(No Model.)

# H. F. COOK.

## STEAM BOILER.

No. 478,690. Patented July 12, 1892.

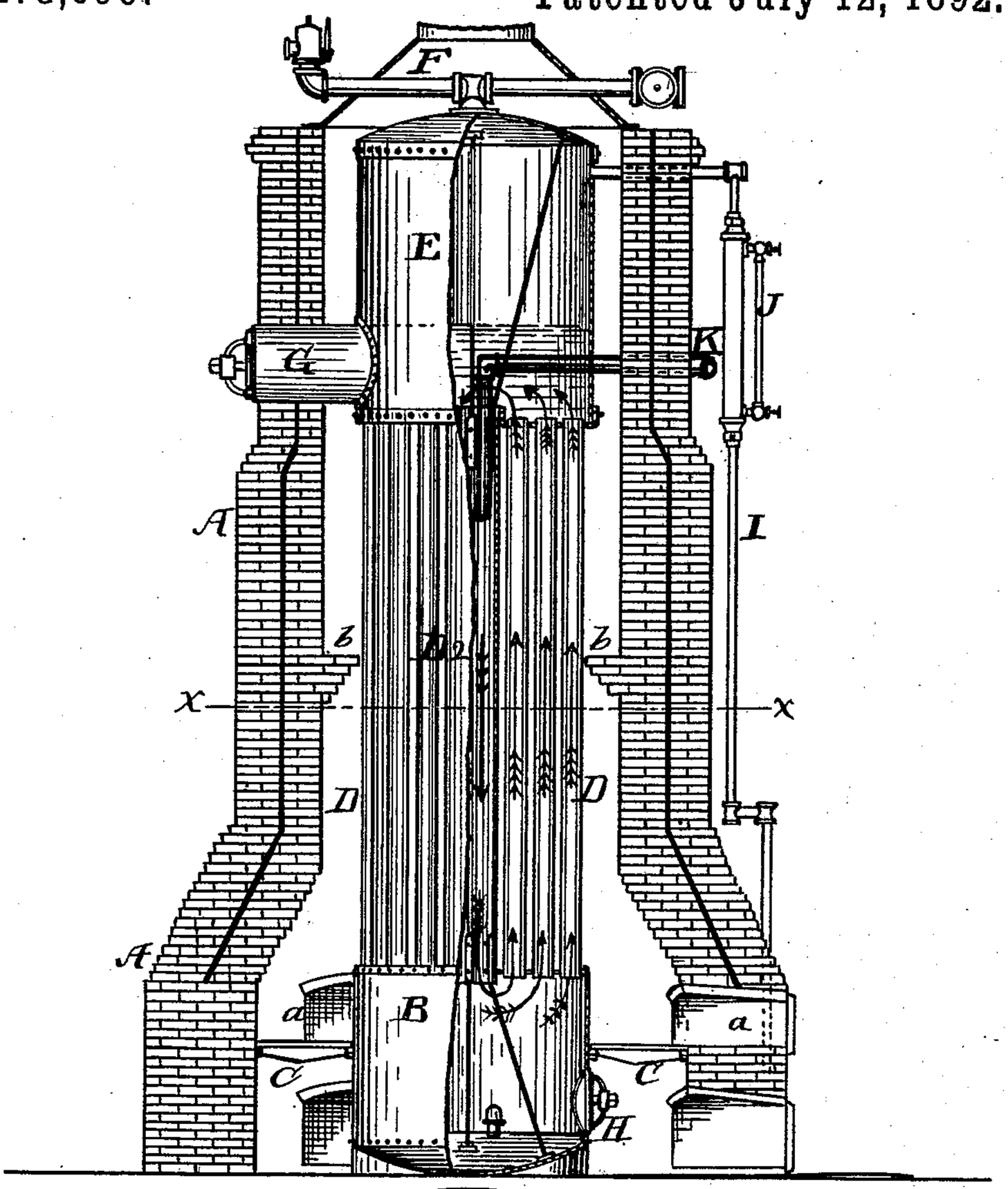


Fig. 1.

