

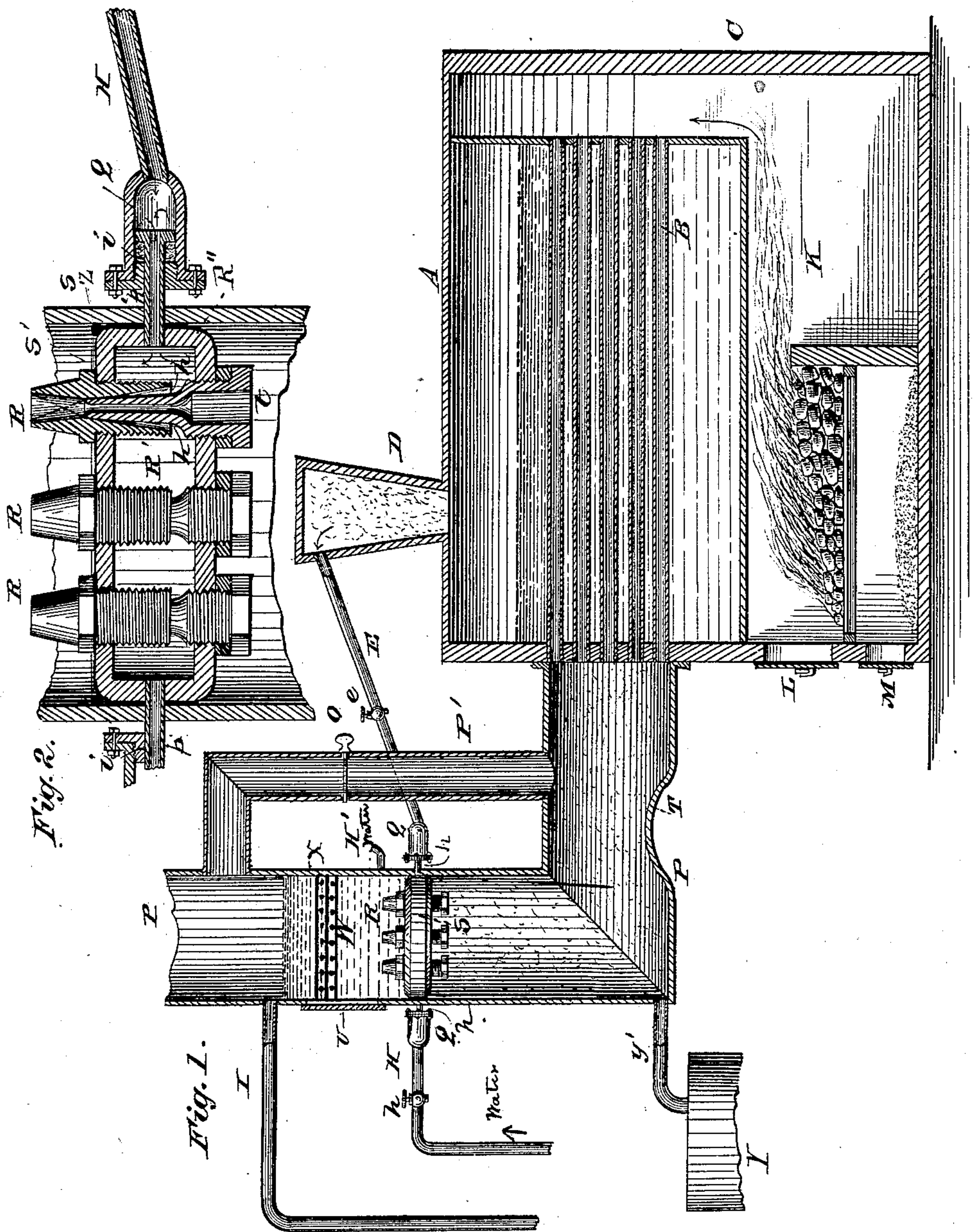
(No Model.)

A. J. SIMMONS.

SMOKE PURIFYING FURNACE.

No. 257,091.

Patented Apr. 25, 1882.



