

No. 635,238.

Patented Oct. 17, 1899.

F. D. CUMMER.
DRYING KILN.

(Application filed Mar. 29, 1894. Renewed June 23, 1897.)

(No Model.)

2 Sheets—Sheet 1.

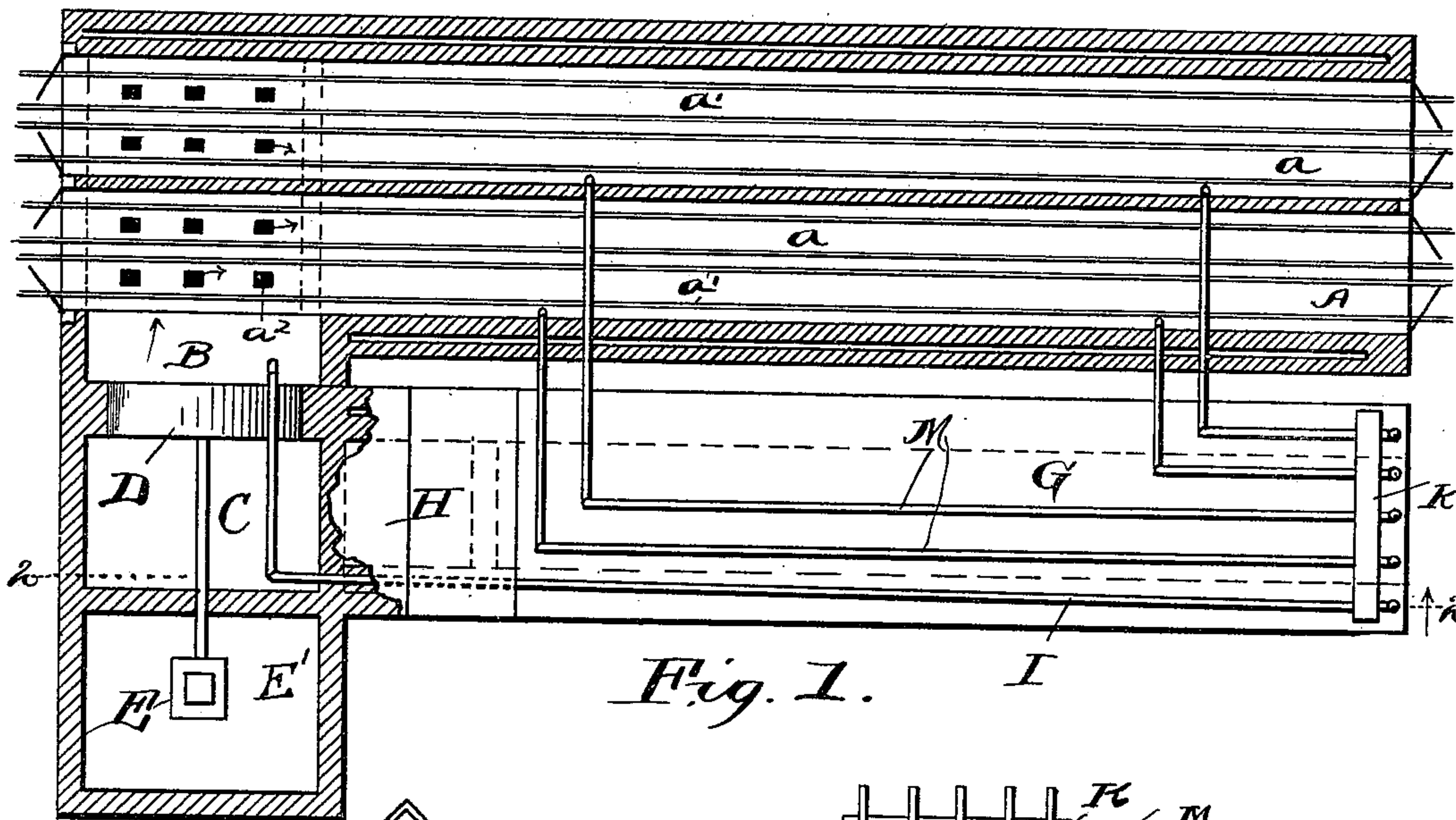


Fig. 1.

