S. W. UNDERHILL.

Brick-Kiln.

No. 202,489. Patented April 16, 1878.

Fig: 1.

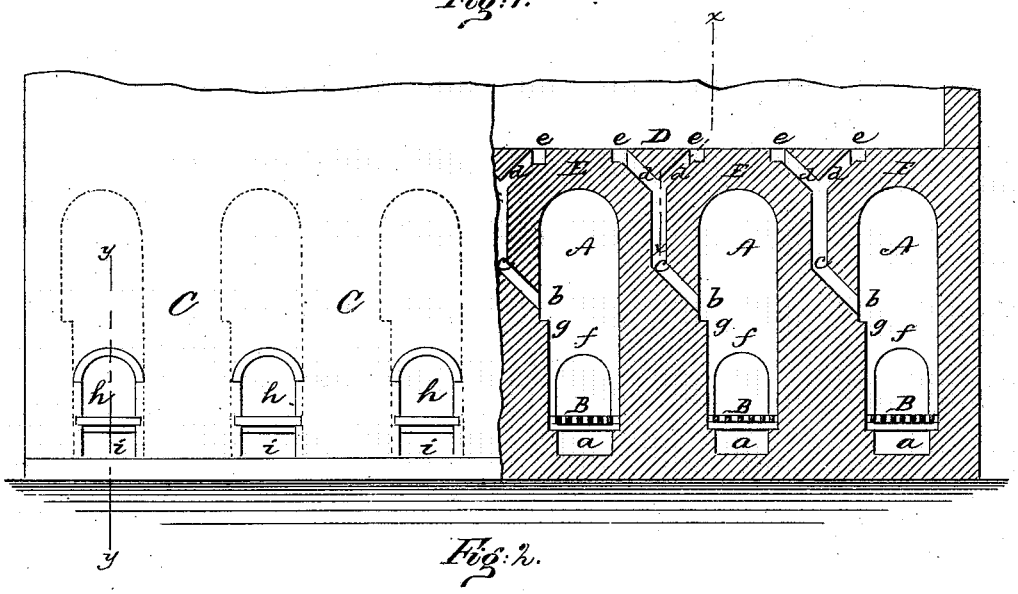


Fig: 2.

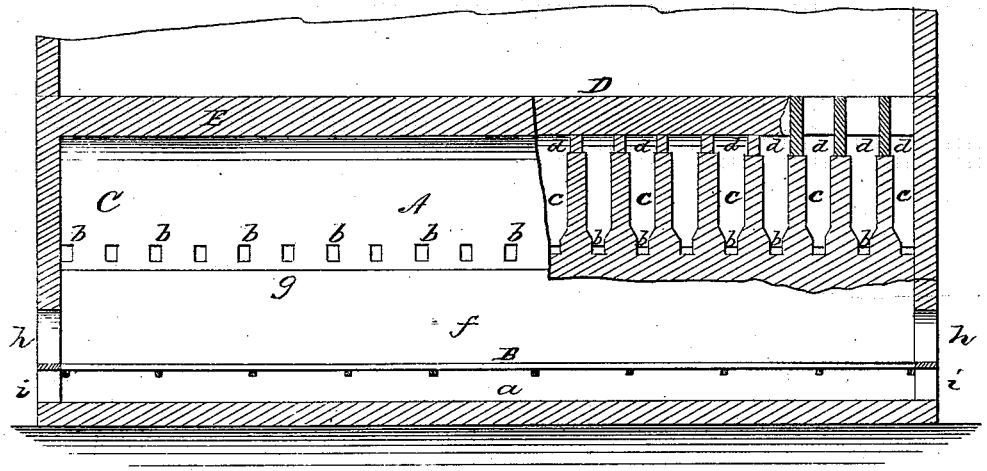
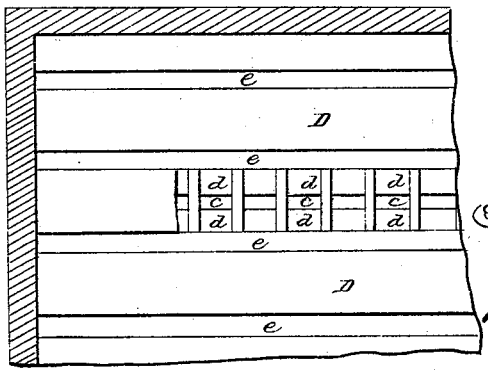


Fig: 3.



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UNITED STATES PATENT OFFICE.

STEPHEN W. UNDERHILL, OF CROTON POINT, NEW YORK.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. **202,489**, dated April 16, 1878; application filed March 5, 1878.

To all whom it may concern:

Be it known that I, STEPHEN W. UNDERHILL, of Croton Point, in the county of Westchester and State of New York, have invented a new and Improved Brick-Kiln; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making part of this specification.

This invention is in the nature of an improvement in brick-kilns; and the invention consists in a permanent base for a brick-kiln, constructed with hot-air reservoirs extending through and from one side to the other of the kiln, said reservoirs having egress-openings for the escape of the heated air only on the side and at or near the bottom thereof.

In the accompanying sheet of drawings, Figure 1 is a front view of my kiln, partly in section; Fig. 2, a longitudinal section of same in lines *x x* and *y y*, Fig. 1; and Fig. 3, a plan or top view of a portion of the top surface of kiln, with part of surface taken away to show flues and outlet-openings.

Similar letters of reference indicate like parts in the several figures.

