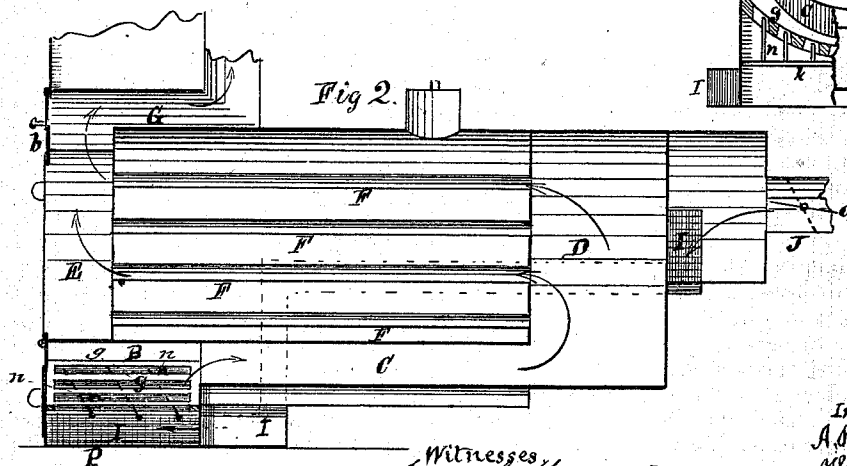
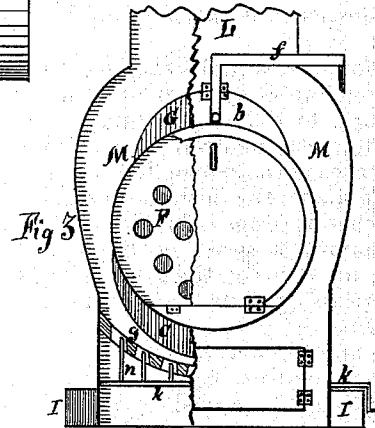
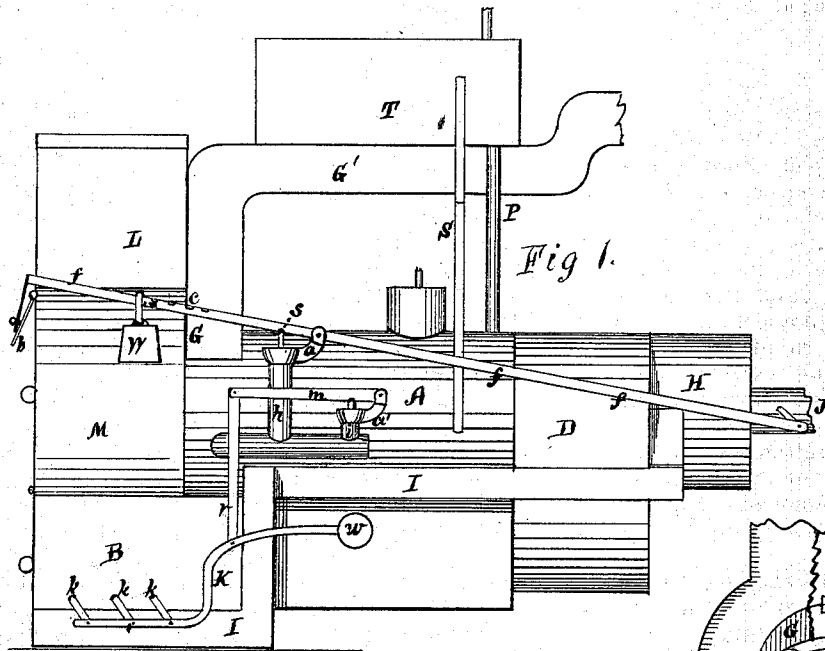


A. B. SMITH.
Boiler-Furnaces.

No. 139,522.

Patented June 3, 1873.



Witnesses
J. A. Ketchard
J. H. Loughborough

Inventor
A. B. Smith. By
J. H. Loughborough
Attorney

UNITED STATES PATENT OFFICE.

AMOS B. SMITH, OF GENEVA, NEW YORK.

IMPROVEMENT IN BOILER-FURNACES.

Specification forming part of Letters Patent No. 139,522, dated June 3, 1873; application filed October 8, 1872.

To all whom it may concern:

Be it known that I, AMOS B. SMITH, of Geneva, in the county of Ontario and State of New York, have invented certain Improvements in Boiler-Attachments, of which the following is a specification—

My invention relates to that class known as horizontal flue-boilers; and it consists more especially in the employment of a series of rocking grate-bars or rakers, which are also operated by the varying pressure of steam.