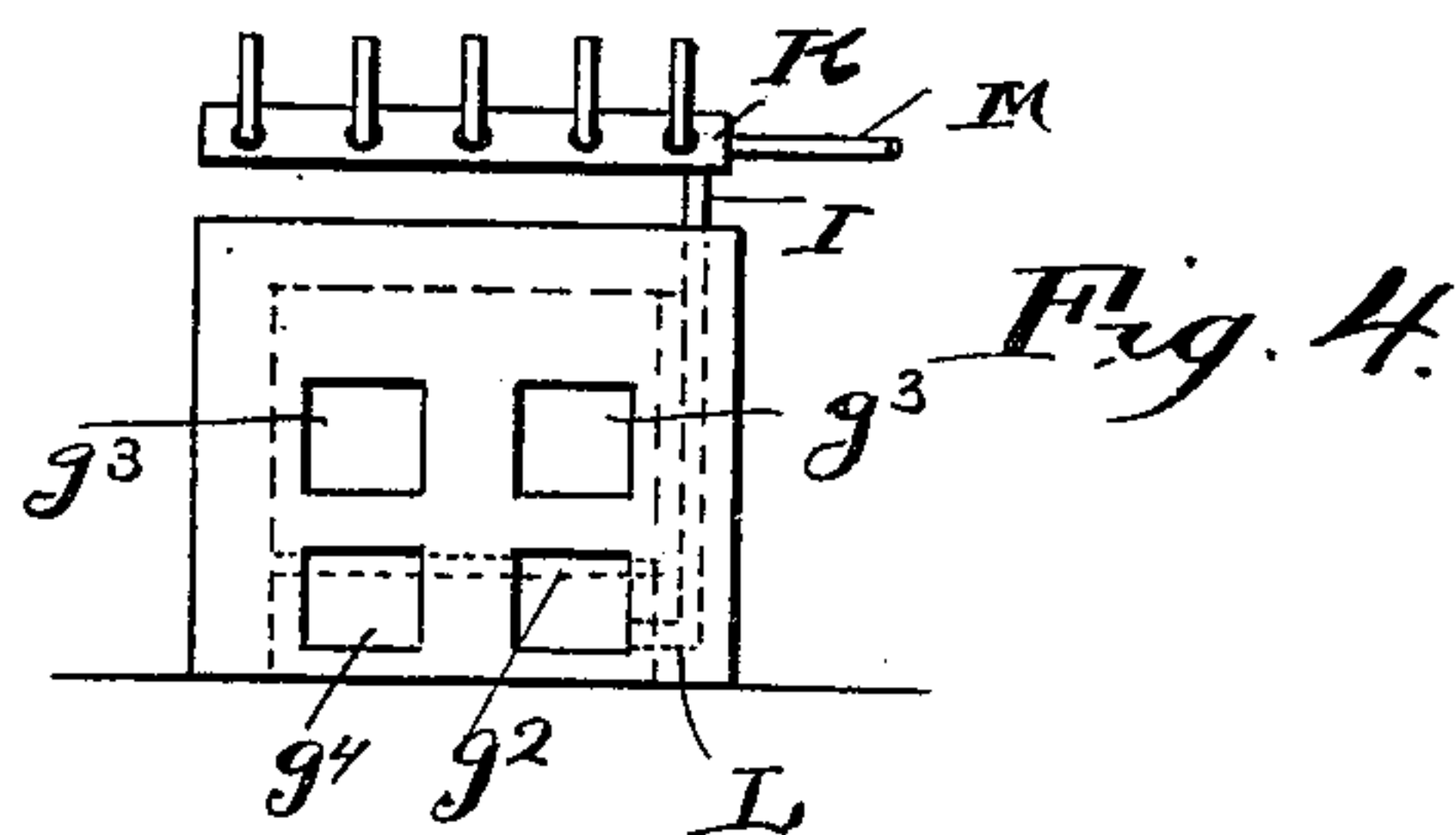


Fig. 4.

