

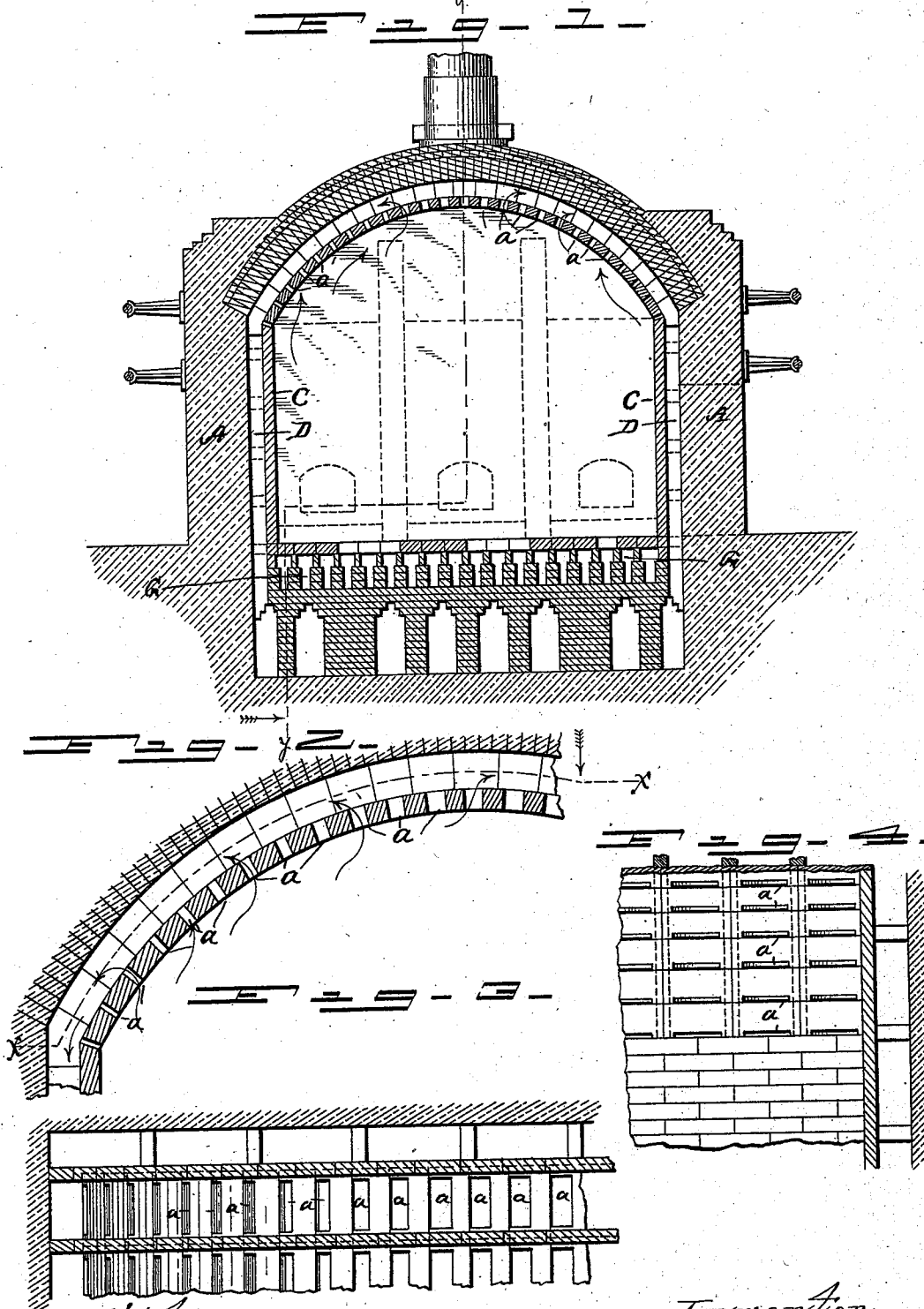
(No Model.)

4 Sheets—Sheet 1.

J. C. ANDERSON.  
BRICK KILN.

No. 379,924.

Patented Mar. 27, 1888.



