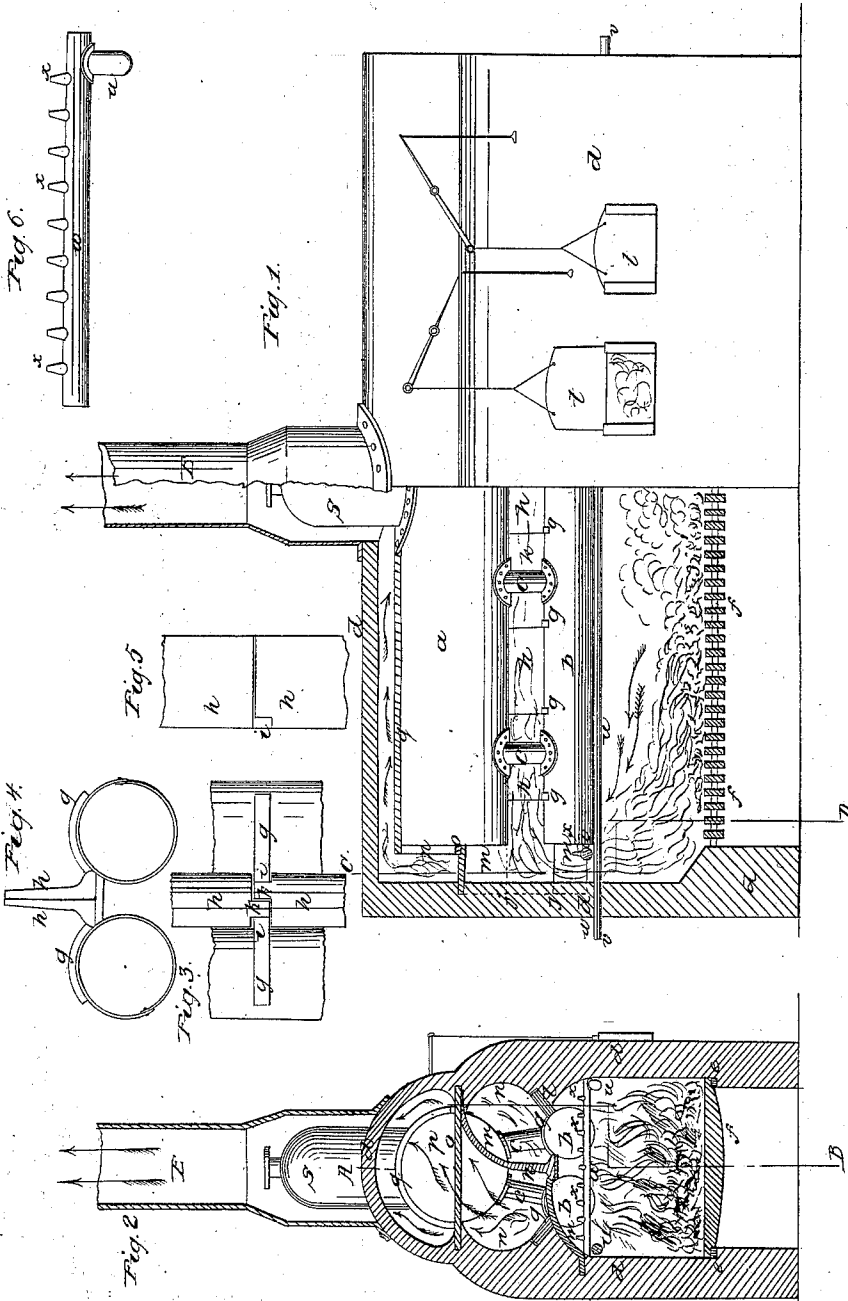


*D. C. Ambler,*  
*Steam-Boiler Furnace.*

*N<sup>o</sup> 11,110.*

*Patented June 20, 1854.*



*Witnesses*  
*Sam. G. Pratt*  
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# UNITED STATES PATENT OFFICE.

D. C. AMBLER, OF NEW YORK, N. Y.

## SETTING OF STEAM-BOILERS.

Specification of Letters Patent No. 11,110, dated June 20, 1854.

*To all whom it may concern:*

Be it known that I, D. C. AMBLER, of the city, county, and State of New York, have invented certain new and useful Improvements in the Setting of Boilers, and that the following specification, taken in connection with the drawings, is a full and sufficient description thereof.

In the drawings Figure 1, is a view of the setting partially in elevation and partially in section on the line A—B of Fig. 2. Fig. 2 is a transverse section on the line C D of Fig. 1. Fig. 3 is a top view of the tiles which form the midriff or partition between the flues on a larger scale. Fig. 4 is a section through said tiles and the water legs of the boilers, and the metallic bearers on the same scale. Fig. 5 is a side view of said tiles. Fig. 6 is a view on a large scale of the cross air pipe and nozzles thereof which admit air to promote combustion at the ends of the flues.