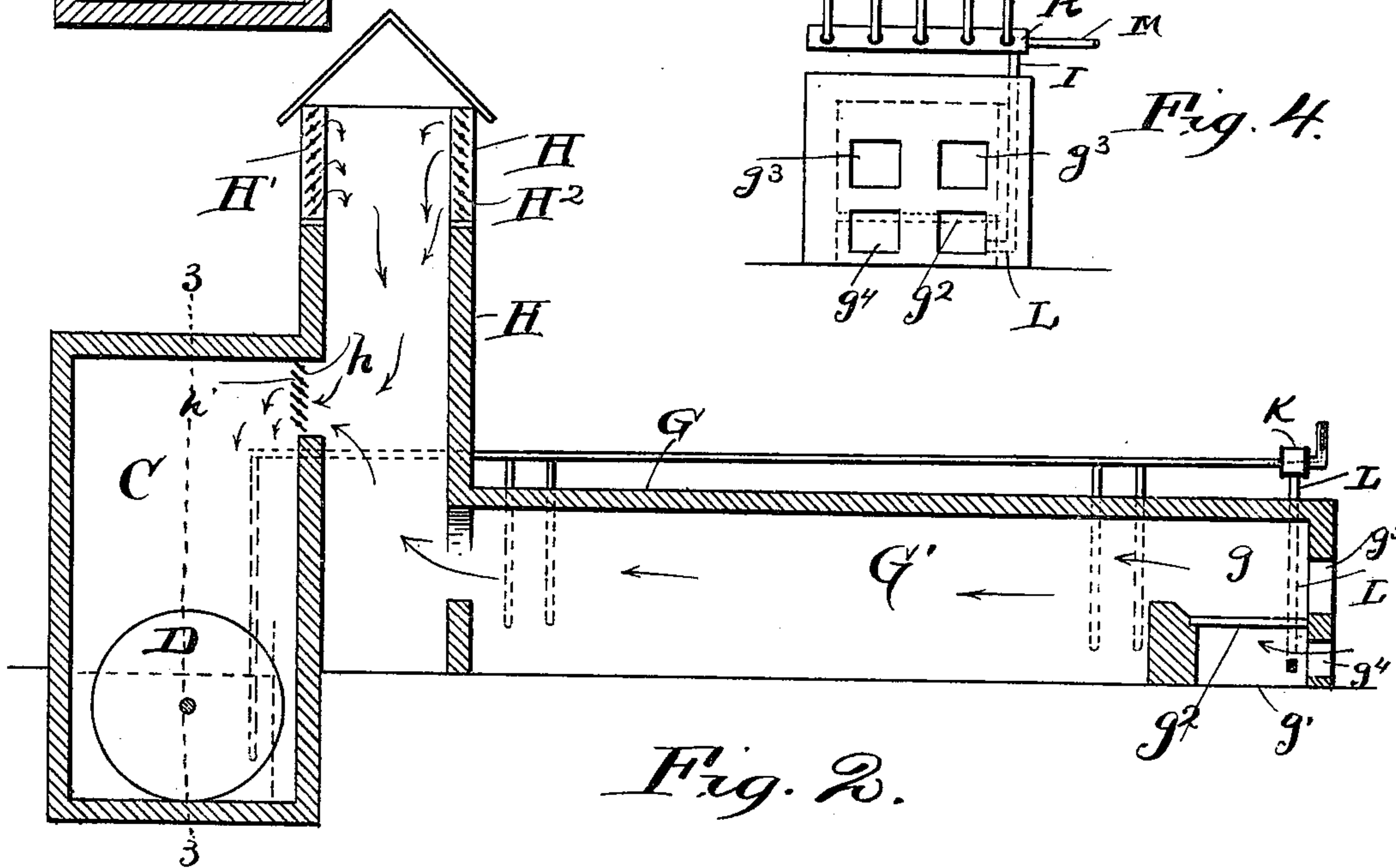


Fig. 2.

Witnesses.
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No. 635,238.

