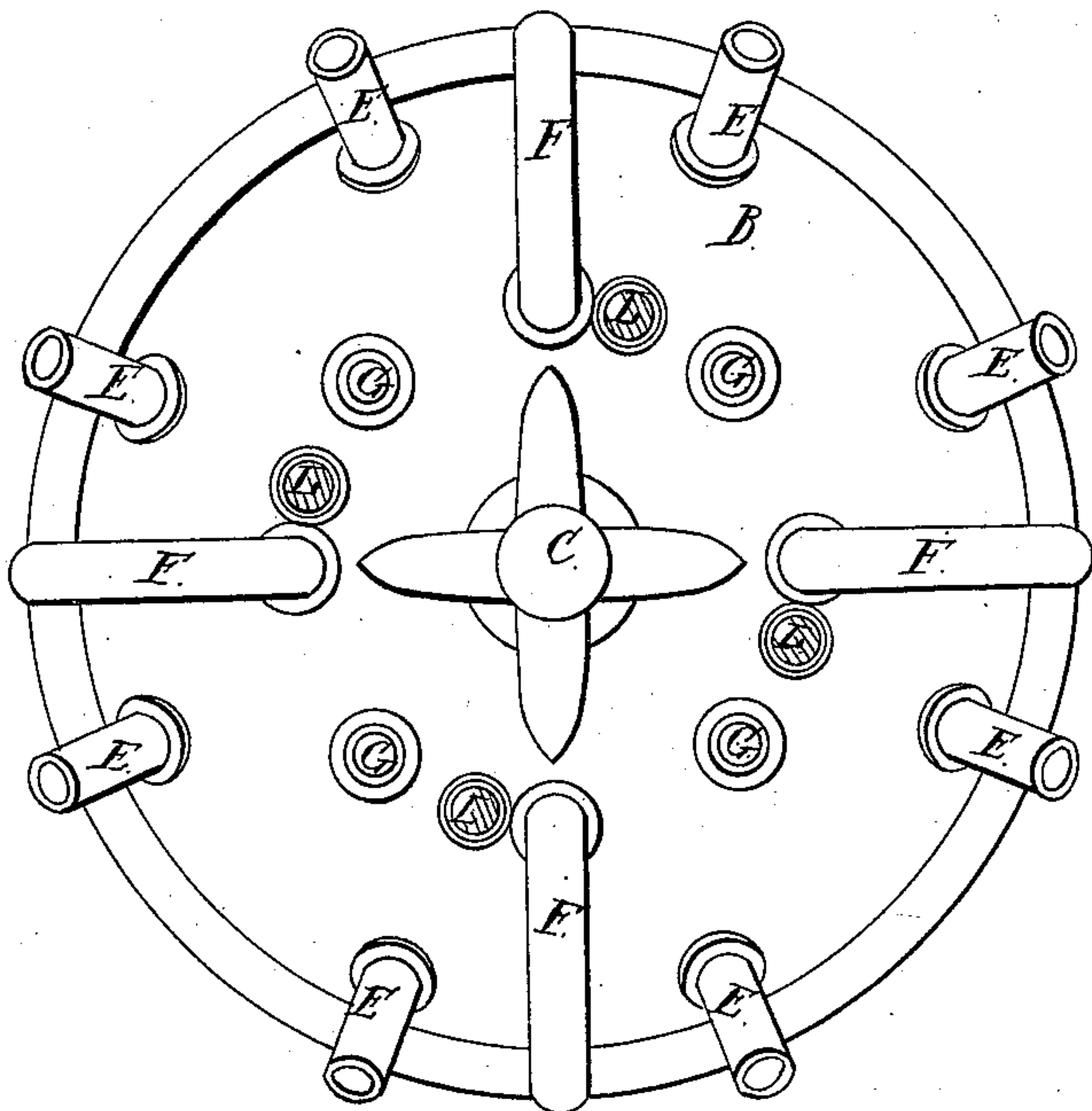


Fig. 3.

