

(No Model.)

5 Sheets—Sheet 1.

A. ENGLE.

FURNACE FOR BURNING WET AND OFFENSIVE SUBSTANCES.

No. 372,305.

Patented Nov. 1, 1887.

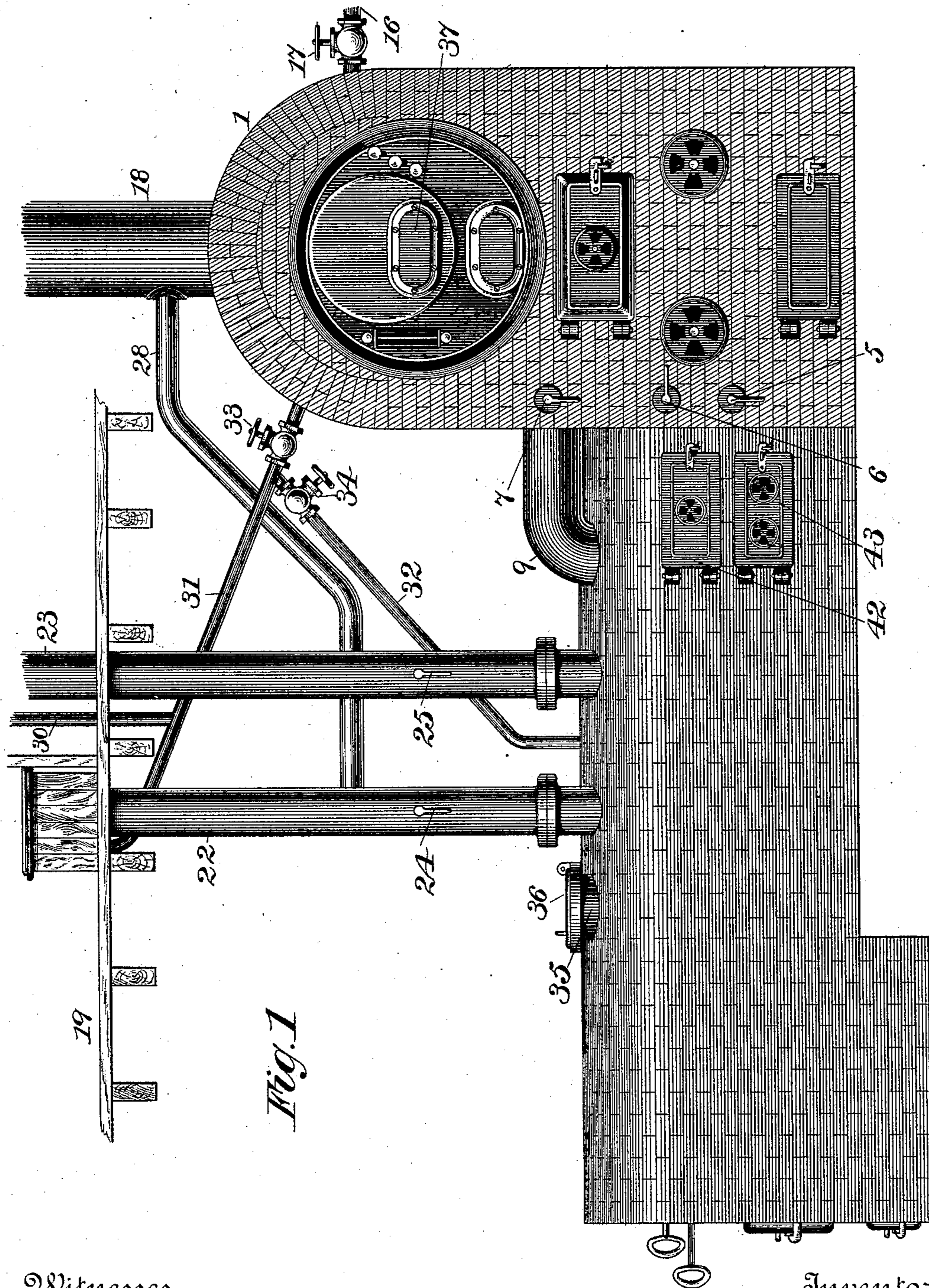


Fig. 1

Witnesses

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C. E. Buckland.

Inventor

By *his Attorney* Andrew Engle  
Albert H. Walker

(No Model.)

