

No. 749,208.

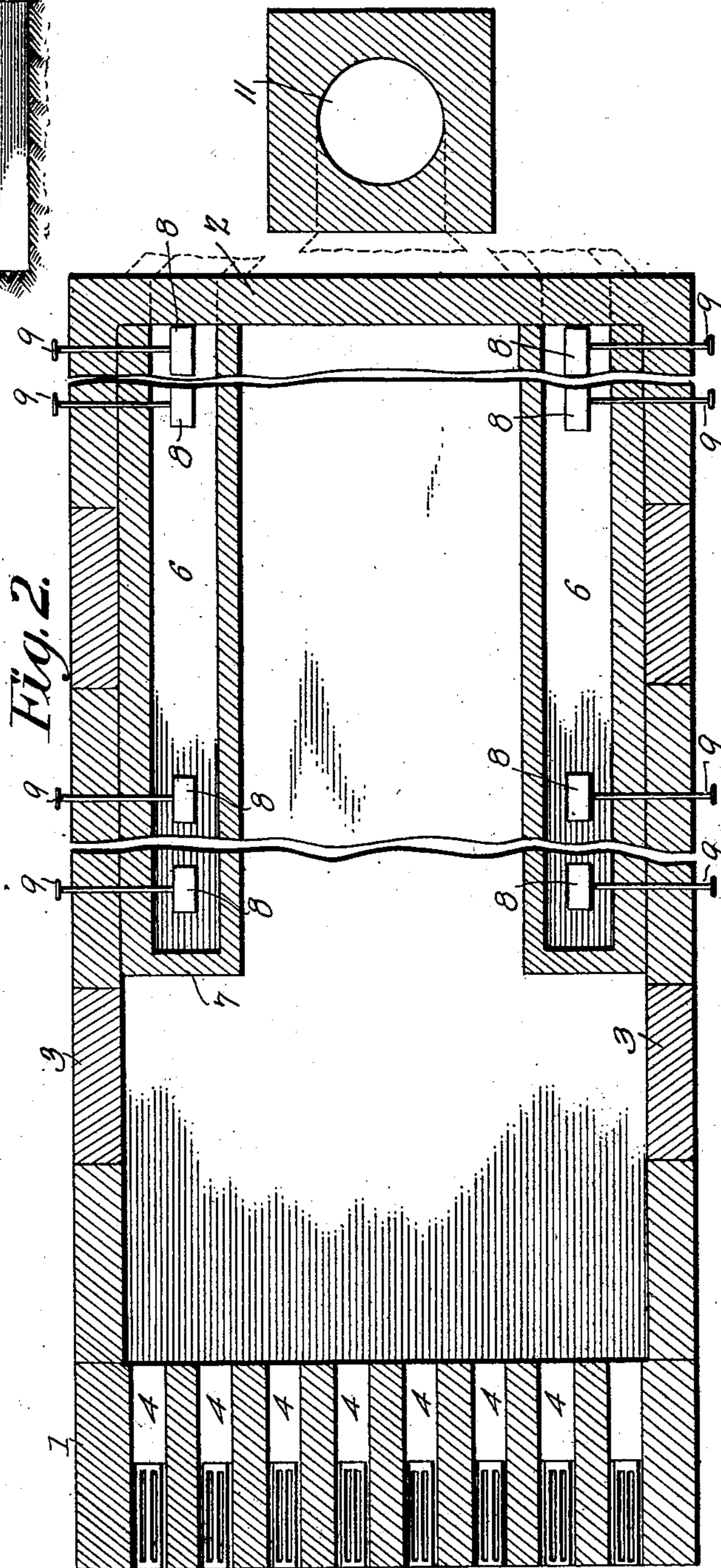
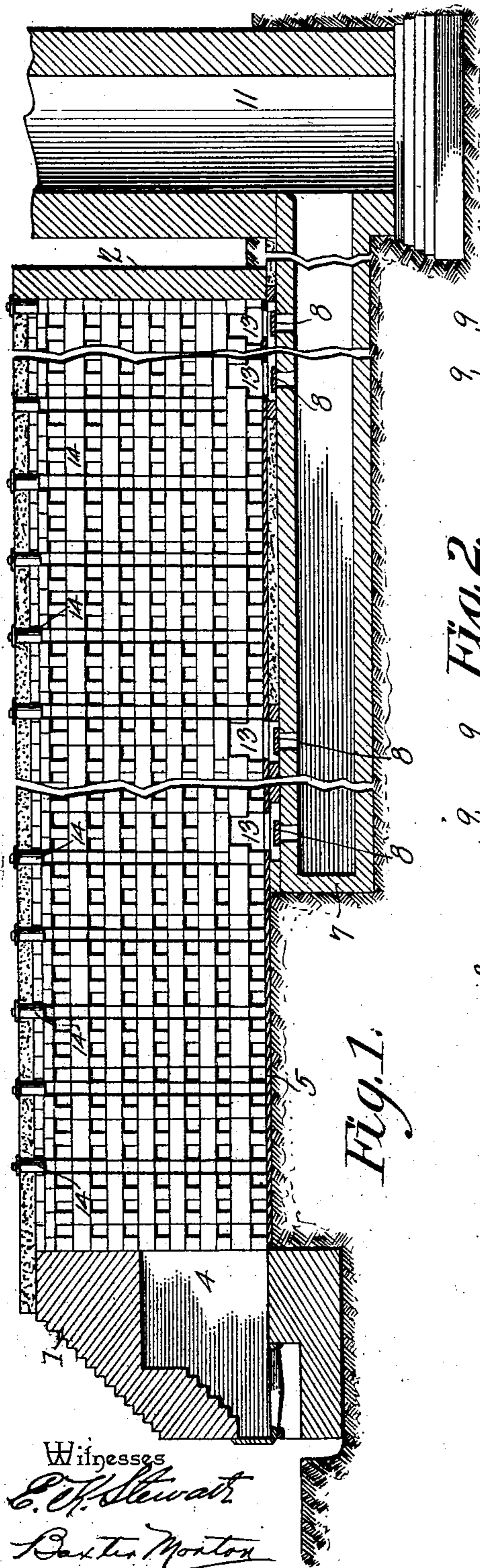
PATENTED JAN. 12, 1904.

