

C. F. KAUL.
CONTINUOUS BRICK KILN.

No. 486,972.

Patented Nov. 29, 1892.

Fig. 1.

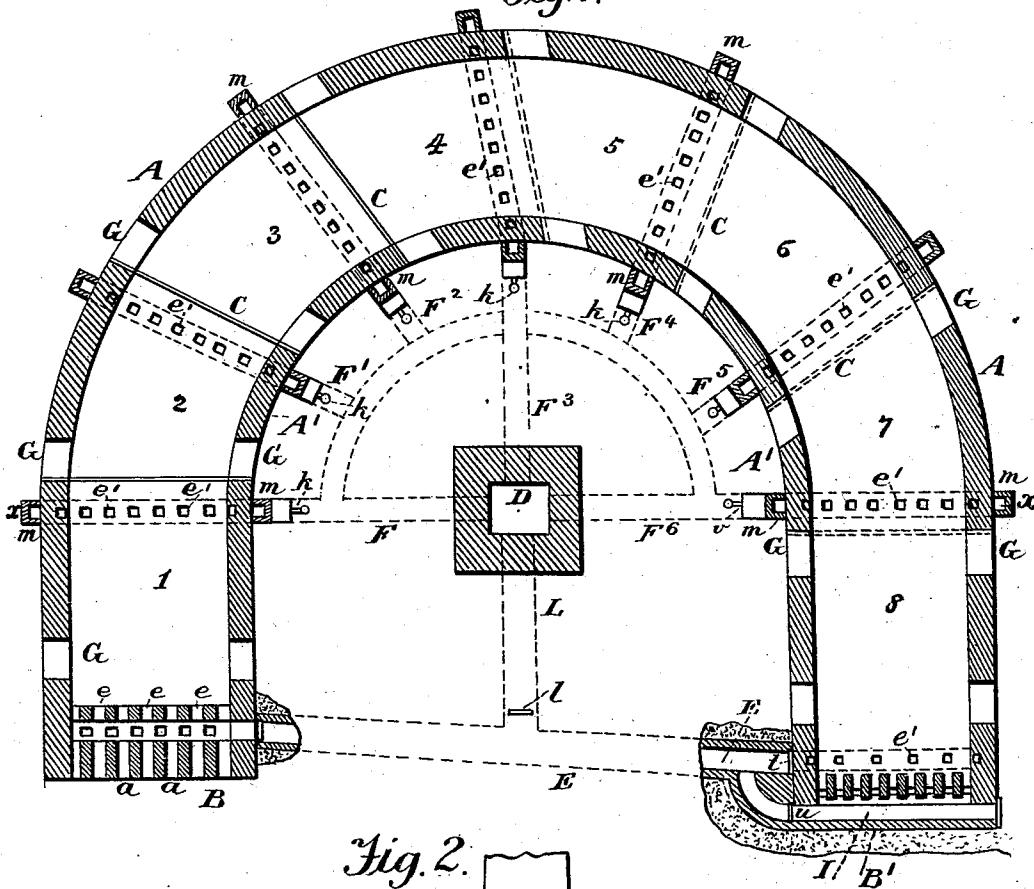
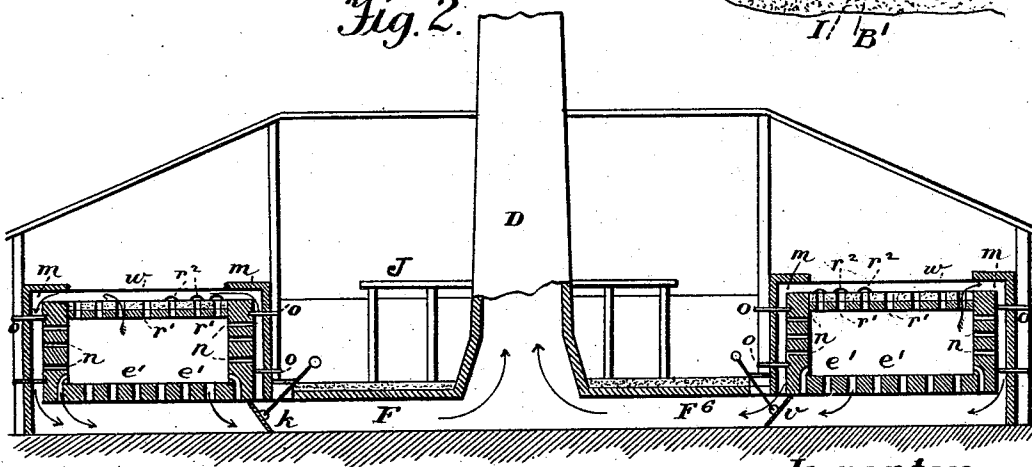


Fig. 2.



Witnesses.

