2 Sheets—Sheet 1.

C. W. BIRCH.

FEEDING AIR TO FURNACES.

No. 184,224. Patented Nov. 14, 1876.

Fig. 1.

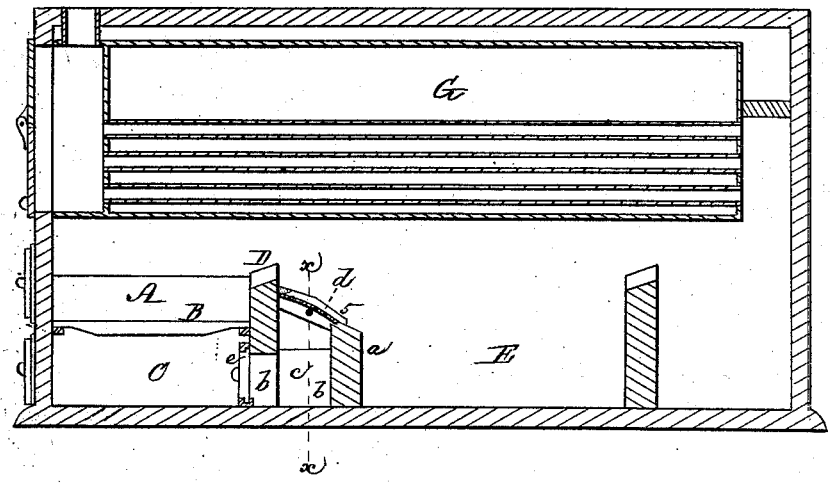
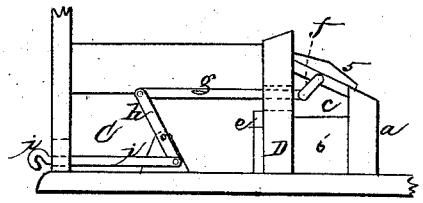


Fig. 4.



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

Inventor,
Charles W. Birch
per Teschemacher & Stearns
Atty's.

2 Sheets—Sheet 2.

C. W. BIRCH.

FEEDING AIR TO FURNACES.

No. 184,224. Patented Nov. 14, 1876.

Fig. 2.

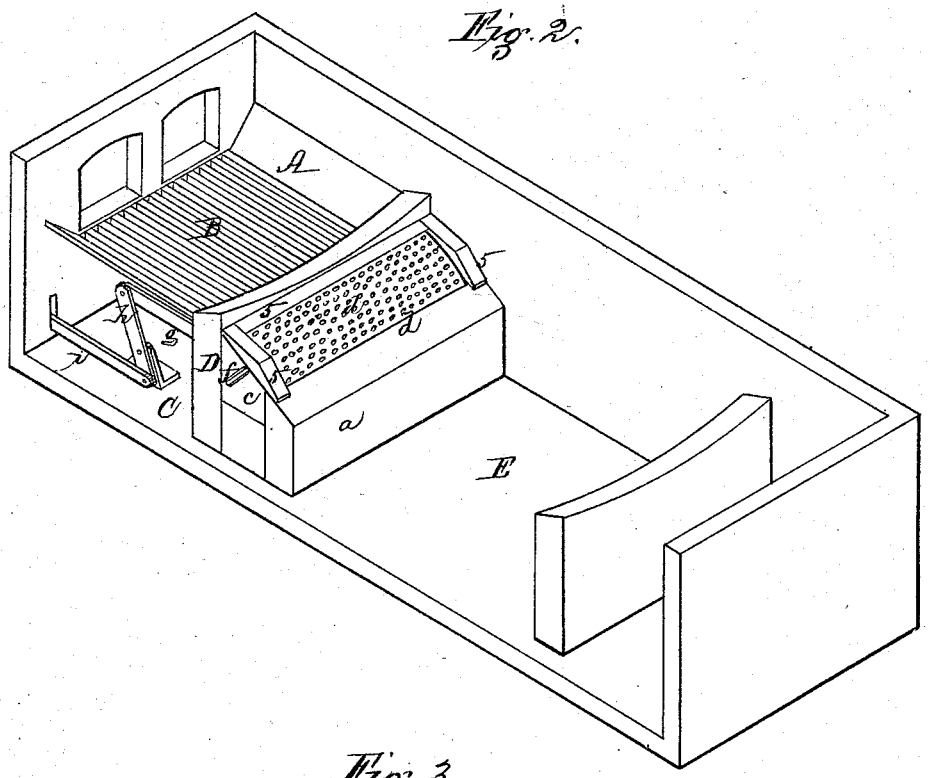
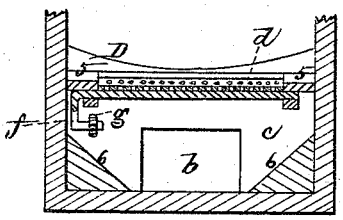


Fig. 3.



