

(No Model.)

G. K. GEIGER, W. D. MCKENZIE & G. L. CROSS.  
SMOKE CONSUMING FURNACE.

No. 453,805.

Patented June 9, 1891.

Fig. 1.

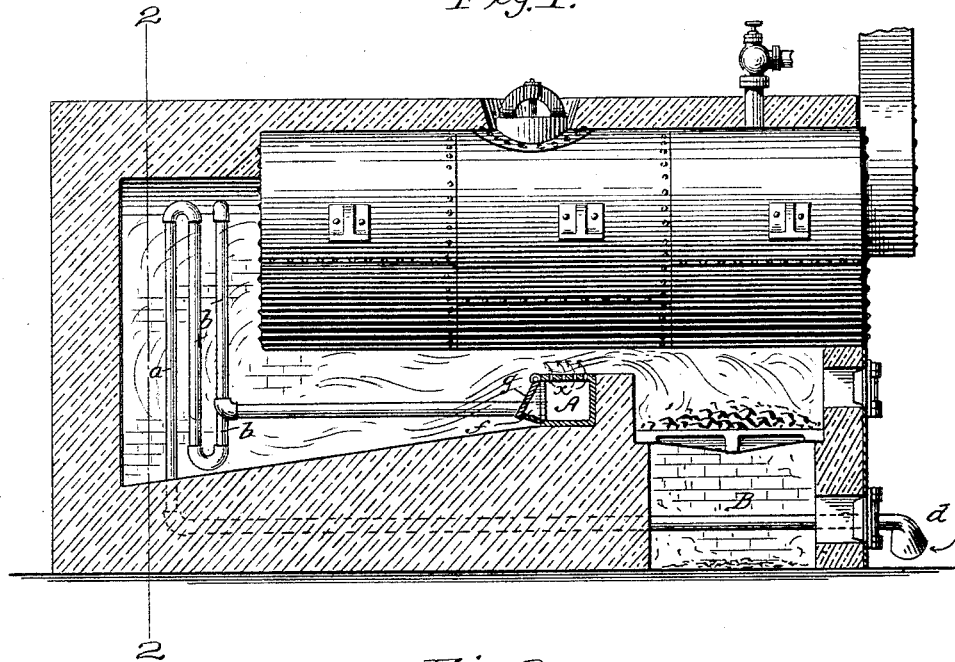
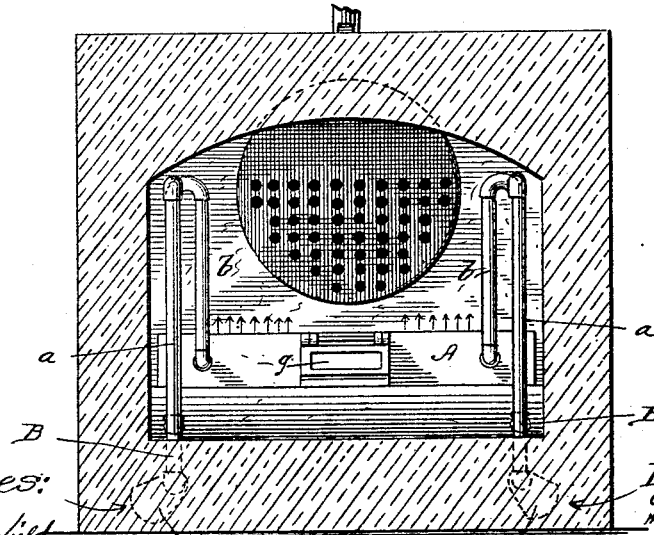


Fig. 2.



Witnesses:

J. A. Garfield  
J. Schweizerloch.

Inventors,  
GEORGE K. GEIGER  
W. D. MCKENZIE  
AND GEROME L. CROSS,

by Chapin & Co.  
Attys.

# UNITED STATES PATENT OFFICE.

GEORG KARL GEIGER, WILLIAM D. MCKENZIE, AND GEROME L. CROSS,  
OF SPRINGFIELD, MASSACHUSETTS.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 453,805, dated June 9, 1891.

Application filed July 5, 1890. Serial No. 357,914. (No model.)

*To all whom it may concern:*

Be it known that we, GEORG KARL GEIGER, WILLIAM D. MCKENZIE, and GEROME L. CROSS, citizens of the United States, all residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to improved means which are applied in relation to a steam-boiler or other furnace for insuring the most complete combustion of the fuel therein burned and a consumption of the smoke.

The invention consists in the construction and combination of parts or instrumentalities as considered in relation to themselves and to the furnace for operation and effect, all substantially as will be hereinafter fully described, and pointed out in the claim.

