(No Model.) 2 Sheets—Sheet 1.

J. STUBBERS.

AUTOMATIC GAS MACHINE.

No. 328,359. Patented Oct. 13, 1885.

Fig. 1.

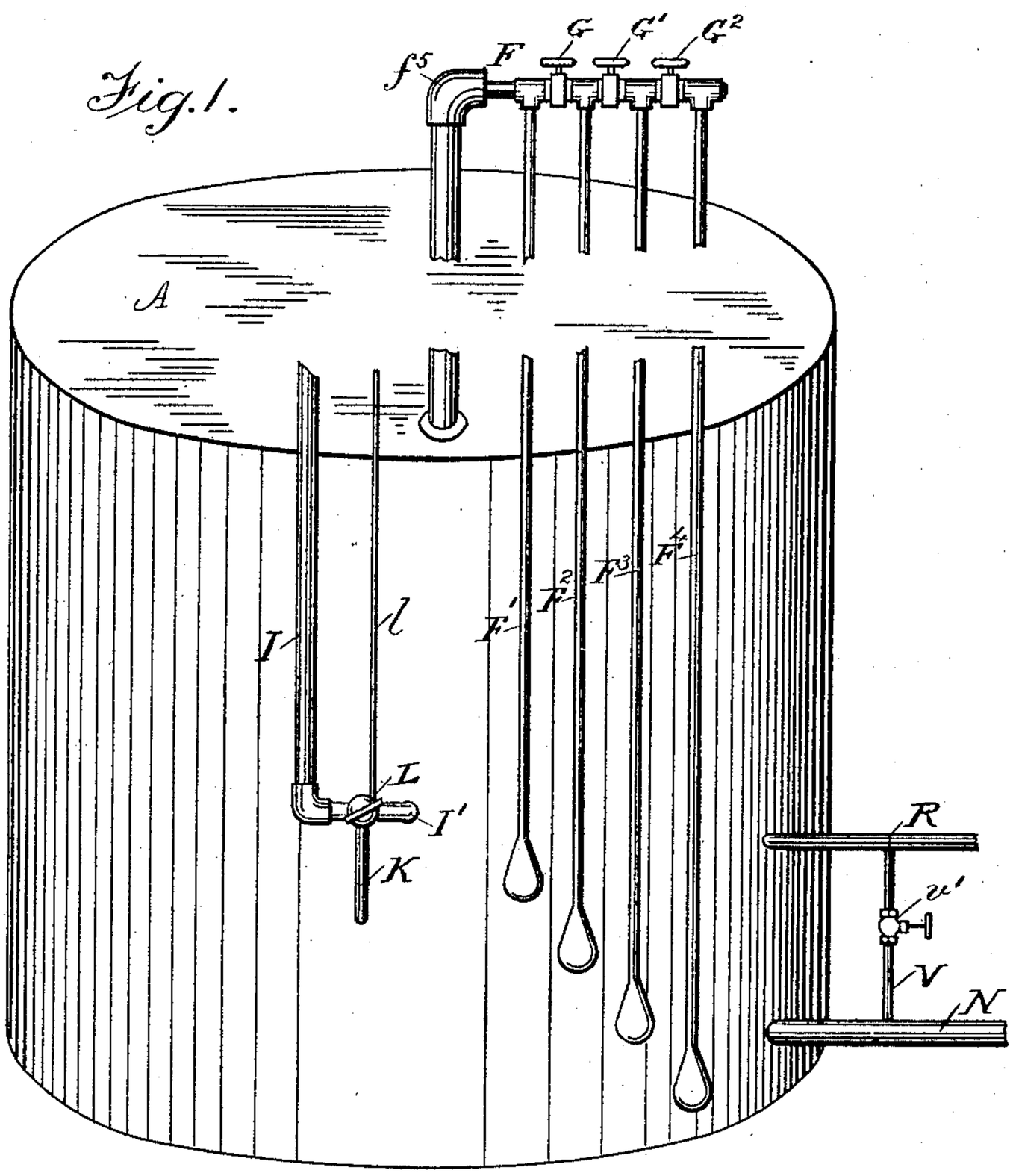
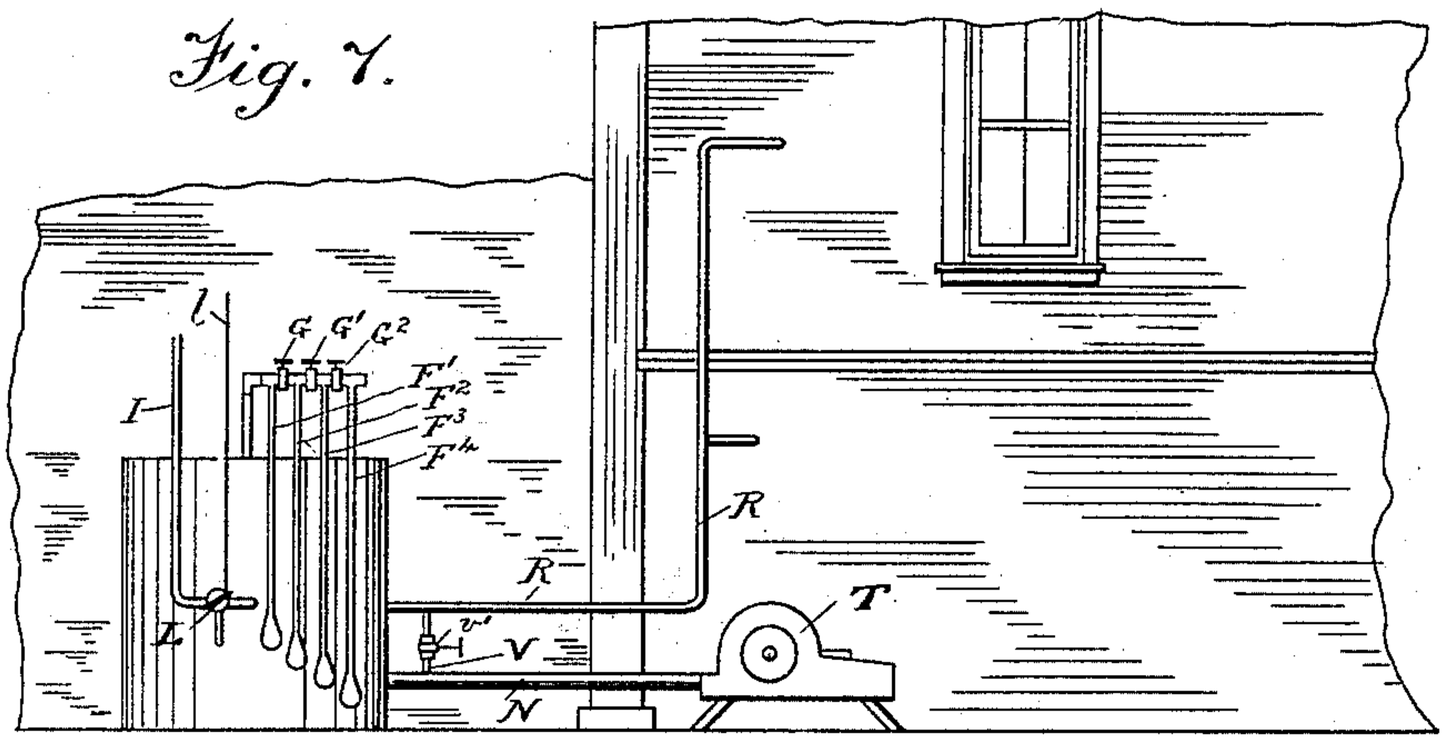