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

Inventor,
Charles W. Birch
per Teshamacher & Sears
Attys.

UNITED STATES PATENT OFFICE.

CHARLES W. BIRCH, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND WILLIAM H. WEST, OF SAME PLACE.

IMPROVEMENT IN FEEDING AIR TO FURNACES.

Specification forming part of Letters Patent No. **184,224**, dated November 14, 1876; application filed September 19, 1876.

To all whom it may concern:

Be it known that I, CHARLES W. BIRCH, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Smoke-Burning 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 my invention. Fig. 2 is a perspective view of the interior of the same, the boiler and one of the side walls being removed. Fig. 3 is a transverse vertical section on the line *x x* of Fig. 1; Fig 4, detail in elevation.

My invention consists in a certain combination of detail elements, as hereinafter more specifically described and claimed.

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 represents the furnace; B, the grate-bars; C, the ash-pit; D, the bridge-wall; E, the combustion-chamber, and G the boiler. Through the bridge-wall D is formed an aperture, *b*, which communicates with an air-chamber, *c*, formed of fire-brick, and located immediately behind the bridge-wall. Over the top of this chamber *c*, is placed a metal frame, 5, within which is fitted a perforated metal plate, *d*, which is inclined at an angle of about thirty degrees, and extends down from a point about four inches below the center of the upper edge of the bridge-wall to the top of the rear wall *a* of the air-chamber, the plate being slightly convex on its upper surface, and being hung on journals at its ends, for a purpose to be hereafter described.

The air from the ash-pit, in a partially-heated state, enters the chamber *c* through the aperture *b*, and thence passes up through the perforated plate *d*, and issues therefrom in fine streams, which impinge upon and are thoroughly commingled with the smoke and other products of combustion as they flow over the top of the bridge-wall D, the inclination and position of the perforated plate *d* causing the jets of air issuing from it to impringe upon the smoke and gases in such a manner as to cause the oxygen to be more thoroughly diffused and more perfectly mixed therewith than by any device heretofore constructed for this purpose, whereby more complete ignition of the hydrocarbon gases is insured, and the products of combustion are consequently caused to be almost entirely consumed within the combustion-chamber beneath the boiler, thus utilizing the fuel to its greatest extent, and at the same time obviating, in a great measure, the nuisance caused by the issuing of smoke and deleterious gases into the atmosphere.

By locating the upper edge of the inclined plate *d* below the level of the upper edge of the bridge-wall D, as described, the flame is prevented from coming into contact with the plate, and thereby warping and destroying it, and furthermore a space is afforded between the upper surface of the plate and the body of smoke, gases, &c., passing over it, which allows the air, after escaping from the apertures in the inclined plate, to become heated, and expand so as to impinge on the entire under surface of the body of smoke, gases, &c., as it passes over the bridge-wall, whereby much better results are produced than if the plate was elevated to such an extent as to cause the gases, &c., to come directly into contact with it, as in the latter case the air could not expand before its contact with the gases, and its mixture therewith would not be so perfect.

The perforated plate *d* may be flat, instead of having its upper surface convex, as shown. The latter is, however, preferable, as the curve of the upper surface of the plate corresponds to that of the currents of gases, &c., passing over the bridge-wall, and causes the oxygen to be more equally distributed and commingled with these gases than if the surface of the plate was flat.

The ends 6 of the air-chamber *c* are inclined, as shown in Fig. 3, down toward the aperture *b*, so that all dust and cinders which may drop through the perforated plate *d* will be deflected down toward the aperture *b* into

a position from which they can be easily removed.

The aperture *b* is provided with a sliding door, *e*, by which the supply of air to the chamber *c* can be regulated as desired.

From one of the journals of the plate *d* projects an arm or crank, *f*, to which is attached one end of a rod, *g*, pivoted to the upper end of a lever, *h*, to the lower end of which is pivoted a rod *i*, extending through the front of the furnace and provided with a handle at its outer extremity; and by this means the plate *d* can be tipped and shaken for the purpose of freeing it from any dust or cinders which may collect upon its upper surface, and thus keeping its apertures open for the free passage of the air.

My improvements may be easily applied at a small expense to boiler-furnaces already constructed without resetting the boiler, and may be used in connection with furnaces of various descriptions.

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

The inclined perforated plate *d*, having its upper surface convex, pivoted at or near its center, and operated by the shaking device, in combination with bridge-wall D, aperture *b*, and air-chamber *c*, provided with sloping sides, as set forth.

Witness my hand this 13th day of September, A. D. 1876.

CHAS. W. BIRCH.

In presence of—

P. E. TESCHEMACHER,

W. J. CAMBRIDGE.