(No Model.) 3 Sheets—Sheet 1.

F. MACARTHY.

KILN.

No. 547,492. Patented Oct. 8, 1895.

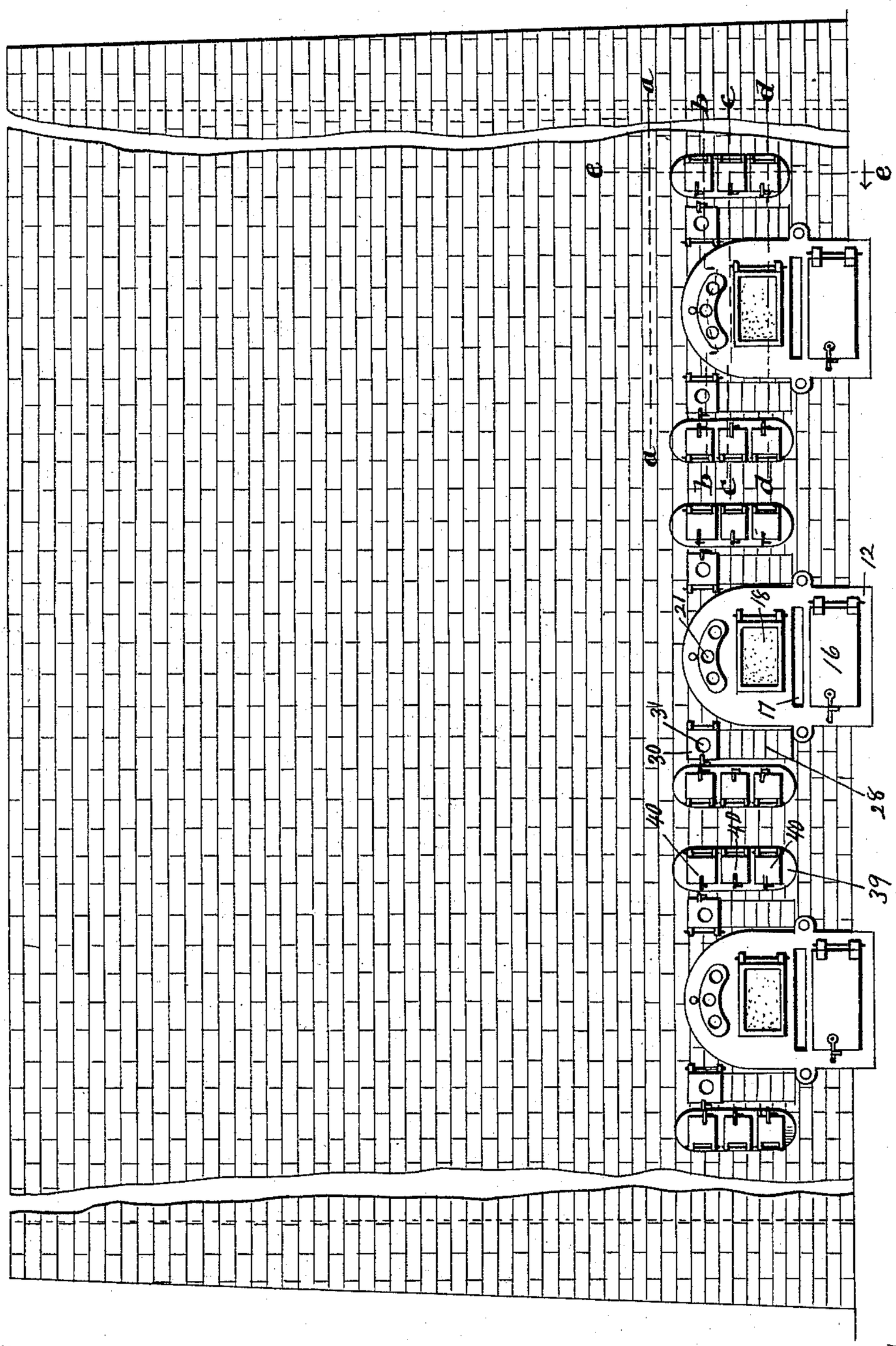

Fig. 1.

Witnesses:
C. H. Rawden
T. E. Turpin

Inventor
Fred Macarthy
By James J. Shelby
Attorney

(No Model.)

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F. MACARTHY.

KILN.

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Fig. 4.

