T. BARROW.

STEAM BOILER.

APPLICATION FILED JULY 31, 1909.

948,366. Patented Feb. 8, 1910.

3 SHEETS—SHEET 1.

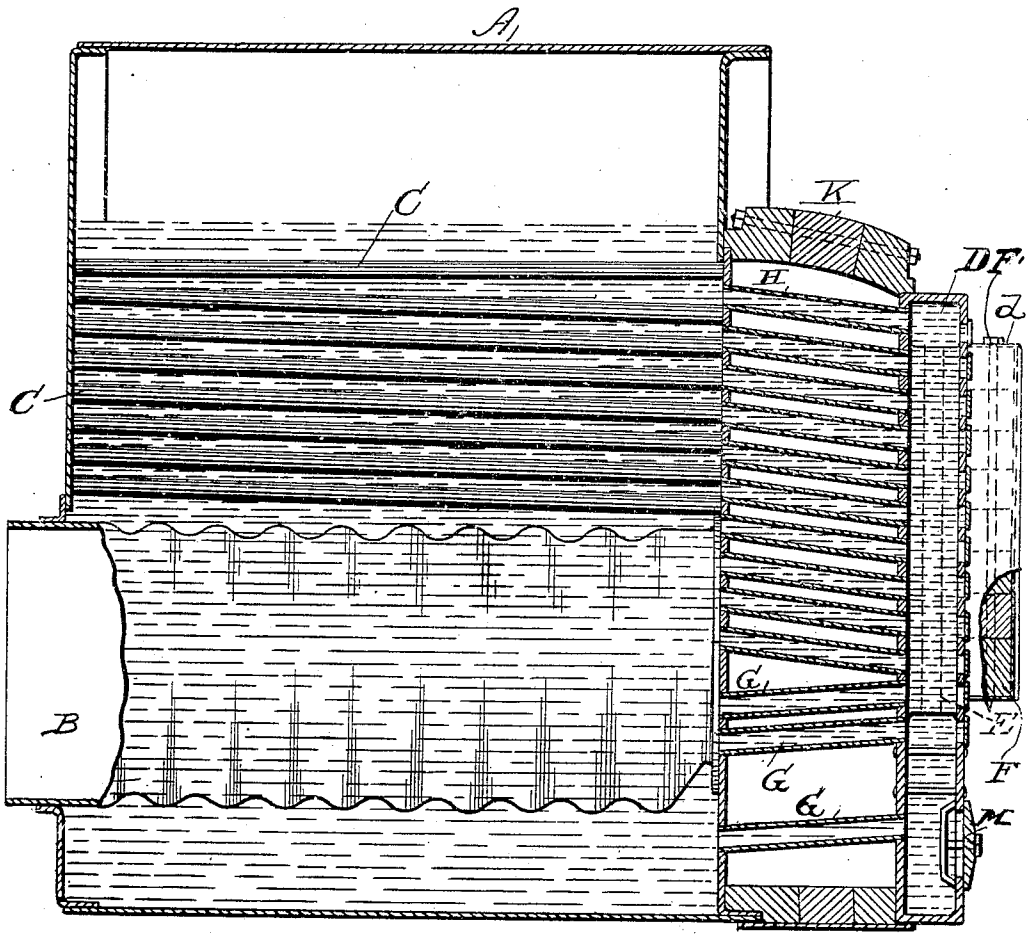

Fig. 1.

Witnesses

O. B. Baenziger.

Grace E. Wynkoop.

Inventor

Thomas Barrow

By S. E. Thomas

Attorneys

T. BARROW.

STEAM BOILER.

APPLICATION FILED JULY 31, 1909.

948,366. Patented Feb. 8, 1910.

