

(No Model.)

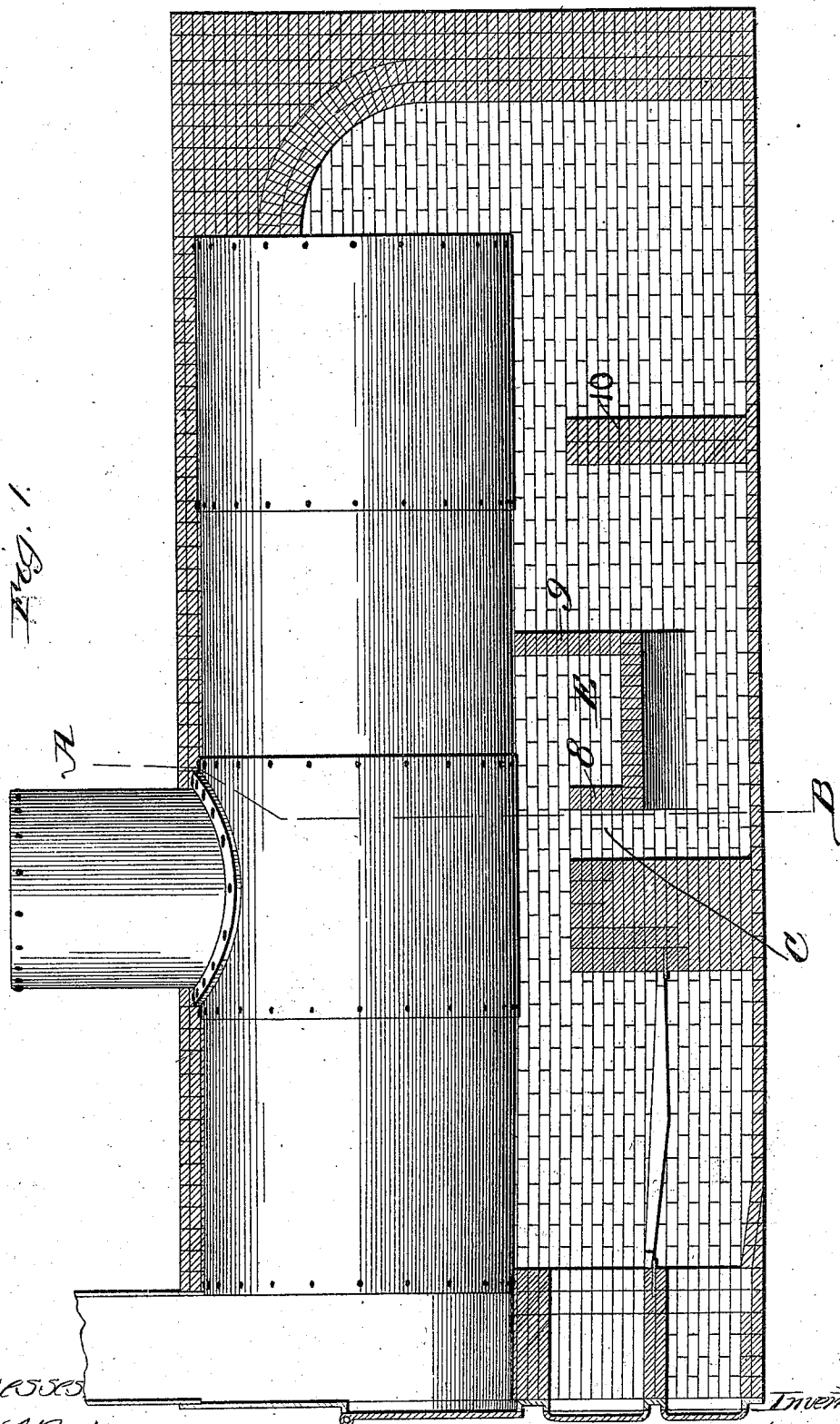
2 Sheets—Sheet 1.

R. CAREY.

SMOKE BURNING APPARATUS FOR STEAM BOILERS.

No. 497,305.

Patented May 16, 1893.