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Inventor,  
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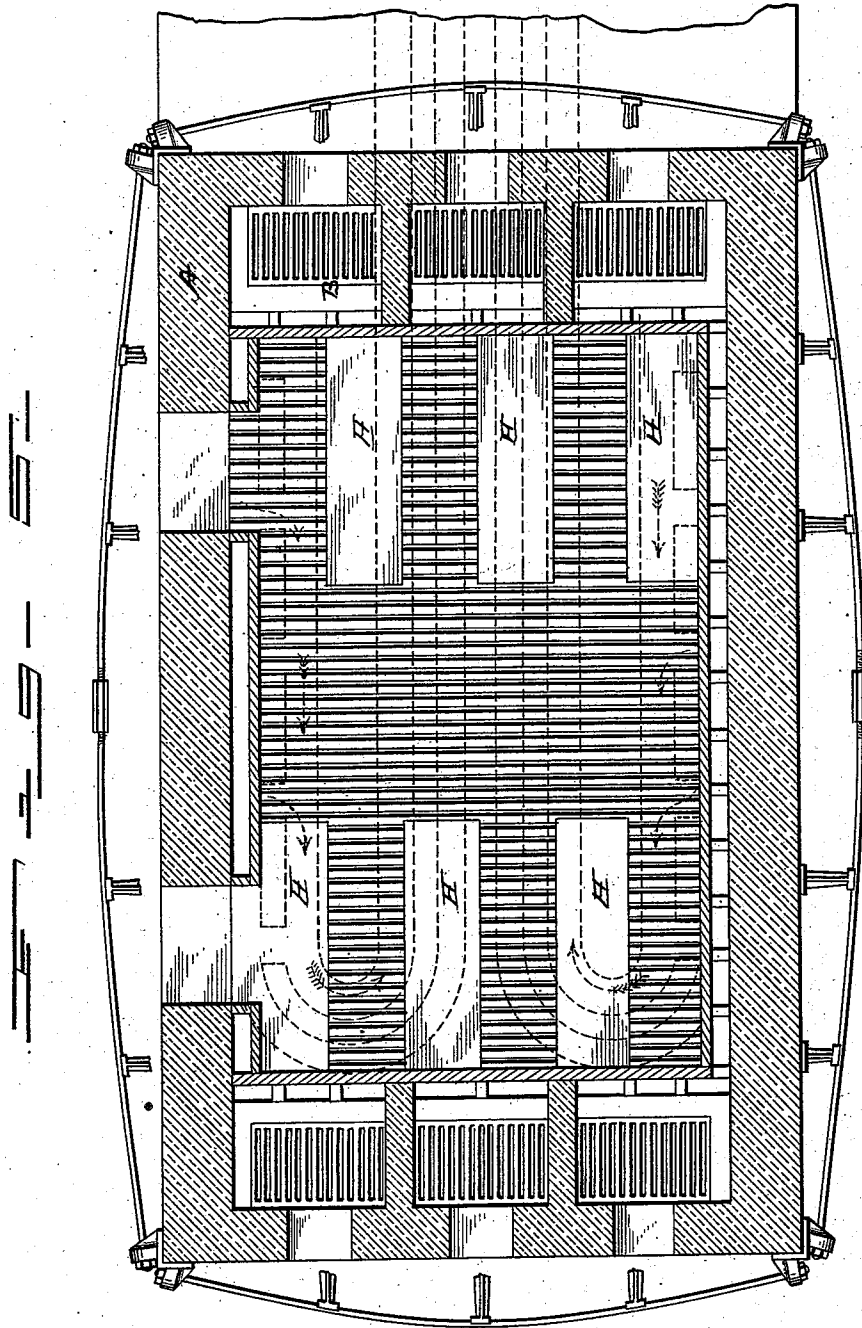
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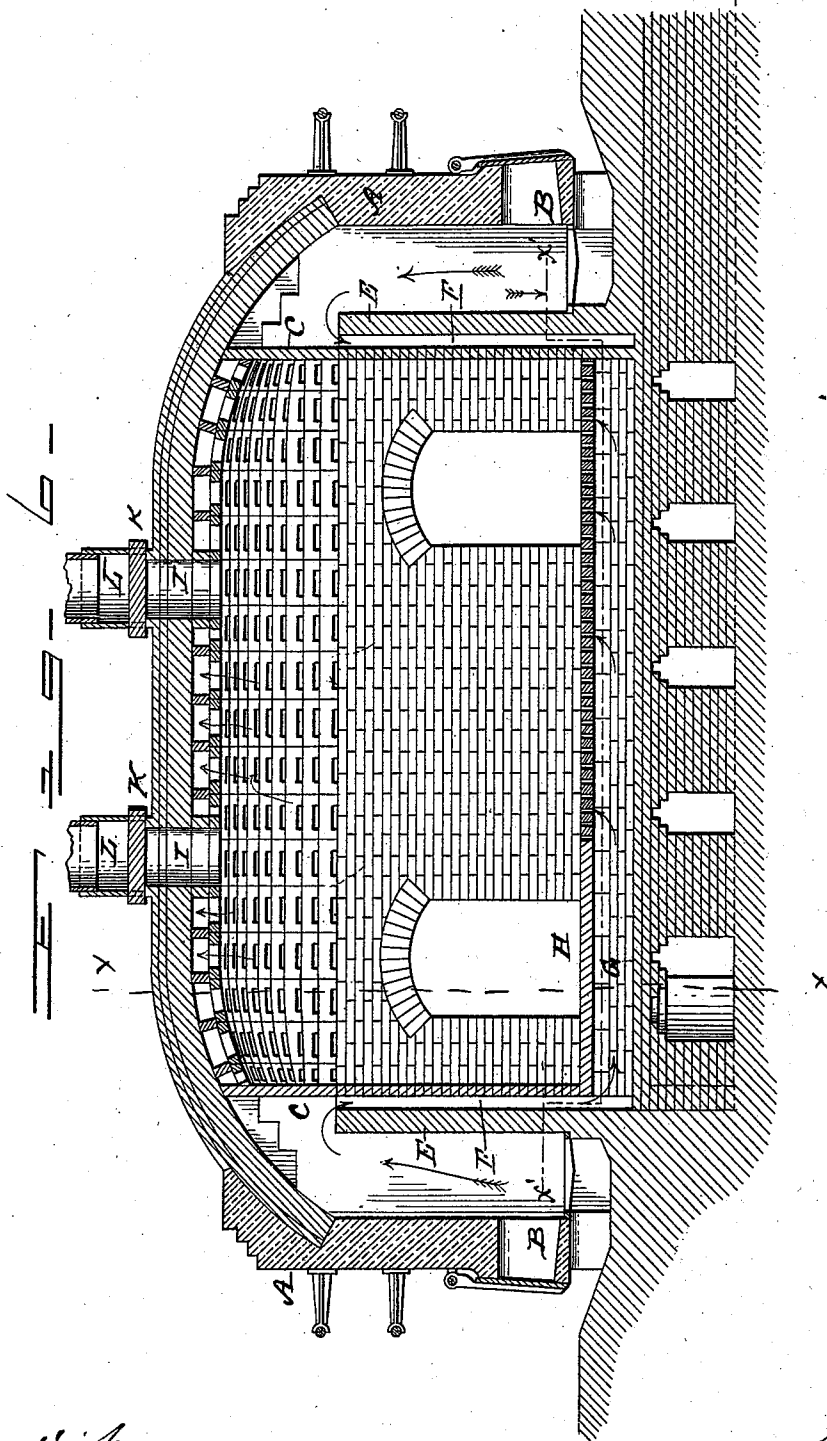