3 SHEETS—SHEET 2.

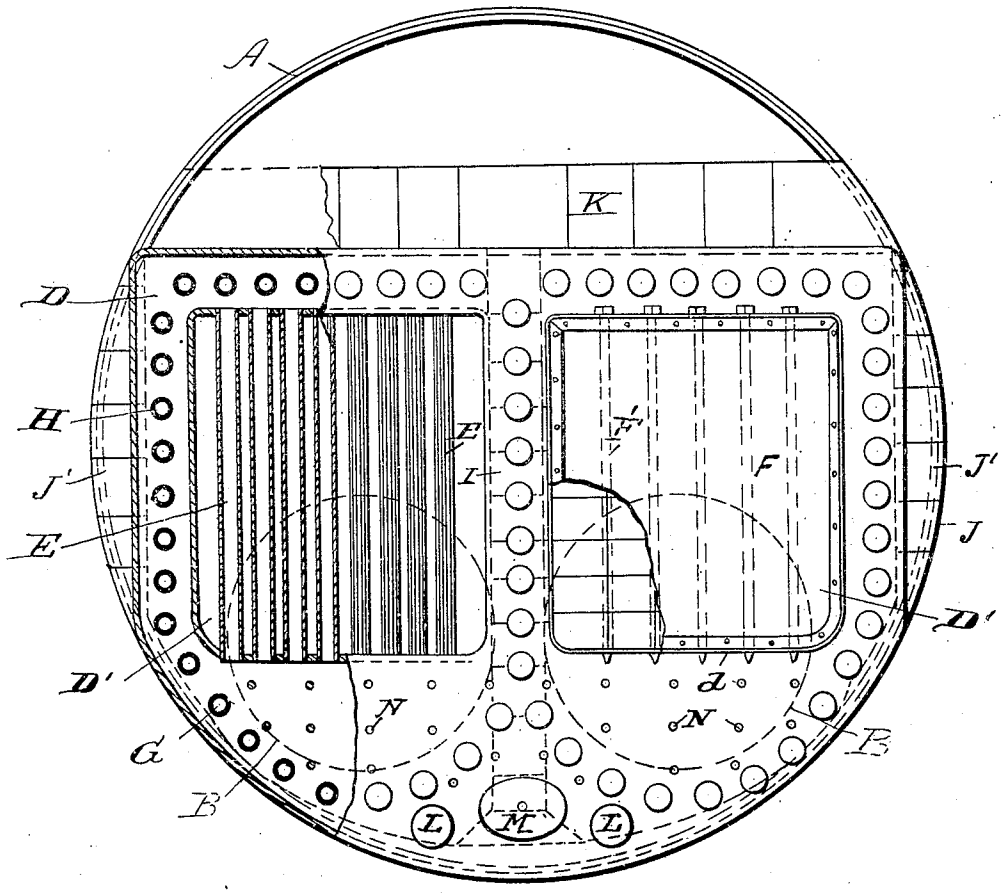

Fig. 2.

Witnesses

O. B. Baenziger.

Grace E. Wynkoop.

Inventor

Thomas Barrow

By S. E. Thomas

Attorneys

T. BARROW.

STEAM BOILER.

APPLICATION FILED JULY 31, 1909.

948,366.

Patented Feb. 8, 1910.

3 SHEETS—SHEET 3.

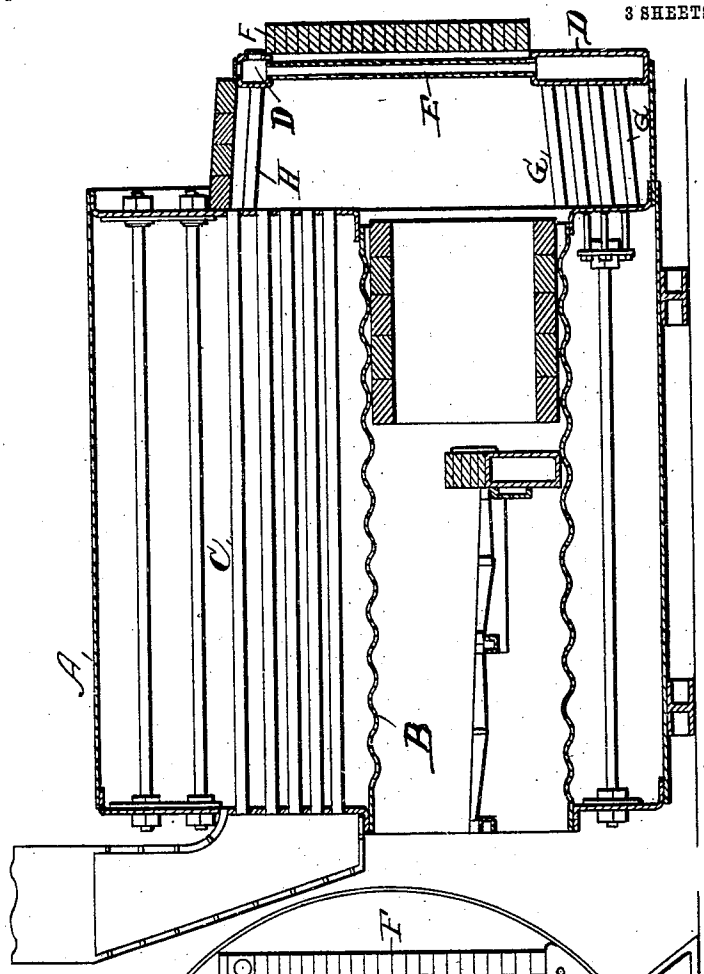

Fig. 3.

