

I. BARTON.

VERTICAL STEAM BOILER.

No. 183,886.

Patented Oct. 31, 1876.

Fig. 1

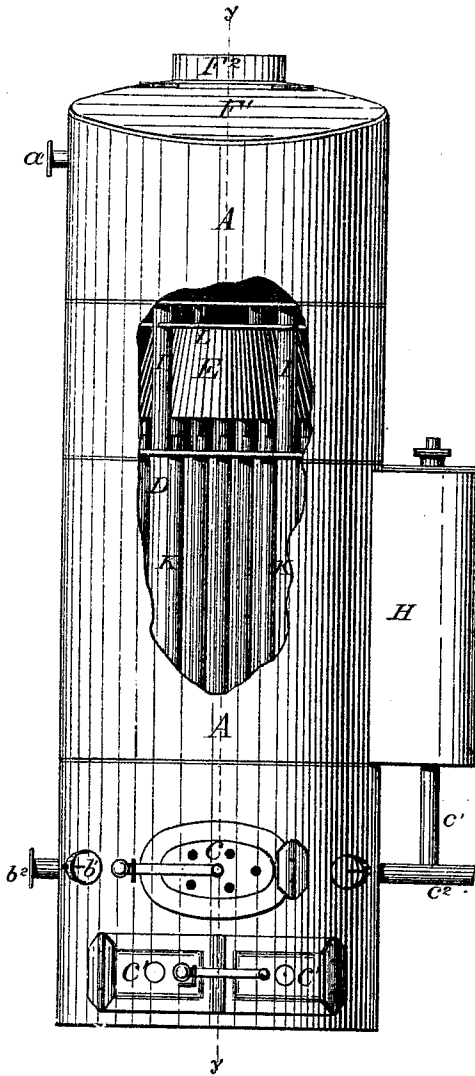
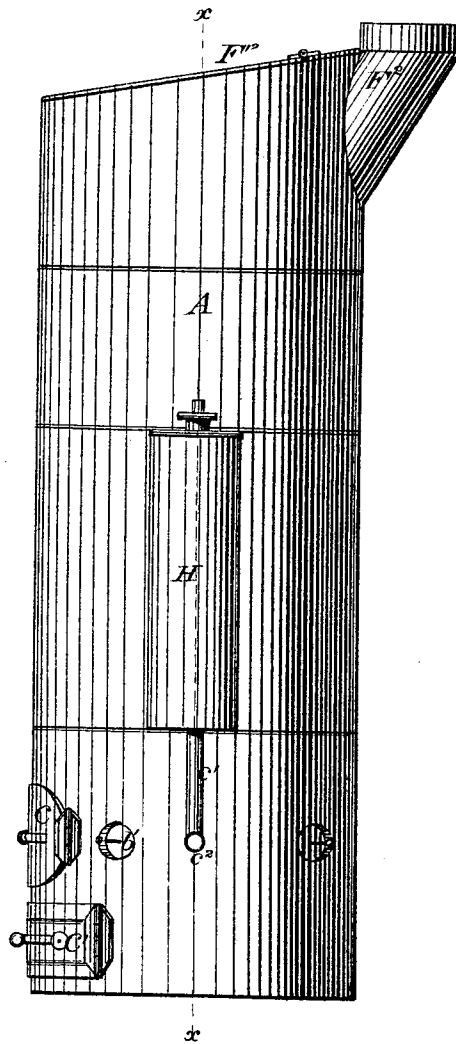


Fig. 2.



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Fig. 3.

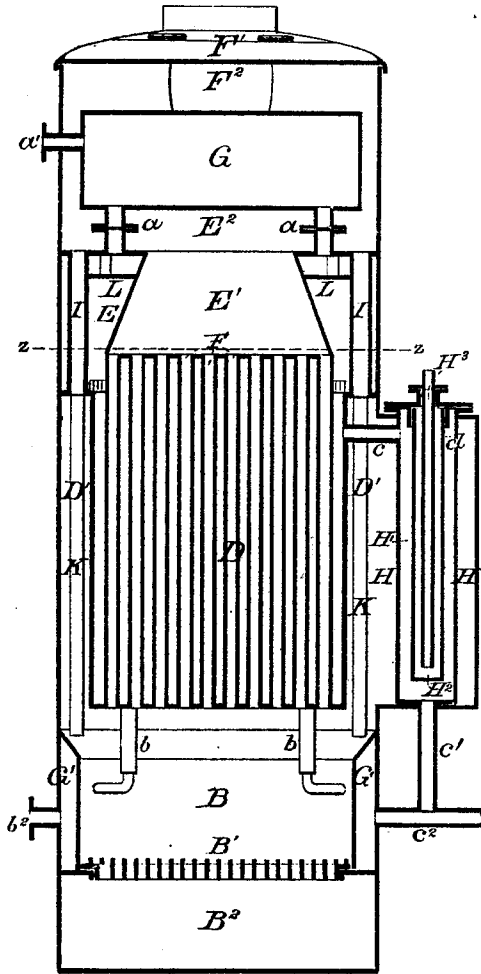


Fig. 4.

