

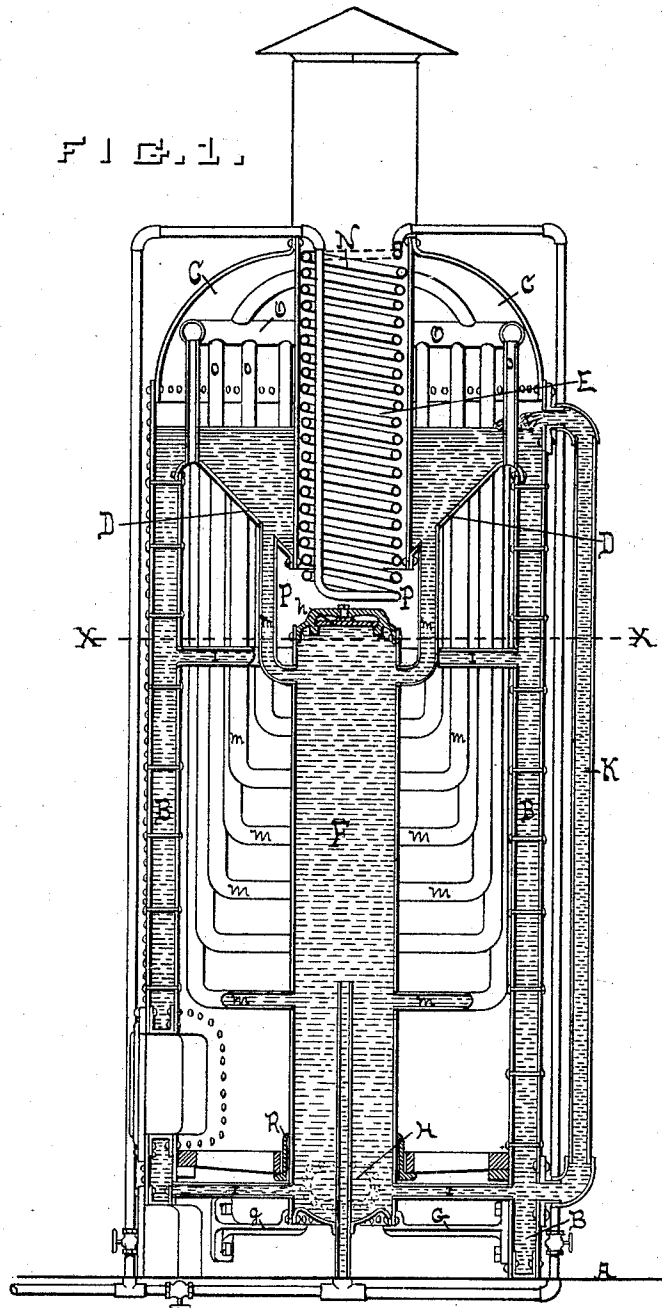
(No Model.)

2 Sheets—Sheet 1.

M. H. PLUNKETT.
WATER TUBE BOILER.

No. 474,645.

Patented May 10, 1892.



WITNESSES:

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Augustus E. Carlson.

INVENTOR

Michael H. Plunkett

(No Model.)

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FIG. 2.

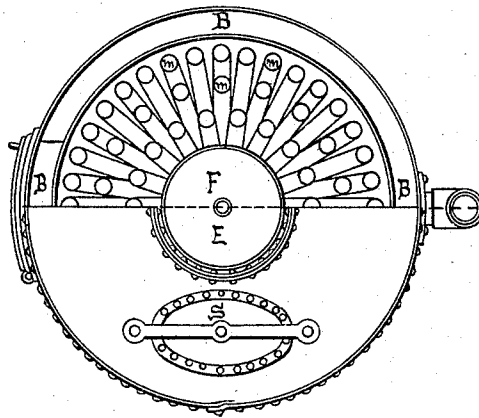


FIG. 3.

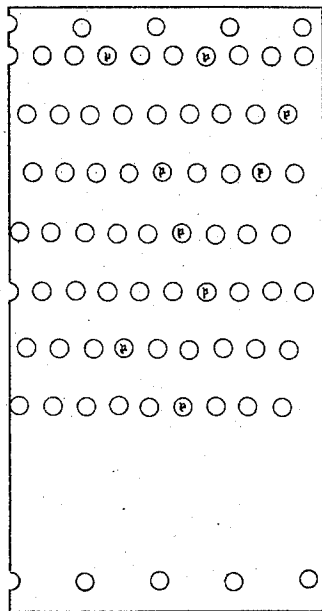
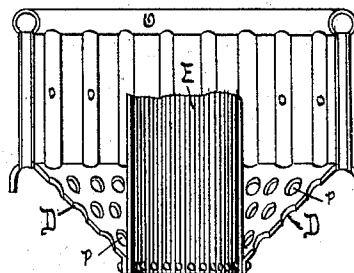


FIG. 4.



