

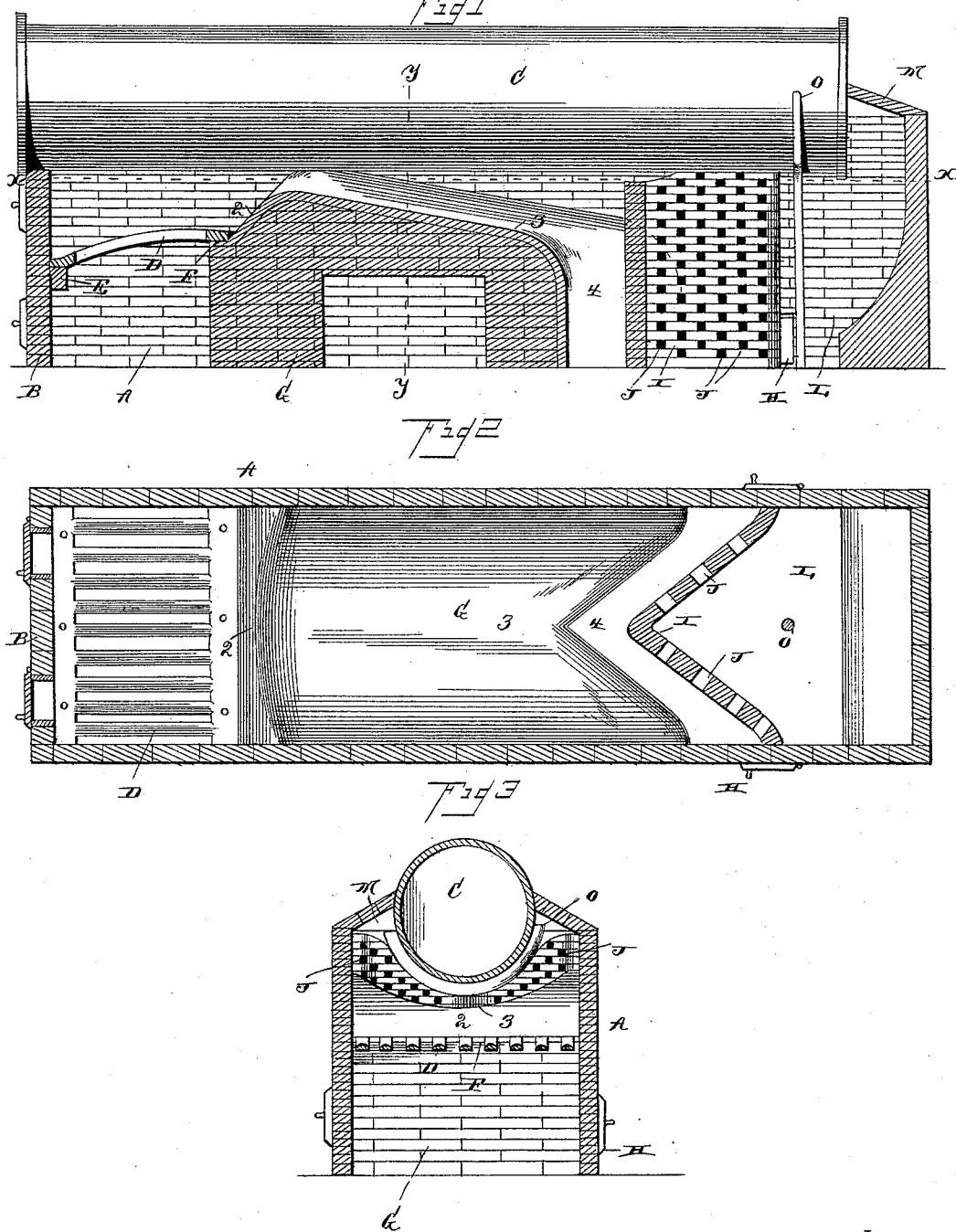
(No Model.)

2 Sheets—Sheet 1.

C. H. WILSON & E. W. BERRY.  
STEAM BOILER FURNACE.

No. 412,868.

Patented Oct. 15, 1889.



