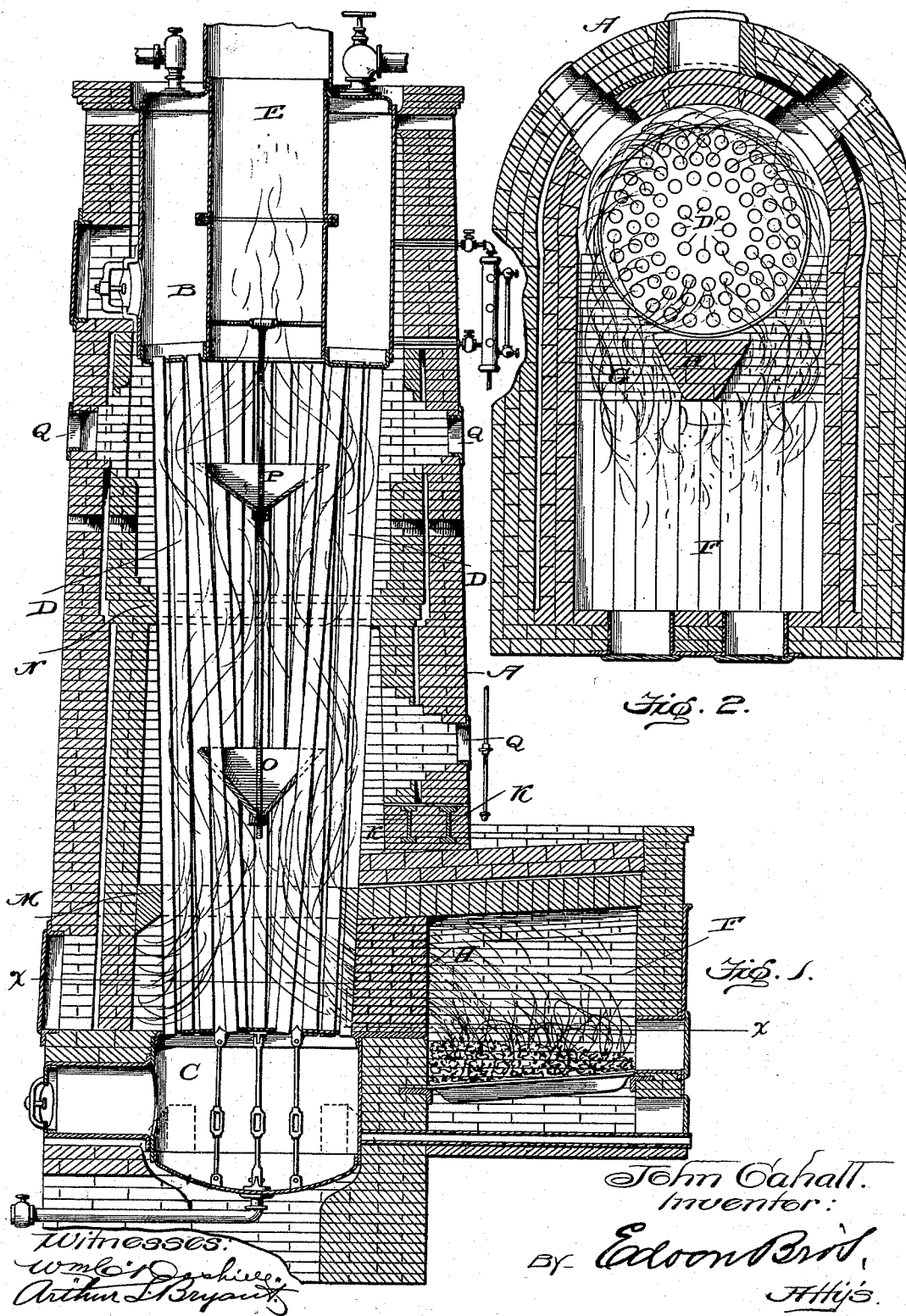


(No Model.)

J. CAHALL.
STEAM BOILER.

No. 518,519.

Patented Apr. 17, 1894.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN CAHALL, OF MANSFIELD, OHIO, ASSIGNOR TO H. E. CAHALL AND W.
H. CAHALL, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 518,519, dated April 17, 1894.

Application filed November 11, 1893. Serial No. 490,658. (No model.)

To all whom it may concern:

Be it known that I, JOHN CAHALL, a citizen of the United States, residing at Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in steam boilers, particularly of that class shown in Patent No. 485,088, granted to me on October 25, 1892; and the object of the present invention is to provide for the free circulation of the product of combustion among the water tubes whereby said tubes will be uniformly heated and the full heating effect of the products of combustion utilized.

With these and such other ends in view as pertain to my invention, it consists in the combination with a water tube boiler and a combustion chamber communicating with the boiler, of a deflector arranged between the boiler and combustion chamber and designed to direct the products of combustion against tubes on opposite sides of the boiler, and deflectors arranged within the boiler, alternately around and between the water tubes therein, whereby the products of combustion are made to pursue a sinuous course among said tubes in passing from the combustion chamber to the stack of the boiler.