The object of my plan of setting is somewhat different from that usually sought, as I desire to make a given amount of fire surface as effective as possible without regard to the quantity of fuel employed, my desire in fact being to consume as much fuel as possible under a boiler of any given size. A boiler of small size and cost will therefore be as effective as a larger one so far as the amount of steam furnished is concerned while it will burn up much more fuel than is usually consumed in a boiler of the same amount of fire surface set in the ordinary manner. In all saw mills and especially in those in the southern sections of the United States, much more waste wood is furnished than is necessary to make steam, sufficient to drive the engine which actuates the mill, and it is necessary to cart away large quantities of slabs and bolts, for the double purpose of preventing incumbrance of space around the mill and as a security against fire. This waste is usually piled in heaps at a distance and burned. The saw dust is another source of annoyance and even when carted away requires time and care in order to its proper destruction by fire. Such mills and others under the same circumstances generally employ usual plans of boiler, but by making use of my method of setting they can obtain power from boilers of smaller size and get rid of a larger quantity of waste wood. At the same time that such effects are produced it is also well to secure

them in connection with such a form of boiler, as shall not be liable to accident, and is easily cleaned and accessible for the purpose of repairs. Such a boiler it was not necessary for me to invent as the form commonly known as the French boiler is well adapted for securing the above named results.

The nature of the first part of my invention therefore consists in providing a boiler substantially such as is herein described with a grate extending under its entire length or nearly so, when it is also set in such manner that the products of combustion shall pass in reverse directions between the heaters or water legs and the bottom of the main boiler, and shall then return over the top of the main boiler substantially in the manner and for the purposes described. And the nature of the second part of my invention consists in forming the midriff or dividing partition between the heaters and the main boiler substantially in the manner hereinafter described.

In the drawings a boiler *a* with heaters *b* and connections *c* surrounded by brick work *d* as shown, and upon proper bearers *e* supported in the setting are arranged grate bars *f* extending from inside to inside of the setting and forming a grate surface whose length is equal or nearly so to the length of the boiler.

The boilers themselves may be supported from beams arranged over the top of the brick work or in any other usual manner. A series of iron bearers *g g g* are then laid upon the heaters bridging the space between them and on these bearers are arranged tiles *h h h* so shaped as to make a joint against each heater and against the bottom of the main boiler. These tiles are in section like a T turned upside down and each of them is cut away at each extremity so as to clear the bearer (see letter *i*) and has also one half of its whole substance cut away for a short distance, as at *k* so that each tile may overlap the other. The endmost tiles may be built into the end walls (see dotted line *j j*) and each by means of the overlap will then support the other throughout the whole length of the series.

The ranges of fire brick or their equivalents *l l* make a tight joint between the heaters and the sides of the setting, and peculiarly formed tiles or their equivalents *m* are located at each end of the main boiler sub-

stantially in the manner represented in the drawings, these latter cause the products of combustion to pass in reverse directions through the flues *n n*. Other bearers *o o* support protectors *p p* of non, or bad conducting materials against the upper halves of the heads of the boilers and material of the same character is arranged in an arch *g g* over the whole top of the boiler. A chimney is fixed as at *r* and the steam dome is shown at *s*; suitable fire doors are arranged along the whole length as at *t t*, and as a full supply of air is essential to a great consumption of fuel I have arranged air pipes *u u* along the whole length of the boiler with one end projecting through the setting as at *v* while the other end thereof connects with cross pipes *w w* provided with nozzles *x x*.

The ends *v* are open and air will enter therein drawn in by the draft and be heated red hot or nearly so in its passage along the pipes. This air will discharge at the nozzles, and set fire to any unconsumed gases, at the same time acting as a supporter of the combustion thereof.

The drawings indicate plainly the course of the flame which parts from the center or nearly so of the furnace and then passes under the tiles *m m* and in reverse directions through the flues, ascends over the tiles *m* returns over the boiler toward its center and is discharged around the dome.

Every portion of the boiler is therefore surrounded by flame, and will from the great proportionate size of furnace be highly effective as heating surface, while the furnace is of more than 4 times the ordinary size, and will consume, without danger of accident immense quantities of slabs, bolts, and saw dust. Doors at the ends might be use-

ful, as a whole slab could then be shoved in on end. I believe however that large doors at the sides as shown are better as the opening thereof does not interfere with the current of the flame.

The bearers *g g* might be dispensed with and tiles laid directly upon the heaters, their expansion and contraction would then disturb the midriff and the plan although cheaper at first, would be less serviceable in the end.

Having thus described my method of setting boilers, I would state that I do not claim as of my invention the form of boiler herein described, neither do I limit myself to the use of a boiler provided with only two heaters, as more might sometimes be advantageous, neither do I claim as of my invention the method of distributing hot air, nor the protecting of steam surface by means of brick or tiles; but

I do claim as of my own invention—

The method of setting a boiler as herein described in so far as the same consists in grate surface extending the whole length of the boiler or nearly so when the same is employed in connection with a midriff located substantially as described, and causing the products of combustion to travel in reverse directions substantially as specified. I also claim tiles shaped substantially as herein described in connection with bearers shaped and located substantially as described for the purpose of forming a midriff or division between the flues as specified.

D. C. AMBLER.

Witnesses:

SAML. GRUBB,  
E. G. HANDY.