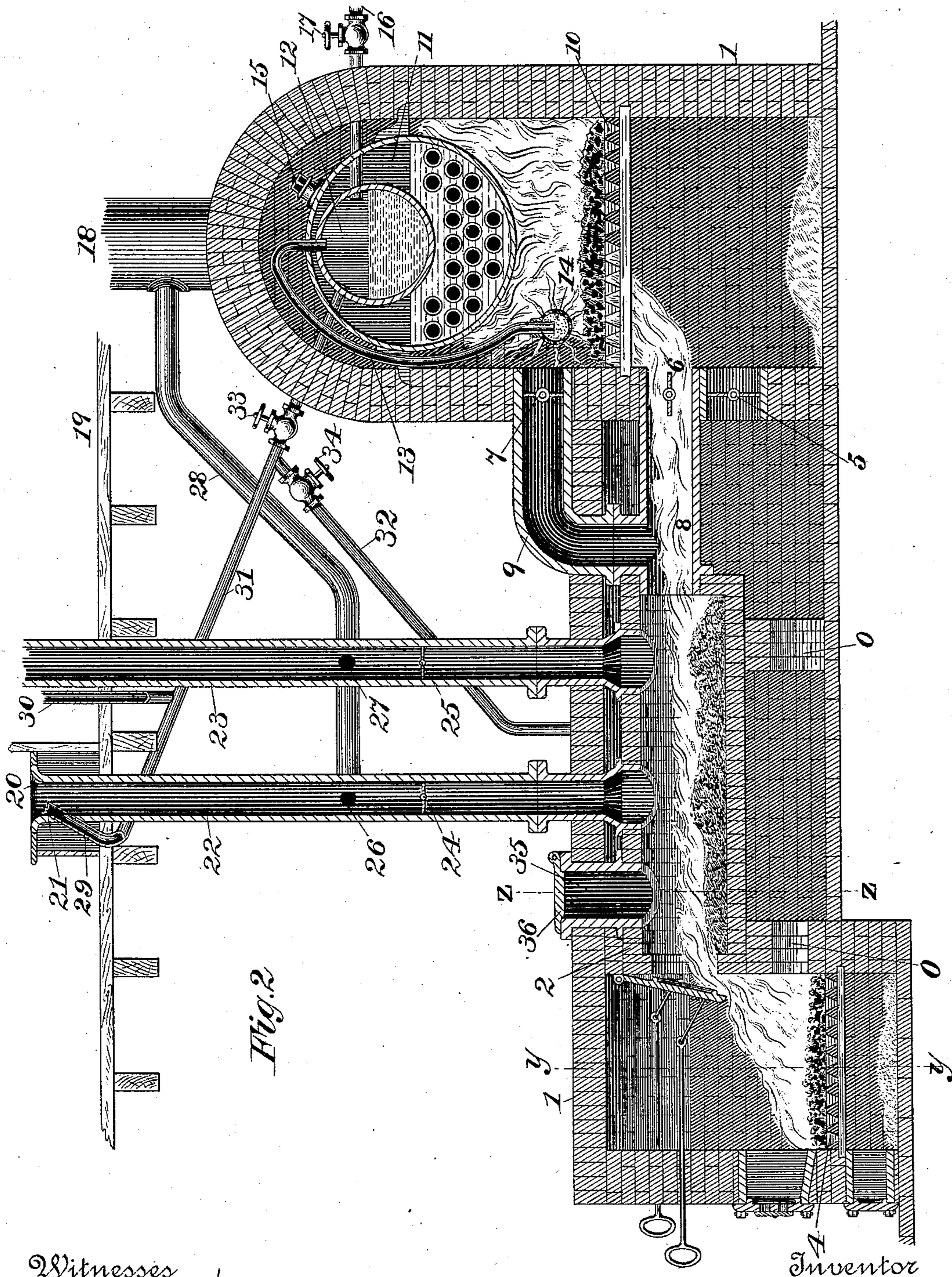
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