

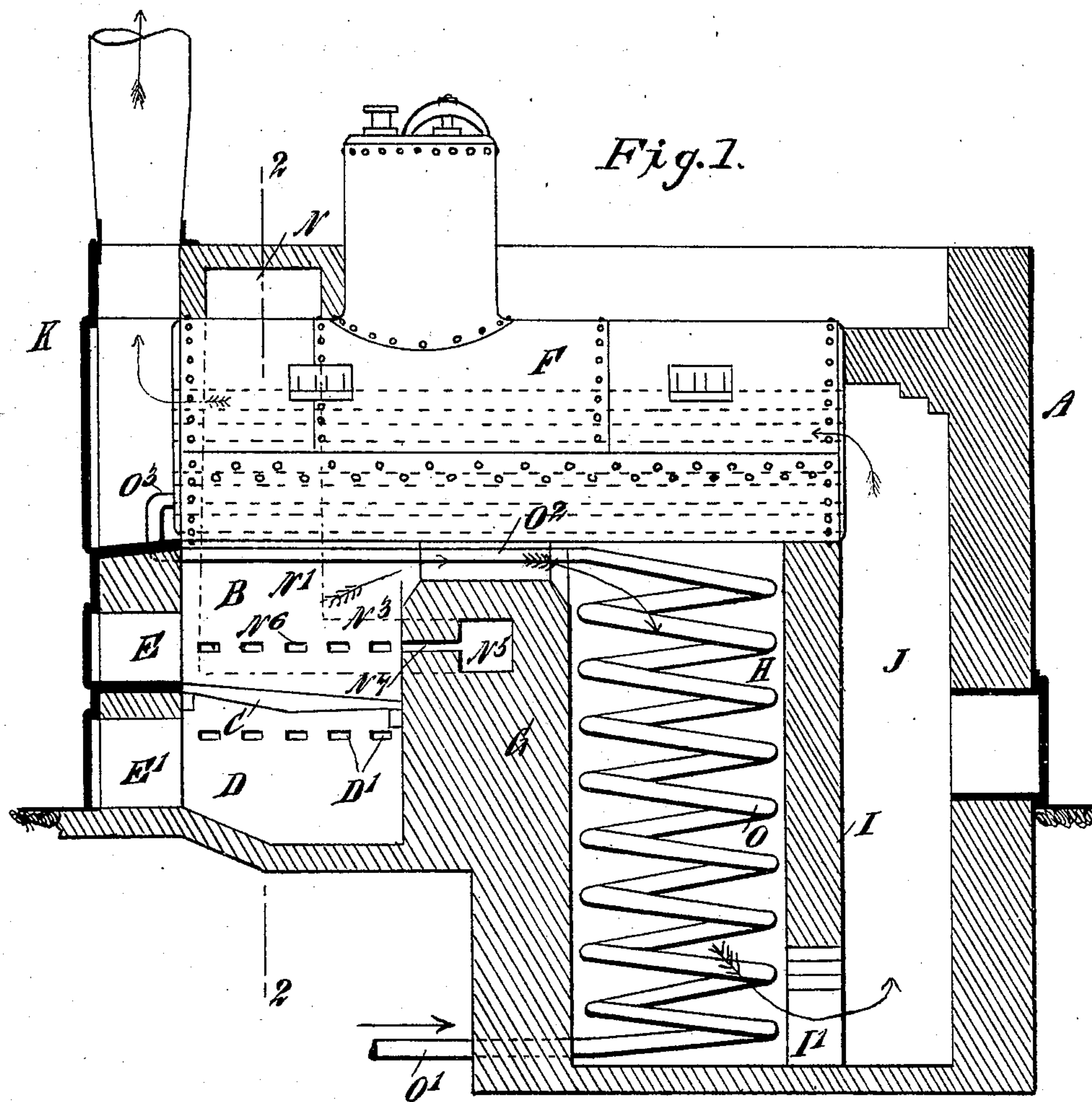
(No Model.)

2 Sheets—Sheet 1.

S. G. SMITH.
FURNACE.

No. 581,179.

Patented Apr. 20, 1897.



