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J. P. VEIRS.

CONTINUOUS BRICK KILN.

No. 493,951. Patented Mar. 21, 1893.

Fig. 1.

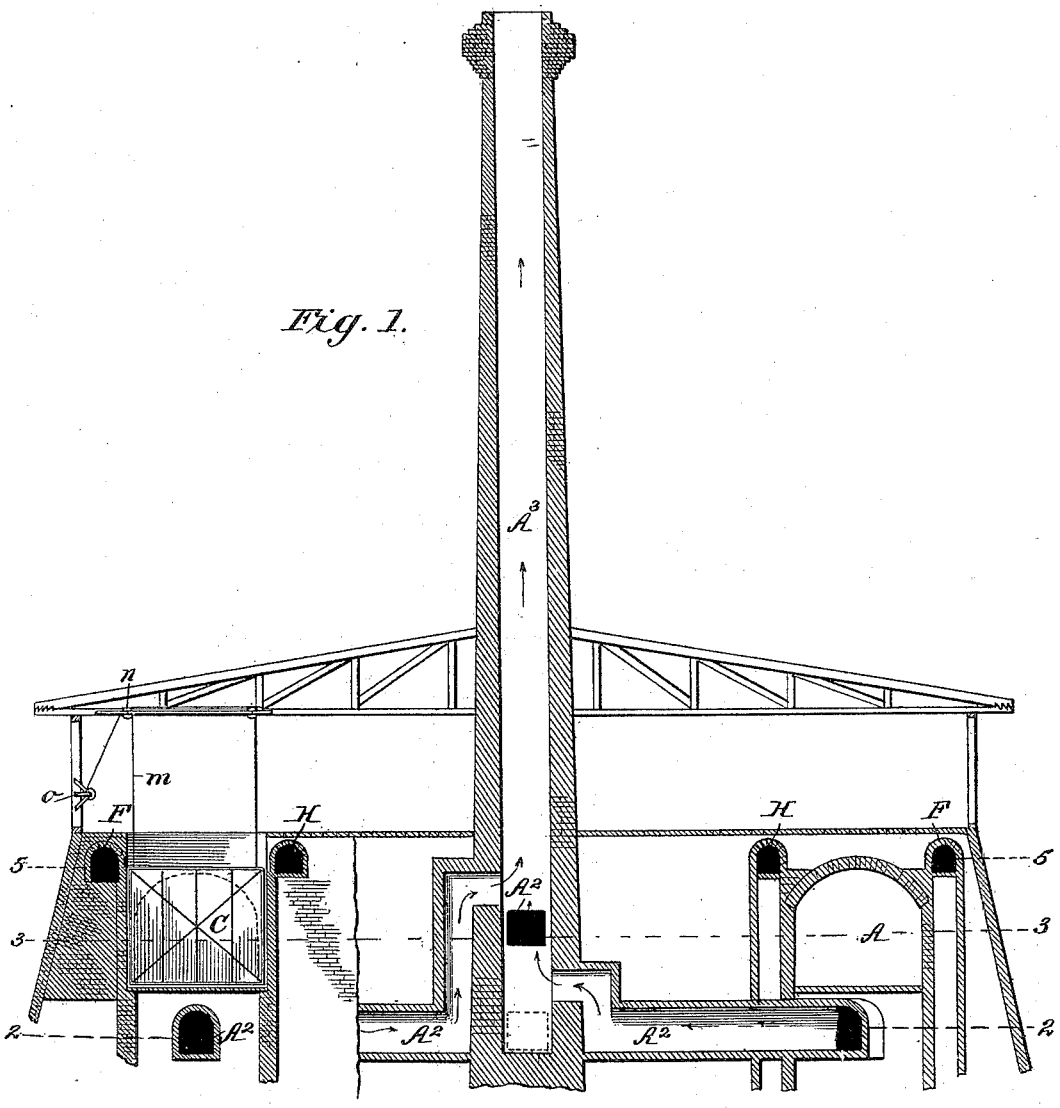

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Fig. 2.

