

No. 671,055.

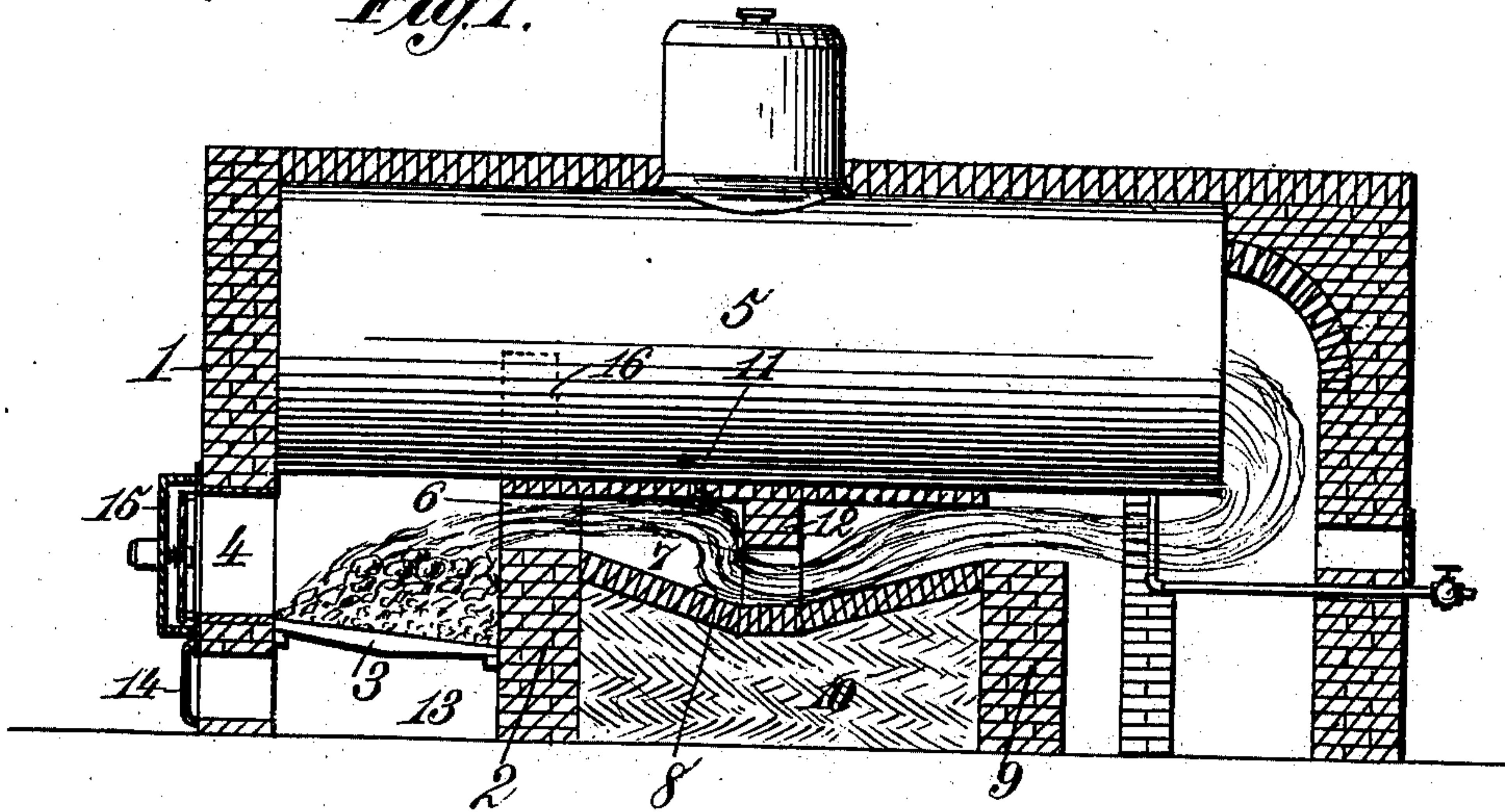
Patented Apr. 2, 1901.