D. J. MARRS.  
KILN.

APPLICATION FILED MAR. 11, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses  
*E. F. Stewart*  
*Baxter Monton*

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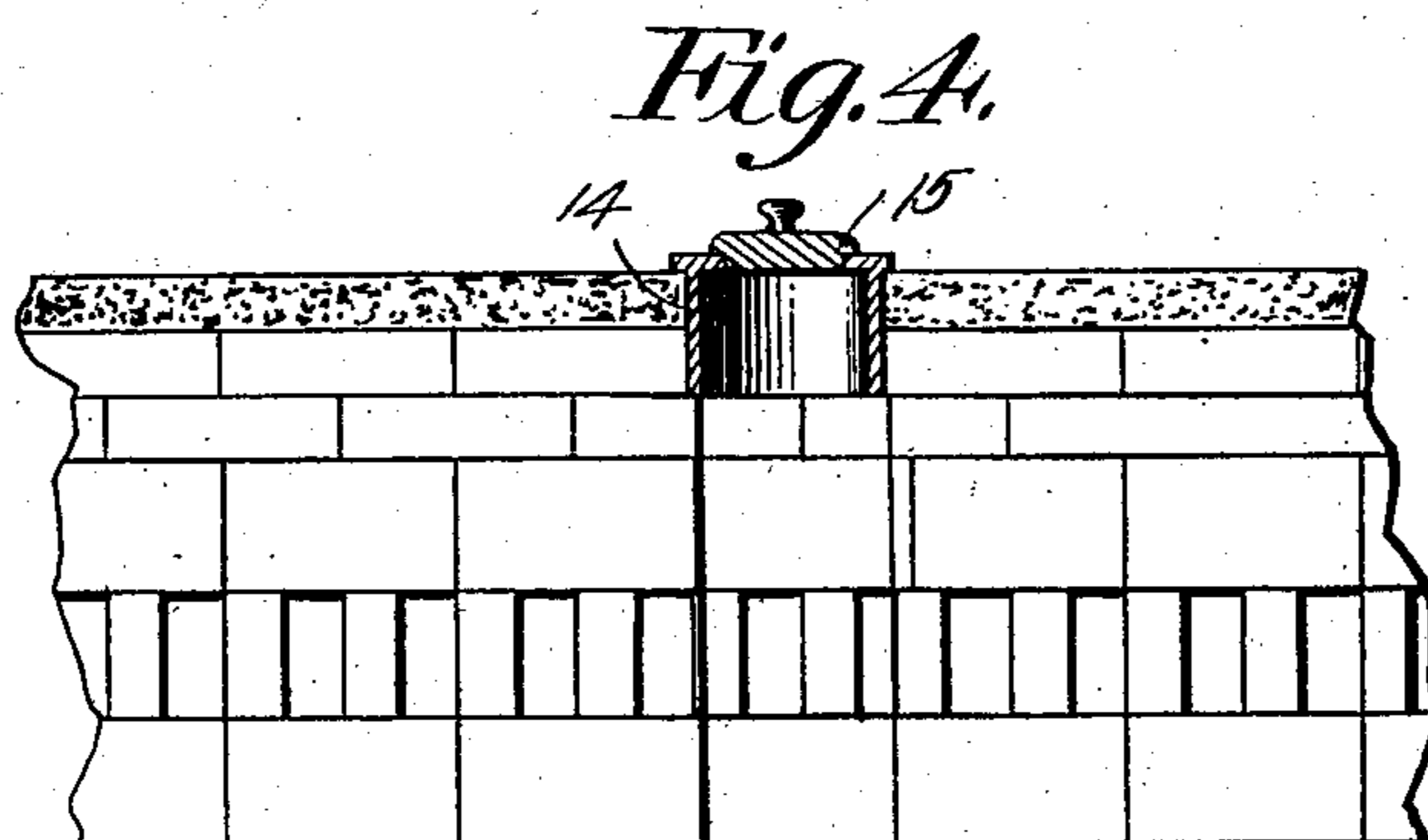
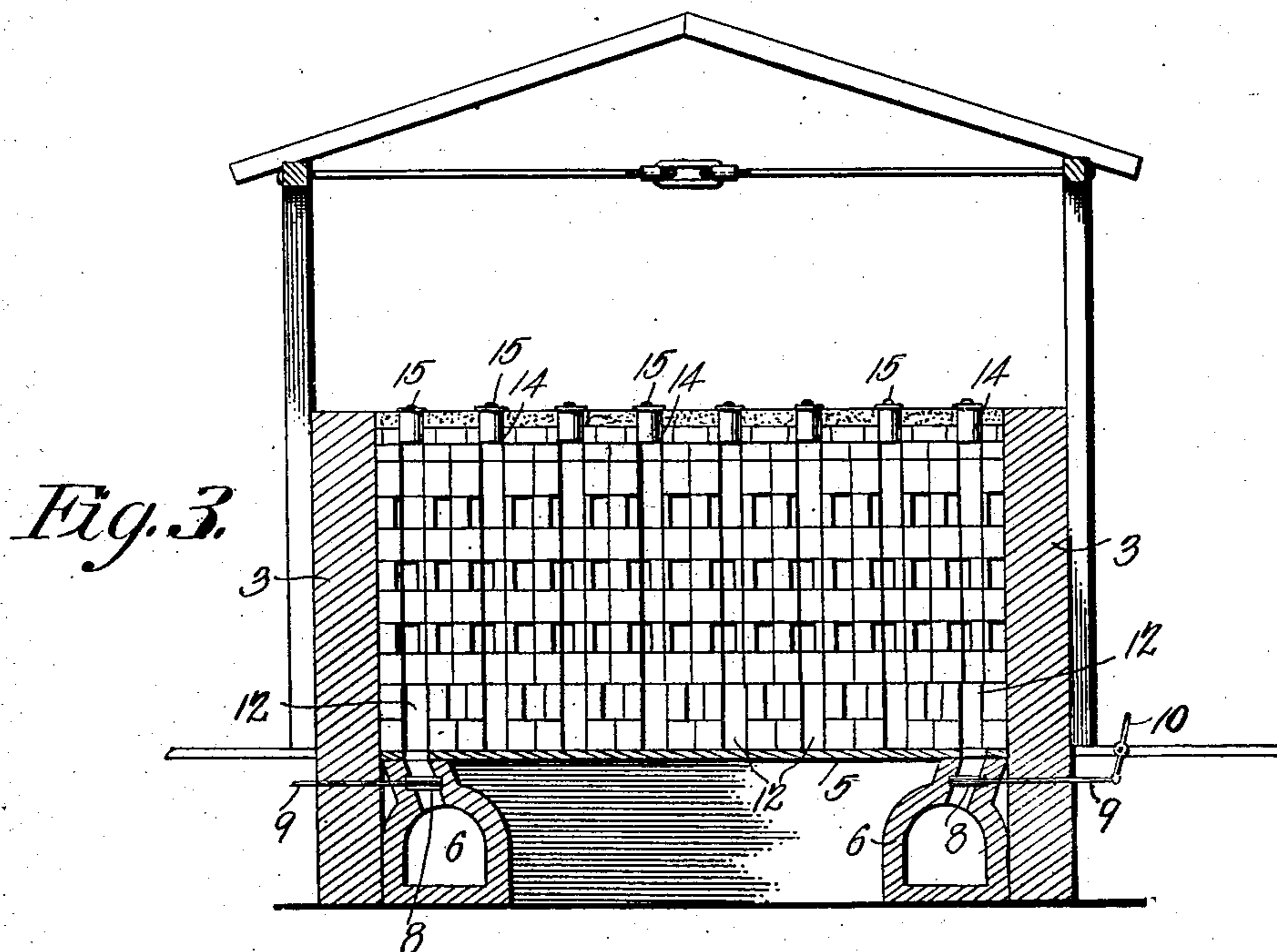
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# UNITED STATES PATENT OFFICE.

