2 Sheets—Sheet 1.

A. W. DUTY.

BRICK-KILN FURNACES.

No. 190,201, Patented May 1, 1877.

Fig. 1.

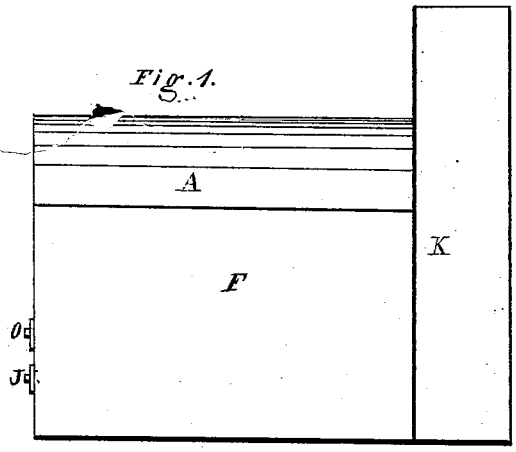


Fig. 2.

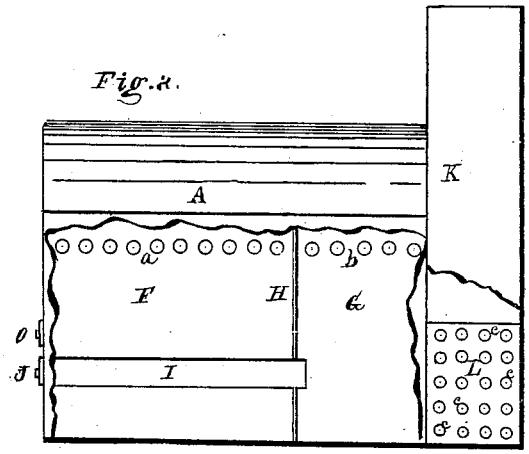


Fig. 3.

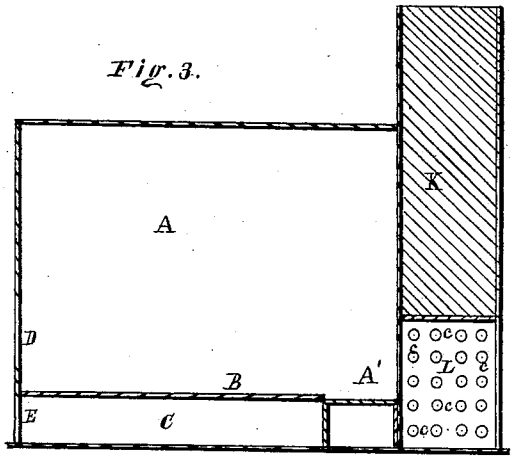


Fig. 4.

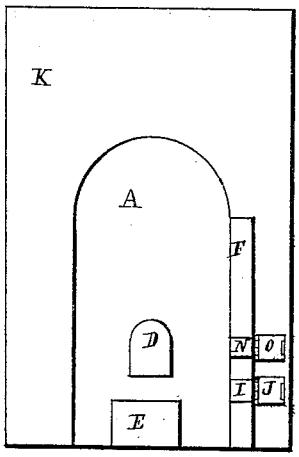
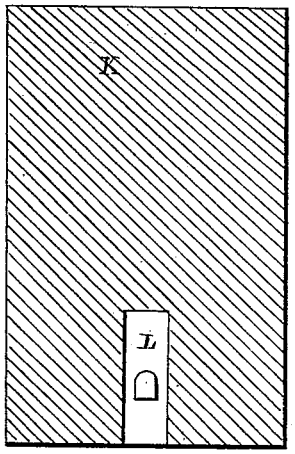


Fig. 5.



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2 Sheets—Sheet 2.

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BRICK-KILN FURNACES.

No. 190,201. Patented May 1, 1877.

