(No Model.) 2 Sheets—Sheet 1.

J. J. BURWELL.

SMOKE CONSUMER.

No. 304,779. Patented Sept. 9, 1884.

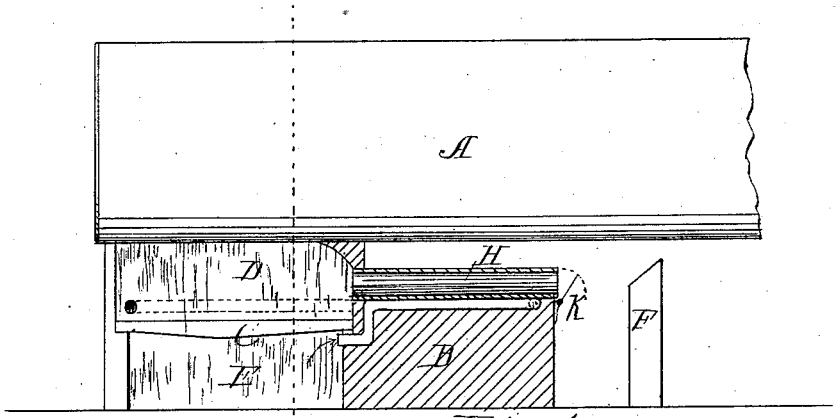

Fig. 1.

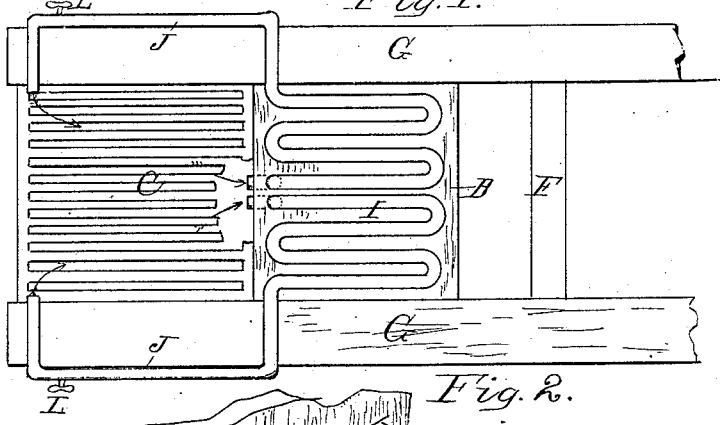

Fig. 2.

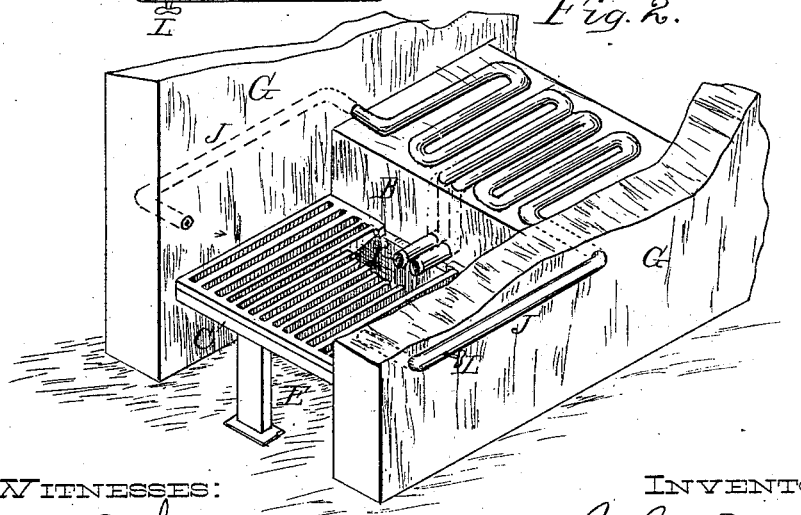

Fig. 3.

WITNESSES:

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Clara Sugenheim.

INVENTOR:

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Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. J. BURWELL.

SMOKE CONSUMER.

No. 304,779. Patented Sept. 9, 1884.

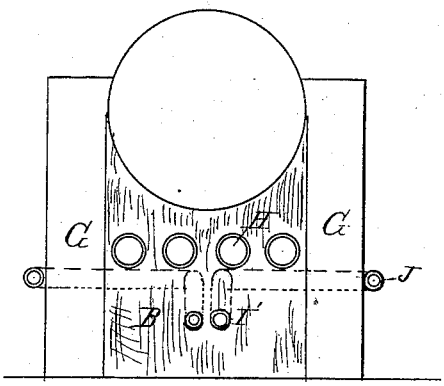

Fig. 4.