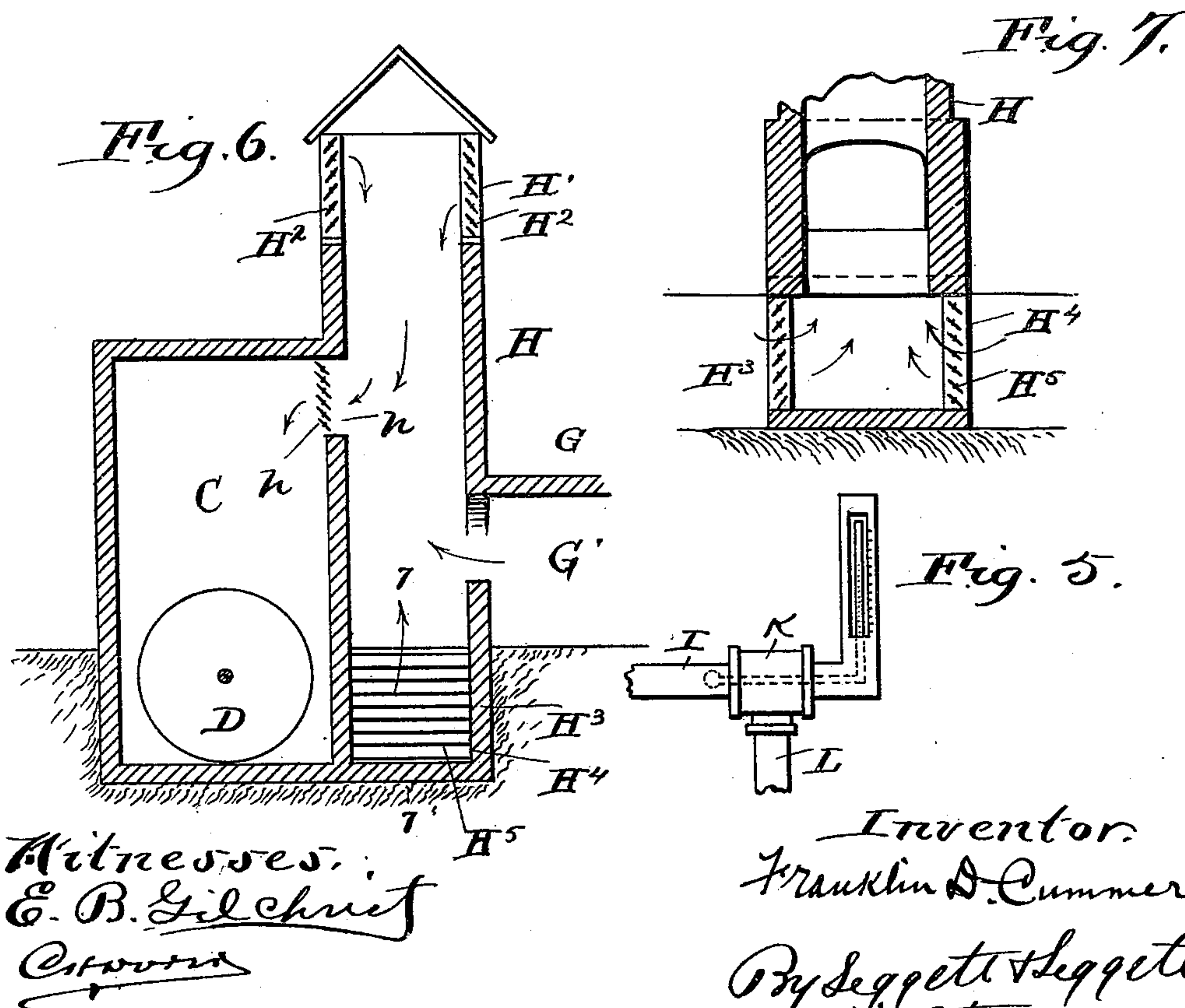
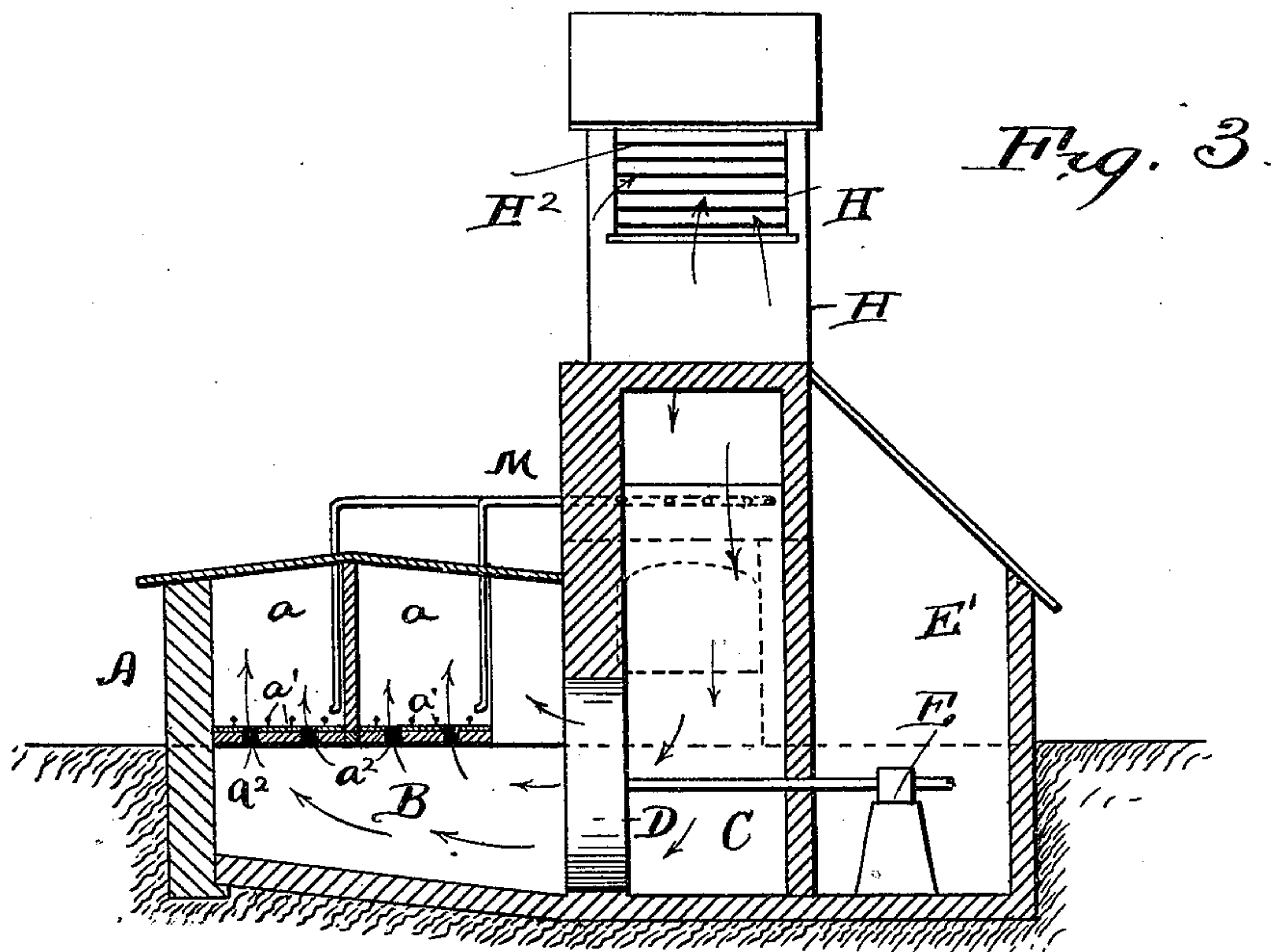
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2 Sheets—Sheet 2.



