

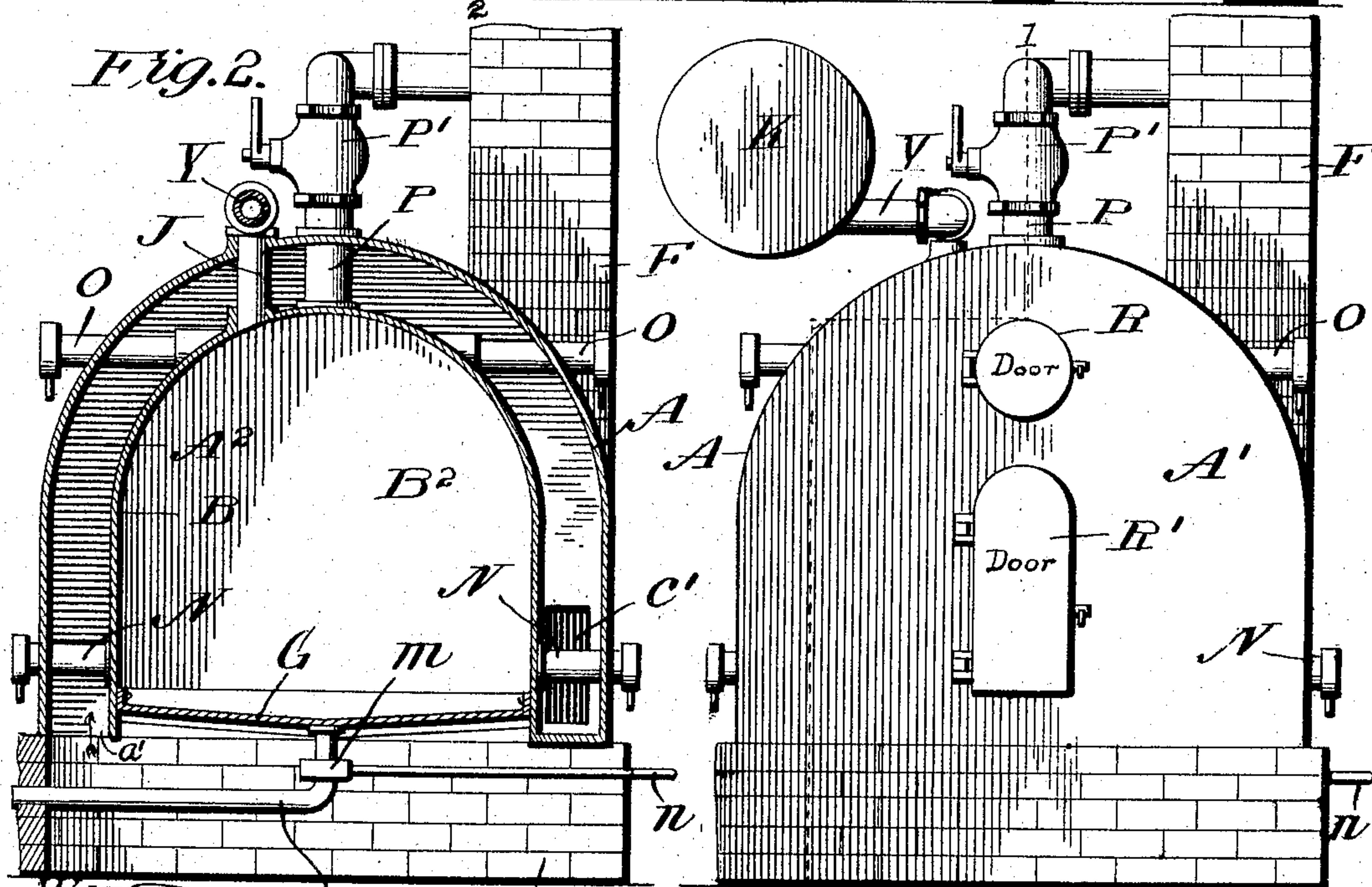
