

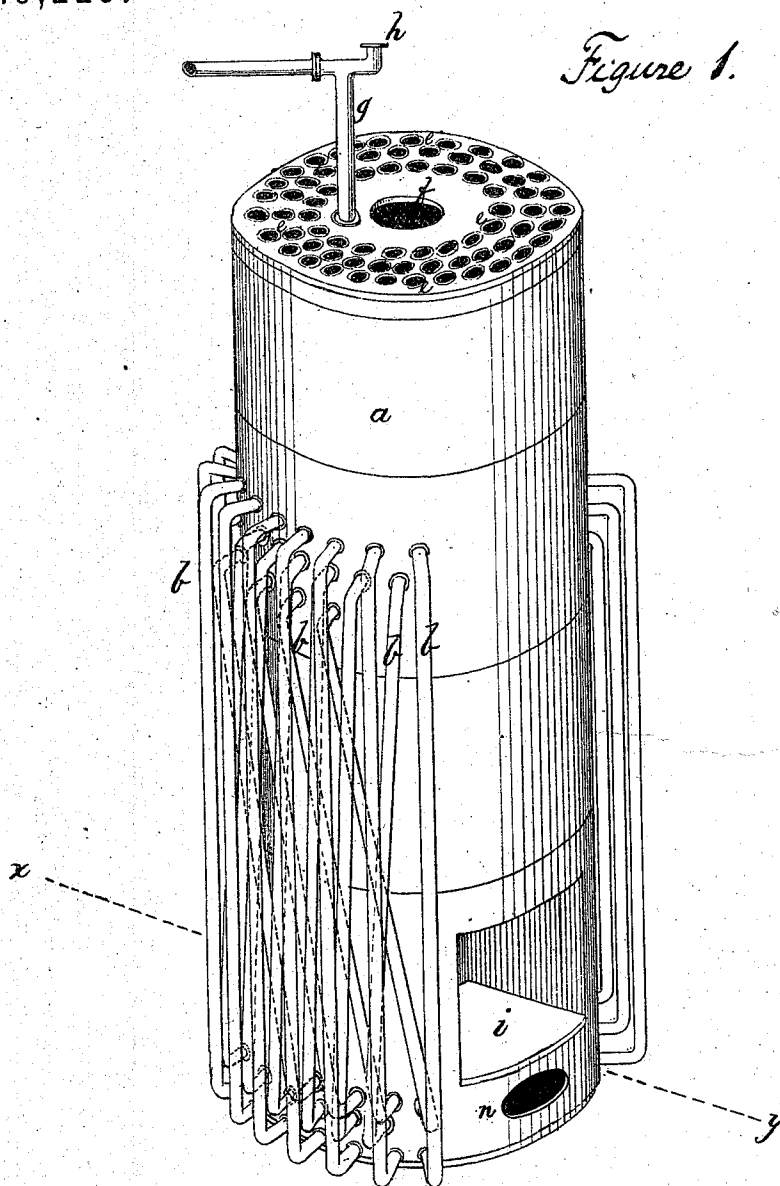
JONAS EBERHARDT.

Improvement in Steam Generators.

No. 119,225.

Patented Sep. 26, 1871.

Figure 1.



Witnesses:
 Thos. A. Burrill.
 Chas. Parham.

Inventor:

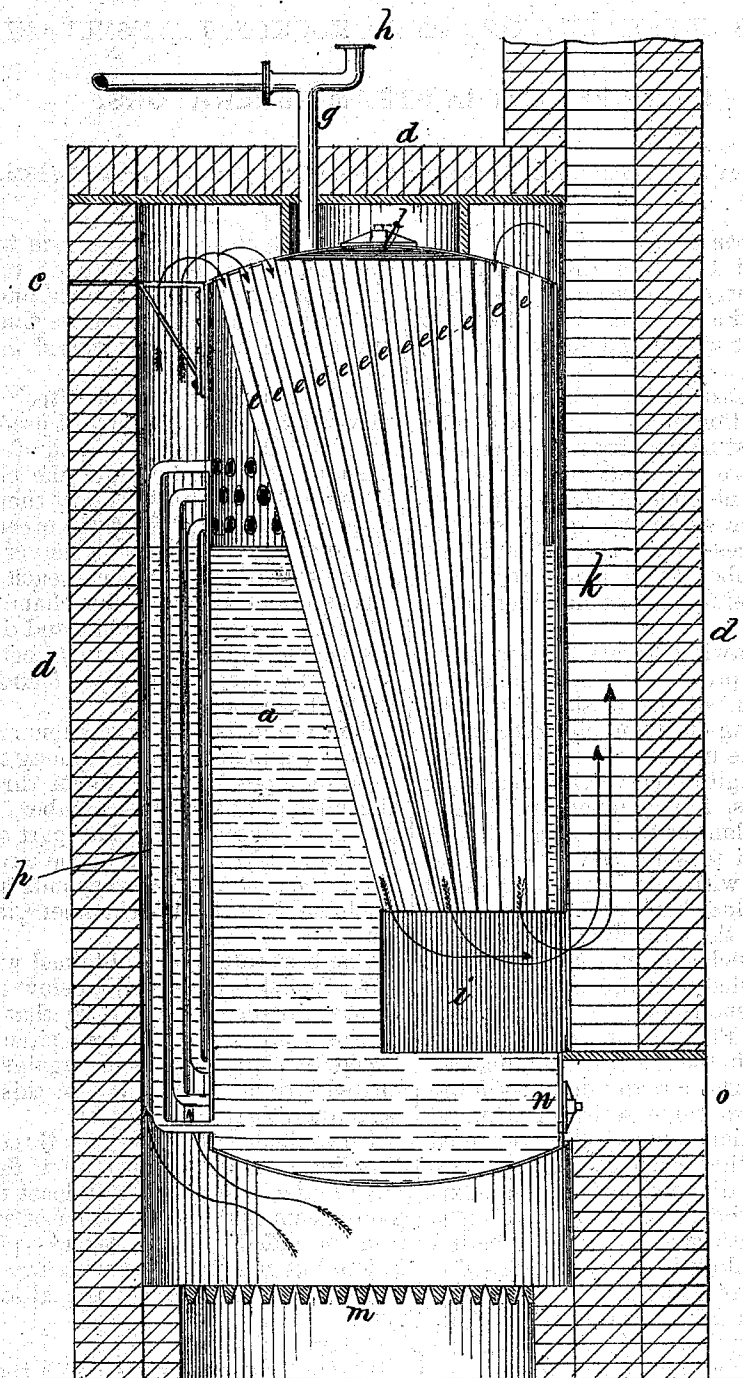
Jonas Eberhardt

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Witnesses:

Chas. A. Burt

Chas. Parkman

Inventor:

Jonas Eberhardt

UNITED STATES PATENT OFFICE.

JONAS EBERHARDT, OF CONSHOHOCKEN, PENNSYLVANIA.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 119,225, dated September 26, 1871.

To all whom it may concern:

Be it known that I, JONAS EBERHARDT, of Conshohocken, Montgomery county, Pennsylvania, have invented a new and useful Boiler or Steam-Generator, of which the following is a specification:

My invention relates to those boilers which have outside circulation-pipes. It consists of a boiler of the kind last named, furnished with interior flues, which are attached at their upper ends to the head of the boiler and at their lower ends (drawn together, as shown) to the shell of a flue-chamber or recess, into which all said flues lead, the said chamber being connected by a flue with the smoke-stack, all as hereinafter described.

In the annexed drawing, Figure 1 is a perspective view of my improved boiler, intended to show the arrangement of the outside or circulation-pipes, the drawing-off steam-pipe *g*, the man-holes *f* and *n*, and the upper ends of the interior flues. Fig. 2 is a longitudinal vertical section of the boiler, grate-bars, fire-chamber, and inclosing masonry on the plane of the line *xy* of Fig. 1; this view is intended to show the interior flues *e*, their arrangement with relation to the head of the boiler and the flue-chamber *i*, and also the fire-space *p*, between the outside of the circulation-pipes *b* and the inclosing masonry.

a is a boiler, provided with the ordinary circulation-pipes *b*, and suspended by lugs, one of which, *c*, is shown in Fig. 2, or in any other substantial manner, within the fire-chamber, inclosed by the masonry *d*. The circulation-pipes *b* are preferably arranged in three series or courses, as shown, the two inner courses being arranged so as to cross each other, each course having a direction more or less diagonal to the longer axis of the boiler and to the outside course of pipes which run parallel with said axis of the boiler. The interior flues employed by me are marked *e*. (See Fig. 2.) They are attached to the head of the boiler, as seen in Fig. 1, their points of attachment being evenly distributed, leaving clear spaces for the man-hole *f* and steam-pipe *g*. A safety-valve pipe is attached to pipe *g* at *h*. The lower ends of the flues *e* are drawn together somewhat, as shown in Fig. 2, so that all can be attached to the top of the flue-chamber *i*, which is made of sufficient size to afford unimpeded draught for the products of combustion from the flues *e* into the flue *k*, Fig. 2. *m* and *n*, Fig. 2, are the grate-bars and lower man-hole.

There should be an aperture in the masonry *d*, opposite the flue-chamber *i*, to facilitate the cleaning out of said chamber and the chimney or flue *k*. When not open for this cleansing operation the aperture is closed with bricks and mortar.

For a cylindrical boiler fifteen feet long and fifty-two inches in diameter I prefer to use sixty-nine circulation-pipes, *b*, each of two inches diameter, distributed around the exterior surface of the boiler, except that part thereof which corresponds in breadth with the breadth of the flue-chamber *i*; and I employ with very beneficial results fifty-six interior flues *e*, each of about three inches diameter, and a flue-chamber, *i*, of about two feet in length, breadth, and depth. I leave a space, *p*, Fig. 2, of one inch, between the outside of the circulation-pipes *b* and the inside of the inclosing masonry *d*.

The products of combustion rising from the furnace circulate over and among the outside circulation-pipes *b*, thence down through the interior flues *e*, into the flue-chamber *i*, thence up the flue *k*, in contact with that part of the shell of the boiler which is clear of the circulation-pipes, being the part which corresponds in breadth with the breadth of the flue-chamber *i*, into the smoke-stack.

The best results are obtained when the water in the boiler is kept a little below the upper ends of the circulation-pipes *b*, so that the contents of these pipes in their free circulation are allowed to eject themselves against the highly-heated interior flues *e*, and in this way produce large quantities of dry steam.

I have had in operation for three months past a boiler constructed as above described, and have found it to produce at least fifty per cent. more steam than a twin boiler of similar dimensions provided with the exterior pipes for circulation, but not provided with my described arrangements for securing the absorption of the heat.

I claim—

The boiler *a*, constructed with the exterior circulation-pipes *b*, the interior flues *e*, and a flue-chamber, *i*, said flues *e* being attached respectively at one end to the head of the boiler, and at the other end to the shell or wall of the flue-chamber, substantially as set forth.

Witnesses: JONAS EBERHARDT.

THOS. A. BURTT,
CHAS. PARHANY.