A. W. DUTY.
Brick-Kiln.

No. 211,463. Patented Jan. 21, 1879.

Fig. 1.

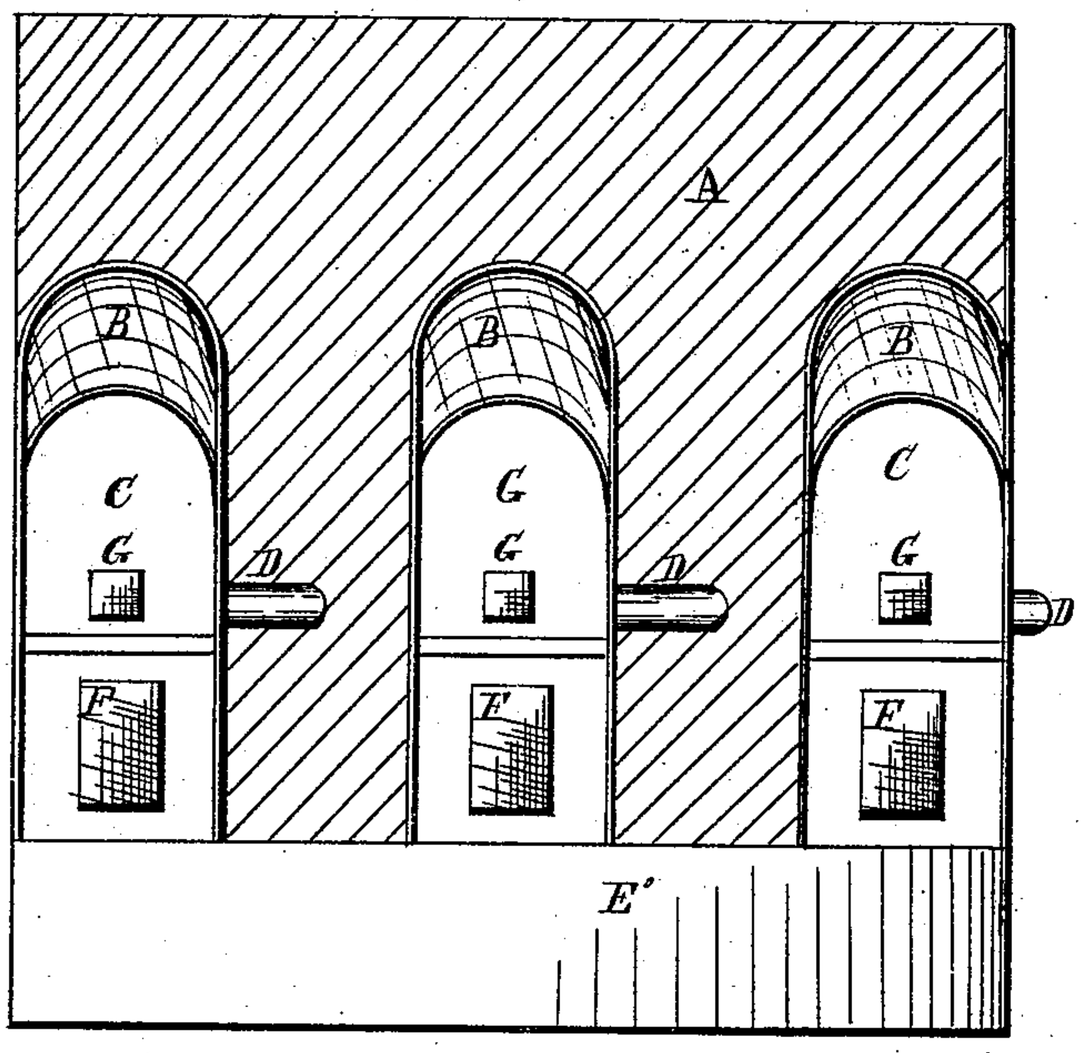


Fig. 2.