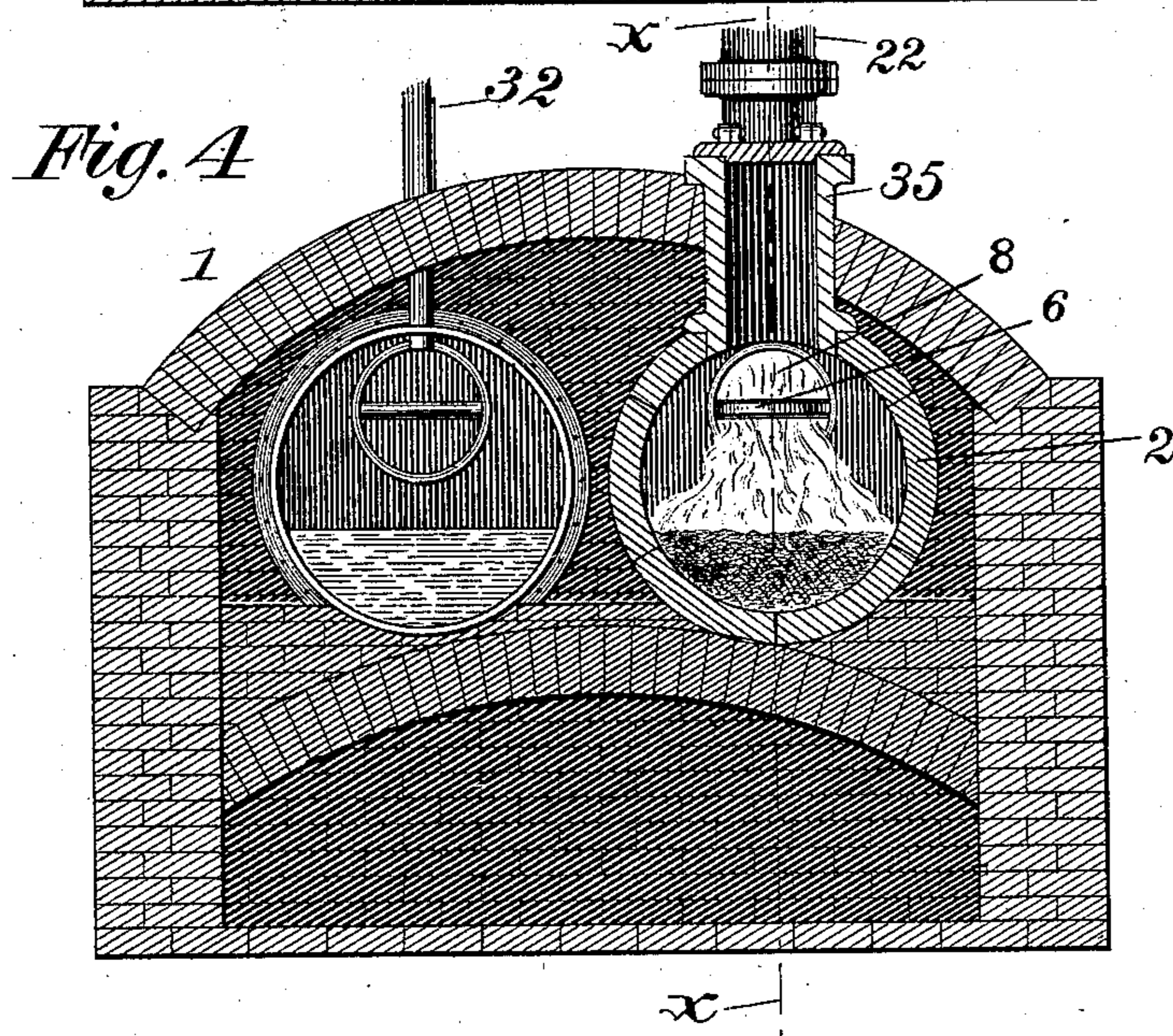
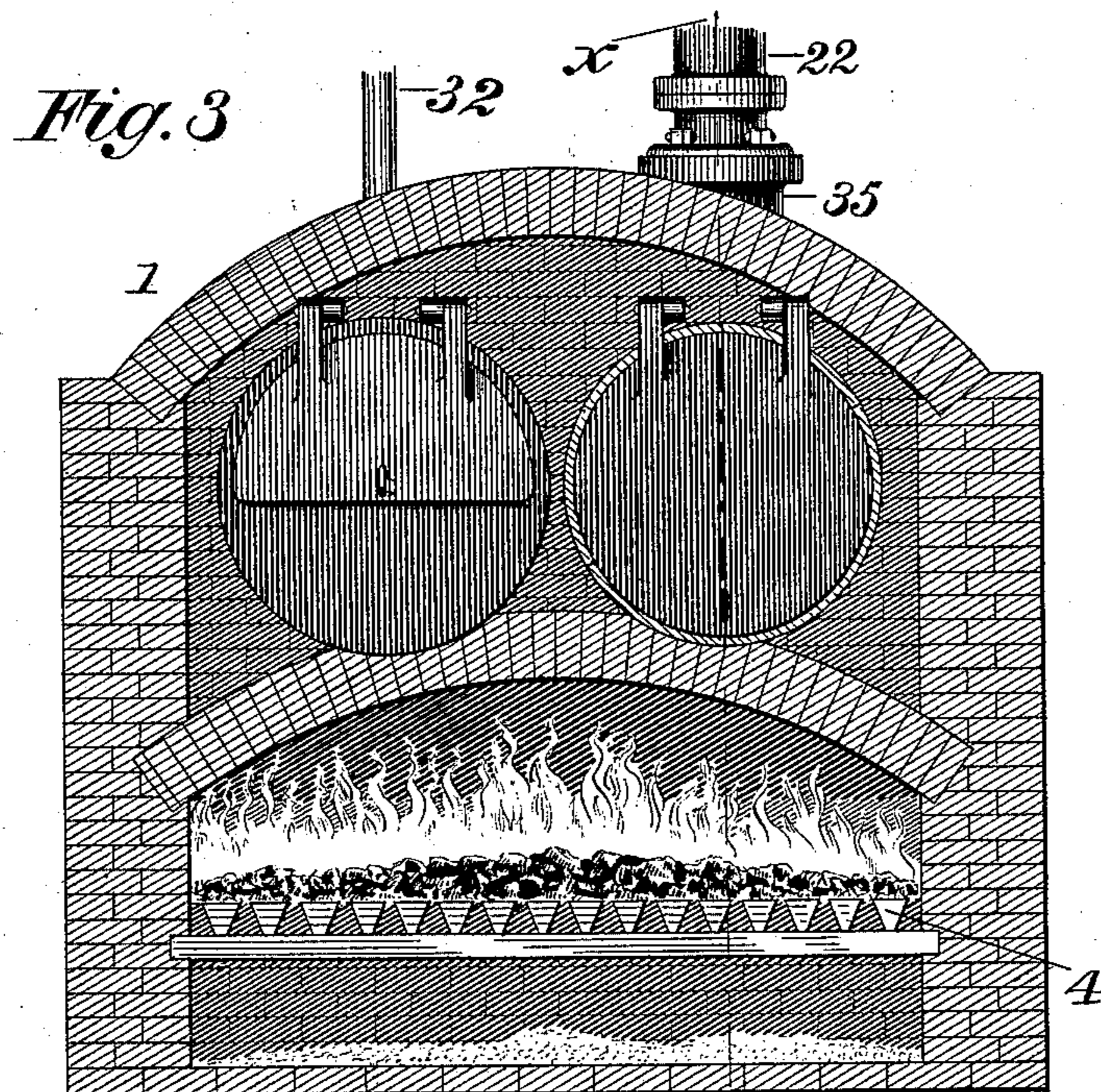
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