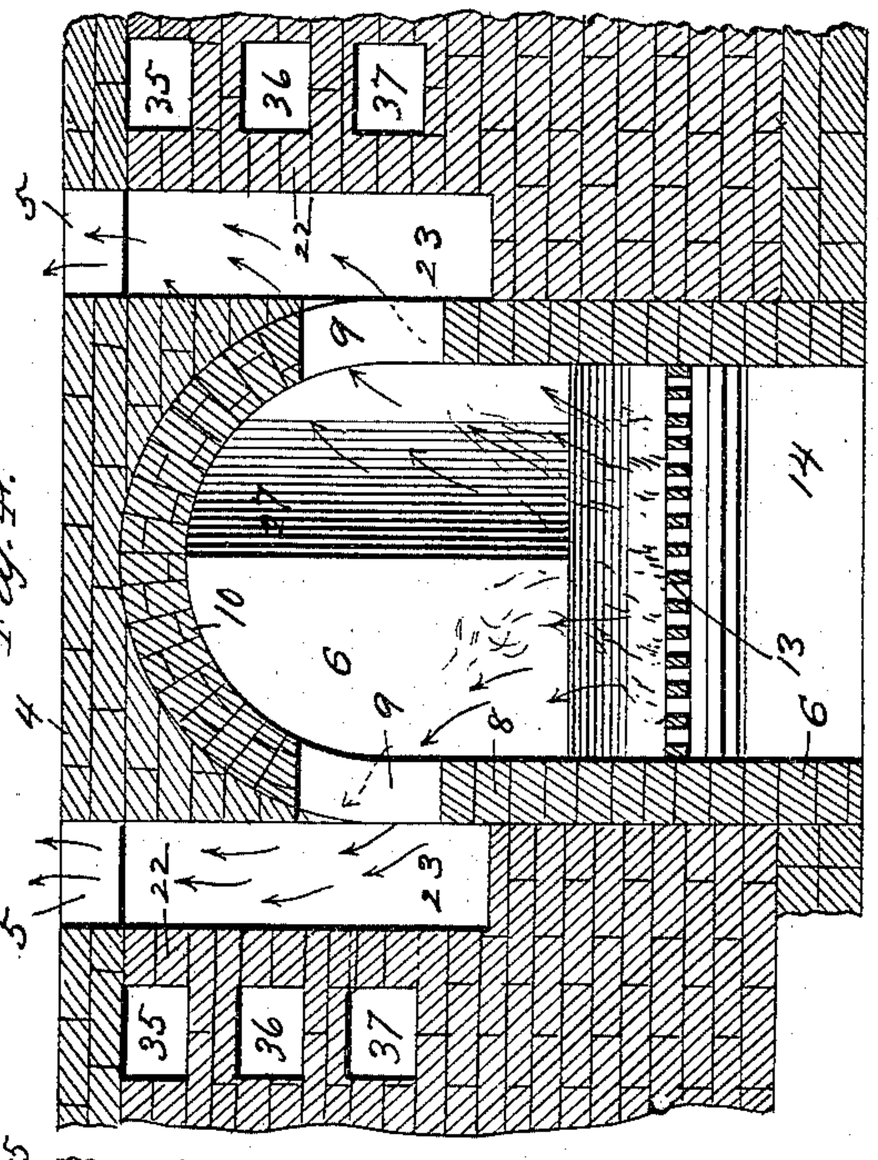

Fig. 2.