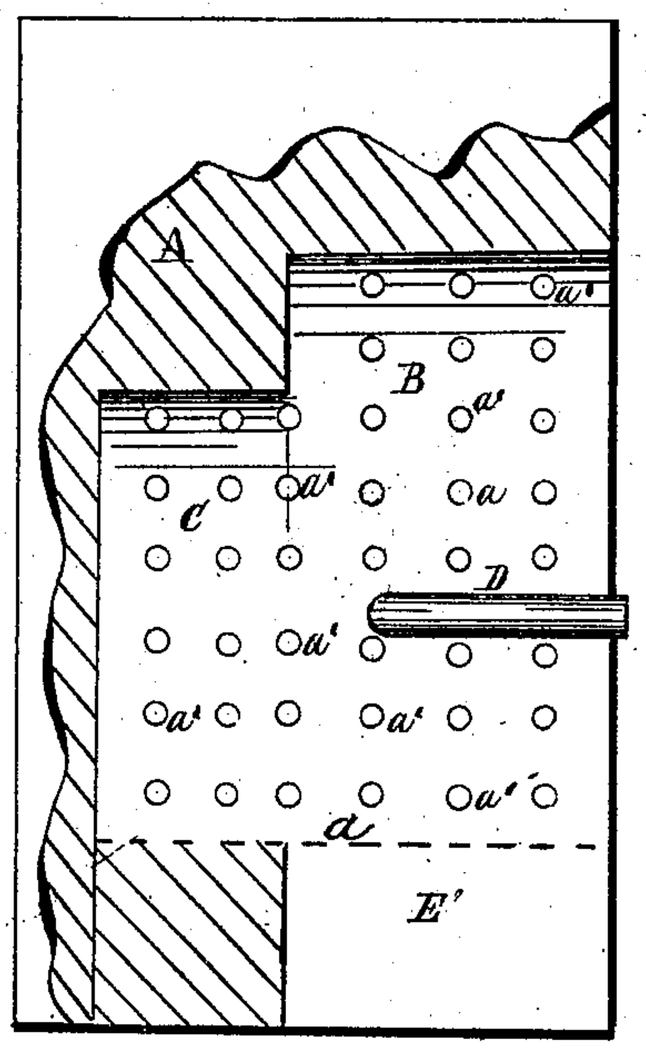


Fig. 3.

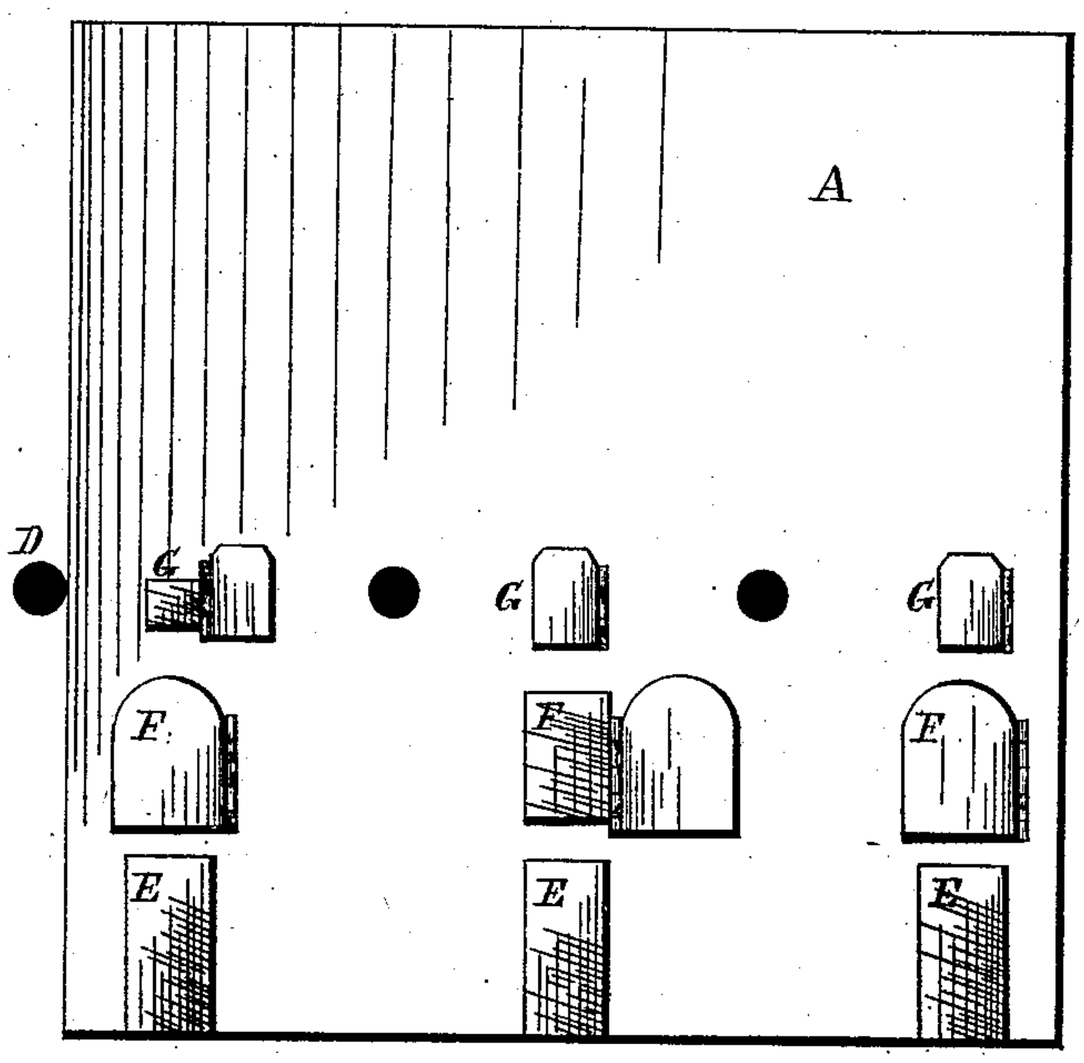
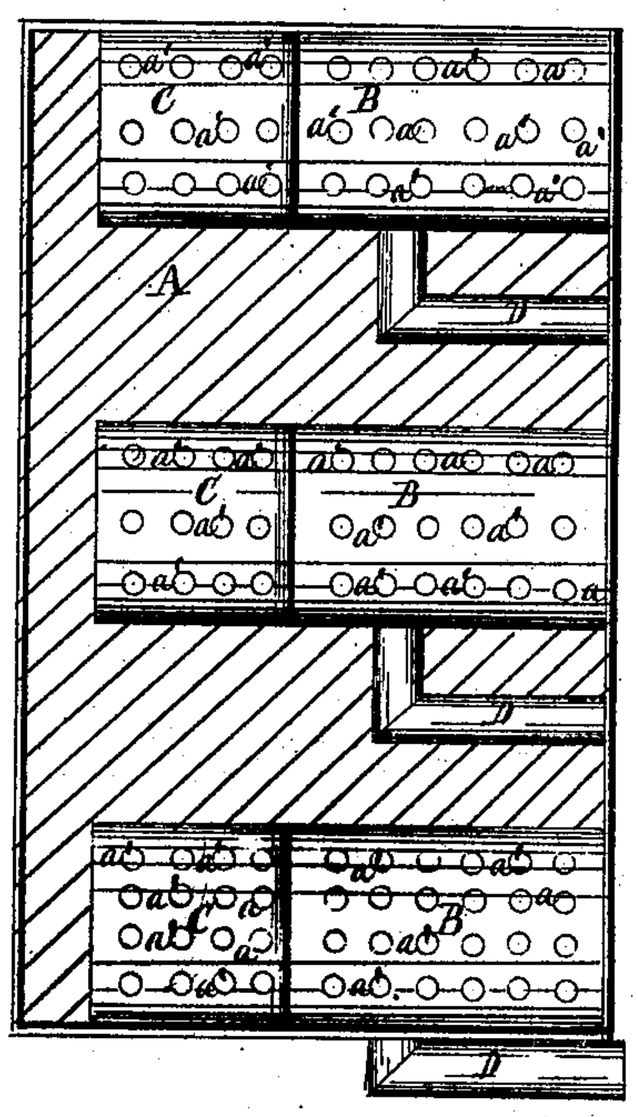