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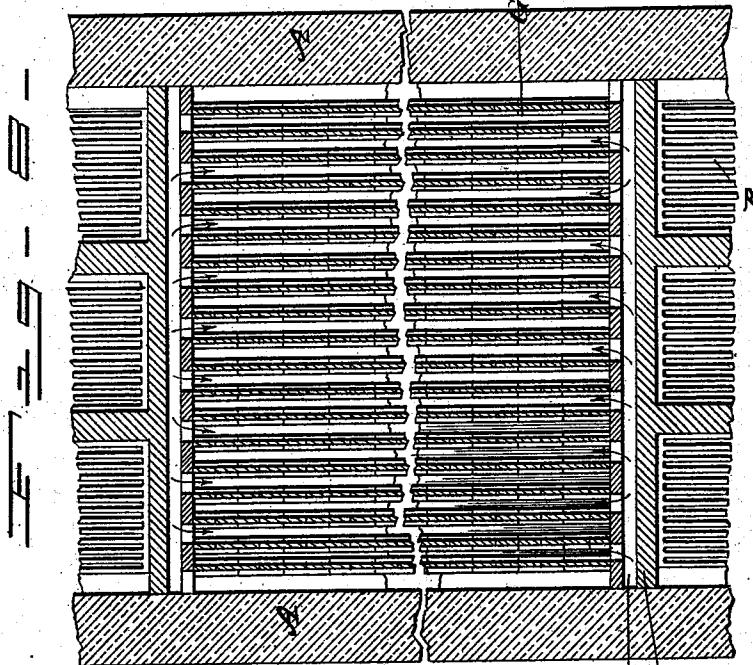
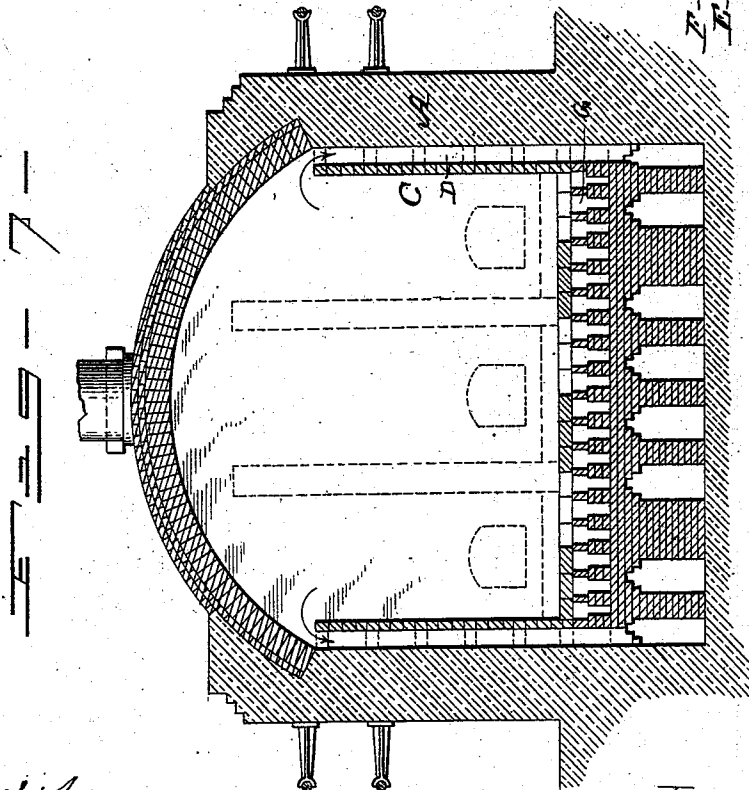
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4 Sheets—Sheet 4.