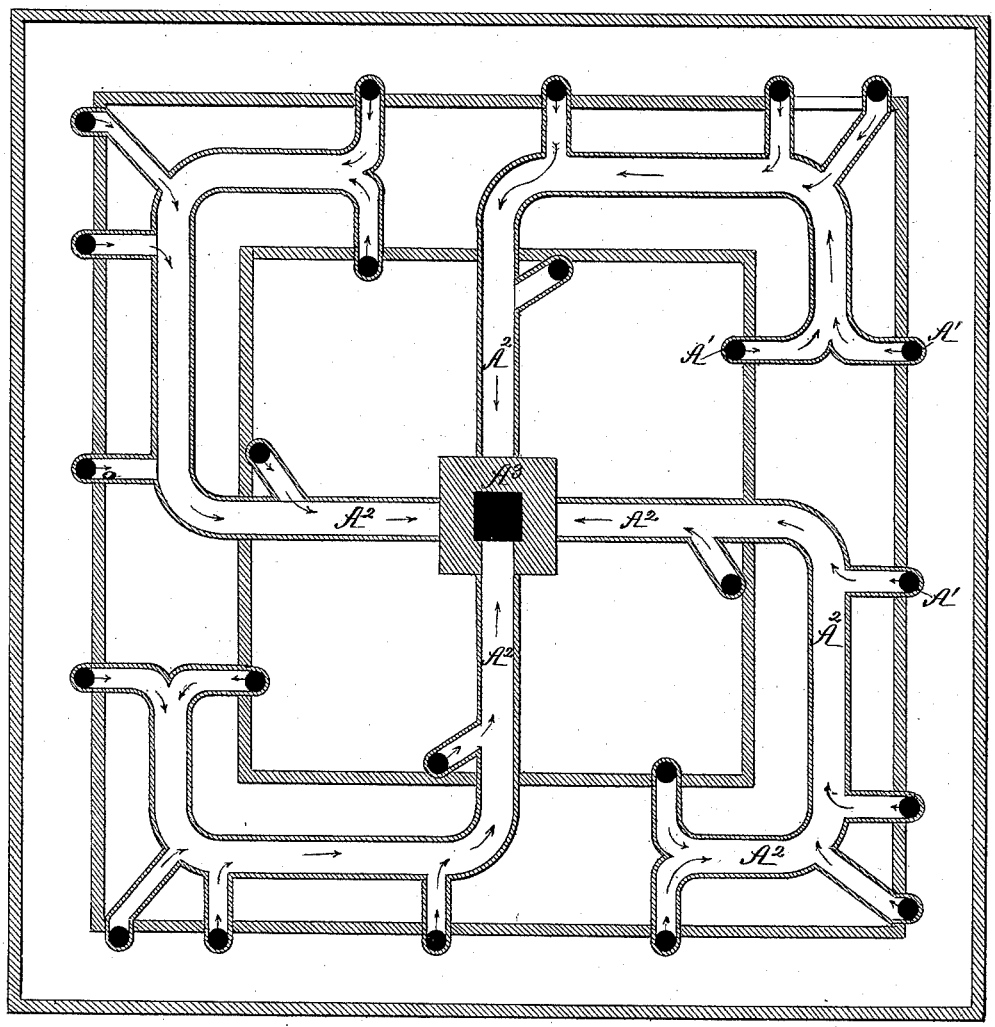

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Fig. 4.

