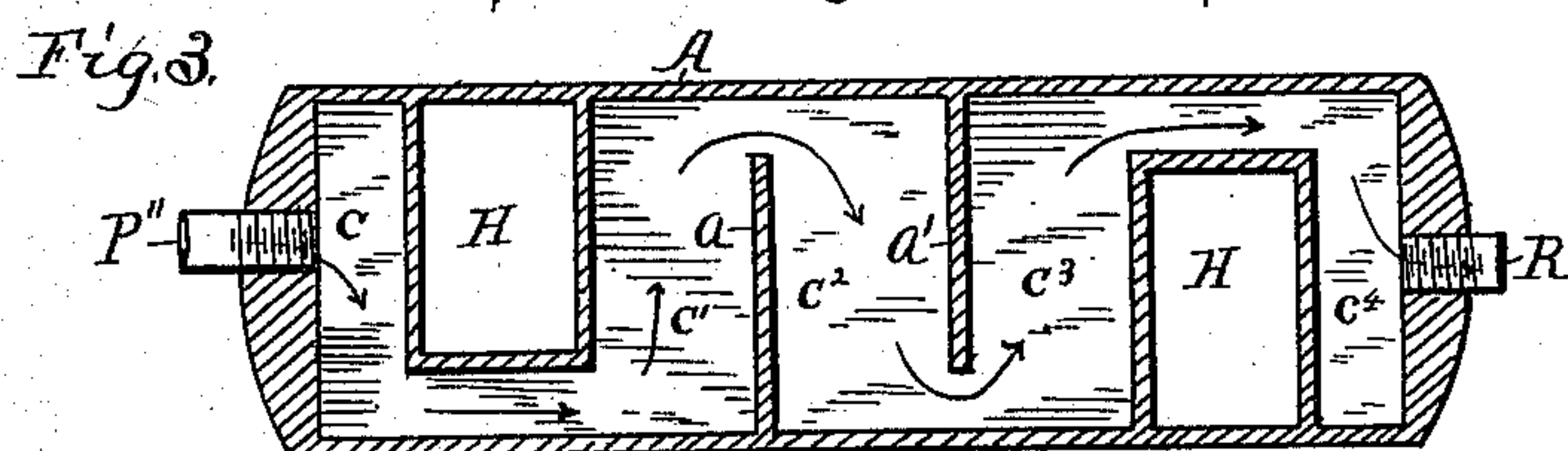
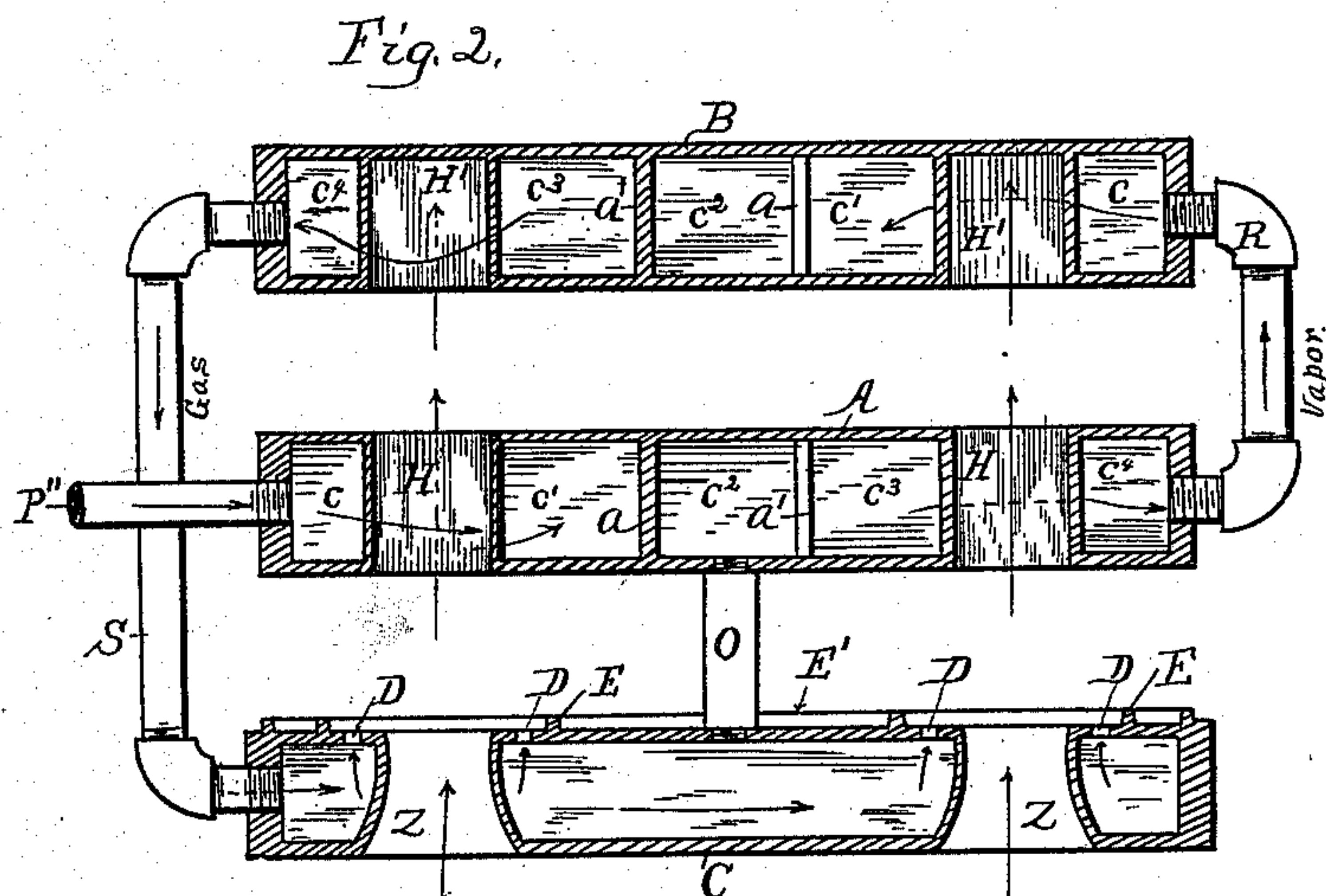
