R. W. HARGRAVE & A. W. BEECHER.

Brick-Kilns.

No. 151,486. Patented June 2, 1874.

Fig. 1.

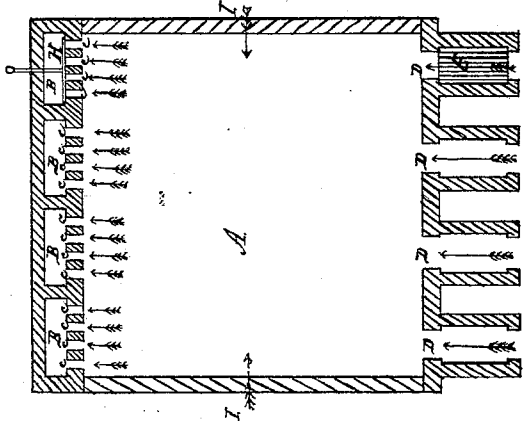


Fig. 3.

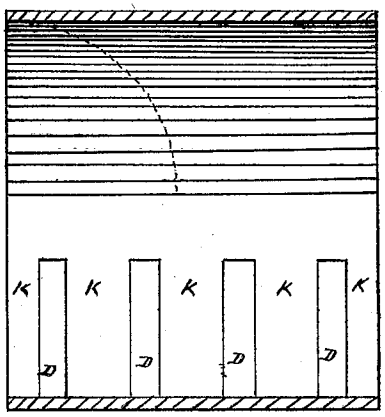
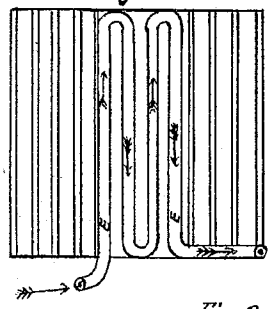


Fig. 5.



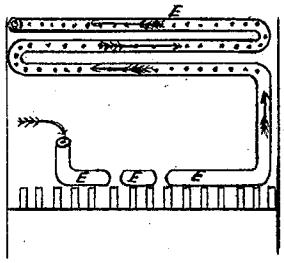


Fig 6.

Fig. 2.

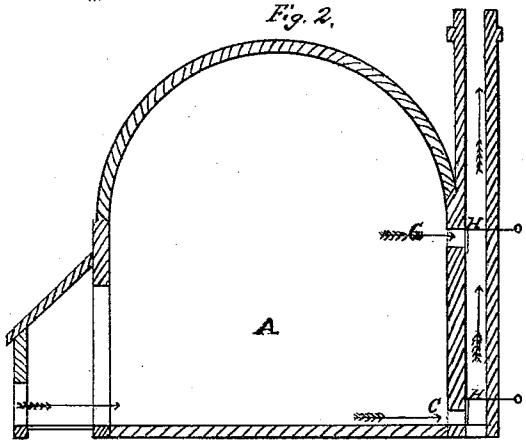
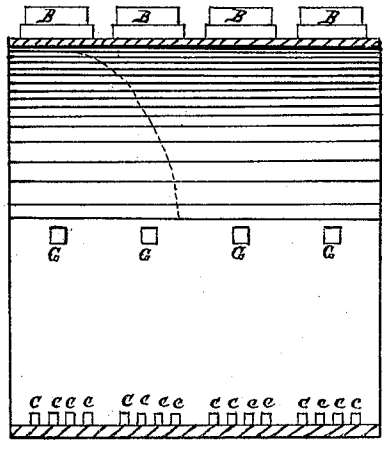


Fig. 4.



WITNESSES.

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AM. PHOTO-LITHOGRAPHIC Co. N. Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

RICHARD W. HARGRAVE AND ALBERT W. BEECHER, OF MARSHALLTOWN, IOWA.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. **151,486**, dated June 2, 1874; application filed April 1, 1874

To all whom it may concern:

Be it known that we, RICHARD W. HARGRAVE and ALBERT W. BEECHER, of Marshalltown, in the county of Marshall and State of Iowa, have invented new and useful Improvements in Brick-Kilns; and we do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawing, in which—

Figure 1 is a ground plan. Fig. 2 is a cross-section. Fig. 3 is an inside view of the front of our kiln. Fig. 4 is an inside view of the rear portion of our kiln. Figs. 5 and 6 are views of the apparatus for applying superheated steam to the fuel for the purpose of more complete combustion.