WITNESSES:

Herbert A. Thorpe
Rev. J. H. Hester

INVENTOR

S. G. Smith
BY *Munn & Co*

ATTORNEYS

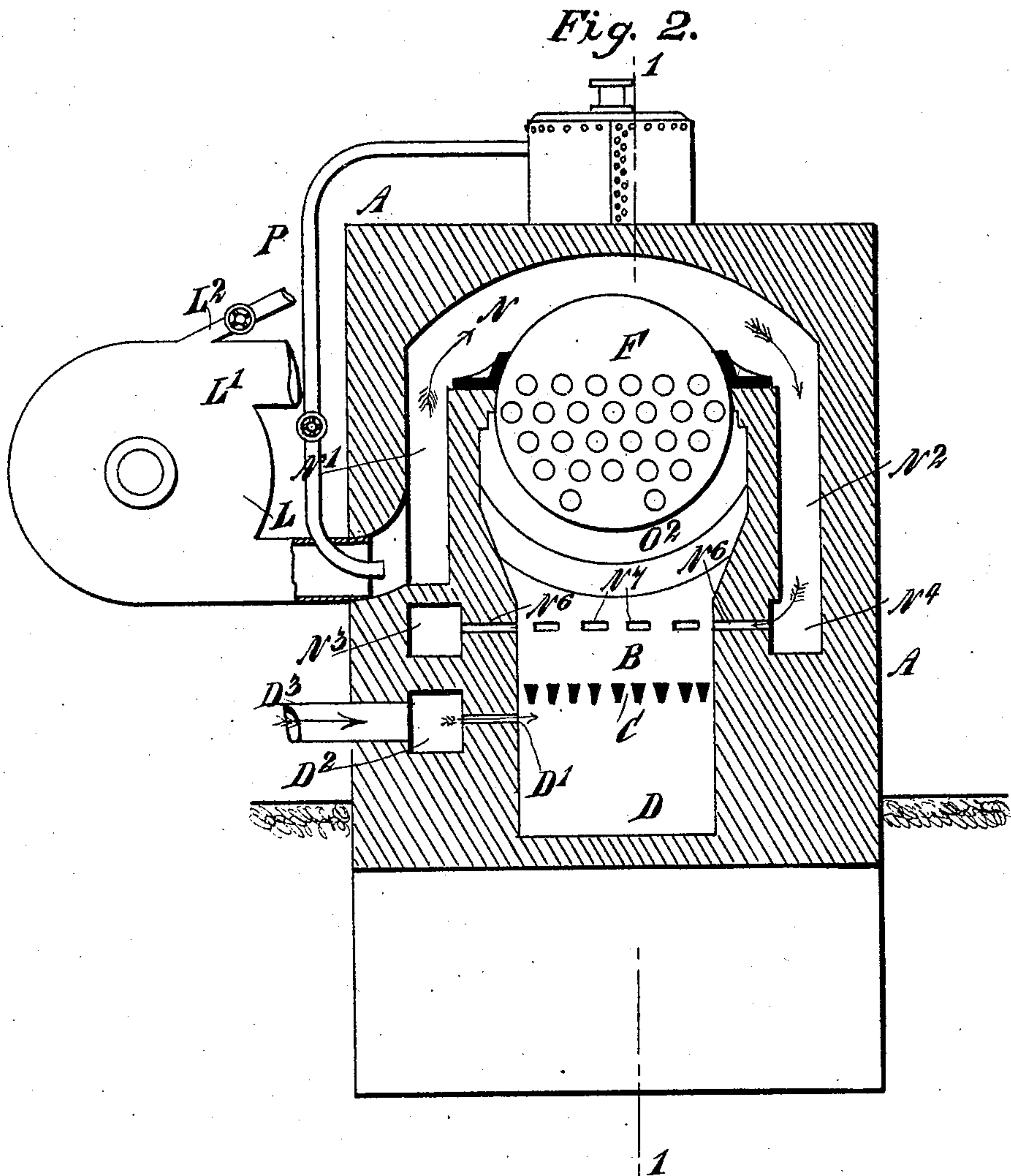
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2 Sheets—Sheet 2.

S. G. SMITH.
FURNACE.

No. 581,179.

Patented Apr. 20, 1897.



WITNESSES:

Herbert A. Phelps
Rev. J. H. Hester

INVENTOR

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UNITED STATES PATENT OFFICE.

SEYMOUR G. SMITH, OF PLAINFIELD, NEW JERSEY.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 581,179, dated April 20, 1897.

Application filed December 11, 1895. Renewed September 25, 1896. Serial No. 607,003. (No model.)