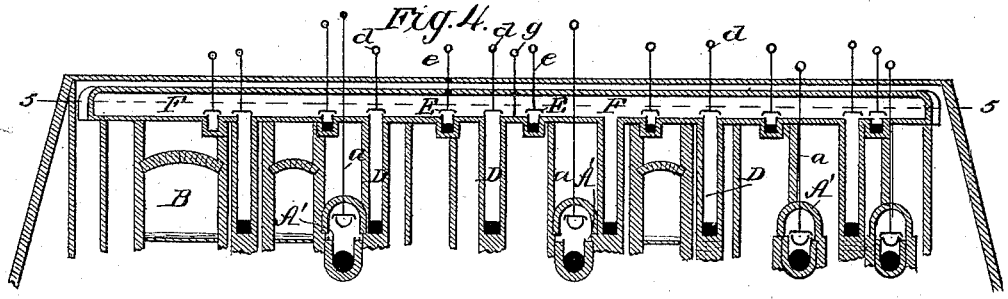
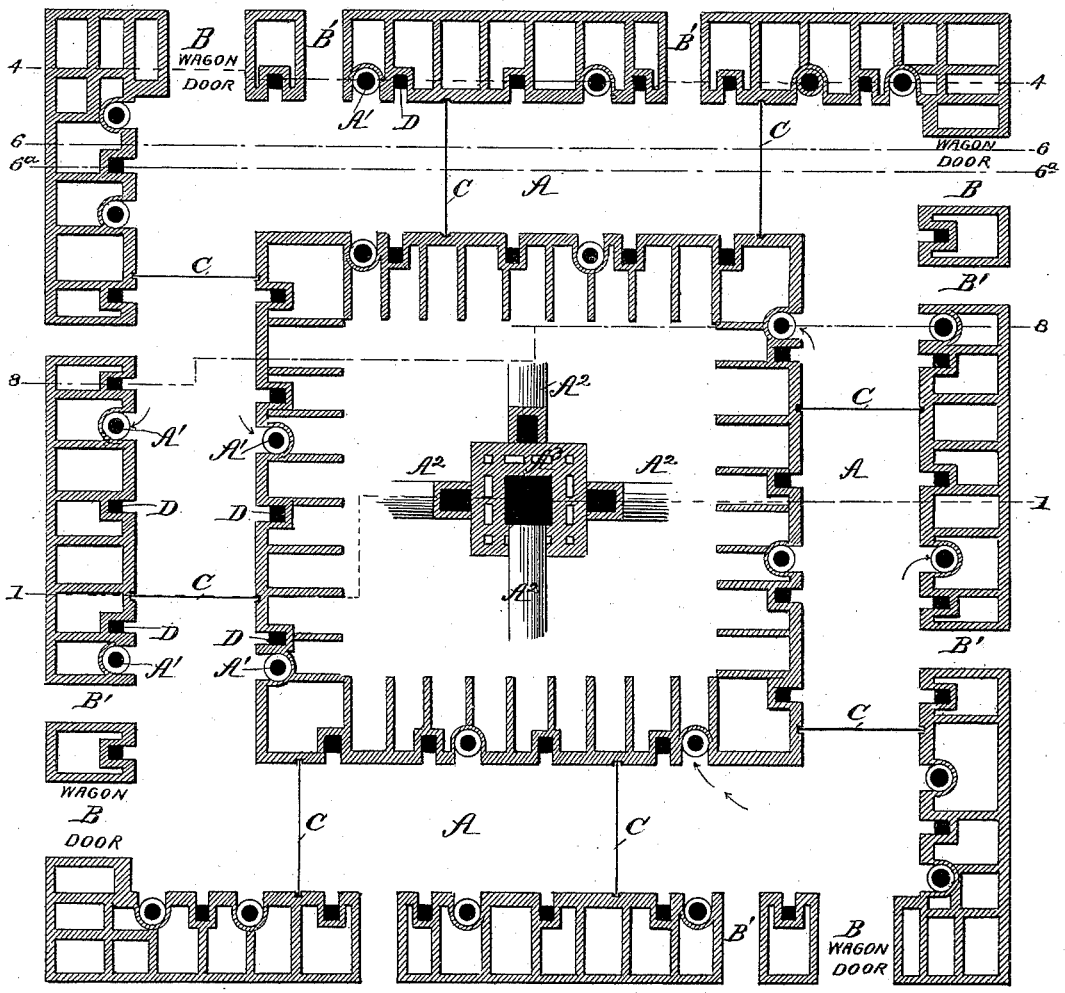


Fig. 3.



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No. 493,951. Patented Mar. 21, 1893.

Fig. 5.

