(No Model.) 4 Sheets—Sheet 1.

A. ENGLE.

PROCESS OF BURNING AND UTILIZING WET AND OFFENSIVE SUBSTANCES.

No. 372,304. Patented Nov. 1, 1887.

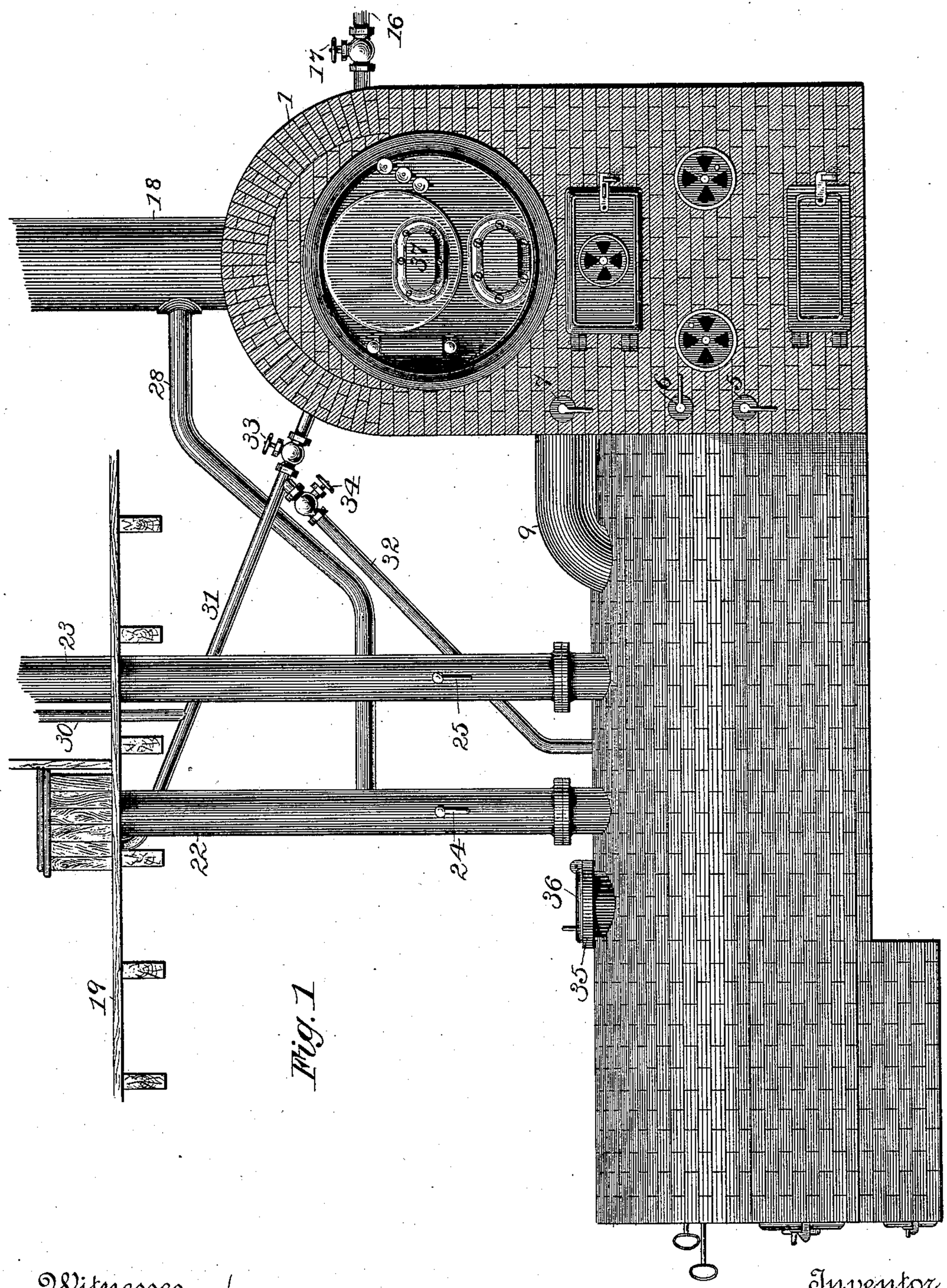