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

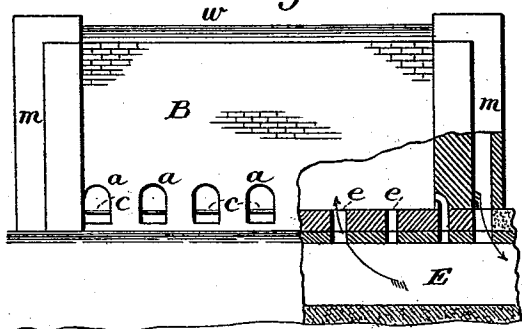


Fig. 4.

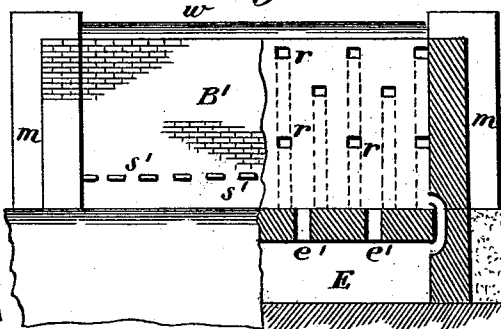


Fig. 5.

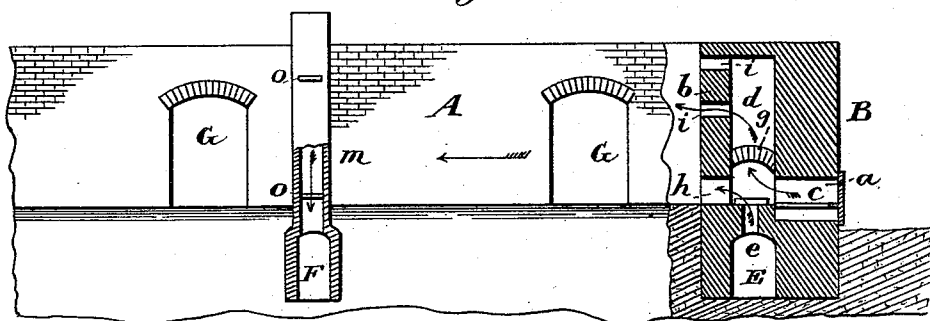
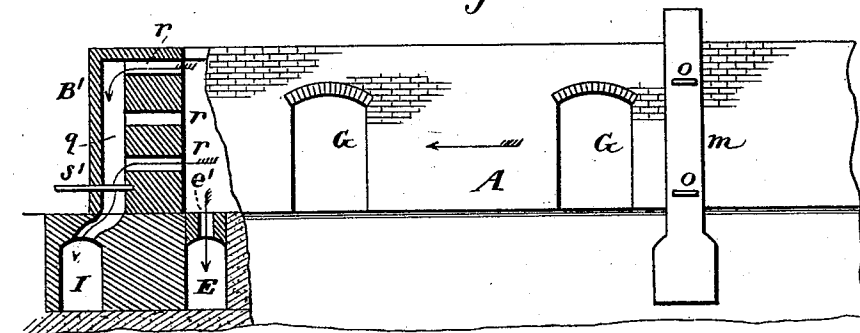
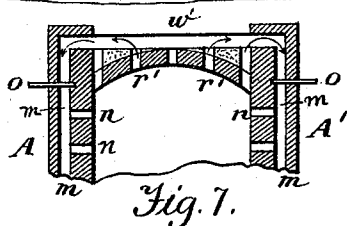


Fig. 6



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UNITED STATES PATENT OFFICE.

CARL F. KAUL, OF MADISON, NEBRASKA.

CONTINUOUS BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 486,972, dated November 29, 1892.

Application filed March 23, 1892. Serial No. 426,097. (No model.)

To all whom it may concern:

Be it known that I, CARL F. KAUL, a citizen of the United States of America, residing at Madison, in the county of Madison and State of Nebraska, have invented certain new and useful Improvements in Brick-Kilns, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in certain improvements in the construction of brick-kilns, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a sectional plan of a brick-kiln provided with my improvements, the section being taken just above the plane of the floor of the kiln. Fig. 2 is a vertical section taken on line $x x$ of Fig. 1. Fig. 3 is a sectional front view of the kiln. Fig. 4 is a sectional rear view. Fig. 5 is a sectional side view of the forward part of the kiln. Fig. 6 is a sectional side view of the rear part. Fig. 7 shows a modification in construction.

The kiln is represented in Fig. 1 in a curved form, the end of the structure where the fire-boxes are located being referred to as the front and the opposite end as the rear.

The main inclosure of the kiln consists of the extended walls $A A'$, a front wall B , and a rear wall B' , and in operation the entire inclosure may be filled and used at once, or it may be divided by removable partitions C into a number of sections, eight being shown in the drawings and numbered 1 2 3 4 5 6 7 8, and one or more may be used continuously.