Witnesses:
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C. B. Gilchrist

Inventor:
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UNITED STATES PATENT OFFICE.

FRANKLIN D. CUMMER, OF CLEVELAND, OHIO, ASSIGNOR TO ELIZA E. CUMMER, OF SAME PLACE.

DRYING-KILN.

SPECIFICATION forming part of Letters Patent No. 635,238, dated October 17, 1899.

Application filed March 29, 1894. Renewed June 23, 1897. Serial No. 641,961. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN D. CUMMER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Kilns or Driers, (for which I have received Letters Patent in England, dated March 22, 1894, No. 6,025, and in France, dated March 22, 1894, No. 237,249, and have an application pending in Germany;) and I do 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 improvements in kilns or driers; and it consists in certain features of construction and in combinations of parts hereinafter described, and pointed out in the claims, and for which Letters Patent have been issued to me in England, dated March 22, 1894, No. 6,025, and in France, dated March 22, 1894, No. 237,249.

In the accompanying drawings, Figure 1 is a top plan, partly in section, of a kiln or drier embodying my invention. Fig. 2 is a side elevation, in vertical section, on line 2 2, Fig. 1. Fig. 3 is an end elevation, in vertical section, on line 3 3, Fig. 2. Fig. 4 is an elevation of a portion of that end of the drier at which the firing of the furnace is done. Fig. 5 is an elevation in detail hereinafter described. Figs. 6 and 7 are elevations in vertical section exhibiting modifications hereinafter described, Fig. 7 being taken on line 7 7, Fig. 6.

A represents the kiln or drier proper, in which the bricks, wood, or other articles or material are dried or burned, the kiln or drier proper shown comprising two rooms or chambers *a*, extending from end to end of the kiln or drier and provided with tracks *a'* for receiving the cars upon which the articles or material to be dried or burned are run into and taken from the kiln.

Chambers or rooms *a* of the kiln or drier at one end, preferably by means of openings or holes *a²* in the floor of said rooms or chambers, are in open relation with a tunnel or large duct B, that is arranged transversely under said ends of rooms or chambers *a*. At one end of said tunnel or duct is located a

commingling-chamber C, into which are sucked or drawn the products of combustion from the furnace, hereinafter described, and air from the outside, any suitable device, preferably a fan or blower D, being employed for sucking or drawing the air and products of combustion into said chamber, said fan or blower being located between the commingling-chamber and the aforesaid tunnel or duct and adapted to suck, draw, or blow the heated air into the tunnel. The fan or blower is operatively connected in any suitable manner with an engine or motor E in a room E' adjacent to the commingling-chamber.

G designates the furnace. Said furnace is located at one side of the drier or kiln proper, preferably about two or three feet or so therefrom. The furnace is preferably quite long. *g* and *g'* designate the fuel-chamber and ash-pit of the furnace, respectively; *g²*, the grate, and *g³ g⁴* the doors leading to the fire-chamber and ash-pit, respectively.

The furnace shown has a comparatively long chamber G' extending rearwardly from the fuel-chamber, with which it is in open relation, and is in open relation at its rear end with the commingling-chamber, to which reference has already been made.

I would here remark that I prefer to use from fifteen to twenty-five pounds of air to one pound of fuel, under which condition the products of combustion would reach from 3,000° to 3,500° Fahrenheit.

By means of the fan or blower hereinbefore referred to I am enabled to create a forced draft through the furnace from under the ash-pit to establish the required supply of air, and consequently oxygen, to the burning fuel in order to produce results most favorable to complete combustion, and consequently most favorable to the greatest economy in the fuel consumed in the present case. It is obvious that the employment of a forced draft through the furnace, as involved in my present invention, would be opposed to economy in connection with the generation of steam, yet in the present case, wherein the object is to produce hot air, to obtain as much heat from a given amount of fuel as is practicable, and to utilize all of this heat, the re-

sult is otherwise—that is, the fuel is most economically utilized.

In Figs. 1, 2, and 3 open relation is shown established between chamber G' of the furnace and the commingling-chamber through a stack or upright flue H, the rear end of said chamber of the furnace discharging into the lower portion of the stack or flue, and the latter, by means of a lateral opening *h* in the wall between it and the commingling-chamber, discharging into the latter. A forced draft is also formed by means of fan or blower D from the external atmosphere to chamber C. For instance, as shown, the stack or flue H, at or near its upper end, is provided with one or more lateral openings H', at which air from the outside enters the stack or flue. The air thence passes to opening *h*, where it unites with the intensely-heated products of combustion from the furnace and passes with the products of combustion into the commingling-chamber, wherein the products of combustion and air thoroughly commingle with each other and the air becomes heated as required. From chamber C the hot air is blown or forced by means of fan or blower D into the tunnel or duct below chambers or rooms *a* of the dryer or kiln and thence into said chambers. One or more, preferably a series, of valves or dampers H² are provided for lateral openings H' at the upper end of the stack and are adapted to regulate the supply of air at said openings.

If the kiln is to be employed for baking or burning purposes—such, for instance, as burning the softer grades of pottery—valves or dampers H² are closed, so that the products of combustion alone will be carried into the kiln proper.

