HAUEISEN, WAGNER & NULSEN.

Brick Kiln.

No. 58,941.

Patented Oct. 16, 1866.

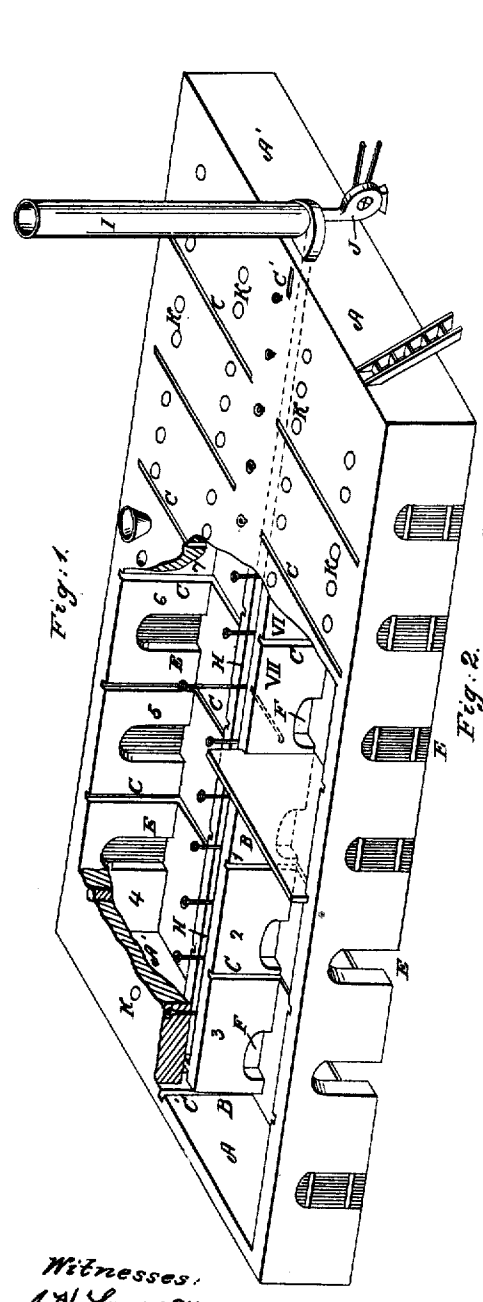

Fig. 1.

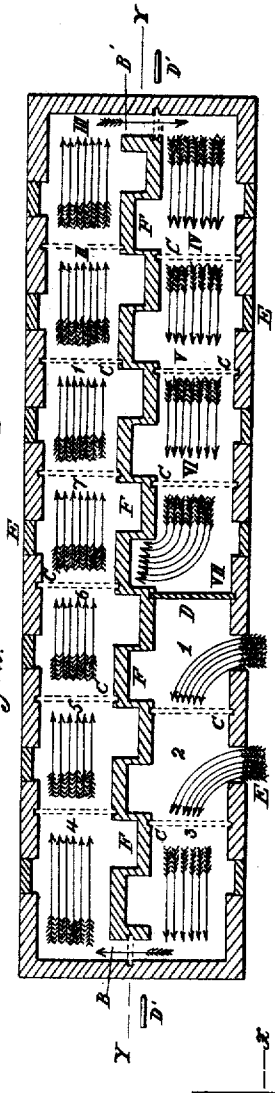

Fig. 2.

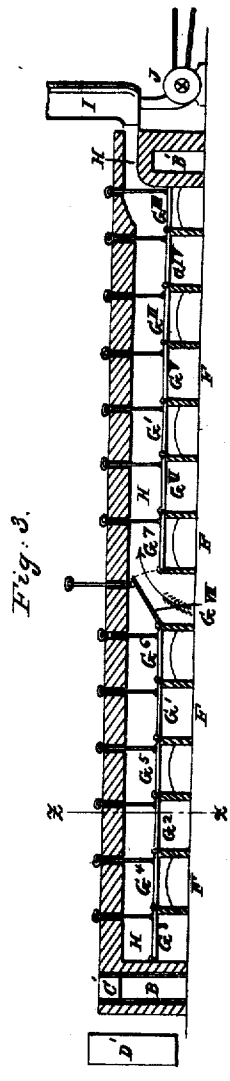

Fig. 3.