This invention relates to the construction and method of operating brick-kilns. It consists of an oblong fire-chamber spanned or covered by an arch, the peculiar arrangement of the independent chimneys, the arrangement of the draft-holes in the rear wall at the base of the chimneys, and at the top of the rear wall, immediately under the base of the arch; also, the arrangement of the dampers or slides in the chimneys, for the purpose of controlling and regulating the direction of the draft; also, the pipes distributing superheated steam, so as to render combustion of the fuel more complete, all of which will more fully hereinafter appear.

In the drawing, A represents the fire-chamber. *c c c c*, &c., represent the draft-holes connecting the burning-chamber (or fire-chamber) with the chimneys at their base; and G G G G, Fig. 2, represent the draft-holes at the top of the rear wall of the burning-chamber. B B B B represent the chimneys which rise from the base of the kiln, and which are entirely independent of each other. The draft-openings *c c c c*, &c., and G G G G are entirely controlled by the dampers H H, acting independently of each other. The upper draft-holes G G G G are opened when the kiln is first fired, for the purpose of drawing off the water-smoke, and when that process is completed they are closed, leaving the draft-holes *c c c c*, &c., open, thus drawing the same and heat over through and around the brick within the kiln. The degree of heat can be maintained steadily at a great degree of intensity for as long a period of time as may be required. D D D D are grated furnaces for burning fuel, projecting four feet to the front, and running up so as to cover the fire-openings in the front wall, and are closed by iron doors with draft-dampers in them. E, in Figs. 1, 5, and 6, represents a steam-pipe of a diameter of from one to two inches, which, starting from a steam-generator situated in one of the openings into the fire-chamber, marked D, is brought thence to the front of the furnace, near the middle, and resting upon the grate, and runs from the front of the grate to the rear four feet and returns; thence to the rear four feet and returns to the front; thence at right angles upon the grate to the right side of the furnace; thence elevated at right angles, and against the side of the furnace, to a height of eight to ten inches; thence four feet to the rear of the furnace, parallel with the grate, at a distance of from eight to ten inches above the same; thence at right angles to the left side of the furnace and return, three times, in a coil; thence from the rear, along the left wall of the furnace, to the front four feet, parallel with and eight to ten inches above the grate. Said pipe E, where elevated above the grate and coiled backward and forward across the opening into the fire-chamber, is perforated at intervals of one-fourth of an inch with holes, one-thirty-second ($\frac{1}{32}$) of an inch in diameter, there being two or more rows of such perforations, which shall so direct the jets of superheated steam as to accomplish the most complete combustion. The admission of the steam into the pipe E is controlled by a pet-cock, so that no more is admitted than will be thoroughly superheated in passing under, around, and through the fire to the perforations, where it escapes, and combines with the heated gases, which would otherwise, as in the ordinary process of burning fuel, escape unburned, thus making a hydrocarbon flame of great intensity, and burning a given number of bricks with less fuel than by any other process now in use.

By means of the independent chimneys B and the working of the dampers H, the process of burning can be confined to either side or center of the kiln, and by closing all draft-

holes but those in one chimney, the entire force of all the furnaces can be concentrated upon any portion of the kiln, and when the burning process is completed in any portion of the kiln, the chimney and furnace opposite such portion can be closed and the process of burning the remainder continued.

I I are side doors giving access to the interior of the kiln, for the purpose of filling it up with green bricks, and removing them after they are burned. K K K are openings, closed by sliding covers, for observing the process of burning, and the admission of cold air when the process of burning is completed. Said kiln is constructed of brick, stone, or iron.

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

The brick-kiln herein described, consisting of fire-chamber A, provided with removable sides or doors I, independent furnaces D, provided with steam-pipe E, independent chimneys B, draft-orifices *c* G, and dampers H, all combined, arranged, and adapted to operate substantially as and for the purposes set forth.

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