To all whom it may concern:

Be it known that I, SEYMOUR G. SMITH, of Plainfield, in the county of Union and State of New Jersey, have invented a new and Improved Gas Generating and Utilizing Furnace, of which the following is a full, clear, and exact description.

The invention relates to smoke and gas consuming furnaces; and its object is to provide a new and improved furnace which is simple and durable in construction, very effective in operation, and designed for consuming and destroying foul air and odors generated in gas-works, slaughter-houses, limekilns, and in all factories and places where objectionable or dangerous gases are generated; also, to consume all smoke produced by any kind of fuel—such as soft coal, shavings, sawdust or wood—or arising from the cremation of garbage or from blast-furnaces, &c., without permitting any of the smoke, gases, &c., to escape into the air.

The invention consists principally of a condensing and gasifying chamber adapted to be heated, and formed with jet-openings leading into the combustion-chamber of the furnace.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a longitudinal section of the improvement on the line 1 1 of Fig. 2, and Fig. 2 is a transverse section of the same on the line 2 2 of Fig. 1.

In the brickwork A of the furnace is arranged a fire-box B, provided in its bottom with a grate C, below which is arranged an ash-pit D. A fuel-charge door E leads to the fire-box B to permit of introducing coal or other fuel into the fire-box to be burned on the grate C. The ashes passing through the grate-bars fall into the ash-pit D and can be removed therefrom from time to time through an ash-door E'.

Into the ash-pit D open the jets D', connected with a chamber D², connected by a pipe D³ with a suitable air-blast for insuring a sufficient introduction of air into the ash-pit and

to the fuel burning on the grate C to cause a proper combustion of the fuel. The boiler F is supported in the usual manner in the brickwork A, and said boiler extends with its forward part into the fire-box B, so that the burning fuel and gases heat the boiler, it being understood that the products of combustion pass over the bridge-wall G, under the boiler F, into a consuming-chamber H, arranged under the rear of the boiler F and in the rear of the bridge-wall G, and leading at its bottom part, by an opening I' in the lower end of the wall I, into a chamber J, extending with its upper end to the rear end of the boiler F to permit the heat to pass through the flues in the boiler and through said flues to the stack K, arranged at the forward end of the boiler, as plainly indicated in Fig. 1.

The foul air, smoke, gases, and the like to be consumed are passed, by means of a pressure-blower L, into the leg N' of a condensing and gasifying chamber N, formed in the top and around the brickwork A, over the front part of the boiler F, as plainly shown in the drawings. This chamber N is formed with a second leg N² in the side of the brickwork A, opposite to that in which the leg N' is located. The lower ends of the legs N' N² connect with longitudinally-extending chambers N³ N⁴, respectively, formed in the sides of the brickwork A, and connect with each other at their rear ends by a transverse channel N⁵, arranged in the bridge-wall G. From the side chambers N³ N⁴ lead jet-openings N⁶ into the fire-box B, a suitable distance above the grate C, and like jet-openings N⁷ lead from the channel N⁵ into the rear end of the fire-box, as plainly indicated in the drawings.

Now it will be seen that the foul air, smoke, gases, and the like to be consumed and forced into the condensing and gasifying chamber N pass from the latter through the jet-openings N⁶ and N⁷ into the fire-box B in a heated condition, to be burned in the fire-box with the fuel burning on the grate C. The foul products and the gases generated in the chamber N are burned in the fire-box B and chamber H, from which the products of combustion (hot air) pass through the opening I' into the chamber J, and through the flues in the boiler F to the stack K.

Now in order to utilize the heat of the gases

in the consuming-chamber II in addition to heating the boiler F, I provide the said chamber with a feed-water pipe O, preferably arranged in the form of a coil and connected at its lower end O' with a pump or other feed-water supply. The upper end O² of the coil of pipe extends forwardly over the bridge-wall II and under the boiler F to pass through the front wall of the brickwork into the lower end of the smoke-stack K, to then connect at O³ with the water-compartment of the boiler F.