Fig. 7.



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(No Model.)

2 Sheets—Sheet 2.

J. STUBBERS.

AUTOMATIC GAS MACHINE.

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Fig. 2.

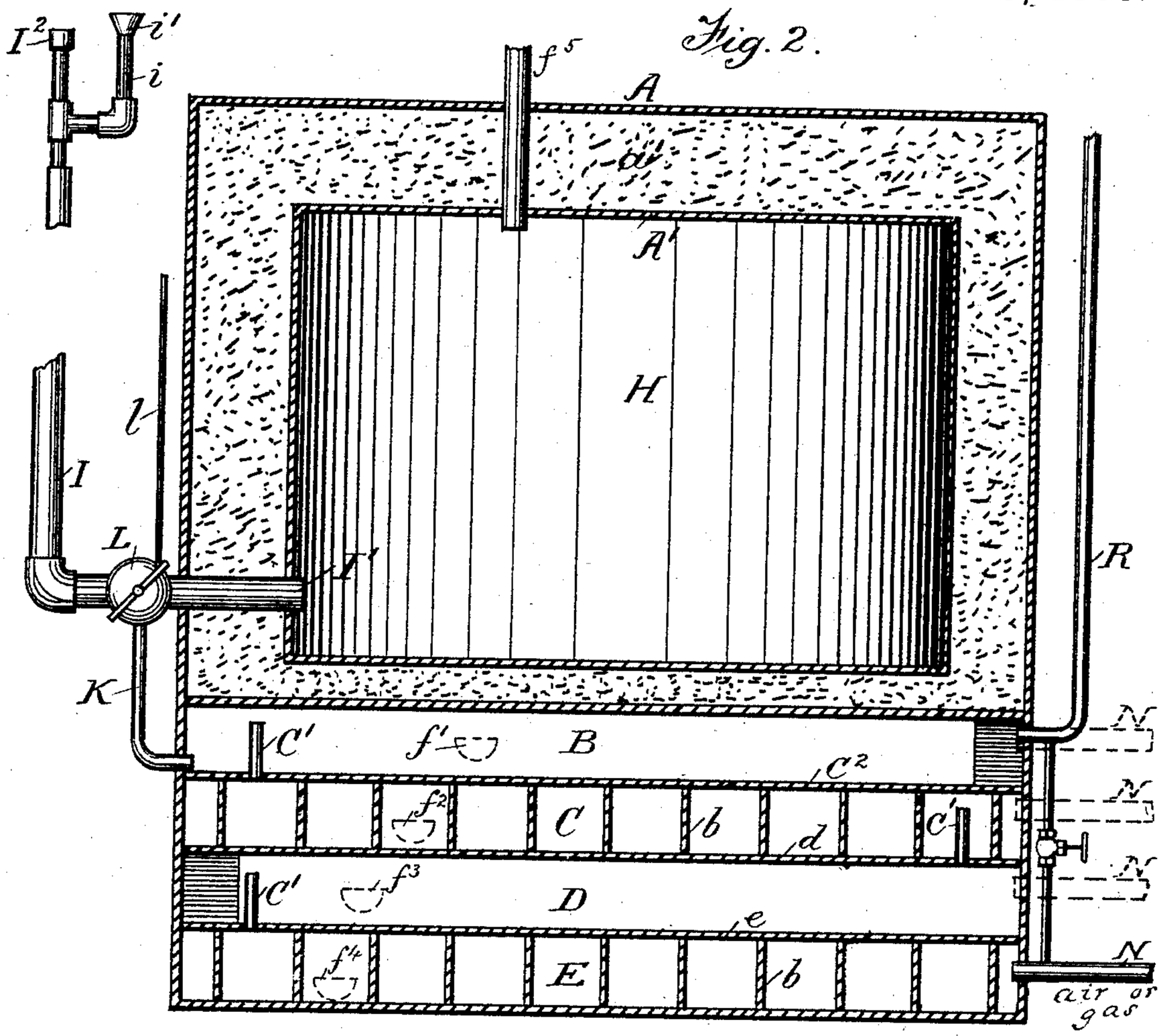


Fig. 4.

