D. BURBANK.

STEAM-BOILER.

No. 187,507. Patented Feb. 20, 1877.

Fig. 1.

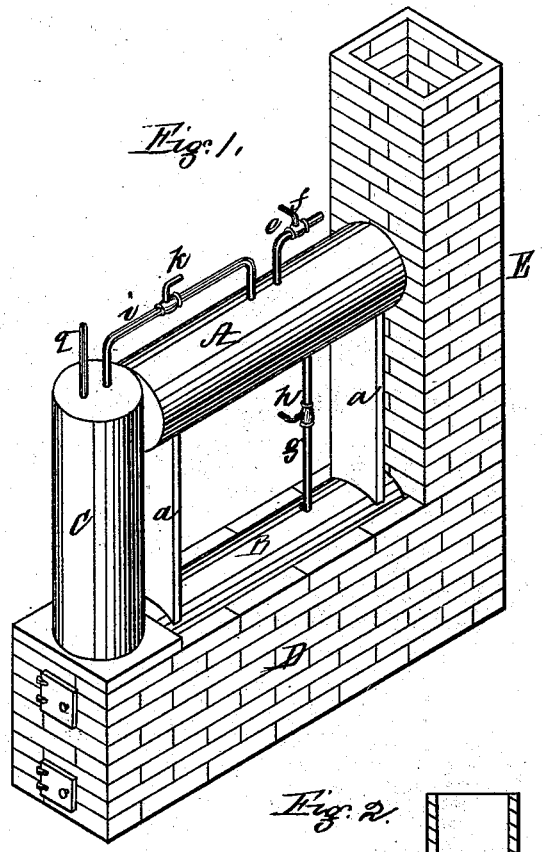
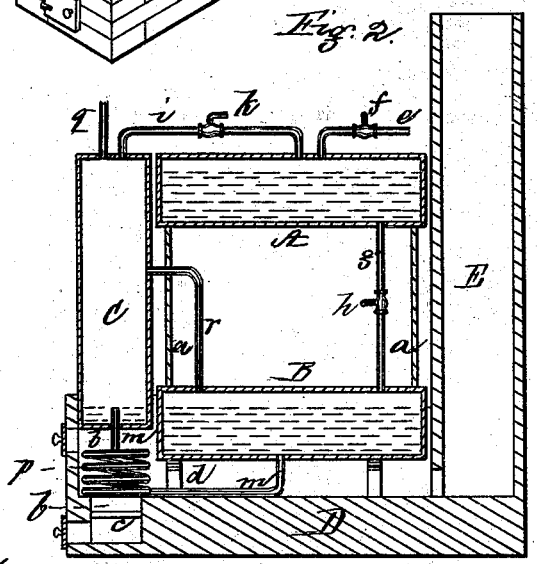


Fig. 2.



Witnesses,
W. J. Cambridge
J. E. Cambridge.

Inventor,
Daniel Burbank,
Per Teschemacher & Stearns,
Attys.

UNITED STATES PATENT OFFICE.

DANIEL BURBANK, OF WOBURN, MASSACHUSETTS.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **187,507**, dated February 20, 1877; application filed December 13, 1876.

To all whom it may concern:

Be it known that I, DANIEL BURBANK, of Woburn, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Steam Boilers or Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of a steam-generator constructed in accordance with my invention. Fig. 2 is a longitudinal vertical section through the center of the same.

My invention has for its object to generate steam more rapidly and with less fuel than heretofore, and at the same time enable the boiler to be supplied with water without the use of a feed-pump; and my invention consists in the combination of a boiler and two boiler-tanks connected together by suitable pipes, one or more coils of pipe placed within the fire-box, and forming part of the connection between the boiler and one of the boiler-tanks being employed, if desired, the water being first admitted to the upper boiler-tank, and thence passing to the second boiler-tank below, from which it passes to the coil or coils, or connecting-pipe, where it is converted into steam, which rises into the boiler, from which it is taken for use.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A B represent two horizontal boiler-tanks, and C a vertical boiler, connected together by pipes, to be hereafter described. The lower horizontal boiler-tank B and the bottom of the vertical boiler C are set in the brick-work D, while the upper horizontal boiler-tank A rests on supports *a*, rising from the boiler-tank B. *b* is the fire-box; *c*, the grate-bars; *d*, the bridge-wall, and E the chimney.

The boiler-tank A is supplied with water through the pipe *e*, which is provided with a valve, *f*, the water passing from the boiler-tank A to the boiler-tank B through the pipe *g*, which is furnished with a valve, *h*. *i* is a pipe, provided with a valve, *k*, through which the steam is allowed to pass from the boiler C to the boiler-tank A.

The boiler-tank B and boiler C are connected together by a pipe, *m*, provided with a coil, *p*, which is inclosed within the fire-box *b*, the water from the boiler-tank B passing into the coil *p*, where it is, with the consumption of a very small quantity of fuel, rapidly converted into steam, which rises through the upper end of the pipe *m* into the boiler C, which serves as a chamber for containing dry steam, the water within the boiler C rising only to the level of that in the boiler-tank B, as seen in Fig. 2.

At the upper end of the boiler C is a pipe, *q*, through which the dry steam is conducted to the point where it is to be used. The upper end of the pipe *m* rises within the boiler C to a point on a level with that below which it is not safe for the water in the boiler-tank B to fall. The boiler-tank B and boiler C are also connected by a pipe, *r*, which insures a sufficient pressure of steam within the boiler-tank B to cause the water to pass into the coil *p*, to be converted into steam, as required.

The generator being in operation, and it being desired to renew the supply of water in the upper boiler-tank A, the valve *k* in the pipe *i* is first closed, after which the valve *f* is opened, which relieves the pressure in the boiler-tank A, and allows the water to flow from the source of supply through the pipe *e* into the boiler-tank A until the desired quantity has been admitted. The valve *f* is then closed and the valve *k* opened, in order to admit steam from the boiler C, so as to produce a pressure within the boiler-tank A; and when it is desired to introduce a fresh supply of water into the boiler-tank B the valve *h* is opened, when the water will pass down through the pipe *g* into the boiler-tank B, the valve *h* being closed as soon as the desired quantity of water has been admitted; and it will thus be seen that no feed-pump is required to supply the boiler, and, consequently, the cost of the pump and the steam that would be required to operate it are saved.

If desired, two or more coils, *p*, and connecting-pipes *m* may be used instead of one, and, if desired, the coil or coils may be dispensed

with, and the boiler-tank B and boiler C merely connected by one or more short pipes; but I prefer to use one or more coils, as the steam is thereby generated more rapidly and economically in consequence of the small quantity of water acted upon by the fire.

A float in the boiler-tank B may be connected with the valve *h* in the pipe *g*, so that the boiler-tank B may be automatically supplied with water when required, thus avoiding all danger of explosion as long as the boiler-tank A is kept supplied with water.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of the boiler-tanks A B and boiler C, with their connecting-pipes *i g m r*, valves *k h*, and supply-pipe *e*, with its valve *f*, constructed and arranged to operate substantially in the manner and for the purpose set forth.

Witness my hand this 11th day of December, A. D. 1876.

DANIEL BURBANK.

In presence of—
P. E. TESCHEMACHER,
W. J. CAMBRIDGE.