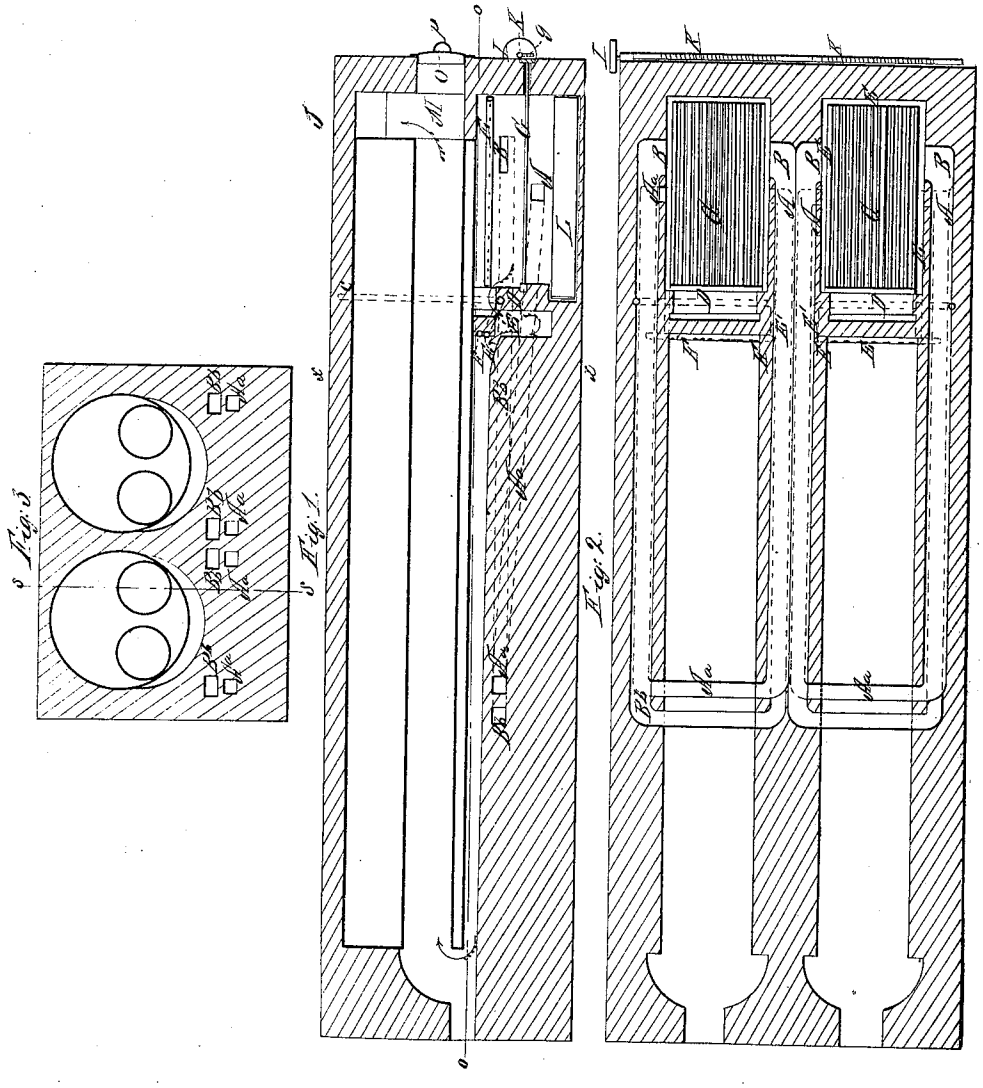
C. Burckhardt,

Steam-Boiler Furnace.

No. 6,503. Patented June 5, 1849.



UNITED STATES PATENT OFFICE.

CHRISTIAN BURCKHARDT, OF CINCINNATI, OHIO.

CONSUMPTION OF FUEL IN STEAM-BOILER AND OTHER FURNACES.

Specification of Letters Patent No. 6,503, dated June 5, 1849.

To all whom it may concern:

Be it known that I, CHRISTIAN BURCKHARDT, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in the Consumption of Fuel, and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the usual manner of making, modifying, and using the same, reference being had to the accompanying drawing, which illustrates the same, in which—

Figure 1. is a vertical longitudinal section. Fig. 2. is a sectional plan. Fig. 3. is a cross section on the vertical dotted line *x*, *x*, Fig. 1.