DAVID JASPER MARRS, OF DENVER, MISSOURI.

## KILN.

SPECIFICATION forming part of Letters Patent No. 749,208, dated January 12, 1904.

Application filed March 11, 1903. Serial No. 147,340. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID JASPER MARRS, a citizen of the United States, residing at Denver, in the county of Worth and State of Missouri, have invented a new and useful Kiln, of which the following is a specification.

My invention relates to kilns for burning brick or tile, and more especially to that type of kilns known as "open-top" downdraft-kilns. The objects contemplated by my invention are, first, to secure economy of fuel, and, second, to so control the temperature in the various parts of the kiln that all the bricks or tiles may be burned to a sufficient degree of hardness and make the number of bricks or tiles ruined by excessive heat as small as possible. I attain these results by constructing a kiln and arranging the charge of brick or tile therein after the manner hereinafter fully described, and shown in the accompanying drawings, of which—

Figure 1 is a longitudinal section broken through in the middle in order to make the figure of convenient size. Fig. 2 is a ground plan broken through in similar manner. Fig. 3 is a vertical transverse section, and Fig. 4 is a detail view showing the arrangement of one of the fire-pots in the upper portion of the charge of brick.

In Figs. 1 and 3 the number of courses of brick shown in the kiln is much smaller than would be employed in practice. This discrepancy is unavoidable on account of the necessarily small size of the drawings, as any attempt to show the actual number of courses would make the scale too small for reproduction.