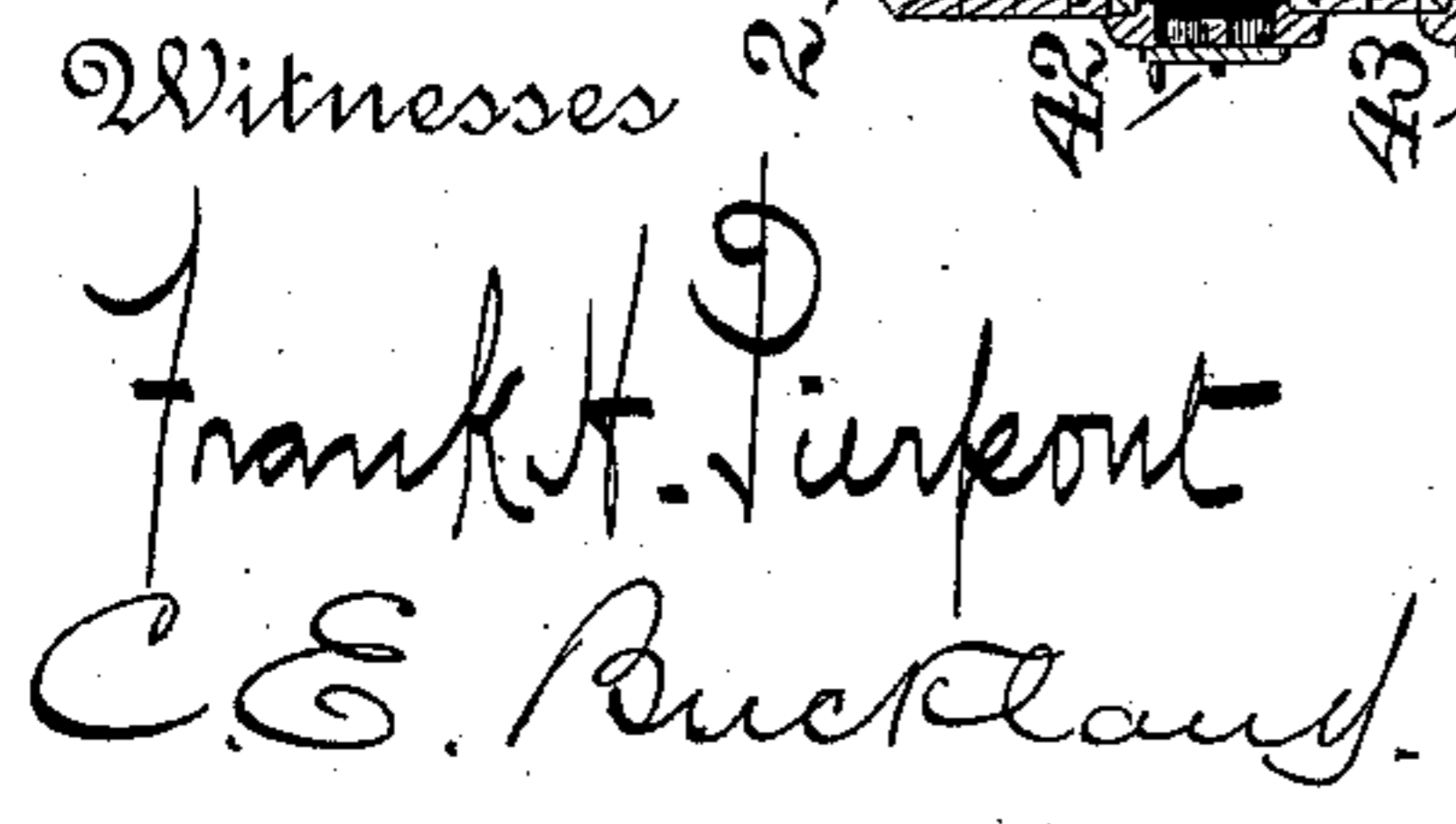
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(No Model.)