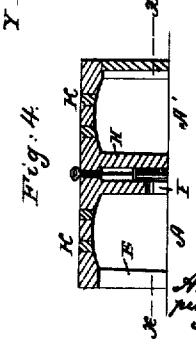

Fig. 4.

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UNITED STATES PATENT OFFICE.

E. HANEISEN, A. WAGNER, AND A. NULSEN, OF CINCINNATI, OHIO, ASSIGNORS TO NULSEN & CO., OF SAME PLACE.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. **58,941**, dated October 16, 1866.

To all whom it may concern:

Be it known that we, EUGEN HANEISEN, ALBERT WAGNER, and ANTHONY NULSEN, all of Cincinnati, Hamilton county, Ohio, have invented a new and useful Improvement in Brick-Kilns; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Our invention relates to a peculiarly-formed kiln or furnace adapted to produce a superior and uniform quality of brick or pottery with a very slight expenditure of time, labor, and material.

Figure 1 is a perspective view of a kiln or furnace embodying our invention. Fig. 2 is a horizontal section at the line *x x*. Fig. 3 is a longitudinal section at the line *y y*. Fig. 4 is a transverse section at the line *z z*.

The furnace comprises, principally, two similar and parallel arched chambers, A A′, of considerable length, and which communicate at their adjacent ends by means of passages B B′, so as to form collectively a continuous vault or gallery, A B A′ B′. This gallery is marked off into a series of equal compartments or subdivisions, 1 2 3 4 5 6 7, I II III IV V VI VII, by twelve transverse grooves, C, which receive in succession a shiftable partition, D. C′ are similar grooves to receive a partition, D′, which, at the proper juncture, is used to separate the adjacent ends of the two chambers A and A′.

Each compartment has an entrance or doorway, E, in its outer wall, through which the molded brick (previously dried by stacking around the furnace) are inserted and stacked for burning and withdrawn after burning.

The inner walls of the gallery have a series of recesses, F, corresponding in number to the entrances—that is, one for each compartment.

Each of the recesses F is in turn, by the lifting of a damper, G^1 G^2, &c., permitted to communicate with a long exit-flue, H, which occupies the entire upper interval between the inner walls of the gallery. With this exit-flue H all of the compartments, through their respective recesses and dampers, in turn communicate.

The flue H discharges into a chimney, I, having a forced draft by means of a blower, J, or other customary or suitable means.

The roof or arch of each compartment is traversed by a series of apertures, K, for the introduction, at the discretion of the operator, of fine coal-dust or other fuel in a comminuted form. These apertures are all closed by a suitable plug or cover, except those of the particular compartment in which the combustion is for the time being taking place.

The entrances E are kept constantly closed, except the two adjacent ones pertaining to the compartments which are for the time being receiving and delivering bricks. The closure of the entrances E may be effected either by doors or by the customary luting with bats and mortar.

While preferring the elongated rectangular form for the gallery adopted in the present illustration, it is evident that the principle may be embodied in elliptical, circular, or other forms, and we therefore disclaim any restriction of our invention to the specific arrangement here represented.

Operation: The partition D being inserted in one of its grooves—say, for example, in that one between compartments 1 and VII—all of the compartments are charged with alternate layers of fuel and bricks in the customary manner. The damper G VII is now opened and the entrances are all closed, except of compartment 1, in which a fire is kindled, and a draft is at the same time created in the chimney. The fire will gradually creep from compartment 1 to compartment 2, and so on until, having made half the circuit of the gallery, it will have become extinct in compartment 1, whose contents, in consequence of the continued entrance of fresh air, will have sufficiently cooled down to permit the removal of its bricks, which having been effected, the compartment is replenished with fresh bricks from the stack which surrounds the kiln, and at the same time the contents of compartment 2 are taken out, which having been effected, partition D is shifted one station to the left. The damper G VII is at the same time closed and the damper G 1 opened, so as to compel the escaping smoke and flame to traverse compartment 1 on their way to the outlet, and thus give the newly-inserted bricks

the benefit of the residue of heat not already expended on the preceding batches of brick.

