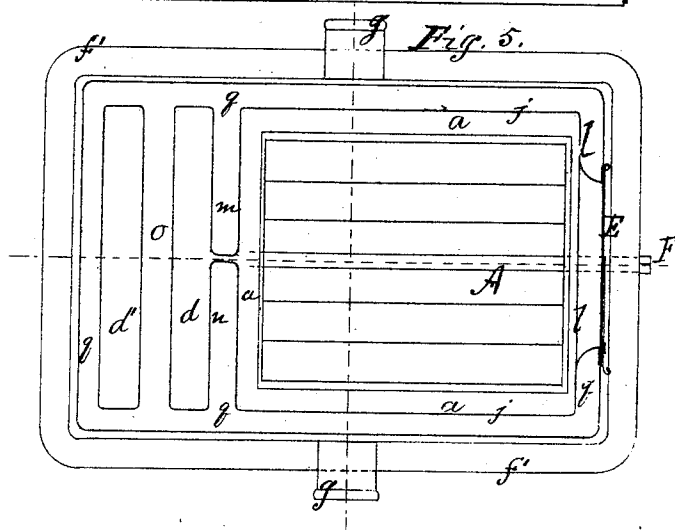
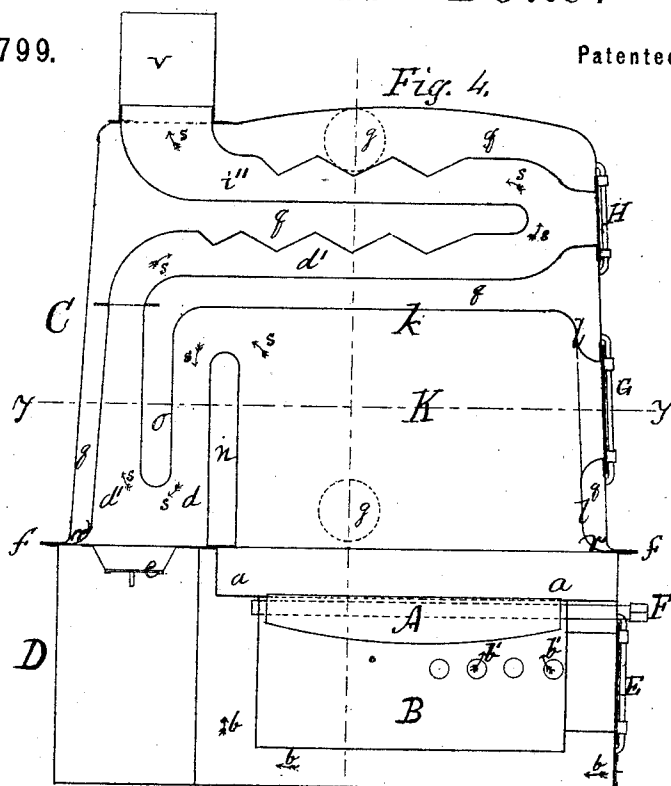


No. 118,799.

Patented Sep. 12, 1871.



Witnesses-
H. R. Peck
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UNITED STATES PATENT OFFICE.

AZEL GAY, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN BOILERS FOR HEATING BUILDINGS.

Specification forming part of Letters Patent No. 118,799, dated September 12, 1871.

To all whom it may concern:

Be it known that I, AZEL GAY, of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Boilers for Heating Buildings; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

Figure 1 represents a front view of my improved boiler. Fig. 2 represents a top view of the same. Fig. 3 represents a central vertical section of the same. Fig. 4 represents a longitudinal vertical section of the same taken at the line $x'x$, Fig. 3. Fig. 5 represents a horizontal section taken at line $y y$ of Fig. 4.

The use of water-heating apparatus for warming buildings and heating vineries and other conservatories has been known for many years, yet most of the structures for these purposes have been too complicated and expensive for general adoption; and, among those known as portable furnaces or boilers, some have been objectionable because of their liability to sustain damage from the unequal expansion and contraction of the several parts of which they were composed.

The object of my present invention is to furnish a boiler for the purposes named which, while it is portable or capable of use without masonry in which to set it up, will not be liable to the above objections, but will be simple and cheap of construction and will economize in the use of fuel, and will efficiently operate as a water-heating apparatus, especially designed and adapted for heating greenhouses or conservatories.