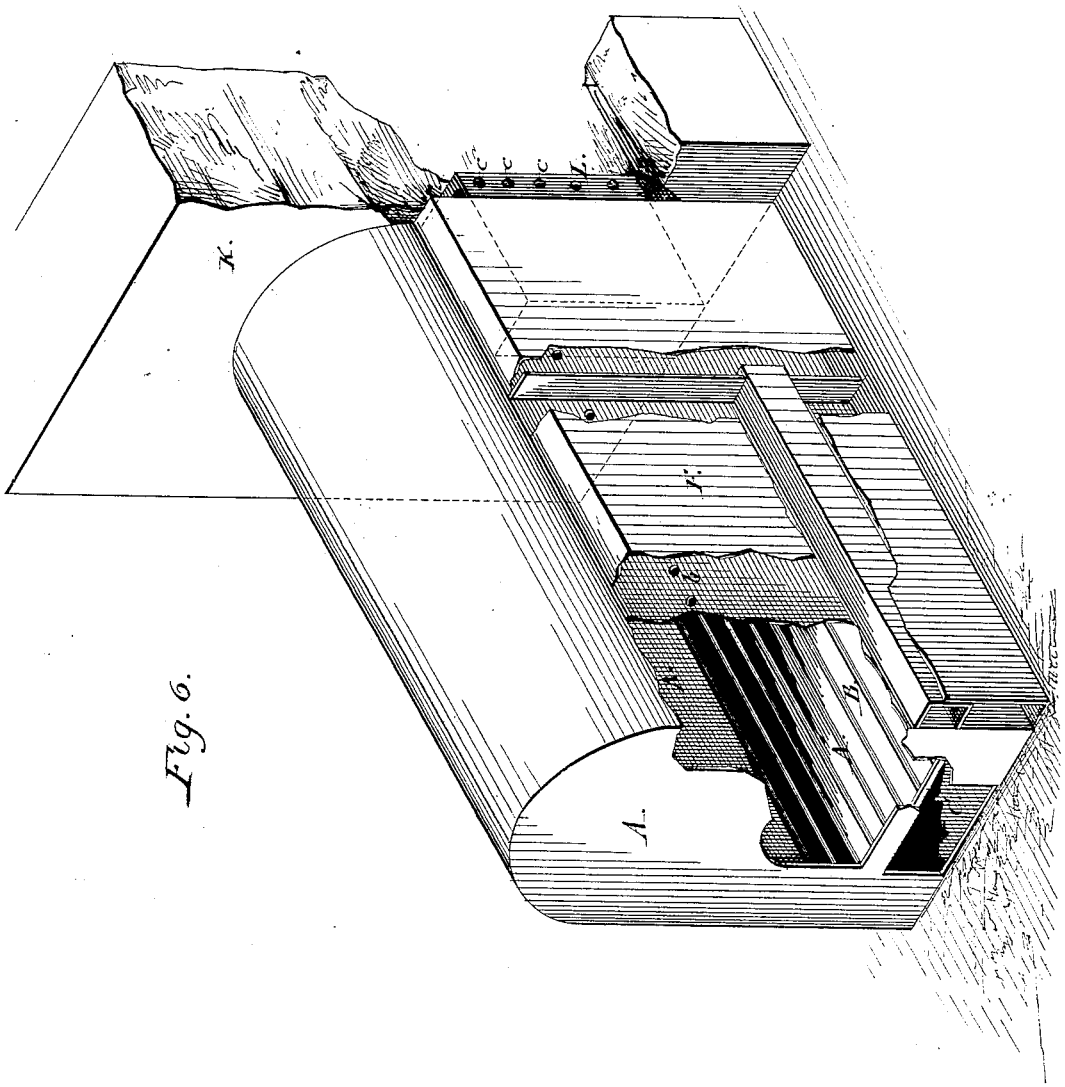

Fig. 6.

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UNITED STATES PATENT OFFICE.

ANDREW W. DUTY, OF CLEVELAND, OHIO.

IMPROVEMENT IN BRICK-KILN FURNACES.

Specification forming part of Letters Patent No. **190,201**, dated May 1, 1877; application filed February 9, 1877.

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 Furnace for Brick-Kilns; 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.

Figure 1 is an outside view of a furnace in its application to a brick-kiln. Fig. 2 is an inside view of air chambers arranged on the outside of the furnace. Fig. 3 is a longitudinal vertical section. Fig. 4 is a front view. Fig. 5 is a vertical section of a brick-kiln. Fig. 6 is a perspective view with portions broken out to show the internal construction.

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

The nature of this invention relates to a furnace and its application to a brick-kiln, the object of which is to economise in the use of fuel, to facilitate the process of burning the brick, and to burn them more evenly and thoroughly than in the ordinary way.