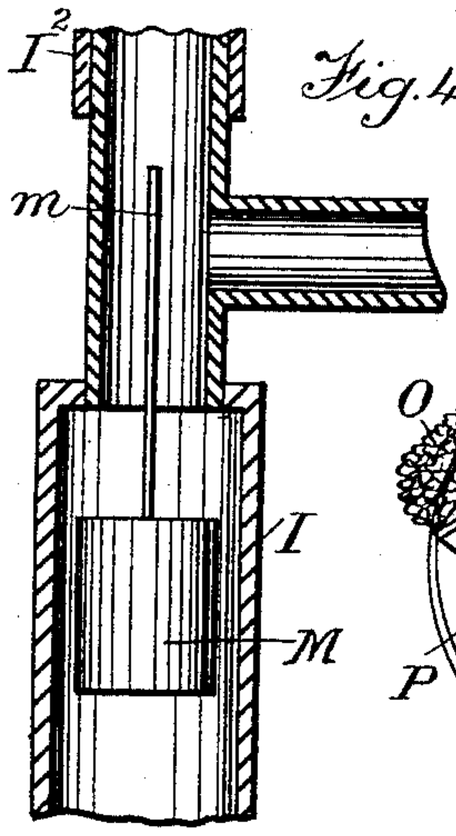


Fig. 3.

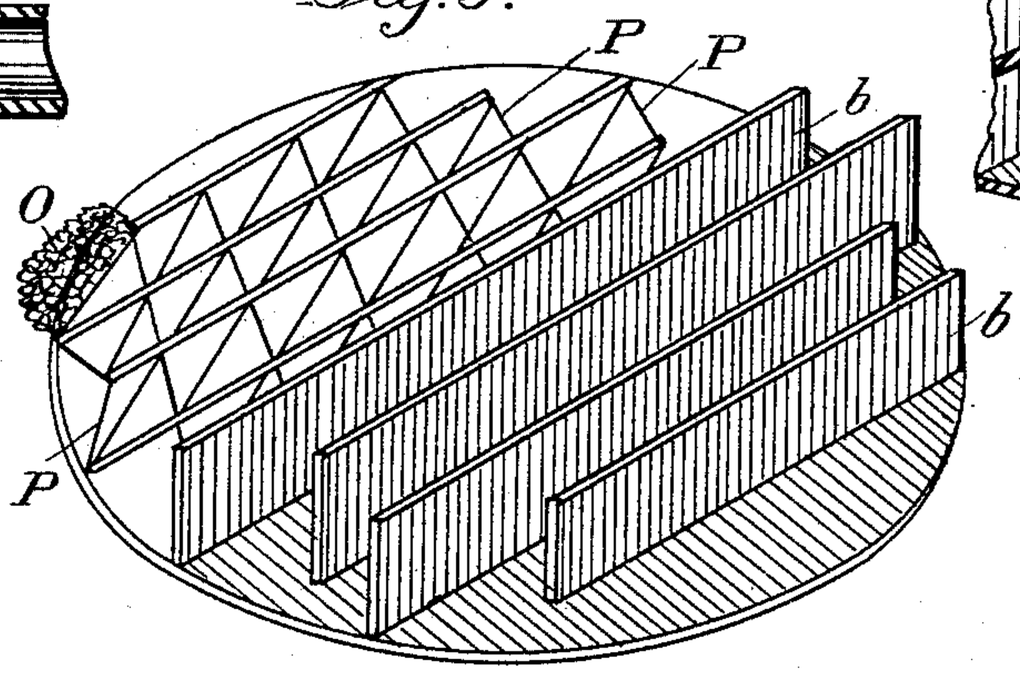


Fig. 5.

