

(No Model.)

2 Sheets—Sheet 1.

E. FALES.

SMOKE CONSUMING FURNACE.

No. 342,081.

Patented May 18, 1886.

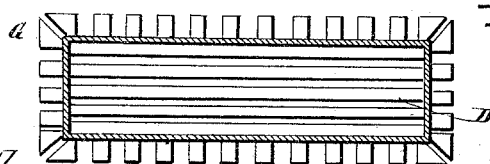
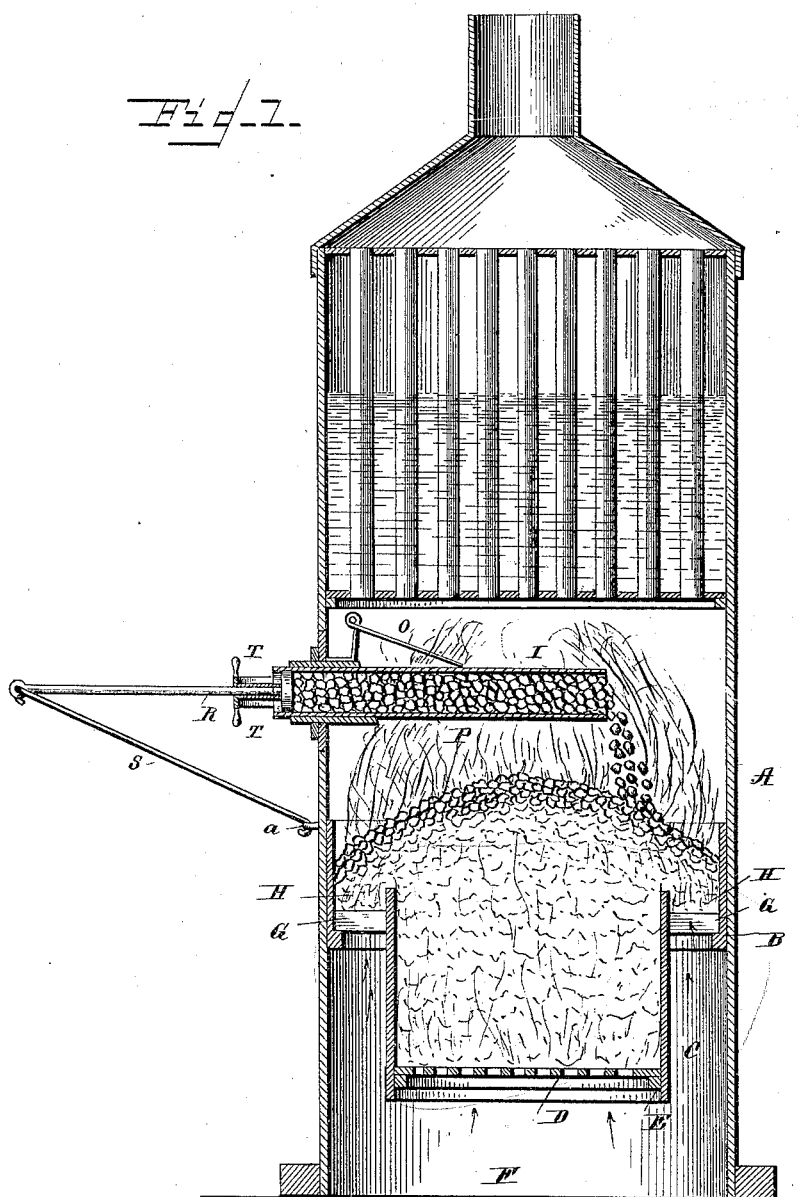


