

(No Model.)

3 Sheets—Sheet 1.

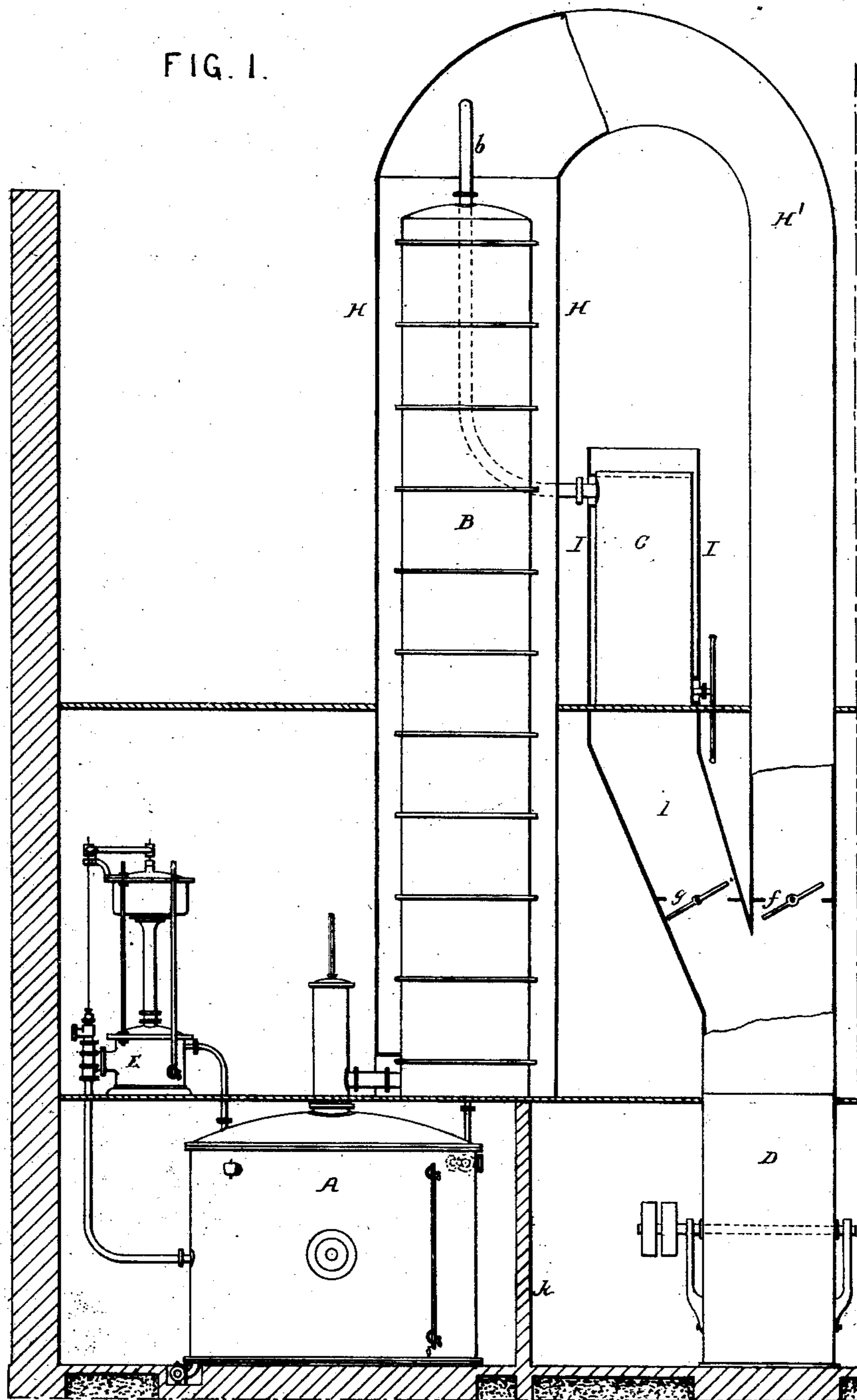
D. F. SAVALLE.

DISTILLING, CONDENSING AND REFRIGERATING APPARATUS.

No. 245,226.

Patented Aug. 2, 1881.

FIG. 1.



WITNESSES

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FIG. 2.