In all the above-mentioned figures corresponding parts are indicated by similar characters of reference throughout.

Referring to the drawings, 1 represents the front end wall of a kiln constructed according to my invention, 2 the rear end wall, and 3 3 the side walls.

4 4 4, &c., are fire-boxes arranged side by side in the front wall of the kiln, each fire-box being provided with an ash-pit and door, as usual.

5 is the floor of the kiln, and 6 6 are flues arranged one on either side of the kiln and

below the level of its floor. At their forward ends the flues 6 6 are closed by end walls 7 7, which, it will be observed, are some distance in front of the fire-boxes 4 4, &c. Ordinarily I place the front end walls of the flues about fifteen feet beyond the inner ends of the fire-boxes. At intervals along the top of each of the flues 6 6 I place dampers 8 8 8, &c., each being provided with an operating-rod 9, extending through the side wall of the kiln and provided, if desired, with a lever 10 for imparting motion thereto. The dampers are usually placed at intervals of twelve feet, and a convenient size for each damper is seven inches by twenty-four inches. The dampers may be of any preferred form; but that shown in the drawings and consisting merely of a sliding plate movable in suitable guideways is one which I have found entirely satisfactory. Beyond the rear wall of the kiln the flues 6 6 turn toward the median line of the kiln and open into a single stack 11.

The bricks should be arranged in the kiln "three over three" or "five over five," the former being the arrangement shown in the drawings, and longitudinal arches from four to six bricks in height should be made along the bottom of the charge. It will be observed that there is a longitudinal arch for each fire-box, and consequently these arches serve to form a part of the draft system. Transverse arches 13 13 13, &c., are also arranged in the bottom of the charge of brick or tile, each transverse arch being of about the same dimensions in height and breadth as the longitudinal arches above mentioned and being so placed that each arch connects correspondingly-placed dampers in the side flues 6 6.

In the top of the charge of brick I provide transverse rows of fire-pots 14 14 14, &c., extending downward to a depth of about eight or ten inches, approximately, the transverse rows being about three feet apart and the fire-pots in each row being separated by about the same amount of space. Each fire-pot is provided with a closure-plate 15, by means of which the downward draft through the fire-pots may be shut off whenever desired, and in order to prevent the escape upward of the

hot air-currents from the fire-boxes the charge of brick is protected by a four-inch layer of earth spread over two courses of brick laid broadside down. The firing-pots are placed  
 5 at the top of openings extending downward through the charge of brick and communicating with the cross-arches at the bottom thereof, thus forming channels through which coal in the form of slack may be deposited on the  
 10 bottom of the kiln.

In burning brick or tile in a kiln constructed according to my invention fires are first started in the fire-boxes at the end of the kiln and allowed to burn slowly in order to "water-smoke" the kiln before beginning the  
 15 burning process proper. In carrying out the water-smoking of the kiln all of the dampers in the side flues 6 6 are closed at first except those nearest the front of the kiln, which are  
 20 left open to cause a draft through the front section of the kiln. After the front section of the kiln has become heated to the desired temperature the front dampers are closed, and the next set of dampers is opened and kept open  
 25 until the next section of the kiln is "water-smoked," when they are closed and the set of dampers next in advance is opened to water-smoke that section. This mode of procedure is continued until the entire kiln has been water-  
 30 smoked. The burning proper is carried on in much the same way as the "water-smoking," except that in the burning or firing process use is made of the fire-pots in the top of the charge of brick for introducing fine coal in order to  
 35 burn all of the brick except that nearest to the fire-boxes at the front of the kiln. In firing, as in water-smoking, the process is begun at the front of the kiln by increasing the heat of the fires used in water-smoking until the  
 40 temperature is high enough to raise the brick in the first twenty or thirty feet of the kiln to a red heat. Then the doors of the fire-boxes are closed and fine coal or slack is introduced through the first row of fire-pots in  
 45 the top of the kiln. The slack introduced through these fire-pots passes downward toward the bottom of the kiln; but a considerable portion of the slack lodges upon the irregular surface presented by the brick sur-  
 50 rounding the opening leading from the fire-pot to the bottom of the kiln. The temperature of the brick at the time the fine coal is introduced is such that it is set on fire merely by contact therewith, and the heat developed  
 55 from the burning of the slack is sufficient to raise the temperature of the adjacent section of the kiln to the point necessary to ignite slack when introduced through the next row of fire-pots. The management of the damp-  
 60 pers in the firing process is substantially the same as in the water-smoking process. When the front section of the charge of brick in the kiln is being burned by means of the heat obtained from the fire-boxes, the first set of dampers in the flues 6 6 will be kept open, and  
 65