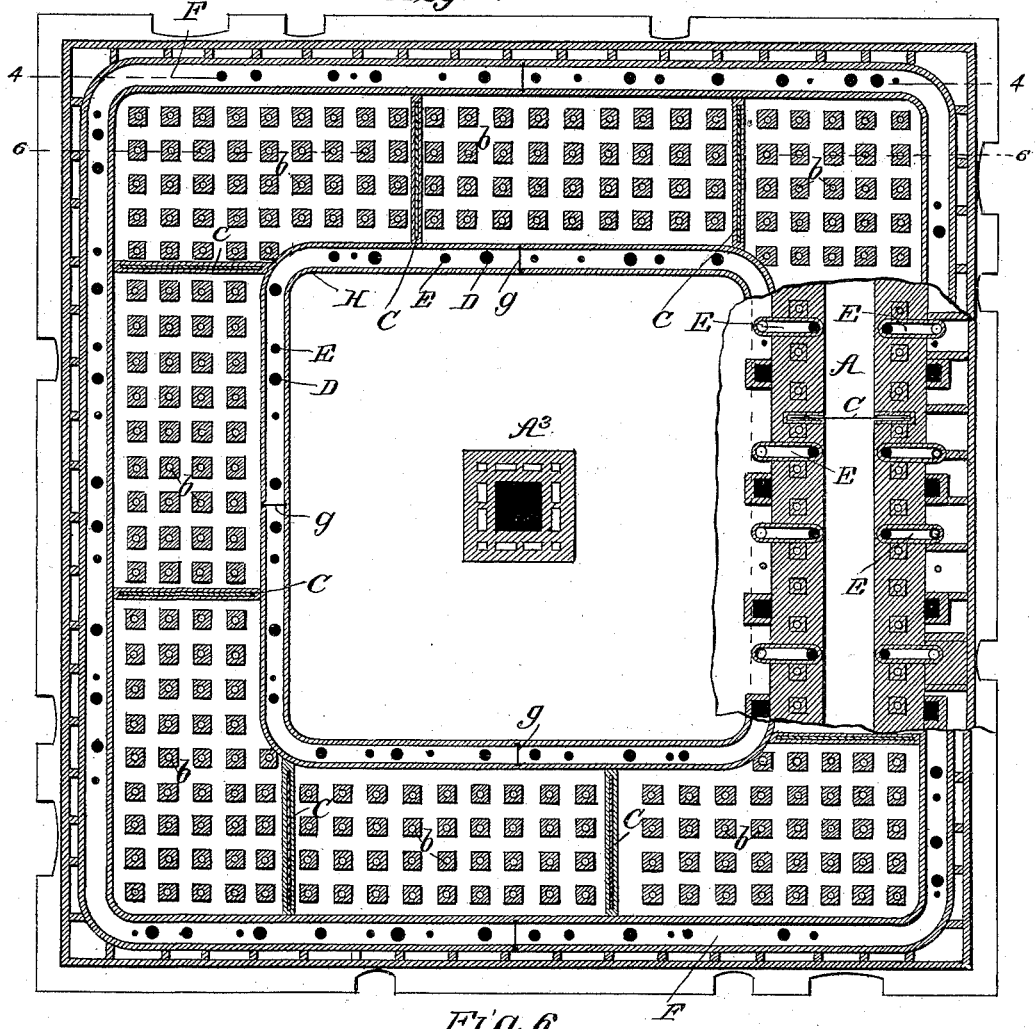

Fig. 6.

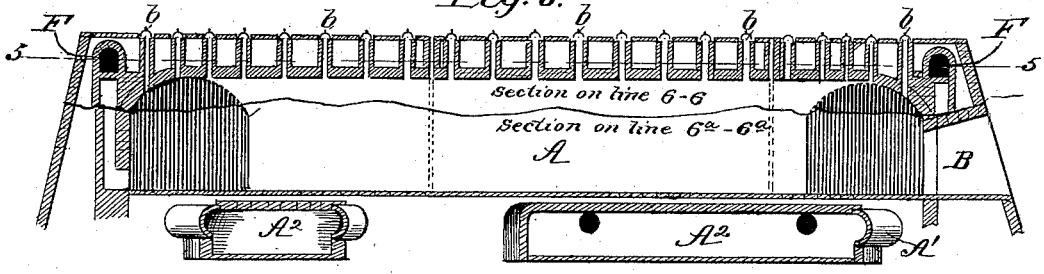

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Fig. 7.