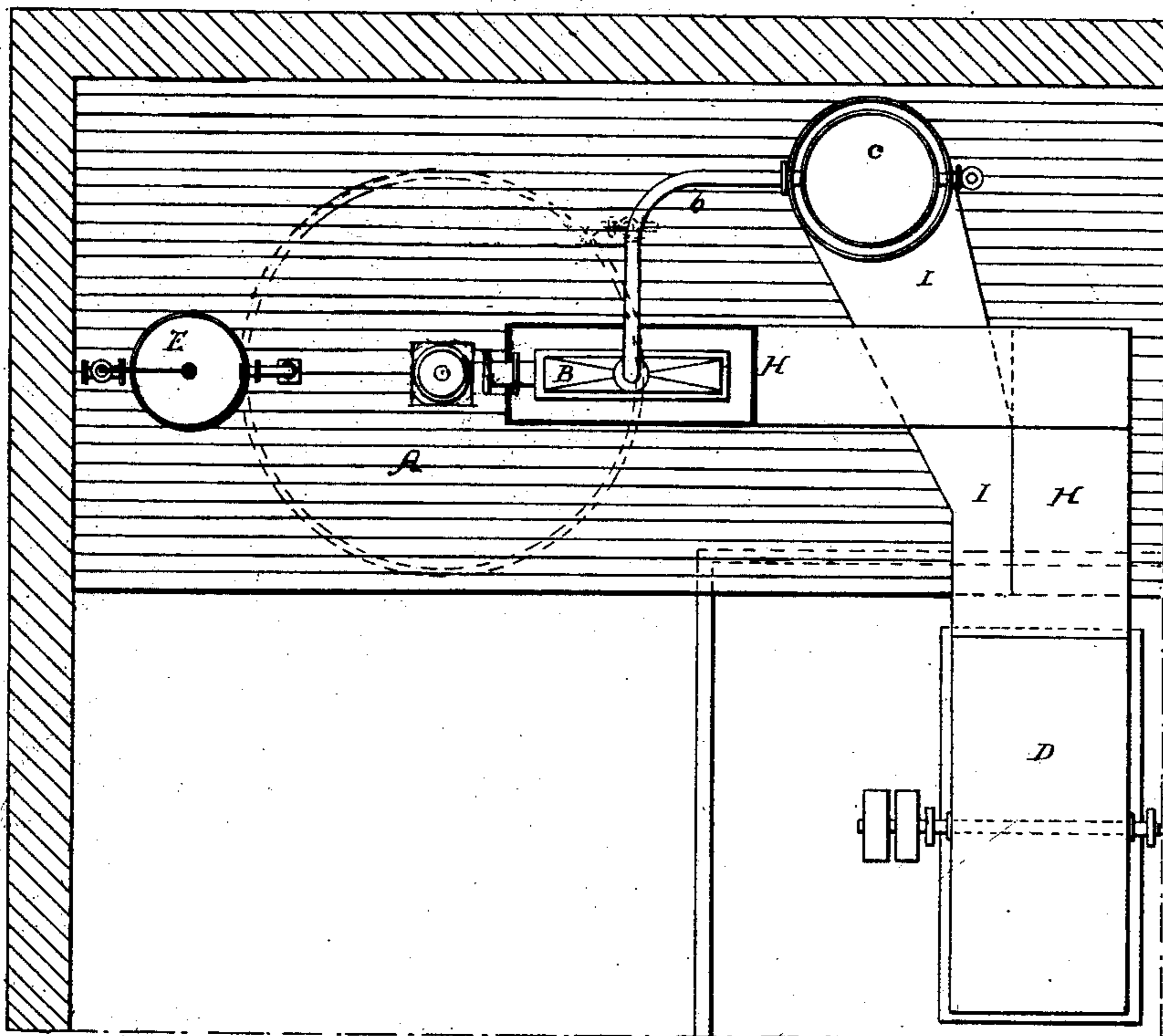


FIG. 5.

