

(No Model.)

2 Sheets—Sheet 1.

R. P. AMBLER.

APPARATUS FOR MAKING AND BURNING GASEOUS FUEL.

No. 330,280.

Patented Nov. 10, 1885.

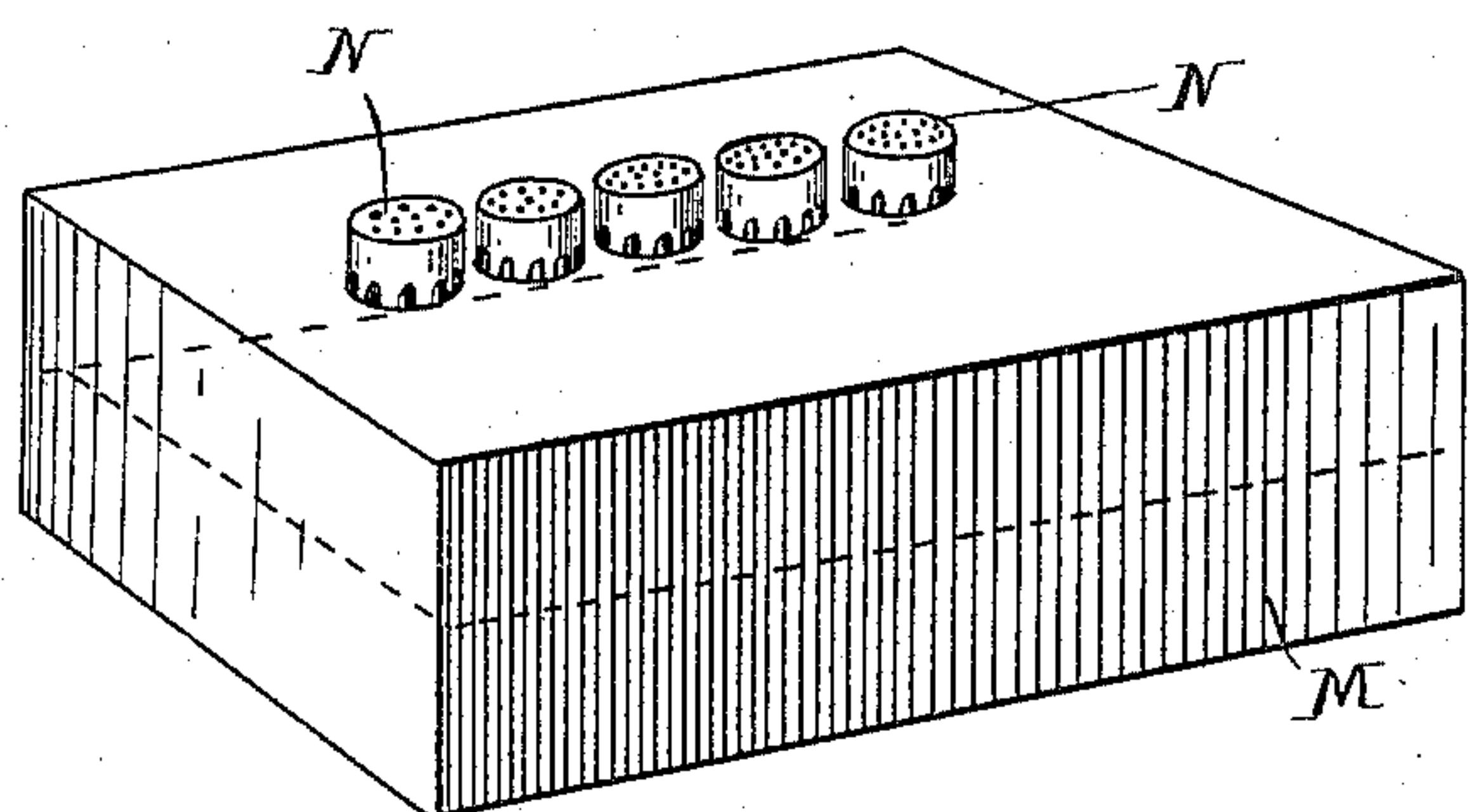


Fig. 1.