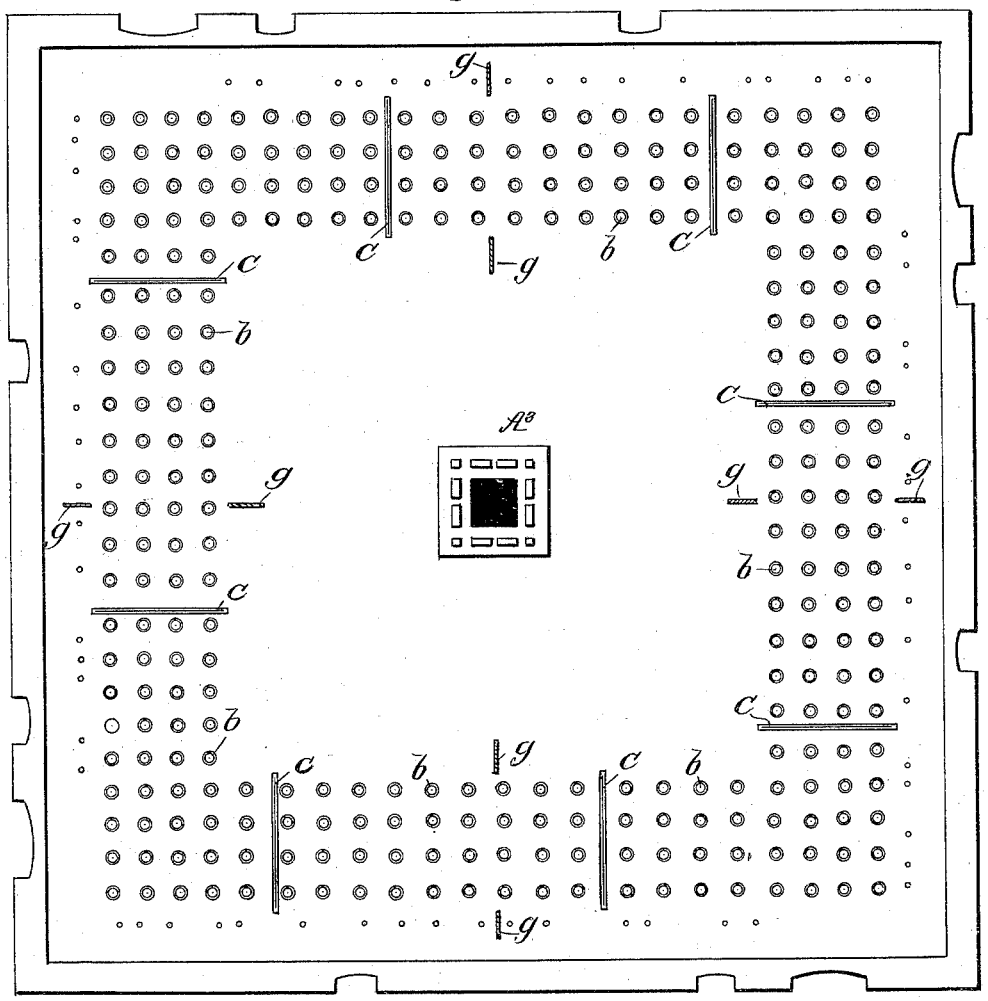
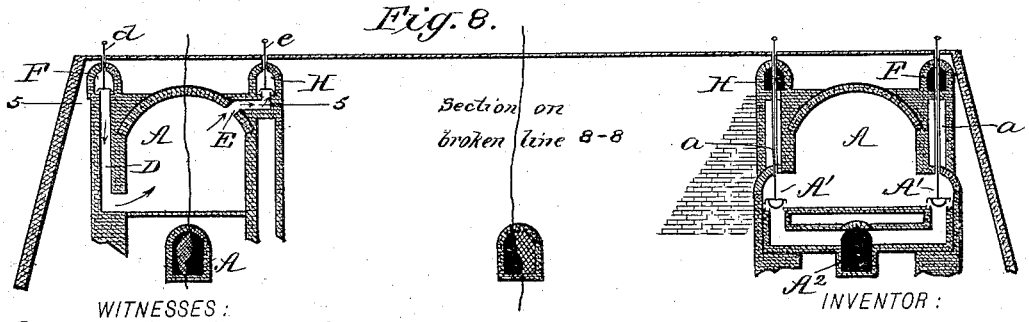


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES P. VEIRS, OF OMAHA, NEBRASKA.

CONTINUOUS BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 493,951, dated March 21, 1893.

Application filed June 14, 1892. Serial No. 436,748. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. VEIRS, of Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Combined Continuous Brick Kilns and Driers, of which the following is a full, clear, and exact description.