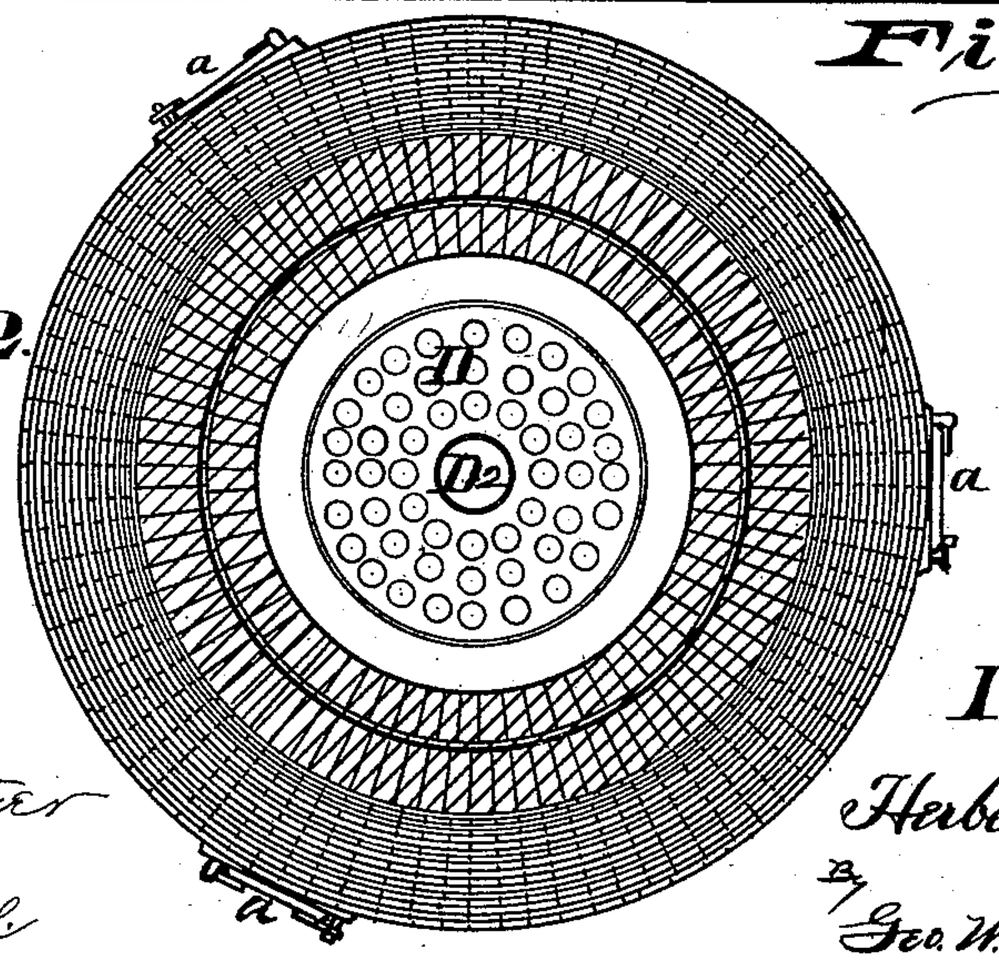


Fig. 2.

Witnesses,
C. M. Buettner
M. M. Carroll

Inventor,
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By Geo. W. Tibbitts Atty.

# UNITED STATES PATENT OFFICE.

HERBERT F. COOK, OF CLEVELAND, OHIO, ASSIGNOR TO L. W. BINGHAM, CHAS. L. DOUGLASS, AND C. B. SQUIRE, ALL OF SAME PLACE.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 478,690, dated July 12, 1892.

Application filed December 28, 1891. Serial No. 416,382. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT F. COOK, a citizen of the United States, residing at Cleveland, Cuyahoga county, State of Ohio, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to steam-boilers; and it consists in the new constructions and combinations, as hereinafter described, and pointed out in the claim.

In the accompanying drawings, Figure 1 is a vertical section of a boiler and setting embodying my invention. Fig. 2 is a cross-section of the same in line *x x* on Fig. 1.

A represents a circular brick or mason work casing of greater diameter at the base portion and tapering to a less diameter from a point just above the fuel-feed openings *a a a*, two or more of which may be provided around said base, the part of said casing above the taper standing in a straight perpendicular column and surmounted with dome-shaped cap $A^2$, having a neck to support a smoke-stack. Within this casing is contained a boiler of my improved construction.

B represents a cylindrical chamber standing on end in the center of said base A and of a height nearly to the top of the said fuel-feed openings. C C are grate-bars surrounding said chamber on a level with the bottoms of the fuel-feed openings, beneath which is the ash-pit, surrounding said chamber B, provided with openings and doors. The upper portion of said chamber B above the fire-grates serves as a bridge-wall to direct the flames upward and in between the flues.

D D are tubes fixed in the top plate of the chamber B, surrounding a central flue $D^2$.

E is a second cylindrical chamber located in the upper part of the casing A, supported on the tops of the tubes D and flue $D^2$. This chamber is of greater height than the lower one and comprises the steam-dome. From the top of this chamber is affixed a pipe F for conveyance of steam therefrom.

G is a manhole-pipe extending through the wall of the casing for the convenience of access to chamber E for cleaning and other purposes.

H is a manhole in the lower chamber B for like purposes.

I is a pipe having a water-column *i*, connecting chambers B E on the outside of the casing-wall, and is provided with a water-gage J.

K is a feed-water pipe, which may lead into the upper chamber, having its discharge end down in the flue $D^2$. This would enhance the downward flow in the central flue. Instead of this, such a pipe might enter lower chamber.

The working and the advantages of this construction are as follows: The furnace-fire is around the top part of chamber B and around the lower ends of the tubes D D, and the flames are directed into the midst of said tubes by the bridge-wall *b*. Thence they pass upward and around the upper chamber E, so that the steam becomes superheated therein. The circulation of water is upward in the tubes and downward in the central flue, as indicated by the arrows. Thus the circulation is perfectly free and unobstructed. The water, being the coolest in the central flue, has a downward flow, while that in the outer tubes, being the hottest, rises, and thereby the circulation is constantly maintained. All sediment in the water is deposited in the bottom of the chamber B, and there the water below the grate-bar level is cool and undisturbed, so that the sediment can easily settle. The tubes and flue being perpendicular, there is no liability of lodgment of sediment or incrustation. The ends of the tubes and flue, also being within the water-space, are not exposed to the fire, and are therefore not liable to be burned out.

Having described my invention, I claim—

In a tubular steam-boiler, the combination of a boiler consisting of a chamber B, located partly below the fire-grates of a furnace, an upper chamber E, the upper tube-sheet of chamber B and the lower tube-sheet of chamber E, connected by a central large flue $D^2$ and by surrounding vertical water-tubes D D, and a circular inclosing casing A, having the walls reduced in diameter above the fire-grates, and a deflecting rim or ridge *b* on its inner surface midway in the space between the two chambers B and E of the boiler, and covered with a suitable crown leading into a smoke-stack, constructed to operate substantially as specified.

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Witnesses:

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D. C. GROVER.