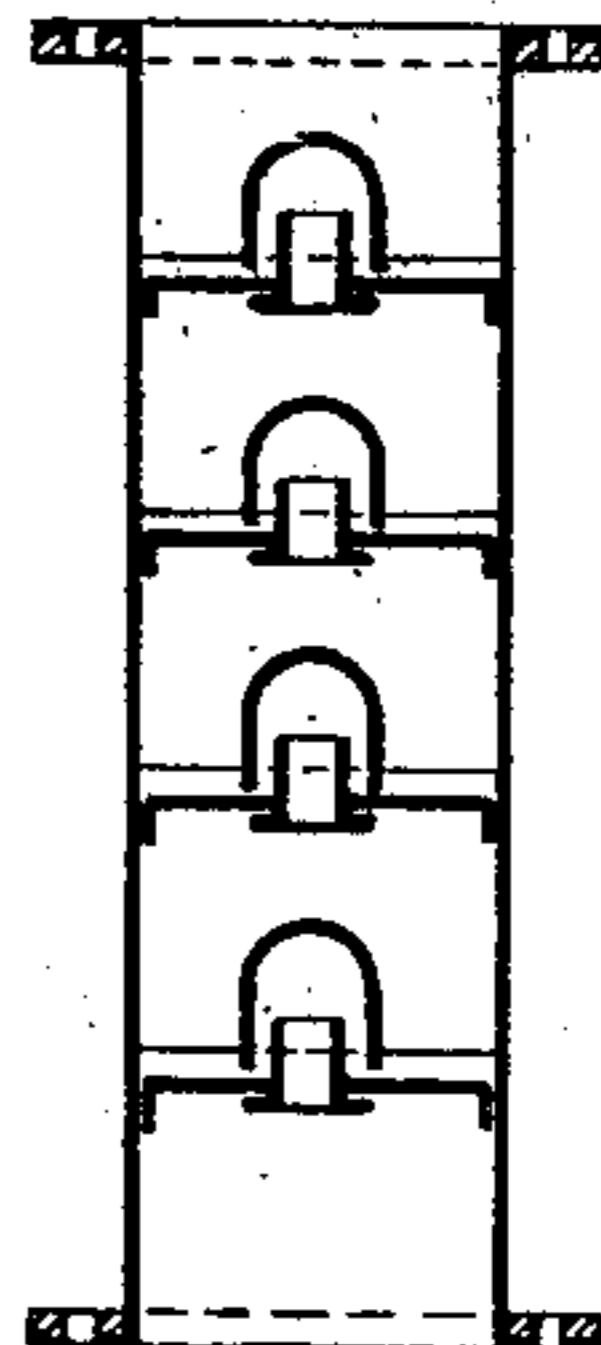


FIG. 7.