WITNESSES

Ad. G. Dietrich.
D. G. Dietrich.

INVENTOR

Along J. Simmons
73y. Pailredge Tolmiston
and
Macdonald

Attorneys

UNITED STATES PATENT OFFICE.

ALONZO J. SIMMONS, OF INDIANAPOLIS, INDIANA.

SMOKE-PURIFYING FURNACE.

SPECIFICATION forming part of Letters Patent No. 257,091, dated April 25, 1882.

Application filed January 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALONZO J. SIMMONS, of Indianapolis, in the county of Marion and State of Indiana, have invented a certain new and useful Improvement in Smoke-Purifying Furnaces; 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, which form a part of this specification.

My invention relates to means for deodorizing and cleansing the gases and products of combustion given off in furnaces in fertilizing-factories, soap-factories, and other manufactories where foul gases are given off.

It consists in certain details of construction and arrangement of parts that will be set forth in the specification and claims and pointed out in the drawings, in which—

Figure 1 is a vertical section of my device, and Fig. 2 a sectional detail view of the injectors and pipes for introducing steam and water thereto.

It is well known that in the manufacture of fertilizers, glue, soap, or other articles of commerce in which foul and deleterious gases are given off, such vapors are the cause of annoyance to the surrounding neighborhood, and are often the cause of ill health to the workmen and persons living in the vicinity of such manufactory. Again, in order to dispose of garbage and refuse matter, it is thrown on the fuel to be consumed, and the gases given off are carried up and thrown out through the smoke-stack.

Now, the object of my invention is twofold: first, to gather the gases, &c., in the room or rooms by means of suction-fans or blowers, carry them to the furnace, and commingle them with the gases there formed; second, to take all of these gases and the products of combustion from the furnace, force them through a series of injectors, where they are commingled with steam or water, and thence into a column of water or liquid in the smoke-flue, where the products are thoroughly washed.

Referring more particularly to the drawings, A indicates the boiler, having the steam-dome

D; C, the furnace, with tubes B, fire-box K, and doors L M, leading to the grate-bars and ash-pit. In the smoke-flue P is located an injector-casing, S, which fits the flue snugly, and has above it a suitable packing, z, so as to prevent leakage between the sides of the flue and casing. Leading into the casing S are two pipes, E H, from the steam-dome and water-main or other water-supply. A pipe, H', admits water to the compartment W when it is intended to use steam alone, and this may be shut off by a stop-cock when the water through pipe H is used. I is a waste-pipe for conducting off the water in W. The pipes E and H are also provided with suitable stop-cocks. At the bottom of the flue P is an additional waste-pipe, y', for drawing the water and products of combustion that fall from the injectors after work ceases and the pressure of steam or water is removed. These may be collected in a suitable receptacle, y. In order to prevent any back flow of such water into the tubes B, I construct the lower side of flue P with the upwardly-bent part T.

P' is an auxiliary smoke-flue that is used when the fires are first built in the furnace, or before steam is generated, and again when work ceases and but little fire is in the furnace. After steam is generated such escape by way of flue P' is cut off by the damper O. Each of the pipes E H is joined to adjustable sockets Q, in which the pipes p are secured, as shown in Fig. 2.

Each injector consists of an upper part made of two frustums of cones, R R', and a lower part, R'', which is a conical tube inserted in the lower frustum, R', and having a lesser hypotenuse, so as to leave an annular space, h, between them, through which the steam, water, &c., are admitted to the opening R. Each of these parts is screwed into the casing and made adjustable with reference to each other by screwing them up or down in the casing. The lower part of R'' opens directly into the smoke-flue.

One or more injectors may be used in the same casing, or a number may be used, each with a separate casing, and then connected by pipes, and when several injectors are used in the same casing they may be upon a straight,

curved, or irregular line, and in any case the lower part or conical tube, R'', may have its lower or outer tube left open and disconnected with any pipe.