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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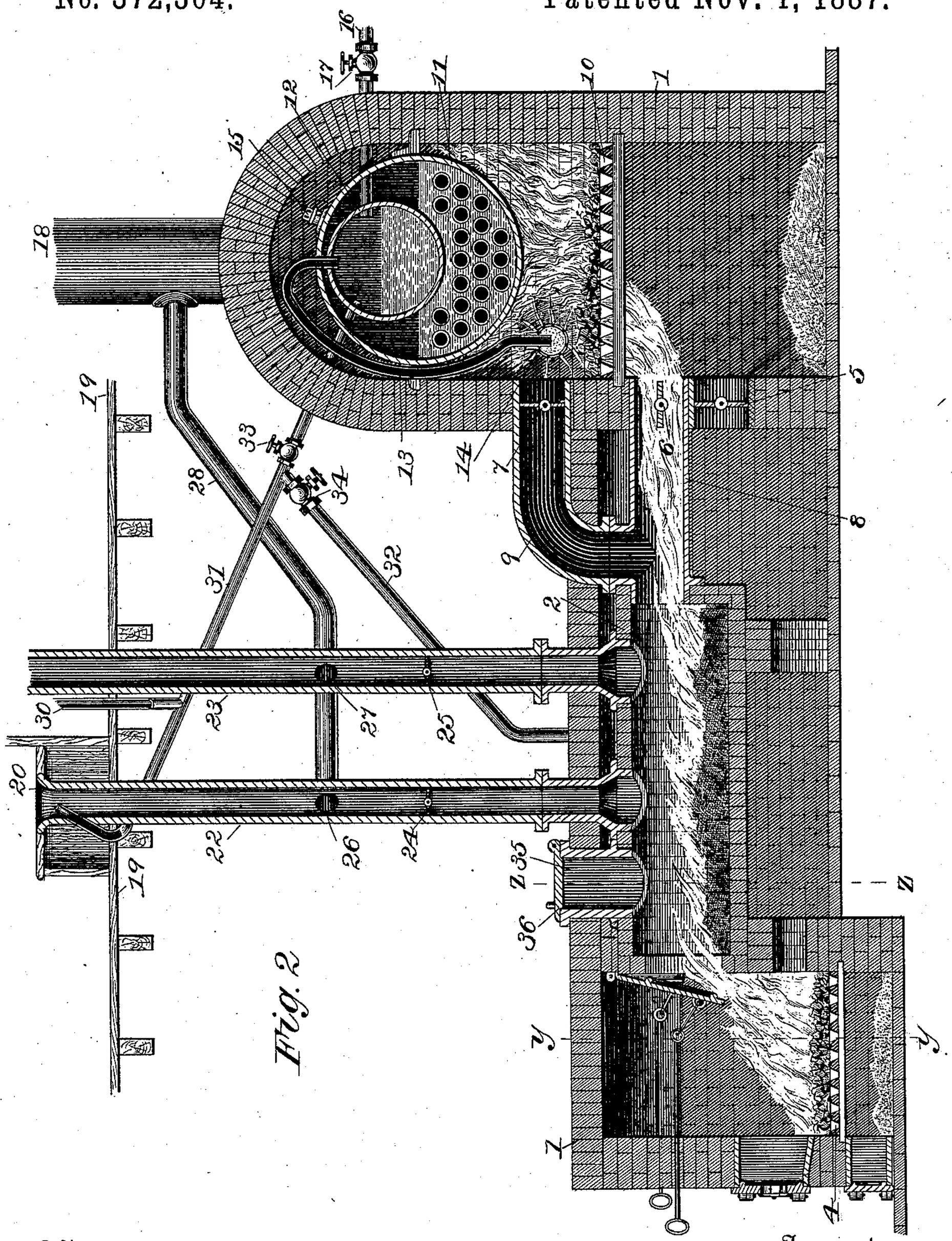

