C. F. PECK.
Brick-Kiln.

No. 198,673. Patented Dec. 25, 1877.

Fig. 1.

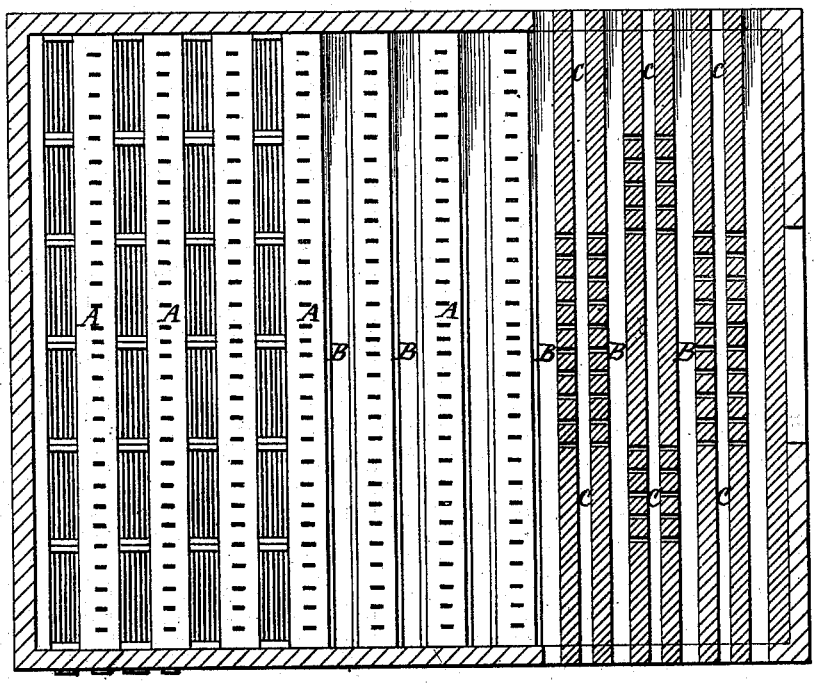


Fig. 2.

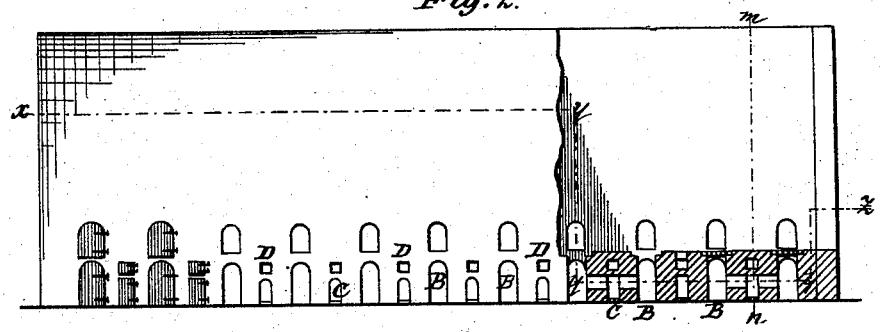


Fig. 3.

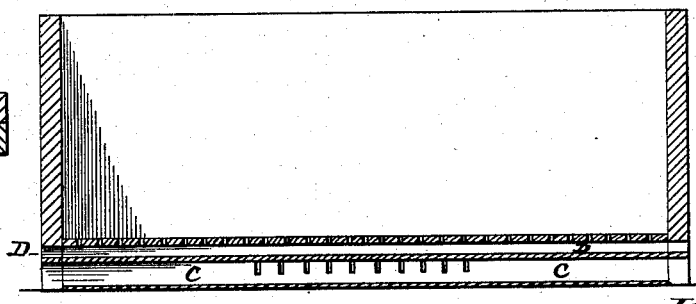


Fig. 5.

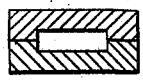
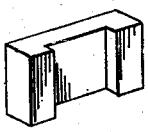


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES F. PECK, OF GEORGETOWN, DISTRICT OF COLUMBIA.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. **198,673**, dated December 25, 1877; application filed December 1, 1877.