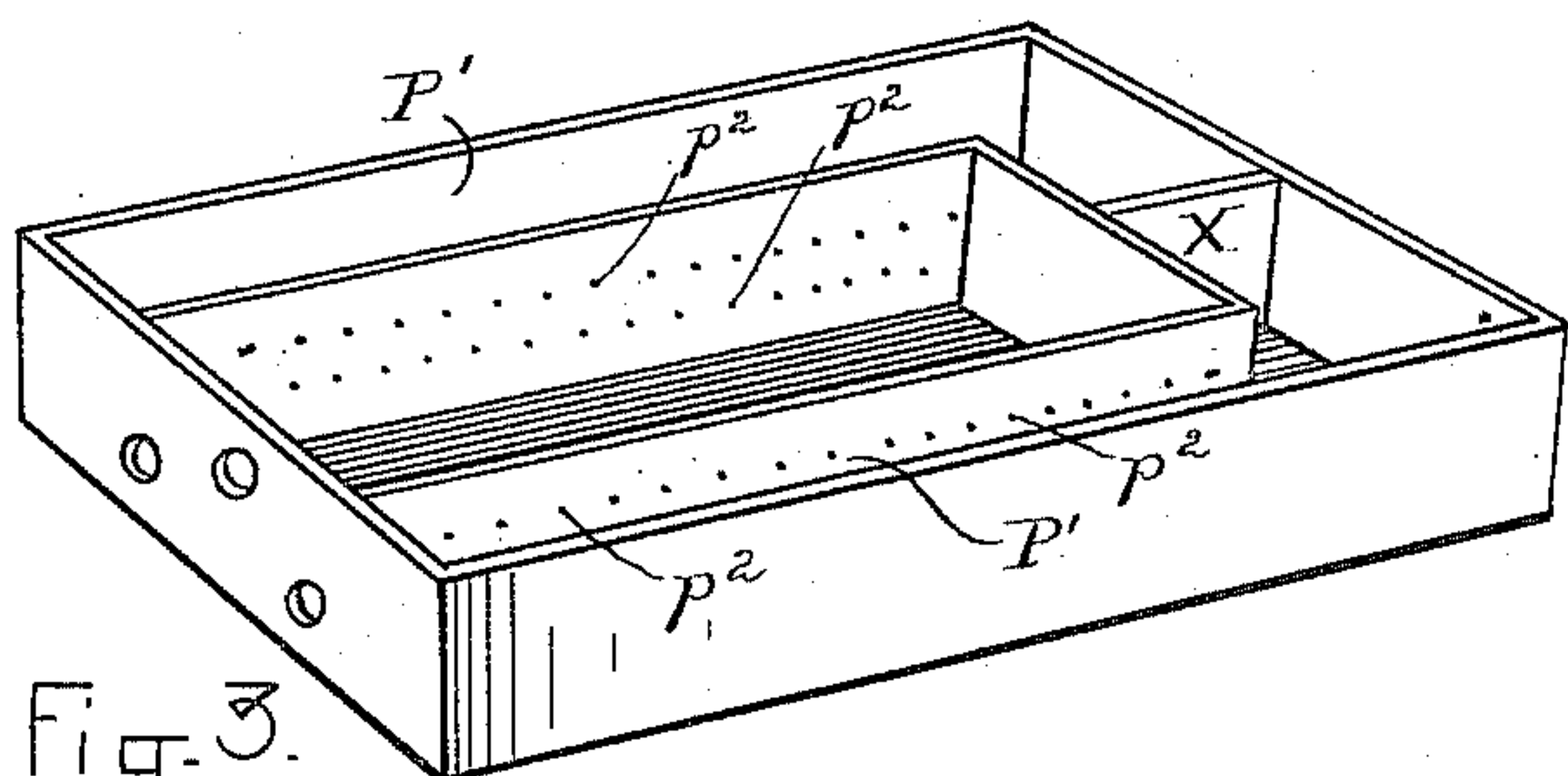


Fig-3.