Fig. 2

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Fig. 3

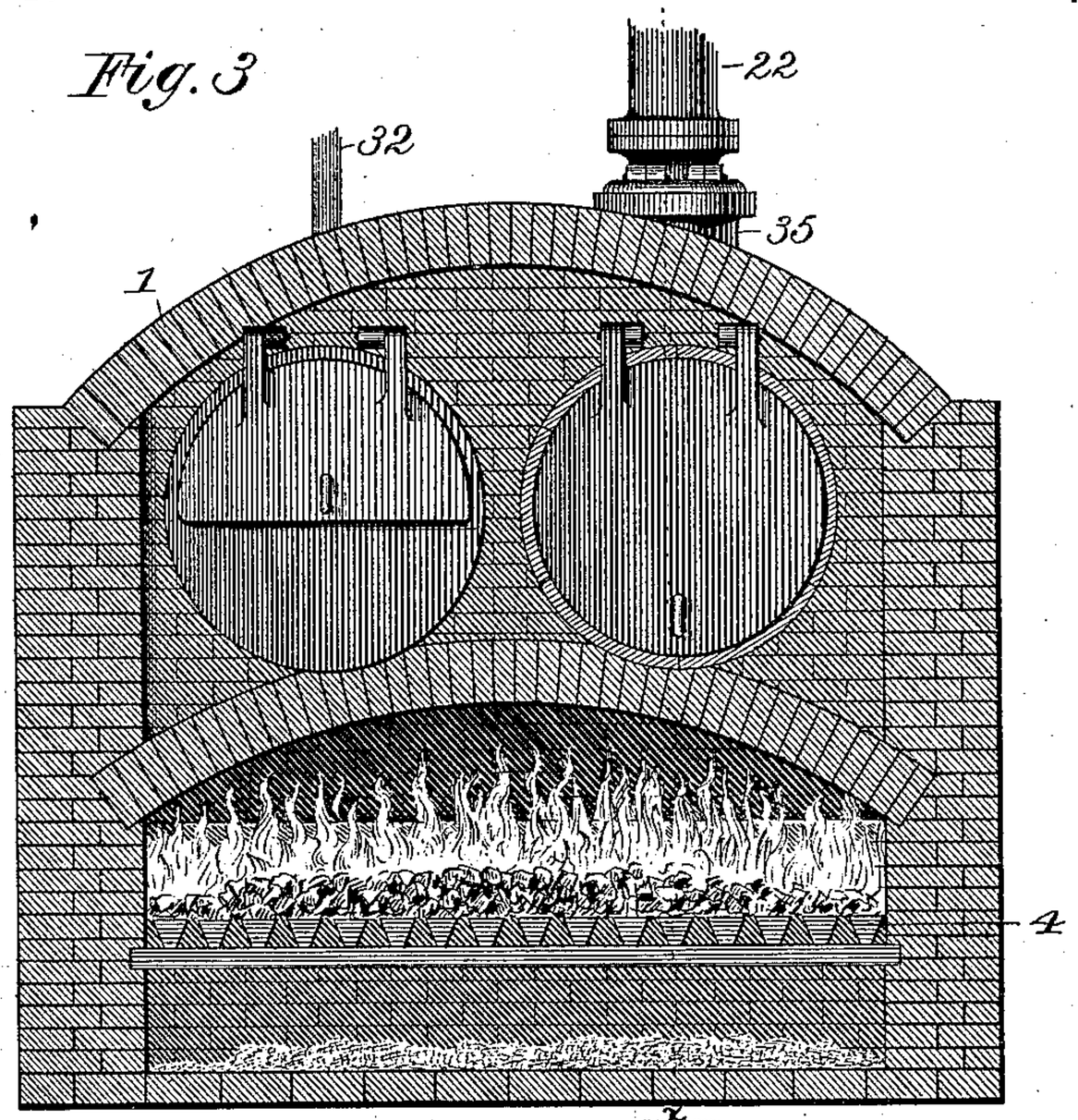
