(No Model.) 3 Sheets—Sheet 1.

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RETORT FOR THE MIXTURE OF FURNACE GASES.

No. 368,979. Patented Aug. 30, 1887.

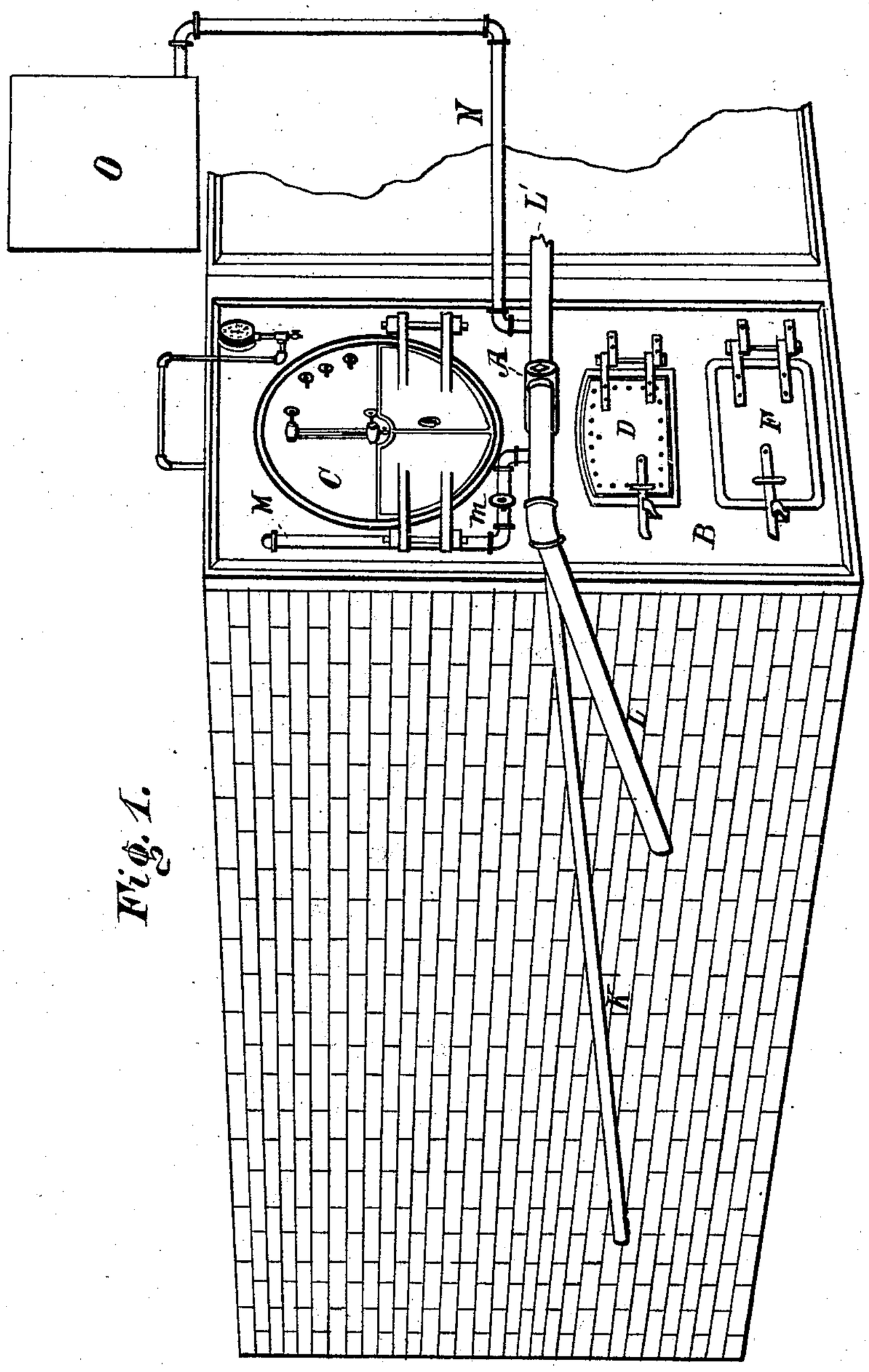

Fig. 1.

