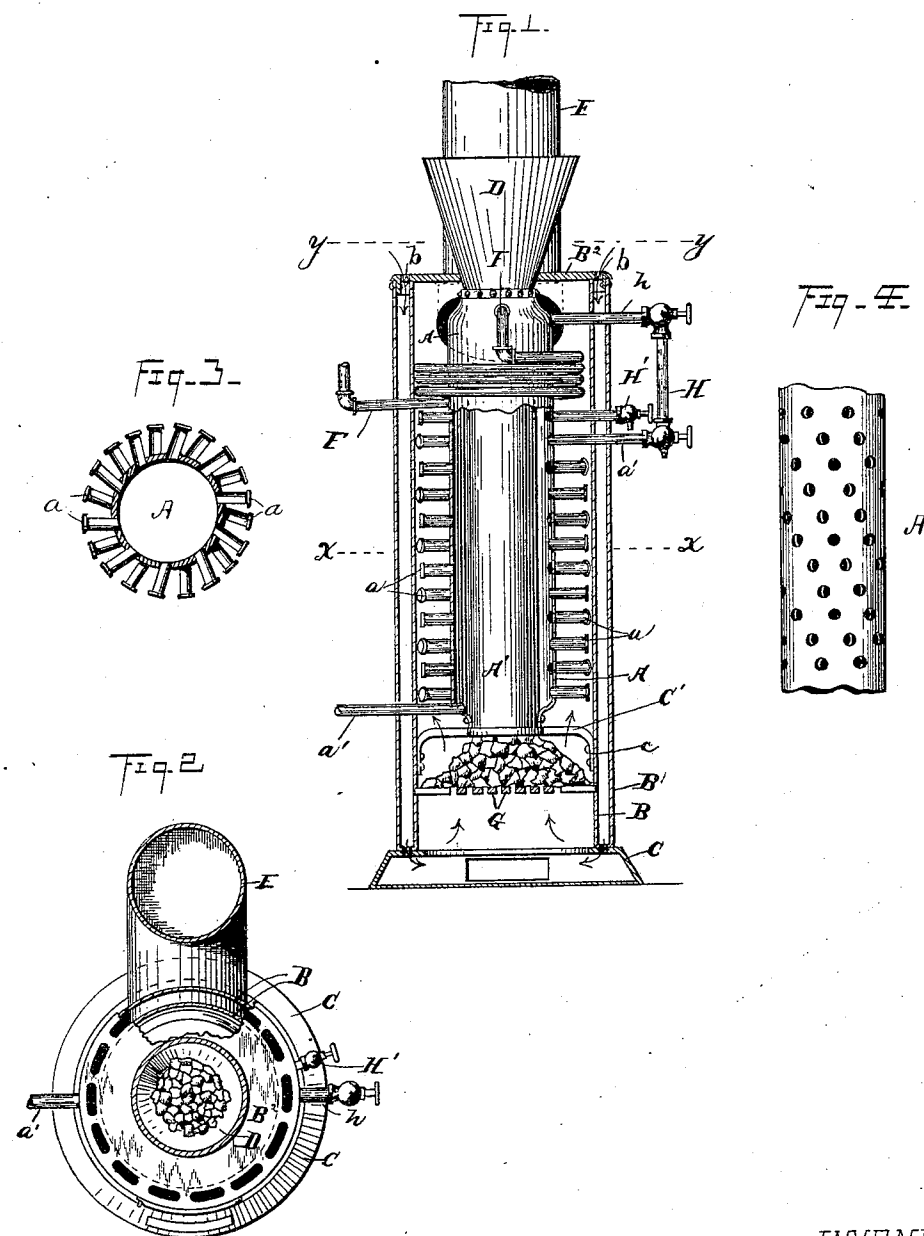


(No Model.)

C. L. WEEDEN.
PORTABLE BOILER.

No. 461,788.

Patented Oct. 20, 1891.



WITNESSES

Will D. Brown
W. D. Johnston

INVENTOR

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His
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UNITED STATES PATENT OFFICE.

CHARLES L. WEEDEN, OF MARION, OHIO, ASSIGNOR OF FIVE-SIXTHS TO
ALEXANDER B. McMURRAY, JAMES A. McMURRAY, JAMES H. VAUGHAN,
EDMOND MOLLOY, AND PATRICK DWYER, ALL OF SAME PLACE.

PORTABLE BOILER.

SPECIFICATION forming part of Letters Patent No. 461,788, dated October 20, 1891.

Application filed February 28, 1891. Serial No. 383,306. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. WEEDEN, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Portable Boilers, of which the following, with the accompanying drawings, is a specification.

My invention relates to portable boilers.

10 The object of my invention is to provide a portable boiler which is especially adapted to use in providing steam for light engines and steam-yachts, and which is also adapted to use in heating dwellings and other buildings and railway-coaches; and a further object is
15 to provide means whereby the products of combustion are caused to contact with and equally heat all parts of the boiler.

My invention consists in the features of
20 construction and combination of parts shown and described herein and defined in the claims.

In the drawings, Figure 1 is a vertical section of my improved boiler. Fig. 2 is a cross-section on the line *y y*. Fig. 3 is a cross-section on the line *xx* of Fig. 1, showing more particularly the arrangement of the tubes; and Fig. 4 is an elevation of the boiler, the
30 tubes being removed to show the spiral trend of the openings in which the tubes are secured.

The boiler proper, which is of the porcupine type, consists of two cylindrical shells A and A'. Radial tubes *a* are tapped into the outer
35 shell A. Water is held in the chamber formed by the two shells A and A' and in the radial tubes *a*, being carried thereto by the feed-pipe *a'*.

