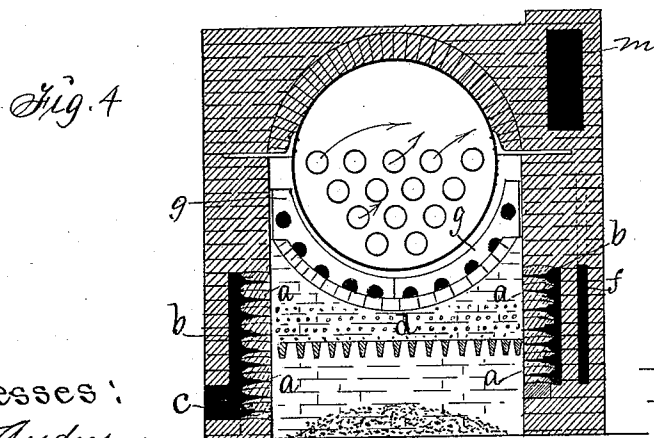
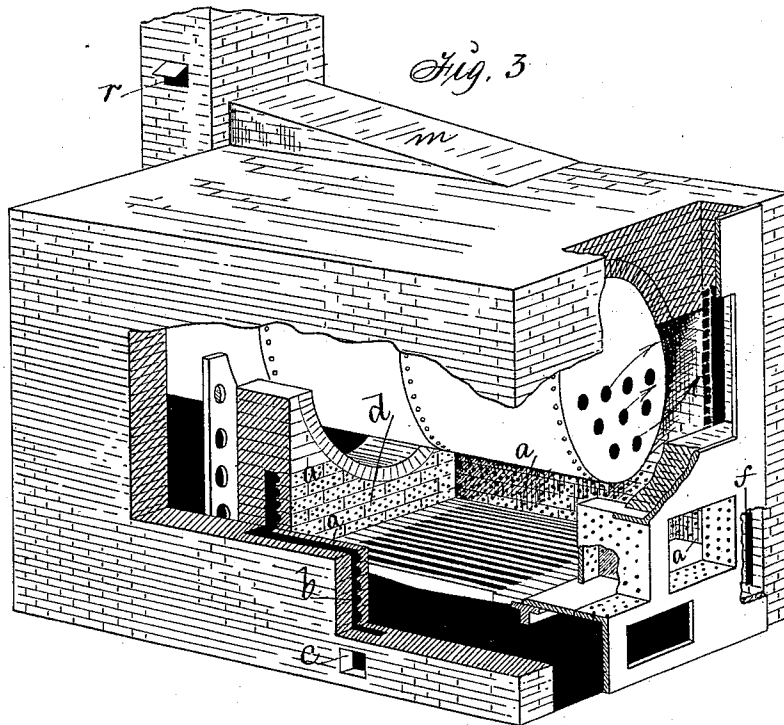
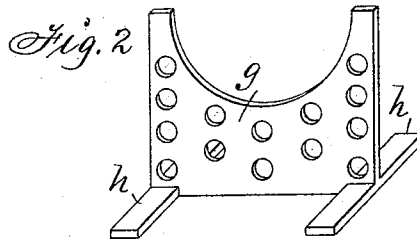
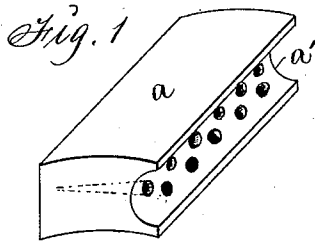


(No Model.)

J. COLLIS.  
BOILER FURNACE.

No. 326,547.

Patented Sept. 22, 1885.



Witnesses:  
W. A. Anderson.  
R. H. Orwig.

Inventor:  
John Collis,  
By Thomas G. Orwig, atty.

# UNITED STATES PATENT OFFICE.

JOHN COLLIS, OF DES MOINES, IOWA.

## BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 326,547, dated September 22, 1885.

Application filed January 21, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN COLLIS, a citizen of the United States of America, and a resident of Des Moines, in the county of Polk and State of Iowa, have invented a new and useful Improvement in Boiler-Furnaces, of which the following is a specification.

My object is to save labor and fuel in the operation of a boiler-furnace, and to prevent the generation of soot and black smoke and the fouling of flues, through which such valuable products of combustion escape.