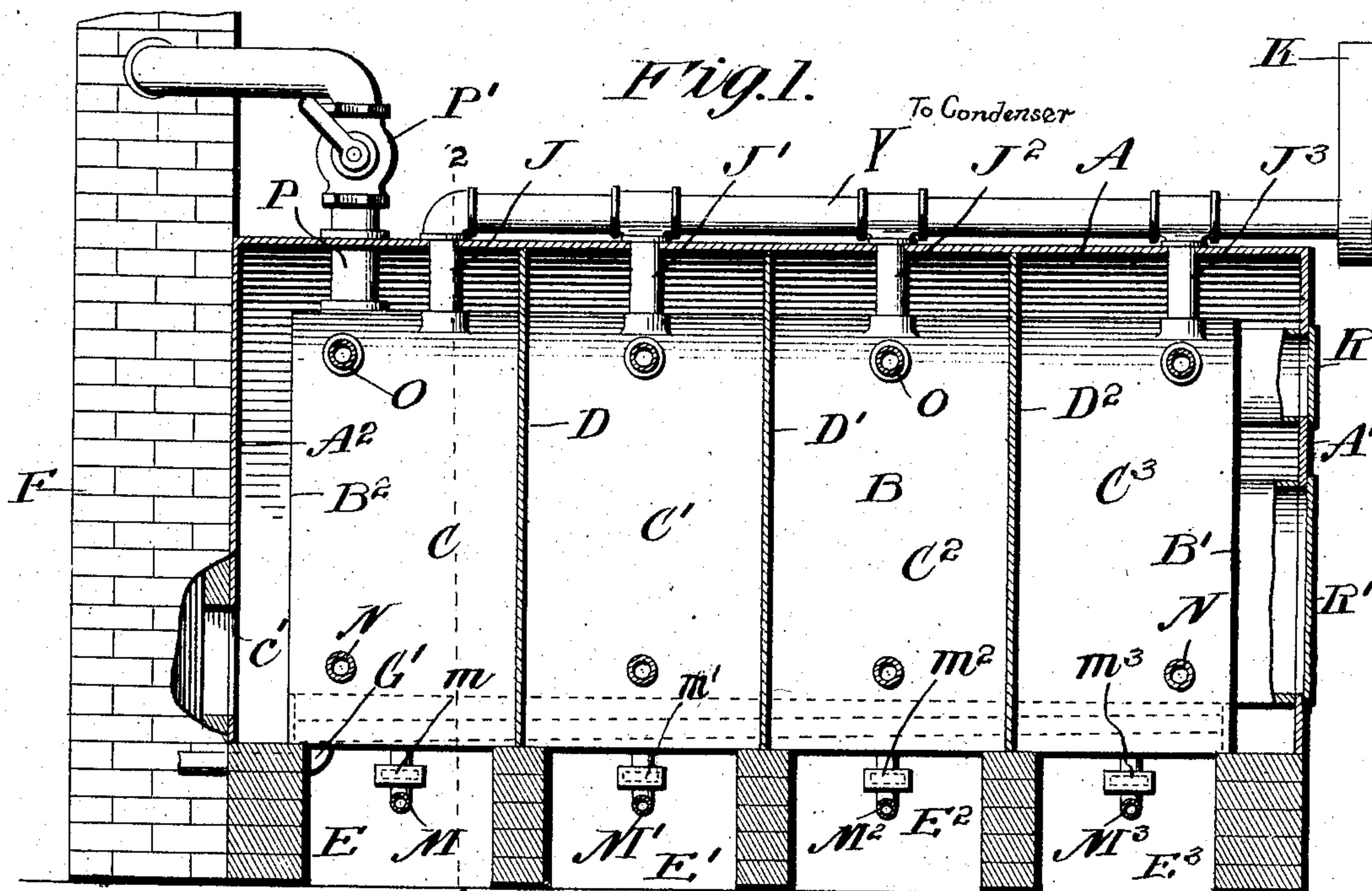
No. 790,097.