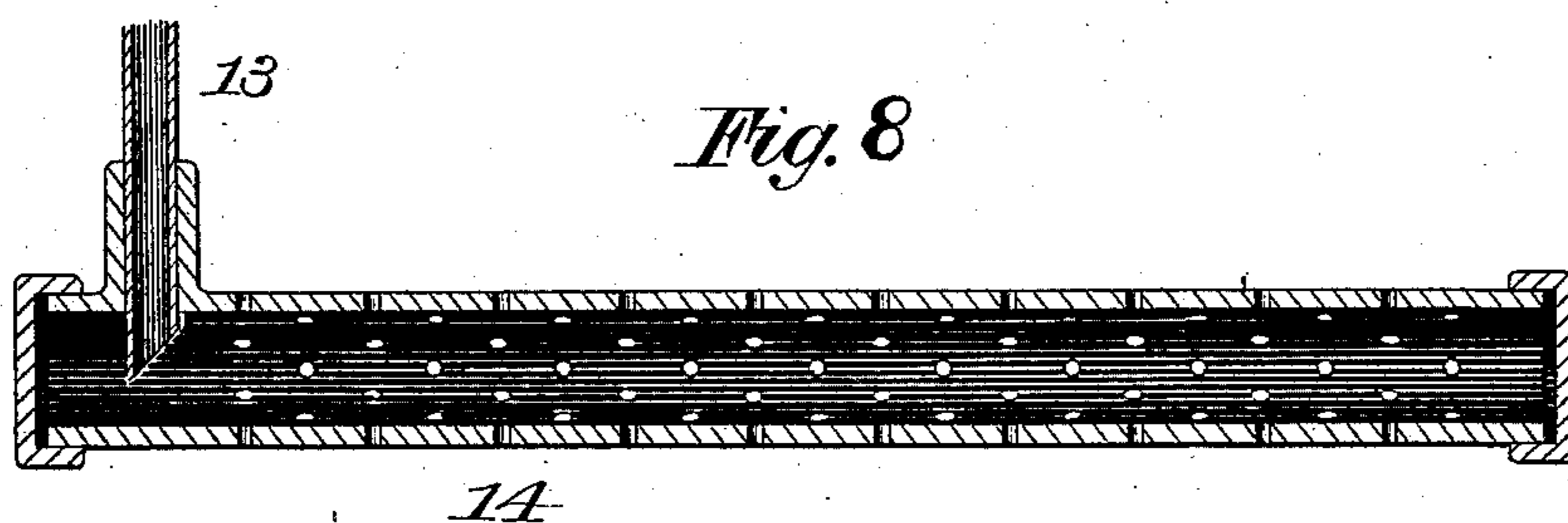
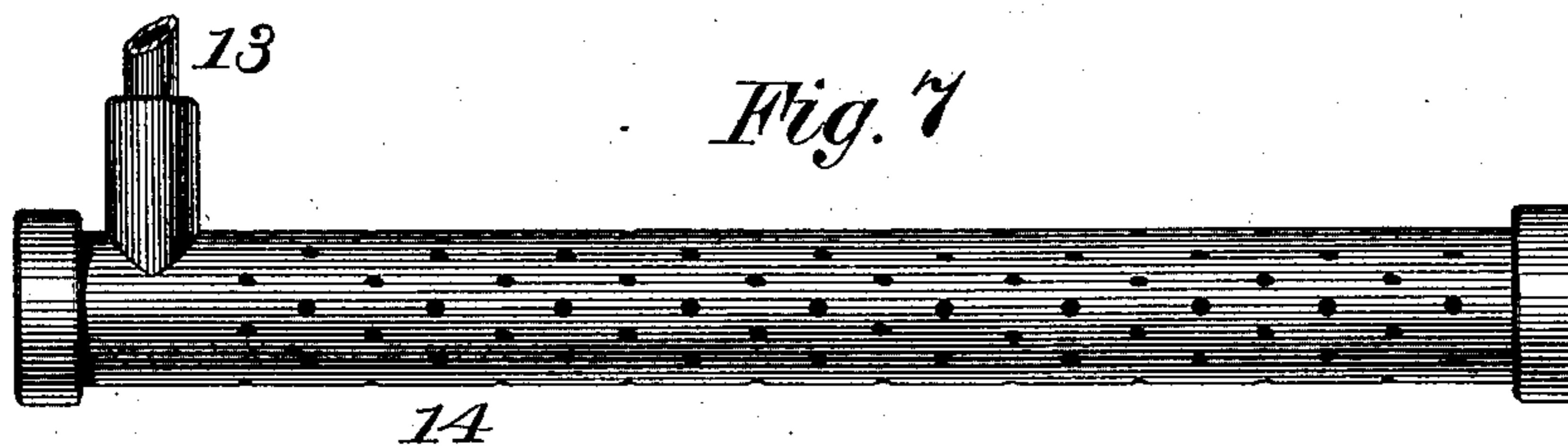
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A. ENGLE.