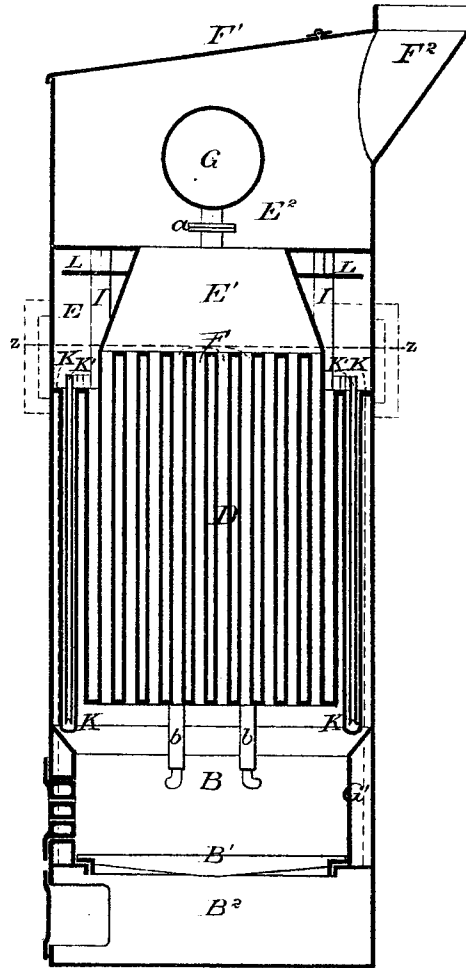
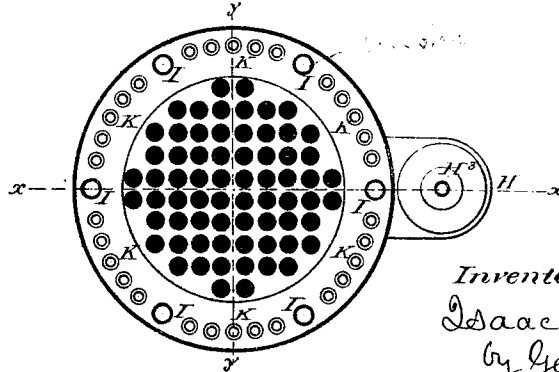


Fig. 5.



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UNITED STATES PATENT OFFICE.

ISAAC BARTON, OF WILLIAMSPORT, PENNSYLVANIA.

IMPROVEMENT IN VERTICAL STEAM-BOILERS.

Specification forming part of Letters Patent No. 183,886, dated October 31, 1876; application filed March 20, 1876.

To all whom it may concern:

Be it known that I, ISAAC BARTON, of Williamsport, in the county of Lycoming and State of Pennsylvania, have invented a new and useful Improvement in Vertical Tubular Steam-Boilers; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The object of my invention is an improvement in vertical tubular steam-boilers, and upon the patent granted to me October 26, 1875, numbered 169,225, and is more especially designed to apply the prominent features of the boiler described in such patent to a portable boiler. My invention therein consists in the construction and arrangement of the various parts, whereby the heating-surface is greatly enlarged and a compact and efficient boiler obtained, all as more fully hereinafter explained.

To enable others skilled in the art to manufacture my boiler, I now describe the same in connection with the drawings, in which—

Figure 1 is a front elevation, with the casing broken away in parts; Fig. 2, a side elevation; Fig. 3, a vertical central section on the line *x x* in Fig. 2; Fig. 4, a vertical central section on the line *y y* in Fig. 3; and Fig. 5, a horizontal section on the line *z z*, in Figs. 3 and 4.

Like letters denote corresponding parts in each figure.