J. O. MORRIS.  
STEAM BOILER FURNACE.

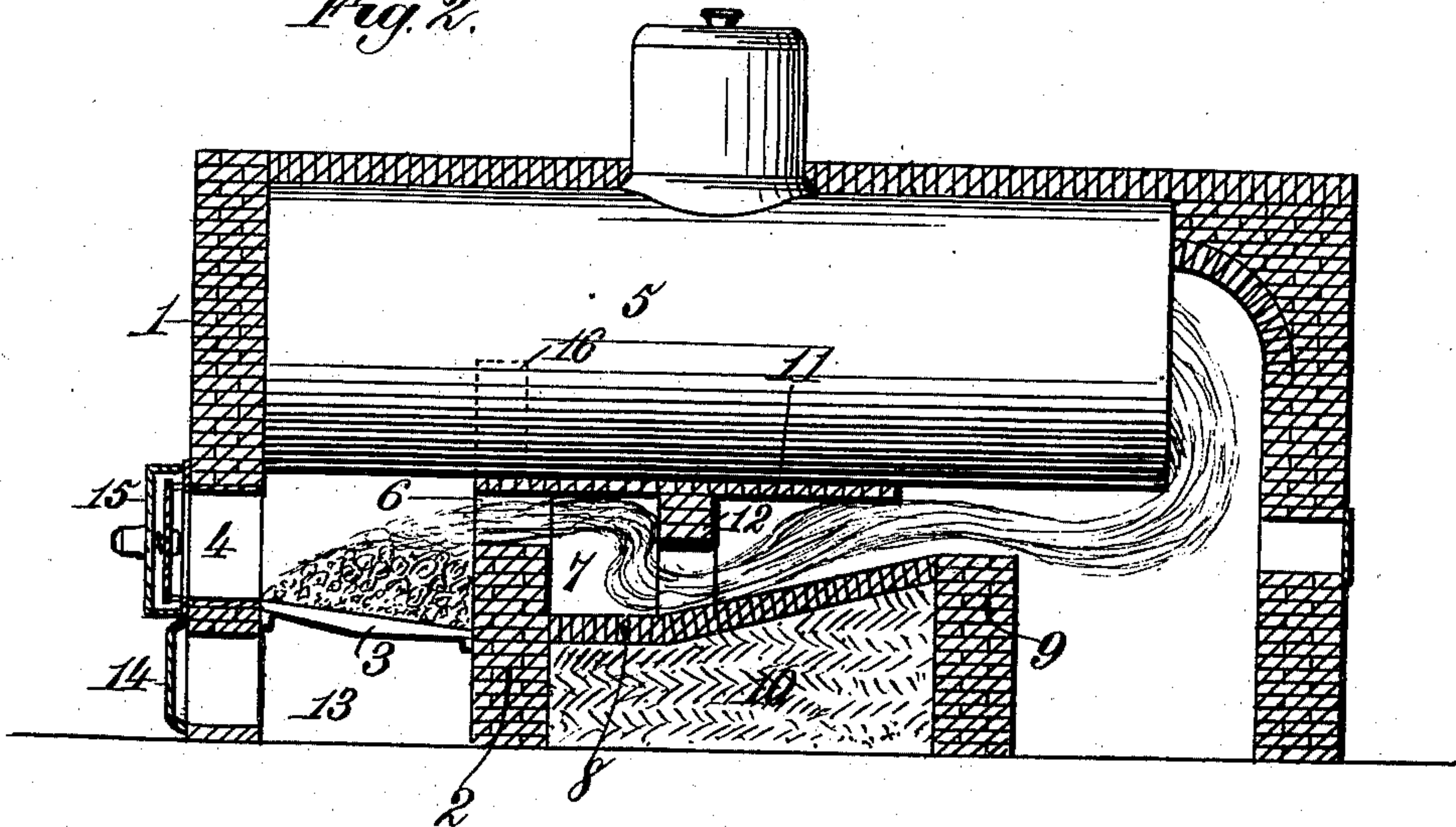
(Application filed Oct. 27, 1900.)

(No Model.)

*Fig. 1.*



*Fig. 2.*



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# UNITED STATES PATENT OFFICE.

JOHN ODEN MORRIS, OF RICHMOND, VIRGINIA, ASSIGNOR TO THE MORRIS SMOKELESS FURNACE COMPANY, OF PORTSMOUTH, VIRGINIA.

## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 671,055, dated April 2, 1901.

Application filed October 27, 1900. Serial No. 34,635. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN ODEN MORRIS, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

This invention relates to steam-boiler furnaces, and has for its objects to provide certain improvements in the construction and arrangement of the parts of the combustion-chamber whereby to secure complete combustion of the smoke and other gaseous products of combustion and also to protect the boiler and prevent deposit of carbon on the under side thereof, where it would be difficult of combustion.

For the purposes above indicated my invention consists in the novel construction and combination of parts in a steam-boiler furnace, as hereinafter described and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a vertical longitudinal section of a steam-boiler furnace constructed in accordance with my improvements. Fig. 2 is a similar view showing a slightly different form of the invention.

Like reference-numerals indicate like parts in both views.

The reference-numeral 1 designates the walls of the furnace; 2, the bridge-wall; 3, the grate; 4, the opening for the fire-door, and 5 a steam-boiler of the horizontal type.

Though I have illustrated my invention more particularly with reference to a boiler of the horizontal type, it will be understood, of course, that my improvements may be used with an upright or vertical boiler.