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UNITED STATES PATENT OFFICE.

MICHAEL H. PLUNKETT, OF BALTIMORE, MARYLAND, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO WASHINGTON BOWIE AND ELIJAH J. BOND, OF SAME PLACE.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 474,645, dated May 10, 1892.

Application filed April 3, 1891. Serial No. 387,544. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL H. PLUNKETT, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Water-Tube Boilers; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in vertical water-tube boilers; the object being to provide a boiler that can be built cylindrical and circular in form, dispensing with the flat or crowning tube-sheets; a boiler that will reclaim and utilize part of the great heat carried off into the smoke-stack; a boiler with a direct draft through the center, arranged so that the heated gases must circulate around the tubes before entering the uptake, thus producing a thorough mixture of the gases of combustion in passing through the boiler to the smoke-stack, causing the heat to be detained and thoroughly distributed around the tubes before escaping, without the use of deflecting-plates or other methods to divert the heat from one part of the boiler to another, which is necessary in boilers having the smoke-flue on the side, as heat will go directly to the exit, wherever it may be, without coming in contact with all the tubes and heating-surfaces, thus causing a great loss of heat of a high temperature, which in many cases will melt antimony in the base of the smoke-stack.

The vertical water column used in this boiler is closed at both ends and supported at the base from the side walls of the boiler, with an opening around the top between the top of the water column and the bottom of the tube-box for the escape of the products of combustion. This water column has a series of water-tubes connecting it to the tube-box, also circulating-pipes to keep up a circulation between it and the water-space around boiler. The smoke-flue is placed in the center of the boiler and directly over the water column. By this arrangement the products of combustion

are brought from all parts of the boiler, circulating around a great number of tubes to the center escape. Through this central smoke-flue the center of the boiler can be entered from the top to clean and repair it, and the water column can be taken out and replaced in the same manner without cutting the tube-box, moving the boiler, or disturbing any of its connections. The water column is not attached to the tube-box, nor does it rest on the boiler-foundation, but is supported at the base from the side walls of the boiler. By this arrangement the water column and the tube-box are protected from any strain due to expansion or contraction, the settling or changing of foundations, which frequently happens to all foundations, such change being a common occurrence on board of ships in a heavy sea. If the water column is attached to the tube-box the weight of the boiler and the water it contains may be thrown on the tube-box. The space between the top of the water column and the uptake is provided with a coil feed-water heater to detain and reclaim heat passing out the smoke-stack, thus utilizing heat that otherwise would be lost. The cylindrical steam-drum is provided with two heads. The top one being put convex in form requires no stays, and in place of a lower sheet there is provided an inverted section of a cone to receive the tubes, this shape giving strength and safety. The small end of this cone, is placed downward next the fire, thus forming a deep recess around the top of the cone where it connects to the inside sheet of the vertical water-leg of the boiler. This recess holds and transmits heat to the surrounding water that otherwise would escape through the smoke-flue, and from the top of this recess a series of steam-superheating tubes run into the steam-drum, with an outlet into the uptake to keep up a circulation of hot air in the tubes and recess.

The centrally-located smoke-flue used in this boiler gives a large effective area of heating-surface, superheats the steam, reclaims and utilizes a great amount of heat passing out of the smoke-flue and ties together the convex top head and the lower conical tube-box. The cylindrical and circular form of the steam-drum and tube-box does away with

all flat surfaces and strengthens the whole structure.

Outside circulating-pipes are provided for the purpose of allowing a free, unobstructed, and rapid circulation (on the principle that heated currents of water ascend while cooler ones descend) and to maintain a steady head of water, as all water-tube boilers with contracted water-spaces will lift the water when driven hard under a heavy head of steam.

The water column is surrounded by the casting G where it comes in contact with the fire to protect it from the action of the fire, corrosion, and injury by fire-tools. This casting acts as a bearing-bar for the grate-bars, and, being open or sectional, admits a supply of air to the fire to support combustion and keep the casting from burning out.

The detailed description of the boiler is as follows, in which like letters apply to like parts:

Figure 1 represents a vertical view of my boiler in section. Fig. 2 is a plan in part section on line X X, Fig. 1. Fig. 3 is a view of the plate which forms the water column. Fig. 4 is a view of the cone-shaped tube-box.