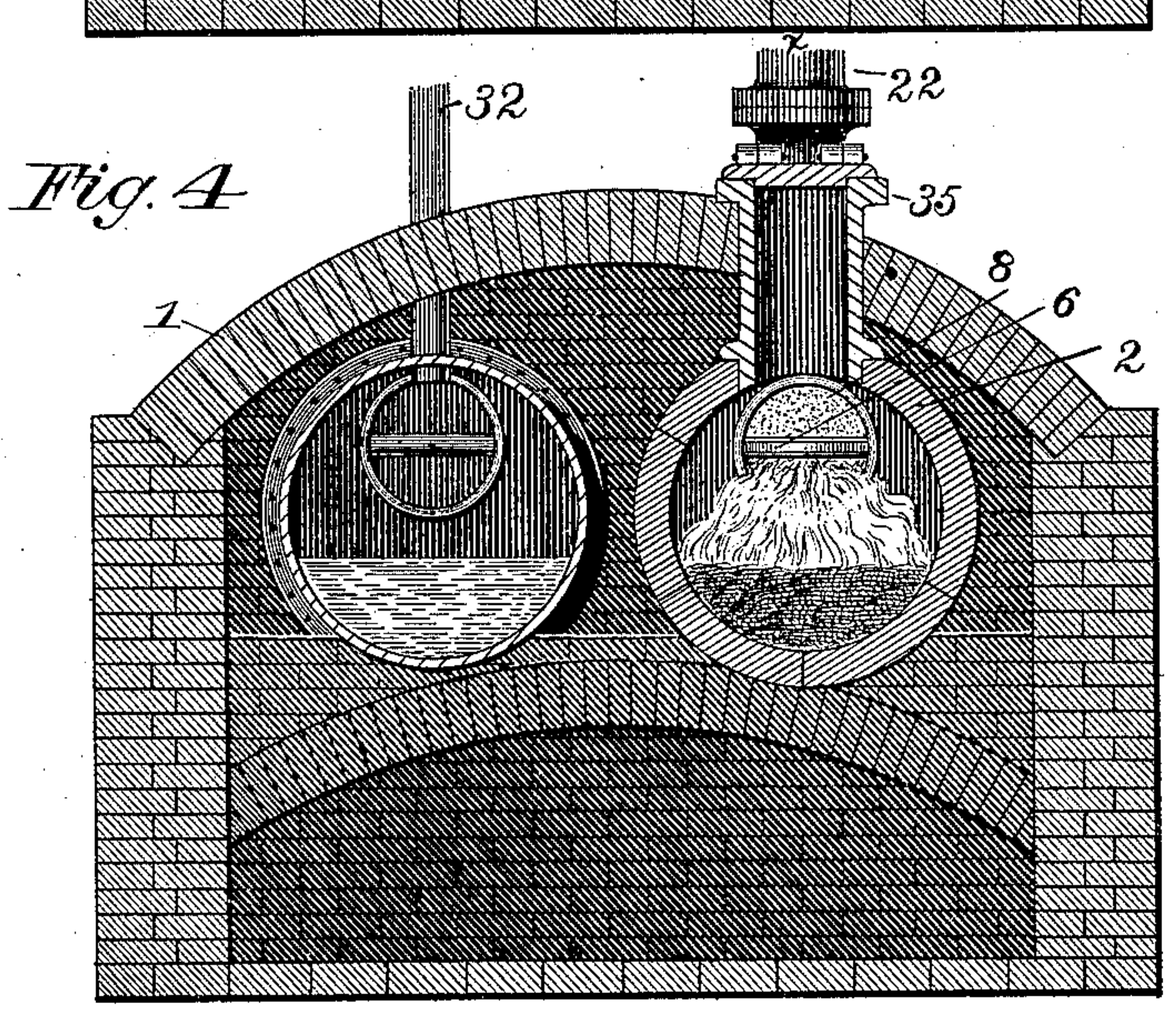


Fig. 4



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(No Model.) 4 Sheets—Sheet 4.

