(No Model.) 2 Sheets—Sheet 1.

D. S. CHAPMAN.

WATER TUBE BOILER.

No. 544,882. Patented Aug. 20, 1895.

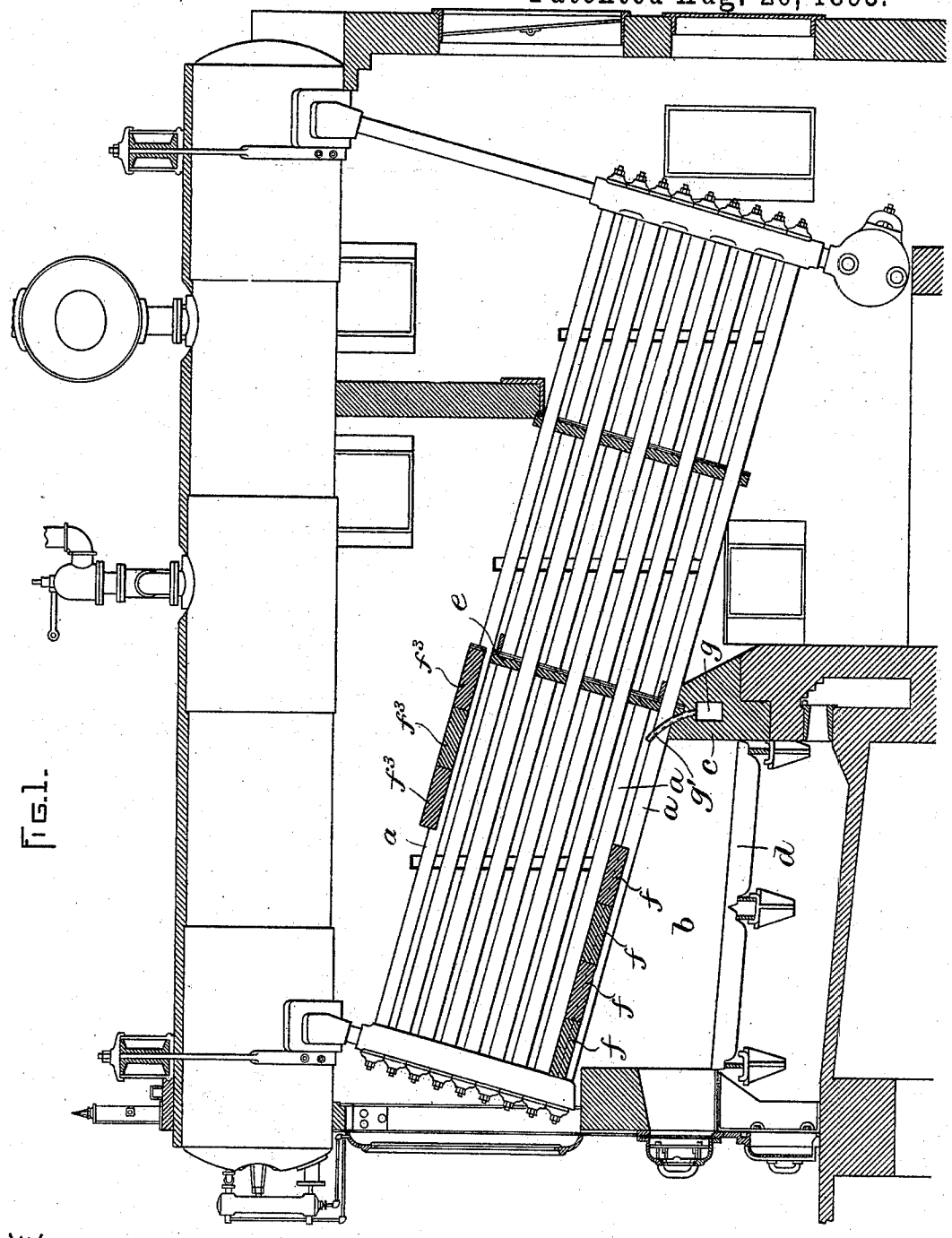

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

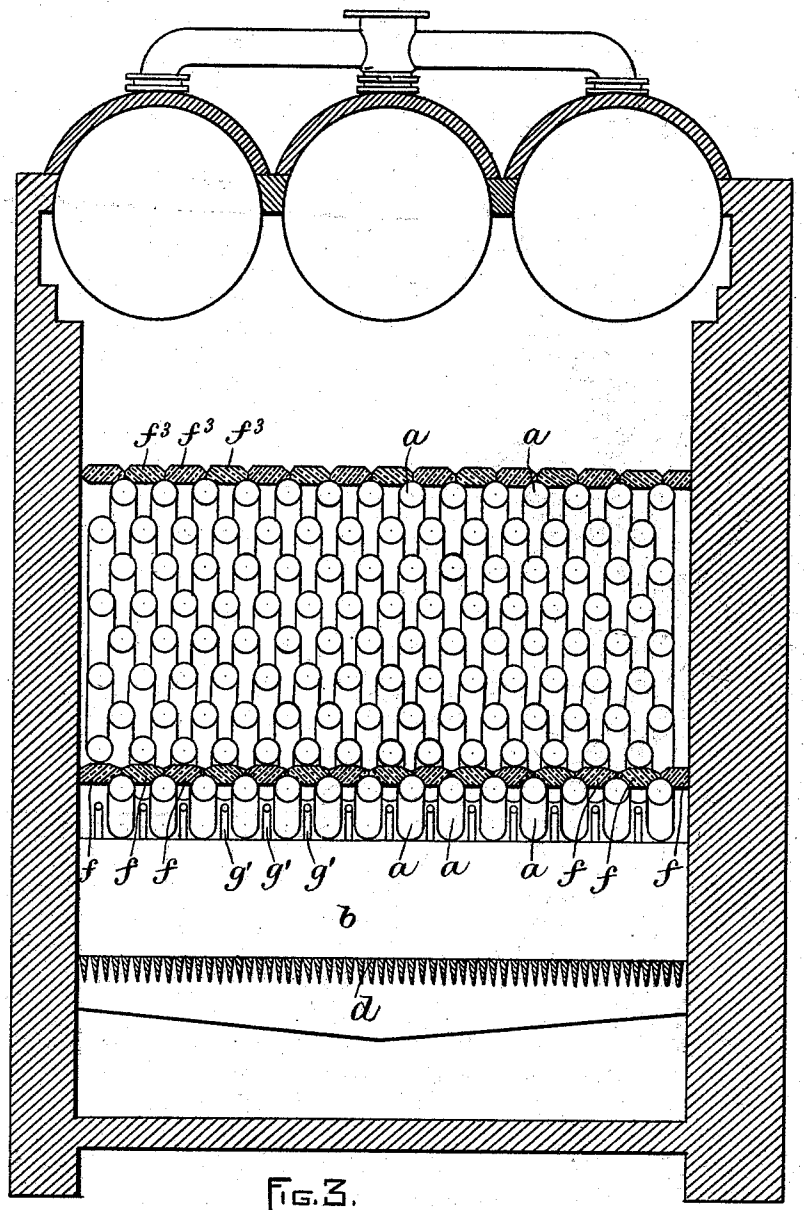
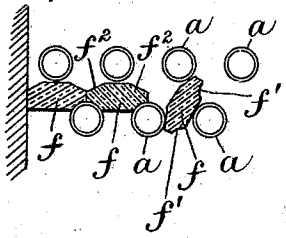


FIG. 3.



WITNESSES:
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UNITED STATES PATENT OFFICE.

DAVID S. CHAPMAN, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE THOMPSON FUEL SAVING AND SMOKE CONSUMING COMPANY, OF BERWICK, MAINE.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 544,882, dated August 20, 1895.

Application filed November 15, 1894. Serial No. 528,877. (No model.)

To all whom it may concern:

Be it known that I, DAVID S. CHAPMAN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

My invention relates particularly to water-tube boilers of the type shown in the well-known Babcock & Wilcox boiler, and has for its object to provide a durable and easily applied and removed heat-radiating and smoke-consuming attachment for such boilers, whereby the combustion of fuel is facilitated and made more perfect, and the escape of unconsumed products of combustion, particularly in the form of carbon, is reduced to the minimum.

My invention consists in the combination, with the tubes and fire-box of a water-tube boiler, of a series of blocks of refractory material supported by a row of tubes at the lower portion of the boiler over the fire-box, said blocks being peculiarly formed, as hereinafter described, so that they may be readily applied to and removed from the tubes, the blocks constituting a partition located over the front part of the fire-box, and preferably adapted to deflect the heated gases backwardly toward the bridge-wall, and thus cause said gases to pass in close proximity to the incandescent fuel in the rear portion of the fire-box near the bridge-wall, thus facilitating the combustion of said gases, all of which I will now proceed to describe and claim.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal section of a water-tube boiler provided with my improvements. Fig. 2 represents a section on line 2 2 of Fig. 1. Fig. 3 represents a section illustrating the manner of applying the blocks to the tubes.