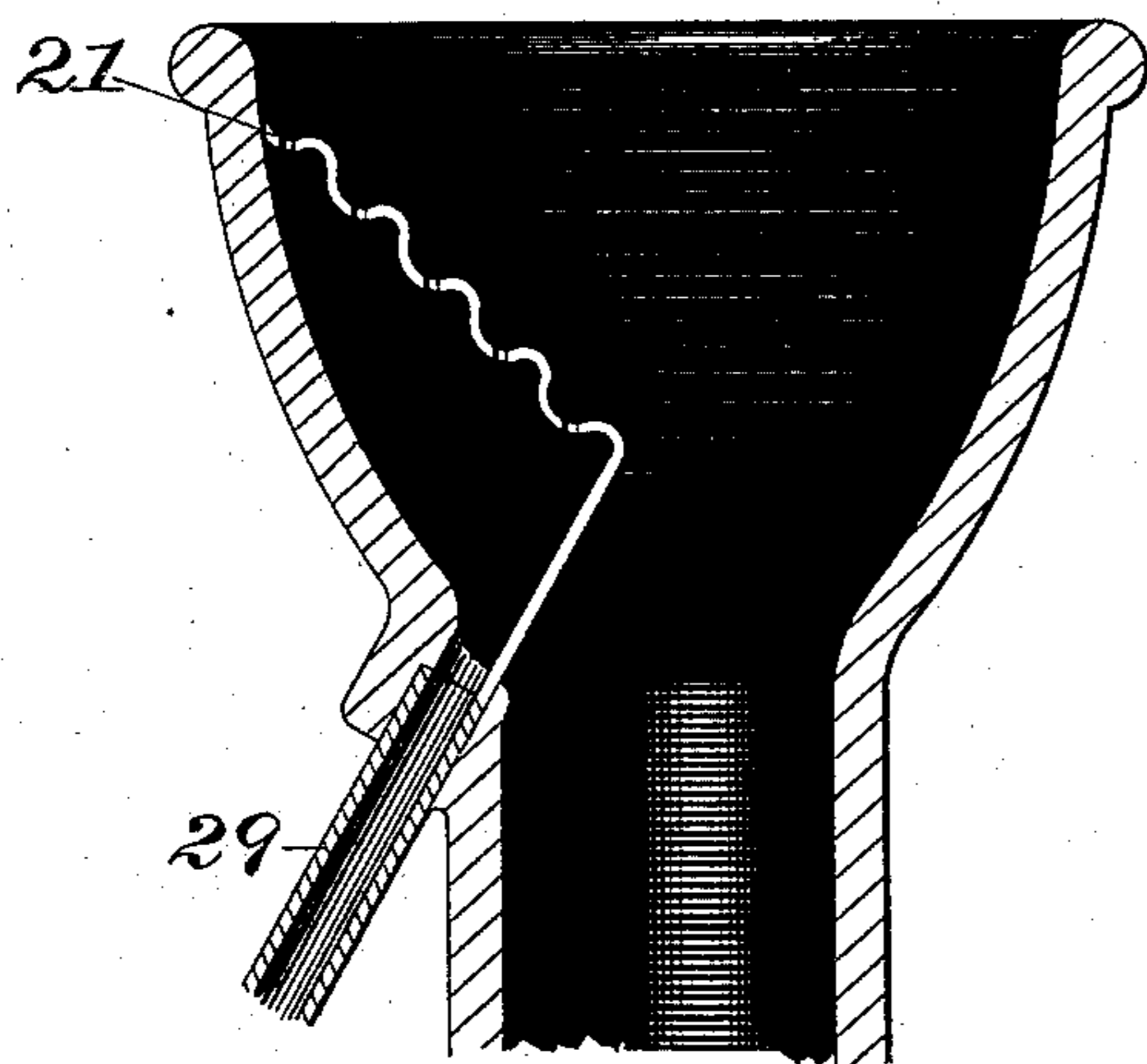
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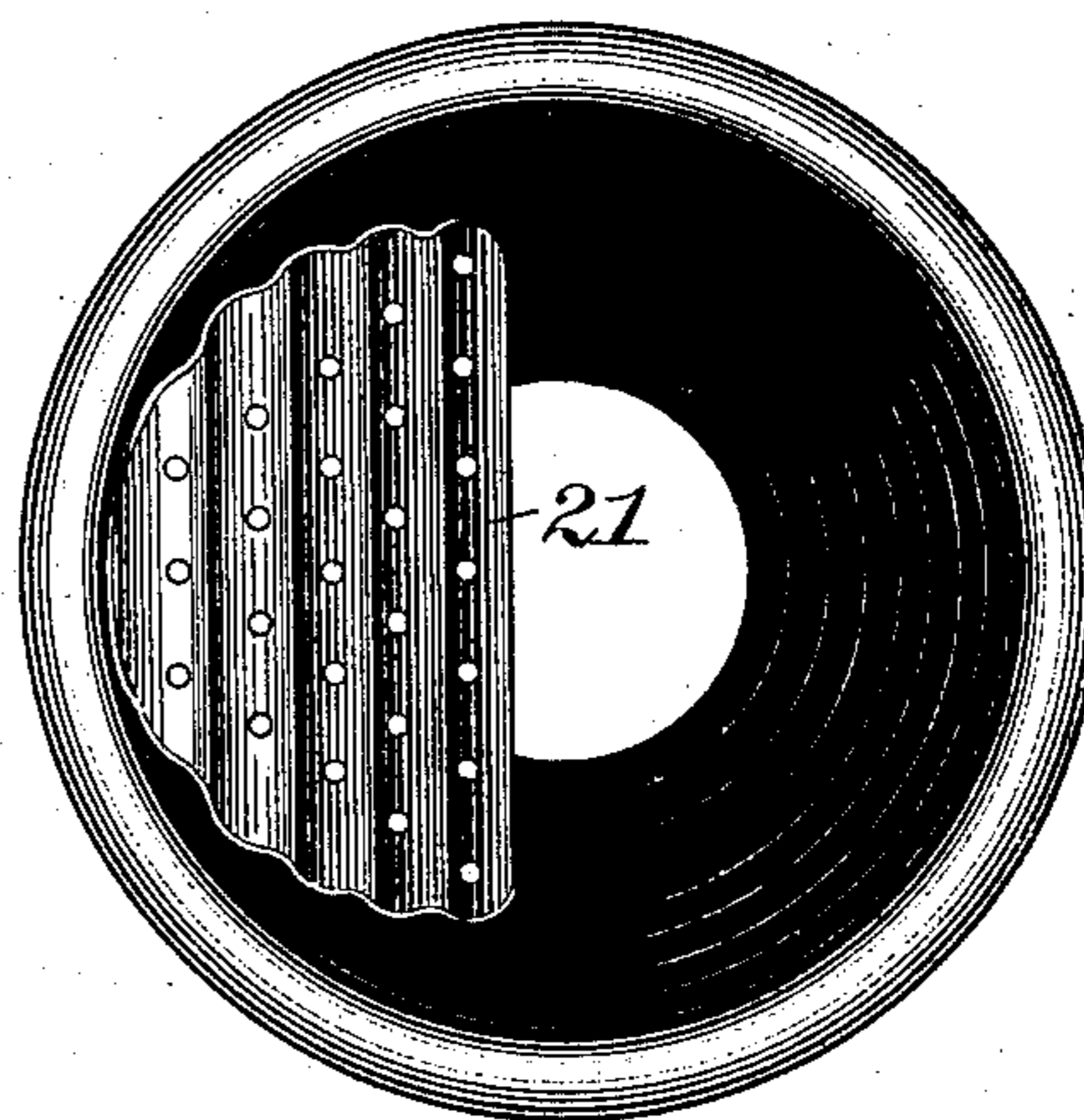
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*Fig. 9*