To all whom it may concern:

Be it known that I, CHARLES FLETCHER PECK, of Georgetown, in the District of Columbia, have invented a new and useful Improvement in Brick-Kilns, which improvement is fully set forth in the following specification.

A long experience has shown that the present form of the kiln used for burning brick has such advantages for receiving and discharging the brick that it will probably never be superseded. As each brick weighs six pounds when it goes into the kiln, and is sold to-day, and in this locality, for about half a cent when put upon the market, economy in filling and emptying the kiln must always be a primary consideration. So heavy and so cheap a product will bear very little expense in handling.

The structure now commonly used is rectangular, having walls about eighteen feet high, open at the top. It is from thirty-five to forty feet in width and from thirty to seventy feet in length.

The bed or bottom consists of a series of low solid walls, about three feet wide and the same depth, running across the kiln, with intervening open spaces about one foot in width, which pierce the walls of the kiln at each end. These open spaces form the ash-pits, and over them are laid the grates. The grates being thus on a level with the top of the low walls before referred to, they, together, form the floor of the kiln, over which carts, wheelbarrows, cars, &c., pass for bringing in the green brick and taking them out after burning. For this purpose at one or both ends of the kiln an open space is left in the wall wide enough for two or three carts to pass.

The fires are built upon the grates before referred to, and over them the fire-places are formed by turning arches of the green brick as they are being set for burning, with small interstices between them. The fire-places are carried up with perpendicular sides eighteen inches apart for seven courses, say, thirty inches high; then seven more overhanging courses on each side complete the arch. The fire is built under and within this arch, which is about forty feet long, eighteen inches wide, and five feet high. The fuel is thrown in from a small opening through the kiln-wall at each end, the ashes falling through the grates into the ash-pit. This ash-pit is also about forty feet long, one foot wide, and three feet deep.

It will be seen that the fuel is burned in a long narrow chamber or tunnel, and that the only supply of air to aid the combustion is through the ash-pit, which is also a long, narrow tunnel, open to the air only at its extremities. There being a strong upward draft, the air which enters the mouth of the ash-pit is quickly drawn up through the grate-bars, and causes a rapid combustion of the fuel near the mouth, while the fires toward the inner parts of the arch are very imperfectly supplied with air. The consequence is very imperfect combustion of the fuel in these inner parts, many of the gases which should be consumed passing off through the top of the kiln.

I have been thus particular in describing the present method of burning brick in order to explain the great advantage it possesses for getting the brick into and out of the kiln, and the serious disadvantage in the consumption of fuel.

The object of my present invention is to preserve the former and overcome the latter.

All the heat in a given amount of fuel can only be developed by complete combustion, and this can only take place by supp g with a large amount of oxygen, from one hundred and fifty to two hundred cubic feet of air being necessary for the perfect combustion of a single pound of bituminous coal. Without this supply of air there must be a loss of heat and waste of fuel.

My present invention consists, first, in means for introducing an abundant supply of fresh air into the body of the kiln, so as to give all parts of the fire-place along the entire length of the arch a supply of oxygen as nearly equal as practically possible.

To accomplish my said object, the low wall or dead space between the ash-pits is built with a flue through it, which also goes through the exterior walls of the kiln. This flue has a series of small apertures, connecting it with

the ash-pit, so that the fresh air is admitted on alternately opposite sides all along under the grate-bars, as hereinafter described. These openings can be formed by setting the courses of brick from half an inch to an inch apart, or by any other convenient means.

In the drawings I have shown a kiln constructed in accordance with this part of my invention.

Figure 1 in said drawings represents a sectional plan view on line *x y z* in Fig. 2, exhibiting the main wall in section, part of the floor with the grates inserted between the piers, part of the floor with the grates removed and exposing the ash-pits, and part of the floor in horizontal section on line *y z*, showing the arrangement of flues and apertures leading into the ash-pits. Fig. 2 is an elevation, partly in vertical section, of the kiln, the plane of section passing through the center of the kiln transversely to the grate-supporting piers. Fig. 3 is a transverse vertical section on line *m n* in Fig. 2.

