

E. Thayer,
Furnace-Grate Bar.
N^o 47,053. Patented Mar. 28, 1865.

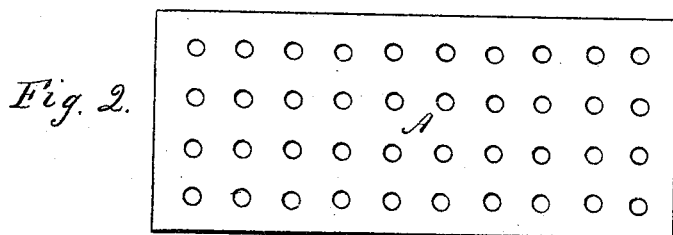
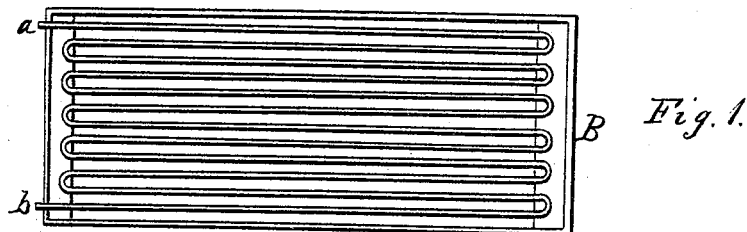


Fig. 3.

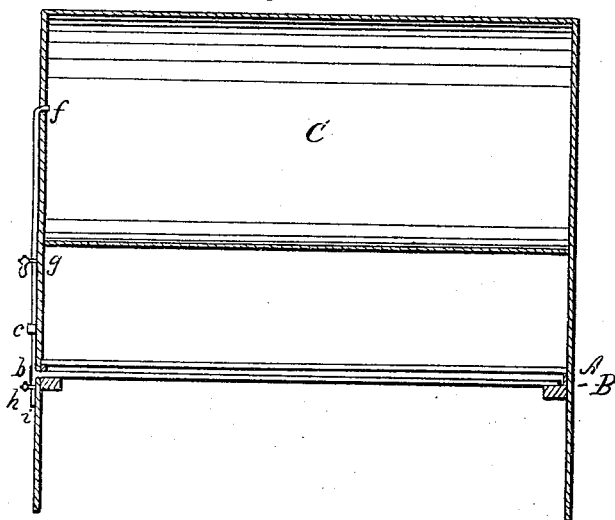
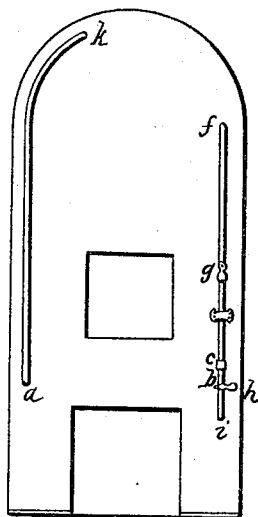


Fig. 4.



Witnesses;
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S. P. Bond

Inventor;
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Steam-Boiler Cleaner.

N^o 47,054.

Patented Mar. 28, 1865.

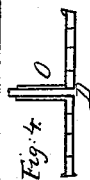
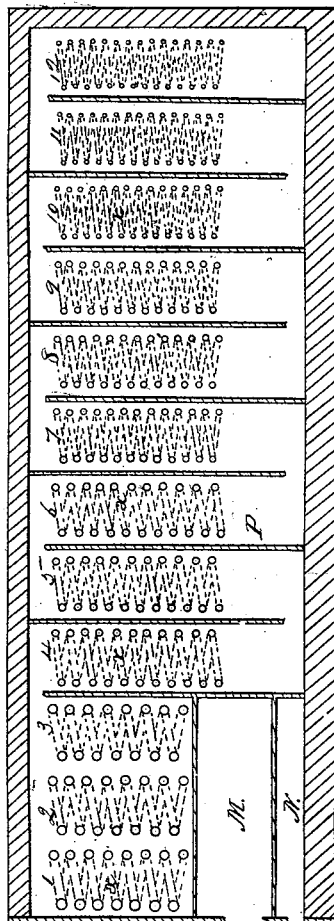
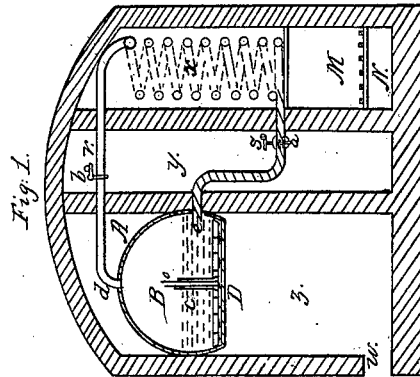
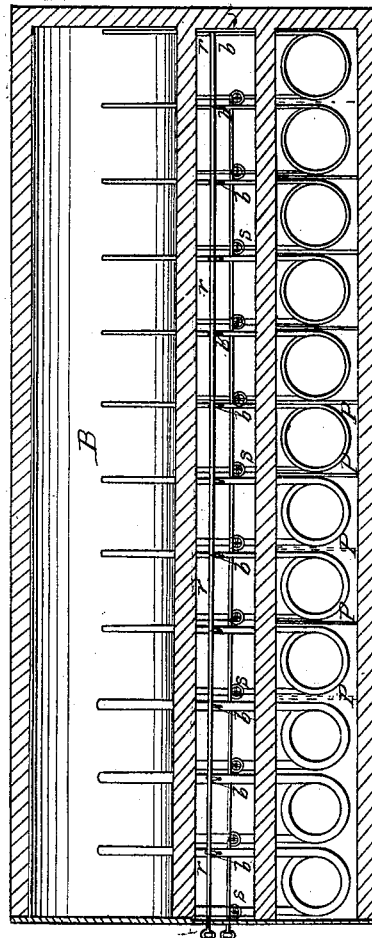