Fig. 4-

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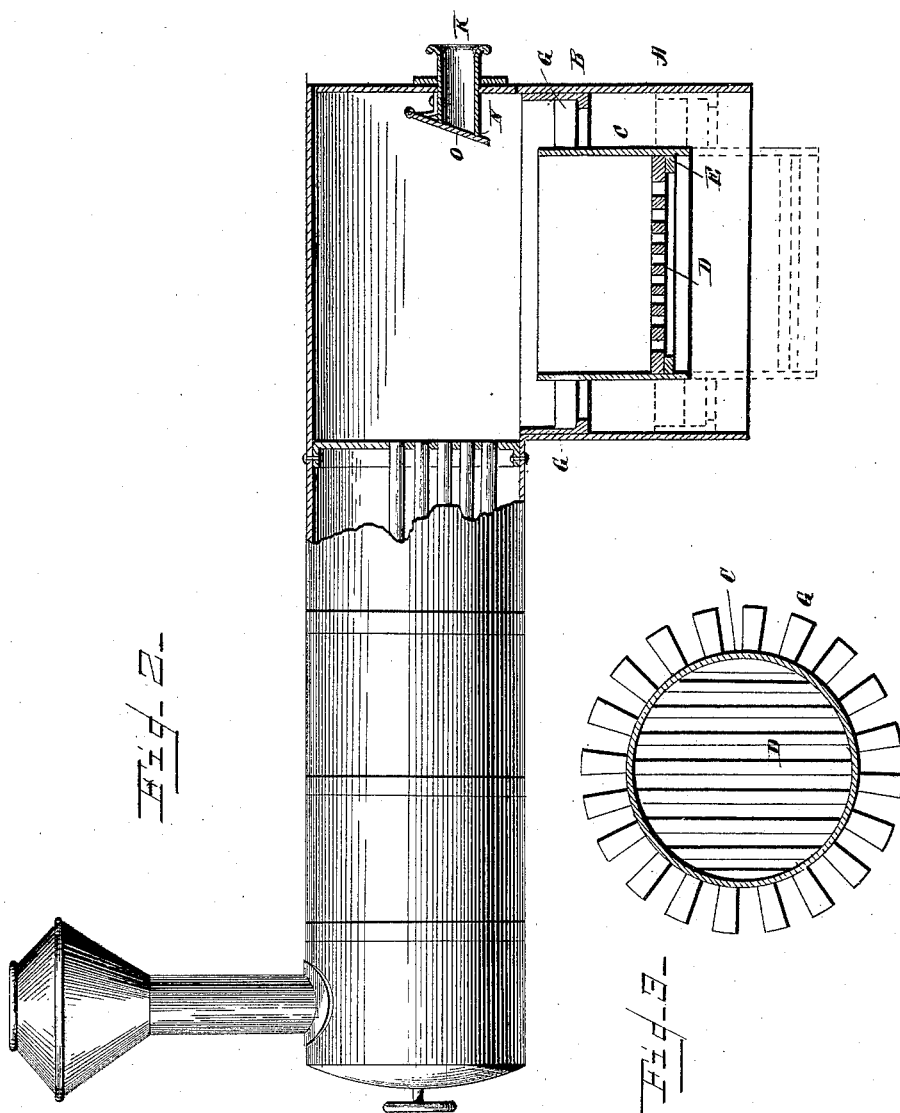
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WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD FALES, OF ST. LOUIS, MISSOURI.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 342,081, dated May 18, 1886.

Application filed December 22, 1885. Serial No. 186,451. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FALES, a citizen of the United States, residing at St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Smoke-Consuming Furnaces for Steam-Engines, &c., and Devices for Feeding Fuel to the Same, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in smoke-consuming furnaces for steam-engines and other purposes, and in devices for feeding fuel to the same.

The object of my invention is to construct a furnace-grate which will effect a complete combustion of the fuel, so that all the gases, together with the smoke, will be consumed.

A further object of my invention is to feed the fuel regularly and evenly to the furnace without admitting air above the fire in the combustion-chamber.

My invention consists, therefore, of a furnace in which a fire pot or chamber is used to hold the main body of the fire, said fire-pot being provided with closed sides and open top, the lower end being provided with grate-bars for the removal of the ashes, while the fire pot or chamber is provided near its upper end with radiating arms or projections, which act in the capacity of grate-bars, and through which the proper amount of air is admitted to effect a complete combustion of the gases and smoke.

Referring to the drawings, Figure 1 is a vertical sectional view of an upright steam-boiler with fire-chamber and devices for supplying fuel to the chamber. Fig. 2 is a side view, partly in section, of a horizontal boiler with my improvements thereon. Fig. 3 is a top view of one form of fire pot or chamber. Fig. 4 is a top or plan view of a rectangular fire pot or chamber adapted for use in horizontal furnaces, brick-kilns, &c.

A indicates the outer wall of a furnace for steam-boilers and other purposes, which may be round, square, rectangular, or other desirable shape, the inside of which is provided with a suitable ledge or projection, B, which supports the fire-chamber.

C is the fire pot or chamber, made of iron or other suitable material, and of any conven-

ient form and size to suit the kind or size of furnace in which it is to be used.

D is a grate supported on a suitable ledge, E, in the lower portion of the fire-chamber, through which the ashes are permitted to fall into the ash-pit, said ash-pit being provided with a suitable door and registers for admitting the proper amount of air to the fire.