In said figures, A A are the grate-supporting piers; B B, the ash-pits, and C C the flues before referred to.

As the parts of the fire-place near the exterior walls are sufficiently supplied with air through the ash-pit, the flues should have no openings until about one-third of the distance to the middle of the kiln is passed—say, six feet. In order to insure a more uniform supply of air through this long fire-place, I arrange these flues alternately, so that one shall have its openings into the ash-pit for a space of about six feet, the middle one-third of the distance to the center of the kiln, and the next one in like manner supplies air for the next six feet, or to the center of the kiln.

By this arrangement the arch has three distinct sources for the supply of air for each half of its length. The first six feet is supplied from the mouth of the ash-pit; the next six feet from the flue on one side through the apertures before mentioned; the next six feet from the flue on the opposite side through the apertures.

If preferred, this separate action of the flues could be omitted, and each flue have the same openings into the ash-pit.

These flues should be made narrow, to avoid weakening too much the exterior wall of the kiln where they pass through it. Six inches would be a sufficient width, and a depth of two feet would give a cross-section of one hundred and forty-four inches.

If piercing the walls of the kiln would weaken them too much, as might be the case in applying this invention to old kilns, the flue could be led around and under the ash-pit. Whichever method is adopted, covers should be placed on the exterior openings of the flues, to enable the burner to regulate the draft.

It may be deemed advisable to construct the walls with buttresses between the openings, so as to strengthen and properly support the superincumbent wall.

One of the most serious practical difficulties in burning brick is the overheating of the arches. On this account the kiln-doors must frequently be left open to cool them, by which the operation of burning is retarded. The bricks in and about the arch are greatly injured by the excess of heat before those in the top of the kiln are burned to a good color.

To obviate these difficulties my invention further consists in constructing the kiln with a second flue, D, separated from, but directly over, the one just described, in each wall or dead-space. Instead of side openings into the ash-pit, this flue has openings in the top, which forms the floor of the kiln, so that the air circulating through this upper flue is allowed to pass up between, and in close proximity to, the arches. By this means they will be prevented from becoming overheated, and the air thus introduced into the body of the kiln will mingle with the gases and products of combustion, and produce a greater heat, and diffuse it more equally throughout the kiln.

The exterior openings of this flue should also be provided with covers, so that the admission of the air can be regulated. It can be constructed to follow the course of the other flue, either through the kiln-wall or around under the ash-pit.

A simpler construction, but a less satisfactory result, perhaps, could be obtained by combining these two into a single flue, with openings in the side into the ash-pit, and openings in the top to admit the air among the bricks between the arches.

The apertures in the top of the flue, which is the floor of the kiln, could be formed, with advantage, by brick molded with a recess in the side, as shown in perspective view in Fig. 4. These, being set on edge, would, as shown in Fig. 5, leave the floor strong enough to bear the carts and horses passing over it when the brick are being delivered.

In all cases the aggregate size of the apertures in the flue should be proportioned to the size of its exterior openings, bearing in mind that those in the top of the flue will be partly covered by the green brick set over them.

Having thus described my said invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. In a brick-kiln in which the grate and arch supporting piers are provided with air-flues, as described, the arrangement of apertures for the discharge of the air under the grate from alternatingly-opposite sides, substantially as herein shown and set forth.

2. In brick-kilns of otherwise ordinary and suitable construction, grate and arch support-

ing piers provided with flues for the admission of and apertures for the discharge of air over and between the grates, substantially as herein set forth.

3. In grate and arch supporting piers of brick-kilns, the combination of flues and apertures, substantially as shown and described, for the admission of air into said flues and the discharge of the same under, over, and between the grates, as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

Witnesses: C. F. PECK.

A. POLLOK,

E. A. DICK.