In the bridge-wall 2 there is an opening 6 for the passage of products of combustion from the bed of fuel and into the combustion-chamber 7, that is located at the rear. The bottom of the combustion-chamber 7 is constructed, in the form, substantially, of a concave cavity 8, from fire-brick or other suitable refractory material. At the rear of this substantially concaved portion 8, to assist in its support, there is a rear bridge-wall 9, while beneath said substantially concaved portion 8 and between the bridge-walls 2 and 9 there may be placed a filling 10 of any suitable ma-

terial. Over the top of the combustion-chamber 7 there is a roof 11, constructed from fire-brick or other suitable refractory material. This refractory roof 11 is in contact with the under side of the steam-boiler 5 and is extended rearward from the bridge-wall 2, as shown, to prevent deposit of carbon on the under side of the boiler. As shown in Fig. 1, the refractory roof 11 may be extended rearward over the entire substantially concaved portion 8 or concave bottom of the combustion-chamber, or, as shown in Fig. 2, the rear portion of said roof 11 may fall a little short of covering the whole of the combustion-chamber. The purpose of this refractory roof 11 is to protect the steam-boiler 5 and to prevent the deposit of carbon on the highly-heated metal surface of said boiler adjacent to the combustion-chamber. It has been found that any carbon deposited on the heated metal under surface of the boiler will not be perfectly consumed and will tend to interfere with the heating capacity of the boiler.

In the combustion-chamber 7, in rear of the bridge-wall 2, there is constructed a fire-brick arch 12, that dips toward the substantially concaved portion 8 a sufficient distance to serve as a baffle to retard the passage outward of the products of combustion, so that they shall be completely consumed. This baffle or arch 12 may be located at a greater or less distance from the bridge-wall 2, according to the draft that may be required. For instance, if the draft of the furnace-stack is insufficient the baffle or arch 12 will be placed nearer to the bridge-wall 2, and, on the other hand, if the draft is excessive the baffle or arch 12 will be placed farther from said bridge-wall. As shown in Fig. 1, the baffle or arch 12 is located immediately above the dip of the substantially concaved portion 8, while in Fig. 2 it is located slightly nearer the bridge-wall 2, and in this case the substantially concaved portion 8 has a dip at its forward end instead of at the center. In every case the refractory roof 11 should be extended a sufficient distance along the top of the combustion-chamber 7 to protect the under side of the boiler and to prevent the deposit of carbon thereon, where it would remain unconsumed.



The reference-numeral 13 designates the ash-pit. 14 is the ash-pit door, and 15 designates the door for the fire-opening, which door 15 may be of any suitable construction—  
 5 as, for instance, of the character described and claimed in Letters Patent No. 650,855, granted to me June 5, 1900.

In the operation of this improved steam-boiler furnace the products of combustion  
 10 are caused to pass from the bridge-wall 2 into the combustion-chamber 7, where they are deflected downward by the arch or baffle 12, being meanwhile retarded in their outward  
 15 passage and retained in the forward end of the combustion-chamber a sufficient length of time to insure complete or perfect combustion. From the rear end of the combustion-chamber the smoke passes outward and  
 20 through the ordinary boiler-flues to the stack. While the products of combustion are being consumed in the chamber 7 there can be no carbon deposited upon the heated metal sur-  
 25 faces of the boiler, the same being protected by the refractory roof 11, and thus all deposit of carbon on the heated surfaces of the boiler is effectually prevented, all the carbon in the  
 30 products of combustion being completely consumed. In this manner there is effected a large economy of fuel and the steaming capacity of the boiler is greatly increased.

The baffle or arch 12 assists in supporting the steam-boiler 5, and a further support may be provided by means of an inverted arch 16,  
 35 extended upward from the bridge-wall 2, as shown.

It has been the constant aim of steam-engineers to produce a steam-boiler furnace which will consume all of the fuel, and thus  
 40 utilize the full heating capacity of the same, generating the greatest possible amount of steam from the fuel used and avoiding any waste thereof. Many attempts have been  
 45 made to accomplish this valuable result, and they have been attended with more or less success; but in no prior steam-boiler furnace of which I am aware have these ends been  
 fully attained. By my invention I produce

a steam-boiler furnace in which by the construction and arrangement of the furnace as  
 an entirety the combustible fuel, which to a  
 50 greater or less extent heretofore has passed out with the smoke and been lost, is retarded or held back in a combustion-chamber by  
 means of the form of the floor thereof and a  
 55 baffle arranged in connection therewith and while so retarded or held is consumed beneath the steam-boiler and the heat produced by the  
 consumption thereof utilized in the generation of steam. The complete combustion in  
 60 the combustion-chamber of this combustible fuel, which has heretofore been to a great extent lost, is accomplished by constructing the  
 floor of the chamber with its upper face substantially concaved and also by providing a  
 65 concaved roof, which receives and closely hugs the under side of the boiler, so that the products of combustion are absolutely precluded  
 from passing between the roof and the boiler, as in case they do deposits of carbon are  
 70 formed on the boiler, which it is desired especially to avoid for the reasons hereinbefore set forth. Besides this the roof, being of refractory material, becomes highly heated and  
 being directly against the boiler applies its  
 75 heat to the latter.

What I claim as my invention is—

In a steam-boiler furnace, the herein-described combustion-chamber located beneath  
 the boiler said combustion-chamber having  
 80 a substantially concaved floor of refractory material and a roof of refractory material concaved to receive and closely hug the under  
 side of the boiler, and a baffle depending from said roof toward the substantially concaved floor to coöperate therewith in retard-  
 85 ing the products of combustion.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN ODEN MORRIS.

Witnesses:

GEO. E. SULLIVAN,  
 H. C. MEYNES.