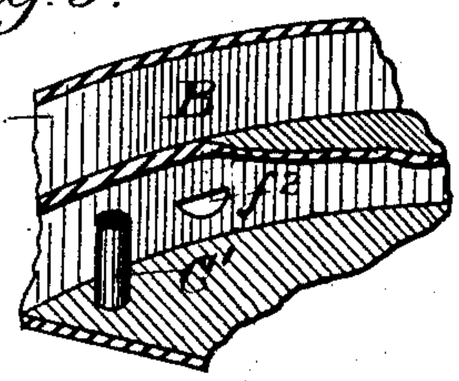
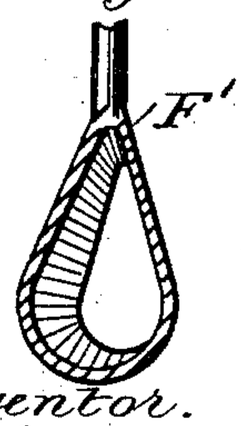


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH STUBBERS, OF CINCINNATI, OHIO.

AUTOMATIC GAS-MACHINE.

SPECIFICATION forming part of Letters Patent No. 328,359, dated October 13, 1885.

Application filed August 25, 1884. Serial No. 141,417. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH STUBBERS, of the city of Cincinnati, in Hamilton county, and State of Ohio, have invented certain new and useful Improvements in Automatic Gas-Machines, of which the following is a specification.

My invention relates to the subject of gas-machines or carburetors; and it consists of several improvements therein. The most important among them is a device by means of which a part only of the carburetor may be brought into action. It is not always desirable to have all the carbureting surfaces of the machine in action, as in such event a gas richer than wanted may and often will be furnished if the demand is small and the whole surface of the machine is in operation. For this reason a device by means of which a part of the carburetor could be cut off from use has long been sought for, and that portion of my machine supplying this want is an important feature of my invention. Certain less important features in the details of the construction will appear in the following description.

In the accompanying drawings, making part of this specification, Figure 1, Sheet 1, is a perspective view of my machine. Fig. 2, Sheet 2, is a cross-section showing the arrangement of the parts internally. Fig. 3, Sheet 2, is a detached view of one of the diaphragms. In this figure the diaphragm is shown inverted, so as to show the partitions which project downward from its under surface, and also to show the zigzag wires which are on the under surface. Fig. 4, Sheet 2, is a section of the feed-pipe, showing the float. Fig. 5, Sheet 2, is a perspective view, showing the relations of the air-pipe opening, and the pipe passing to the lower chamber. Fig. 6, Sheet 2, shows that end of the air pipe or tube which is soldered or otherwise affixed to the outer casing of the machine. Fig. 7, Sheet 1, is a general view, showing the relations of the machine and its attachments to the surface of the ground and to the cellar or room containing the blower.

A case, A, which is preferably cylindrical in shape, incloses the greater portion of the device. A diaphragm, *a*, shuts off the upper part of the case from the lower portion. In this upper division a second cylinder or vessel, A′, having the same shape as the upper compartment, is placed. While being similar in shape to the upper compartment, the vessel A′ is less in all its dimensions, and hence a space, *a′*, is left which completely surrounds the vessel A′. This space is packed with some substance, a^2, which is a non-conductor of heat—such, for example, as sawdust.

Below the diaphragm *a* the cylinder A is divided into two or more chambers, preferably four, B C D E, by means of the diaphragms, as C^2 *d e*, which chambers are air and water tight, except by means of conduits, which will be pointed out hereinafter. On the under side of each diaphragm are secured, in an air-tight manner, by soldering or otherwise, a number of parallel partitions, *b*, which latter project downwardly at substantially right angles to the diaphragm to which they are soldered, nearly or quite touching the diaphragm below. It is necessary that the upper joint—viz., between the roof of the chamber and its partition *b*—should be tight, but the lower joint, between the floor of said chamber and said partition, need not be tight; indeed, it is preferable to have it otherwise. The partitions *b* divide each chamber into a series of parallel passages which connect with each other at the ends. This is accomplished by making the partitions shorter than the distance across the chamber, having one closely soldered to the case A on one end, leaving a free space at its other end, while the two adjacent partitions are attached at the opposite side of the case to where the first-mentioned partition was attached, and have a free space at the ends where the first partition is united to the case. In this way they continue, each alternate partition being closely soldered to the same side of the case A, and each adjacent partition being closely soldered to the other side of the case A. Thus is formed a labyrinth or passage between the partitions, which necessitates a passage through the entire length of all the passages, of any gas or air which passes from one end to the other of the chamber. The partitions *b* of each chamber run in a direction at right angles to

the direction of the partitions *b* of the adjacent chambers.