My invention is in the nature of an improved brick kiln of that type known as "continuous kilns" in which the brick burning proceeds continuously through a tunnel which returns into itself, in the different parts of which tunnel there is going on at the same time the drying and burning of bricks, the cooling and removal of the burned bricks, and the recharging of the tunnel with green bricks.

My invention consists in the peculiar construction and arrangement of parts whereby these operations are carried out more expeditiously, more economically, and more uniformly, and better burning of the bricks secured, and a greater economy of heat and saving of fuel are obtained, all as hereinafter fully described and shown in the accompanying drawings, in which—

Figure 1 is a vertical central section through the kiln and stack on line 1, 1, Fig. 3. Fig. 2 is a horizontal section through line 2, 2, Fig. 1. Fig. 3 is a horizontal section through line 3, 3, Fig. 1. Fig. 4 is a partial vertical section through lines 4, 4, of Figs. 3 and 5. Fig. 5 is a horizontal section through lines 5, 5, of Figs. 1, 4 and 6, the right hand part being taken on the plane of line 5, 5, of Fig. 8. Fig. 6 is a broken vertical section through lines 6, 6 and 6^a 6^a of Figs. 3 and 5, the top part being through line 6, 6 of Fig. 5 and the bottom part through line 6^a 6^a of Fig. 3. Fig. 7 is a plan view of the kiln taken under the roof, and Fig. 8 is a partial vertical section on broken line 8, 8, of Fig. 3.

In general shape the continuous kiln is square with the tunnel A—A, A—A, in which the bricks are burned, running around in the form of a quadrangle within the same. These tunnels have the usual small doors B′ for wheelbarrows for carrying brick in or out, but have in addition at the end of each tunnel, or in line with the same, a large door B adapted to receive a horse and cart which may be drawn directly into the kiln and the brick loaded directly into the cart thus saving one handling of the bricks and thereby reducing the cost of the same to that extent.

On opposite sides of the tunnel at proper intervals along their length are outlet pipes A′ A′ for the smoke and gas. These outlets are not located in the floors of the tunnel, which interferes greatly with the floor capacity for bricks, but are located in recesses on the sides of the tunnel and are closed by dampers *a* as shown in Figs. 2 and 3 and on the right hand side of Fig. 8. These paired outlet flues communicate in groups with four main outlet flues A^2 A^2 A^2 A^2 which are located beneath the tunnels and radiate from the central stack A^3. These flues A^2 open into the stack at different levels, as shown in Fig. 1, so that the gases issuing from one will not choke the outlet from the opposite one. The object in having the outlets A′ A′ from the tunnels paired or arranged in pairs on opposite sides of the tunnel, is to secure a more uniform distribution of the hot currents through the bricks and avoiding the convergence of the hot currents and an excessive heat at any one point.

C are movable partitions which extend across the tunnel at suitable intervals and serve to separate one portion of the tunnel from the rest so as to confine the draft to that portion of the tunnel in which the bricks are being burned. These partitions, see Fig. 1, are made of a skeleton frame of iron covered with tin, and they slide in grooves in the side of the tunnel, as shown in Fig. 3, and are adjusted vertically to be raised to open the tunnel, or be lowered to close it, by means of chains *m*, pulleys *n* and windlass *o* as shown in Fig. 1.

In the top part of all of the tunnels are numerous charging or firing holes *b*, see Fig. 6, which rise through short chimneys surrounded by earth, see Fig. 5, and open through the top covering as shown in Figs. 6 and 7. These firing holes are closed by caps as shown in Fig. 6.

In conserving heat and economizing fuel, I construct my kiln so that after a section of brick has been burned the heat from these red hot bricks is taken off and carried to a

portion of the kiln in advance of the fire, and is made to dry out the green bricks and prepare them for the more intense heat that is to follow. This part of the kiln will, however, be better understood after the description of the operation of charging, burning, and removing the bricks, and will be described farther along.

