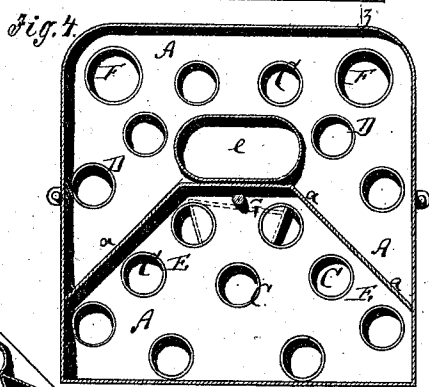
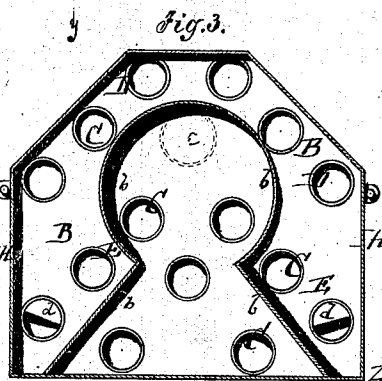
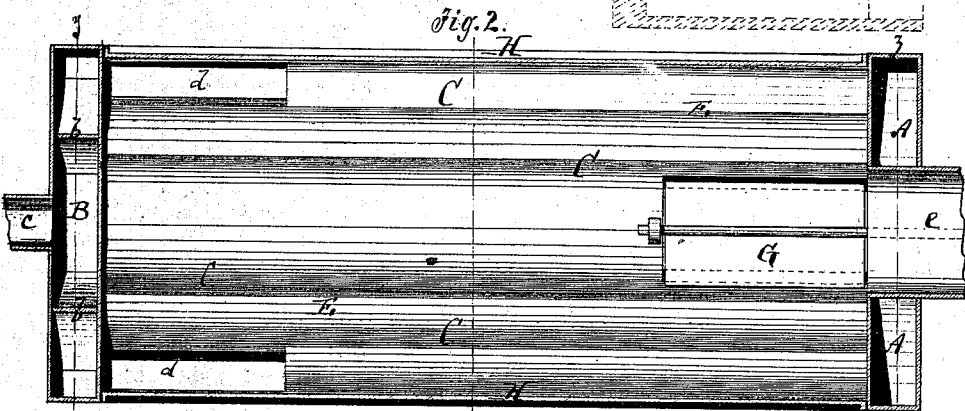
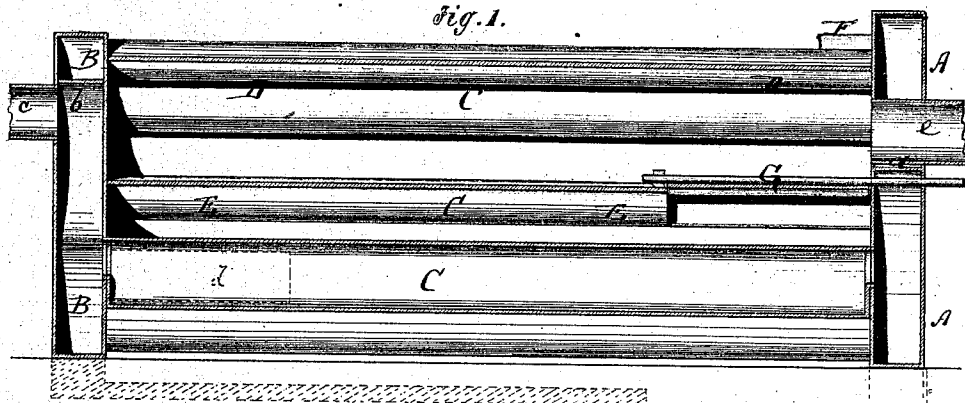


A. L. PENNOCK.

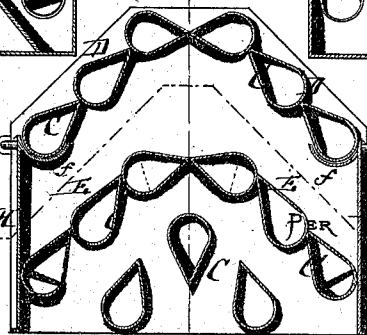
Steam Boiler.

No. 103,363.

Patented May 24, 1870.



Witnesses:
A. Bennenndorf
Alex. St. Roberts



Inventor:
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United States Patent Office.

ABRAHAM L. PENNOCK, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 103,363, dated May 24, 1870.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ABRAHAM L. PENNOCK, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and improved Steam and Hot-Water Boiler; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 represents a vertical longitudinal section of my improved boiler.

Figure 2 is a horizontal section of the same, taken on the plane of the line *x x*, fig. 5.

Figure 3 is a vertical transverse section of the same, taken on the plane of the line *y y*, fig. 2.

Figure 4 is a vertical transverse section of the same, taken on the plane of the line *z z*, fig. 2.

Figure 5 is a vertical central transverse section of the same.

Similar letters of reference indicate corresponding parts.

This invention relates to steam and hot-water boilers, and consists in certain improvements thereon, and in the method of heating the water, which will be specified hereinafter more particularly.

A in the drawing is the front-end chamber of my improved boiler.

B is the back-end chamber of the same.

The two chambers are flat, of quadrangular or other suitable form, and are connected with each other by longitudinal pipes C C.

The water to be heated enters the front chamber A through pipes F, and is confined in the upper part of the chamber A by a partition, *a*, in the latter.

It is thereby forced to enter only the pipes of the upper row D, and flow in them to the back chamber B.

There it is, by another partition, *b*, kept from the central pipes of the row E, and from the lower separate pipes, and flows back to the front chamber in the outer pipes of the row E.

It there enters the pipes formerly omitted, and flows back into that part of the chamber B which is separated by the partition *b*. Thence it escapes through a pipe, *c*.

The smoke passes along under the lower row E sur-

rounding the lower pipes C, and passes then through openings *d* in said lower row, into the space between the rows D E, in which it moves forward until it reaches the escape-pipe *e* by which it is guided to the chimney.

The pipe E passes through the chamber A at that part where the cold water enters the same, so that thus the coldest water will be brought in contact with the heat of the escaping smoke to absorb such heat almost entirely.

The steam or hot-water escapes through the pipe *c*, where the heat is collected during its passage through the openings *d*.

Directly above the fire-place is provided, in the lower range E of pipes, an aperture which is closed by a damper, G. When this damper is opened the smoke passes directly up into the pipe *e* without reaching the back end of the boiler. For starting a fire this arrangement is of great importance.

The upper range D of pipes forms the roof of the boiler.

The sides of the same are formed by metal plates H, which have curved inward-projecting flanges or troughs *f* at their upper ends, the said flanges or troughs resting under the outer pipes of the range D. The troughs are to be filled with sand or equivalent material to form smoke-tight joints.

I am aware that hollow heads subdivided into compartments for the purpose of creating a backward and forward movement of the water through the tubes is not, in itself, new, and I therefore have no desire to claim it specifically.

Having thus described my invention,

I claim as new, and desire to secure by Letters Patent—

1. The combination of front chamber A, having partition *a* and water-inlet pipes F, back chamber B, having partition *b* and water-outlet pipes *c*, with the longitudinal pipes C, arranged in rows D E, for the purpose described.

2. The side plates H, having the troughs *f*, to form tight joints on the upper range of pipes, as set forth.

ABRAHAM L. PENNOCK.

Witnesses:

C. D. COLLADY,
GEO. W. SHEPHERD.