This invention applies more particularly to what is known as a "permanent base" of a brick-kiln—that is, a system of furnaces, flues, and reservoirs permanently constructed to receive the pile of unburned bricks, in contradistinction to the ordinary arrangement of such bricks for the purpose of burning them.

The object to be gained in constructing a permanent kiln substantially as hereinafter described is to obtain a greater percentage of perfectly-burned bricks than results from the ordinary burning, as in the usual method of burning bricks by arranging them so as to form vaulted furnaces, and in most, if not all, of the kilns heretofore constructed, a large percentage of imperfectly-burned bricks, particularly about the sides and tops of the kiln, results from such burning.

To reduce this percentage of imperfectly-burned bricks, and as far as possible to cause the uniform burning of the bricks throughout the entire number, as well as to burn the same with coal, I construct a kiln of suitable masonry or fire-brick, and on a suitable foundation. This kiln consists substantially of a series of vaulted passages, A, extending entirely from side to side of the kiln, and each passage reaches from the grate-surface to nearly the upper surface of the kiln. The top of these passages may be arched, as shown in Fig. 1; or they may be of any other convenient form, but preferably arched. At or near the base of each passage A are placed grate-bars B. These grate-bars extend through the entire length of the vaulted passages A from one side of the kiln to the other, so that they may be fired from either end. Beneath the grate-bars B are ordinary ash-pits *a*. Into one side of each reservoir A, above the grate-bars, are placed the ingress-openings *b* of a series of flues, *c*, which pass upward through the piers C between each reservoir A. These flues branch into two outlet-openings, *d*, and into channels *e* of the upper surface D of the kiln. The air-space *f* above the grates B is somewhat narrower than the hot-air reservoirs proper, A. The difference in width results from an offset, *g*, on one side of each of the passages, and the ingress-openings *b* are preferably placed immediately above this offset.

The sides or ends wherein are placed the furnaces and air-reservoirs above described are walled up, as shown in Figs. 1 and 2, leaving no openings excepting the openings *h* for the furnace-doors and the openings *i* for the ash-pits.

Having now described the construction of my brick-kiln, its operation is as follows: The coal-fires being properly started on the surface of the grate-bars B, the furnace-doors are closed. The air passes in through the ash-pits, and up through the ignited coal into the reservoirs A, and forces out the cold air through the openings *b*. This is continued until the reservoirs A are of a bright red heat, when the furnace-doors at one end are opened. Immediately a current of the external air passes through the open door and directly over the surface of the ignited coal. Owing to the large supply of heat and hot air stored in the reservoirs A, there is sufficient heat radiated down to the surface of the coal below to keep the coal sufficiently hot to cause it to ignite on the upper surface. A continuous supply of oxygen is furnished the ignited coal

by the current of external air, which is admitted through the open door and passes directly over the coal nearly across the kiln. Being thoroughly heated, it rises, some passing out through a few of the openings *b* near the opposite end of the reservoir A, the balance rising to the top of the reservoir A, displacing the highly-heated air already stored there, forcing it out through the remainder of the openings *b*, which causes a current of hot air in the reservoir A to pass in the opposite direction from the current over the surface of the coal below. Consequently the openings *b*, immediately over the open furnace-door, are only supplied by hot air stored in the reservoir A, which, in turn, is supplied by the current of hot air coming from the opposite side of the kiln. Consequently the reservoir A will be continuously supplied with sufficient heat to cause the ignition of the surface of the coal below. If the heat declines below the temperature required, partially or entirely closing the door will cause a rapid accumulation of heat, as the draft will then pass up through the coal. Owing to the openings *b* being all on the same level and supplied from the reservoir A, in which air of equal temperature seeks the same level, they must necessarily be supplied with air of equal temperature. The air, which finds exit through the openings *b*, passes through the flues *c* and through the outlets *d*, and thence through the passages formed in the superimposed piled brick on the upper surface D of the kiln.

By making the air-space *f* immediately above the grate-bars somewhat narrower than the hot-air reservoirs A above such space, it is believed that the cold air, in its passage over the fire, will be more particularly confined to the space immediately above the fires until it has become sufficiently heated to ascend and displace the hot air stored in the reservoirs A, as above described.

From the construction and operation of my brick-kiln, as I have described it, it will be seen that the draft of the kiln is not checked by requiring it to be forced through the coal to be burned. For that reason the kiln is thoroughly supplied in every part with hot air, particularly the opposite side from the open door, causing the brick above to be burned sufficiently hard close to this side of the kiln; and by closing the door and opening the door on the opposite side of the kiln an equal length of time, both sides will be equally burned. The doors are usually both closed for five or ten minutes between each change from side to side. The doors are left open on either side about half an hour each time.

The free supply of draft caused by the open door forces the heated air to the top of the kiln, and burns the brick piled there as thoroughly and uniformly as elsewhere.

It is believed that, owing to the several ways of arranging the drafts—viz., first, burning with both doors closed and the draft passing up through the coal; secondly, by burning the coal on the top by leaving one door wholly or partly open; and, thirdly, by reversing the doors opened—the burner has more control over his fires than in any kiln before invented.

It will be observed that the brick-work E above each arch or reservoir is left solid, while the piers C between the reservoirs have formed in them the hot-air flues *c* and openings *d*. This construction adds materially to the stability of the foundation of the kiln.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a permanent base for a brick-kiln, under the brick to be burned, a series of hot-air reservoirs, extending through from one side to the other, having exit-openings only on the side, at or near the bottom, substantially as and for the purpose described.

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