On referring to the drawings, A represents the furnace alluded to, of which B, Fig. 3, are the fire-grates, C the ash-pit, and D E, Fig. 4, are the respective doors, whereby access is had to said fire-place and ash-pit.

On the side of the furnace are arranged two air-chambers, F and G, Fig. 2, a portion of the outside wall of which is represented as removed in order to show the chambers. H is the dividing or partition wall separating the chambers from each other. The chamber F opens directly into the front part of the fire-place, through the perforations *a*, and chamber G opens into the anterior part of the fire-place through the perforations *b*. Air from the outside of the furnace is introduced into said chamber G by a conduit or flue, I, Figs. 2 and 4, which is provided with a door or damper, J. Air is admitted to the chamber F by an opening, N, Fig. 4, provided with a door or damper, D, both of which doors are shown as being open.

The abovesaid furnace is set up against the wall or face of a kiln, so as to cover one of the fire arches or places, as shown in the drawings, on which K represents a portion of a brick-kiln, and L one of the arches or flues into which the outlet of the furnace directly opens. The perforations *e* in the arch indicate the numerous small flues for transmitting the heat through the kiln, such as are usually made in kilns for that purpose.

Instead of building the fire directly in the arch L of the kiln, as is ordinarily done, it is made outside thereof in the furnace, the heat, gas, and smoke of which pass at once into the arch through the opening A′, Fig. 3, and which are conducted therefrom into and throughout the body of the kiln by the numerous flues *c* ramifying the structure.

In order to effect a more full combustion of the fuel and the gases and smoke arising therefrom, and also for other purposes presently explained, is the object of the air-chambers F and G referred to. By means of the chamber F fresh air is admitted to the front of the furnace over the burning fuel, which, on mingling with the gas and smoke thereof, produces a combustion of them which otherwise would pass off into the kiln without much heat, and would, therefore, be virtually lost.

At such time in the process of burning the brick more air is needed in the after part of of the furnace than is supplied by the ordinary draft, and that from the air-chamber F it is furnished by the chamber G, which, on opening the damper J, allows air to enter the chamber through the flue I, from which it passes into the fire-place through the perforations *b*. By this supply of fresh air to the fire at this point a more complete combustion of the gas, smoke, &c., is effected, thereby utilizing all the combustible elements of the fuel; hence little besides the heat passes from the furnace into the kiln, the gas and smoke being nearly if not all consumed before reaching the kiln.

On first firing up the furnace the air from chamber F only need be used. The draft from chamber G may be wholly or nearly shut off by closing the damper J. When the furnace is fully heated up, and the kiln dry, and the moisture therein driven off, the draft from chamber G is used to re-enforce and augment the draft of the furnace, and thereby cause an increment of heat in the kiln.

When the fire is first started in the furnace for the purpose of burning the brick it is difficult to get a current or draft through the kiln on account of the dampness of the brick and the air in and about them, which must first be driven off before a free circulation in the kiln can be obtained, and the object in opening the draft from chamber F on first firing up is to get as much draft as possible to force the heat and dry air into and through the kiln, to drive off the damp air therein. After the kiln has become dry, and the damp air driven out therefrom, there is a free circulation or draft through the kiln. At this stage of the process of burning brick the damper or door J is opened to admit air into the chamber G, from thence into the after part of the furnace, by which the heat becomes intensified by a more full combustion of the fuel, and the gases and smoke eliminated as it passes into the kiln. It is at this time in the process of burning that the greatest heat for the purpose is required, and is obtained by the additional draft from the chamber G, to complete the combustion of the gas and smoke at that point. At the same time the draft from chamber F may be continued in use to sustain a full and sufficient draft in the furnace, if found necessary.

Each one of the arches of the kiln is provided with a furnace. Said arches, being close together, cause a close approximation of the furnaces, the distance between them being but little; hence the air-chambers are not only heated by their respective furnaces, but also by the adjacent one; hence the air in the chambers becomes greatly heated before entering the furnace. Therefore, drafts of heated air issue from the chambers into the furnaces instead of cold air directly from the outside.

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

The air-chambers F and G, flue I, and openings *a* and *b* arranged in relation to each other and in combination with the furnace A, substantially as herein described, and all adapted to a brick-kiln, as set forth, and for the purpose specified.

ANDREW W. DUTY.

Witnesses:
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