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# UNITED STATES PATENT OFFICE.

JAMES C. ANDERSON, OF HIGHLAND PARK, ILLINOIS.

## BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 379,924, dated March 27, 1888.

Application filed August 6, 1887. Serial No. 246,309. (No model.)

### *To all whom it may concern:*

Be it known that I, JAMES C. ANDERSON, a citizen of the United States of America, residing at Highland Park, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Methods of Burning Brick, Tiles, &c., of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain improvements in methods of burning brick, tile, and other articles made from clay.

The object of my invention is to so construct a kiln that the articles to be burned therein will not be exposed directly to the branding or vitrifying portion of the flame of the furnace; but the heat is distributed throughout the kiln by transmission through the walls, and then, by coming into direct contact afterward with the articles, they will be evenly and uniformly burned throughout the kiln.

My invention consists, therefore, in combining the principles of the two well-known types of kilns—viz., the down and up draft kilns—the products of combustion being first carried up from the furnace and down through a chamber located between the outer wall of the kiln and the inside thereof, and then partially under the floor of the kiln, and finally projected into the kiln, coming into direct contact with the articles to be burned, whereby the brick or articles nearest the furnace and at the sides of the kiln are burned by the heat transmitted through the inside lining of the kiln, and the bricks or articles more remote from the furnace or in the central portion of the kiln are burned by direct contact with the products of combustion.