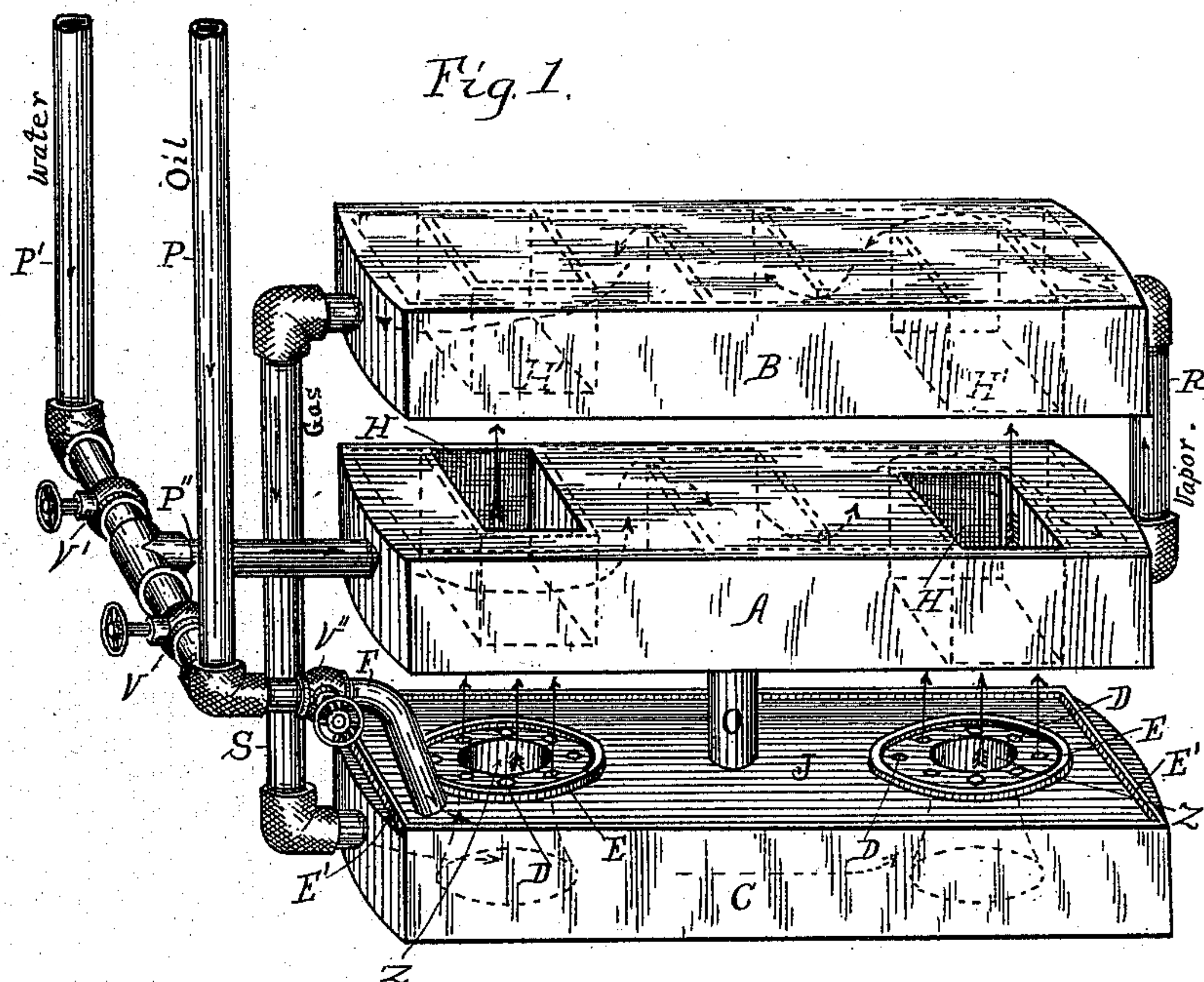