Fig 4



Witnesses
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UNITED STATES PATENT OFFICE.

ANDREW W. DUTY, OF CLEVELAND, OHIO.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. **211,463,** dated January 21, 1879; application filed November 22, 1878.

To all whom it may concern:

Be it known that I, ANDREW W. DUTY, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and Improved Brick-Kiln; and I do hereby declare that the following is a full, clear, and complete description thereof, reference being had to the accompanying drawings, making part of the same.

This invention relates to the construction of brick-kilns; and consists in providing them interiorly with certain furnaces and air-flues, whereby the smoke and gases in the furnaces are more fully consumed and the heat more uniformly diffused throughout the structure, and by which improvement the heat may be regulated in degree and diverted more or less from the center of the kiln to the outer parts or sides, or from the sides to the center, as the condition of the kiln may require.

For a more full understanding of the invention, reference will be had to the following detailed description and accompanying drawings, in which—

Figure 1 represents a vertical section of a brick-kiln, looking from the center outward in direction of the furnaces and flue-arches. Fig. 2 is a side view, in section, showing a side of a furnace and flue. Fig. 3 is a front view of the outside. Fig. 4 is a plan view, in section, showing the top of the furnaces and flues.

Like letters of reference refer to like parts in the several views.

In the drawings, A represents the body of the kiln, which may be of the usual shape and of any desirable size. In building said kiln care is taken to form therein, along two opposite sides, coal-furnaces B, having the arch or roof thereof considerably above the crown of the flues or fire-arches C, leading from the rear of the furnaces into the body of the structure or kiln. Said furnaces and the flues or fire-arches are not independent structures placed within the kiln and built around and over, but are formed therein on setting the bricks in the kiln, as fire-arches are made in ordinary brick-kilns.

E′ are the ash-pits of the furnaces, and the dotted line *a*, Fig. 2, indicates a grate. E are the doors of the ash-pits, and the doors of the furnaces are seen at F. G are openings through which to observe the condition of the fire in the furnaces, and for the admission of air therein, for a purpose hereinafter described.