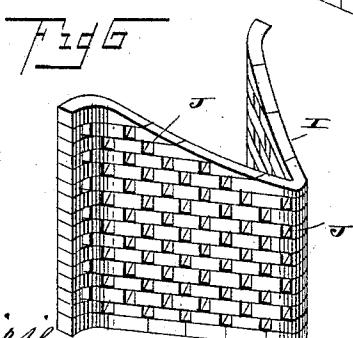
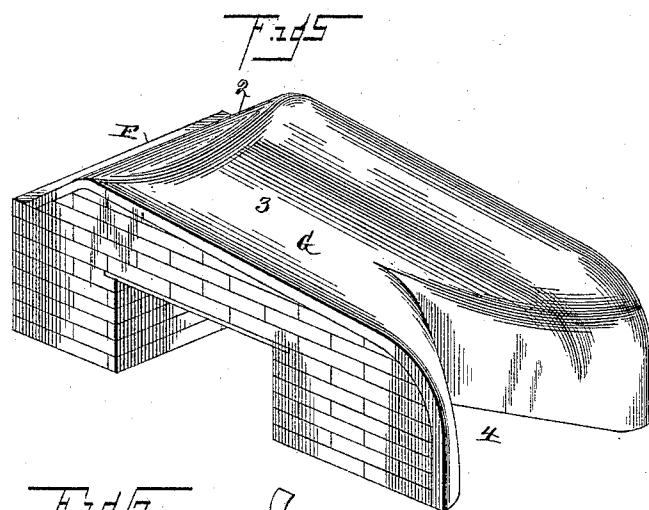
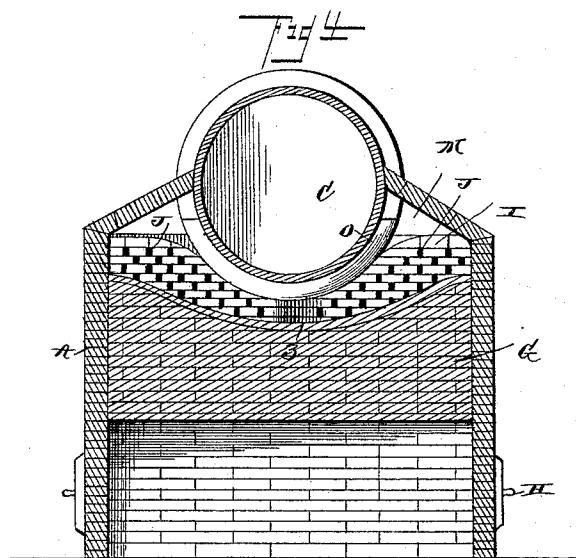
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Witnesses

John Smirle  
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By their Attorneys,

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# UNITED STATES PATENT OFFICE.

CHARLES HENRY WILSON AND ERVIN W. BERRY, OF PADUCAH, KENTUCKY.

## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 412,868, dated October 15, 1889.

Application filed June 20, 1889. Serial No. 314,938. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES HENRY WILSON and ERVIN W. BERRY, citizens of the United States, residing at Paducah, in the 5 county of McCracken and State of Kentucky, have invented a new and useful Steam-Boiler Furnace, of which the following is a specification.

This invention relates to furnaces for steam-boilers, kilns, heating apparatus, and other purposes for which furnaces are employed; and it has for its object to so construct the same as to consume the smoke and gases from the burning fuel in a more perfect manner 15 than heretofore, thereby economizing fuel and enabling steam to be made at a less expense.

The invention consists in the improved construction and arrangement of parts whereby the said results are effected, as will be hereinafter more fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a longitudinal sectional view of a boiler-furnace equipped with our improvements. 25 Fig. 2 is a horizontal sectional view of the same, taken on the line  $xx$  in Fig. 1. Fig. 3 is a vertical transverse section taken through the grate and ash-pit at the front end of the furnace. Fig. 4 is a vertical transverse sectional view taken through the fire-wall on the line  $yy$  in Fig. 1. Fig. 5 is a perspective view of the fire-wall of the grate. Fig. 6 is a perspective view of the equalizer or regulator at the rear end of the furnace.

35 The same letters refer to the same parts in all the figures.

A designates the supporting wall or frame of the boiler, which may be constructed of fire-brick or other suitable refractory material 40 and of any desirable and convenient shape and design.

B designates the front wall of the boiler-support, having the ordinary fire-boards to the furnace and ash-pit under the grate-bars 45 and other usual appendages.

C designates the boiler, which may be of any suitable construction.

D designates the grate, which is supported upon a shoulder or offset E on the inner or 50 rear side of the front wall B of the furnace, and the rear end of which rests upon a shoul-

der F of the fire-wall G. The shoulder F is somewhat higher than the offset E, and the grate D is therefore placed in a forwardly-inclined position. By this arrangement of the 55 grate the clinkers and other obstructions to the draft are prevented from working in a rearward direction and choking the draft-passage. They are, on the contrary, inclined to move in a forward and outward direction, so 60 as to enable them to be readily removed from the furnace. This desirable result is aided by the peculiar configuration of the grate-bars, which are curved longitudinally and provided with transversely-convexed upper surfaces. By this construction of the grate-bars 65 the clinkers and other obstructions to the draft will be readily induced to move outwardly in the furnace, and choking of the draft is rendered less liable to occur.