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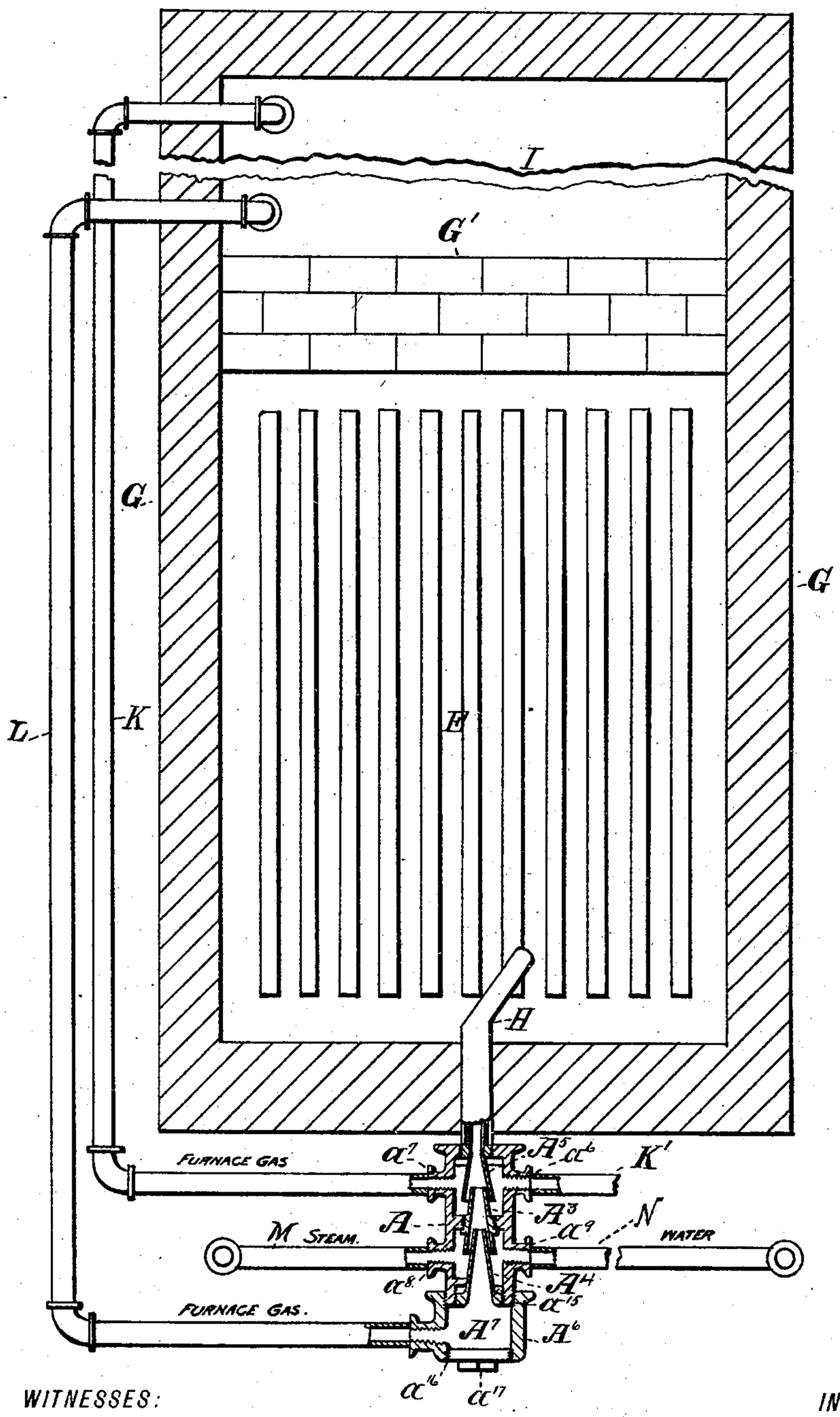
Fig. 2.