Figure 1 is a side elevation of a steam-generator having my improvements attached. Fig. 2 is a vertical longitudinal section of the same, the water-tank and a portion of the coal-reservoir being removed. Fig. 3 is a sectional elevation of the left-hand end of Figs. 1 and 2.

It is found desirable to have this class of steam-generators self-regulating as far as possible; and to that end I apply an automatic device to close the draft-valve, and open the check-valve in the smoke-flue, when the steam is raised above the desired pressure, and vice versa when it drops below it; and also a self-raker having a series of fingers which are thrown up between the grate-bars, when the steam pressure falls, thus clearing out the ashes, &c.

I use an ordinary horizontal flue-boiler, A. The furnace or fire-box B may be made separately, and is arranged under the front end. The combustion-flue C passes under and to the rear of the boiler, opening into the chamber D. The caloric current passes from chamber D through the boiler-flues F to chamber E, and thence out to the chimney or smoke-stack through flue G G'. I place the air-chamber H against chamber D. The former is provided with two air-flues, I, leading along each side of the boiler and down to the sides of the ash-pit P under the grate g. The pipe J, leading to chamber H, has a damper or air-valve, d, which is connected to the flap-valve b by a lever, f. This lever is pivoted to the arm a, and rests in a notch or fork in the top of the stem s of the steam-valve in the cylinder h. The lever may be graduated, as shown at c, Fig. 1, and provided with a counter-weight, W, whereby the air-valve d may be made to close at any desired pressure of steam

and the valve b to open. The raker-bars k are connected to the bent lever k, as shown in Fig. 1, and the said lever is connected by the rod r to the valve-lever m, which is pivoted to the arm a', and is connected with the valve in the cylinder i, the same as the lever f before described is to the valve in cylinder h. The counter-weight w is designed to keep the lever k down, except when it is raised by the pressure of the steam. The extension of the lever k between the weight and the rod r, is provided as a handle by which to work the rakers by hand when necessary. The coal-reservoir L I place over the front end of the boiler, and the curved chutes M lead down from the reservoir on either side of the boiler to the furnace B below; thus a portion of the radiant heat from the boiler heats the coal preparatory to being delivered into the furnace. The water-tank T is placed upon the elevated horizontal section G' of the smoke-pipe, from which, in a similar manner to the above, the water is heated before entering the boiler. The water-pipe P may be provided with any suitable cock by which to regulate the flow or supply to the boiler. The standards S support that portion of the smoke-pipe and of the tank T. A flap-valve might be provided within or at the bottom of the chutes M, and operated by the pressure of the steam, similarly to the valves b and d, to regulate the supply of coal, if desired. I make the fire-grate g concave, as seen in Figs. 2 and 3, which, it is believed, will economize fuel in this class of boilers by bringing all the burning coal nearer to the boiler.

It will be seen that when there is no steam-pressure in the boiler, the draft-valve d is open, as shown in full lines in Fig. 2, and the check-valve b is closed. The air to supply the fire enters through pipe J into drum H, thence down each side of the boiler through pipes I to the ash-pit under the grate. The caloric current passes through flue C, under the boiler, to chamber D, through the boiler-flues F, chamber E, (as indicated by the arrows,) and smoke-flue G G' to the chimney. The weight W is placed upon the lever f at a point to afford the desired pressure of steam, and when it rises above that, that end of the lever is forced toward the position shown in

full lines in Fig. 1, thus closing the draft-flues J and I, and opening the valve *b*. This makes a very sensitive regulator of the fire. Should the latter get low on account of the accumulation of ashes upon the grate, the weight *w* is allowed to drop by the decrease of the steam-pressure, and the fingers *n* of the rakers *k* are thrown up between the grate-bars *g* and clear them from ashes or cinders.

It is obvious that the smoke-flue might be passed through or around the tank, if desired; and the same may be said of the coal-reservoir; but, for simplicity, the plans or arrangements shown and described are preferred.

What I claim as my invention, is—

1. The automatically-acting rakers *k*, constructed and operated substantially in the manner and for the purposes set forth.

2. The arrangement of the coal-reservoir *L*, provided with one or more chutes, *M*, in relation to the boiler *A*, smoke-flue *G*, and furnace *B*, substantially as and for the purposes herein shown and described.

AMOS B. SMITH.

Witnesses:

WM. S. LOUGHBOROUGH,
PATRICK MCINTYRE.