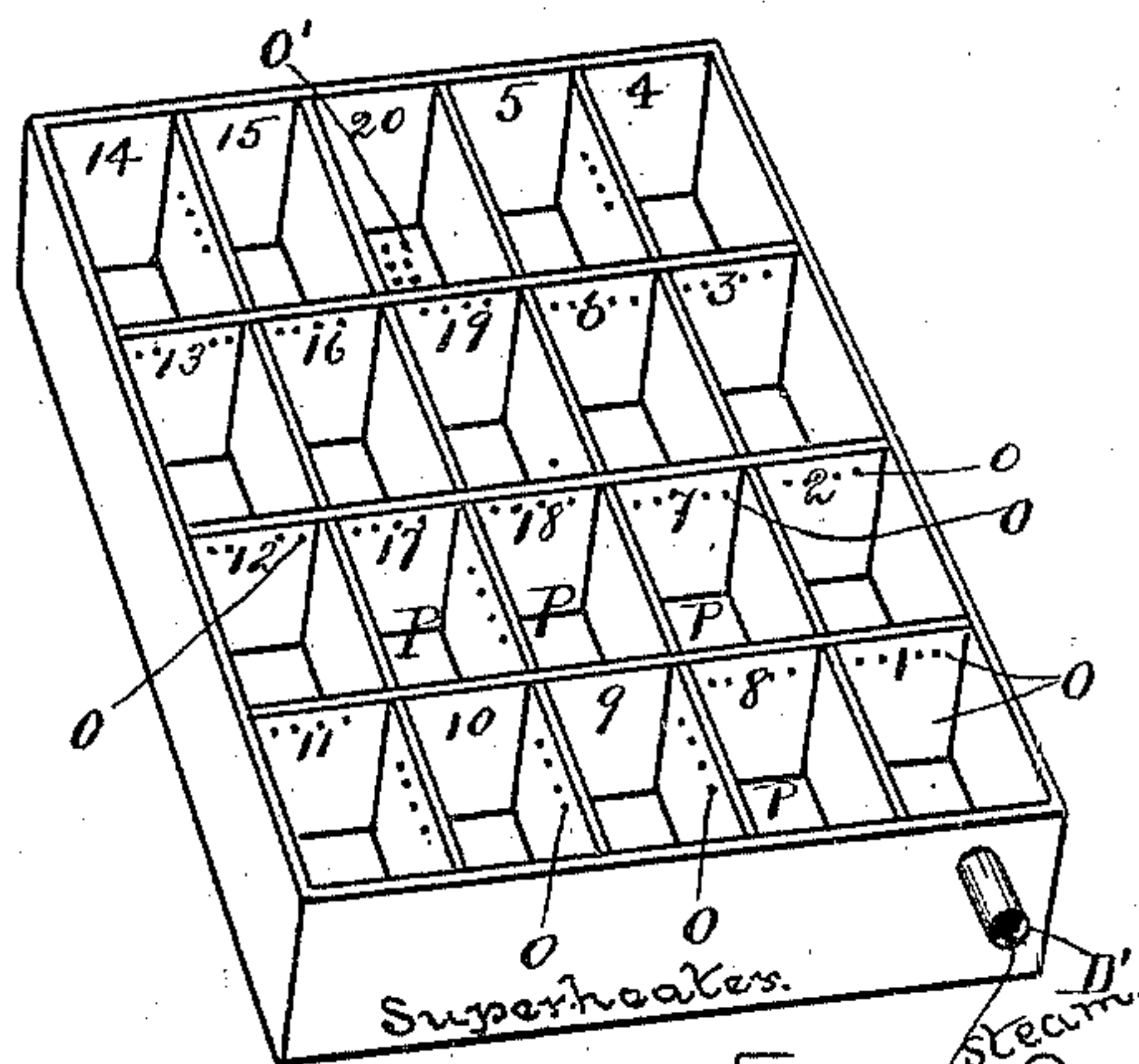


Fig-2

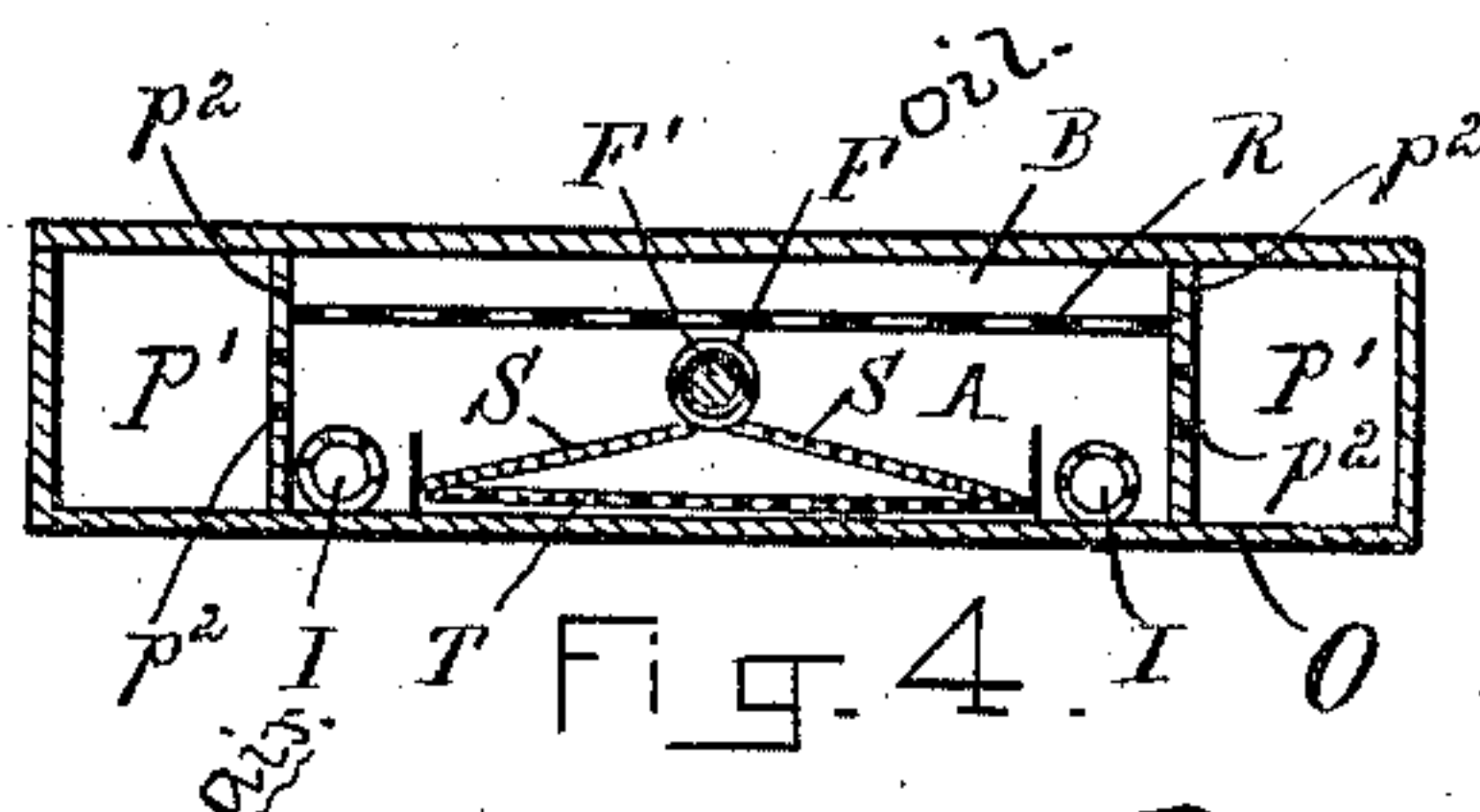


Fig. 4.10

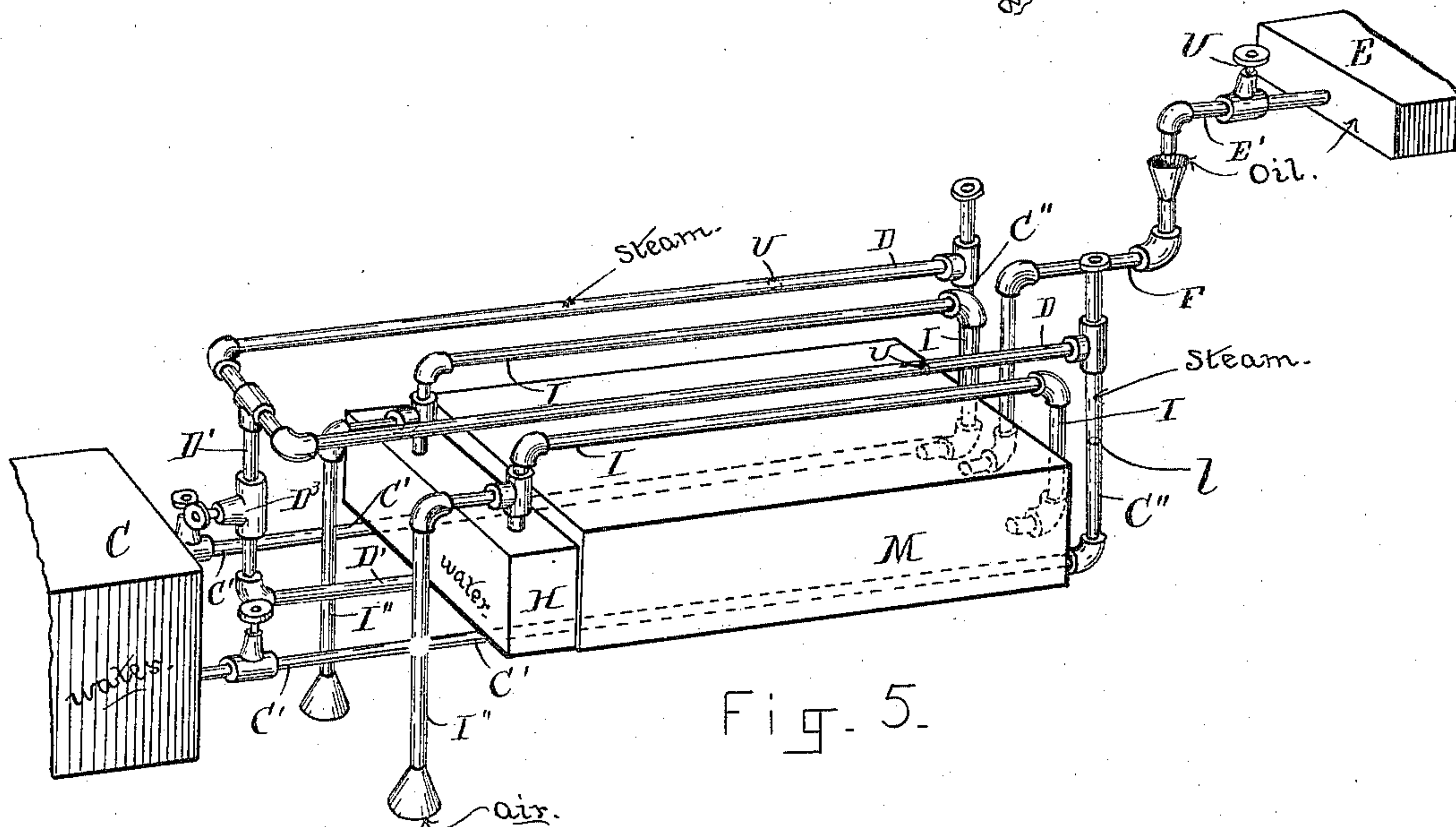


Fig. 5.

WITNESSES:
Chas. S. Gooding.
H. Brown.
Richard J. Powers

INVENTOR:
Russell P. Ambler
by Wright & Brown
Attys.