My invention consists in the construction and combination of air-heating and air-distributing side walls, a hollow metal front, an air-heating and air-distributing bridge-wall, a grate, a horizontal boiler, and an auxiliary bridge-wall and superheater, as hereinafter set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a fire-brick such as I use in constructing air-heating and air-distributing walls. Fig. 2 is a perspective view of my auxiliary bridge-wall and superheater. Fig. 3 is a perspective view of my improved boiler-furnace, having parts broken away. Fig. 4 is a transverse section showing the positions of the air-passages in the side walls relative to the grate.

*a* represents a perforated brick made of fire-clay, that is convex on its top surface and concave on its bottom, and that has a chamber, *a'*, formed in one of its edges and the chamber intersected by a series of perforations.

In building a new furnace I form the inside courses of the walls of these perforated and chambered fire-brick, as shown in Figs. 3 and 4, to extend the entire length of the grate some distance below and also some distance above the grate, in such a manner that cold air will be admitted from the outside to the chambers in the perforated brick, to become heated therein and discharged therefrom through the perforations into the combustion-chamber above the grate, against the side bars in the grate, and into the chamber under the grate.

*b* represents a passage or air-space formed in the wall to connect the chambers *a'* in the perforated fire-brick, and *c* an opening extending from the passage *b* outward to admit cold air.

*d* represents a bridge-wall having air-heating

and air-distributing fire-brick combined therewith and the air passage or chamber *b*, connected with the chambers *a'* of the perforated fire-brick *a*, to distribute hot air and mingle it with the products of combustion as they arise from the fuel on the grate.

*f* represents an air passage or chamber that extends forward from the rear end of one of the side walls to intersect an opening in the hollow metal front of the wall for the purpose of conveying cold air from the outside into the hollow metal front to aid in keeping the outside of the metal front cool, and also to aid in heating and distributing air to the fuel in the combustion-chamber.

*g* represents my auxiliary bridge-wall and superheater placed under the rear portion of the horizontal boiler. It is perforated and preferably made of cast-iron in two pieces, so that it can be readily placed in position from the opposite sides of the boiler. It is provided with lateral projections *h*, to support it in a vertical position, or retained perpendicular in any suitable way. When it becomes heated by the products of combustion that are liberated from the fuel on the grate and strike it and pass through and over it, the heated metal will aid in maintaining a high degree of heat under the rear portion of the boiler and prevent any soot or black smoke that may escape over the fixed bridge-wall at the rear end of the grate from passing into or through the boiler-flues.

*m* represents a flue formed in the side wall to extend rearward and upward from the front of the boiler to a chimney at the rear end of the wall.

*r* represents an adjustable cover over an opening in the chimney, through which opening cold air is admitted to check the draft whenever desired.

I am aware that perforated fire-brick have been placed in furnace-walls, and that air-chambers formed in furnace-walls have been connected with hollow metal fronts; but my manner of forming the inside faces of the side walls and the bridge-wall with perforated brick having chambers in their edges, convex top surfaces, and concave bottoms, and connecting the chambers in the edges of the fire-brick by passages or chambers *b* and one or more openings, *c*, is novel and advantageous,

in that cold air is thereby drawn from outside of the furnace, heated, and distributed automatically and continuously under the grate, against the grate, and over the grate and fuel, to be mixed with the products of combustion as they are liberated from the fuel and as required to maintain a bright fire upon all parts of the grate.

I am also aware that two bridge-walls have been built in a furnace; but my manner of constructing and combining a detachable and adjustable auxiliary bridge-wall and superheater with the side walls and boiler is new and useful for the purposes stated.

I claim as my invention—

1. Furnace side walls having perforated fire-brick *a a'*, extending on their insides the entire length of the grate and above and below the grate, and air-passages *b* and *c*, a bridge-wall having corresponding fire-brick, *a a'*, and their chambers connected with the passages *b c*, substantially as set forth, for the purposes stated.

2. A furnace having its parallel side walls and its transverse bridge-wall faced with perforated fire-brick having chambers in their inner edges to produce continuous air-passages extending from one side of a hollow metal front to the other side of the same front, air-passages *b* and *c* and *f*, a hollow metal front having perforations in its inside wall, a grate, and a boiler, arranged and combined substantially as shown and described, to operate as and for the purposes stated.

3. A perforated adjustable and detachable auxiliary bridge-wall and superheater, in combination with a fixed bridge-wall and a horizontal boiler in a furnace, to operate in the manner set forth, for the purposes stated.

JOHN COLLIS.

Witnesses:

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