The base D, upon which the boiler C is supported in the present instance, is formed by the outer casing and ash-box B, and the bottom of the latter extends out laterally to the outer casing and forms an air-flue, introducing air under the ash-box and thence through the side-flues to the grate A, as indicated by the arrows $b b'$. These flues which conduct the air directly under the ash-box, and the ledges upon which the fire-brick at the sides of the grate are placed, cause the air to be heated before it reaches the grate and its fuel, and thus the heat which is radiated by the ash-pit and the sides and ends of the fire-brick is availed of for promoting the combustion of the fuel and heating the boiler. The side door e communicates with an apartment under the

combustion-flues $d d'$, in which the sliding door e is placed for access to clean out these flues. The base D and boiler C are connected by uniting their flanges at $f f$. Underneath the door E, which communicates with the ash-box B, there is a suitable register to regulate the draught of air to the furnace. The grate A may be agitated by means of the central shaft F which supports it, as represented in Figs. 4 and 5. The exterior or outer portion of the boiler C is made of a single piece of metal or casting, which has three door-ways, G H I, four tubular posts, g , for coupling on the circulating water-pipes, which will extend throughout the building to be heated, and the openings i' for the smoke-flues. The lower edges of the outer casing of boiler C terminate with the horizontal flanges f' , which will be secured to the horizontal flange at the base of the combustion-chamber K at $r r$, so as to form a water-tight joint at f . To these flanges the flange surrounding the upper edge of base D is also fastened. The interior casing of the boiler C consists of the top and sides $j k l$ of the combustion-chamber K, the bridges $m n$, water-back o , and combustion-flues d' and i'' , as represented in the drawing. The interior structure of the boiler may be cast in two or more parts, with suitable connecting-flanges. The doors H I, around the edges of which the smoke-flues $d' i''$ are secured so as to form water-tight joints, are used for the purposes of cleaning out these flues, and the door G communicates with the combustion-chamber K. The products of combustion pass through the flues $d d'$ and i'' to the exit-flue V, as indicated by the arrows S. The arrangement of the water-spaces q of the boiler in relation to the heated surfaces of the inner casings is such as to form thin sheets or bodies of water around the fire-chamber and between the combustion-flues, whereby the water will be rapidly heated, and, as fast as its particles are thus heated, they ascend and are driven through the upper ports g , thence through circulating-tubes, and returned through the lower ports to the boiler, whereby a constant revolution of the contents of the boiler is kept up.

The upper sides of the flues d' and i'' are of the zigzag form represented in Fig. 4, by which an increased heating-surface is provided; but to enable these flues to be easily cleaned out, and to prevent any obstruction of the draught, the bottoms of these flues are made smooth and level.

The two water-bridges *m n* are placed directly in rear of the grate A, with a very narrow aperture between them, whereby an increased surface of this part of the boiler is brought in contact with the caloric generated in the combustion-chamber. Besides this advantage of the divided water-bridge, the forming it in the two parts *m n* obviates the liability of injury to the boiler by any inequality in the expansion and contraction to which furnaces are often subjected.

The advantages of the construction of the boiler C so as to be capable of use upon either an ordinary brick-work furnace or on the base D, which is portable, is obvious. The boiler is independent of the base as a structure, and can be used upon any suitable base.

It is obvious that a single flue, or more than two flues, may be substituted for the flues *d' i''* and accomplish substantially the same results.

Having fully described the construction and manner of using my improved boiler, I claim, and desire to secure by Letters Patent, as my invention—

1. The combination of the outer casing of boiler C with the interior structure thereof, consisting of the top and sides of the combustion-chamber K, the bridges *m n*, water-back *o*, and combustion-flues *d' i''*, connected by the horizontal flanges *f*,

in the manner and for the purpose substantially as described.

2. The combination of the bridges *m n* with the sides *j j* of the combustion-chamber K and outer casing of boiler C, substantially as and for the purpose described.

3. The arrangement of the flues *b b'* under the ash-box and around the ledges *a* of the fire-brick, substantially as and for the purpose specified.

4. The construction of the smoke-flues *d' i''* with zigzag upper surfaces and plane lower surfaces, substantially as and for the purposes described.

5. The arrangement of the smoke-flues *d' i''* in relation to each other and to the boiler C and doors H I, whereby the narrow water-spaces *q* are formed and free communication may be had for cleaning out the flues, substantially as and for the purposes specified.

6. The combination of the base D with the interior and outer casing of boiler C, when the parts are constructed, arranged, and used in the manner and for the purpose specified.

In testimony hereof I have hereunto set my hand this 19th day of July, A. D. 1871.

AZEL GAY.

Witnesses:

H. P. K. PECK,
S. E. PECK.