The operation of the kiln is as follows: A portion of the tunnel comprehending any number of sections between the movable partitions, is supposed to be charged with the green bricks, which are stacked up on its floor in the usual fashion, with a series of vertical openings below each firing hole *b*. Slack, or pulverized fuel, is charged through the firing holes and falls down through the spaces in the bricks and is evenly distributed. The section of bricks that are to be burned is now separated from the green ones in the front or farther along in the tunnel by lowering a partition C, all the other partitions being raised behind the closed partition and the fire (if more than one section is burned at a time). A temporary brick wall is now built across the tunnel at the point where the fire is to be started, with firing arches on a level with the floor through which wood is charged. The dampers *a* nearest the closed partition C are then opened so that the section of tunnel to be burned has a draft through it, and the wood fire is then kindled and the burning commences. As soon as the heat becomes intense enough the pulverized fuel takes fire and the burning continues without further wood. The fire is now drawn through the section of tunnel by the draft, and the bricks are burned. At the same time green bricks are stacked in the tunnel in advance, and when the fire has burned up to the closed partition, another one farther along is let down, the dampers *a* nearest to it opened, and the first partition is raised, and the fire goes on burning continuously in the next section. As fast as the fire burns along, fuel is charged in a new row of fire holes *b*, farther along, and a row of fire holes in the rear is left out. As the burning progresses continuously the burned bricks are cooled by the draft, and a wagon or cart is drawn in the doors B behind the fire, and the burned bricks are removed. It will then be seen that the burning of the bricks, the filling in of green ones in advance of the fire, and the removal of the burned and cooled ones behind the fire, goes on continuously in an unceasing cycle.

I have found that after a section of bricks has been burned and left red hot, there is a great deal of heat left in them that has not been practically utilized. Efforts have been made heretofore to use this heat to dry out the bricks in advance of the fire. My present invention comprehends an improved construction of furnace for doing this, which I will now proceed to describe. Just above the tunnel and running around the outer edge of the same is a continuous flue F, and above the tunnel and running around the inner side is another continuous flue H. These flues have vertical branches D, Figs. 3 and 5, that open into the tunnels at their sides near the bottom and on a level with the floor, as shown on the left of Fig. 8. These continuous flues F and H also have other branches E that extend horizontally, as on the left of Fig. 8, and open into the tops of the tunnels. These two sets of branches have dampers *d* and *e* which control respectively their openings. In the continuous flues F and H are arranged at suitable intervals cut-off valves *g* which extend crosswise the flues, and are adapted to close the flue, or cut off any section of the flue from other parts thereof. The branches E of these flues are outlets for the hot air escaping from the burned and still red hot bricks, and its branches D are inlets for conveying said heated currents to the section of the tunnel in which the green bricks are contained. Now if it is desired to transfer the hot currents from a mass of bricks that have just been burned, to the green bricks in front of the fire, the dampers *g* in the top flues F and G are raised between these two points and are kept down outside of these points. The dampers *e* in the flues above the hot bricks are then opened, and the dampers *d* at this point are closed, and the dampers *d* at the green bricks are opened and the dampers *e* closed. The hot currents from the hot bricks then pass up and through the branches E and dampers *e* and travel along the flues F and H until they reach the region of green bricks, and there they pass down through the branches D and enter the tunnel at the lower level of the green bricks where they dry out the bricks uniformly and without leaving them in a sweated condition at the bottom.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a central smoke stack; of a tunnel containing the bricks to be burned extending around the stack, and outlet flues from the tunnel, extending to the stack and opening into the same each at a different level from all the others, substantially as shown and described.

2. A continuous brick kiln comprising a quadrangular firing tunnel with adjustable partitions therein, two quadrangular over head hot air flues F and H arranged above the tunnel on each side thereof, each hot air flue being provided with dampers *g* and alternating passages E D leading directly into the top and bottom of the tunnel respectively, and valves *d* and *e* for throwing these passages into communication with the over head flues substantially as and for the purpose described.

3. A continuous brick kiln comprising a quadrangular firing tunnel with wagon doors B aligned with each section of the quadran-

gular tunnel, a central smoke stack, outlet passages A′ A² leading outwardly from the tunnel and extending beneath its floor to the central smoke stack, valves *a* for controlling the same, adjustable partitions C for dividing the tunnel into sections, the over head hot air flues F and H, with dampers *g* and alternating branches E D leading respectively into the top and bottom of the tunnel, valves *d e* for controlling the same, and firing holes *b* opening into the top of the tunnel substantially as shown and described.

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GEO. J. ANDREWS.