D indicates the smoke-stack with which the several sections of the kiln have communication by the underground flues $F F'$, &c.

G indicates door-openings in the walls $A A'$ for access to the interior of the kiln for filling it with brick.

The fire-boxes a are located in the front wall B and are provided with separate doors. An inner wall b , Fig. 5, is located a suitable distance in rear of the front wall B , so as to leave the space d between them, which is crossed by brickwork on the plane of the grates c , the said brickwork having apertures e , provided with removable covers, said apertures being connected with a flue E below. A series of arches g cross the space d above

the plane of the fire-chambers a . Openings h are made in the wall b , said openings being on the level of the floor and of the fire-chambers. Apertures i , being passages for heat and smoke, are made in the wall b above the level of the arches g . A row of apertures e' is made in the floor near the line where the first partition C is placed to form the rear of section 1, said apertures being provided with removable covers. These apertures e' , being passages for heat, connect with an underground flue F , which extends to the smoke-stack.

At each end of the line of apertures e' in the side wall is a vertical flue m , which extends downward from the top of the wall to the flue F , and apertures n in the wall form lateral communication between the flues m and the interior of the kiln. Dampers o are provided to regulate the draft through the flues m . A damper k is provided by which the flue F , running to the smoke-stack, may be opened or closed. The succeeding section 2 has also near its rear a row of apertures e' in the floor, vertical side flues m in the walls provided with dampers, and apertures n , the apertures e' and vertical flues m connecting with an underground flue F' , which leads to the smoke-stack. The parts m and e' are in construction similar to the parts m and e' in section 1, and the remaining sections of the kiln are similar in construction to section 2, being provided with similar flues and passages and underground flues communicating with the smoke-stack. The last section 8 has the rear wall B' , no removable partition being used, and the apertures e' in the floor connect with the underground flue E , which extends to the front part of the kiln under the row of apertures e , which connect therewith. A series of vertical flues q are made in the rear wall B' and extend downward and connect with an underground flue I , which extends along the rear wall and is connected with the flue E , as seen in Fig. 1. The lateral passages r in the wall B' connect the flues q with the interior, and the downward passages q are provided with dampers s' , so that the current of heat may be directed through the passages r to said flues q or through apertures e' , the latter being provided with re-

movable covers. The top of the kiln is closed after the kiln is charged with green brick in the following manner: The mass of brick in the kiln or in one or more sections thereof is covered with a layer of brick in which are set the thimbles r' , and then the layer of brick is covered by a layer of earth or clay which surrounds the thimbles, the latter being provided with removable covers r'' , so that they may be opened or closed, as desired. The vertical flues m in the opposite walls turn inward at right angles at their upper ends, and these opposite flues may be put in connection by means of a removable flue w , which is somewhat like an inverted gutter, and is placed in position on and across the top layer of earth with its extremities joining the opposite flues at their upper ends.

In operation supposing the kiln to be used by sections continuously, sections 1 and 2, or more, are first charged with green brick, vertical openings being left through the mass extending from the top to the bottom. The layers of brick and earth are then put on to close the top, the thimbles being set so that passages may be formed through the top, the said thimbles being directly over the openings through the mass of brick in a manner heretofore known. A partition C is then put in at the rear of section 2 or of the filled portion of the kiln. The doors G being closed the flues m , the apertures e , and damper k are opened. The caps or covers are removed from a row of the thimbles at the top which is in line with the opposite vertical flues m , and a flue w is placed in position to cover the row of open thimbles and also connect the upper ends of the opposite flues m . A passage being thus opened for heat and the products of combustion from the fire-chambers to the smoke-stack D, the fire is then started. The draft passes rearward through draft-openings h and i in the wall b , through the mass of green brick, through the apertures e' in the floor, through the lateral passages n to the flues m , and through the open thimbles communicating with the flue w , and downward through flues m to the underground flue F, and through flue F to the smoke-stack. While section 1 is being heated to remove the moisture from the green brick in that section section 3 is being filled with green brick and the top of section 3 is being closed in the same manner as sections 1 and 2 were previously closed, and a partition C inserted. The flue w is then removed from section 1, the caps to cover the line of thimbles of section 1 are replaced, the caps covering the thimbles of section 2 are removed, and the flue w is placed over the open thimbles of section 2. The flues and dampers of section 1 are then all closed and those of section 2 are opened, and the draft passes directly through section 1 and through the passages in section 2 to the underground flue F, and through the latter to the smoke-stack. Now the brick in section 2 have been dried and partly heated,