*Fig. 10*



Witnesses

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# UNITED STATES PATENT OFFICE.

ANDREW ENGLE, OF BAXTER, ASSIGNOR OF TWO-THIRDS TO JAMES CAL-  
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## FURNACE FOR BURNING WET AND OFFENSIVE SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 372,305, dated November 1, 1887.

Application filed April 23, 1887. Serial No. 236,422. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW ENGLE, of Bax-  
ter, Iowa, have invented a new and useful Fur-  
nace for Burning Wet and Offensive Sub-  
stances, of which the following description and  
claims constitute the specification, and which  
is illustrated by the accompanying five sheets  
of drawings.

This furnace is suitable for use in perform-  
ing processes of so volatilizing and burning  
night-soil, urine, and other wet and offensive  
substances as to cause those substances them-  
selves to furnish fuel for their own evapora-  
tion and combustion.

Figure 1 is a longitudinal elevation of the  
furnace. Fig. 2 is a perpendicular longitudi-  
nal section of one form of the furnace, drawn  
on the line  $x x$  of Figs. 3 and 4. Figs. 3 and  
4 are perpendicular lateral sections of that  
form of the furnace on the lines  $y y$  and  $z z$ ,  
respectively, of Fig. 2. Fig. 5 is a perpen-  
dicular longitudinal section of another form of  
the furnace, drawn on the line  $y y$  of Fig. 6; and  
Fig. 6 is a perpendicular lateral section of that  
form of the furnace on the line  $z z$  of Fig. 5.  
Figs. 7 and 8 are an elevation and a longitudi-  
nal central sectional view, respectively, of the  
superheater. Figs. 9 and 10 are a central ver-  
tical sectional and a plan view, respectively,  
of the separator.

I first describe the first form of furnace and  
its mode of operation.

The brick-work which comprises the body  
of the furnace is represented by the numeral  
1. The oven 2 is preferably constructed of  
brick, and the oven 3 is preferably constructed  
of iron. These ovens are preferably placed  
parallel to each other, and the fire-place 4 is  
placed in front of them both. Openings  $O$   
and  $O$  in the brick walls which support the  
oven 2 give passage to the flames under that  
oven when the valve 5 is open and the valves  
6 and 7 are both closed, and corresponding  
openings in the corresponding walls which sup-  
port the oven 3 give passage to the flames un-  
der that oven when its corresponding valves  
are in corresponding positions. The pipes 8  
and 9 lead from the rear end of the oven 2 to-  
ward the fire-place 10, the first-mentioned pipe

opening below and the other opening above  
that fire-place. The boiler 11 is placed above  
the fire-place 10, and the retort 12 is placed  
within that boiler, and preferably nearest its  
upper side. The pipe 13 extends from the re-  
tort 12 through the wall of the boiler and  
thence downward to a place adjacent to the  
fire-place 10, where it is provided with the su-  
perheater 14, so fixed thereto as to be readily  
removable and be readily replaced by a new  
one when it has been injured by the fire. The  
pipe 13 may be provided with a valve, if de-  
sired, and in that case another pipe should  
run through the wall of the boiler 11 from  
the retort 12, and be provided with a safety-  
valve like the safety-valve 15; which in all  
cases is inserted in the wall of the boiler.  
The pipe 16 may extend from the retort 12  
through the wall of the boiler 11, and may  
communicate with a sewer, cesspool, or other  
receptacle of offensive liquids, and if it is em-  
ployed should be provided with the valve 17.  
The smoke-pipe 18 extends upward from  
the rear end of that part of the furnace which  
incloses the boiler 11 and the retort 12. The  
floor 19 is appurtenant to two adjacent privy-  
closets, one of which is provided with the seat  
20 and the separator 21, and the other one of  
which is provided with a corresponding seat  
and separator. (Not shown in the drawings.)  
The large pipes 22 and 23 extend downward  
from the two seats, respectively, to the oven  
2, and are provided with the valves 24 and 25,  
respectively, and with openings 26 and 27, re-  
spectively, communicating with the ventilat-  
ing-pipe 28, which latter discharges into the  
smoke-pipe. The two separators are fixed  
within the pipes 22 and 23, respectively, im-  
mediately below the seats, and those separa-  
tors drain into pipes 29 and 30, respectively,  
and those pipes unite in the pipe 31. The  
latter passes through the wall of the boiler 11  
and discharges into the retort 12. A branch  
pipe, 32, extends from the pipe 31 to the oven  
3. The valves 33 and 34 are so placed in the  
pipes 31 and 32, respectively, as to direct the  
discharge of the pipe 31 into the oven 3 or the  
retort 12, or into both of those receptacles, as  
may be desired. The opening 35, provided

with the horizontal door 36, gives entrance for garbage to the oven 2 from the outside of the furnace.

The mode of operation is as follows: When the seat 20 is occupied, the night-soil drops down the pipe 22 into the oven 2, lodging temporarily upon the valve 24, if that valve is closed at the time, while the urine passes through the corrugated and perforated separator 21 into the pipe 29, and thence runs partly into the oven 3 and partly into the retort 12. When enough night-soil and urine have accumulated to make a burning expedient, the boiler 11 is supplied with water, and the valve 5 is opened, and the valves 6 and 7 are closed, while the corresponding valves of the oven 3 are correspondingly managed, and the valves 17, 24, 25, 33, and 34 are closed, and the door 36 is shut down, while the doors of the ovens 2 and 3 are partly open. Then a fire is made on the fire-place 4, and another fire is made on the fire-place 10. The flames from the fire on the fire-place 4 pass under and around the ovens 2 and 3, and the matter in those ovens is partly evaporated into steam and partly volatilized into gases by the resulting heat. That steam and those gases, having no other egress, pass out of the doors of the ovens and into the flames above the fire-place 4, where they are partly consumed. The unconsumed particles pass, with the smoke from the fuel on the fire-place 4, through the opening which is furnished with the valve 5, and thence upward through the fire-place 10 and the fire that is thereon. During their passage through that fire all the unconsumed particles of matter undergo combustion, and thus increase the heat in that part of the furnace. In the meantime that heat is passing through the walls of the boiler 11, and through the walls of the flues therein, and through the water it contains, and through the walls of the retort 12 into the interior thereof, thus volatilizing the contents therein contained. The steam and gases thus produced pass through the pipe 13 into the superheater 14, and when they issue thence are consumed in the fire above the fire-place 10.