Outside of and inclosing the boiler proper
40 are two casings B and B'. The whole device rests upon an ash-pit. The boiler is supported by the bracket C', which is in the form of a yoke, into which the lower end of the boiler rests, and is secured to the inner
45 casing B, as seen at *c* in Fig. 1.

A hopper D on the top of the boiler opens into the inner shell A', the opening through said shell forming a magazine for coal. A plate B'' covers the top of the device outside
50 of the hopper D. Said plate has holes through

it, which communicate with the open space between the inner and outer casings B and B'. A stack or pipe E for the escape of the products of combustion communicates with the space between the boiler-shell A and the
55 inner casing B.

A pipe F is tapped into the top of the boiler and circles around it any desired number of times, as illustrated, and passes out through the casings B and B', as at F', and provides
60 for taking steam from the boiler.

Below the lower end of the boiler, in the fire-box, I fix a grate G of any suitable construction.

H is a water-gage, which has its upper con-
65 nection *h* at the top of the boiler and its lower connection with one of the radial tubes *a'*, which is extended through the casings B B'. H' is a blow-off cock fixed to one of the radial
70 tubes.

K represents coal fed into the device.

By reference to Fig. 4 it will be seen that the openings in the shell A, in which are secured the tubes *a*, are arranged a greater distance apart horizontally than vertically, and
75 also that the successive series or rows of openings are not in vertical alignment, but are arranged at an angle to each other. It will further be noted by reference to Fig. 3 that the rows of tubes are set at an angle to the radius
80 of the boiler-shell. By thus arranging the radial tubes *a*, I create a plurality of spiral draft-passages, which entirely encircle the boiler and trend upward at an angle of about fifty-three degrees. By having the tubes arranged
85 at an angle to each other, as stated, and also at an angle to the radius of the boiler-shell the natural line of draft of the products of combustion is broken, and the flames are re-
90 tardated in their escape and are caused to envelop all of the radial tubes and heat them equally, thus causing a saving in fuel, inasmuch as all of the heat is utilized before it escapes from the stack.

I have found that it is impractical to make
95 the radial tubes *a* on their inside measurement of greater proportionate length than seven inches to one inch in diameter—*i. e.*, if the tubes are one inch in diameter, they should not exceed seven inches in length; if two
100

inches in diameter, they should not be more than fourteen inches in length. They may, however, be proportionately shorter to the diameter given than the maximum stated. If
 5 a greater proportionate length than that specified is given, there will not be a perfect circulation of water in the tubes, and they will in consequence burn off at the ends. The radial tubes *a* are closed at their outer ends.

10 The use of my invention will be readily understood from the description already given. Coal is fed into the magazine through the hopper the same as one would fill a coal-stove. The door of the ash-pit and the door to the
 15 fire-pot (not shown) are kept closed. Air enters through the openings *b* in the top plate *B'*, passes down between the casings *B B'* into the ash-pit, up through the fire-box, around the boiler between the radial tubes,
 20 and out through the stack. The steam generated is superheated in the coil of pipe *F*.

The construction and arrangement herein shown and described secures a more perfect combustion of fuel than other forms, and it
 25 has greater heating and steam-producing capacity, has a long life, and there is no danger of explosion.

Instead of a boiler of two shells, a single cylinder may be used, in which case there
 30 would be no magazine for coal. The furnace in such case would be fed through the fire-box door. The form shown, however, is preferable, as it requires little attention in firing.

What I claim as my invention is—

35 1. In a portable vertical boiler, the combination, with the boiler-shell, of tubes radiating therefrom at an angle to the radius of the said shell.

40 2. In a portable vertical boiler, the combination, with the boiler-shell, of spirally-arranged tubes radiating therefrom at an angle to the radius of the said shell.

45 3. In a portable vertical boiler, a boiler-shell having spirally-arranged tubes radiating therefrom at an angle to the radius of the shell, in combination with a superheater.

4. In a portable vertical boiler, a boiler-

shell having spirally-arranged tubes radiating therefrom at an angle to the radius of the said shell, and a superheater located above 50 the said tubes.

5. In a portable vertical boiler, a boiler-shell having spirally-arranged tubes radiating therefrom at an angle to the radius of the said shell, and a pipe coiled around the up- 55 per portion of the shell and forming a superheater.

6. In a portable vertical boiler, a boiler-shell having a plurality of rows of tubes radiating therefrom at an angle to the radius 60 of the said shell, the tubes of each successive row being arranged at an angle to the tubes of the preceding row, whereby spiral draft-passages are formed around the shell in op- 65 posite directions.

7. In a portable vertical boiler, an inner and an outer shell, the inner shell forming a coal-magazine, in combination with spirally-arranged tubes carried by the outer shell.

8. In a portable vertical boiler, an inner 70 and an outer shell, the inner shell forming a coal-magazine, in combination with spirally-arranged tubes carried by the outer shell and extending at an angle to the radius of the said shell. 75

9. A portable vertical boiler consisting of an inner and an outer shell, radial tubes tapped into the outer shell, a pipe tapped into the top of the boiler and encircling the outer shell to superheat the steam, two casings inclosing 80 the boiler, with an air-passage between said casings, a plate covering said device and having air-passages through the same, a hopper opening into the inner shell, and a stack or pipe for the escape of the products of com- 85 bustion.

In testimony whereof I affix my signature, in presence of two witnesses, this 6th day of February, 1891.

CHARLES L. WEEDEN.

Witnesses:

JOS. A. OSBORNE,
 J. H. VAUGHAN.