Referring to the accompanying drawings, in which this invention is illustrated, Figure 1 is a sectional elevation longitudinally of a steam-boiler furnace of ordinary construction, and also showing the improved combustion-perfecting means. Fig. 2 is a rear elevation and cross-section of the same on or about the plane indicated by the line 2 2, Fig. 1.

The bridge-wall is formed step-shaped at its upper forward portion, as shown in Fig. 1, and behind the rising portion of the bridge-wall is set a box A, of cast-iron or other suitable metal or material, which extends entirely across said bridge-wall from side to side of the furnace-chamber, and said box is closed, except as to the multiplicity of perforations *x* in its top. We provide one or more air-pipes B, which pass horizontally from the front of the furnace through the ash-pit and under the bridge-wall and combustion-chamber at the rear thereof, and each air-pipe is thence projected upwardly within the rear of the combustion-chamber, as at *a*, and in one or several return-bends, as shown at *b*. Considerable sections or lengths of the air-pipes are also disposed at the rear of said combustion-chamber, and then each pipe continues forwardly through the space in the combustion-chamber to communicate with the said box A. The end of each air-pipe B is provided outside of the furnace-front with a properly-de-

flected funnel *d*, whereby the air-currents may be most effectively directed into the said pipe, and, as plain, the air passing rearwardly, reaching in a more or less heated state the vertically-disposed sections of the pipe, circulates therein and becomes heated in a high degree and is thence forced into the said box A, to issue in jets at the perforations at the top of the bridge-wall, and, so issuing, pure heated air commingling with the products of combustion at the bridge-wall conduces, in conjunction with the products of combustion, to the generation of such a gas as may be nearly all consumed, and thereby an increased effective heat from a given quantity of fuel is secured, and there will be a correspondingly less proportion of smoke.

The course of the pipe at the rear of the combustion-chamber is devoid of sharp angles, whereby the easy passage of air through the furnace is assured, and there is provided at the rear central part of the box A a hand-opening *f*, which is adapted to be closed by the hinged cover *g*. Dust, ashes, or soot which may collect in the said box may be readily removed, and the pipes B may also be cleared by forcing through them steam or air under pressure, which may be entered at the front of the furnace through any suitable hose-pipe or other conduit, taking steam from the boiler or air from any blower or air-compressor. The said funnels *d d* for the outer ends of the air-pipes B at the front of the furnace are coupled to the pipes, as indicated by dotted lines in Fig. 2, so that the said outwardly-flaring funnel extremities of the air-pipes B B may have a direction generally upwardly or downwardly and toward either side of the furnace. This provision is deemed of much importance in the practical utilization of the smoke-consuming furnace, for it will be apparent that under the burning of various kinds of coal different volumes of heated air are necessarily to be supplied to effect the most perfect smoke-consuming results, and therefore when a class of coal is being burned, in connection with which a lesser quantity of the highly-heated air is to be supplied than might be necessary at the time of burning another kind or grade of coal, by properly turning the funnel extremity or mouth of the air-

pipe B, or, in other words, by turning such funnel-mouth away from the greatest air currents or drafts in the boiler-room, there will be a decreased current of air entered to the said air-supply pipe, and thence to the box at the bridge-wall.

It will be especially noted that the pipes after passing through the ash-pit and under the bridge-wall, and then having by their return-bends a disposition in the rear of the combustion-chamber, enter the cast-iron box A at the ends thereof, so that there will be such a hot-air draft in and through the box as to force the soot which may collect toward the end of the box near or to the middle thereof, so that it may most easily be withdrawn at the centrally-disposed hand-opening. By setting the said box behind the bridge-wall the box is protected from the destructive action of the usually more or less wet flame at the grate, the pipes B being also protected from such heat action by being carried under the grate.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

In a smoke-consuming furnace, the combination, with a bridge-wall provided at its forward

portion with the guard-riser and the hollow metallic box located at the top of the bridge-wall behind said guard-riser and having the perforated top and centrally of its rear side the hand-opening and closure therefor, and the combustion-chamber at the rear of the bridge-wall entirely closed, of two pipes passing rearwardly from the front and at each side of the furnace through the ash-pit and under the bridge-wall and having the return bent sections disposed the one upon the other in the rear of the closed combustion-chamber and thence forwardly extended to a communication with the said box near the ends thereof and the said pipes at their ends at the front of the furnace provided with funnels outwardly flaring, the axes of which are angular to the pipes, and said funnels being adjustable on said pipes, all substantially as shown and described, and for the purposes set forth.

GEORG KARL GEIGER.  
WILLIAM D. MCKENZIE.  
GEROME L. CROSS.

Witnesses:

WM. S. BELLOWS,  
J. D. GARFIELD.