The nature of my invention consists in applying decomposed steam at a high temperature to the products of combustion above the coal or other fuel, together with a due proportion of atmospheric air, the whole of which commingle, and by which all the combustible matter in the fuel is consumed.

The drawing represents the application of my improvements to the furnaces of steam boilers which will serve to illustrate the principle, and from this its application to other purposes will be readily comprehended. In the usual place at the front of the boilers the furnace is located. The grate bars G, in this furnace are placed much nearer the boilers than in ordinary furnaces, and the space below said bars is also smaller; in this latter space there is a tank L, filled with water, as is usual in some other furnaces. The grate bars G, are round, and revolve on bearings front and back; they project beyond the furnace in front, where they bear pinions (*g*) which gear into a worm wheel on a shaft K. that extends across the front of the furnace, and may be turned by being geared to any moving power through the medium of the pulley I, which keeps the grate bars constantly revolving and removes the ashes, prevents clinkers forming and saves the necessity of stirring up the fire. Just behind the fire there is a bridge of firebrick, in which a pipe D is bedded; this pipe D, is connected with the top of the boiler or steam chamber by a pipe (*c*) the pipe D receives an intense heat from the furnace, the flame of which first impinges upon the bridge in which it is situated, directly at the front of the flue: there is another fire bridge or partition just behind the one before named, which has the bottom of the boiler resting on it, and only extends down nearly to the bridge at D; behind this last named bridge or shield a pipe E, runs across the flue from one side to the other, in which there is a row of small holes, this pipe extends along the furnace on each side to the front and across the front, as shown in Fig. 2; the side pipes are pierced with holes in like manner to that which extends across behind the bridge, but the front has no holes in it. This pipe E. communicates with the pipe D. by a short pipe E′. Above that portion of the pipe E. which crosses the flue behind the bridge, there is a similar pipe F. which is supplied with air from the air flues hereafter described, and discharges it through small holes like those in the pipe E.

The air flues A and B are represented in the drawing by colored lines; the right hand ones by red lines; the left hand ones by blue lines: these flues open into the space below the grate, as clearly indicated in Fig. 1. thence they extend back a sufficient distance in the direction of the smoke flue, and on each side thereof, inclining upward till they nearly reach the level of the bottom of the flue, thence they cross over under the smoke flue to opposite sides, and thence return back to a point nearly over their commencement, and open into the fire chamber over the fuel, and under the pipe E. through an oblong expanded orifice B. see Fig. 1; by this arrangement a current of air is kept up from the space below the grate through an extended tube, where it is heated to a certain degree; and then discharged into the gases arising from the fuel, and that created by the decomposed steam, and thereby a perfect combustion is produced.

The smoke flue beyond the bridge at F is contracted to one fourth or less of the ordinary size of flues in like situations, and it is made to follow the curvature of the boiler, as shown in the cross section Fig. 3. where is also shown the relative position of the flues A. *a* and B *b* at those points. The return flues through the boiler terminate at M. in a chamber from which the stack N arises. O. is a manhole. P. is the ordinary clamp for fixing the cover thereof: this manhole is to clear the flue through. The contraction

of the flue under the boiler, and shaping it to the figure of the lower part of the boiler, adds greatly to the economy of the fuel, while the perfect combustion by the employment of the decomposed steam, and atmospheric air above the fuel, in the manner set forth, greatly increases the heating capacity and decreases the gases which are to be carried off by the smoke pipe; and by this arrangement it becomes necessary to divide the furnaces when more than one boiler is used, leaving one fire to each boiler, with a division wall between, which greatly augments the effect of the other parts of my arrangement.

Having thus fully described my improvements in burning fuel, what I claim therein as new, and for which I desire to secure Letters Patent, is—

The employment, arrangement, and combination of apparatus, constructed substantially as herein described for consuming the gases arising from ignited fuel, by the introduction of decomposed steam, or the gases resulting therefrom, and atmospheric air, air in a highly heated state over fire. I also claim the revolving grate, constructed and operating as herein above described and made known

CHRISTIAN BURCKHARDT.

Witnesses:
WM. GREENOUGH,
J. J. GREENOUGH.