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Fig. 5

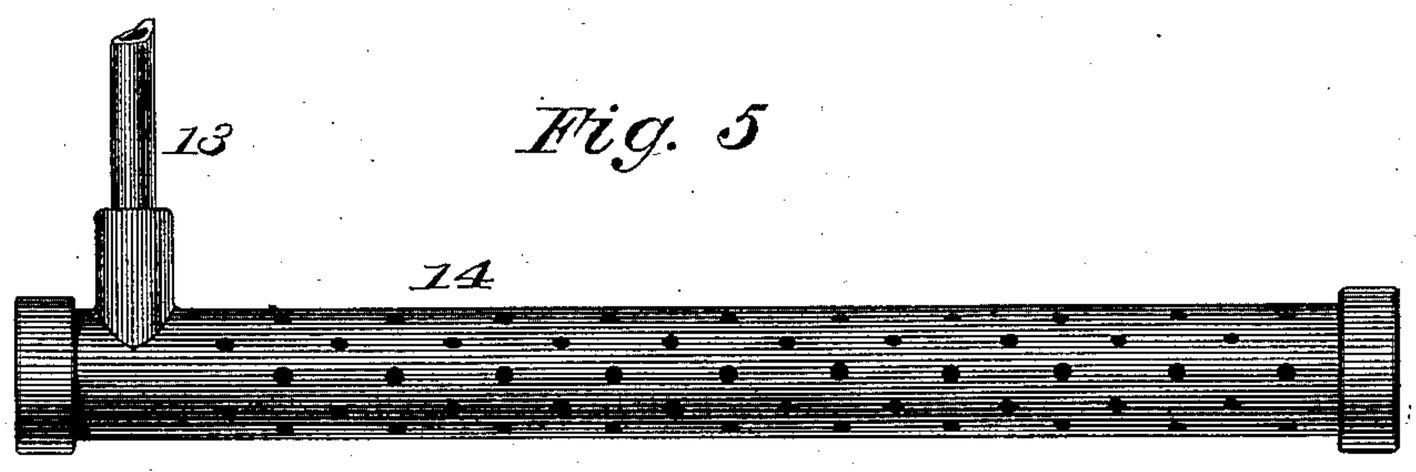


Fig. 6