The fire-wall G, which supports the rear end of the grate, is a massive structure of fire-brick or other refractory material, which is located longitudinally in the furnace. The front end of the said fire-wall forms a convex curve 2, which constitutes the rear wall of the fire-chamber and serves to keep the fuel in proper position upon the grate-bars and to direct the draft in an upward and rearward direction. The upper surface of 70 the fire-wall is concave in transverse section, as will be clearly seen by reference to Figs. 3 and 4 of the drawings, and is concentric with the under side of the boiler, from which the said fire-wall at its highest point is not 75 far removed, thus forming a throat 3, through which the products of combustion are forced to pass. The rear end of the fire-wall, the upper side of which is still curved or concaved in transverse cross-section, is inclined 80 in a downward and rearward direction, and its extreme rear end is provided with a V-shaped longitudinal recess 4, which forms an ash-pit, access to which may be had through doors H H in the side walls of the 85 furnace.

I designates a V-shaped equalizing and regulating wall, which is constructed transversely in the furnace in rear of the fire-wall, and the front edge of which extends into the 90 V-shaped recess 4 at the rear end of the latter. Said draft regulating and equalizing

wall may be built or constructed of fire-brick, clay, or other refractory material, and it is provided with numerous longitudinal perforations or draft-passages J J. The upper edge of the draft-regulating wall extends up closely to the boiler and is curved concentrically with the latter, between which and the upper edge of said wall there is only limited draft-space, the draft being mainly through the longitudinal passages J J.

In rear of the draft-regulating wall and between the latter and the rear wall of the furnace is located a combustion-chamber L, the top of which is formed by an inclined or return plate M. In said chamber is located a vertical support O for the rear end of the boiler.

The operation and advantages of this invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed, by those skilled in the art to which it appertains.

The front end 2 of the fire-wall serves to deflect the draft in the proper direction and to retain the fuel in position in the fire-chamber. By the peculiar configuration of the upper surface of the fire-wall the heat and flames will be forced closely into contact with the heating-surface of the boiler, and no part of the latter is left unexposed to the action of the flames. The space between the upper surface of the fire-wall and the under side of the boiler forms a large and continuous combustion-chamber, in which combustion is thoroughly effected. Ashes which are carried rearwardly by the draft will on striking the draft-regulating wall be deflected downwardly into the ash-pit or compartment 4, which is sufficiently spacious to hold the accumulations of a considerable period. The V-shaped regulating-wall serves to arrest the strong rearward draft and to divide it into two currents, which are forced to find their way through the passages J in the said wall. The result of this is that the chamber or compartment L becomes heated to a very high degree, and soot and the like which enter the said chamber, as well as the smoke, will thus be thoroughly and almost completely consumed.

The fire-wall G, which, as described, is a massive and substantial structure, will retain a considerable amount of latent heat, which, when the fires are temporarily put out, will cause the contents of the boiler to remain in a heated state for a considerable period until the fires shall again be started.

Our improved furnace, besides being useful as a steam-boiler furnace, may be advan-

tageously employed in connection with brick-kilns and kilns and driers for various purposes, and we reserve the privilege of using it, with such modifications as may be found necessary, in any manner and for any purpose for which it may be employed.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a furnace, the herein-described fire-wall, having its front end curved upwardly and rearwardly to within a short distance of the boiler, the upper surface of said fire-wall being extended from thence in a downward and rearward direction and provided with a V-shaped recess forming an ash-pit, the upper surface of said fire-wall being curved transversely concentrically with the boiler, substantially as set forth.

2. In a furnace, the combination, with the fire-wall having a V-shaped recess at its rear end, of the V-shaped draft regulating and equalizing wall, substantially as herein described.

3. In a furnace, the herein-described V-shaped draft regulating and equalizing wall provided with a series of longitudinal openings or passages, substantially as and for the purpose set forth.

4. The combination, in a furnace, of the fire-wall having a V-shaped recess at its rear end, the downwardly and forwardly inclined grate, and the V-shaped draft regulating and equalizing wall having longitudinal perforations or passages, as set forth.

5. The combination of the furnace walls or casing, the longitudinally-arranged fire-wall having transversely-curved upper surface and provided with a V-shaped recess at its upper end, the downwardly and forwardly inclined grate supported upon said fire-wall and upon a shoulder on the rear side of the front wall of the furnace-casing, the V-shaped draft-regulating wall having longitudinal perforations or passages, the doors in the side walls of the furnace registering with the ash-pit between the fire-wall and the V-shaped draft-regulating wall, and the vertical boiler-support located in the combustion-chamber in rear of said draft-regulating wall, substantially as and for the purpose set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

CHARLES HENRY WILSON.  
ERVIN W. BERRY.

Witnesses:

THOMAS W. ALLEN,  
W. R. HOLLAND.