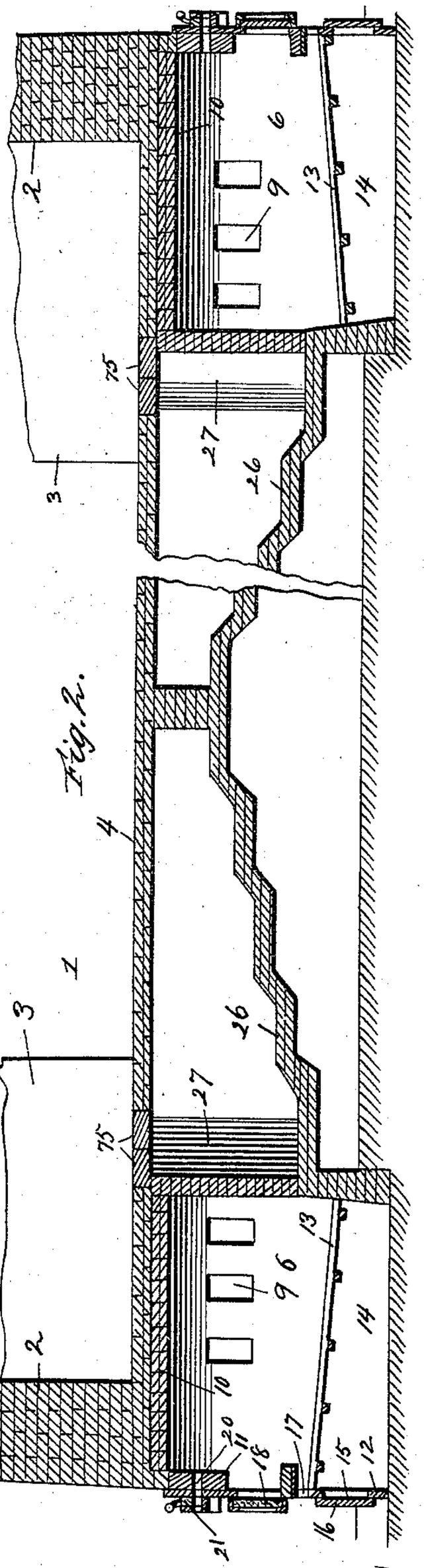

Fig. 3.

Witnesses:
H. Raeder
R. F. Matthews.

Inventor
Fred Macarthy
By James J. Shelby
Attorney

(No Model.)

3 Sheets—Sheet 3.

F. MACARTHY.

KILN.

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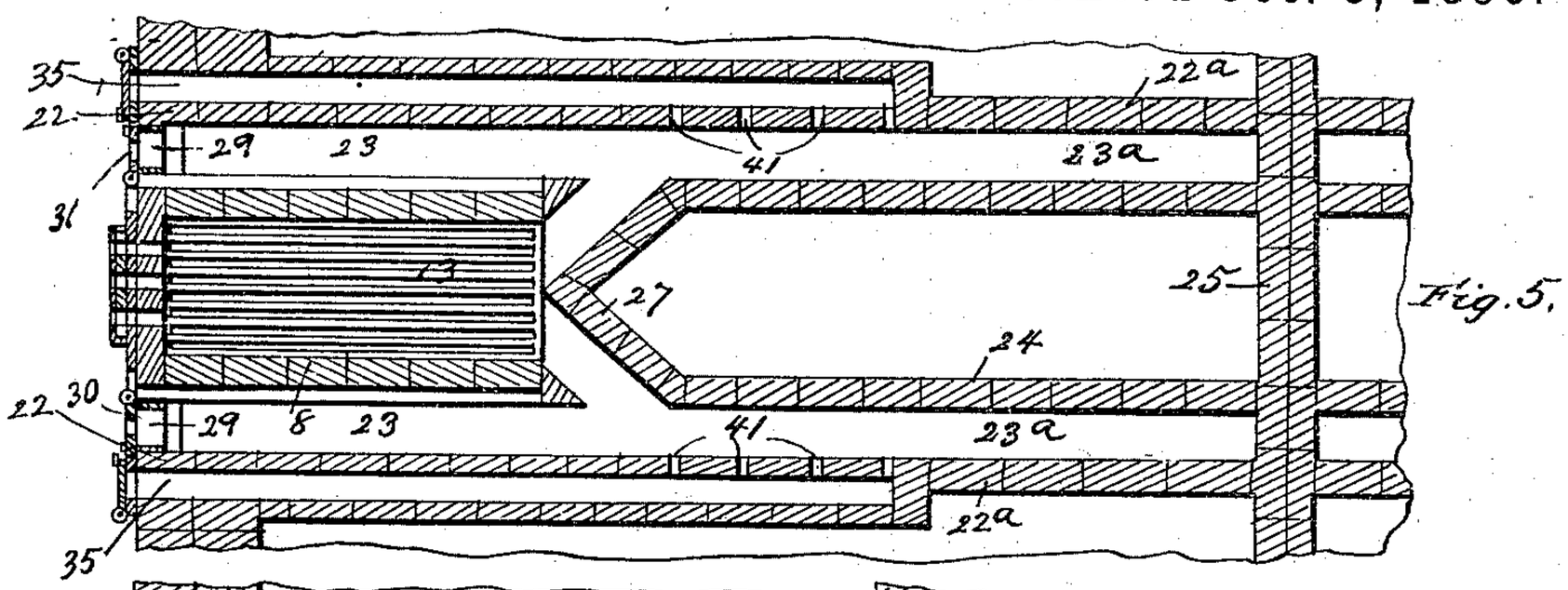

Fig. 5.