and the contents of section 1 is getting quite hot. Fuel is introduced into section 1 through the thimbles in the top, and this is done from time to time, as becomes necessary. Section 4 is then filled with green brick and closed at the top and thimbles set in the same manner as section 3 had been previously. The flue w is removed from section 2 and the caps to cover the thimbles which were covered by said flue are replaced on said section. The caps covering a line of thimbles of section 3 are removed and the flue w is substituted. The dampers of section 3 are opened and those of section 2 are closed, and the operation proceeds, as before, in section 2. As the operation continues toward the rear part of the kiln the contents of section 1 becomes cool, the fire in the fire-chambers a having been allowed to go out, and the firing being continued rearward through the thimbles in the top of the kiln the heat is drawn into the mass of green brick, and the brick in section 1 being sufficiently cool may be taken therefrom, the top layers of brick and earth being removed, and said section may be refilled with green brick for further operation in the same manner as before. When the next section to the last in the kiln has been reached and the brick therein has been dried and heated, the flue w is placed in position on section 1 to connect the vertical flues m and cover the line of thimbles between them. The caps of said thimbles having been removed the dampers of side flues m and the damper k are opened, the apertures e , and also the dampers t and u of the flues E and I, are also opened, the damper v of the flue F⁶ is closed, the doors of the fire-boxes a are also closed, and communication is thus established between the rear end of the kiln and the front end, and heat and products of combustion are drawn from the rear through the flue E to section 1 to dry the green brick at the beginning of a new operation. When the brick in the rear part of the kiln are entirely burned and cooled, the brick in sections 1 and 2 have been considerably heated, the brick in section 3 have been dried, and the fire-chambers a are then charged with fuel, and the operation is continued in the same manner as before. By this construction an advance, up, side, and down draft kiln is provided having drafts in different directions, there being a draft rearward from the front, an upward draft through the thimbles in the top of the kiln, side drafts through apertures n in the opposite walls, and downward drafts through side flues m and through apertures in the floor of the kiln, so that the heat is evenly distributed to the whole contents of the kiln. The heat and the drafts may be regulated by the dampers, according to the amount required, and the heat may be forced to any part of the interior, as desired, to the top, bottom, or sides.

Access may be had to the interior of the kiln from any point on either side through the doors G for the convenience of workmen

and for the admission of fresh air, as desired, this construction being of considerable importance.

The kiln is well adapted for use either as a drier or for burning the brick, the heat being quickly distributed to the mass of brick at all points, and the suction of the smoke-stack causes the moisture of the green brick to be rapidly evaporated. The underground flue L, running from the flue E to the smoke-stack, is used only when the operation is being finished and is for forming a draft from the rear end of the kiln directly to the smoke-stack. This may be done by opening the dampers *l*, *t*, and *u*.

A modification in the construction of the covering of the kiln is shown in Fig. 7. Instead of the top layers of brick and earth and the removable flue *w* a solid arch is sprung over the walls and a permanent flue *w'* is made therein to connect with the vertical side flues *m*, this construction being intended for use in burning hard brick for walks and street pavements and intense heat being required.

I do not confine myself to the curved form of kiln shown in Fig. 1, as the kiln may be constructed in other forms with similar results, the passage from the rear end to the front end being provided in any form of the building. The smoke-stack may be located at any desired point convenient for its connection by underground flues with the main building. A platform J is provided on which the brick is usually deposited to be carried into the kiln.

I claim—

1. In a brick-kiln, the combination, with the walls or casing of the brick-chamber, of a series of passages for draft, a portion of said passages being constructed for upward draft, a portion for downward, and a portion being for lateral or sidewise drafts, an underground flue with which the downward draft-passages are connected, and a smoke-stack to

which the underground flue extends, substantially as set forth and described.

2. In a kiln, the combination, with a brick-chamber provided with apertures in its floor, of an underground flue with which said apertures connect, apertures in the covering of said chamber provided with removable covers, a flue placed on the top of said chamber to cover a row of said apertures, vertical flues in the side walls, connecting with said top flue at its extremities and with said underground flue, and apertures *n*, connecting said side flues with the interior of the said chamber, whereby upward, downward, and side or lateral drafts for heat are produced, substantially as set forth.

3. The combination of the brick-chamber of a brick-kiln which has a perforated covering and is provided with opposite vertical flues in the side walls, of a removable flue constructed to cover a row of perforations in said covering and also to connect two opposite vertical flues at their upper extremities, substantially as set forth and described.

4. In a brick-kiln, the combination, with one or more fire-boxes at the front, of an inner wall *b*, provided with openings *h* and *i*, apertures *e'* in the floor of the brick-chamber, an underground flue leading to a smoke-stack, a perforated covering on said chamber, removable caps for the apertures in said covering, vertical flues *m*, and lateral passages *n* in the side walls, and a removable flue *w* to be placed on the top covering in position to cover a row of apertures and also to connect with vertical flues *m* at their upper extremities, substantially as and for the purposes described.

In testimony whereof I have affixed my signature in presence of two witnesses.

CARL F. KAUL.

Witnesses:

H. A. DANIELS,
PHILIP MAURO.