Witnesses
Frederick A. Miles.
J. Simmons

Inventor
RICHARD CAREY

By *Edw. B. Booth*

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

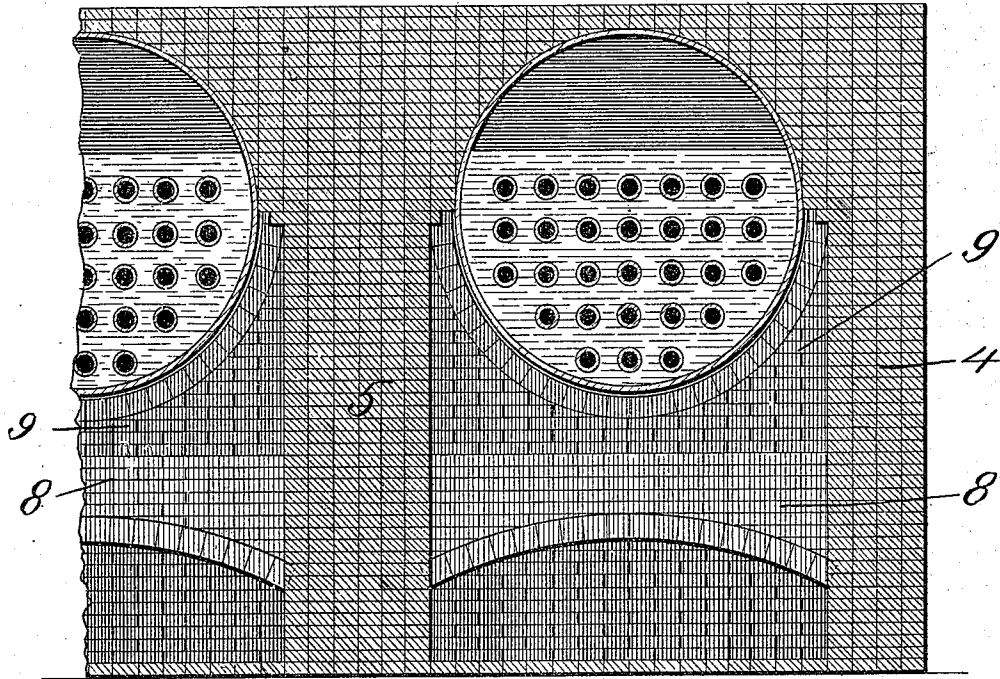
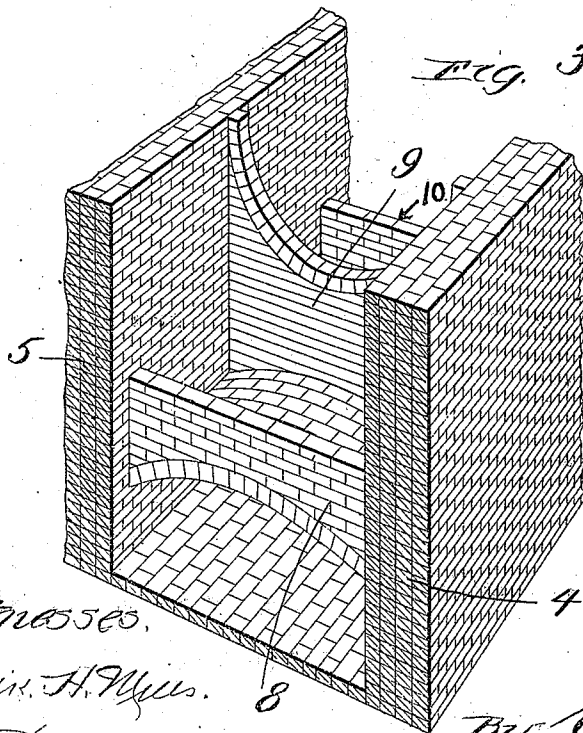


Fig. 3.



Witnesses,

Fred. H. Mills.

A. Simmons

Inventor

Richard Carey

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UNITED STATES PATENT OFFICE.

RICHARD CAREY, OF CHICAGO, ILLINOIS.

SMOKE-BURNING APPARATUS FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 497,305, dated May 16, 1893.