Other novel features in detail of construction will be fully described, and pointed out in the claims.

Referring to the drawings, Figure 1 is a vertical sectional view on the line X X of Fig. 6. Fig. 2 is a sectional end view of a portion of the roof or arch of the kiln. Fig. 3 is a top or plan view of a portion of the arch of the kiln with the outer wall removed. Fig. 4 is a side view of a portion of the arch with outer wall removed. Fig. 5 is a top or plan view of the lower portion of the kiln, taken on the line X X of Fig. 1. Fig. 6 is a longitudinal vertical sectional view taken on the line yy of Fig.

1. Fig. 7 is a vertical sectional view of a modification in which the double wall or lining of the arch is omitted. Fig. 8 is a top or plan view of the lower portion of the kiln below the floor, showing the arrangement of the heat-conducting flues.

It must be understood that in burning brick and articles of pottery by the well-known downdraft system the flame is first projected over and on the top of the articles to be burned, and is drawn down by the draft through the spaces or interstices left for such flame to the flues beneath connecting with the stack, and that bridge-walls of various construction are made for guiding the first part of the flame upward before striking the top of the material to be burned. By this method much loss is experienced in branding, melting, distorting, and warping the goods at the first fire contact with the same on top of the kiln; also, that additional heat is always thrown to this part of the kiln by the natural rising up of the heat to the highest point against the arches of the kiln; and by the best methods it has not been found practicable by the draft obtained from the stack to draw an equal portion of this heat down to the bottom of the kiln, and therefore in all cases the brick lying immediately on the bottom and for several courses above the same must be left in a salmon or unburned condition, for should the fires be pushed to a sufficient degree of intensity to fully burn the brick on the bottom of the kiln the brick on the top of the kiln would suffer to such an extent as to be entirely melted and rendered worthless. The same condition takes place to a large extent on the sides of the kiln—that is, the brick piled along the side walls of the kiln do not receive sufficient of fire contact, or, rather, the heat absorbed by the walls of the kiln, with the air admitted through the cracks in the side walls of the kiln, leaves the brick always in an unburned condition. The same objection exists with the updraft kilns, but in a reverse manner—i. e., the bricks in the arches and lower portion of the kiln are overburned by contact with the fire, while the bricks in the top and on the sides of the kiln are underburned, or are of a salmon color. To obviate this difficulty I cause the fire to be first projected up over the bridge-walls near the top of the kiln, and then to descend through the

spaces formed by the solid wall between such spaces and the main kiln-body down to and beneath the bottom or floor of the kiln and for a distance of about one-third of the length of the kiln before it is allowed to ascend to the main chamber, and then to come in contact with the articles to be burned, in which case the first or stronger part of the flame is made to give up its heat to the intervening wall or lining and to the floor beneath and transmitted by such lining or floor to the brick, after which the flame, robbed of its damaging qualities, is made to come in direct contact with the brick, passing up through the same to the top of the kiln, and then down by the draft through the spaces formed by the lining of the kiln and the main wall thereof to the flues beneath. The last part of the operation serves not only to cut off the chilling influence of the air admitted through the cracks in the wall, but by heating the lining or jacket the heat is communicated to the brick piled in the main body of the kiln contiguous thereto, thus avoiding an overburning of the top of the kiln and causing a full heat to be communicated to the bottom and sides thereof, and it is found in actual practice that the brick piled upon the bottom of the kiln are burned better than those at the top, notwithstanding the downdraft character of the same, and the branding influence of the first part of the flame entirely avoided.

A indicates the outer walls of the kiln, which may be of any suitable construction and braced in any desirable manner.

B B are the furnaces, located at each end of the kiln, and are also of any well-known or suitable construction.

C indicates the inner wall or lining of the kiln, constructed of fire-brick or other refractory material and separated from the outer wall a short distance, so as to leave a chamber or space, D, between the two walls. The interior wall or lining, C, is also arched, as shown in Figs. 1 and 6, and is provided with numerous holes or apertures, *a*, through which the heat or waste products of combustion pass to the chambers or spaces D in the sides of the kiln and from thence to the stack-flues.

