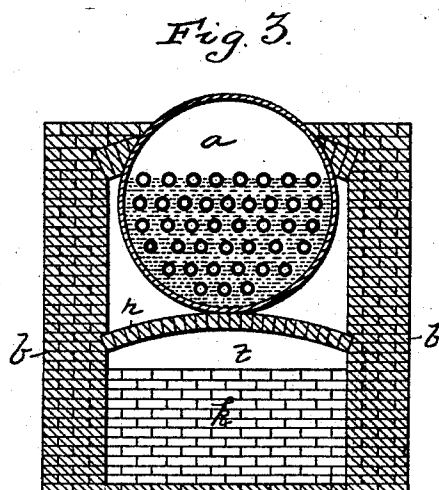
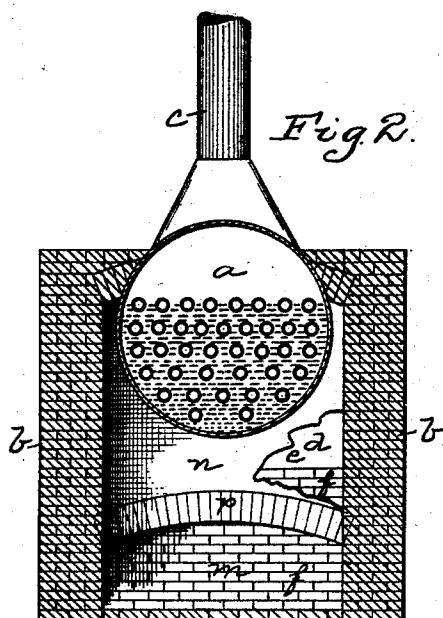
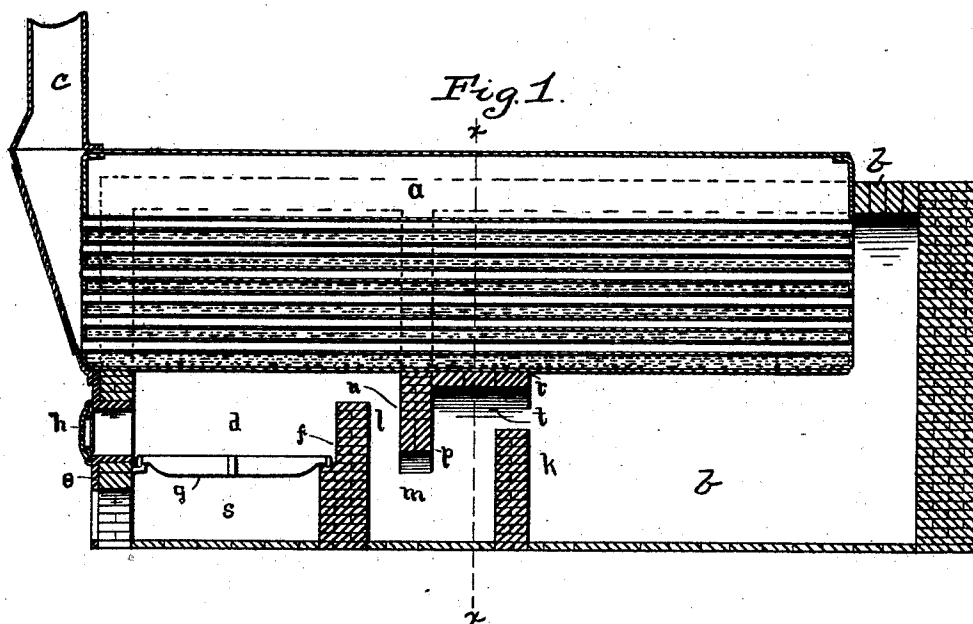


(No Model.)

W. BRAND.
BOILER FURNACE.

No. 519,787.

Patented May 15, 1894.



Witnesses:
J. Barrett.
L. M. B. Little

Inventor.
William Brand.
By Kay, Totten & Cooke,
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM BRAND, OF PITTSBURG, PENNSYLVANIA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 519,787, dated May 15, 1894.

Application filed March 3, 1894. Serial No. 502,160. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BRAND, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Boiler-Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to steam boiler furnaces, its object being to provide a means for distributing the heat from the fire chamber along the lower surface of the boiler, and, at the same time, to protect the boiler from too high heat at any one point.