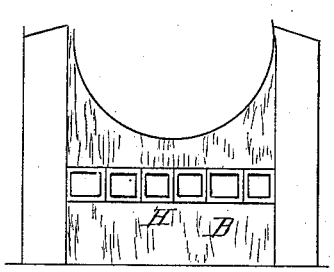

Fig. 5.

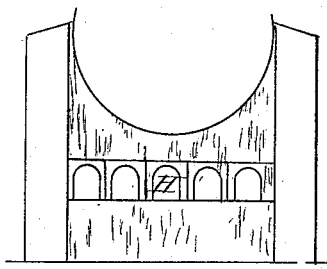

Fig. 6.

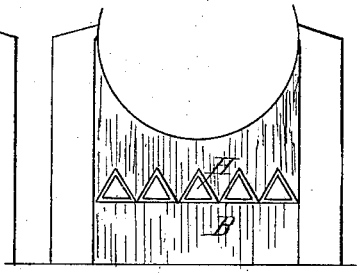

Fig. 7.

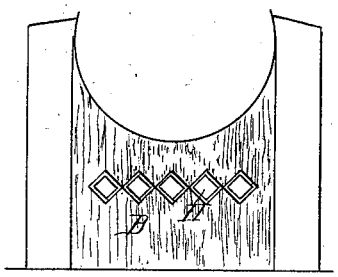

Fig. 8.

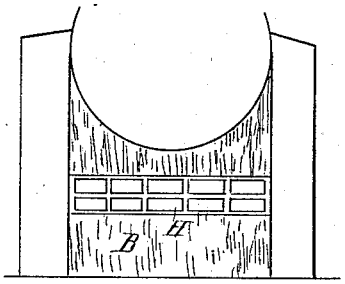

Fig. 9.

WITNESSES:

C. D. Burke

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INVENTOR:

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By D. D. Burke

Attorney.

UNITED STATES PATENT OFFICE.

JOHN J. BURWELL, OF NEWPORT, KENTUCKY.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 304,779, dated September 9, 1884.

Application filed August 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. BURWELL, of Newport, in the county of Campbell and State of Kentucky, have invented a new and useful Improvement in Smoke-Consumers, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section of a furnace equipped with my improved smoke-consuming device. Fig. 2 is a top or plan view. Fig. 3 is a perspective view of the furnace with the bridge-wall and pipes. Fig. 4 is a cross vertical section through line X of Fig. 1; and Figs. 5, 6, 7, 8, and 9, front views showing modified forms of making the retort-pipes.

The object of the present invention is to provide a cheap, simple, and effective smoke-consumer; and it consists, first, in providing a series of fire-clay pipes or flues through the bridge-wall, which act as retorts for the product of combustion; and, second, in having air-pipes beneath the retort-pipes, provided with inlets at one end below the grate-bars and outlets at the other end above the grate-bars, all of which will now be set forth in detail.

In the accompanying drawings, A represents the boiler; B, the bridge-wall; C, the grate-bars; D, the combustion-chamber; E, the ash-pit; F, the deflective wall to the rear of the bridge-wall, and G the side walls.

I preferably construct the bridge-wall B thicker than usual, and place therein above the line of the grate-bars a series of horizontal fire-clay pipes, H, side by side. These pipes are embedded in the wall, and are of the same length as the thickness of the bridge-wall, so that all the products of combustion in the combustion-chamber pass through these pipes and in contact therewith. Beneath these pipes, and also embedded in the bridge-wall, are two serpentine pipes, I, which enter the bridge-wall centrally side by side at a point below the grate-bars, and extend thence upwardly to or near the pipes H, whence they extend rearwardly to the rear side of the bridge-wall, and are then bent backward, but on a horizontal plane, and extend thus back and forth below the pipes H and emerge from the side wall, and have a limb, J, extending forward outside or along the side wall to the forward end of the combustion-chamber, where they pass through the side wall and communicate with the combustion-chamber.

The retort-pipes H may or may not have dampers or valves K at their rear ends, but in some cases it is preferable. I also provide the pipes J J with cocks L, so as to enable the operators to check the movement of air through the pipes I.