Application filed July 13, 1892. Serial No. 439,859. (No model.)

To all whom it may concern:

Be it known that I, RICHARD CAREY, a citizen of the United States of America, residing in Chicago, in the county of Cook, State of Illinois, have invented a new and useful Smoke-Burning Apparatus for Steam-Boilers, of which the following is a complete description and specification.

My invention relates to improvements in steam boiler settings, which are so constructed as to give the most efficiency of the fuel used by a thorough consumption of all the combustible particles, and hence to a great extent the burning of smoke and gases, which in the ordinary steam boiler is passed out direct from the furnace through the tubes or flues into the chimney carrying off to a considerable extent, a good portion of the heated gases.

In my invention I have the principle of the boiler setting so constructed as to temporarily check and hold the smoke and gases formed from a direct escape.

The object of my invention is to produce a smoke burning furnace so constructed in the setting of the steam boiler that by my improvements two distinct features are involved, first the checking of the direct escape of combustible gases, and thereby retaining a larger quantity of the heat eliminated in their liberation. Secondly to burn the smoke produced by the liberation of these gases and thereby to a great extent diminish the smoke nuisance that is now prevailing.

While I am aware that great efforts of others have been made in this direction, and that their success has been more or less questioned, I state that while my apparatus appears very simple and trifling in its construction, the theoretical and the practical demonstration, by its practical use, has beyond all doubt proved that this question of smoke nuisances has been solved.

The principle involved in this apparatus consists chiefly of collecting and holding temporarily the smoke and gases produced, and by so placing the accumulation chamber for the smoke and gases in such a manner as to force the gases, when trying to escape, to come into contact with the hottest part of the flame thereby consuming all the combustible parts of the smoke and gases. I obtain these ob-

jects through the following instrumentalities described and shown in the accompanying drawings, in which—

Figure 1 is a longitudinal cross section of the boiler setting showing a cross section of my invention applied immediately under the boiler and back of the fire bridge. Fig. 2 is a vertical cross section through the boiler and boiler setting, showing the form of both walls in a combustion chamber, of which my apparatus consists, and how located and supported; said cross section being taken at line A. and B. Fig. 1. Fig. 3 is a perspective vertical cross section taken between the fire bridge and first wall at the same place, with the boiler lifted out of its settings so as to more prominently show my invention.

Similar letters refer to similar parts throughout the several views.

My invention consists simply of placing a retaining wall at a proper distance from the fire bridge, said wall being placed on suitable supports between the two sides of the boiler setting. The distance between the fire bridge and the first retaining wall of my smoke burning apparatus is decided by the area of the chimney and by the size of the grate surface according to the size of the boiler but its area will be no less than the area between the under side of the boiler and the fire bridge. The retaining wall will not be made higher than the height of the fire wall. The second retaining wall for the smoke will be placed according to the size of the boiler at a certain distance from the first retaining wall, and said wall will be built from its support clear up to and around its lower half part, said walls being connected at the lower part by an arch or bottom extending from one to the other, from wall to wall, and from side to side of boiler setting forming a pocket or closed combustion chamber with no other outlet than the space preserved between the fire bridge and the first retaining wall, and through which space the flame must absolutely pass down and under the bottom of said pocket. The bottom of said pocket may be supported by an arch from side to side of boiler setting or by suitably arranged iron beams from side to side of boiler setting.