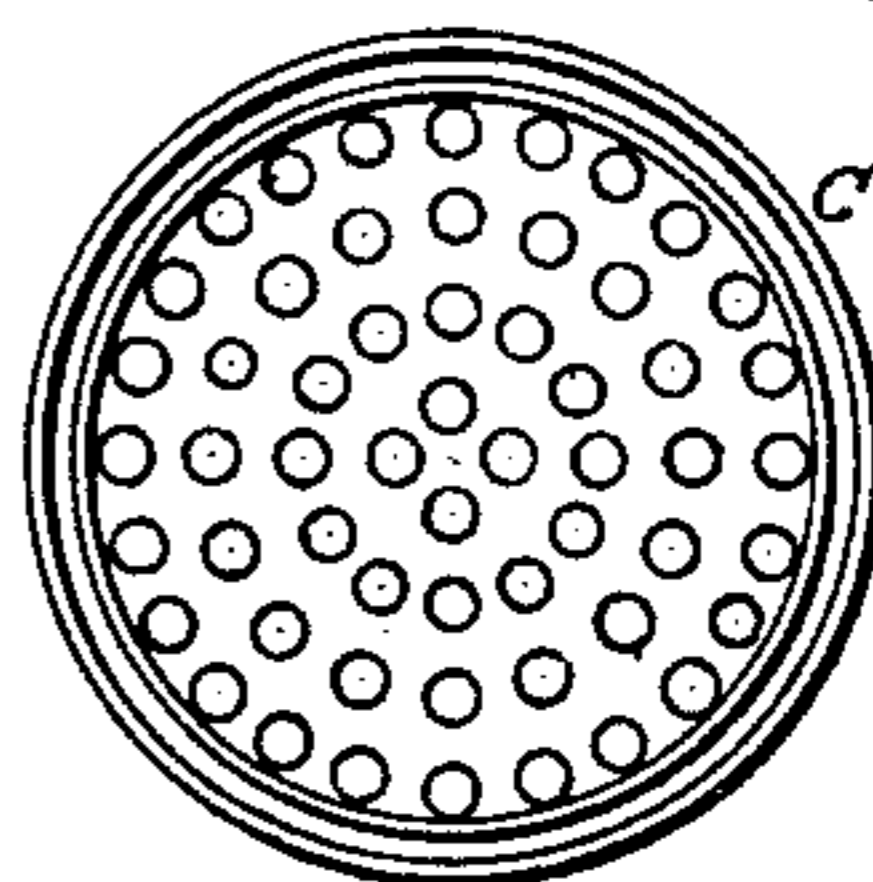


FIG. 3.

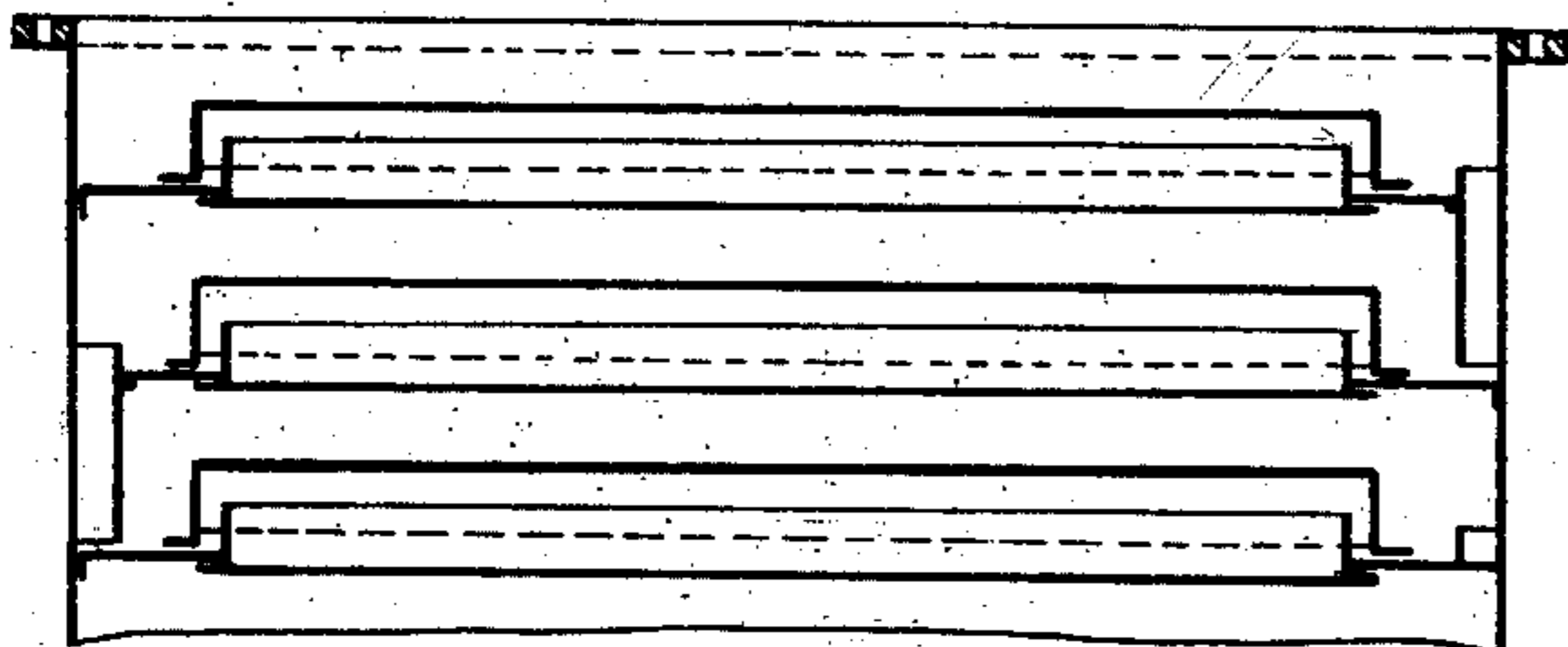


FIG. 6.

