

J. C. BAUM.
Improvement in Smoke-Consuming Furnaces.
No. 128,525. Patented July 2, 1872.

X
Fig. 1.

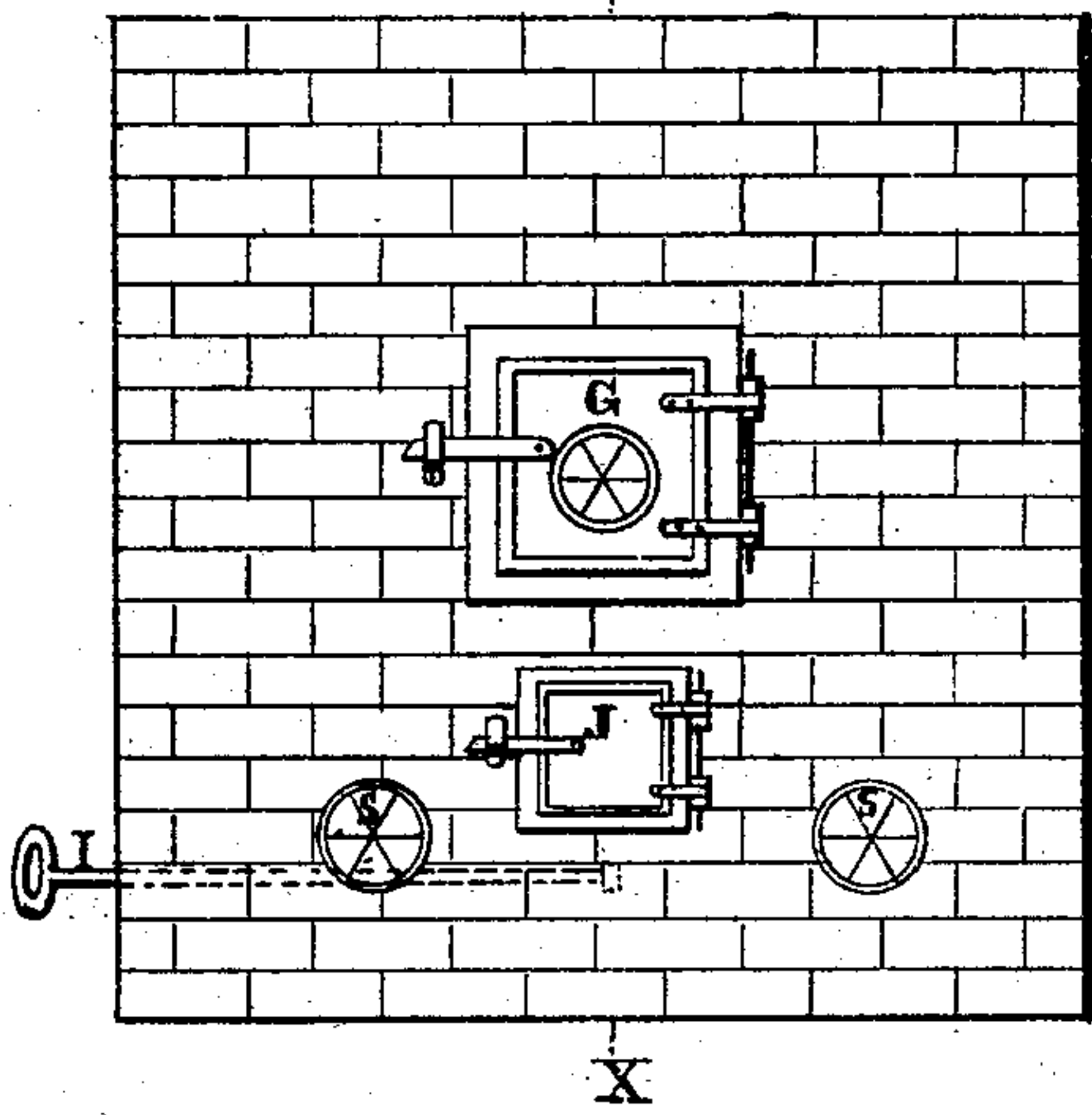
