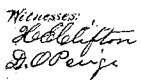


R. B. Pullan,
Steam-Boiler Furnace,

Patented Jan. 24, 1860.



N. PETERS. PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

Sheet 2-2 Sheets.

R. B. Pullan,

Steam-Boiler Furnace,

N^o 26,920,

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Fig. 6.

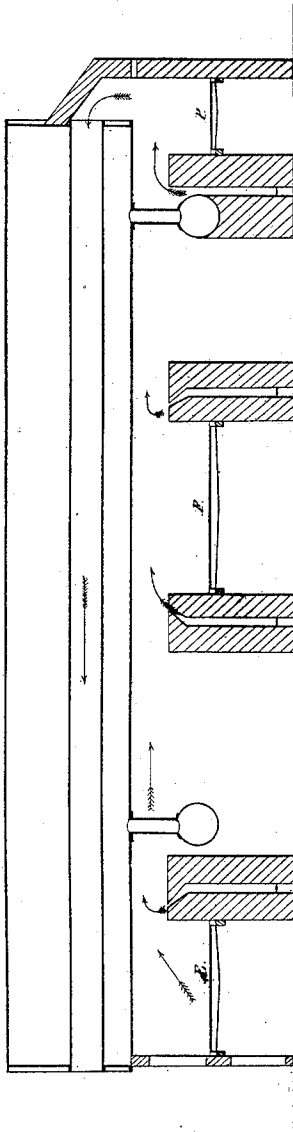
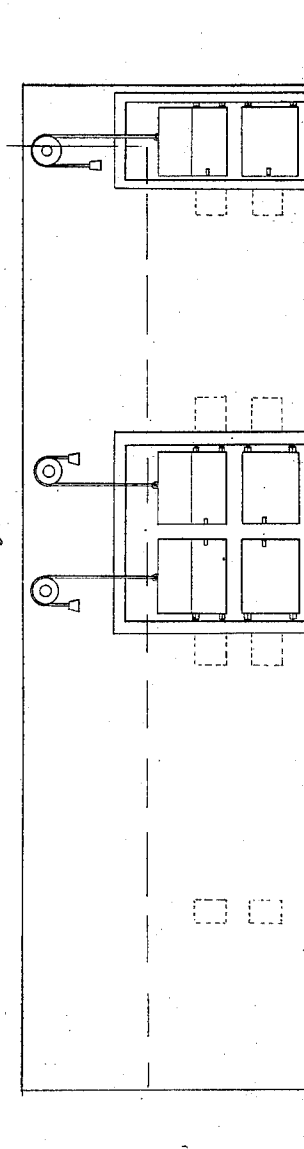


Fig. 7.



Witnesses:
Edw. H. H. H. H.
E. R. H. H.

Inventor:
Richard B. Pullan

UNITED STATES PATENT OFFICE.

RICHARD B. PULLAN, OF CINCINNATI, OHIO.

FURNACE.

Specification of Letters Patent No. 26,920, dated January 24, 1860.

To all whom it may concern:

Be it known that I, R. B. PULLAN, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Furnaces; and I do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon and made to form a part of this specification.

The nature of my invention relates, first, to a series of furnaces constructed, combined and arranged in such manner that the smoke and gases from the first furnace may pass over the burning coke of the other furnaces and be perfectly consumed, thereby effecting great economy in fuel. Second to a rotary fire bed constructed and arranged in such manner, that coals after being charred in the first furnace, may be transferred to the second, by a rotary motion of said fire bed as hereinafter set forth.

In reference to the accompanying drawings, Figure 1 is a perspective view, representing the furnaces, inclosed, and arranged for operation, for steam boilers. Fig. 2, is a plan of the series of furnaces as shown from the top. Fig. 3, is a longitudinal sectional view of the furnaces, showing the arrangement of the dividing bridge walls, and the device for operating the rotary fire bed. Fig. 4 is a transverse sectional view, taken through the red lines (*x, x*) looking toward the rear end of the boilers, showing one of the devices for supplying air to the rear of the furnaces. Fig. 5, is a transverse sectional view taken through the red line (*y, y*), looking toward the front ends of the boilers, showing one of the devices for supplying air to the flame as it passes from the second to the third furnace. Fig. 6, Sheet 2, is a longitudinal sectional view, showing the series of furnaces as arranged without the rotary fire bed. Fig. 7, Sheet 2, is a side view, showing specially a device for regulating the admission of air to the flame.

(A) represents the masonry, surrounding the furnaces.

(B) are boilers.