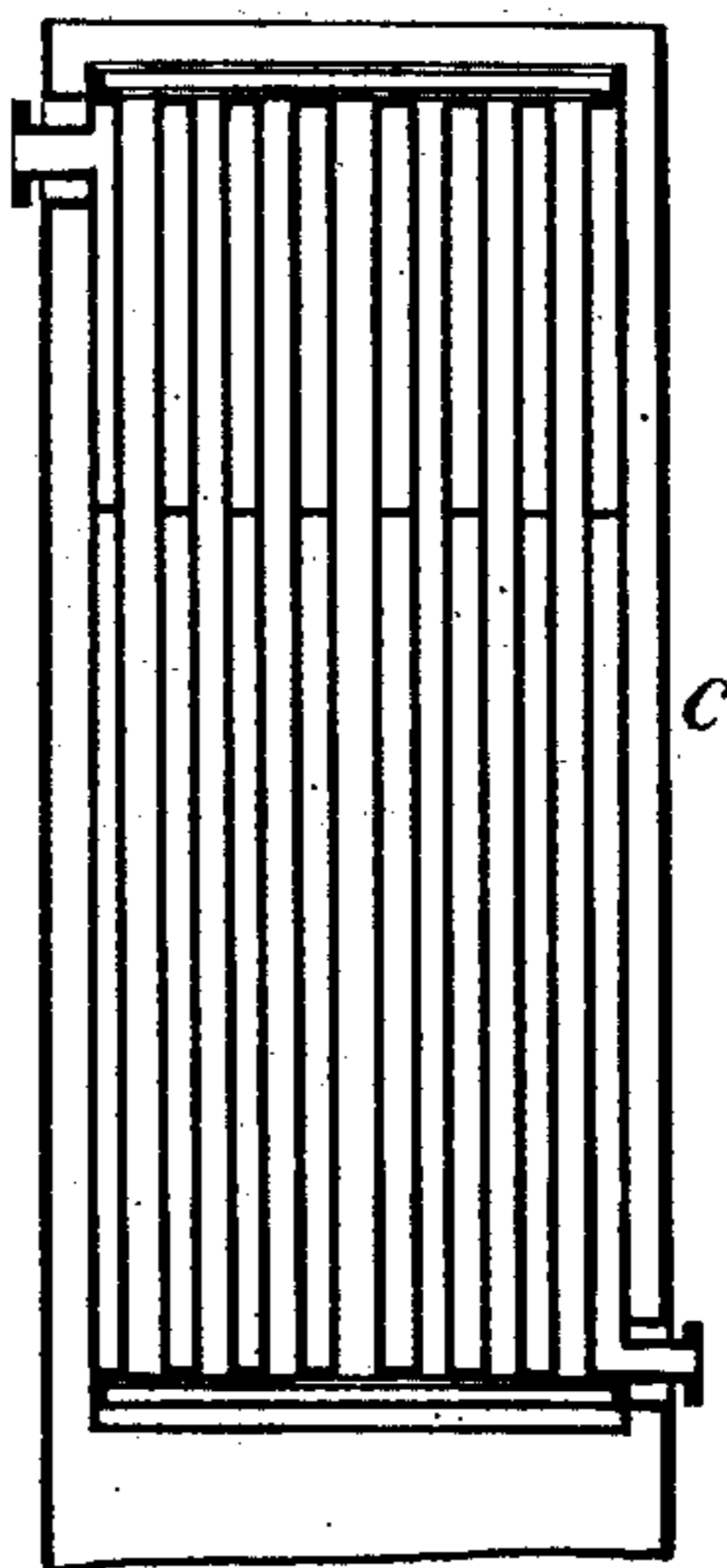
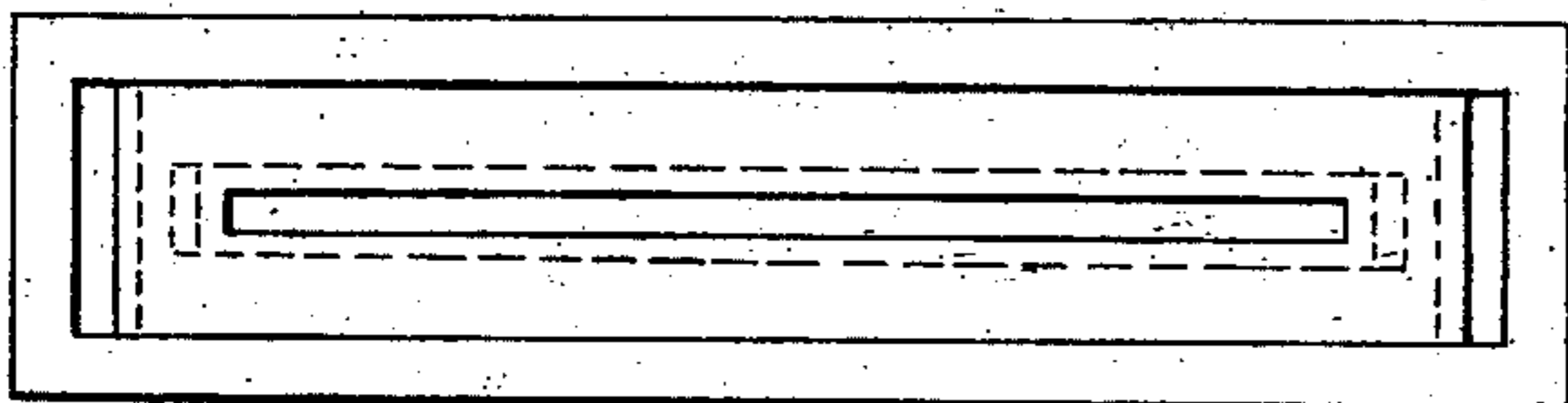