(No Model.)

C. BALL.
RETORT VAPORIZER.

No. 413,885

Patented Oct. 29, 1889.



Witnesses,

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UNITED STATES PATENT OFFICE.

CORTLAND BALL, OF INDIANAPOLIS, INDIANA.

RETORT-VAPORIZER.

SPECIFICATION forming part of Letters Patent No. 413,885, dated October 29, 1889.

Application filed May 13, 1889. Serial No. 310,673. (No model.)

To all whom it may concern:

Be it known that I, CORTLAND BALL, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful
5 Improvement in Hydrocarbon-Burners, of which the following is a specification.

The invention consists in the construction, arrangement, and combination of the several parts, as hereinafter described and claimed.

10 The object of my invention is the effectual, safe, and economical use of petroleum, either crude or refined, for heating and cooking stoves, or for any other purpose to which the device may be applicable.

15 A further object is to so construct the burner as to vaporize the oil and water, and then bring the vapor in contact with a sufficient amount of heat under pressure to decompose and convert it into gas; also to provide a convenient means for conveying oil to
20 the starting-pan and for lighting the same.

For domestic purposes perfect safety and economy are two requisites that are absolutely essential in a burner for consuming petroleum or any of its inflammable products.
25 The former difficulty has been overcome by inventions patented heretofore, and so in that respect I do not claim any superiority for my burner over some that have preceded it.

30 I accomplish perfect combustion by a complete volatilization of the oil before it enters the diffusing gas-chamber, from whence it passes immediately into the combustion-space, where it is burned without producing
35 any smoke or soot; hence the full value of the oil is utilized. This result heretofore has not been attained; consequently much of the real value of the oil has been lost by passing off in smoke and a sticky oily soot which adheres very tenaciously to the stove-lids and
40 all cooking utensils with which it comes in contact.