The holes or apertures *a* in the arch of the lining of kiln are graduated in size and are smaller as they approach the lower portion or base of the arch than they are in the crown of the arch, so as to check the heat and draw it up through the center of the kiln, thus preventing it from taking a short cut from the bottom of the kiln across to the bottom of the arch, as would be the case if apertures in the base of the arch were of the same size as those in the crown.

In the modification shown in Fig. 7 the arch of the lining is dispensed with, and in order to prevent the flame from passing diagonally and directly to the top of the chambers in the sides of the kiln I have the brick set closer together in the sides near the base of the arch than in the center, thus producing a like re-

sult. The end walls of the lining C extend up to the arch of the outer wall, as shown in Fig. 6, so as to prevent the heat or flame from the furnace from entering directly into the interior of the kiln.

E is a bridge-wall or fire-bag located between the furnace and the end wall, C, of the lining, said wall being separated from the lining-wall, so as to leave an open space or chamber, F, which communicates with the flues G, located below the floor of the kiln.

The flues G near the furnace are covered by means of a fire-brick floor, H, which extends back for some distance from the lining-wall, for a purpose to be more fully described hereinafter, while the other portions of the flues are left open, so as to permit the flame and products of combustion to pass up through the bricks. Each alternate flue G leading from the space or chamber F is closed in order to prevent the heat currents from the furnaces at each end of the kiln from coming in contact with each other, and also to direct such currents upward through the bricks to be burned, as shown in Fig. 8.

I are openings through the arch of the kiln, which are controlled by suitable dampers, K, and communicate with suitable stacks, L, said dampers being opened when it is desired to cool the brick and allow them to be removed from the kiln.

In operating, the bricks are piled in the kiln in any suitable manner. The fires are started in the furnaces B. The flame or products of combustion pass up over the bridge-wall E and down through the space or chamber F and enter the flues G below the floor of the kiln, and, after passing along below the solid portion H of the floor, find their way up through the perforations in the floor and through the articles in the kiln to the crown of the arch, and from thence to the spaces between the walls of the kiln and to the stack-flues below the floor of the kiln. As before intimated, the first or stronger portion of the flame from the furnaces gives up its heat to the wall or lining adjacent to the bridge-wall and to the solid portions of the floor of the kiln, and transmits the heat to the bricks which are adjacent to the wall and bottom of the kiln, after which the flame, robbed of its damaging qualities, is made to come into direct contact with the brick and to pass up through the same. By this method it will be noticed that all the bricks or articles to be burned are subjected to a heat sufficiently strong to completely burn the same, while the bricks are protected from the vitrifying or damaging portions of the flame.

I am aware that kilns have been constructed with a floor supporting the articles to be burned, said floor having openings graduated in area in accordance with their relation to the fire-places, and such I do not claim.

Having thus described my invention, what I claim is—

1. In a kiln for burning brick, tiles, &c., the

flues or spaces F, leading from the furnaces into the flues G below the floor of the kiln, said flues G being perforated at their rear ends, whereby the most violent or hottest portion of the flame, as it comes from the furnace, is transmitted to the articles to be burned through the walls of the flues, and the milder portion of the flame is precipitated into the articles in the middle of the kiln, as set forth.

2. In a kiln for burning brick, tiles, &c., the flues or spaces F, leading from the furnaces into the flues G below the floor of the kiln, said flues being perforated, as described, in combination with the openings *a* in the arch of the kiln and chambers or spaces D in the sides of the kiln, as set forth.

3. In kilns for burning brick, tiles, &c., the inner arch or lining, which is provided with apertures *a*, said apertures being smaller at the base than at the crown of the arch, whereby the heat is drawn through the center of the kiln, as set forth.

4. In kilns for burning brick, &c., the bridge-walls E, separated from the walls C by the chamber or flue F, through which the products of combustion pass, in combination with the flues G and solid floor H, whereby the heat is transmitted to the brick to be burned in the ends and bottom of the kiln and finally projected among the articles in the center of the kiln, as set forth.

5. In kilns of the character described, the flues G, arranged beneath the floor of the kiln, each alternate flue being closed at the end, as described, whereby the flames or products of combustion from the furnace will not come in collision with each other.

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

J. C. ANDERSON.

Witnesses:

J. C. CUSHMAN,

JNO. D. ONDERDONK.