5 The operation of the device is as follows: The gases which escape into the rooms are gathered by means of any suitable suction-fans or blowers, and brought to the furnace and admitted either upon the burning fuel or below
10 it, as may be desired, where they are mingled with the products of combustion which are carried off through the smoke-flue P. Water is now let into the receptacle W through pipe H', and steam from the dome through the in-
15 jectors, where it passes off under pressure to the opening in R, meeting at the apices of the cones the products of combustion, which are thereby forced into the column of water in compartment W. The steam emerges from
20 between the outer and inner cones in right lines on each side of the apex of the inner cone, as shown in dotted lines, Fig. 2. Consequently a high vacuum is obtained between the apex and focus or crossing of the right
25 lines—that is to say, before the steam has an opportunity to touch the sides of R it acts entirely to form a vacuum, and when it passes the apex it acts as a pushing-power to force the gases and products into the column of wa-
30 ter above. If I have a large column of water in the flue, I must have a larger amount of steam to sustain it above. Therefore, when I wish to increase the volume of steam admitted to the water-column I unscrew the part R or
35 R'', or both, so as to enlarge the annular space *h* at the apices of R' R''. The vacuum thus created causes the products of combustion in lower part of flue P to be drawn rapidly into the opening *t* and forced into the column of
40 water at N, which is constantly flowing in at pipe H' and off at I, so that the water is kept clean and the particles carried off through pipe I. Within the chamber W, I have a series of cross-bars, X, at suitable intervals apart, by
45 means of which the gas-bubbles, as they arise, are broken up by coming in contact with the bars, and therefore are prevented from escaping at the top of the water.

Instead of using steam from the dome, I may
50 use water under pressure by way of pipe H to create the vacuum.

If any sediment should lodge on top of the casing S, which may be sometimes after the steam or water is cut off, I remove it by means
55 of a hand-hole in the flue, which is closed by a suitable plate, U, and in this way I adjust the injectors to allow a greater or less amount of steam or water, and give an opportunity to adjust or remove the casing S.

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

1. In a device for deodorizing and cleansing

the products of combustion in furnaces, a smoke-
65 flue having a column of water therein, and provided with a series of injectors for the passage of steam, water, and products of combustion, the column of water being held up by the pressure from the steam and water issuing from the
70 injectors, said injectors also acting to cause a vacuum in the lower part of the flue, substantially as set forth.

2. In a device for deodorizing and cleansing products of combustion in furnaces, a smoke-
75 flue provided with a casing or receptacle containing a series of vacuum-injectors, said casing forming the bottom of a water-chamber in the flue, substantially as set forth.

3. A furnace provided with a flue having a series of injectors, a column of liquid in the
80 flue above the injectors, and openings for steam and water pipes to the injectors, as set forth.

4. A furnace provided with a smoke-flue having a series of injectors, a column of water in the flue, pipes for the supply of steam and wa-
85 ter to the injectors, and an overflow and auxiliary supply-pipe connected directly with the water-chamber, substantially as and for the purpose set forth.

5. In a smoke-purifying furnace, the combi-
90 nation of the main flue having a casing and series of injectors supporting a column of water in said flue, the products of combustion passing through the injectors underneath the column of water, with an auxiliary flue having a suit-
95 able damper, whereby the products of combustion are carried off when the injectors are not in use, substantially as set forth.

6. In a device for deodorizing and cleansing products of combustion arising from the manu-
100 facture of fertilizers or other articles giving off noxious vapors, a series of injectors secured in a casing fitted to the flue, said casing having openings for the passage of steam, water, and products of combustion to the injectors, as and
105 for the purpose set forth.

7. In a device for deodorizing and cleansing products of combustion, the combination, with the injectors arranged in the flue, of adjusta-
110 ble pipes leading from the boiler-dome and water-supply, substantially as set forth.

8. The combination, with the flue P and in-
115 jector-casing S, forming the bottom of a water-receptacle in said flue, of the bars X in said receptacle, whereby the gas-bubbles are broken up and their escape from the top of the water prevented, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in
120 presence of two witnesses.

ALONZO J. SIMMONS.

Witnesses:

M. F. ROBINSON,
D. B. BROOKS.