

F. E. HOFFMANN.

Improvement in Brick-Kilns.

No. 115,734.

Patented June 6, 1871.

Fig. 1.

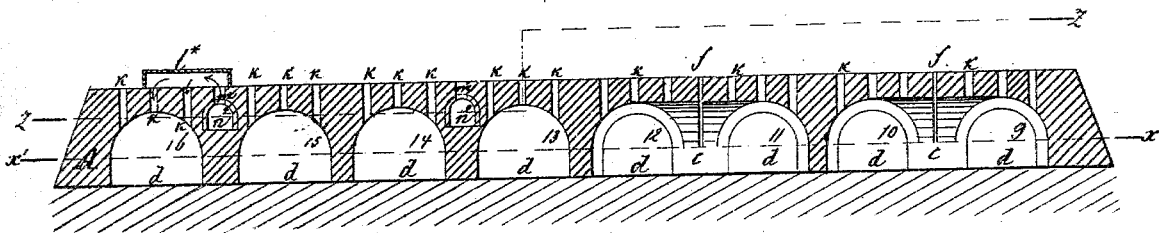
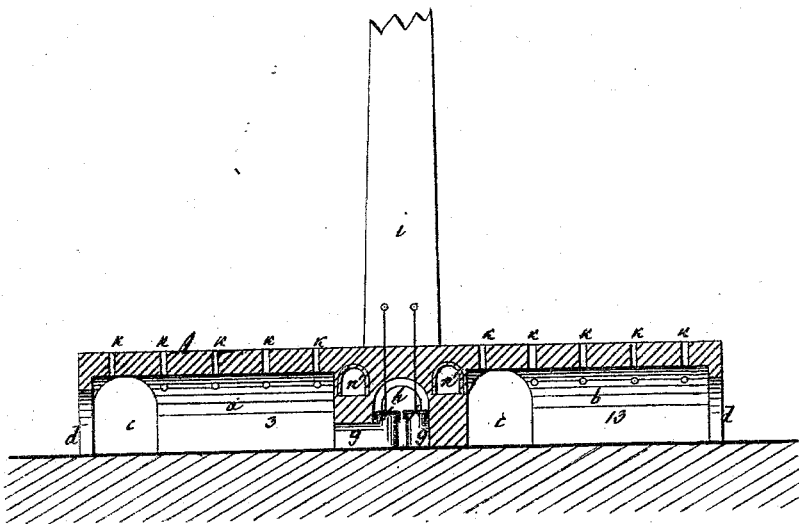


Fig. 2.



Witnesses.

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Fig. 3.