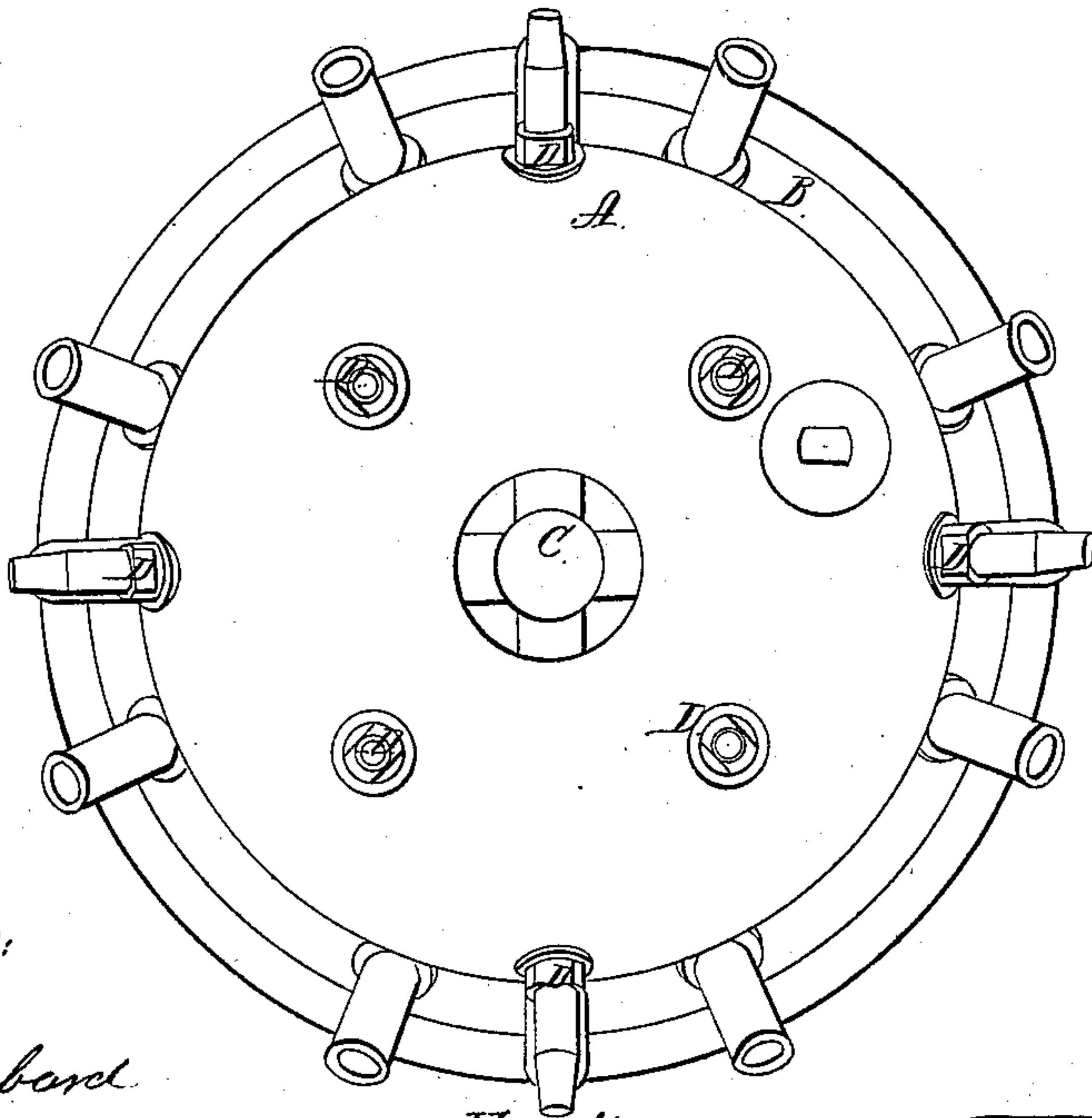


Fig. 4.

Witnesses:

N. C. Lombard

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Inventor:

F. W. Thayer.

United States Patent Office.

FREDERIC WILLIAM THAYER, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 76,552, dated April 7, 1868.

IMPROVEMENT IN HYDROCARBON-BURNERS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, FREDERIC WILLIAM THAYER, of Boston, in the county of Suffolk, and State of Massachusetts, have invented a new and useful Apparatus for Burning Petroleum or other Hydrocarbons, for the purpose of producing heat; and I do hereby declare that the following is a full, clear, and exact description of the same, taken in connection with the accompanying drawing, making a part of this specification, in which—

Figure 1 is an elevation of the apparatus arranged in two forms, as it is proposed to be used in the fire-box of a boiler.

Figure 2 is a vertical section of the same.

Figure 3 is a plan of the lower retort and its appendages; and

Figure 4 is a plan of the whole apparatus.

The subject-matter of my invention relates to the construction of an apparatus for burning petroleum and other hydrocarbons for fuel, for the purpose of producing heat, to be used for generating steam, heating furnaces, and other similar uses in the arts.

My invention relates, in the first place, to the manner of constructing and arranging the devices by which the fuel is converted into a gaseous form, and mixed with air in such a manner as to produce the most perfect combustion of the same, with reference to the production of heat; and consists, first, in the employment of an evaporator or retort, which is partially filled with petroleum, and converts the same into vapor by the application of external heat, and, in combination therewith, a series of jet-pipes, projecting from said retorts towards the surface to be heated, the orifices of said jet-pipes bearing such a relation to the normal evaporative capacity of the retorts that the generation of vapor within the same will produce a pressure that will project the vapor from said pipes with considerable force, so as to produce an elongated flame therefrom similar to that produced by the blow-pipe; and it also consists, in the second place, in combining, with the jet-pipe, operating as before described, a mixing-tube or chimney, which encloses the same, and within which air in a graduated quantity is mixed with the jet of vapor, the air being drawn into the tube at the inner end by the draught produced by the jet, and the mixed gases discharged at the outer end, where they are ignited.