when the doors of the fire-boxes are closed and the burning of the next section of brick is carried on by means of fine coal introduced through the fire-pots at the top of the kiln that set of dampers will be closed and the next  
 70 set will be kept open. This procedure is continued in burning the entire kiln; but in order to furnish draft in burning the sections more remote from the front of the kiln the doors in the fire-boxes are opened and air is  
 75 allowed to enter and pass through the section of brick at the forward end, which has already been burned. This air from the outside of the kiln serves to cool off gradually the burned sections at the front of the kiln and  
 80 also to produce draft through the sections which are in process of being burned.

It will be readily seen that in burning brick in a kiln such as I have described and proceeding as I have explained the heat is generated  
 85 practically all through the kiln, as required, instead of being produced in substantially one portion and transmitted by flues from this portion through the remainder. The advantage resulting from this arrangement is ob-  
 90 vious. In order to burn all the brick thoroughly by means of a furnace at one end of the kiln, it would evidently be necessary to have an extremely high degree of heat in the  
 95 furnace in order to insure a sufficiently high temperature at the end of the kiln most remote therefrom. Such high temperature in the furnace is undesirable, for the reason that the waste of heat increases in proportion,  
 100 roughly speaking, to the increase in temperature of the furnace and, further, because the bricks nearest the furnace and subjected to excessive heat would be to a certain extent fused together and rendered unfit for use. A further  
 105 advantage is obtained by constructing the kiln and arranging the charge of brick in the manner described—that is, by having a larger number of small fire-pots in the top of the charge of brick and using a small fire in  
 110 each I am enabled to use for most of the burning slack coal, which is the cheapest form of fuel obtainable.

Having now fully described and shown the construction of my invention and explained the mode of operation thereof, what I claim  
 115 as new, and desire to secure by Letters Patent, is—

1. In a brick-kiln, a permanent floor, side and end walls, a furnace at one end comprising a plurality of sections; a smoke-stack at  
 120 the other end, flues beneath said floor extending from a point at a distance from said furnace to said stack, dampers in said floor communicating with said flues, a body of green  
 125 brick inclosed by said walls, longitudinal passages in the body of said green brick communicating with the sections of said furnace, transverse passages in said body of green brick extending between corresponding dampers, fire-pots in the top of said body of green brick,  
 130

passages leading from said fire-pots to the transverse passages extending across said body of green brick, and means for operating said dampers.

- 5 2. In a brick-kiln, a permanent floor, side and end walls, a furnace at one end, a smoke-stack at the other end, flues beneath said floor and at the sides thereof, said flues extending from a point at a distance from said furnace  
10 to said stack, dampers in said floor communicating with said flues at intervals throughout their length, a body of green brick inclosed by said walls, longitudinal passages in said body of green brick communicating with said

furnace, transverse passages in said body of green brick extending between correspond- 15  
ingly-placed dampers, fire-pots in the top of said body of green brick, passages extending downward from said fire-pots to said trans-  
verse passages, and means for operating said 20  
dampers.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAVID JASPER MARRS.

Witnesses:

E. MILLER,

A. J. MANNING.