The boiler rests on a base A with a vertical water-leg B, which is connected at the upper end with the cylindrical steam-drum C and the cone-shaped tube-box D, the uptake E passing through the center of the steam-drum C. The vertical water column F is closed at both ends and rests on the support G. Two manhole-plates H h are provided for entering water column, top and bottom.

i i i i are horizontal circulating-pipes connecting water column and water-space around boiler.

K is a circulating-pipe outside of boiler, connecting steam-drum C and lower part of water-leg or boiler.

m m m m are a series of vertical water-tubes connecting water column and tube-box.

N is a feed-water heater to heat the water entering boiler.

D is a cone-shaped tube-box with a deep recess around the top for reclaiming heat.

O o are steam-superheating tubes with an outlet into the uptake.

P is an open space around top of water column for the escape of gases and for entering the boiler to clean and repair it internally.

R is a protecting-plate around water column to protect it from the action of the fire.

S is a manhole-plate in top head for entering steam-drum.

p p are tube-holes in water-column plate and cone tube box to receive water-tubes.

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

1. A vertical centrally-located water column closed at both ends and free to expand and contract and having a space above it for the products of combustion to pass to the central chimney, connected by L-shaped pipes, with

one end to said water column and with the other end to the inverted-cone-shaped tube-box, as shown and described.

2. A closed water column free to expand and contract and a central chimney above it, in combination with an annular water-space connected by horizontal circulating-tubes to the water column and by L-shaped tubes to the cone tube-box and steam-drum, as set forth.

3. In combination with a central closed water column connected by horizontal tubes with the annular water-space and by L-shaped tubes to the tube-box, the superheating-tubes extending from the top of said tube-box into the steam-drum, and a central chimney, as and for the purpose specified.

4. The superheating-tubes extending from the top of the tube-box into the steam-drum, and a central chimney, in combination with a central closed water column connected by tubes with the annular water-space and the tube-box and supported from the wall of the boiler, all as shown and set forth.

5. In vertical boilers, a central closed water column connected by horizontal circulating-tubes with the annular water-space of the boiler and by L-shaped tubes with the cone tube-box, in combination with the outside circulating-tubes connected to top and bottom of said water-space, as shown and set forth.

6. A vertical water-tube boiler having therein an annular fire-box, in combination with a vertical centrally-located water column closed at both ends and supported at the base from the side walls or bottom of the boiler, with an opening around the top of the water column between the column and the tube-box to allow the products of combustion to escape around the tubes to the uptake, as shown and described.

7. A vertical water-tube boiler having therein an annular fire-box surrounded by water, in combination with a vertical centrally-located water column, a centrally-located smoke-flue, a cone-shaped tube-box, with the small end of cone placed downward next the fire, thus forming a deep recess upward and all around the top of the cone where it connects to the vertical water-leg of boiler for the purpose of absorbing heat detained there in passing out through the uptake, as shown and described.

8. A vertical water-tube boiler having therein an annular fire-box surrounded by water, in combination with a cone-shaped tube-box, a vertical centrally-located water column closed at both ends and supported from the base, provided with inside horizontal circulating-tubes to maintain a circulation of water between water column and water-space around the boiler, a centrally-located smoke-flue with a feed-water heater at its base extending downward to check the rapid escape of heat that it may be utilized in heating the feed-water entering the boiler, as shown and described.

9. A vertical water-tube boiler having therein an annular fire-box surrounded by water, in combination with a centrally-located smoke-flue, a centrally-placed vertical water column closed at both ends and supported at the base with an opening around the top of the column, with a cone-shaped tube-box having a series of vertical water-tubes secured therein and extending downward and entering the vertical water column at right angles, connecting water column and cone-tube box and steam-drum of boiler, and also a series of steam-superheating tubes extending from the top recess of the tube-box into the steam-drum, with an outlet into the uptake to keep up a circulation of hot air in tubes and recess in tube-box, as shown and described.

10. A vertical water - tube boiler having therein an annular fire-box surrounded by water, in combination with a centrally-located smoke-flue, a cylindrical steam-drum having a convex top head and the lower head

or tube-box cone-shaped, a vertical centrally-located water column closed at both ends and supported from base of boiler, and provided with protecting-plates where the fire rests against it to prevent injury by heat or corrosion, as shown and described.

11. A vertical water - tube boiler having therein an annular fire-box surrounded by water, in combination with a centrally-placed smoke-flue, a cone-shaped tube-box, a vertical centrally-located water column closed at both ends and supported at the base, and provided with circulating-pipes outside of the boiler to facilitate the circulation of water between the upper and lower parts of the boiler, as shown and described.

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

MICHAEL H. PLUNKETT.

Witnesses:

JNO. T. MADDOX,
LOUIS DUNGAN.