2 Sheets—Sheet 1

C. B. BRYANT & H. YOUNG, Jr.

SMOKE-CONSUMING FURNACE.

No. 185,289.. Patented Dec. 12, 1876.

Fig. 1.

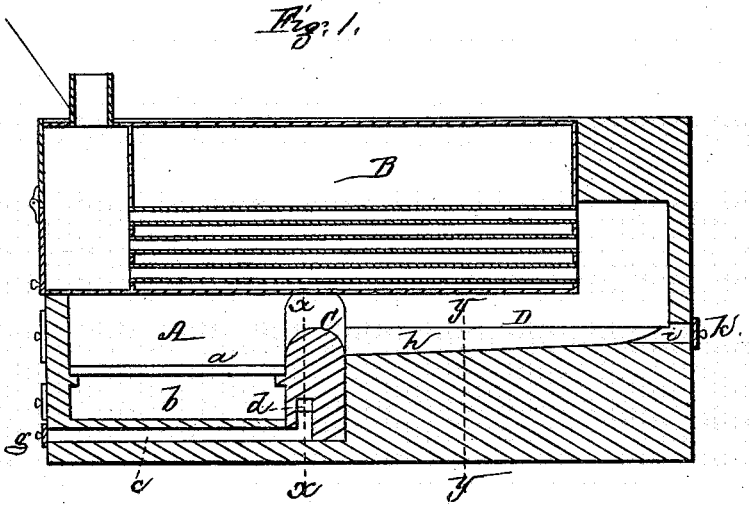


Fig. 3.

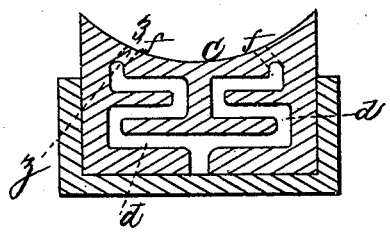
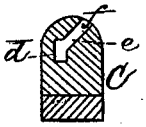


Fig. 5.



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2 Sheets—Sheet 2.

C. B. BRYANT & H. YOUNG, Jr.

SMOKE-CONSUMING FURNACE.

No. 185,289. Patented Dec. 12, 1876.

Fig. 2.

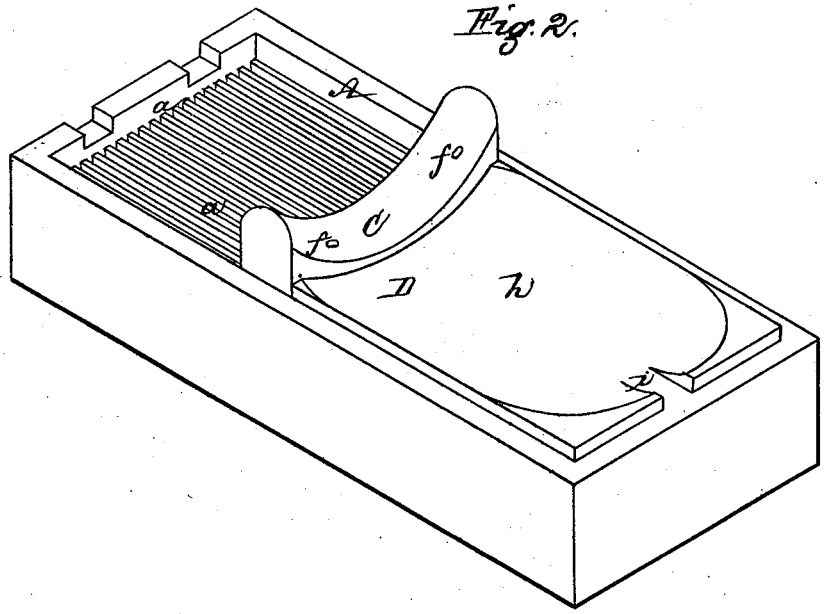
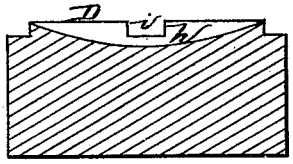


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES B. BRYANT, OF STONEHAM, AND HENRY YOUNG, JR., OF WOBURN, ASSIGNORS TO THEMSELVES AND THEOPHILUS KING, JR., OF QUINCY, MASSACHUSETTS.

IMPROVEMENT IN SMOKE-CONSUMING FURNACES.

Specification forming part of Letters Patent No. **185,289**, dated December 12, 1876; application filed October 14, 1876.