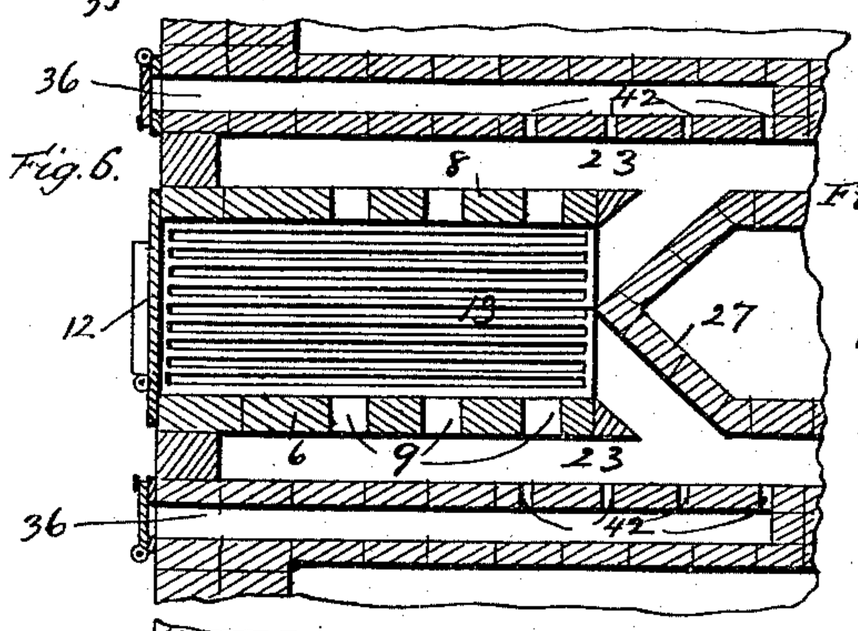

Fig. 6.

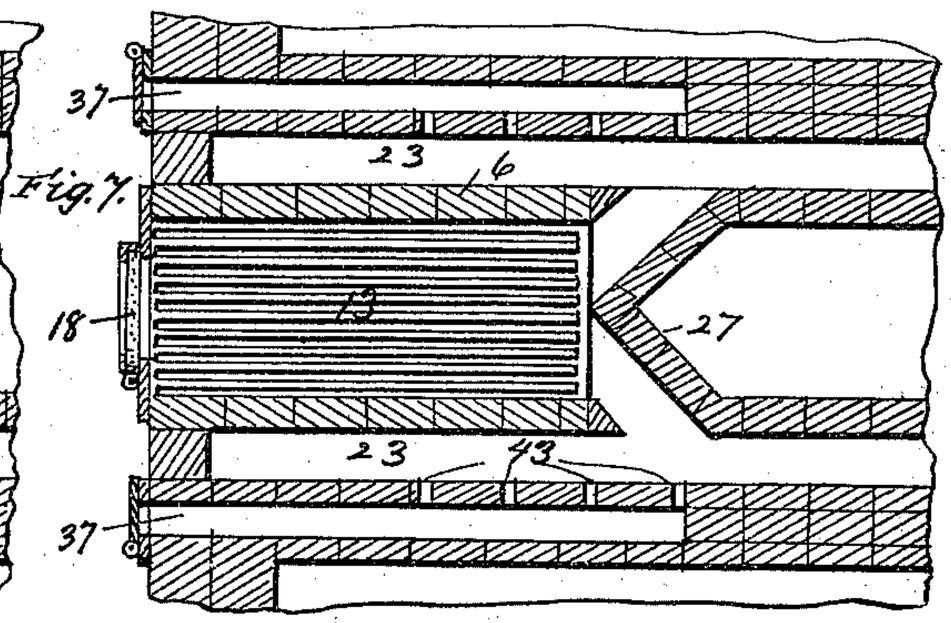

Fig. 7.