When the foregoing part of the operation has gone far enough to reduce the night-soil in the oven 2 to a dry condition, the valve 5 is closed and the valve 6 is opened. Thereupon the flames pass from the fire-place 4 into the oven 2 and ignite the contents thereof, and those contents burn till they are substantially consumed, and if any light particles escape combustion in the oven they are burned in passing through the fire on the fire-place 10. If during this burning it becomes expedient to increase the draft, the valve 7 may be opened, and to increase the draft still more the valve 6 may be closed. Then the smoke from the fire in the oven 2, instead of passing through the fire on the fire-place 10, is projected against and around the superheater and into the flames which surround it, where that smoke and its accompanying unconsumed gases

are completely burned up. The flames from the fire-place 4 may in like manner be sent through the oven 3 when the contents thereof have been evaporated down to a dry residuum, and that residuum thus be in like manner consumed. Thus the burning continues till the whole of the night-soil in the oven 2 and the whole of the urine in the oven 3 have been burned up with fire, and until only a little dry sediment remains in the retort 12. When the furnace cools down, that sediment may be removed through the aperture in the end of the retort, which is disclosed to view by removing the plate 37.

The boiler 11 may be used to supply steam for warming apartments or for other purposes, or it may be employed only as a water-jacket for the retort 12, in which latter case it requires no other outlet than the safety-valve 15 and no inlet other than any convenient means of originally supplying it with water.

The ovens may both be provided with drain-pipes having cocks, and the retort 12 may be partly or wholly discharged through the pipe 16, according as that pipe is located in the wall of the retort.

The oven 3 may be omitted from the furnace and the whole of the urine be sent from the pipe 31 into the retort 12, or the retort and its water-jacket, together with the pipes 13 and 16 and the superheater 14, may be dispensed with and the whole of the urine be sent into the oven 3, or, if that oven is also omitted, then into the oven 2, which in that case should be constructed of iron. So, also, the valve 6 may sometimes be omitted, with the pipe leading thereto, and the function thereof be substantially performed by the valve 7 and the pipe which leads to it; and in other cases the latter valve and pipe may be dispensed with and their functions be substantially performed by the former instrumentalities.

The second form of the furnace differs from the first form in not having the oven 3 or the pipe 32, leading to that oven, and likewise differs in having the additional fire-place 40, with an ash-pit, 41, under it, and with the additional doors 42 and 43, leading to that fire-place and that ash-pit, respectively, and also in having the pipe 44, furnished with the valve 45, and extending from the flue under that ash-pit to the pipe 9 above that fire-place.

The mode of operation when the fire-place 40 is used is modified as follows: A fire is made on the fire-place 40 at the same time that other fires are made on the fire-places 4 and 10, and the flames from the fire on the fire-place 40 pass over the wet and offensive substances in the oven 2, driving before them the steam and gases arising therefrom out of the door of the oven and into the flames above the fire-place 4, where the flames from the fire-places 4 and 40 meet and mingle, after which they pass forward as in the first form of the furnace. This operation may continue till the substances in the oven 2 are reduced to a dry condition, when the valve 5 is closed and the valve 6 is

opened. Thereupon the flames will pass from the fire-place 4 into the oven 2 and ignite the contents thereof and drive the products of the resulting combustion into and through the flames on the fire-place 40, and thence they pass into and through the flames on the fire-place 10; or the valve 5 may be closed and the valve 6 be opened before the substances in the oven 2 are entirely dried, and in that case the flames from the fire-place 4 will drive the steam and gases arising from those substances into the flames on the fire-place 40 until those substances are dry enough to ignite. The pipe 44 may sometimes be used to convey a portion of the products of combustion which would otherwise pass through the fire-place 10 into the pipe 9, and thence into the flames above the fire-place 10.

I claim as my invention—

1. The combination of the oven 2, provided with an opening in the front and a valve in the rear thereof, with the fire-place 4, provided with an outlet under the oven and with the valve 5, closing that outlet, all arranged and operating together substantially as described.

2. The combination of the oven 2, provided with an opening in front, the fire-place 40 in the rear of the oven and connected therewith and provided with a valve rearward thereof, and the fire-place 4, provided with an outlet under the oven and with the valve 5, closing that outlet, all arranged and operating together substantially as described.

3. The combination of the oven 2, provided with an opening at the front and a valve in the rear thereof, the fire-place 4, provided with an outlet under the oven and with the valve 5, closing that outlet, and the fire-place 10, placed in the rear of the valve 5 and above its level, all substantially as described.

4. The combination of the oven 2, provided with an opening in front, the fire-place 40 in the rear of the oven and provided with a valve rearward thereof, the fire-place 4, provided with an outlet under the oven and with the valve 5, closing that outlet, and the fire-place 10, placed in the rear of that valve, all substantially as described.

5. The combination of the fire-place 10, the boiler 11, the retort 12 inside the boiler, the pipe 13, and the superheater 14, all substantially as described.

6. The combination of the oven 2, the fire-place 4, the fire-place 10, and the boiler 11, all substantially as described.

7. The combination of the oven 2, the fire-place 4, the fire-place 10, the boiler 11, the retort 12 inside the boiler, the pipe 13, and the superheater 14, all substantially as described.

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Witnesses:

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