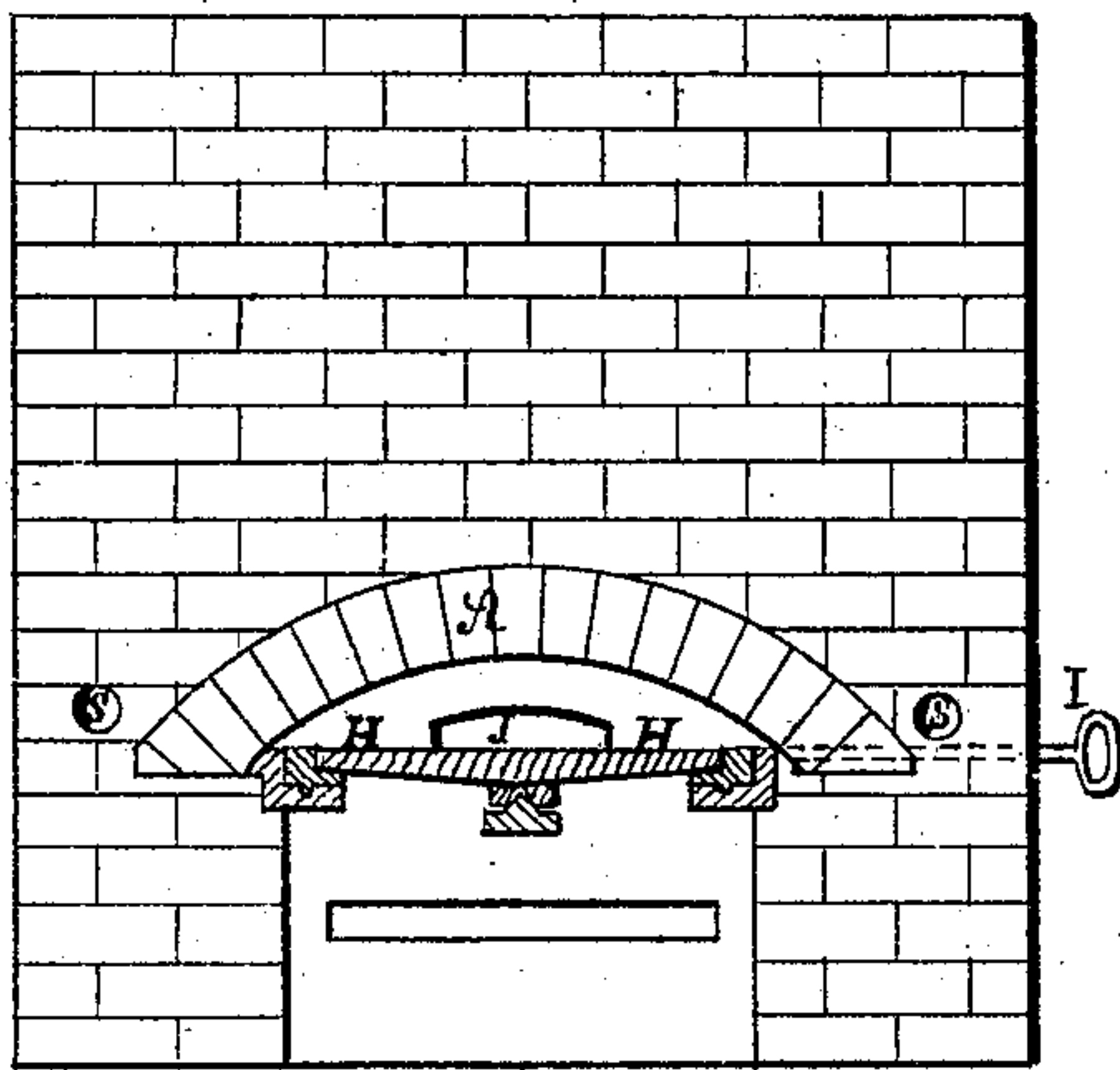
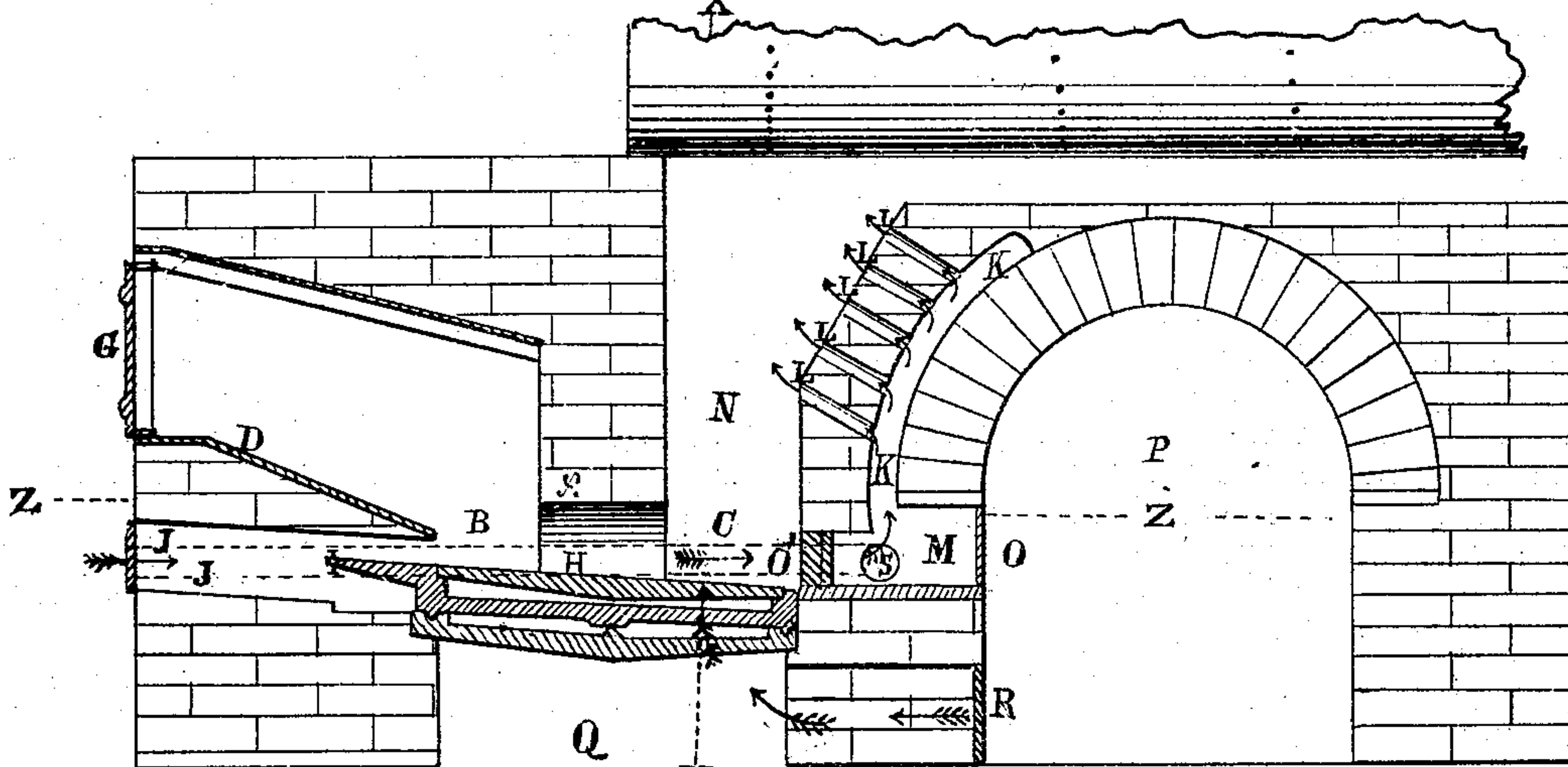