It consists, essentially, in combining with the ordinary cylindrical boiler, a fire or coal chamber under the forward end thereof having a bridge wall at the rear end of said chamber, a combustion chamber beyond the bridge wall and confined between the bridge wall and a wall back of the same, and a depending wall between said two walls and above the combustion chamber to force the flame and gases down into the combustion chamber and having an arch or roof extending from said depending wall backwardly over the rear wall of the combustion chamber, so that after the ignition of the fire the products of combustion, together with the unconsumed gases and air, will pass over from the bridge wall, strike against the depending wall, and through the heating and intermingling of the unconsumed gases and air they will be brought into condition for proper combustion of the gases, which will take place within the combustion chamber back of the fuel chamber, and the flame will then pass backwardly along the boiler furnace, direct contact of the flame and highly heated gases with the boiler above the combustion chamber being prevented by the arch leading backwardly from the depending wall; it being found that by a boiler furnace of this construction the fuel is practically all consumed so that no smoke escapes from the furnace, and that the amount of fuel necessary for heating is materially reduced.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a furnace embodying my invention. Fig. 2 is a

cross section on the line $x-x$ looking toward the front end of the furnace; and Fig. 3 is a cross-section on the line $x-x$ looking toward the rear end of the furnace.

Like letters of reference indicate like parts in each of the figures.

In the drawings a is the boiler, which is a cylindrical boiler and is illustrated as a tubular boiler having a series of tubes extending longitudinally through the same, though my invention may of course be employed with any suitable form of boiler to which it is applicable. The boiler is supported in the ordinary way within the walls b , and has at the forward end thereof the chimney flue c , and it is not necessary to describe these parts more fully. At the forward end of the boiler is the fuel chamber d , which is formed by the front wall e and bridge wall f between which the grate bars g extend, the fuel chamber having the feeding door h , though the chamber may be fed in any suitable way, such as by mechanical stokers, if desired. The bridge wall f extends upwardly toward the lower surface of the boiler and beyond the same is the rear bridge wall k , the space between the two walls f and k forming the combustion chamber m . Depending within such combustion chamber is the wall n which is supported on a suitable arch p and extends up along the sides of the boiler between the side walls b so that the flame, unconsumed gases, &c., pass downwardly between the walls f and n into the combustion chamber m . It will be noticed that the depending wall n is formed closer to the bridge wall f than to the wall k , the space between the walls f and n simply forming a down-take flue leading into the combustion chamber m . Above the rear part of the combustion chamber m and extending backwardly from the depending wall n is the arched roof or top wall r , which extends from the depending wall n backwardly over the combustion chamber m and preferably to the rear edge of the wall k . When the boiler furnace is in use the coal is ignited upon the grate bars g within the fuel chamber d in the ordinary way, air being admitted through the ash pit s and through the door h , and the flame and heated products rise and strike the lower surface of the boiler a , traveling along the same. With the flame

and heated products, the unconsumed gases, the carbon held in suspension or smoke, and the air pass over the bridge wall *f* and strike against the depending wall *n*, being deflected by the same through the flue *l* into the combustion chamber *m*, and the gases and air becoming intermingled in such passage and highly heated by contact with the heated surfaces both of the fire bridge *f* and depending wall *n*, as well as the side walls, so that as or after they enter the combustion chamber *m* they unite with each other, forming a very high heat within the combustion chamber *m*, and the highly heated products and flame therefrom rise from such chamber, striking against the roof *r* and bridge wall *k* in the passage *t*, traveling thence along the lower surface of the boiler and passing forward through the tubes or flues to the smokestack. In this course the highest heat generated is within the combustion chamber *m*, which is directly below the wall *n*, and the heated products in passing upwardly from the combustion chamber raise this wall *n* to a high heat, which is communicated to the incoming gases and air passing downwardly on the other side thereof through the flue *l*, and in this way heating the incoming gases and air and materially assisting in the combustion thereof, it being found that the walls are held at a high heat and that practically perfect combustion is obtained in the combustion chamber, so that the gases passing from the same are simply products of combustion, there being practically no smoke when the furnace is operating in normal condition, and a very

high heat being generated within the furnace. As the flame and highly heated products would act to burn the boiler or overheat it if they rose directly against the same from the combustion chamber *m* and would disturb the water circulation within the boiler, the arched roof *r* is provided, which substantially protects this part of the boiler from too high heat and directs the flame backwardly along the lower surface of the boiler.

It is found that in the operation of the boiler a very high and even heat is generated, and that practically no smoke escapes from the furnace except when coal is being fed thereto and the air enters and chills the same, though this can be overcome by the use of the ordinary stoker.

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

In a boiler furnace, the combination with the boiler, of a fuel chamber at the forward end thereof having a bridge wall, a combustion chamber back of said bridge wall and having a rear bridge wall, a depending wall between said bridge walls within the combustion chamber, and an arch or roof extending rearwardly from the depending wall over the combustion chamber, substantially as set forth.

In testimony whereof I, the said WILLIAM BRAND, have hereunto set my hand.

WILLIAM BRAND.

Witnesses:

ROBT. D. TOTTEN,
J. N. COOKE.