To all whom it may concern:

Be it known that we, CHARLES B. BRYANT, of Stoneham, in the county of Middlesex and State of Massachusetts, and HENRY YOUNG, Jr., of Woburn, in the county and State aforesaid, have invented certain Improvements in Smoke-Consuming Furnaces, 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 longitudinal vertical section through a steam-boiler furnace constructed in accordance with our invention. Fig. 2 is a perspective view of the interior of the same, the boiler and upper portion of the brick-work being removed. Fig. 3 is a transverse vertical section through the bridge-wall on the line *x x* of Fig. 1. Fig. 4 is a transverse vertical section through the combustion-chamber on the line *y y* of Fig. 1. Fig. 5 is a section on the line *z z* of Fig. 3.

Our invention has for its object to promote the combustion of smoke and gases in a furnace, thereby intensifying the heat and economizing fuel; and consists in a combination of elements and devices, as hereinafter described and claimed.

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

In the said drawings, A represents the furnace; B, the boiler; *a*, the grate-bars; *b*, the ash-pit; C, the bridge-wall, and D the combustion-chamber. Extending longitudinally under the center of the floor of the ash-pit is an air-passage, *c*, which communicates with two flues or passages, *d d*, formed within the bridge-wall C, as seen in Fig. 3, and from the top of each of these flues *d* extends a small passage, *e*, (Fig. 5, and dotted in Fig. 3,) which terminates in a discharge-orifice, *f*, in the top of the bridge-wall, the passages *e* being inclined upward at an angle of about forty-five degrees, and also slightly inward toward the center of the combustion-chamber. The external air first enters the passage *c*, and thence passes into and up through the flues *d d*, issuing from the discharge-orifices *f f* in streams, which impinge upon, and become thoroughly commingled with, the smoke and gaseous products of combustion as they flow over the top of the bridge-wall into the chamber D; and by thus locating the discharge-orifices *f* at or near the top of the bridge-wall, instead of at the rear thereof, the jets or streams of air are caused to so impinge upon the smoke and gases as to effect their ignition at the point best calculated to produce the most advantageous results, and the smoke and gases are thereby caused to be almost entirely consumed within the combustion-chamber, thus intensifying the heat and effecting a great saving in fuel. The air-passage *c* is provided at its outer end with a door, *g*, by means of which the quantity of air admitted to the flues *d*, and issuing from the discharge-orifices *f*, can be regulated as desired. The air, in its passage through the flues *d*, becomes partially heated, as is desirable, before being mixed with the smoke and gases, and it also tends to cool the bridge-wall and prevent its rapid destruction by the intense heat to which it is exposed. The number of flues or air-passages within the bridge-wall may be varied, a single one only, or more than two, being employed, as preferred, and any desired number of discharge-orifices, *f*, may be provided in or near the top of the bridge-wall. The upper surface of this wall C is made convex in the direction of its width, this form corresponding to the natural curvature of the currents of smoke and gases, and facilitating their passage over the top of the wall, as no obstructing corners or angles are presented. The bottom *h* of the combustion-chamber D, instead of being on, or nearly on, a level with the floor of the ash-pit, is elevated to bring it almost up to the level of the upper edge of the bridge-wall, and above the level of the grate-bars, by which construction the volume of smoke and gases is prevented, after passing over the top of the bridge-wall, from descending out of the reach of the streams of air emitted from the discharge-orifices *f*, and the gases, &c., are thus kept in contact

with the air for a much longer time than would be the case if the bottom of the combustion-chamber were not elevated, and consequently the air is caused to be more thoroughly and perfectly mingled with the smoke and gases, the combustion of which is by this means promoted to a great extent.

The bottom *h* of the combustion-chamber is made concave, as seen in Figs. 1, 2, and 4, this form giving an upward direction to the flame at the sides and rear end of the combustion-chamber, and causing it to be projected against the boiler more forcibly and effectively than would be the case were the bottom *h* perfectly level, as heretofore. *i* is an aperture, closed by a door, *k*, through which access can be had to the interior of the combustion-chamber for the purpose of freeing it from dust and cinders.

Boiler-furnaces already constructed may be provided with our improvements at a moderate cost, there being no necessity of resetting the boiler, and our invention may be used in connection with any furnace to which it can be advantageously applied.

What we claim as our invention, and desire to secure by Letters Patent, is—

The bridge-wall C, provided with one or more flues or interior passages in communication with the external air, and with a series of inclined discharge-orifices, *f*, at or near the top of the wall, in combination with the combustion-chamber D, having its bottom elevated nearly to a level with the upper edge of the bridge-wall, substantially as and for the purpose set forth.

Witness our hands this 12th day of October, A. D. 1876.

CHARLES B. BRYANT.
HENRY YOUNG, JR.

In presence of—
P. E. TESCHEMACHER,
N. W. STEARNS.