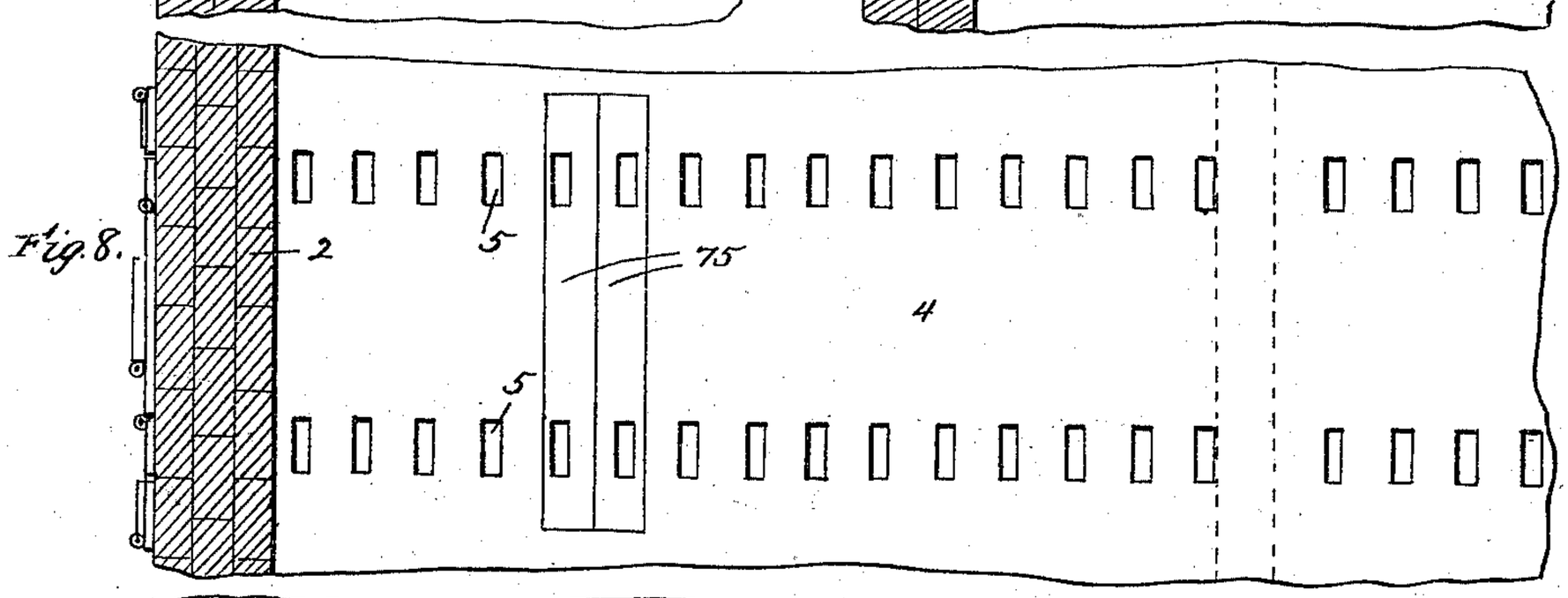

Fig. 8.