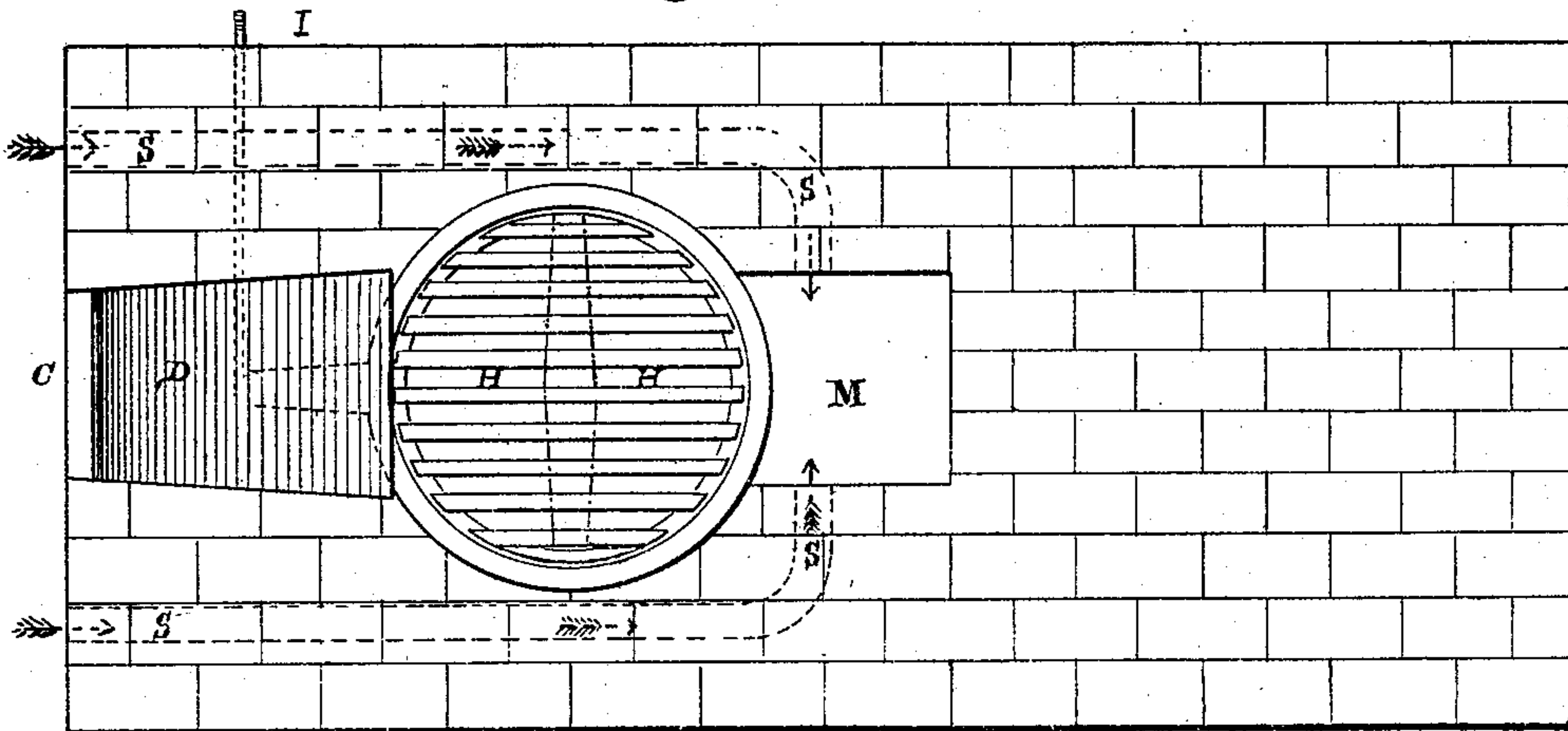
Fig. 4.