On the floor of each chamber is placed a short pipe, *c'*, which projects above the floor of the chamber, and establishes communication with the chamber below. Each chamber is provided with an opening—viz., *f'* in chamber B, opening f^2 in chamber C, opening f^3 in chamber D, and opening f^4 in chamber E. These openings, preferably, are located in the case A, and preferably have the shape of the segment of a circle with the cord or straight side above, and are so located that the top of each opening is slightly below the top of the pipe *c'* in the corresponding (*i. e.*, same) chamber. The bottom of the segmental opening preferably reaches to the bottom of the chamber. A pipe, F', is connected with openings *f'*, a pipe, F^2, is connected with openings f^2, a pipe, F^3, is connected with openings f^3, and a pipe, F^4, is connected with openings f^4, the lower end of each pipe being expanded so as to inclose the peculiar-shaped segmental opening with which it communicates, as aforesaid. These pipes extend upwardly and communicate with a cross-pipe, F. Three valves, G G' G^2, are placed in the pipe F—viz., valve G between the points of union of the pipes F' and F^2, and valve G^2 between the points of union of the pipes F^2 and F^3, and valve G^2 between the points of union of the pipes F^3 and F^4. These valves have stems which are long enough to reach above the surface of the ground when the case A is buried. An elbow, f^5, from the pipe F leads into the reservoir H—that is to say, the interior of the case A'—and in this way forms a communication between the pipe F and the reservoir A.

At any convenient place, preferably on the outside of the case A, is placed the feed-pipe I, from which an arm, I', enters the reservoir H at its bottom. From the bend of this elbow a small pipe, K, which communicates with this pipe I I', passes downward to enter the upper chamber, B, near the bottom of the latter. At the bend of this elbow, where the three pipes, I I' K, meet, is placed a three-way cock, L, whose valve-handle *l* is extended upwardly to any convenient point above ground. The three-way cock L takes two positions, in one of which it permits a passage through pipes I I' into the reservoir H, cutting off all communication with the pipe K. In the other position the communication exists between the pipes I' and K, and the pipe I is cut off.

It is desirable to employ an indicator in connection with the feed-pipe to show how high the gasoline stands in the reservoir. A preferred means for obtaining such indication consists as follows: A pipe, *i*, branches from the upper part of the pipe I and terminates in a funnel, *i'*, into which the gasoline is poured when filling the reservoir. The upper end of the pipe I is covered by a cap, I^2. A float, M, rests on the surface of the oil in the pipe I, and has projecting from its upper surface a wire, *m*, which comes up high enough to be seen when the cap I^2 is removed, and thus serves as an indicator as to the quantity of gasoline in the reservoir.

A pipe, N, which is to introduce air or gas to be enriched into the pans, enters at the top or top portion of the lowest chamber, E. To insure certainty of action it may have a blower attached.

There yet remains to be described a peculiarity of some importance in the carburetor. Throughout the length of all the channels formed by the partitions *b* are festoons of netting, which hang from the under surface of the diaphragm forming the top of the chamber. These pieces of netting or cloth O are held to the top by means of small wires P, which extend diagonally across the top of each channel, are soldered or otherwise secured at each end to the top, and in the free space between the said ends hold the pieces of netting against the top of the chamber, and let them hang down on each side of said wire into the chamber. The wires P are so placed that alternate wires are parallel to each other, and adjacent wires lie in opposite diagonals, thus having the netting hang in a zigzag course through the channels.

From the upper part of the top chamber, B, a pipe, R, leads off to the gas pipe or pipes to be supplied by the carburetor, and these gas pipe or pipes supply the burner or burners with gas. The case A, with its attachments, are buried in the ground several feet below the surface, preferably near the house or building to be supplied with gas, so that the pipes N and R may be carried into the cellar or equivalent place. Other attachments are continued to the surface of the ground, as already described, and there properly protected.