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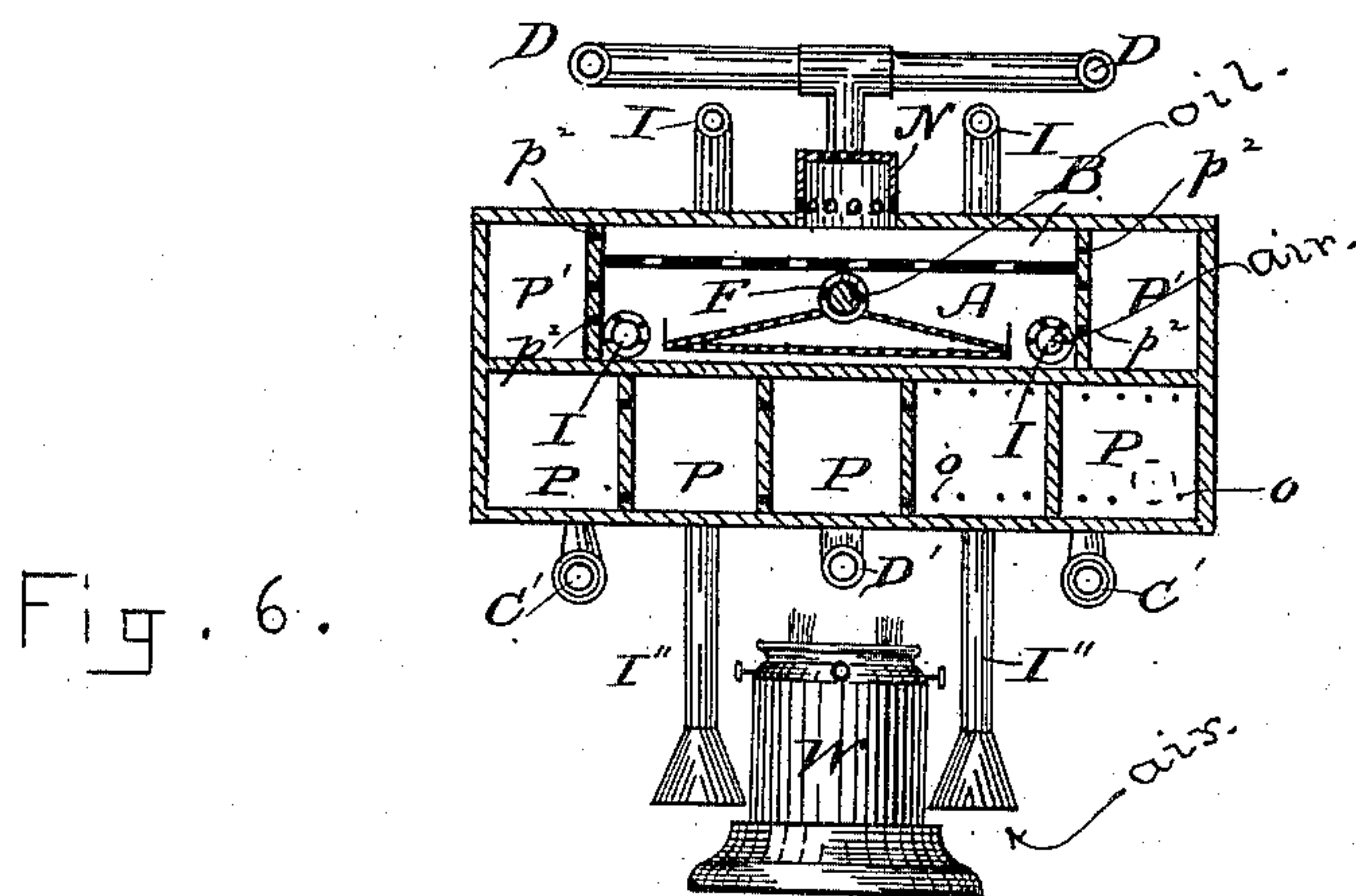


Fig. 6.