My invention relates, in the third place, to the method of heating and regulating the quantity of air that is supplied to the jets, and also thereby protecting that part of the evaporator which is not covered by the petroleum, and consists in forming upon the exterior of the upper part of the evaporator, a chamber for heating the air which is supplied to the chimneys, the inner ends of which are enclosed within the chamber, which is supplied with air by means of a pipe leading to the exterior of the furnace, so that the action of the exterior heat of the fire-chamber upon that part of the evaporator which is not filled by the petroleum is intercepted, and the jets of vapor are supplied with hot air in a very simple and convenient manner; and it also consists in so arranging and combining the chimneys with the heating-chamber as to support and adjust them in proper relation to their jets, while their inner ends are left open all around the jet, to admit the proper supply of air.

My invention relates, in the fourth place, to the manner of constructing some of the details of the apparatus, which will be hereafter described.

A A' represent two retorts or evaporating-vessels, of an annular form, for containing the petroleum-fuel, but may be made of any form that will best suit the shape of the fire-chamber in which they are to be placed. They are designed to be filled with petroleum to about half their height. To the lower evaporator is attached an air-chamber, B, which encloses the upper surface of the retort, and protects that part of it that is not covered by the petroleum, and also heats the air within it. This chamber is supplied with air by means of the pipe C, leading downward outside of the furnace. D D, &c., are jet-pipes, each made with a small orifice, and inserted into the upper surface of the evaporators. The capacity of these jet-pipes relatively to the evaporative capacity of the retort is to be such that considerable pressure will be generated within the same, so that the vapor will issue from the jet-pipes with considerable force. The jet-pipes in the upper retort project a considerable distance from the retort, to enable the external air to flow in on all sides, to supply the jet of vapor that issues from the jet-pipe with the requisite amount of oxygen for combustion, and also to project the flame produced directly upon the surface to be heated, in a manner similar to the operation of a blow-pipe. E E, &c., are mixing-pipes, which are secured to the walls of the air-chamber by adjusting-nuts *a*, as shown, and their inner

ends surround the conical jet-pipes D. By means of the nuts *a*, the pipes E can be drawn in or out, so as to leave a greater or less space between the jet and pipe, through which the air from the chamber is drawn in by the action of the jet of vapor escaping from the jet-pipe, by which means the quantity of air supplied to the jet can be nicely regulated. When the mixed gases arrive at the outer extremity of the pipe E, they are ignited and projected directly towards the heating-surface of the boiler. The jet-pipes shown in connection with the upper evaporator, A', do not have mixing-pipes in combination with them, but obtain their oxygen for combustion from the combustion-chamber, and in this case the jet-pipes project a considerable distance from the evaporator, to allow the air to take a forward motion with the jets, but, so far as their relation to the fire-surface is concerned, they are arranged in the same manner, that is, so that the fire-surface shall be just beyond the extremity of the flame. F F, &c., are jets and mixing-pipes, of the form shown, for applying a flame beneath the evaporator, in case the heat of the furnace-chamber is not sufficient to evaporate the petroleum with sufficient rapidity. G G are other pipes, to heat the upper evaporator, under the same. H is a pan, for containing petroleum or other fuel, to be first fired, for the purpose of heating up the evaporator, and commencing to form vapor, and getting the apparatus to work. I is a pipe, by which the petroleum is introduced into the evaporator. J is a pipe, by which the heavy oil is drawn off after the lighter oil has been vaporized. K is a glass gauge, connected with the evaporator by suitable pipes, for ascertaining the height of the petroleum-oil in the same. L L are standards to support the apparatus. M is the boiler. The upper retort, when used, is to be supplied with petroleum, in the same manner as is shown in the lower one, by another set of pipes and fixtures of the same character as is there shown.

In putting the apparatus into operation, the retorts are filled with petroleum to about half their height, and some light fuel, with petroleum, is placed in the pan H and set on fire. When the retorts are heated so that vapor is freely formed, the jets will be ignited and the operation will become continuous. Suitable cocks or valves may be used with the several jets, so that the use of them may be discontinued when desired, or the discharge so regulated as to produce the best result.

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

1. The combination of one or more elongated projecting jet-pipes with the evaporator or retort, when they are so proportioned to each other that, by means of the evaporation alone, the vapor will be discharged from said pipes with force, so as to produce an elongated jet of flame, similar to that of the blow-pipe, substantially as described.
2. The jet-pipe, supplied with gas or vapor, as described, in combination with the adjustable mixing-pipe or chimney, by which a current of air is drawn into the same, and mixed with the jets of vapor, substantially as described.
3. Combining with the retort or evaporating vessel the air-chamber, for heating the air supplied to the jets and protecting the vessel, substantially as described.
4. So combining the chimney with the heating-chamber and jet-pipe that it is supported by the upper wall of the chamber in proper relation to the jet-pipe, so as to receive from the chamber the proper amount of air to supply the jet, substantially as described.
5. Adjusting the chimney and jet-pipe by means of the nuts *a*, in combination with the air-chamber, substantially as described.
6. The employment of two or more retorts, one over the other, and the heating of the uppermost retort by jets supplied by the retort beneath it, substantially as described.

Executed at Boston, this eleventh day of December, 1867.

FRED' C WM. THAYER.

Witnesses:

N. C. LOMBARD,
WM. C. HIBBARD.