The furnace having been, by the just-described preparatory operations, fully heated up and prepared for its normal and permanent action, the bricks are now and at all times hereafter inserted without fuel, but with such horizontal and vertical interstices as to afford free passage to the draft and to the coal-dust or other comminuted fuel, whose application we will now proceed to describe.

The above operation having proceeded in rotation half-way around the gallery, the compartments—say I and II—being open, and the compartment 1, although without fuel of its own, being by this time in a glowing heat from the emanations of the preceding batches, we begin to apply in said compartment 1 our peculiar mode of burning by the precipitation of comminuted fuel, such as fine coal-dust or charcoal, through the apertures K.

The glowing heat acquired by the feed-air in traversing the series of compartments of already burned bricks, being now amply sufficient to ignite and completely consume the coal-dust, dispenses from this time forward with the insertion of any fuel along with the bricks, as is commonly done, and the amount of fuel actually required will be but a small fraction of that consumed under the old way.

In the just-described normal operation of the furnace the entering draft performs the twofold service of heating the air up to the point of ignition, and of gradually cooling the already burned bricks, while the outgoing air serves to preheat and to complete the drying of the unburned bricks by a gradual operation that involves no tendency to crack the bricks or to impair the homogeneity of their substance.

After once starting, the furnace must be kept filled to its utmost capacity, every compartment, except the two adjacent ones which are for the time being emptied and replenished, being fully charged with brick either preheating, burning, or cooling. Thus the operation becomes henceforth continuous, unceasing, and to a great extent automatic.

The entering air at first pervades those bricks which have been in the oven the longest and are burned and cooled. It next reaches those that are hotter, and, receiving itself their heat, it advances through the still hotter bricks, and, reaching the opposite side of the gallery in a condition of glowing heat, it serves to ignite and consume the particles of coal-dust descending at this part through the apertures K. Advancing thence, it strikes the already highly-heated brick in the immediate rear of the combustion-compartment, and so on in succession through the more newly-inserted batches of unburned bricks, to which it gradually gives up its entire heat, so as to leave the kiln as cool as it entered the same.

Thus the principal portion of the heat required for the burning of the bricks is continually conducted from the burned bricks into those not yet burned, and to effect the burning of the latter a very small quantity of fuel suffices.

One of the advantages of this system of gradual heating to a glowing condition, followed by a brief but active and complete combustion and as gradual a cooling, is seen in the uniformity of appearance of the bricks and their freedom from flaws, seams, and incipient fractures.

The intensity and duration of the actual burning and the prolongation of the gradual heating and cooling are all under perfect control, being regulated by the number and size of the compartments, the amount of fuel, and the force of the draft.

The operation of putting the bricks in and out is a very simple one, the bricks being all easily accessible to a person on the ground-level, and the uniform and uninterrupted operation in itself simplifies the work.

The gradual heating and cooling of the work are believed to render this system peculiarly applicable to the manufacture of porcelain and earthenware and to articles of enameled metal.

To recapitulate, a kiln thus constructed possesses the following advantages: Constant use of the entire oven; constant, uniform, and uninterrupted employment of the men, and economy of labor; complete utilization of all the heat; uniformity, handsome appearance, and soundness of the bricks, and freedom from damage and loss.

We claim herein as new and of our invention—

1. The method, substantially as described, of burning bricks, &c., by the contact of falling coal-dust or other comminuted fuel with a draft of air which has become heated by traversing the already burned brick.

2. The arrangement of the continuous gallery A B A′ B′, shifting partitions or partitions D D′, and dampers G^1 G^2, &c., or devices substantially equivalent, whereby the operations of preheating, burning, and cooling are simultaneously and continuously performed, in the manner substantially as explained.

In testimony of which invention we hereunto set our hands.

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