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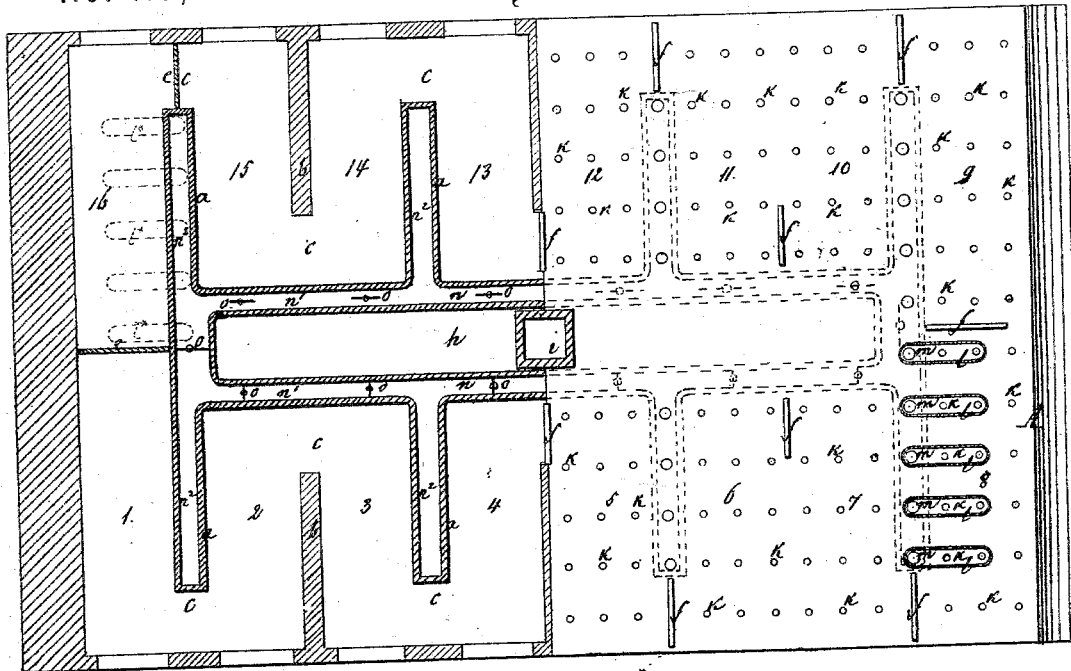
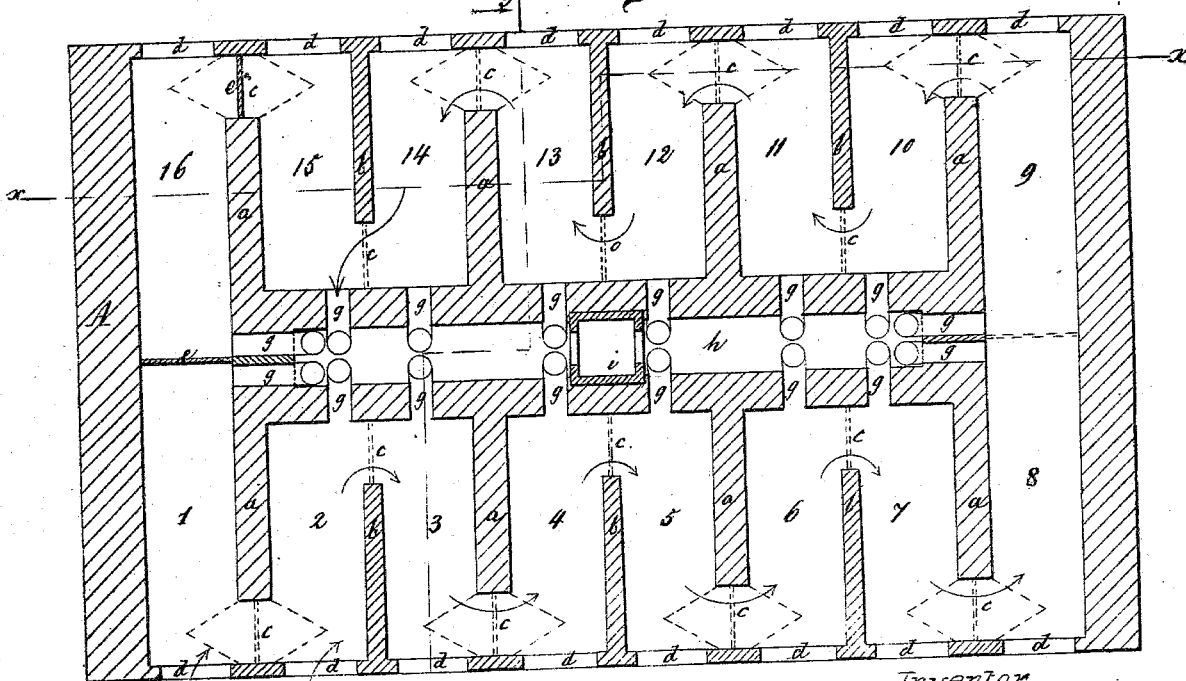


Fig. 4.



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## UNITED STATES PATENT OFFICE.

FREDERICK E. HOFFMANN, OF BERLIN, PRUSSIA.

## IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. 115,734, dated June 6, 1871.

*To all whom it may concern:*

Be it known that I, FREDERICK E. HOFFMANN, of Berlin, Prussia, have invented a new and Improved Brick-Kiln; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a longitudinal vertical section of this invention, the line *x x*, Fig. 4, indicating the plane of section. Fig. 2 is a transverse section of the same taken in the plane indicated by the line *y y*, Fig. 4. Fig. 3 is a horizontal section of the same, the plane of section being indicated by the line *z z*, Fig. 1. Fig. 4 is a similar section of the same in the plane indicated by the line *x' x'*, Fig. 1.