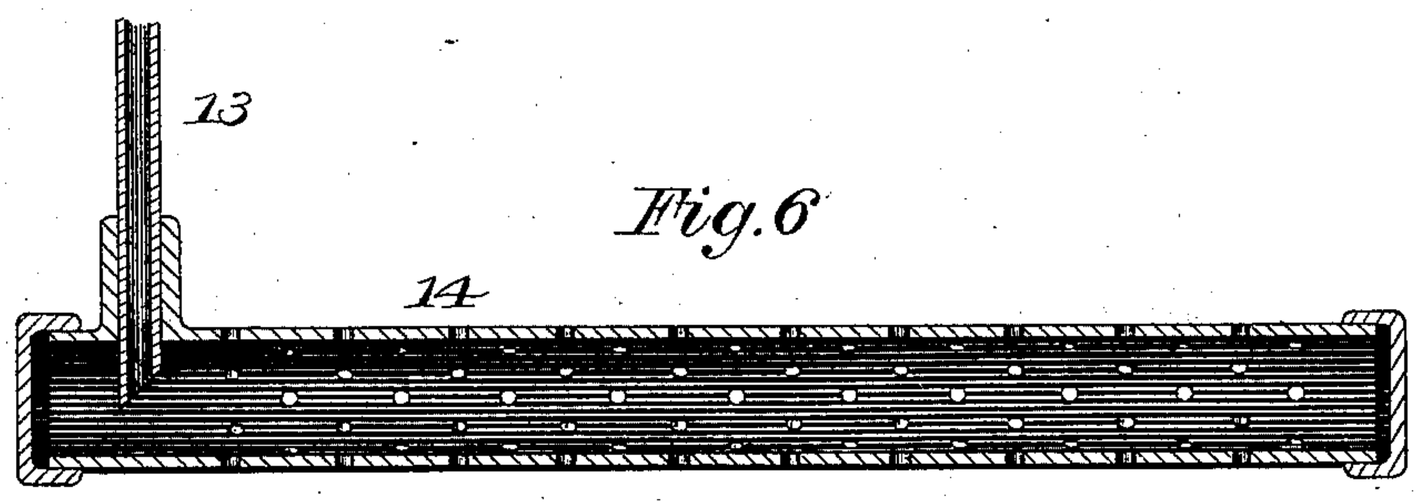


Fig. 7

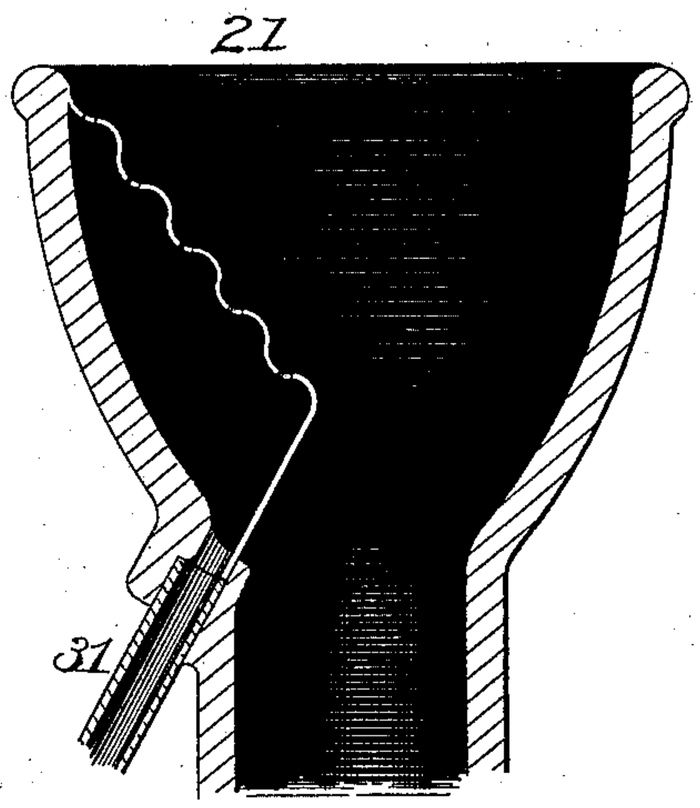
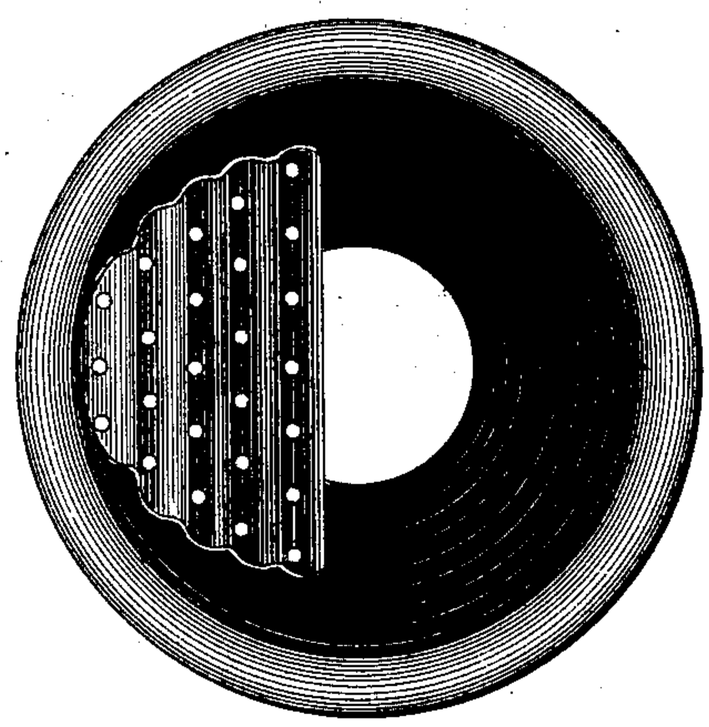