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RETORT FOR THE MIXTURE OF FURNACE GASES.

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Fig. 3

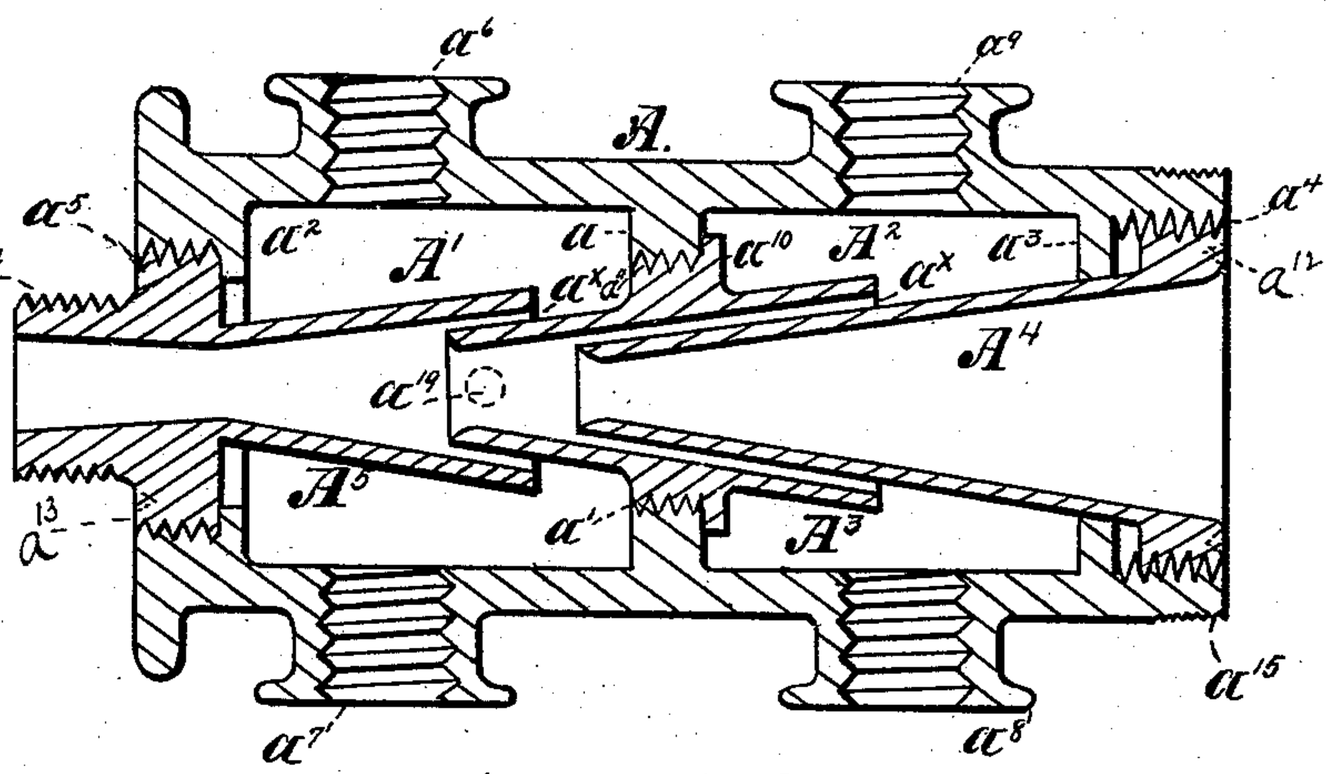


Fig. 4

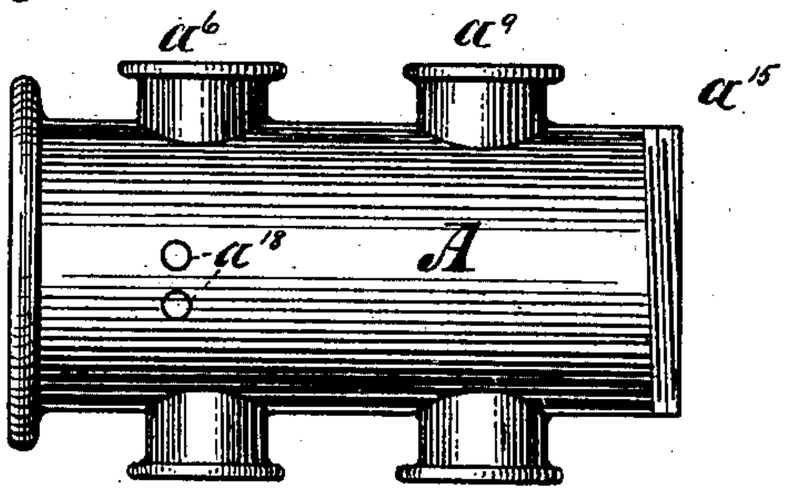


Fig. 5

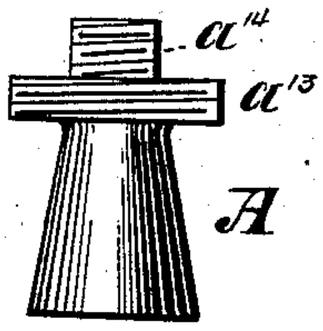


Fig. 6

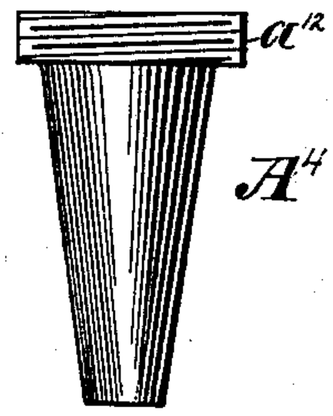
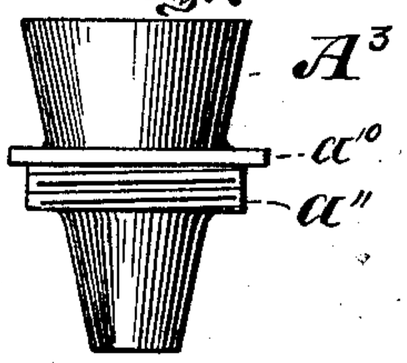


Fig. 7



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UNITED STATES PATENT OFFICE.

OLIVER M. SIMMONS, OF KANSAS CITY, MISSOURI, ASSIGNOR OF ONE-HALF TO FRANK T. ROBINSON, OF SAME PLACE.

RETORT FOR THE MIXTURE OF FURNACE-GASES.

SPECIFICATION forming part of Letters Patent No. 368,979, dated August 30, 1887.

Application filed January 28, 1887. Serial No. 225,828. (No model.)

To all whom it may concern:

Be it known that I, OLIVER M. SIMMONS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a new and Improved Retort for the Mechanical Mixture of Furnace-Gases; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

In all steam-boiler furnaces the main object is to accomplish the greatest amount of effective heat-units with the economy of fuel and labor. The most effective coal used is that supplying large quantities of what is termed "heavy carbonated hydrogen gas," and this gas is generally wasted and lost by imperfect combustion. In the consumption of coals the loss of this unconsumed heating agent materially increases the cost of coals, and, in fact, prevents the best results of its application. To economize and use this gas, and thus effectually obtain the full benefit of every heating element of the coals, is the object of my invention, the means whereby such object is accomplished being fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a perspective view of a steam-boiler furnace, showing furnace-front plate and my improved retort attached thereto; also the pipes leading from beneath the boiler to the retort and the means for the induction of water or steam and furnace-gases under different pressures. Fig. 2 is a horizontal sectional view of the furnace, taken above the point of attachment of the retort to the fire-plate, and showing the retort in section, and also the bridge-wall. Fig. 3 is a longitudinal sectional view of the retort. Fig. 4 is a top view of the retort. Fig. 5 is a view of one of the cone cases or cylinders of the retort, one end of which passes through the fire-plate. Fig. 6 is a view of a cone cylinder or case in the opposite end of the retort to that attached to the front furnace fire-plate. Fig. 7 is a view of the central cone cylinder or case of the retort.