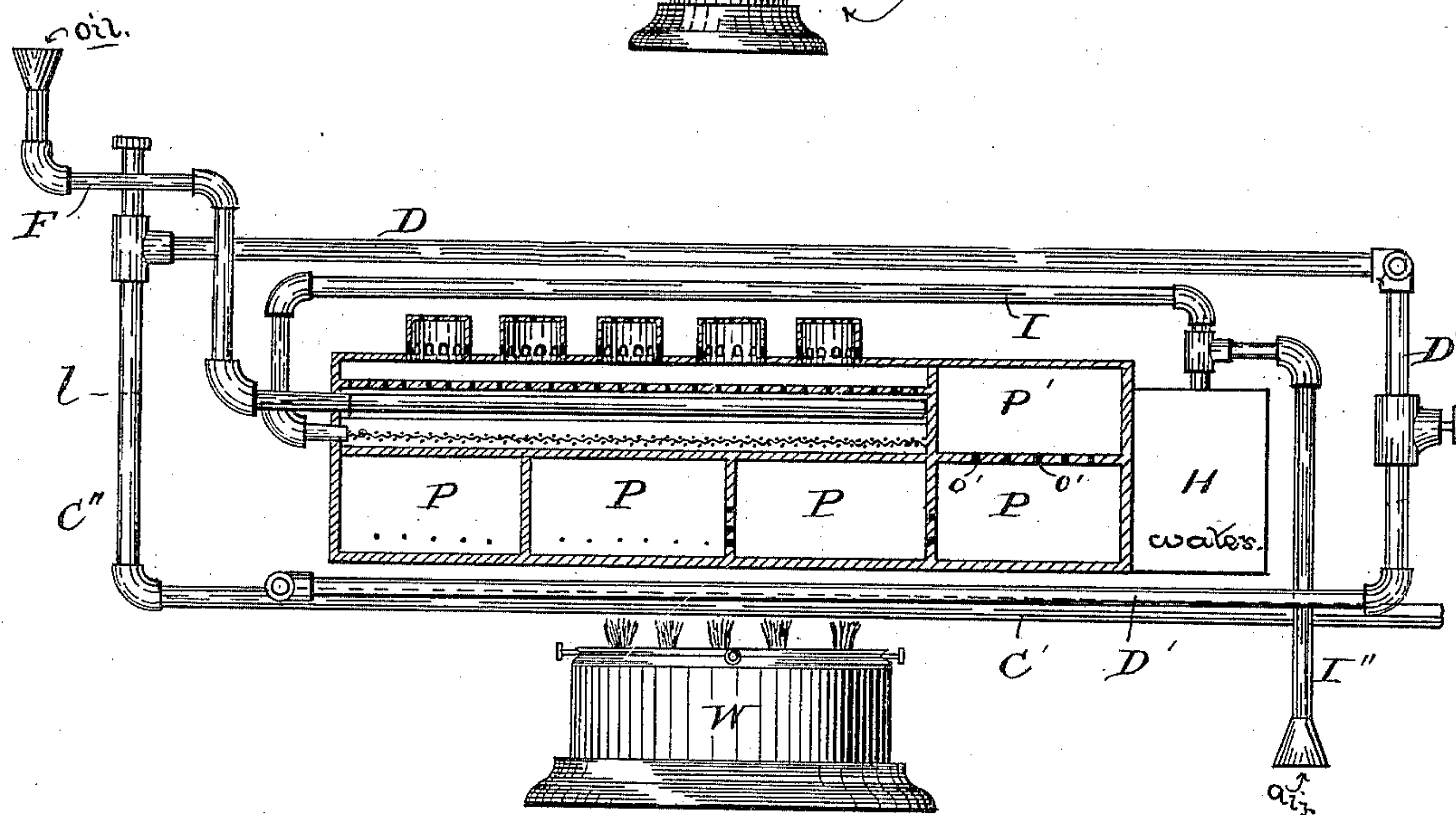


Fig. 7.

WITNESSES:

R. J. Powers
J. L. White

INVENTOR:

INVENTOR;
Russell P. Ambler
by Wright Brown
Attys

UNITED STATES PATENT OFFICE.

RUSSELL P. AMBLER, OF MEDFORD, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HENRY DEITZ, OF ALBANY, NEW YORK.

APPARATUS FOR MAKING AND BURNING GASEOUS FUEL.

SPECIFICATION forming part of Letters Patent No. 330,280, dated November 10, 1885.

Application filed February 16, 1885. Serial No. 156,045. (No model.)

To all whom it may concern:

Be it known that I, RUSSELL P. AMBLER, of Medford, in the county of Middlesex and State of Massachusetts, have invented certain
5 Improvements in Apparatus for Making and Burning Gaseous Fuel, of which the following is a specification.

The object of this invention is to combine the elements contained in water, oil, and air
10 in such a manner as to produce a cheap and convenient fuel to be used in households and wherever heat is required. This object is attained by first reducing water to a gaseous form by means hereinafter described, and
15 then uniting with it in certain proportions the carbon of vaporized oil and the oxygen of air, though it should be understood that the elements of combustion chiefly relied upon are the oxygen and hydrogen contained in
20 water, there being only a sufficient quantity of carbon added to give body and steadiness to the flame, and not enough to produce a flame by itself.

In using the word "oil" I refer especially to
25 that class of oleaginous substances which are more or less volatile, and which are capable of vaporizing under heat without residue. For purposes of safety and economy, I prefer to take my carbon from the refined petroleum
30 or kerosene in common use as a basis, adding to this a small proportion of other more volatile oils as may be needed to facilitate the chemical combinations desired.

In this machine no attempt is made to
35 manufacture and store a permanent or fixed gas, but the gaseous elements are led to the point of combustion immediately after being formed. The first and most important agent in the process referred to is a regulated and
40 uniform heat. This may be obtained from coal gas or naphtha, but a very cheap substitute, which I find sufficient for my purpose, is found in the flame of a kerosene lamp or stove. This flame being placed directly under
45 the gas-generator is by the peculiar arrangement of the apparatus made to carry on at the same time four different processes, viz: it heats the water to the boiling-point, producing steam; it superheats the steam, or,
50 in more accurate terms, disassociates the ele-

ments of which it is composed; it vaporizes the oil; it maintains the temperature uniformly at a point where the chemical combinations necessary to combustion can take place.