Now it will be seen that by the arrangement described the feed-water passed through the pipe O is heated to a high degree before it passes into the water-compartment of the boiler F. I prefer to introduce live steam and air into the condensing and gasifying chamber N, so that the steam and air are heated to a high temperature and combine with the foul air, smoke, and odors forced through the chamber by the pressure-blower L, connected with the leg N'. In the suction-pipe L' of the blower L for the leg N' is arranged a valved air-inlet pipe L² for drawing fresh atmospheric air into the said blower L to mix with the foul air. Steam is introduced into the chamber N by a pipe P, preferably connected with the steam-compartment of the boiler F and discharging into the outlet of the blower L. Thus foul air, smoke, or gases and fresh air and steam are mixed and pass together into the chamber N. By this arrangement a highly-combustible gas is generated within said chamber N, and the gas passing through the jet-openings N⁶ N⁷ is burned within the fire-box B with the fuel burning on the grate C. The intense heat thus generated by the consumption of the gases permits of heating the water in the boiler F very quickly, so as to insure a high steam-pressure in the boiler at a small consumption of fuel on the grate C.

If the device is applied to large plants, a very large percentage of the fuel can be saved, as the heat obtained by the burning of the gases in the fire-box B and chamber II is very great and can be utilized for the purpose of heating the water in the boiler and the feed-water before the latter enters the boiler. All odors, smoke, and the like generated by burning or treatment of any vegetable, mineral, or organic matter can be reduced to an inoffensive and practically sightless substance, thereby removing any objectionable or dangerous odors or smoke now passing into the air. It is well known that only about twenty-seven per cent. of the actual combustion is utilized, but with my process a much larger percentage is made effective, and consequently a larger saving in the coal consumed is obtained.

By placing the pipe O for the feed-water in the gas-consuming chamber II, I am enabled to utilize the heat generated by burning the waste gases, and the pipe cannot be fouled on the outside, as no cinders, soot, or

other solid particles come in contact with said pipe, as all such solid matter is condensed and gasified in the chamber N and burned in the fire-box B and chamber II, as before described.

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

1. A furnace, consisting of a casing having a fire-box in communication with a consuming-chamber, the casing also having a condensing and gasifying chamber comprising two legs straddling the fire-box and communicating at their lower ends with side chambers connected by a transverse channel, the chambers and channel having jets delivering into the fire-box, a boiler located above the fire-box and consuming-chamber, a blower delivering into the condensing and gasifying chamber, and a steam-pipe leading from the boiler to the blower, substantially as described.

2. A furnace, comprising a casing having a fire-box, the furnace also having a condensing and gasifying chamber having two legs straddling the fire-box, each leg communicating with a side chamber and the side chambers being connected by a transverse channel, the chambers and channel having jet-openings delivering into the fire-box, a boiler, a blower delivering into the condensing and gasifying chamber, and a steam-pipe passing from the boiler to the nozzle of the blower, substantially as described.

3. A furnace, comprising a casing having a fire-box, a consuming-chamber divided from the fire-box by a bridge-wall, the casing also having a condensing and gasifying chamber leading to the fire-box and a chamber rearward of the consuming-chamber with which the consuming-chamber directly communicates, a boiler located above the consuming-chamber and fire-box and receiving the products of combustion from the chamber which communicates with the consuming-chamber, a blower delivering into the condensing and gasifying chamber, and a steam-pipe leading from the boiler to the nozzle of the blower, substantially as described.

4. A furnace, comprising a casing having a fire-box and a consuming-chamber in communication with the fire-box, the furnace also having an additional chamber rearward of the consuming-chamber and directly communicating therewith, a boiler located above the fire-box and consuming-chamber and receiving the products of combustion from the chamber rearward of the consuming-chamber, and a feed-water pipe coiled within the consuming-chamber, substantially as described.

5. A furnace, comprising a casing having a fire-box and a consuming-chamber, the casing also having a condensing and gasifying chamber communicating with the fire-box, a boiler located above the fire-box and consuming-chamber a feed-water pipe coiled within

the consuming-chamber, a blower delivering into the condensing and gasifying chamber, and a steam-pipe leading from the boiler to the blower, substantially as described.

5 6. A furnace, comprising a casing having a fire-box and a consuming-chamber divided by a bridge-wall, the casing also having an additional chamber rearward of the consuming-chamber, and a condensing and gasifying
10 chamber above the fire-box, the condensing and gasifying chamber having legs straddling the fire-box and the legs respectively com-

municating with side chambers connected by a transverse channel, the side chambers and passage having jet-openings delivering into 15 the fire-box, a boiler located above the fire-box, and consuming-chamber, and a blower delivering into the condensing and gasifying chamber, substantially as described.

SEYMOUR G. SMITH.

Witnesses:

THEO. G. HOSTER,
A. A. HOPKINS.