In Fig. 7 the device in its relations to the house, blower, &c., are shown. Here we find the case A with its attachments sunk in the ground. The pipes F' F^2 F^3 F^4 are carried above the surface of the ground to join pipe F, which is located above the surface. Similarly the feed-pipe I and the stem *l*, for operating the three-way cock, are shown above the ground. The drawings also show how the pipe N is connected with the blower T, located in the basement or cellar or other convenient apartment. A pipe, V, connects the pipes N and R, the latter of which is shown connected with the house-pipes. This short pipe V is provided with a valve, *v'*, controlling communication between the pipes N and R. When the valve *v'* is opened, air, which is forced by the blower through pipe N, enters pipe V, as well as the carburetor. Passing through pipe V into pipe R it serves several important functions. When the gasoline is first let into the chambers, the resulting gas is very rich in hydrocarbons, and dilution with pure air is necessary to secure its complete combustion. In doing this there is great economy in the use of the gas, as no smoky hydrocarbons escape burning. It also prevents gumming up

of the burners, and hence is in many ways advantageous.

In operating the machine the reservoir H is first filled with gasoline through the pipes *i* I I′, the cock L having been previously turned to connect the pipes I I′. The index-rod *m* shows when the reservoir is about full. Any air or gas which may be in the reservoir H is driven out by the inflowing gasoline. The air passes out through pipes f^5 F F′ into chamber B; thence out through pipe R. The valves G G′ A^2 are supposed to be closed. The cock on pipe R is now closed. After the reservoir is filled the cock L is turned, and the gasoline runs from the reservoir into chamber B, the air in the chamber being driven through pipes F′ F f^5 in to the reservoir. The gasoline continues to run into the chamber B until it has closed over the opening *f′*, when it stops flowing, as the air-pressure is balanced above and below, and it becomes impossible for any more oil to escape from the reservoir into the chamber B. It will be remembered that the top of the air-pipe *c′* is higher than the top of the opening *f′*; hence no oil can get into the lower chamber. The air or gas to be enriched will pass through the inlet-pipe N, and then pass successively through the empty chambers E, D, and C, by way of the respective conduits C′, in their respective roofs, and enters the chamber B through the conduit C′ in its floor, and passing through the cells or passage-ways of said chamber B and coming into contact with gasoline held in the netting and covering the bottom of said passage-ways, becomes enriched and carbureted, and passes from the chamber to the delivery-pipe R. If, now, it is desired to more highly carburet the incoming air or gas, or carburet a greater amount thereof, the valve G is opened, an escape for the air in the upper part of chamber B is provided through pipe C′, chamber C, pipes F^2 F, into reservoir H, and the gasoline again begins to flow and overflows the pipe *c′*, and passes into chamber C. It continues flowing until it stops up the opening f^2 in chamber C, when it is stopped as before. In this way the admission of gasoline into the chambers C D E is controlled, respectively, by the valves G G′ G^2. When the chambers have been charged with gasoline, the netting soaks it up by capillary attraction. Air is introduced or driven through the pipe N, passes through all the channels of each chamber, passing from chamber to chamber through the pipes C′, before it reaches the outlet-pipe R. In its passage over the surface of the oil and through the netting it becomes highly charged with hydrocarbons, and issues from the pipe R as an excellent-burning gas for illuminating or heating purposes. As the gasoline becomes exhausted in the various chambers, it drops below the level of the openings *f′* or f^2 or f^3 or f^4, as the case may be, and permits the flow of oil to start again.

The peculiar shape of the openings *f′* f^2 f^3 f^4 the better permits the oil which has risen in the pipes F′ F^2 F^3 F^4 to escape readily. With an ordinary circular opening, trouble has been heretofore experienced from the oil sticking in the pipes and preventing the air passing through them after the level of the oil had dropped below the level of the openings. If gas should collect in the reservoir H, by the vaporization of the gasoline therein, obviously great trouble will be experienced. To prevent the gasoline vaporizing in said reservoir, the packing a^2 has been provided to assist in keeping it cool.