One or more valves or dampers *h'* are preferably provided for opening *h* and are adapted to close said opening if for any reason the operation of fan or blower D is stopped or arrested, and thereby cause the products of combustion from the furnace, in case the latter was fired, to pass up through stack or flue H.

Suitable means are preferably provided for quickly and conveniently ascertaining the temperature at the discharge end of the fan or blower and at one or more points in the kiln or drier proper. I provide for the purpose preferably as follows: A pipe I, that opens into tunnel or duct B at the discharging end of the fan or blower, thence leads to the front end of the furnace, where it discharges into a larger pipe or box K, arranged above and transversely of the furnace. A pipe L, for the purpose hereinafter made apparent, leads from box or pipe K downwardly and discharges into the ash-pit below the grate of the furnace, and one or more pipes M lead from the different chambers or rooms *a* of the kiln or drier to box or pipe K. A thermometer or heat-measuring device or instrument is provided for each of pipes I and K, said heat-measuring devices or instru-

ments being properly exposed to the hot air passing through the respective pipes and being preferably located in a row at the front of the furnace and extending through the transversely - arranged pipe or box K, as shown in Fig. 5. By means of pipe L, opening into the furnace ash-pit, in which there is suction produced by the fan or blower, as hereinbefore indicated, and the connection of said pipe with pipes I and M circulation is assured through said pipes I and M to the heat-measuring instruments. For instance, stack or flue H might be continued downwardly, as at H³ in Figs. 6 and 7, and air from the outside introduced at one or more sides of this downward extension of the stack or flue, as shown at H⁴ in said figures, and the opening or openings H⁴, that thus admit air into the lower portion of the stack or flue, might be provided with valves or dampers H⁵ in the same manner and for the same purpose as those employed at the upper portion of the stack in the construction hereinbefore described.

In the case illustrated in Figs. 6 and 7 the portion of the stack or flue that is located immediately rearward of the furnace constitutes a commingling-chamber, wherein the air coming up from below and the products of combustion from the furnace meet and commingle. The air may be introduced at the lower end of the flue H, at the top of said flue, at both places, or at any other suitable point.

If desired, suitable instruments or devices might also be attached to pipes I and M for ascertaining the humidity of the air passing through said pipes, and thereby ascertaining the humidity of the air at the discharge end of the fan or blower and at the different points in the kiln or drier proper.

What I claim is—

1. In a kiln or drier the combination with a source of heat, of a commingling hot and cold air chamber, and an intermediate hot and cold air supply stack, the said drier provided with a long chamber in open relation at one end with the source of heat, and at its opposite end in open relation with the stack, said stack extending above the drier and commingling-chamber, and there provided with cold-air inlets, an inlet from the stack into the commingling-chamber, and controlling valves or dampers for said inlets, substantially as described.

2. The combined furnace and chamber, the stack at the rear of said chamber and a passage-way from the furnace to the stack some distance above the base of the stack, controlled air-inlet openings at the top and the base of the stack, a commingling-chamber and a passage from the stack to said chamber on a plane above the passage from the furnace to the stack, and a blower connected with said commingling-chamber, substantially as set forth.

3. The furnace and heat-chamber, the stack

at the rear end of said chamber, the air-commingling chamber adjoining said stack, and the drier-chamber next to the commingling-chamber, said parts constructed and connected as described, a blower in the duct from the commingling-chamber to the drier-chamber, and a passage from the commingling-chamber to the stack, and means to control the passage of air into the stack, substantially as set forth.

4. The construction described, comprising the furnace and heat-chamber, a stack into which said chamber discharges, a discharge-opening in the side of said stack above the passage from the furnace and heat-chamber, valve-controlled openings in the top of the stack to admit air or the escape of the products of combustion, and air-inlet openings in the bottom of the stack, in combination with a drying-chamber, a commingling-chamber

between the said drying-chamber and the stack and a blower in the passage between the commingling-chamber and the drying-chamber, substantially as set forth.

5. In an apparatus as described, a combined furnace and heat-chamber, a commingling-chamber for air and the products of combustion and a stack or chimney through which the said elements pass into the commingling-chamber, in combination with a drying-chamber and a blower to carry the commingled air and products of combustion forward into the same, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 7th day of November, 1893.

FRANKLIN D. CUMMER.

Witnesses:

C. H. DORER,
WARD HOOVER.