The fire pot or chamber C is provided with a series of radial arms or bars, G, near the upper end at uniform distances apart around the entire wall of the chamber, said arms or bars serving to hold the fire-chamber on the ledge B, and also acting in the capacity of grate-bars, and admit the air-currents to readily pass up and supply the necessary oxygen to effect a complete combustion of the gases and smoke.

The dimensions of the fire-chamber are in about the following proportions: twelve inches in diameter and nine inches deep; length of grate-bars at top of chamber, two and a half inches. This gives an area of grate-surface about two times larger than the area of the lower grate, D, and admits the proper amount of air equally on all sides of the fire. These dimensions may be increased or diminished to meet the requirements of furnaces of different sizes without departing from the spirit of my invention. The top of the fire-chamber extends a short distance above the grate-bars G, so as to leave a fire-pocket, H, between the walls of the furnace and the wall of the fire-chamber, which effectually heats the greater volume of air before it comes in contact with the main body of the gases and smoke rising from the fire-chamber C.

It will be noticed that the fire is built in the fire pot or chamber C, and that the fuel is fed in from the top, the greater portion of the fire and fuel being in the fire-chamber, so that the air in its passage through this mass of fuel is somewhat retarded, and the central draft, which carries the gases and smoke upward, is not very great. This is not the case with the air-currents which pass up through the grate-bars G, for the reason that there is a smaller body of fire and fuel to resist it, and, furthermore, the grate-surface is much larger in superficial area than that in the bottom of the fire-chamber. This causes a suction-blast or current of

air to pass up all around the main body of the fuel, which converges toward the top of the combustion-chamber I, as shown, and surrounds or pockets the gas and smoke until it is mixed with the proper amount of air, when perfect combustion takes place, which causes a greater heat, and the smoke is entirely consumed.

I will now proceed to describe the devices by which I feed the fuel to the fire pot or chamber, and while these devices are specially adapted for feeding fuel into the fire-chamber shown, yet I do not wish to limit myself to such use, as it can be readily adapted for use in other kinds of furnaces.

K is a tube pivotally secured in the door or side of the furnace, said tube being provided with convex sides L, to fit snugly in the opening formed in the door or side of the furnace, so that the tube can be turned on its pivot-pin M to bring the tube K to any desired angle. The inner end of the tube K is beveled off, so that the lower edge is longer than the upper edge, as shown at N, Fig. 2.

O is a valve or gravity door, pivoted some little distance above the upper side of the inner end of the tube K, and is designed to fit snugly over and close the beveled end of said tube, and by hanging the door, as I do, some little distance above the tube the operator can more readily lift it with the charger.

P is the fuel-charger, and consists of an open cylinder, in which is placed a plunger or piston, R. The outer end of the piston-rod is connected to the walls of the furnace by the rod or bar S, which holds the plunger from backward movement when the charger is being drawn back. The charger P is provided with handles T, by which it is drawn out of the combustion-chamber. The operation of this portion of my invention is as follows: The plunger R being drawn back, the charger P is filled with coal and inserted in the tube K, and pushed as far into the combustion-chamber as is desired. The end of the charger raises the door O; but as the tube K is filled with the charger P no air is permitted to enter the combustion-chamber above the fire. The plunger-bar is

now secured to the staple or hook o and the charger drawn back. The coal is pushed out of it by the plunger and regularly distributed over the entire surface of the fire, and when it is desired to supply the sides of the furnace with fuel the tube K and charger are swung around to the right or left on the pivot-pin M.

b are peep-holes placed in the door or side of the furnace, and closed with isinglass or other suitable material, through which the fireman is enabled to see the condition of the fire.

The devices for feeding the fuel shown and described will form the subject-matter of a separate application.

Having thus described my invention, what I claim is—

1. In a furnace for steam-engines and other purposes, a fire pot or chamber having an open top, a grate in its lower portion, and a grate projecting from near its top toward the walls of the combustion-chamber, as and for the purpose set forth.

2. In a furnace for steam-engines and other purposes, a fire-chamber having its side solid or closed, a grate in its lower end, and a grate, substantially as described, surrounding its upper portion, as set forth.

3. In furnaces for steam-engines and other purposes, a fire pot or chamber adapted to be suspended in the combustion-chamber, and having an open top and solid sides, provided with a grate at its bottom, and a grate surrounding its upper portion to hold a portion of the fire and to receive a portion of the fuel, as described, whereby the main volume of air to effect complete combustion is caused to pass through the fire on the upper grate and mingle with the gases formed in the main body of the pot to consume the same, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD FALES.

Witnesses:

N. D. ADAMS,

L. W. SINSABAUGH.