Similar letters indicate corresponding parts.

This invention relates to a brick-kiln which differs from that described in my patent No. 48,244, dated June 13, 1865, in two essential features. First, the kiln-chambers in my new kiln are so constructed that their end walls can be perforated with door-ways large enough to give access to wagons without destroying the requisite power of resistance of said walls, and thereby much labor and time are saved in charging and emptying said kiln-chambers. Secondly, with the kiln-chambers is combined a hot-air flue capable of drawing heated air free from the products of combustion out of one kiln-chamber and injecting said heated air into another kiln-chamber, so that the surplus heat evolved by the charge of one kiln-chamber in the act of cooling is utilized for the purpose of drying green bricks in another chamber; and consequently the operation of drying the bricks is effected in the same chambers in which the same are afterward burned, and the labor required for removing the bricks from one chamber and resetting them in another is saved; and furthermore the heated air is drawn off and prevented from incommoding the workmen employed in introducing bricks in and removing them from the kiln.

In the drawing, the letter A designates a kiln, which contains a series of arched cham-

bers marked 1 2 3 to 16, the number of which may be increased or diminished, as may seem desirable. These chambers are arranged in the form of a rectangle, as shown in Fig. 4 of the drawing; but they may be arranged so as to form any other desirable shape or figure—for instance, a star. These chambers are separated from each other by partition-walls *a b*, which are provided with apertures *c* alternately on opposite ends, so that the whole series of chambers forms a zigzag channel, as indicated by the arrows in Fig. 4. The arches of the chambers rest against each other, while the two longitudinal sides of the kiln are not exposed to any thrust from the arches, so that the same can be provided with door-ways *d*, of any desired size, the door-ways shown in the drawing being nearly equal in height and width to the chambers, thereby giving access to wagons or carts for the purpose of introducing bricks into the chambers or removing them therefrom. The various chambers can be separated from each other by movable partitions *e*, which are made of sheet metal, and which can be introduced through slots *f* in the arch, so as to close the aperture *c* in the partition-walls *a b*.

From the following description it will be seen that two such movable partitions are always in use during the operation of the kiln.

Each kiln-chamber connects, by a bottom flue, *g*, with a smoke-flue, *h*, that extends along the center of the kiln and communicates with a smoke-stack, *i*, situated in the center of the kiln or in any convenient position in relation thereto. Each of the bottom flues is provided with a valve, *j*, (see Fig. 2,) whereby the communication between the several kiln-chambers and the smoke-stack can be established or interrupted, as required. When the kiln is in operation only two of the bottom flues are open; all the others are closed, and also all the door-ways *d*, with the exception of two, are closed. The tops of the arches are perforated with a number of small holes, *k*, through which fuel is introduced into the several chambers. The size of these holes varies according to the nature of the fuel to be used. For coal, their diameters are from five to six inches, but for wood, from eight to ten inches. These

holes in the tops of the arches also serve to draw off the heated atmospheric air which accumulates near the tops of the kiln-chambers, and when the kiln is in operation either all or a portion of the feed-holes of that chamber from which the hot air is to be drawn off are covered with oblong caps *l*, which are open below, and which extend over holes *m*, leading down into the hot-air flue *n*, while the feed-holes of all the other feed kiln-chambers are closed up by suitable covers. The caps *l* are hermetically closed against the external air by throwing up sand or clay against them. The hot-air flue *n* is best seen in Fig. 3, and also in section in Figs. 1 and 2. It consists of two main branches, *n*<sup>1</sup>, which extend in a longitudinal direction through the side walls of the smoke-flue *h*, and of a series of legs, *n*<sup>2</sup>, formed in the alternate partition-walls *a* of the kiln-chambers, said partition-walls being made wider than the partition-walls *b*, so as to obtain room for the hot-air legs *n*<sup>2</sup>. Suitable dampers *o* in the hot-air flue regulate the course of the hot air received by said flue.