X
Fig. 2.



X
Fig. 3.



Attest.
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J. T. Irving.

Inventor
J. C. Baum per
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UNITED STATES PATENT OFFICE.

JOHN C. BAUM, OF CINCINNATI, OHIO.

IMPROVEMENT IN SMOKE-CONSUMING FURNACES.

Specification forming part of Letters Patent No. 128,525, dated July 2, 1872.

I, JOHN C. BAUM, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Smoke-Consumers, of which the following is a specification:

My invention is more especially adapted for use in connection with steam-boilers, and provides a new method of applying an established principle of combustion to the consumption of the volatile carbon and other gases, which are generated by heat from bituminous coal, and, if unconsumed, pass off as smoke. The principle alluded to, is, that a perfect combustion of these gases will be accomplished only by combining with them a proper proportion of atmospheric air while they are intensely heated, for, after their temperature has fallen to a certain stage, a perfect combustion cannot take place, and hence the gases pass unconsumed. Herein lies the great defect of our present system of boiler-furnaces; they are directly under the boiler, and the generated gaseous substances ascend into immediate contact with the boiler, which decreases their temperature instantly to 550° , when an ignition of the gases will not take place, even if subsequently mixed with atmospheric air.

The special object of my invention, including other important features of convenience in firing, preservation of the boiler from burning out, and the utilization of the otherwise wasted heat, which radiates through the furnace-walls, is to secure a perfect combustion of these gases by uniting with them a sufficient quantity of highly-heated air while they are in a state of red heat. To accomplish this I raise an arch or arched diaphragm over the furnace, to divide it into two chambers—a generating coking chamber and a combustion-chamber. The grate-bars of the furnace are inclined, being higher in the generating-chamber, and descending under the arch into the combustion-chamber, being so constructed as to rotate horizontally. An inclined feed-channel descends from the furnace-door, which is provided with a damper to the generating-chamber, so that the coal thrown in at the door slides, of its own gravity, into the generating-chamber, where it is coked, and is then shaken by the rotating grate into the combustion-chamber, where it is consumed by a supply of atmospheric air from beneath. The

gases which are dispelled from the coal in the generating-chamber by the heat of the combustion-chamber, having no other means of exit, must pass under the arch and through the bed of live coals in the combustion-chamber, which raises their temperature to a state of ready ignition when subsequently combined with air, and then they are compressed into a narrow neck leading from the combustion-chamber to the recess under the boiler. This compression causes a more complete mixture of these ascending gases with the excess of atmospheric air that passes unconsumed up through the fire from beneath the combustion-chamber. After ascending a short distance, this narrow neck enlarges and gradually expands toward the recess under the boiler. A number of small orifices communicating with a hot-air chamber, which has communication with the outer air, penetrates the side of this expanded part of the neck, and introduces into the red-hot ascending gases a sufficient quantity of highly-heated atmospheric air, to complete their combustion before they come into contact with the boiler. The enlargement in the neck is to retard the velocity of the draught, and thereby allow a more complete diffusion of the air throughout the gases.

In the accompanying drawing forming part of this specification, Figure 1 is an end elevation of my furnace. Fig. 2 is a vertical longitudinal section of the same through lines X X of Fig. 1. Fig. 3 is a horizontal section through the plane indicated by lines Z Z of Fig. 2. Fig. 4 is a vertical cross-section through lines x x of Fig. 2, showing the arch over the furnace.

General Description.

A is the arch dividing the furnace into the combustion and generating chamber. B is the generating-chamber. C is the combustion-chamber. D is the inclined feed-channel descending from the furnace-door G, (which is provided with a register,) to the generating-chamber. H is a circular inclined shaking-grate, which is lower in the combustion-chamber than in the generating-chamber, and is shaken by a rod, I, hinged to an arm of the grate, and projecting out through the furnace-walls. By means of this shaking-grate which rotates on a pivot, the ashes in the combustion-chamber may be deposited in the ash-pit be-

neath it, and the coal in the generating-chamber when it has been sufficiently coked is fed to the combustion-chamber, and at the same time the coal in the feed-channel D is caused to descend into the combustion-chamber without opening the furnace-door. A recess, J, beneath the channel D leads from the front end of the furnace to the generating-chamber as a means of access to the fire, for the purpose of pushing the coal backward by a poker, should it cake on the bars. This recess is essential, as no access to the fire can be gained through the feed-channel D, it being filled with coal. K is a channel at the rear of the combustion-chamber, and connecting with the hot-air chamber M, for the purpose of introducing highly-heated air into the ascending gases through the orifices L L L, &c., in the side of the expanded part of the neck N, which leads from the combustion-chamber to the recess under the boiler. P is a large arched recess at the rear of the furnace, by which to gain access to the fire through the door O, hot-air chamber M, and the fire-door O', for the removal of clinkers which accumulate at the lower side of the grate. Q is the ash-pit, provided with a door, R, which has in it a register to regulate the draught. In the walls of the furnace are flues or air channels S S, communicating with the hot-air chamber, and also with the outer air. These flues supply

the air which is fed to the ascending gases in the neck of the combustion-chamber. The currents of cold air which pass through these flues, absorb the radiated heat in the walls of the furnace, and conduct it into the combustion-chamber. Thus a waste of heat is not only prevented, but the cold air becoming highly heated, is better prepared to unite with the hydrocarbon gases. The channel K and hot-air chamber M also perform this function to an important extent.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of arch A, inclined feed-channel D, and grate H, substantially as and for the purpose specified.
2. The recess J, in combination with channel D, grate H, and chambers B and C, substantially as and for the purpose specified.
3. The combination of hot-air chamber M, channel K, and orifices L L L, &c., substantially as and for the purpose specified.
4. The combination of chambers B and C with hot-air chamber M, flues S S, channel K, and orifices L L L, &c., substantially as and for the purposes set forth.

JOHN C. BAUM.

Witnesses:

J. TWOHIG,
P. M. SHUEY.