The crown and sides of the furnaces and the fire-arches or flues C are pierced with openings *a′*, formed when setting the bricks. Said openings ramify throughout the entire structure for conducting into it the heat, smoke, and gases from the furnaces.

D are side air-flues, extending from the outside of the kiln into the furnaces, respectively. In practice said flues are provided with dampers for regulating the admission of air into the furnaces, and which, like the main flues or fire-arches C, are not pipes laid up in the bricks, but are formed by the bricks on setting them in the kiln.

The above-described brick-kiln is an improvement on one for which a patent was granted to me May 1, 1877.

In my patented brick-kiln the furnaces were independent structures, and built up against the outside of the kiln, and having a direct opening into the main flues or fire-arches C, which were of small size as compared with the fire-arches in this my present kiln.

Placing the furnaces on the outside of the kiln, though for some reasons desirable, is objectionable for the reason that there is a loss of heat, as the heat from the heated body of the furnaces is radiated into the air, and therefore lost. This loss of heat is avoided by building the furnaces within the kiln, as herein described, thereby utilizing all the heat from the furnaces, some of which passes therefrom into the main flues or fire-arches, and is conducted along thereby to the more central parts of the kiln, and as it passes along the arches more or less of the heat, smoke, and gas escapes therefrom through the openings *a′* between the bricks, and thus is diffused through the structure. Much of the heat, smoke, and gas from the furnaces passes directly upward and through the opening between the bricks, and is diffused among them. The furnaces, by being on the outside, take up much room, and are in the way, and are also inconvenient, all of which is avoided by having them on the inside, as described.

It is found in practice that the heat, smoke,

and gases from the furnaces tend toward the more central part of the kiln. As a consequence that part of the structure is liable to become more heated than parts remote therefrom—that is to say, along and about the sides; hence results an unequal burning of the bricks.

To equalize the heat throughout the kiln, and thereby cause more uniformity in burning the bricks, is one purpose of the side flues, D, which, as above said, extend from the outside of the kiln into the interior part of the furnace, where they terminate above the fire.

The tendency of the heat toward the center of the kiln, as above said, can be more or less checked and caused to ascend more directly upward into the kiln by the introduction of fresh air through the side flues, D, to the anterior part of the furnace. This checking of the inward flow of the heat not only prevents the central part of the kiln from becoming too hot, but the fresh air from the side flues forces the heat more or less out to the sides, thereby keeping up the necessary degree of heat remote from the center of the kiln for burning the bricks; hence it will be obvious that thus equalizing the heat from the center to the sides of the kiln must result in a more uniform burning.

In the event the sides of the kiln become too hot, or more heat is needed in the more central parts of the structure, the side flues are wholly or partially shut off, and air is admitted to the furnace through the sight-openings G. The draft of air thus admitted tends to drive the heat, smoke, and gases back toward the center of the kiln, at the same time cooling down that portion nearer the sides.

If, during the process of burning, more air is needed at the anterior part of the furnaces than the ordinary drafts supply, the deficiency is supplied by a partial opening of the side air-flues, D. By this introduction of fresh air at this point, and at the proper time, a more complete combination of the fuel, smoke, and gas is effected, and the heat is consequently augmented more or less, as the condition of the kiln may require. The increased heat thus obtained can be forced toward the central parts of the kiln by opening the sight-holes G, thereby admitting a current of air from the outside, which will tend to drive the heat toward the more central parts of the structure. This inward flow of the heat, however, can be checked and forced back toward the sides, more or less, by a full opening of the side flues, D.

It will be obvious that by the use of the side air-flues and the sight-openings G, the heating of the kiln is under full control of those having it in charge; hence the burning of the brick will be done more uniformly, and therefore with but little loss in over-burned and under-burned bricks.

As above said, the furnaces are made much higher than the main flues or fire-arches C in the rear of them, the purpose of which is to give more room in the furnaces above the fire for the combustion of the smoke, gas, &c., than would be the case were the furnaces no higher than the fire-arches, which may not improperly be considered as an extension of the furnaces.

I am aware that brick-kilns have been provided with air-flues running from the outside to the interior of the furnace and fire-arches, and that said kilns have been constructed with fire-arches within the walls thereof; hence I do not claim such, broadly, but the improvement hereinbefore set forth.

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

In brick-kilns, one or more coal-furnaces, A, and fire-arches C, with intermediate spaces between for bricks, arranged within the walls of the kiln and provided with openings a', with the crown of the coal-furnace above the said fire-arches, in combination with the air-flues D, substantially as and for the purpose set forth.

ANDREW W. DUTY.

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