Fig. 3.



Witnesses.

Franklin Clark
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W. H. Thayer.

UNITED STATES PATENT OFFICE.

ELI THAYER, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN TUBULAR GRATES.

Specification forming part of Letters Patent No. **47,053**, dated March 28, 1865.

To all whom it may concern:

Be it known that I, ELI THAYER, of the city and county of Worcester, and State of Massachusetts, have invented a new and Improved Mode of Constructing Tubular Grates for Furnaces and Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in so arranging tubular bars with valves and stop-cocks as to form a grate and to create and continue a constant circulation of water or steam through the same, by means of which the grate is kept at a low temperature, while the heat, which in ordinary grates is only destructive, is by these means made useful in the production of steam.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figure 1 represents so much of the tubing or steam-pipe as lies within the furnace and constitutes the grate. Fig. 2 represents a screen to cover and protect the grate from wear or injury. Fig. 3 represents a side view of the grate and the pipes connecting it with the boiler, together with the stop-cock *g*, the valve *C*, and the vent or blow-off cock *h*, also of the screen *A*, Fig. 2. Fig. 4 represents the front of the furnace and the pipes through which the water enters the grate from the boiler and returns to the boiler from the grate.

In the construction of the grate I use very strong pipes, varying in size according to the length of the furnace and in distance apart according to the size of coal to be used.

The screen *A*, Fig. 2, may be made of wire, iron rods, perforated sheet metal, or cast-iron, and may be in one piece or in sections. Its object is to protect the grate, and, by making requisite a smaller number of tubes, to diminish the expense of the grate and to increase the draft of the furnace.

I will now proceed to describe the operation of my grate.

We suppose the boiler *C* to be filled with water above the flues or to some point between *f'* and *k*, Fig. 4. A fire is kindled either on the grate-bars (Fig. 1) or, if the screen (Fig. 2) be used, on it. The effect

of the heat will be to expand the water in the tubes and to create steam in a certain portion of them. The force of this expansion or steam will be exerted equally in each direction from the point where it is formed, a portion of its force being directed toward the point *b*, where the water enters the grate, and a like portion toward the point *a*, where the water or steam leaves the grate; but the force exerted in the direction of the point *b'* raises the inverted valve *c*, which stops its further action in that direction. Then the whole force of the steam and expansion acts in the direction of the point *a*, Fig. 1, and is continued to the point *k*, Fig. 4, where the heated water or steam enters the boiler. As soon as the pressure in the tubes is thus relieved or approaches an equality to that of the steam in the boiler, the valve *c*, Fig. 4, will be forced down by its own weight and that of the column of water above it, and a new supply of water from the boiler will thus be admitted into the grate, when the same action as above described will be repeated.

The passage of the water or the steam through the grate will always be more or less rapid, according to the quantity of the heat in the furnace above it. The bars will thus be kept at a low temperature.

It is probable that the circulation through the grate will be so rapid that no sediment can be deposited in it, but in case there should be, I provide for expelling it in the following manner: Close the stop-cock *g*, which shuts off the water from the grate, and open the vent or blow-off cock *h*. The steam from the boiler will then enter the pipe *a k*, Fig. 4, at the point *k*, and, passing into the grate at the point *a*, will go through the entire length of the tubing constituting the grate and pass out at the point *i*, thus removing all obstructions.

There is also another method by which the same result can be effected—that is, by combining on each side of the grate the pipes *a k* and *i f*, so that the water could be admitted to the grate for a certain length of time at one end and then at the other, this change being made as often as should be found necessary to keep the grate clear.

The pipe *a k* and the pipe *i f* are continuations of the pipe forming the grate, the first

being connected by an elbow-joint at the point *a* and the other by a T-joint at the point *b*, above the vent-cock *h* and below the valve *c*.

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

The arrangement of the several parts herein described, viz.: the stop-cock *g*, the check-valve *C*, the vent-cock *h*, the tube or pipe constituting the grate, including its connections

both with the boiler and the vent-cock *h*, and the screen which covers and protects the grate, in the manner and for the purposes above described.

ELI THAYER.

Witnesses:

S. P. POND.

ELIJAH GRISWOLD.