PATENTED MAY 16, 1905.

A. J. ADAMS.
RETORT FOR WOOD DISTILLATION.

APPLICATION FILED DEC. 27, 1901.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

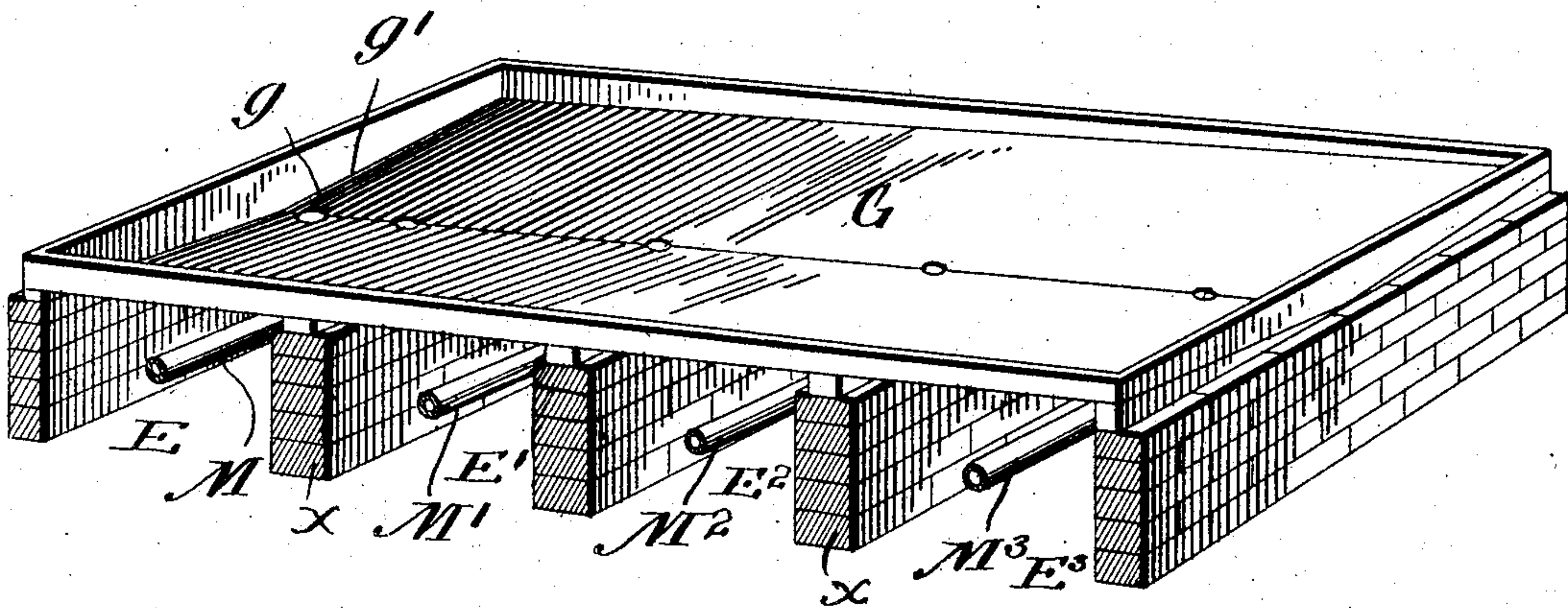


Fig. 4.