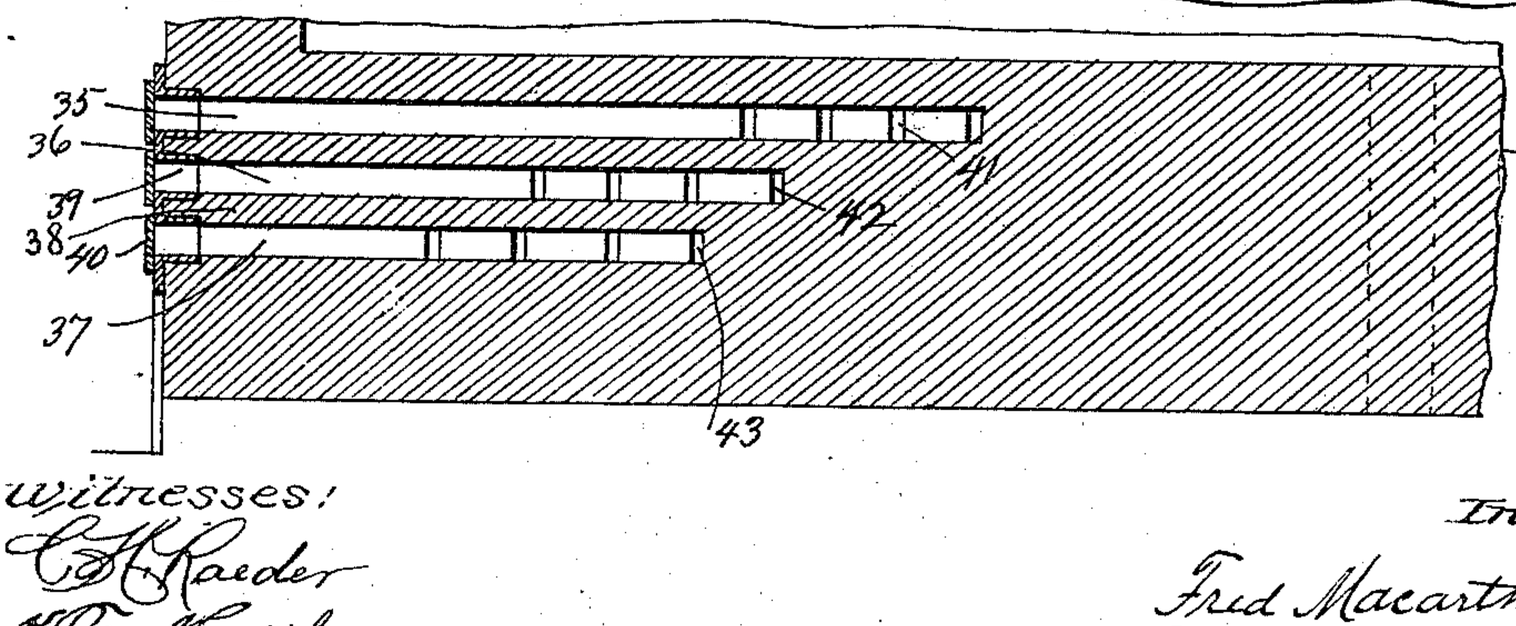

Fig. 9.

Witnesses:
C. H. Kaeder
W. F. Matthews.

Inventor
Fred Macarthy
By James J. Shelby
Attorney

UNITED STATES PATENT OFFICE.

FRED MACARTHY, OF SAYREVILLE, NEW JERSEY, ASSIGNOR OF ONE-HALF TO THE SAYRE & FISHER COMPANY, OF SAME PLACE.

KILN.

SPECIFICATION forming part of Letters Patent No. 547,492, dated October 8, 1895.

Application filed May 8, 1895. Serial No. 548,597. (No model.)

To all whom it may concern:

Be it known that I, FRED MACARTHY, a subject of the Queen of Great Britain, residing at Sayreville, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Kilns; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in that class of kilns known to the art as "updraft-kilns;" and it has for its main object to provide an updraft-kiln embodying a simple and compact construction and arrangement of furnaces, air-flues, &c., which obviates the objectionable necessity of using a grated fireplace the whole or nearly the whole width of the kiln and of building or setting an arch or eye of green bricks over the before-mentioned fireplace, which bricks are always liable to considerable risk from overfiring, and consequent discoloration and loss of shape are obviated.

Another object of the invention is to provide an updraft-kiln embodying a simple, cheap, and compact construction of flues, openings, &c., whereby the disposition of the heat and particles of combustion may be controlled by the attendant and may be distributed to various parts of the chamber containing the bricks or other wares to be burned.

Other objects and advantages of the invention will be fully understood from the following description and claims when taken in connection with the annexed drawings, in which—

Figure 1 is a broken elevation illustrating one side of my improved kiln. Fig. 2 is a detail vertical transverse section of the lower portion of the kiln, taken through two furnaces on opposite sides of the kiln. Fig. 3 is an enlarged detail vertical section of one of the furnaces. Fig. 4 is a section taken in the plane indicated by the line *x x* of Fig. 3. Figs. 5, 6, 7, 8, and 9 are detail sections taken in the planes indicated by the lines *b b*, *c c*, *d d*, *a a*, and *e e*, respectively, of Fig. 1.

In the said drawings similar numerals designate corresponding parts in all of the views, referring to which—

1 indicates the chamber of the kiln, which is formed by the front and rear walls 2 and the side walls 3, of brick or masonry, and may have its upper end open or closed, as desired.