In carrying out my invention I make first a hollow cylinder or receiver, A, of the proper length, and interiorly midway its length I form a cylindrical flange, *a*, which projects from the side of said cylinder, and is provided with a circular screw-threaded opening, *a'*. At the opposite ends of the cylinder A, and within said cylinder at short distance from said ends, I cast or form the cylindrical flanges a^2 a^3, and between the central flange, *a*, and the flanges a^2 a^3 are formed two separate contiguous chambers, A' A^2. I then form screw-threads a^4 a^5 on the inner portion of the cylinder, extending from the extreme outer opposite ends of said cylinder to the respective flanges a^2 a^3. Through the opposite sides of the cylinder A, in a transverse relation, I make screw-threaded perforations a^6 a^7, which open into the chamber A' from opposite sides, and the screw-threaded perforations a^8 a^9, which open into the chamber A^2, said perforation being made of a sufficient size to admit water and steam pipes or conductors of the ordinary size. I then make a cone cylinder or case, A^3, of a size which will permit the flow of the gases and leave room for the mixing of the gases in the chambers, and fit the central opening, *a'*, between the opposite chambers A' A^2, and extending from a continuous line drawn through the cylinder A, and centrally through the perforations a^8 a^9 in chamber A^2 to a continuous line drawn transversely through the cylinder or receiver A and perforations a^6 a^7 on the side of said perforations nearest the flange *a*. Around the outer side of the cone cylinder A^3, I form a circular flange, a^{10}, and on the side of said flange, toward the smaller end of the said cone cylinder, and projecting a slight distance therefrom and at a distance less in extent than the flange a^{10}, I make a circular screw-threaded flange, a^{11}, of the exact size of the screw-threaded opening in flange *a*. I then place the cone cylinder A^3 in place in the cylinder A, the flange a^{10} closing against the side of the flange *a* on the side toward the chamber A^2. I then make another concentric cone cylinder

or case, A^4, to extend from the outer end of the retort or cylinder A, which is provided with the screw-thread a^4 through the cone cylinder A^3 to a point within said cylinder slightly beyond the relative side of the flange *a*, which is opposite the chamber A′. Upon the outer larger and extreme end of the cone cylinder A^4, and around said end, I make a screw-threaded flange, a^{12}, the thickness of said flange in the direction of the cylinder being made less proportionately than the distance from the outer end of the cylinder A to the flange a^3, which inner portion of said cylinder is screw-threaded at a^4 to receive exactly the screw-threaded flange a^{12} and permit said flange to play between said end of cylinder and the said flange. The larger end of the cylinder or case A^4 is therefore of increased dimensions to that of the same relative end of the concentric cylinder A^3, which is suitable to admit freely the gases. I then make another cone cylinder or case, A^5, of similar dimensions circumferentially to that of the cylinder A^3, and to extend from a point midway between the central flange, *a*, and a continuous line drawn transversely through the cylinder A, and through the perforations a^6 a^7 on the side of said perforations nearest the said flange *a* to the end of the said cylinder, and a suitable distance beyond said end of cylinder, for the purpose hereinafter described.

Near the smaller end of the cone cylinder A^5, I make around said cylinder a screw-threaded flange, a^{13}, to fit the screw-threaded opening a^5 in the end of the cylinder A opening from the chamber A′. The smaller projecting end of said cone cylinder A^5, which is extended beyond the flange a^{13}, and also beyond the cylinder A, is screw-threaded at a^{14} on its outer portion, so as to be attached to a furnace-front plate, as herein described, or other places to which natural gases are used as a source of combustion.