In order that others may be able to make and use my improved burner, reference will
45 be made to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in each figure.

50 Figure 1 is a perspective view of the apparatus complete. Fig. 2 is a central vertical longitudinal section of the same; Fig. 3, a

horizontal longitudinal sectional view of part A, showing the interior construction.

My improved burner as represented is divided into three sections or parts A, B, and C. 55

A is the primary and B the final retort.

Section C contains the gas-chamber, air-inlet flues, and the pan that holds the oil that is burned in starting a fire.

Section A has vertical flues H H, and is divided into cells $c\ c'\ c^2\ c^3\ c^4$, which are made
60 by the walls of the flues H H and the cross-walls $a\ a'$ on either side of section A. At each alternate end of these walls there is a passage between each wall and the side wall of section A. 65

The top plate of section B has no opening through it at $H'\ H'$, (see Fig. 2,) but in every other respect it is an exact duplicate of section A. By this slight difference in the construction of the two sections the flues H H in
70 section A are converted into the recesses $H'\ H'$ in section B.

The gas-chamber of section C has funnel-shaped air-inlets Z Z, the upper ends of which
75 are on a level with the top of gas-chamber, so that the air will radiate therefrom directly into the base of the flames. The pan J is formed by the annular ribs E E and the flanges $E'\ E'$, which extend above and around
80 the top edge of section C. The gas passes from the gas-chamber into the combustion-space between sections A and C through the vent-holes D D D D. The sections A and C are held firm in their proper relation to each
85 other by the post O, and that, with the pipes R and S, connected as they are with the several parts, holds each one to its place. It will of course be understood that suitable tanks or reservoirs may be placed in any locality or position found to be most convenient, and then connected to the pipes P and P'. 90

The pipes P'' and F may be connected to the burner by entering the stove in front, at the side, or any other place considered suitable. It will be found preferable to bend pipe F
95 so that it will pass with and through the same opening made for pipe P''; and it will also be understood that the burner is to be placed in the fire-box of the stove and arranged so
100 that the ventilation will be as good as it is possible to obtain.

In starting a fire the mode of procedure is: first open the valve V'' until a sufficient quantity of oil from the pipe F has run into the pan J. Then the oil is to be ignited, and very soon broad flames from the burning oil will be ascending against section A, and to a certain extent will pass up through the flues H and H, while a still greater volume, spreading on either side of section A until it is completely enveloped by the flames, and the flames still ascending, pass on, heating in a like manner section B. As soon as the retorts are hot, then the valve V is to be opened just enough to allow the oil from the pipe P to drip in very minute drops into cell C of retort A. The heat soon vaporizes the oil, and the vapor passes on from cell to cell (in the direction indicated by the arrows) into the pipe R, from whence it passes into and through the final retort B, down through the pipe S, into the "receiving-diffusing gas-chamber" (as I call it) of section C, from which it passes immediately through the vent-holes D D D D into the combustion-space between sections A and C, where it unites with the air from the air-inlets Z Z, and combustion takes place. It will be found expedient at all times when starting a fire to let oil enough into the pan J so it will burn until gas generates from the oil that goes into the retort A and passes around into the combustion-space and ignites. Very soon after this takes place the retorts A and B will become extremely hot. Then the valve V' should be turned to allow water from the water-pipe P' to pass through into the retort A in just as small a quantity as it is possible to make it pass. It must be understood that retort A should be very hot before valve V' is opened to let water into it, because the intensity of the heat required to vaporize water is much greater than for the petroleum. The water-pipe P' and its connections may be discontinued at any time, that it may not be desirable to use the superheated vapor generated from the water. The cross-walls of the cells c c' c^2 c^3 c^4 become extremely hot, and the vapor, as it forms or generates, is forced by its own expansion in a zigzag course through retort A, and the small quantity of oil and water it may force before it will, by its coming in contact with these red-hot walls, become completely vaporized by the time it passes into the pipe R, and in this high degree of heat it enters the final retort B and passes through it in the same zigzag way that it did through retort A, and by its prolonged contact with so much extremely-hot surface, under a very high expansive pressure, the vapor becomes decomposed and absolutely converted into gas, and in a complete gaseous state it passes from the retort B, down through the pipe S, into the gas-chamber of section C, from whence it passes into the combustion-space through the vent-holes mentioned heretofore. A much higher degree of heat is maintained in the retort B than can be sustained in retort A,