4 indicates the floor of said chamber, which is provided with a plurality of vertically-disposed openings 5, for a purpose presently described, and 6 indicates the permanent furnaces for supplying heat to the chamber 1, of which any suitable number may be employed at the front and back of the kiln. These furnaces 6 are built entirely within the kiln, as shown, and they are formed by the side walls 8, which extend through the main walls 2, as shown, and are each provided with three (more or less) openings for the escape of heat and products of combustion, the curved or arched tops 10, the fire-tiles 11, arranged at the forward ends of the arched tops 10, and the iron castings 12, which may be secured in position in any suitable manner and serve to form the front walls. Said furnaces 6 are respectively provided with a grate 13, preferably arranged as shown, and in order that access may be had to the ash-pits 14 below the grates 13, I provide the castings 12 with door-openings 15, controlled by doors 16. I also provide the castings 12, immediately above the grates 13, with slots 17 to permit of a chisel-bar being used on the grates in the usual manner without the necessity of opening the furnace-doors 18 and admitting cold air to the furnace when not desired, and I further provide the castings 12 with openings 19, which register with openings 20 in the fire-tile 11 and are controlled by dampers 21, which may be readily adjusted to admit cold air into the furnaces above the fires when desired.

Formed between suitable vertical walls 22, which extend through the main walls 2 (see Fig. 5) and the side walls 8 of the furnaces, are flues 23, which are designed to receive the products of the furnaces that are discharged through the openings 9 in the side walls 8, and formed between said walls 22 and continuations 22^a thereof and walls 24 are continuations 23^a of the flues 23, which extend to the dividing-wall 25 between the two sets of furnaces, flues, &c., of the kiln and have their bottoms 26 stepped upwardly toward

their inner ends, as shown, so as to increase the draft toward such ends. The walls 24 at their outer ends merge into converging walls 27, which meet at the middle of the open rear ends of the furnaces 6 and serve in practice to divide the products of combustion as they escape from such open ends and deflect them into the flues 23ª. Said converging walls 27 extend upwardly almost to the curved or arched tops of the furnaces 6, and the space between them and the said curved or arched tops is preferably occupied by fire-tiles 75, which may or may not be provided with openings 5, as desired.

The flues 23 23ª are designed in practice to convey the heat and products of combustion from the furnaces to the openings 5 in the chamber-floor 4, which openings 5 are arranged in rows directly above said flues, as better shown in Fig. 8 of the drawings, so as to permit the products of the furnaces to pass directly from the said flues 23 23ª up into the chamber 1 among the bricks or other wares placed therein.

I prefer in practice to close the outer ends of the flues 23 23ª with temporary brickwork 28, (see Fig. 1,) as such brickwork may be readily removed when it is desired to clean the flues of sand, &c., which, falling from the chamber 1 through the openings 5, quickly collects in the flues 23 23ª and must be removed at frequent intervals, and I also prefer to arrange the castings 29 in said brickwork, which castings are provided with doors 30, equipped with sight-glasses 31 for a purpose presently described.

35, 36, and 37 indicate air-supply flues, of varying lengths, which are arranged in vertical series on the opposite sides of the flues 23 23ª with respect to the furnaces and are separated from each other by horizontal walls 38, as better shown in Fig. 9 of the drawings. A casting 39, suitably secured in position, closes the outer ends of each series of flues 35, 36, and 37, and it is provided with three doors 40, one for each flue, whereby one may be opened while the others are closed for a purpose presently pointed out. The uppermost air-supply flue 35 of each series is also the longest, and it is provided in its wall contiguous to the flue 23 23ª and at points adjacent to its open end with openings 41, which connect it with said flue 23 23ª, as shown. The intermediate flue 36 of each series is next to the flue 35 in length, and it is also provided adjacent to its inner end with openings 42, which connect it to the adjacent flue 23 23ª, and the lowermost flue 37 of each series, which is also the shortest, is connected adjacent to its inner end by openings 43 with the adjacent flue 23 23ª. By reason of this construction and arrangement of the flues or air-ducts 35, 36, and 37 it will be appreciated that a greater quantity of air may, when desired, be supplied to one part of the flues 23 23ª than is supplied to another. For instance, if it is desired to supply more heated air to the inner portions than to any other part of the flues it is simply necessary to close the doors of the flues or ducts 36 and 37 and open the door of the uppermost and longest duct 35, which extends farthest toward the middle of the kiln, while when it is desired to supply more air to the portion of the flues 23 23ª adjacent to the walls 2 than to any other part it is simply necessary to close the doors of the flues 35 and 36 and open the doors of the flues or ducts 37. The intermediate flues or ducts 36 are for supplying air to the portions of the flues 23 23ª between the middle and outer ends thereof, and when it is desired to supply a greater amount of air to such portions than to the other portions it is simply necessary to close the doors of flues 35 and 37 and open those of the said flues or ducts 36. In this way the attendant is enabled to control the temperature of the flues 23 23ª, which act as combustion-chambers, by admitting air to certain parts of such flues and cutting off the supply to other parts, as is deemed advisable from time to time, the sight-glasses 31, before described, being designed to enable the attendant to readily ascertain the condition of different parts of the flues 23 23ª, and consequently the proportionate temperature of different parts of the kiln-chamber 1.