My invention still further consists in the peculiar construction and arrangement of parts as will be hereinafter more fully pointed out and claimed.

In the accompanying drawings:—Figure 1 is a vertical sectional view through a boiler embodying my improvements. Fig. 2 is a horizontal sectional view on the line *xx* of Fig. 1.

Like letters of reference denote corresponding parts in both figures of the drawings, referring to which—

A designates the external shell of the boiler, which is shown as composed of suitable brick or masonry and, B, designates a steam drum which is suitably supported within said shell, near or at the upper end thereof, and is connected with a mud drum, C, arranged within

the lower portion of the shell, by a series of water tubes, D. As shown in the drawings the mud drum is preferably made of less diameter than the steam drum and the water tubes are inclined inwardly slightly from their upper to their lower ends thereby exposing a greater portion of their body to the action of products of combustion passing through the boiler than would be exposed were said pipes arranged in a perfectly vertical position. The steam drum, B, is provided with a central vertical flue, E, which connects the interior of the boiler with the stack thereof.

At one side of the boiler, near the lower end thereof, is arranged a furnace or combustion chamber, F, which is separated from the boiler by a bridge wall, G. The products of combustion generated in the furnace, E, in passing over the bridge wall, G, are divided into two independent bodies by a deflector, H, which is arranged substantially in the middle of the bridge wall and extends from said wall to the roof of the furnace. The deflector, H, is preferably composed of the same material as and built integral with the bridge wall and made substantially triangular in cross section, the apex of the triangle being toward the chamber, F, so that the products of combustion are directed against tubes on opposite sides of the boiler.

As shown in Fig. 1 of the drawings the portion of the external shell, A, of the boiler, above the bridge wall, G, and the furnace, is supported by parallel I-beams, K, which are suitably supported on opposite sides of the furnace so that the weight of said wall will not rest on the roof of the furnace.

Portions, M, N, of the external shell, A, of the boiler are projected inwardly to abut against the outer circle of water tubes and form baffles to the passage of the products of combustion up the inner walls of said shell. The lower baffle M is arranged in substantially the same horizontal plane as the top of the furnace or combustion chamber, F, whereby, as the products of combustion pass from the furnace, they strike said baffle and are deflected inwardly among the tubes of the boiler.

Within the inner circle of water tubes, D,

between the baffles, M, N, is arranged a conical shaped deflector, O, which is designed to deflect the products of combustion outwardly among the water tubes and against the inner wall of the shell, A, of the boiler. A similar deflector, P, is arranged above the upper outer baffle, N. The deflectors, O, P, are made of the same diameter of the circle formed by the inner water tubes, at the points where it is desired to place said deflectors, and are suspended by bolts, which are fastened to steam drums. After the products of combustion have been deflected outwardly among the water tubes, by the upper deflector, P, the draft through the stack of the boiler and flue, E, in the steam drum draws said products of combustion back among the water tubes and up through said flue into the stack.

I attach importance to the upright deflector erected upon the bridge wall at a point between the combustion chamber of the furnace and the vertical boiler, and said deflector arranged between the side walls of the furnace and forming therewith the diverging flame passages, as by such construction I am able to more uniformly distribute the currents of products of combustion and heat as they pass from the furnace into the boiler and to secure better results generally. And I also attach importance to the combination with a furnace, its bridge wall, and the upright deflector, substantially such as herein described, of an upright boiler provided with conical deflectors within and around its tubes and one above the other, and with the side deflectors, as such construction enables me to cause the divided currents of heat to travel in sinuous lines or courses among and around the tubes of the boiler and to secure a more equable distribution of the heat and products of combustion.

At suitable points in the external shell, A, of the boiler are formed passages, Q, which are adapted to be closed by suitable doors

and through which the interior of the boiler can be inspected, &c.

From the foregoing description and the drawings it will be seen that I have provided simple and effective means for causing the products of combustion to take a sinuous course among the water tubes of the boiler in passing from the furnace to the smoke stack.

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

1. The combination with a vertical water tube boiler, and a furnace situated at one side of the boiler and having its bridge wall provided with the upright deflector which forms divergent flame passages between said furnace and the boiler, of the deflector M on the inside of the vertical boiler and substantially level with the roof of the furnace, another deflector N outside of the rows of water tubes and above the deflector M, and the suspended deflectors O, P, within the rows of water tubes and on opposite sides of the upper deflector N, substantially as and for the purposes described.

2. The combination with a furnace, of the vertical boiler having the inclined water tubes, a deflector M situated within the boiler, outside of the series of water tubes, and substantially on a level with the roof of the furnace, an upper deflector N which incloses the series of water tubes, and the inverted conical deflectors O, P, suspended within the series of water tubes and arranged respectively above the outside deflectors M, N, to direct the course of the products of combustion in sinuous lines, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN CAHALL.

Witnesses:

H. E. BELL,
J. F. BOALS.