For convenience of illustration I have shown in Fig. 1 the retort or cylinder A attached to the furnace-front plate B, which supports the end of the boiler C, and has the usual opening, D, above the grate E, to receive the coals, and ash-opening F below the grate. In Fig. 2 is shown the grate, and beyond the grate the bridge-wall G′, which extends from one to an opposite side wall, G G. Beyond the bridge-wall is the combustion-chamber I, into which the gases fall. I then perforate the furnace-front plate B above the grate and between the boiler C and the opening D to the said grate, and insert a pipe, H, therein, which extends through said furnace-plate B and beneath the boiler C a short distance, and is bent downwardly toward the grate E. The outer end of the pipe H is made with a screw-thread and of a suitable size to receive the threaded end a^{14} of the cone A^5, and the retort or cylinder A, attached in that manner to its place. I then attach to the retort A and to the threaded opening a^7 therein a pipe, K, which leads therefrom around the outer side of the wall G G, on opposite sides of the furnace, thence through the walls G G to the extreme portion of the chamber I, whence it is turned in a downward direction. Upon the outer end of the cylinder or retort A, opposite to that attached to the fire-plate B, I form a screw-thread, a^{15}, and upon said end I fit a removable auxiliary portion, A^6, (see Fig. 2,) and thus form between the said end of the cylinder A and in said auxiliary portion of the retort a chamber, A^7. In the extreme end of the auxiliary portion A^6 of the retort, which portion is attached to the retort in the same longitudinal plane, I make an opening, a^{16}, and in said opening I fit a screw-threaded cap, a^{17}, which may be removed at will, whereby the interior of the retort may be reached and cleaned. The opposite sides of the portion A^6 of the retort are also provided with screw-threaded openings, and contracted to the proper size to receive the end of the pipe L, which extends, in a similar manner to the pipe K, around the wall G, and enters the chamber I beyond the bridge-wall G′ and nearer the bridge-wall than the pipe K and is turned in a similar downward direction. A similar pipe, L′, (seen in Fig. 1,) may be attached to the opposite side of the retort A, and carried to and attached to an adjoining retort or retorts arranged in series on adjoining furnaces. I then attach to the perforated openings a^8 of the cylinder A a pipe, M, which extends upwardly and enters the boiler C at a point suitable to give the steam its entrance to the said pipe, a stop-cock, *m*, serving to let on and cut off the supply of the steam. Extending from cylinder A, upon the opposite side, is a pipe, N, which extends upwardly to and connects with a reservoir, O. In the top portion of the retort or cylinder A, and through said portion, and communicating with the chamber A′, are made the perforations a^{18} a^{18}. Through the lower portion of the retort A, I make a perforation, a^{19}. (Shown in dotted lines in Fig. 3.)

In the operation of my invention, and as heretofore premised, the gases which are the heaviest and which are the lowest in temperature are not consumed, and at the beginning of the flame in the furnace the hydrocarbons are formed. I therefore introduce the opposite end of pipe L to that which is attached to the retort at the rear of the flame, and the end of pipe K, being, as seen in the drawings, farther away, is so situated as to take up the other heavy component parts of combustion. I then turn on the steam through pipe M, and the fire under the boiler C being generated the steam creates a suction between the cone cylinders A^3 A^4, and the gas which is drawn into the chamber A^7 is carried through the cone cylinder A^4. The chamber A^2 is first charged with the steam, which passes through the orifices $a^{\times}$, between the cone cylinders A^3 A^4, and thereby creates a vacuum at the point of the cylinder A^4, and then passes

through the orifices $a^{\times}$, between the cone cylinders A^3 A^5, the ends of the said cone cylinders A^3 A^5 terminating in the chamber A′, and the gases, which follow the suction created by the steam in the cone cylinder A^3, are now mixed at nearly the same point with the hydrocarbons and steam, and pass through the pipe H to the flame above the coals on the grate E, thereby revivifying the fire and producing a more intense heat than is obtainable by blasts of air or any artificial means for increasing combustion. At the point of the exit of the gases in union with the steam out of the pipe H, the pipe H being hot, they are further superheated, and the steam is decomposed and intermingled with the other gases before reaching the carbon on the grate-bars. By the intermingling of the gases at the point of mixing, and also where the suction is formed at the smaller end of the cone cylinder A^3, a higher degree of temperature is formed, which causes resinous formations from the coals, and to prevent this the openings a^{18} a^{18} in the retort admit sufficient air, which acts as a flux and keeps said parts from obstructions. The condensed steam or water passing into the retort escapes through the opening a^{19} in the bottom of the retort. To regulate the amount of gas that shall in a determined period of time be mixed with steam or other gas or gases, the concentric cone cylinders are adjustable in and out in their telescopic relation to the cone cylinder A^3 by a simple rotation of the outer cone cylinders, so that the extent of the cylindrical orifices which are between the cylinders is increased or diminished at will and the supply of gas thus controlled. Either one of the cone cylinders may be thus adjusted to attain the results desired.