FIG. 4.



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(No Model.)

3 Sheets—Sheet 3;

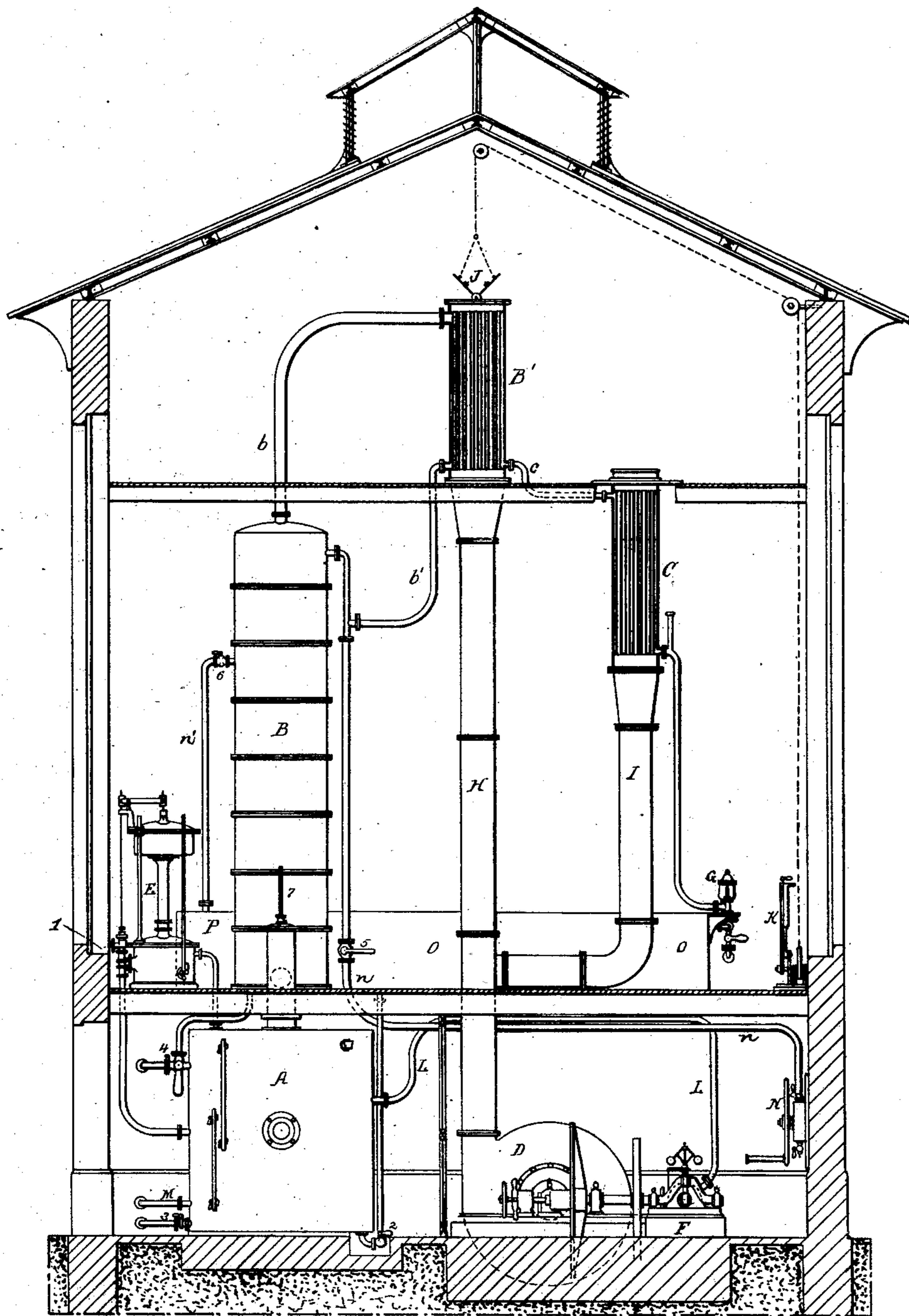
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FIG. 8.