Fig. 8



Witnesses

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UNITED STATES PATENT OFFICE.

ANDREW ENGLE, OF BAXTER, ASSIGNOR OF ONE-HALF TO JAMES CALLANAN, OF DES MOINES, IOWA.

PROCESS OF BURNING AND UTILIZING WET AND OFFENSIVE SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 372,304, dated November 1, 1887.

Application filed August 23, 1886. Serial No. 211,617. (No model.)

To all whom it may concern:

Be it known that I, ANDREW ENGLE, of Baxter, Iowa, have invented a new and useful Process of Burning Wet and Offensive Substances, of which the following description and claim constitute the specification, and which is illustrated by the accompanying four sheets of drawings.

This process relates to methods of so volatilizing and burning night-soil, urine, and other wet and offensive substances as to cause those substances themselves to furnish fuel for their own evaporation and combustion.

The drawings represent a furnace invented by me and suitable to be used in the performance of my new process; but I do not herein claim any part of the apparatus I describe, because that furnace is shown, described, and claimed in my application Serial No. 236,422, filed April 28, 1887, for Letters Patent of the United States thereon.

Figure 1 is a longitudinal elevation of the furnace above mentioned. Fig. 2 is a perpendicular longitudinal section of the furnace on the line *x x* of Fig. 3. Figs. 3 and 4 are perpendicular lateral sections of the furnace on the lines *y y* and *z z*, respectively, of Fig. 2. Figs. 5 and 6 are an elevation and a longitudinal central sectional view, respectively, of the superheater. Figs. 7 and 8 are a central vertical sectional and a plan view, respectively, of the separator.

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 grate 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 support the oven 3 give passage to the flames under that oven when its corresponding valves are in corresponding positions. The pipes 8 and 9 lead from the rear end of the oven 2 toward the grate 10, the first-mentioned pipe opening below and the other opening above that grate. The boiler 11 is placed above the grate 10, and the retort 12 is placed within that boiler, and preferably nearest its upper side. The pipe 13 extends from the retort 12 through the wall of the boiler, and thence downward to a place adjacent to the grate 10, where it is provided with the superheater 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 desired, 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 employed 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, respectively communicating with the ventilating-pipe 28, which latter discharges in the smoke-pipe. The two separators are fixed within the pipes 22 and 23, respectively, immediately below the seats, and those separators 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 grate 4, and another fire is made on the grate 10. The flames from the fire on the grate 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 grate 4, where they are partly consumed. The unconsumed particles pass with the smoke from the fuel on the grate 4 through the opening which is furnished with the valve 5, and thence upward through the grate 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 grate 10. When the foregoing part of the process 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 grate 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 grate 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 grate 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 grate 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.

I claim as my invention—

The process of burning wet and offensive substances, which consists, first, in volatilizing their liquid constituents by means of heat generated outside of the receptacle of those substances and conducted into that receptacle through the walls thereof; second, in conducting its resulting vapors out of that receptacle and into and through fire exterior thereto, and, third, in burning the dry residuum of those substances in their place of sedimentary deposit in that receptacle, all substantially as described.

ANDREW ENGLE.

Witnesses:
ALBERT H. WALKER,
FRANK H. PIERPONT.