Should it be desirable to operate the retort inversely and draw the foul gases from a deodorizing-furnace, the hydraulic power of water in the reservoir O may be applied under any degree of pressure, and water may be used in direct application to the retort and mixed with the gases and wasted away.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. A retort for the mixture of gases, having separate chambers, and conductors for the furnace-gases communicating with said chambers, and concentric cases in said chambers, and orifices between said cases, as and for the purpose described.

2. A retort for the mixture of gases, having separate chambers, and conductors for the furnace-gases and furnace-gas-mixing agents communicating with said chambers, and concentric cases in said chambers having a telescopic adjustment in relation thereto, and orifices between said cases, for the purpose described.

3. A retort for the mixture of gases, consisting of a hollow receiver having separate chambers, and conductors for the furnace-gases and furnace-gas-mixing agents communicating with said chambers, and concentric cases within said hollow receiver, and orifices between said cases, and means for producing a suction through said hollow receiver and said cases, for the purpose described.

4. A retort for the mixture of gases, consisting of a hollow cylinder having separate chambers, and conductors for the furnace-gas connected thereto, and a cylinder connecting interiorly said chambers, and adjustable concentric cylinders in telescopic relation thereto, and having orifices between said cylinders and the terminal openings of said cylinders in juxtaposition in one chamber, for the purpose described.

5. A retort for the mixture of gases, consisting of a hollow receiver having separate contiguous chambers, and conductors for the furnace-gases and furnace-gas-mixing agents communicating with said chambers, and concentric cases in said retort in telescopic relation, and orifices between said cases communicating with said chambers, and a removable auxiliary portion of said retort having a chamber in communication with said cases, and conductors for other component gases connected with the chambers of said auxiliary portion of the retort, for the purpose specified.

6. A retort for the mixture of gases, consisting of a hollow receiver having separate chambers, and conductors for the furnace-gases and furnace-gas-mixing agents communicating with said chambers, and concentric cases within said retort in telescopic relation and terminating at one end in relative proximity to each other in one chamber, and orifices between said cases communicating with said chambers, and means for creating a suction through said receiver and through said cases, and opening in the side of said receiver communicating with one of said chambers and above the junction of the said ends of the cases, for the purpose specified.

7. A retort for the mixture of furnace-gases, consisting of a hollow longitudinal cylinder having separate chambers, interiorly-threaded ends, and an interior cylindrical threaded flange between said chambers, openings on opposite sides of the said cylinder for the reception of conductors for the furnace-gases, and a central cone cylinder provided with an exterior flange, and also an adjoining threaded flange midway its length, and a cone cylinder provided with a thread upon its enlarged end portion in one chamber and in telescopic relation with said central cone cylinder and extending into the portion of said cylinder which is in an adjoining chamber, and a cone cylinder provided with an exterior threaded flange and inclosing the smaller end portion of said central cone cylinder and in an adjoining chamber of the retort, and a threaded projection of said end of the said cone cylinder and an auxiliary portion of said retort having a chamber and openings thereto to admit the

gases, and openings in the sides of said retort to one of said chambers near the terminal point of the relative ends of the cone cylinder, for the purpose described.

8. The combination, with a furnace, of a retort having chambers, and furnace-gas-mixing cases in said chambers, and conductors for the furnace-gas connected with the said retort and the interior of said furnace, and a tank for water, and water-conductors connected with the said retort, and also with the said tank, for the purpose specified.

OLIVER M. SIMMONS.

Witnesses:
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