A represents the outside casing of the boiler, which is put up in sections and bolted together with angle-iron joints in the ordinary manner. B is the fire-box, B¹ the grate, and B² the ash-pit. The fire-box and ash-pit are provided with suitable doors C C'. D is the boiler proper, suspended within the casing to a point a little above the fire-box, leaving a free open space, D', between the boiler and the casing. Above the boiler proper is situated the annular steam-drum E, whose center forms a combustion-chamber, E¹, and whose shell is a part of the outer casing. F are tubes which perforate the boiler proper, and connect the fire-box B and the combustion-chamber E¹. Above the combustion-chamber E¹ is the smoke-box E², having its top closed by a door,

F¹, and provided with the stack F² opening out of one side of the same. G is a cylindrical steam-drum placed in the smoke-box just above the combustion-chamber E¹, and supported upon two pipes, *a*, which connect the same with the annular drum E. A steam-pipe, *a'*, projects from the drum G through the side of the casing. The sides of the fire-box are composed of a water-jacket, G', which is connected by suitable pipes *f* with the boiler proper. Suitable hand-holes *f*¹ open through the casing into the water-jacket for cleaning out the sediment which collects in the same. A pipe, *f*², also enters the water-jacket for drawing off the water from the boiler when desired. On one side of the boiler, above the fire-box, and inclosed by the casing, is situated a vertical semicircular chamber, H, connected its entire length and width with the space D. In the chamber H, suspended at its top, is placed a large pipe, H¹, which is connected near its upper part by a pipe, *c*, with the boiler proper, and at its bottom with the water-jacket G' through the intervention of the pipes *c*¹ *c*². H² is a pipe of smaller diameter than the pipe H¹, and suspended within the same. The pipe H² has its lower end closed, and is perforated near its top, as shown by *d*, the said perforations connecting the said pipe with the pipe H¹. Inside the pipe H² is suspended a pipe, H³, of smaller diameter. This pipe has an open lower end, and is connected at its upper end with the feed-pump. I represents pipes which pass through the annular drum E, and lead the products of combustion which rise in the space D' into the smoke-box. In the space D' are suspended the circulating-pipes K, which connect with the annular drum E, and project downwardly to or below the bottom of the boiler proper. These pipes have small circulating-pipes K' placed inside of them. In the annular drum E, above the water-line, is placed a plate, L, leaving a space between such plate and the casing, which plate serves to break any globules of saturated steam and liberate the dry steam. Instead of being constructed as shown, this plate may cover the entire width of the annular chamber E, and be perforated.

The operation and advantages of the various parts of my boiler are as follows: The

water is pumped into the pipe H^3 ; from thence, through the perforations d in the pipe H^2 , into the pipe H^1 , becoming gradually heated as it advances. From the pipes H^1 it runs through the pipes c^1 c^2 into and fills the water-jacket G^1 , and then through the pipe c into the boiler proper till the same is sufficiently full. The products of combustion rise from the fire-box, pass through the tube F into the combustion chamber E^1 and smoke-box E^2 , and thence out the stack. The products of combustion also arise in the space D' , thoroughly heating the circulating-pipes K and filling the chamber H , and passing finally through the pipes I into the smoke-box, and out the stack. The water-jacket G' serves to heat thoroughly the water, and also collects the sediment from the boiler, which is cleaned out through the hand-holes. The drop circulating-pipes K form a very cheap and efficient means of heating the water, and the space D' allows the products of combustion to thoroughly heat the shell of the boiler. The pipes I lead off the products of combustion from the space D' , and utilize the same in heating the water and steam in the annular drum E . The cylindrical steam-drum, by being placed in the smoke-box, just above and across the combustion-chamber E^1 , and in the direct line of the products of combustion, superheats the steam, and at the same time is placed out of the way, so as not to take up additional room.

The door F^1 allows the entire upper part of the boiler to be inspected or easily reached for repairs.

In Fig. 4 is represented, in dotted lines, a modification of the water-jacket G' . In this

form it is extended to the bottom of the annular drum E , and connected to the same by pipes e . The jacket may also be connected to the boiler proper. This boiler is adapted to be taken down and put up in the manner of portable boilers generally.

Having thus fully described my boiler, and explained some of its advantages, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a vertical tubular boiler, the combination, with the outer casing, of the boiler proper suspended within the casing above the fire-box, an annular drum above such boiler proper, a space between the casing and the shell of the boiler proper, and drop circulating-pipes suspended from the said drum in the said space, substantially as described and shown.

2. The combination, with the casing A , of the vertical chamber H , adapted to hold a feed-water heater, inclosed by the said casing and connecting with the hot-air space of the boiler, substantially as described and shown.

3. In a portable vertical tubular boiler, the combination, with the outer casing A , of the boiler D suspended therein, the tubes F , the free open space D' , the annular drum E , the pipes I , the combustion-chamber E^1 , the drop circulating-pipes K' , and the water-jacket G' , all constructed and arranged substantially as described and shown.

This specification, signed and witnessed this 1st day of March, 1876.

ISAAC BARTON.

Witnesses:

FRANK B. GUISE,
EDWARD T. TREMAINE.