The inlet-pipe N is preferably connected with only the lower chamber of those present, but there may be an inlet-pipe for each chamber, each inlet-pipe being provided with a suitable valve for opening and closing its pipe. (See dotted line in Fig. 2.) In such event that inlet-pipe communicating directly with the lowest chamber in use may be the one employed.

In cases where it is not desired to feed separately the carbureting-chambers intermediate between the first and the last, the valves, as G or G′ or G^2, and the air-pipes connecting said carbureting-chambers with the air-pipe F, except the air-pipe connecting the lowest carbureting-chamber with pipe F, will not be used and may be dispensed with.

While the various features of my invention are preferably employed together, one or more of said features may be employed without the remainder. In so far as applicable, one or more of said features may be employed in connection with gas-machines or parts thereof other than those particularly herein described.

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

1. In a gas-machine, the combination of the reservoir H, conduit F, communicating with said reservoir, pipe F′, chamber B, chamber C, pipe C′, pipe F^2, and valve G, substantially as and for the purposes specified.

2. In a gas-machine, the combination of the reservoir H, conduit f^5 F, communicating with said reservoir, pipe F, chamber B, chamber C, pipe C′, pipe F^2, valve G, chamber D, pipe F^3, and valve G′, substantially as and for the purposes specified.

3. In a gas-machine, the combination of the reservoir H, conduit f^5 F, pipe F′, chamber B, chamber C, pipe C′, pipe F^2, valve G, chamber D, pipe F^3, valve G′, chamber E, pipe F^4, and valve G^2, substantially as and for the purposes specified.

4. In combination with a reservoir, H, and a chamber, B, the pipe F and pipe F′, the latter provided with the enlarged segmental opening *f* and exit or gas-delivery pipe, substantially as and for the purposes specified.

5. In combination with a reservoir, H, and the series of two or more chambers, as B C, &c., the air-pipes F′ F^2, &c., provided at their junction with their respective chambers with the enlarged segmental openings *f f′* and pipes C′, the upper edge of the openings *f f′*, &c., being, respectively, below the top of the pipe C′ in the same chamber, and inlet-pipe, as N,

and gas-discharge pipe, substantially as and for the purposes specified.

6. The combination of the reservoir H, and chamber B, and pipe F f^5, pipe F′ and pipe I, arm I′, pipe K, and three way-valve L, inlet-pipe N, and delivery-pipe R, substantially as and for the purposes specified.

7. The combination of the reservoir H, chamber B, pipe F f^5, pipe F′, pipe I, arm I′, pipe K, three-way valve L, and one or more additional chambers, as C D E, each provided with a pipe, C′, and pipe F^2, or F^3, or F^4, and inlet-pipe N, and delivery-pipe, substantially as and for the purposes specified.

8. The combination of the reservoir H, chamber B, pipe F f^5, pipe F′, pipe I, arm I′, pipe K, three-way valve L, and one or more chambers, as C D, &c., each provided with pipe C′ and with a pipe, as F^2 F^3 F^4, the opening from the down pipe, as F^2 F^3 F^4, being enlarged and of a segmental shape, the upper straight edge of the opening being below the surface of the pipe C′ of its chamber, inlet-pipe, as N, and gas-delivery pipe, substantially as and for the purposes specified.

9. In a gas-machine, the combination of the reservoir H, air-conduit F, communicating with said reservoir-pipe F′, chamber B, pipes I and K, arm I′, and cock L, substantially as and for the purposes set forth.

10. In combination with the reservoir H and two or more carbureting-chambers located below the level of the bottom of the said reservoir, the air-pipe F, communicating with the upper or air portion of the reservoir, and an air-pipe connected to the pipe F and to the lower of the carbureting-chambers, and a pipe connecting the lower or fluid portion of the said reservoir with the upper carbureting-chamber, said last-named pipe entering the last-named chamber at or near the bottom of the latter, substantially as and for the purposes specified.

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