The hot air which passes from one of the chambers—8, for instance, as shown in Fig. 3—through the caps *l* into the hot-air flue, escapes therefrom through the holes *m* in the top of said flue, and through another set of caps, *l*<sup>\*</sup>, (see Figs. 1 and 3,) down through the feed-holes of chamber 16, which is supposed to contain newly-introduced or green bricks. This chamber is separated by two of the movable partitions *c* from the adjoining chambers, (see Fig. 4,) so that the hot air cannot pass into either of those. The bottom flue of the chamber containing the green bricks is opened, and by the suction of the smoke-stack the hot air is continually drawn through the green bricks, so that the moisture contained in said bricks is rapidly absorbed and carried off through the bottom flue and the smoke-stack. By adjusting the dampers *o* in the hot-air flue the hot air drawn off from either of the kiln-chambers can be directed into either of the others. The apertures *m*, leading through the top down into the hot-air flue, are about twice as large as the feed-holes *k* of the kiln-chambers; since at least two of the latter are always brought in communication with one of the former.

If the bricks introduced into the kiln are very moist, it may be desirable to facilitate the drying process by the application of an exhauster in the door-way of the chamber containing green bricks, said exhauster performing in this case the function of the smoke-stack.

In the drawing (particularly Fig. 4) it is assumed that the door-ways of the chambers are closed in the usual manner by means of bricks and clay.

In No. 1 green bricks are being introduced, and from No. 2 burned bricks are carted away. Chambers 3, 4, 5, 6, and 7 are cooling; also,

No. 8, in which the fire has just been left to go down, and from the feed-holes of which the superabundant hot air passes off through the hot-air flue, said feed-holes being connected by caps *l* with the holes *m* in the hot-air flue, as shown in Fig. 3. In Nos. 9 and 10 the fire is kept burning, for the support of which a sufficient quantity of air remains, notwithstanding the obstruction of some of the heated air through the feed-holes of No. 8, the air being supplied through the open door-ways of Nos. 1 and 2, as indicated by the arrows in Fig. 4. The bricks in Nos. 11 to 15 are heated by the products of combustion passing off from the fires in Nos. 9 and 10. The bottom flue of No. 15 is open and allows the products of combustion to pass off to the smoke-stack. Chamber 16 has just been filled with green bricks, and communicates with the hot-air flue by caps *l*, being supplied with hot air from chamber 8, as indicated in Fig. 3, while it communicates, by its bottom flue, with the smoke-stack, whereby the air introduced from the hot-air flue, after having been saturated with and cooled by the moisture from the green bricks, is drawn off. A movable partition is introduced between chambers 1 and 16; and also between chambers 16 and 15, as previously stated and shown in Figs. 3 and 4. After the green bricks in chamber 16 have been dried and chamber 1 has been filled with green bricks, the movable partition between chambers 15 and 16 is taken out and inserted between chambers 1 and 2; the door-way of chamber 1 is closed; also, the bottom flue of chamber 15, while the bottom flue of chamber 1 is opened. Furthermore, the communication of chamber 1 and the hot-air flue is established, and that between chamber 16 and said hot-air flue is interrupted, while at the same time the fire in chamber 9 is left to go out, and said chamber is brought in communication with the hot-air flue, so that the air taken from said chamber will serve to dry the green bricks in chamber 1. The fire is transferred from chamber 10 to 11, and in this manner the operation progresses. Each day one of the chambers is supplied with green bricks, the bricks in another previously filled are dried, one chamber is emptied, and the fire is advanced every twenty-four hours for the space of one chamber. Each day one of the movable partitions is moved forward for two chambers, and the operation can be continued without interruption.

If the kiln is constructed as shown in the drawing, the partitions fitting between 1 and 16 and between 8 and 9 must be wider than the others; but the kiln-chambers may be easily so arranged that partitions of a uniform width can be inserted between all of them.

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

1. The arrangement, in a burning kiln, of a series of arched chambers, the arches of which

are supported by zigzag partition-walls, substantially as and for the purposes herein shown and described.

2. The movable caps *l*, in combination with the hot-air flue *n n'*, with apertures passing down through the arch of the kiln, partly into the kiln-chambers and partly into the hot-air flue, substantially as herein set forth.

This specification signed by me this 17th day of March, 1871.

FREDERICK E. HOFFMANN.

Witnesses:

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H. KREISMANN.