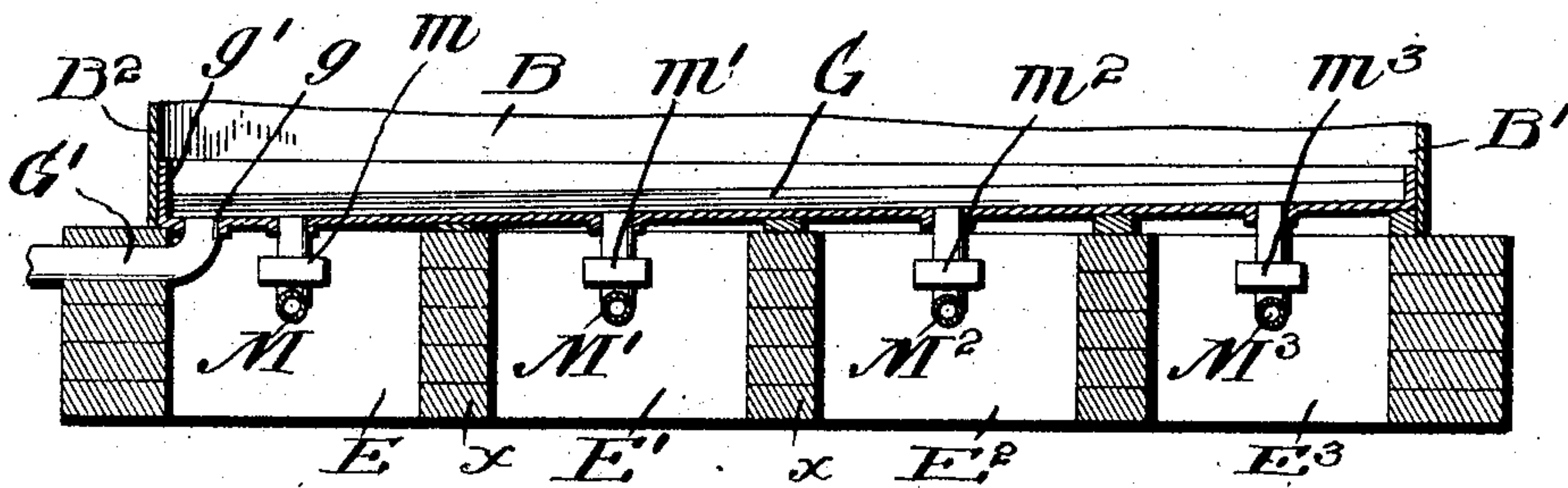


Fig. 5.