(C) is a rotary fire bed formed with an annular rim (*C'*) supporting central bar (*d*) and grate bars (*e*) and arranged in the seat (*e'*) in such manner as to be allowed to rotate:—Within the seat (*e'*) are arranged friction rollers (*j*) in such manner as to afford bearings to the rim (*C'*) and facilitate

the rotation thereof. The inner portion of the lower edge of the rim (*C'*) is made with cogs (*d''*) by means of which, through the medium of the cog wheel (*e''*) and crank (*t*), the fire bed (*C*) is made to rotate; the supporting central bar (*d*) is provided with a journal (*d'*) which is made to fit and work in a step formed in the bridge wall (*g*) thereby affording a central bearing for the fire bed (*C*) as shown in Fig. 3, the bar (*d*) is formed to fit and lie closely upon the wall (*g*) so that no draft, may be admitted from the first furnace (*E*) to the second (*F*) from the ash pit (*G*).

(*e*) is a bridge-wall constructed immediately in rear of the ash pit (*H*) and furnace (*F*) and formed to extend upon either side to the boilers (*B*), leaving a central flue space (*I*) as shown in Fig. 5, in the rear portion of the bridge wall (*e*) are apertures (*h*) communicating with the ash pit (*p'*) of the furnace (*P*) and with the opening (*i*) of the wall (*e*) by means of which air may be admitted to the flame as it leaves the second furnace (*F*): immediately in rear of furnace (*P*) is a bridge wall (*f*) extending to the boilers in the center, and leaving open flue spaces (*J*), on either side as shown in Fig. 4, by means of which the smoke and gases escaping from the second furnace (*F*) will be deflected over the burning coke of the furnace (*P*) and their combustion thereby facilitated.

In the front of the wall (*f*) are apertures (*h*) communicating with the ash pit (*p'*) and with the openings (*i'*) of the flue spaces (*J*) by means of which air may be admitted to the flame as it leaves the third and last furnace (*P*) thereby completing the process of combustion.

The rear furnace (*P*) is constructed in the form of a pit, having its grate bars arranged at a distance of from six to ten inches below that portion of the fire bridges, over which the flame and smoke pass; so that a bed of fuel of a depth sufficient to prevent the passage of air, beyond what may be necessary to support the combustion of said fuel, may be placed on said grate bars without obstructing the flue space above.

(*o*), shown by dotted lines, in Fig. 3, is a door communicating with the ash pit (*H*), by means of which air is afforded to the second furnace (*F*) and through which the ashes may be removed from the pit (*H*).

(*n*) Fig. 1 is a door communicating with

the furnace (P) by means of which coke may be fed thereto.

(*n'*) is a door by means of which, air is admitted to the furnace (P) and also to the 5 apertures (*h, k*). The admission of air to the openings (*i, i'*) may be regulated by means of suitable valves made to operate with reference to the openings (*h, k*), or by means of register doors, communicating 10 with the interior space of the bridge walls (*e, f*) in such manner that the exact quantity of oxygen necessary to support combustion and to afford sufficient draft may always be admitted to the flame through the 15 openings (*i, i'*).

In order to facilitate, and render more perfect the combustion of coke in the furnaces (F, P) pools of water may be kept constantly in the bottoms of the ash pits 20 (*H, p'*).

The operation of my invention may be described as follows. Fire will be kindled in the first furnace (F) upon the front portion of the fire bed (C) and upon the grates 25 (K). When these coals become thoroughly charred, that portion of them upon the grates (K) will be removed to the bed (C) which will then be made to revolve until the burning coals occupy the second furnace 30 (F). Air will then be admitted to the ash pit (H) sufficient to carry on active combustion in the furnace (F). Fresh coals will then be lighted in the furnace (E), the smoke and gases from which will pass over 35 the bed of live burning coals of the furnace (F): coke will then be ignited in the furnace (P), sufficient air being admitted to the ash pit (*p'*) to support combustion. Air

will now be admitted to the flame through the openings (*i, i'*) in sufficient quantity to 40 perfect the combustion of the smoke and gases, its admission being regulated as before described.

When coke is difficult to procure, the charred coals from the furnace (F) may be 45 forced over the bridge walls (*e*) into the furnace (P), fresh coals being always lighted in the first furnace, and being transferred as before described.

I do not claim the arrangement of a series of furnaces, one in the rear of the 50 other, irrespective of the individual character of the furnaces. Nor do I claim arranging such furnaces alternately crosswise of the boilers they are designed to heat, as 55 in the English specification of W. Taylor of 1854. But

What I claim as the first part of my invention is—

1. The mutual arrangement of the furnace 60 E, with the coke furnaces F, and P, each operated in the manner and for the purpose set forth.

2. I claim a rotary fire bed, constructed and arranged in such manner, that coals, 65 resting thereon after having been charred in a front or first furnace, may be transferred to a second furnace by a rotary motion of said fire bed, substantially as and 70 for the purposes set forth.

In testimony of which invention I have hereunto set my hand.

RICHARD B. PULLAN.

Witnesses:

W. P. EUSEY,
H. E. CLIFTON.