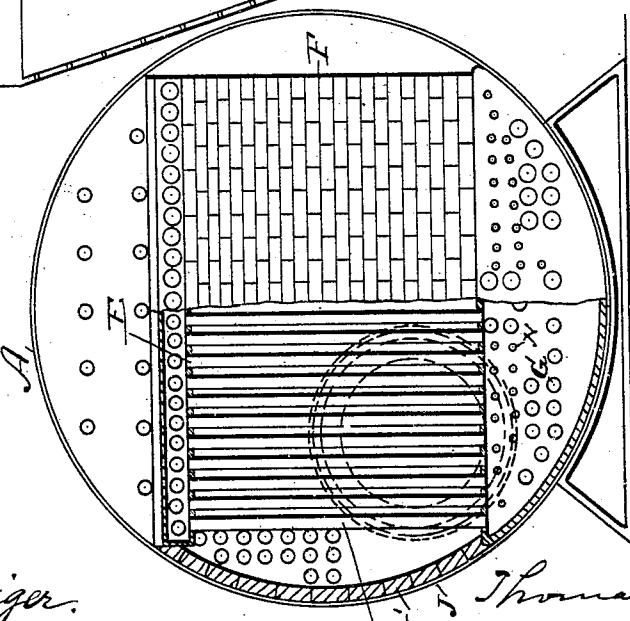

Fig. 4.

Witnesses

O. B. Baenziger.

Grace & Wynkoop.

Inventor

Thomas Barrow

By

E. E. Thomas

Attorneys

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS BARROW, OF DETROIT, MICHIGAN.

STEAM-BOILER.

948,366. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed July 31, 1909. Serial No. 510,562.

To all whom it may concern:

Be it known that I, THOMAS BARROW, citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Steam-Boilers, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in steam boilers, shown in the accompanying drawings and more particularly pointed out in the following specification and claims.

One of the objects of my invention is to increase the rapid circulation of the water by connecting the boiler and a header by water tubes leading from points near the bottom of the boiler on an upwardly inclined angle toward the header, and from the header by upwardly inclined water tubes back to the boiler,—the top row of water tubes entering, however, below the top row of fire flues; the products of combustion causing the water to circulate freely from the bottom of the boiler into the header and from the latter back to the boiler.

By arranging the top row of water tubes from the header back to the boiler so that they deliver the water below the fire flues, the water tubes will always be below the water line in the boiler and the water circulating through them is forced to pass up between the fire flues before it reaches the water line of the boiler.

A further improvement is in the construction of the header itself. It may be either of welded steel plate or a steel casting,—the arrangement being such that the flues may be put in position from the back of the boiler into the header. By this arrangement separate combustion chambers may be provided if desired. To provide for rapid circulation from the bottom to the top of the header, vertical tubes are employed around which the products of combustion pass,—the openings through the header being bridged by water tubes and closed at the back by a fire brick wall, spaced therefrom for the passage of the products of combustion around the tubes.

Other advantages and improvements will hereafter appear.

In the drawings: Figure 1 is a longitudinal vertical section through the boiler and header connected to the same. Fig. 2 is a rear end elevation with parts broken away and in section to more clearly show the construction. Fig. 3 is a longitudinal vertical section of a somewhat different type of boiler to that shown in Figs. 1 and 2,—the header in this case being in two parts joined by vertical water tubes, the upper and lower parts being respectively connected to the boiler by inclined water tubes, as in the former case. Fig. 4 is an end elevation of the boiler shown in Fig. 3, with parts broken away and in section showing the vertically disposed water circulating tubes connecting the upper and lower members of the header.

Referring now to the letters of reference placed upon the drawings:—A is the shell of the boiler.

B is a furnace flue of the usual corrugated type.