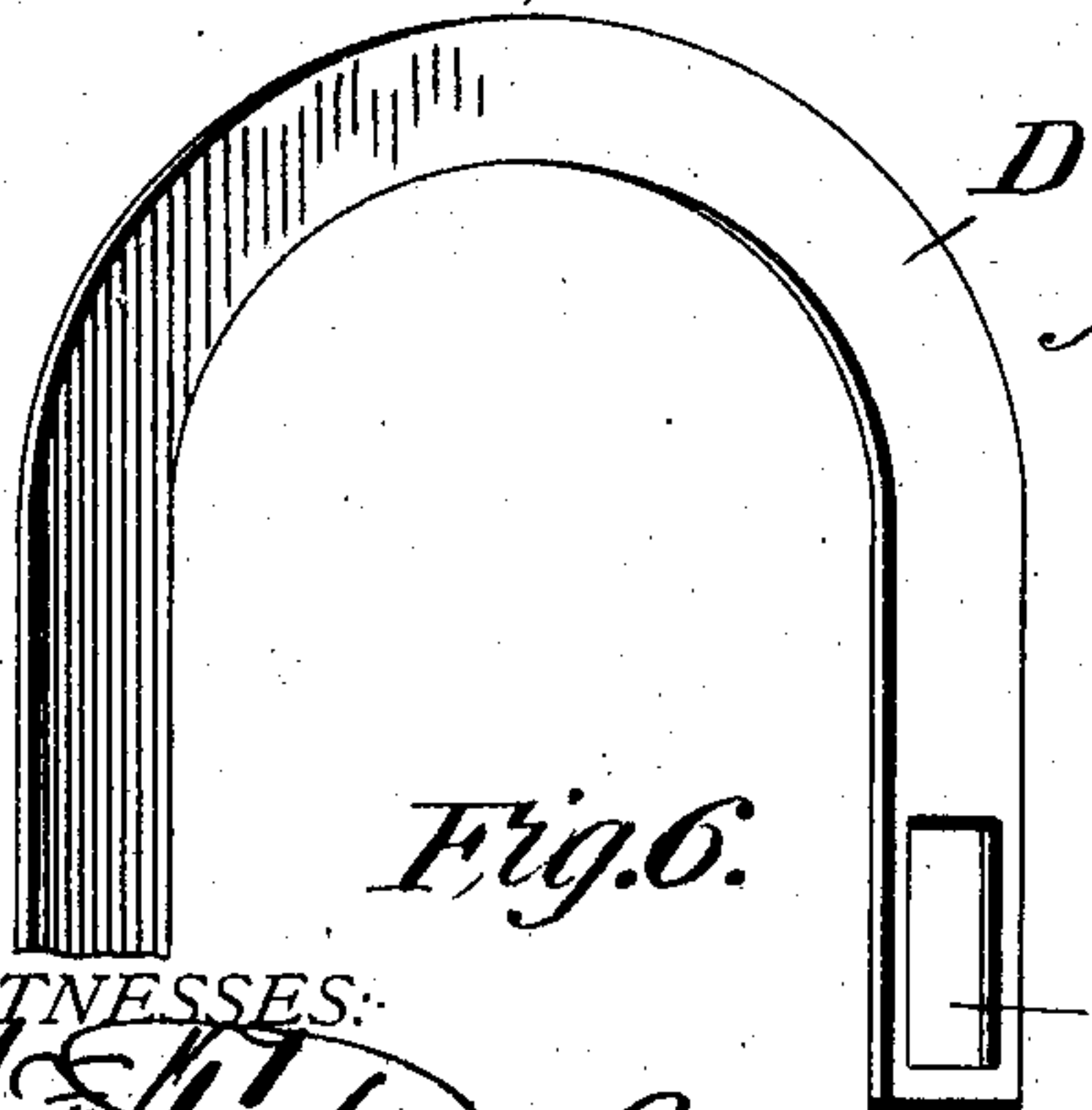
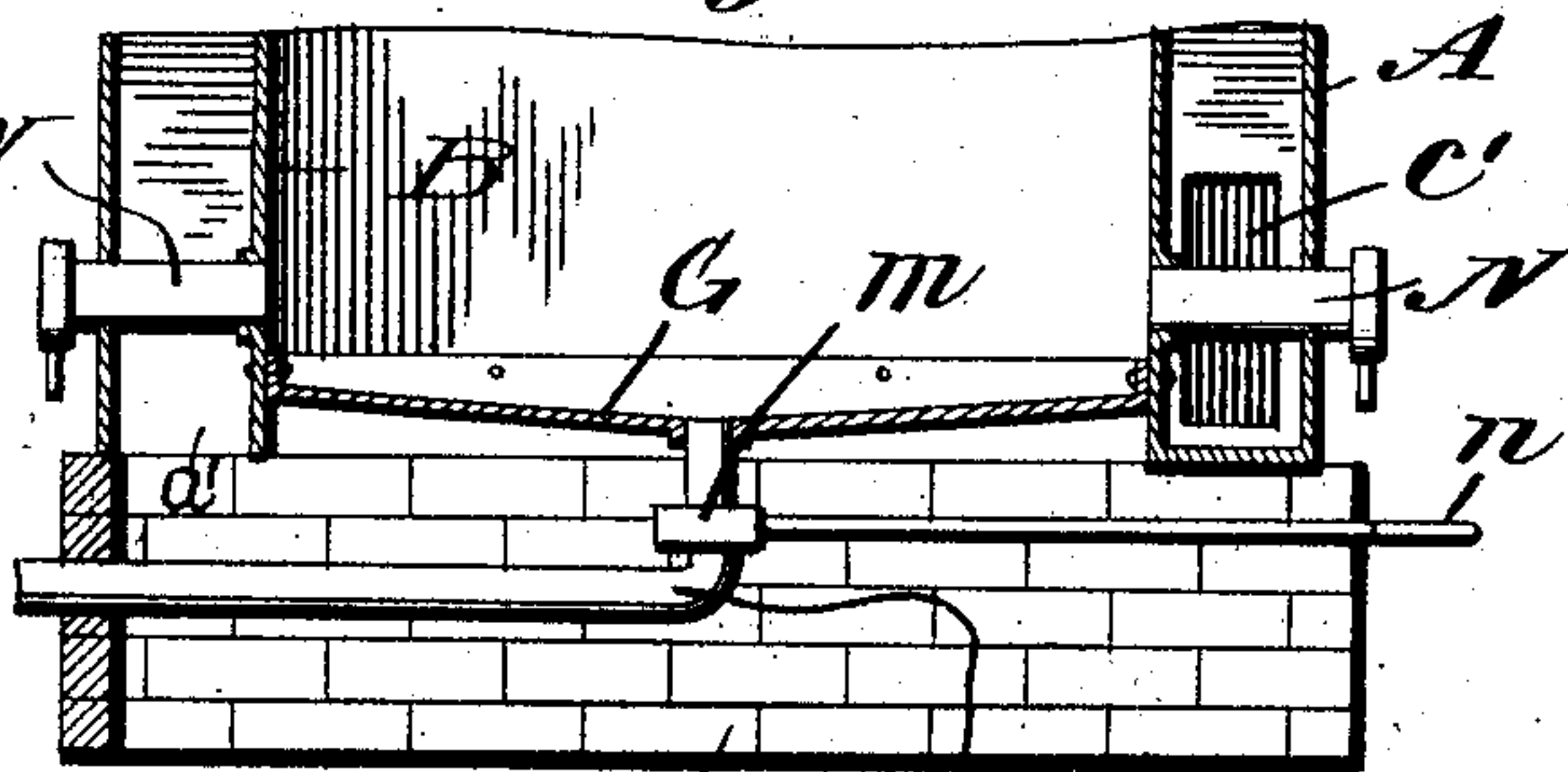


Fig. 6.