Of the accompanying drawings, forming a
55 part of this specification, Figure 1 represents a perspective view of the generator-casing with its burners, the accompanying external parts being removed. Fig. 2 represents a perspective view of the superheating device
60 inverted, and deprived of its bottom plate or partition. Fig. 3 represents a perspective view of the interior of the upper part of the generator with the top removed. Fig. 4 represents a transverse section of the part shown
65 in Fig. 3 with the top and the oil supplying and subdividing devices added. Fig. 5 represents a perspective view of the entire apparatus. Figs. 6 and 7 represent, respectively, transverse and longitudinal sections of the
70 entire apparatus.

The same letters of reference indicate the same parts in all the figures.

In the drawings, M represents the generator, which consists of an oblong chest, of brass
75 or other metal, supplied with burners N on the top and divided interiorly into two parts by a horizontal partition, O, the lower part containing an arrangement for superheating steam, and the upper part containing an ar-
80 rangement for receiving air, vaporizing oil, discharging the superheated steam in jets, and combining and burning the gases.

The superheating device consists of a series of small compartments, P, communicating
85 with each other by minute perforations *o*, through which steam passes in the direction of the numbers extending from 1 to 20, as shown. In the last compartment perforations
90 *o'* are made in the upper wall to allow the steam to pass upwardly into inclosed spaces or chambers, hereinafter described.

In the interior of the upper part of the gas-generator, beginning at the partition X in one end and extending along both sides, are inclosed
95 spaces or chambers P' P', to receive the steam-gas as it ascends from compartments No. 20 in the superheating device below, and to discharge the same into the vaporizing and combining chambers, hereinafter described,
100

through the perforations p^2 in the sides, as shown.

In the upper division of the gas-generator are two chambers, A B, separated by a horizontal perforated partition, R. In the lower of these (marked A) the oil is vaporized, and the vapor as it is formed is placed between jets of steam-gas coming in opposite directions from the side spaces, $P' P'$. The oil is introduced by and discharged from a pipe, F, and distributed on a diaphragm, S, of wire-gauze sloping from the center on either side, and connected with a horizontal diaphragm, T, beneath, as shown, the use of the latter being to receive and vaporize any surplus oil that may fall or flow from above.

I I represent pipes through which air and vapor are introduced, as hereinafter described.

The compartment B, above the perforated partition R, is a combining-chamber, into which the carbon vapor ascends through the perforated partition R, and where it is again placed between and brought in contact with jets of steam-gas which are sent out in opposite directions through the upper line of perforations, P^2 , from the side spaces, P' , as shown in Fig. 6.

Fig. 5 shows a perspective view of the gas-generator in connection with its attachments and accessories, as follows:

First. A water-tank, C, with two pipes, C' , leading from it, these passing under the generator and terminating in two upright tubes, C^2 , closed at the top, as shown, the purpose of which is to make steam space and pressure.

Secondly. Steam-pipes, D, which connect with the pipes C^2 at an elevation and pass horizontally above the generator at a point where they meet and merge into one pipe, D' . These pipes D have perforated partitions V at a point near their union with the pipes C^2 , to keep back the water and allow the steam to pass through. The pipe D' is provided with a valve, D^3 , to regulate the flow of steam, and passing under the generator enters compartment No. 1 in the superheating device, as shown in Fig. 2.

Thirdly. An oil-tank, E, and pipe E' , leading from it, which is furnished with a valve, V, to regulate the flow of oil, and which terminates in a perforated cap so arranged that the oil is separated in drops.

Fourthly. A pipe, F, which receives the oil and conducts it to the vaporizing-chamber A. This pipe extends through the chamber A lengthwise, and from the point where it enters the chamber is perforated in both sides at even distances, to allow the oil to drop regularly on the sloping diaphragm S. Within this pipe, running through its entire horizontal length, is a brass rod, F' , the use of which is twofold: first, to diminish the space in the pipe, so as to prevent the necessity of introducing a large quantity of oil, and, secondly, to conduct the oil as it drops from pipe E' and distribute it evenly through the perforations in the latter.

Fifthly. A box, H, placed at one end of the generator, which contains water to be vaporized by heat from the burner W. Connected with said box are the pipes I, extending first upward, then laterally over the generator close to the burners n , and then downward to and into the chamber A. Two air-induction pipes, I' , each with a cone-shaped head, receive the air and conduct it upwardly to the pipes I. The vapor generated in the box H rises into the pipes I, and is mingled with air in said pipes. The vapor is changed by heat from the burners N to a dry or gaseous state, so that the air mixed with it becomes hydrogenated.