C are fire flues.

D is a header or water chamber which may be provided with openings D′ in line with the furnace flues B. The header, however, may be formed without these openings but when formed as shown, in order to provide for the rapid circulation of the water from the bottom to the top of the header, the openings are bridged by water circulating tubes E. Bolted or otherwise secured to the header and forming a projecting flange or frame, is the member *d* in which is supported a fire brick wall F spaced from the tubes E and held in place by the bolts F′ passing through grooves shaped in the edge of the brick to receive them.

G are a series of water tubes connecting the back end of the boiler with the header,—the tubes being inclined upwardly from the bottom of the boiler toward the header. H are a series of water tubes also connecting the header with the boiler being inclined upwardly from the header toward the boiler. The top row of water tubes enter below the top row of fire flues C,—the two top rows of fire flues being spread apart at the back to provide for the entry of the top row of water tubes between them.

I is a wall formed of brick or tile dividing the combustion chamber into two compartments,—the tile being supported by inclosing the centrally arranged row of water

circulating tubes dividing the combustion chamber. By providing two separate combustion chambers they may be used independently for forced draft, the fire brick wall materially aiding in the combustion.

J are the side walls of the combustion chamber which may be of light iron.

J′ is a brick or tile wall between the side walls and the water tubes being spaced from the latter for the passage of the products of combustion around the tubes. The brick wall surrounding the central row of water tubes dividing the combustion chamber into two compartments and the brick wall between the outer row of circulating tubes and the outer jacket or wall forming the combustion chamber, serves to protect the tubes and outer jacket and also when heated assists the combustion of the gases within this chamber.

K is an arch formed of tile or brick extending from the top of the header to the boiler and bridging the combustion chamber,—the arrangement being such that a space is left between the arch and the top row of water tubes leading from the header to the boiler in order that the flame may freely pass around the water tubes before passing on through the fire flues to the stack.

L are clean-out holes in the lower part of the header and practically in line with the bottom of the combustion chamber in order that the latter may be readily cleaned from the back of the boiler.

M is a hand hole in the lower part of the rear wall of the header. In the rear end of the header in line with the circulating tubes are hand hole plates, upon removing which the tubes may be cleaned or taken out if required,—the construction being such that all of the tubes may be expanded from the back end of the boiler with an extension expander if desired.

N are stay bolts placed in the wall of the header.

Having indicated the several parts by reference letters, the operation will be readily understood. The inclined water tubes leading from the boiler to the header will take up the water passing out to the header,—the tubes being exposed to the products of combustion as it passes around the tubes, to and through the header, and out through the fire flues,—thereby greatly increasing the rapid circulation of the water through the boiler and header. By inclining the tubes from the header to the boiler and from the boiler to the header, the friction incident to the passage of the water through the tubes is materially reduced.

It will be noted that provision has been made for the passage of the products of combustion completely around the tubes including the tubes bridging the open space formed in the header. It will also be noted that the brick lining having once become heated, will materially aid the combustion of combustible gases and thereby the rapid circulation of the water.

Having thus described my invention, what I claim is:—

1. In a boiler, a header provided with openings, vertical tubes bridging said openings and connecting the upper and lower parts of the header, brick walls closing said openings and spaced from said tubes, means for supporting the brick walls, a series of fire flues, a plurality of upwardly inclined water tubes leading from the bottom of the boiler into the header, a plurality of upwardly inclined water tubes leading from the header back to the boiler but below the fire flues, and an arched wall bridging the space between the end of the boiler and the header above the water tubes and spaced therefrom, substantially as described.

2. In a boiler, a header provided with openings spaced from the rear end of the boiler, vertical water tubes bridging said openings and connecting the upper and lower parts of the header, a plurality of inclined tubes leading from the boiler to the header and back to the boiler between said openings, a brick wall inclosing said latter tubes forming separate combustion chambers, an outer jacket leading from the boiler to the header, a plurality of inclined tubes leading from the boiler to the header and from the header to the boiler adjacent to said jacket, a brick wall between said jacket and the tubes and spaced from the latter, and an arched wall bridging the space between the end of the boiler and the header above the water tubes and spaced therefrom, substantially as described.

In testimony whereof, I sign this specification in the presence of two witnesses.

THOMAS BARROW.

Witnesses:
GRACE E. WYNKOOP,
SAMUEL E. THOMAS.