In speaking of the sides of boiler setting,

I mean the walls 4 and 5 shown in Fig. 2. At a proper distance from the last retaining wall 9, reaching up to the under part of the boiler, I place a third wall 10, its main object being that when the flame has passed through the opening formed by the back part of the fire bridge and the first retaining wall, and under the bottom of the pocket by the first and second retaining walls, to throw said flame up against the back part of the boiler. The working of said smoke burning apparatus is as follows. When the smoke and gases liberated by the consumption of the fuel, pass over the fire bridge it enters into the pocket formed by the first retaining wall 8 and second retaining wall 9 where no outlet is found, the smoke and gas is then forced to revolve around and return back through the opening formed between the boiler and the first retaining wall and then down through the opening or space between the back part of the fire bridge and the first retaining wall causing said gas and smoke to come into immediate contact with the hottest part of the flame from the fire, also said flame will tend to keep the bottom of said pocket and also first retaining wall into a high degree of glowing heat, which will assist in the partial combustion of the smoke and gases formed. After having passed through the last opening and through spaces formed between the back part of the fire bridge and retaining wall and under the arch or pocket of said combustion chamber (E) it is further consumed by being brought into immediate contact with said arch held glowing by the constant playing of the flames against and under same. It may be seen that the apparatus serves its two objects, first that of retaining the gases so as to secure a more thorough combustion of these gases before they pass out into the chimney, as in the ordinary boiler furnaces, thereby retaining a considerable amount of heat that would otherwise escape without any direct benefit.

A hasty examination and judgment of this apparatus might tend to lead any one to believe, the checking of the draft, that was absolutely necessary for the supply of enough of oxygen used in the combustion, would tend to a sluggish action of the fire and present a new difficulty that of keeping up steam, but what we otherwise would gain by a brighter fire is gained in the economy of utilizing more of the heat involved in the production of the gases liberated by the combustion, which means that this will fully offset the less bright fire produced by the checked draft. It may be argued that the greater the draft the more intense the heat with a proper amount of fuel, but it must be borne in mind also that the greater the intensity of the fire, the quicker is the combustion and escape of the created gases. Hence I wish to state as before mentioned, that the gaining, in a retaining of these gases is greater than

the loss produced by the lessening of the draft, which also means a saving of fuel.

It will be seen from the foregoing description that the closed pocket or combustion chamber formed by the first and second retaining walls is of great importance, for the reason that the smoke and gases liberated by the consumption of the fuel are therein checked and are caused to come in contact with the first retaining wall and the arched bottom portion of the pocket, which are kept in a glowing or incandescent heat by the action of the flames playing directly against them, and the combustible parts thereof consumed, and the flames caused by the ignition of these particles made to come in contact with and are thrown by the third retaining wall up against the back surface of the boiler. It will also be seen that the first retaining wall (8) subserves another purpose than that of forming with the second retaining wall a combustion chamber, in that it forms a wall of incandescency, by being in direct contact with the flames, and hence the larger the area of incandescency the greater the efficiency obtained, producing results which could not be secured if the flames only struck against the surface of the arch.

I am aware that the idea of temporarily checking the gases and smoke liberated by the consumption of the fuel for the purpose of burning the same is not broadly new, but— Having thus described my invention, what I claim as new, and pray that Letters Patent will be granted to me, is—

1. In a boiler setting, the combination with suitable side supporting walls, of a central retaining wall which extends up to and around the lower surface of the boiler, a first retaining wall forward of the said central wall, and an arched bottom portion connecting said walls, the first retaining wall and the arched bottom portion being in close proximity to the fire bed and the space between the walls forming a pocket, whereby the gases and smoke liberated by the consumption of the fuel on the fire bed, entering said pocket, are thrown back and down against the first retaining wall and the arched bottom portion, heated to incandescency by the flames playing directly against them, and are consumed, substantially as described.

2. In a boiler setting, the combination with suitable side supporting walls, of a central retaining wall which extends up to and around the lower surface of the boiler, a first retaining wall forward of the said central wall, and an arched bottom portion connecting said wall, the first retaining wall and the arched bottom portion being in close proximity to the fire bed and the space between the walls forming a pocket, whereby the gases and smoke liberated by the consumption of the fuel on the fire bed, entering said pocket, are thrown back and down against the first retaining wall and the arched bottom portion, heated to in-

candescency by the flames playing directly
against them, and are consumed; and a third
retaining wall in rear of the central wall
which is adapted to throw the flames, after
5 they pass through the opening formed be-
tween the back part of the fire bridge and
the first retaining wall, and under the bottom
of the pocket by the first and second retain-

ing walls, up against the back surface of the
boiler, substantially as described. ^{1c}

In testimony whereof I have affixed my sig-
nature in presence of two witnesses.

RICHARD CAREY.

Witnesses:

PHILIP LATMON,
AXEL JOHNSON.