The mode of operating the machine is as follows: A burner, W, of sufficient capacity, is first placed under the generator. Then the valves in the pipes C' , connected with the water-tank, are slightly opened. The water slowly fills the pipes C' and rises by hydrostatic pressure to the line indicated in Fig. 5, (marked l .) Being immediately heated, the water expands and rises, but steam is at the same time formed, which, being prevented from escaping by the closed top of the upright tubes C^2 , and being also partially obstructed by the partitions U in the pipes D, exerts a backward pressure on the water in the pipe C' and passes gradually through the partitions U, and is conveyed through the conducting-pipes D' to the first compartment, P, in the superheating device; thence it passes successively through all the compartments in the order shown by the numerals in Fig. 2, being held in each compartment under heat until it is forced by pressure through the small opening o near the bottom of each compartment. By this means the steam is caused to leave the state of saturation and assume a gaseous form, the oxygen and hydrogen of which it is composed being for the time disassociated and so prepared to enter into new combinations. In this form it is passed upward through the small openings o' in the top of the last compartment to the upper part of the generator, and fills the inclosed side spaces, P' , from which it is discharged in jets into the vaporizing and combining chambers A B, as already described. As soon as steam has thus been formed, the valve connected with the oil-tank E is very slightly opened, so as to allow a very small quantity of the fluid to pass in drops into the pipe F, the quantity being regulated according to the flame required and the proportion of steam-gas generated. The oil is now conducted along the brass rod placed in pipe F, and being evenly discharged on both sides through the small openings spreads itself on the frame-work or diaphragms of wire-gauze, where by the heat from the burner W, it is quickly volatilized. The carbon vapor thus formed receives a supply of hydrogenated air from the induction-pipes I and I' , as well as the jets of steam-gas from the side spaces, P' , by which means it is rapidly lifted into the combining-chamber above,

where the mixed elements enter into a more perfect union and form a gaseous compound that rises to the burners N and passes off in continuous combustion.

5 It is noticeable that in this machine there is no boiler in the ordinary sense of the word, and that in dispensing with this the necessity of generating a large quantity of steam, which might be dangerous in the hands of unskilled
10 persons, is avoided. It is also noticeable that the action of the machine is nearly automatic, as when the tanks are filled and the valves properly adjusted it feeds itself, the elements of combustion being continuously supplied.

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

1. In a machine for making and burning gaseous fuel, the combination of an external heater, whereby uniform and continuous heat
20 is supplied, connected water and steam receptacles over said heater, constituting with the heater a steam generating and superheating apparatus, a chamber continuously heated by said heater and receiving the superheated
25 steam, a diaphragm in said heated chamber, whereby oil is divided and held thinly spread until vaporized by the heat in said chamber and mingled with the superheated steam, and a burner or burners communicating with said
30 chamber where the mingled elements are consumed, as set forth.

2. In a machine for making and burning gaseous fuel, the combination of an external heater, whereby uniform and continuous heat
35 is supplied, connected water and steam receptacles over said heater, constituting with the heater a steam generating and superheating apparatus, a chamber continuously heated by said heater and receiving the superheated
40 steam, a diaphragm in said heated chamber, whereby oil is divided and held thinly spread until vaporized by the heat in said chamber and mingled with the superheated steam, an independent water-receptacle arranged to be
45 heated by said heater, a pipe or pipes extending from said water-receptacle over and into said heated chamber, and having air-receiving branches, whereby air is permitted to mingle with the hydrogen from the water in the tank
50 and pass in a hydrogenated form into said chamber, where it is mingled with the superheated steam and vaporized oil, and a burner or burners communicating with said chamber where the mingled elements are consumed, as
55 set forth.

3. The steam-superheating device composed of the series of compartments connected by orifices in their lower portions in such manner as to cause the steam to pass through each in succession, combined with a pipe for the ad- 60 mission of steam, and a heater under said compartments, as set forth.

4. The combination of the chamber A, having the perforated oil-supplying pipe, and the oil-subdividing diaphragm, the combining- 65 chamber B, separated from chamber A by a perforated partition, and the side spaces, P' P', which receive superheated steam and communicate with the chambers A and B, as set forth. 70

5. The combination, with an external heater, of the oil supplying and subdividing apparatus composed of the pipe F, connected with an oil-reservoir, and having numerous perforations which deliver the oil in drops, and the 75 gauze diaphragms under the perforations of said pipe, whereby the oil is held thinly spread for the action of the heat, as set forth.

6. In an apparatus for making gaseous fuel, the oil-supplying pipe F, containing the rod 80 F', whereby the oil is caused to flow in a thin annular stream, and provided with numerous perforations communicating with the annular oil-containing space in the pipe, said rod and perforations causing the oil to escape in drops 85 along the entire length of the perforated portion, as set forth.

7. The steam-generating apparatus composed of the heater W, the water-pipes C' C', located over the heater and communicating 90 with a suitable water-reservoir, the vertical tubes C² C², containing water and steam, and the steam-pipes D D, communicating with the tubes C² and with the superheating device, as set forth. 95

8. The air-hydrogenating apparatus consisting of the externally-heated water-tank H, the air-induction pipe I', and the pipes I, receiving air from the pipes I' and steam from the tank H, combined with the vaporizing- 100 chamber and the heater, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of February, 1885.

RUSSELL P. AMBLER.

Witnesses:

C. F. BROWN,
RICHARD J. POWERS.