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UNITED STATES PATENT OFFICE.

DÉSIRÉ F. SAVALLE, OF PARIS, FRANCE.

DISTILLING, CONDENSING, AND REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 245,226, dated August 2, 1881.

Application filed April 22, 1880. (No model.) Patented in France October 23, 1878.

To all whom it may concern:

Be it known that I, DÉsirÉ FRANCOIS SAVALLE, a citizen of the Republic of France, and a resident of Paris, France, have invented certain Improvements in Distilling, Condensing, and Refrigerating Apparatus, and in the Process of Distillation, (for which I have obtained a French patent, October 23, 1878, No. 127,086,) of which the following is a specification.

My invention relates to improvements in the distillation of alcohol and other volatile substances, and in the apparatus for condensing and cooling the vapors from the still.

The object of my invention is to construct the condenser and refrigerator of the apparatus so as to facilitate and economize the process of condensing and cooling the vapors. This object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a side view, partly in section, of one form of my improved apparatus; Fig. 2, Sheet 2, a plan view of the same; Figs. 3, 4, and 5, enlarged sectional and detail views of the rectifying-column; Figs. 6 and 7, enlarged section and plan, respectively, of the refrigerator; and Fig. 8, Sheet 3, an elevation, partly in section, of the preferred construction of my apparatus.

Referring to Sheets 1 and 2 of the drawings, A is the still proper, and E the steam-regulator, neither of which is illustrated in detail, as they may be of any of the usual constructions. The still communicates through its upper part with the rectifying-column B, which, in the present instance, is arranged to perform at the same time the office of a condenser. The top of the column B communicates through a pipe, *b*, with the refrigerator C, whence the cooled and condensed vapors flow into a suitable receptacle. To cool the condenser-column and refrigerator, I make use of currents of cold air, and for this purpose I surround the condenser-column B with a casing, H, the upper end of which communicates through the tube or conduit H' with a fan-blower, D, while a casing, I, surrounding the refrigerator, also communicates with the fan.

The conduit H' is provided with a valve or

damper, *f*, to regulate the passage of the air, and the casing I is provided with a valve, *g*, for a similar purpose.

The column B, which, in the present instance, is arranged to serve the double purpose of a rectifier and condenser, may be constructed as rectifying-columns are usually constructed. As will be seen on reference to Figs. 2, 3, 4, and 5, it is rectangular in cross-section, and is made up of a series of sections, each section being provided, as usual, with slotted partition plates and caps, to give an extended condensing surface, as shown in Figs. 3, 4, and 5.

The refrigerator C, as illustrated in Figs. 6 and 7, consists of a cylindrical casing, through which pass a series of tubes for the passage of the cold air to condense and cool the vapors which enter from the condenser and flow out from the lower end of the refrigerator in liquid form.

The fan D, which supplies the cold air to the refrigerator and condenser, is arranged in a compartment separated from the still-chamber proper by a bulk-head, K, so that the fan may receive the necessary fresh air.