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UNITED STATES PATENT OFFICE.

ALBERT J. ADAMS, OF CLEVELAND, OHIO, ASSIGNOR TO THE INTERNATIONAL WOOD DISTILLING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

RETORT FOR WOOD DISTILLATION.

SPECIFICATION forming part of Letters Patent No. 790,097, dated May 16, 1905.

Application filed December 27, 1901. Serial No. 87,463.

To all whom it may concern:

Be it known that I, ALBERT J. ADAMS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Retorts for Wood Distillation; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to retorts for the destructive distillation of wood, whereby the volatile hydrocarbons, pyroligneous acid, &c., are removed from the charge of wood, thereby producing fine charcoal.

The objects of my invention are to provide a retort which is economical in the use of fuel and in the saving of the products and a retort which may be easily regulated as to the admission and cut-off of air to the interior of the retort at different points, as will be hereinafter fully set forth.

My invention consists in the construction of the retort and its auxiliaries whereby the above-cited effects are attained to the best advantage.

In the drawings, Figure 1 is a vertical longitudinal sectional view taken on the line 1 1 of Fig. 3 and also partly broken away at the front and rear head of the outer casing. Fig. 2 is a transverse vertical sectional view taken on the line 2 2 of Fig. 1, showing the arrangement of air-inlets. Fig. 3 is a front elevation of a retort constructed in accordance with my invention. Fig. 3^a is an isometric view of the retort-bottom. Fig. 4 is a central longitudinal section through the retort-bottom with the inner casing broken away. Fig. 5 is a transverse section through the retort with both casings broken away. Fig. 6 is a detached detail perspective view, partly broken away, of one of the partitions which separate the space between the inner and outer casings into compartments.

A represents a dome-shaped outer casing,

which is formed of boiler or plate metal and is provided with front and rear heads A' A².

B represents an inner chamber, which is provided with front head B' and rear head B² and is formed smaller than the exterior casing A both in length and in cross-section, thus leaving a space between the two walls exterior of the inner chamber and surrounding the inner chamber at the top, sides, and ends.

The space between the casings A and B is divided into sections C, C', C², and C³, more or less in number, according to the capacity of the retort, by means of partition-walls, as D, D', and D², which extend around at intervals and fill the space between the walls. Each section C, C', C², and C³ is provided with a separate furnace or fire-pit E E' E² E³, from which the heat and products of combustion pass into the respective sections and thence pass through an opening *c'* (see Fig. 2) to the next section. Each partition is formed with an opening *c'*, whereby an even temperature in the several sections is maintained. From the section C the products of combustion pass to and through a chimney F. The furnaces or fire-pits E, E', E², and E³ extend the entire width of the retort, and the side walls thereof are formed by the retort foundation, the same consisting of a plurality of parallel walls X, between which the fires are built on the earth.

By the above-described construction and arrangement it will be seen that the inner casing or retort proper, B, is surrounded by products of combustion and that the charge of wood within the chamber B is equally heated, and thus discharged of its volatile products and gas without being in any way in direct connection with the outer air. The products of combustion pass from the several furnaces E E' E² E³ to the several compartments C C' C² C³ through space *a'* between the casings A and B (see Fig. 2) and from the said several compartments pass through the openings *c'* in the partitions D D' D² and in the rear head A² to the chimney F.

In order to carry off the heavy hydrocarbons, such as tar and the like, the floor G of the retort B is formed with inclined sides and is also inclined downwardly toward one end g' , thus forming a trough for the distillate. The lower end of the trough-floor G, as at g , is provided with a suitable pipe or outlet G' , whence the tar passes into a tank or suitable receptacle, where the same is collected. (See Figs. 4 and 5.) The volatile matter, such as the pyroligneous acid and the like, is carried off through pipes J, J', J², and J³, which communicate with the retort B and with the pipe Y, which leads to a condenser K of any suitable construction. (See Fig. 2.)