In the practice of the invention when the kiln is fired a portion of the products of combustion from the furnace will pass through the openings 9 in the furnace-walls, the flues 23, and the openings 5 in the chamber-floor above said flue 23, while the remainder will pass through the rear ends of the furnaces, the flues 23ª, and the openings 5 above said flues 23ª, and in consequence such products will be evenly distributed throughout the kiln and will pass directly up through the bricks or other wares placed in the chamber 1 of the kiln.

It will be appreciated from the foregoing that with my improved kiln the heat and products of combustion may be so distributed by an intelligent attendant that all parts of the kiln will be supplied with a uniform degree of heat, and as a consequence of this no portion of the bricks or other wares will be so burned as to be rendered worthless, as is the case in those kilns in which a grated fireplace extending the whole or nearly the whole width of the kiln is used, and in which it is necessary to subject a great number of bricks to the danger of being ruined by setting an arch or eye of them over the aforesaid fireplace. It will also be observed that my improved kiln is not costly to build in the first instance and that it may be kept in repair at a slight expense, which is a desideratum. It will be further perceived that I have provided a kiln which embodies furnaces arranged entirely within its main walls and a construction whereby articles placed in the chamber of the kiln adjacent to the walls thereof may be sub-

jected to the same degree of heat from such furnaces as articles placed at or near the center of the kiln.

Having described my invention, what I claim is—

1. An updraft kiln comprising main walls and a floor forming a chamber, a furnace arranged wholly within the main walls of the kiln and having openings 9 in its side walls and also having its inner end open, a V-shaped wall 27, extending upwardly from a point slightly above the furnace grate to the crown thereof and having its apex arranged in the inner, open end of the furnace so as to form large divergent escape flues and enable it to divide the furnace products as they pass from said open end, the straight flues 23, of a height throughout their length corresponding to the distance between the openings 9, and the chamber floor arranged on opposite sides of the furnace beneath the floor of the chamber and formed by walls 22^a, and the side walls of the furnace and communicating directly with the openings 9, in said side walls, the straight flues 23^a, arranged in line and in the same horizontal plane and communicating with the flues 23, and also arranged beneath the chamber floor on opposite sides of the plane of the V-shaped wall so as to receive the furnace products deflected thereby, openings formed in the chamber floor above the flues 23, in planes on opposite sides of the furnace, and connecting said flues and the interior of the chamber, and openings formed in said floor above the flues 23^a, and connecting the same and the interior of the chamber, substantially as specified.

2. An updraft kiln comprising main walls and a floor forming a chamber, a furnace arranged wholly within the main walls of the kiln and having openings 9, in its side walls and also having its inner end open, a V-shaped wall 27, extending upwardly from a point slightly above the furnace grate to the crown thereof and having its apex arranged in the inner, open end of the furnace so as to form large divergent escape flues and enable it to divide the furnace products as they pass from said open end, the straight flues 23, of a height corresponding to the distance between the openings 9, and the chamber floor and arranged on opposite sides of the furnace beneath the floor of the chamber and formed by walls 22^a, and the side walls of the furnace and communicating directly with the openings 9, in said side walls, the straight flues 23^a, arranged in line and in the same horizontal plane and communicating with the flues 23, and also arranged beneath the chamber floor on opposite sides of the plane of the V-shaped wall so as to receive the furnace products deflected thereby, openings formed in the chamber floor above the flues 23, in planes on opposite sides of the furnace and connecting said flues and the interior of the chamber, openings formed in said floor above the flues 23^a, and connecting the same and the interior of the chamber, and a plurality of independent air ducts of different lengths arranged one above the other in the same vertical plane at the sides of the flues 23, 23^a, opposite to the furnace and having lateral openings adjacent to their inner ends connecting them with said flues and also having doors at their outer ends, all substantially as specified.

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

FRED MACARTHY.

Witnesses:
GEO. F. HENDRICKSON,
FRED M. TOWNLEY.