The same letters of reference indicate the same parts in all the figures.

a a represent the tubes of a tubular boiler such as that known as the Babcock & Wilcox, said tubes being arranged over the fire-box *b* in the usual or any suitable manner.

c represents the bridge-wall, and *d* the grate.

The tubes *a* extend lengthwise of the fire-box from the front to and beyond the bridge-wall, and are provided with a partition or flame-plate *e*, which extends upwardly from the bridge-wall and separates the space between the portions of the tubes that are directly above the fire-box from the space between the portions of the tubes that are beyond the fire-box, so that the products of combustion pass upwardly between the portions of the tubes that are located over the fire-box, and then downwardly between the portions of the tubes that are located beyond the fire-box.

In carrying out my invention I arrange over the lower row of tubes a series of blocks *f* of refractory material—such as fire-brick—said blocks collectively forming a partition extending from the front end of the fire-box partly but not entirely to the bridge-wall, so that the products of combustion are deflected toward the bridge-wall and pass upwardly through an opening between the rear end of said partition and the bridge-wall. The blocks *f* are formed so that they may be readily inserted in the spaces between the lower row of tubes and the next row above, each block being provided with concave faces *f′ f′* on its under side, formed to bear on portions of two adjacent tubes, and with beveled faces f^2 f^2 on its upper side, formed to permit the upward insertion of the blocks between the tubes and the adjustment of the blocks between the row of supporting-tubes and the row above, so that the blocks can be readily applied to the tubes to form the position as represented in Fig. 3. It will be seen that this form gives the block its greatest thickness in the middle, where it is exposed to the greatest heat, the beveled faces f^2 being separated from the seats *f′* by portions of the edges of the blocks, so that the edges of the block that rest on the tubes are relatively thick and substantial. The function of the blocks is to absorb heat from the products of combustion and to radiate the heat downwardly, thus facilitating the combustion of the fuel and of the products of combustion arising therefrom, and, further, to deflect the products of combustion backwardly toward the bridge-wall before they pass upwardly between the tubes.

The fuel in the back part of the fire-box, near the bridge-wall, is usually incandescent, particularly in long fire-boxes, because the distance from the door is so great that the fresh fuel cannot be easily thrown to this point. Hence the fuel that is accumulated there is pushed back from time to time from the burning mass nearer the front. When fresh coal is inserted, it therefore remains at a considerable distance from the bridge-wall and a body of incandescent fuel exists between the fresh fuel and the bridge-wall. The gases arising from the fresh fuel are therefore deflected by the partition formed by the blocks *f*, and brought thereby into close proximity with the said incandescent fuel, the combustion of the gases being thus greatly facilitated.

f^3 f^3 represent another series of blocks similarly formed and supported by a row of tubes at the upper portion of the series of tubes, said blocks constituting a partition extending forward from the flame-plate *e* and deflecting the products of combustion that pass upwardly between the tubes, causing said products to pass between the forward end of the partition formed by the blocks f^3 and the forward ends of the tubes. The blocks f^3 also absorb heat and radiate the same, promoting the combustion of gases, &c., in the spaces between the tubes.

I do not limit myself to the particular location of the blocks and partitions here shown, and regard any arrangements of blocks of refractory material formed as shown and supported by the tubes of a water-tube boiler in position to absorb heat and to facilitate and promote the combustion of gases, &c., as within the scope of my invention.

g represents an air-duct located in the bridge-wall and provided with air-inlets through which outside air may be admitted and with a series of outlets *g'* in the form of tubes extending upwardly above the bridge-wall and delivering air to the products of combustion as they pass between the lower partition and the bridge-wall, thus promoting the combustion at that point.

The blocks will usually be retained in place on the tubes by friction; but if there should be a tendency of the blocks to slip endwise a suitable stop or detent may be employed, such as a fixed bar extending across the ends of the inner blocks of the series or braces extending from said blocks to the frame-plate.

I claim—

The combination with a water tube boiler having tubes arranged in parallel rows, the spaces between the tubes of each row alternating with the tubes of the next row above it, of a heat absorbing and radiating partition interposed between said rows and composed of a plurality of blocks of refractory material each having concave faces on its under side formed to bear on the upper portions of two adjacent tubes, and beveled faces on its upper side separated from the said concave faces by portions of the edges of the block, said beveled faces permitting the upward insertion of each block between the tubes of the row by which it is to be supported, and its adjustment to its operative position between said row and the next above it, the blocks having relatively thick edges resting on the supporting tubes.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 5th day of November, A. D. 1894.

DAVID S. CHAPMAN.

Witnesses:
C. F. BROWN,
A. D. HARRISON.