After the distilling process is finished, which with my device requires far less time than with other devices or retorts, the fires are allowed to "die" or "go out" and air is admitted to the interior chamber or retort B through pipes M M' M² M³, pipes O, and pipes N for the purpose of producing imperfect combustion of the charge in order to eliminate from the charcoal all side products in the form of tars or vapors, as after the distillation of the wood certain products remain, which not being volatilized by the mere heating of the retort will be consumed when the air is admitted due to the air supplying oxygen, whereas prior to the introduction of the air combustion of these products would be prevented by the absence of oxygen. Another feature of my invention is the means of regulating this supply of air to the interior chamber or retort B, so that it may be applied at the points necessary in the required quantity, and inasmuch as the arrangement of the charge and the density of the wood may vary, as may also the "dryness" of the different portions of the charge, I have devised the following arrangement for supplying the inner chamber or retort B with air. The air-pipes M, M', M², and M³ heretofore referred to are located in the bottom G of the retort B along its central portion longitudinally and extend outwardly to one side. (See Figs. 2 and 3^a.) The inner ends of the pipes M, M', M², and M³ are in open relation with the interior of the retort B and the outer ends of said pipes are in open relation with the exterior air either through the furnace or from outside of the same. Each of the air-pipes M, M', M², and M³ has valves or cut-offs, such as $m m'$ $m^2 m^3$, of any preferable construction; but I prefer to use a slide cut-off, as illustrated, having a handle n , by means of which it can be opened or closed to the required extent to control the admission of the air to the retort B and its charge.

The pipes N heretofore referred to project into and communicate with the interior of the retort-chamber B at its lower sides, a number of pipes being provided at each side, accord-

ing to requirements. It is, however, desirable that one air-pipe (or in some cases two) be supplied at each side section C, C', C², and C³, as illustrated in Figs. 1 and 2. The other series of pipes O heretofore mentioned are provided at or near the upper portion of the retort-chamber B and have communication with the interior thereof. The pipes O are provided at both sides of the retort (see Fig. 2) and are supplied with cut-off valves, preferably of the slide type, (conventionally shown and which may be of any desired form,) as are also the pipes N. Also both series of the pipes N and O have communication with the exterior air.

P represents a safety-pipe which communicates at one end with the interior of the retort-chamber B and at the other end with the chimney or flue F. The pipe P is supplied with a suitable valve P' for opening or closing communication between the interior of the retort-chamber B and the chimney F. This pipe P is used in case of danger from overproduction of vapor and also as a draft-pipe when the charge is being formed into charcoal.

R R' represent charging-doors, which are located at the front of the retort and communicate with the interior of the chamber B. The doors may be formed so as to close airtight, or they may be luted after the retort is charged. The object of providing one door above the other is to allow of the retort being fully charged at its front end. Both doors may be used as inspection-holes during the charging process.

It will be seen that by constructing a retort according to my invention the products of distillation are fully collected and may be subsequently treated and that the process of charging the charge after the distillation is finished is easily and perfectly accomplished and that air may be admitted at suitable parts of the retort-chamber B and also in required quantity at any point, thus in the first place extracting all the useful products from the charge and in the next place producing a charcoal which is fine in grain and is thoroughly charred throughout by the combustion of the non-volatile tar, &c., which remains in the wood after the distillation of the volatile products of distillation.

What I claim is—

1. In a retort, the combination with the outer casing, of an inner casing spaced therefrom, partitions formed with openings arranged between the inner and outer casings, thereby forming a plurality of compartments, furnaces located beneath each of said compartments, and air-inlet pipes communicating with the said inner casing at its upper and lower portions.

2. A retort for the destructive distillation of wood, comprising an inner chamber adapted to receive the charge, said inner chamber

being inclosed within an outer casing in such a manner as to leave a space between the said inner chamber and outer casing at sides and top, a furnace communicating with said space,
5 and valve-controlled air-inlets at the bottom and top of said inner chamber, for the purpose set forth.

Signed by me at Cleveland, Cuyahoga county, Ohio, this 19th day of September, 1901.

ALBERT J. ADAMS.

Witnesses:

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