because the liquids entering retort A are in their normal state and have a tendency to lower the temperature, while the vapor that passes into retort B is very hot. The continual dripping of the oil and water into retort A will not reduce the temperature enough to retard the process of vaporization, but will keep it sufficiently low so that there will be no deposit of carbon in the retort. The pressure of the gas from the gas-chamber will force the flames up through the flues H and H, and on each side of retort A broad flames will ascend, completely encompassing sections A and B and heating each very hot. The flames that pass up through flues H and H ascend into the recesses H' and H' of section B and are reflected back against the top of section A, heating it to an excessive degree.

It will be observed that throughout the specification I have made use of the words "retort," "section," "gas-chamber," "receiving-diffusing gas-chamber" indiscriminately, but in each case I wish to have it understood that I refer to the same part when using the same letter or letters of reference—as, for instance, "retort" A and "section" A invariably mean the same.

I am aware that hydrocarbon-burners have heretofore been used in which flames pass through funnel-shaped and also plain cylindrical flues in a generating-retort; but I am not aware that burners have been used heretofore with square flues passing through a generating-retort the walls of which are utilized in forming generating-cells within the retort.

I am also aware that jets of air have been introduced into the flames through the bottom of the burner; but I am not aware, however, that a burner has been constructed heretofore in which, beneath the generating-retort a short distance, there is placed a gas-chamber through which inverted-funnel-shaped air-inlets pass, the tops of which are on a level with the top of the gas-chamber, so that the air will radiate from the inlets directly into the base of the flames.

I do not claim as new the introduction of air into the flames from beneath the burner, neither do I claim as new the flues passing through the generating-retort; but

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

1. In apparatus for vaporizing and burning hydrocarbon oils, in combination with the gas-chamber C, having the burners constructed as described, the vaporizing-retort A, arranged a short distance above the gas-chamber and provided with the flues H H for conducting the flame and heat from the burners upward, with pipes for supplying oil and water thereto, and with interior alternating partitions for prolonging the passage of vapor to its exit, the superheating-retort B, of similar construction to retort A, arranged above said retort A and connected thereto by the pipe R for conducting the vapor to the superheater, and

connected with the gas-chamber by the pipe S, opposite pipe R, for conducting the gas to the gas-chamber and burners, substantially as and for the purpose specified.

5 2. In apparatus for vaporizing and burning hydrocarbon oils, the vapor-generating retort A, provided with square flues H and partition-walls *a a'*, and divided into vapor-generating cells *c c' c² c³ c⁴*, formed by the
10 walls of flues H and the partitions, a retort B, of similar construction to retort A, situated a short distance directly above it and connected to it by a pipe R, through which the vapor from retort A may pass into retort B,
15 wherein the vapor is decomposed and converted into gas, and a burner located below retort A and connected to said decomposing-retort B by pipe S, substantially as set forth.

20 3. In apparatus for vaporizing and burning hydrocarbon oils, in combination with a gas-chamber provided with burners for con-

suming gas, a vapor-generating retort and a vapor-decomposing retort of similar construction arranged a short distance apart, the former directly above the burners and the latter directly above the former, provided with alternating partitions, thus forming a series of cells within them and connected together by a pipe through which the vapor may pass to the decomposing-cells, the former retort
25 connected with the supply-pipe opposite its exit and provided with flues for conducting the flame and heat to the decomposing-retort from the burners, and the latter retort connected by a pipe opposite its supply-inlet to
30 the gas-chamber for supplying gas to the burners, substantially as set forth.

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