In the construction illustrated in Fig. 8, Sheet 3, the apparatus is shown in a more complete form, the rectifying-column B being arranged to serve only the purpose of a rectifier, and a condenser, B', being arranged between the column B and the refrigerator C. Devices also are shown for supplying the upper plates of the column with partially-distilled spirits, and an engine is shown for driving the fan which supplies fresh air to the condenser and refrigerator. In other respects the apparatus shown in Fig. 8 resembles that shown in Fig. 1.

A is the heater or still proper for the reception of the crude alcohols, and provided with heating-coils, and E is the steam-regulator. The upper part of the still, provided with a thermometer, 7, communicates with the rectifying-column, which may be constructed as shown in Sheet 2 of the drawings. The top of the column communicates, through a pipe, *b*, with the upper part of the analyzing-condenser B', which is of the tubular character illustrated, and is provided at its lower end with a tube, *b'*, which connects it with the upper

plates of the column, and also, at a little distance above the bottom, with another tube, *c*, which communicates with the tubular refrigerator C. The lower end of the latter is in communication, through a suitable tube and test-gage, G, with the receptacle for the products of distillation.

A conduit, H, connected with the bottom of the condenser, supplies air from the fan D to the interior of the tubes of the condenser, which is open at the top and provided with wing-valves J, controlled by cords or chains passing over pulleys and operated by a handle, K, so as to regulate the amount of air passing through the condenser-tubes. A tube, I, supplies air to the refrigerator C in a similar way, valves, however, not being necessary in this case.

The fan D may be driven in any suitable manner, and is shown in Fig. 8 as driven by frictional gearing from a steam-engine, F, the exhaust-steam from which may be utilized in aiding the heating of the still. This exhaust-steam may be carried through a pipe, L, to the still, in which it is continued in a supplemental coil.

N is a pump which communicates through a pipe, *n*, provided with a cock, 5, with the upper part of the rectifying-column, and can supply the alcohol for filling the upper plates of the column, as described hereinafter.

O is the reservoir for the liquid to be evaporated, while the trough P receives the impurities from the upper plates of the column through the valve-pipe *n'*. The valve I is for the admission of live steam to the still, while the condensed steam escapes through the valve 3, and the water of condensation from the exhaust-steam from the engine escapes through the pipe M. A three-way cock, 2, can be so operated as to allow the crude alcohol from the reservoir O to flow into the still, or to permit the complete emptying of the still, while the cock 4 can be so operated as to allow the unfinished products from the column to be returned to the still, or to allow the water used in cleansing the column to flow out.

The operation of the complete apparatus shown in Fig. 8 is as follows: The still A is first filled with crude alcohol from the reservoir O through the cock 2. Then, by means of the pump N, the cock 5 having first been

opened, the upper partition-plates of the column B are charged with partially-distilled alcohol through the pipe *n*. This preliminary introduction of the alcohol onto the upper plates of the column will form the subject of a separate application, however. The apparatus is then heated by opening the cock 1, which admits the steam from the generator to the still, and the cock 3 for the condensed steam being opened, the distillation of the liquid contained in the still and the alcohol in the column is by this means proceeded with. Meanwhile the fan D has been put in operation, and the air thus admitted to the condenser cools the vapors therein, so that the poorer alcohol flows back in a liquid state through the pipe *b'*, while the richer vapors pass to the refrigerator, where they are completely condensed and cooled, and thence flow to the test-gage G.

The production of alcohol is regulated to a certain extent by the valves J, which determine the amount of cool air supplied to the tubular condenser.

When the apparatus has once been put in operation the distillation is continuous. The completion of the operation is indicated by the thermometer 7, which rises to 102° when the liquid in the still no longer contains alcohol. The still is then emptied and the steam-valve 1 closed. The upper plates of the column B still contain some alcohol which is very impure. This is removed by opening the cock 6 and replacing the impure liquid on the plates by water from the pump N. This done the cock 6 is closed and the cock 4 operated, so as to allow the water to escape from the column.

I claim as my invention—

The combination of the condenser and refrigerator of a distilling apparatus with an air fan, pump, or blower, D, and air-conduits H' and I, leading, respectively, to said condenser and refrigerator, and one or both provided with regulating-valves, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DÉSIRÉ FRANCOIS SAVAILLE.

Witnesses:

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ROBT. M. HOOPER.