In the rear of the bridge-wall is a deflecting wall or partition, F, which performs the office of checking in a measure the product of combustion, and in deflecting the flame which issues from the mouth of the pipes H against the boiler.

The operation of the device is as follows: When fire is started in the furnace, the cocks L are turned, so as to permit air to enter the supply ends I′ of the pipes I. The pipes I being directly under the retort-pipes H, the heat of the retort-pipes is communicated to the air-pipes I, so that the air in its passage through the pipes becomes heated, and as the supply of air is received from a point beneath the grate and discharged in an intensely-heated condition into the combustion-chamber directly into and through the burning mass, a large quantity of heated gas is supplied to the combustible matter in the chamber without greatly detracting from the heat produced in the pipes H. Pipes have heretofore been used for heating air, as I am well aware; but those have been so arranged that to heat the pipes the requisite temperature to supply heated air produced a loss of heating-power. The whole volume of the product of combustion being passed through the pipes H, they will finally become heated to incandescence, and as the superheated air from the pipes I J is also passed through these retort-pipes H a liberal supply of oxygen is afforded for the carbon which is liberated to produce an inflammable gas. As a result, in practice, when the retort-pipes H become thus heated, the dense carbonic gas which issues from the rear ends of the retorts H bursts into a white flame before the deflecting-wall F is reached, thus not only furnishing an additional source of heat, but completely consuming the floating

particles of carbon which were not burned up in the combustion-chamber.

I have also found in practice that when the retort-pipes H are brought up to a white heat and the air through the pipes I shut off the retorts do effective work in consuming the carbonic gas and the black elements in the smoke or product of combustion. I therefore use the pipes I only for the purpose of providing a body of heated air to the combustion-chamber during the initial period of firing up, and then turn off the air by means of the stop-cocks L and allow the white heat of the retorts to produce the desired chemical effect on the carbonic gas to make an easily-inflammable gas when it emerges from the retorts and mingles with the air in the space between the bridge-wall and the deflecting-wall F.

I do not confine myself to the round form of retort-pipe H, as shown; but it is obvious that these retorts may be made square, arched, triangular, diamond-shaped, or rectangular in cross-section, and, instead of being made in one piece, fire-clay brick may be used, the principal feature to be observed being to produce a series of flues through the bridge-wall of sufficient length so that when they are heated to incandescence they will perform the functions of retorts and furnish carbureted hydrogen in a heated state, which is necessary to rapid unity with oxygen and ready combustion.

I am aware that there are smoke-consuming furnaces in which the bridge-walls have plates provided with perforations and also perforated deflected chambers, and I do not lay claim to this feature; but I wish to call especial attention to the method of forming the bridge-wall somewhat thicker than ordinary, and containing a series of flues which extend through the said bridge-wall, and a pair of serpentine pipes beneath the flues with inlets beneath the grate-bars and an outlet within the fire-chamber for the purpose of creating a current of heated air into the fire-chamber.

Having described my invention, what I claim is—

1. The combination of the horizontal retorts H, with air-pipes I beneath them to be heated by the retorts, said air-pipes having their inlet ends below the grate-bars and their discharge ends above the grate-bars, substantially as herein set forth.

2. The combination of the long retort-pipes, the air-circulating pipes, arranged as described, and the bridge-wall with the deflecting-wall F to the rear of said bridge-wall, substantially as herein set forth.

3. The horizontally-disposed serpentine pipes I, embedded within the bridge-wall, and having projecting ends which open in the combustion-chamber and ash-pit located near to or against the retort-pipes, so as to be heated by the latter, substantially as herein set forth.

4. In combination with the fire-clay retort-pipes H, provided with dampers, the bridge-wall B, the air circulating and supply pipes, arranged as described, and the regulating-valve L, applied to these pipes, substantially as described.

5. The combination of the combustion-chamber, the ash-pit, and the side walls of a furnace with the bridge-wall, having embedded therein horizontally-disposed retorts or pipes, and the pipes I, beneath and in contact therewith, said retorts having ends communicating with the ash-pit and the combustion-chamber, substantially as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand, this 15th day of August, 1883, in the presence of witnesses.

JOHN J. BURWELL.

Witnesses:
H. J. HARROP,
O. J. BAILEY.