

(No Model.)

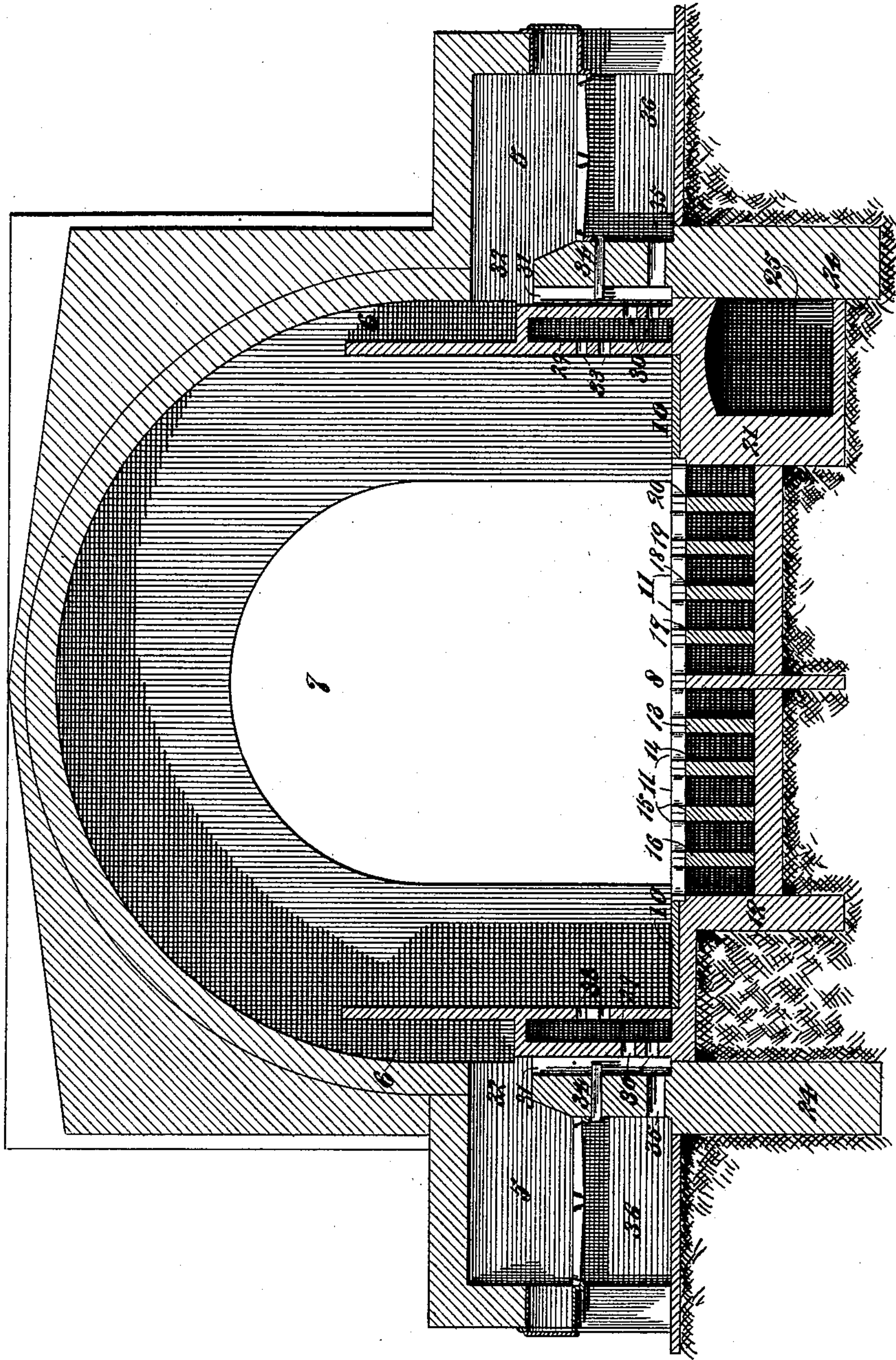
2 Sheets—Sheet 1.

W. P. GRATH.  
BRICK KILN.

No. 463,601.

Patented Nov. 17, 1891.

Fig. 1.



Witnesses:  
Charles Pickles,  
Jesse V. Pickles

Inventor:  
W. P. Grath,  
By Fowler & Fowler  
Attorneys.



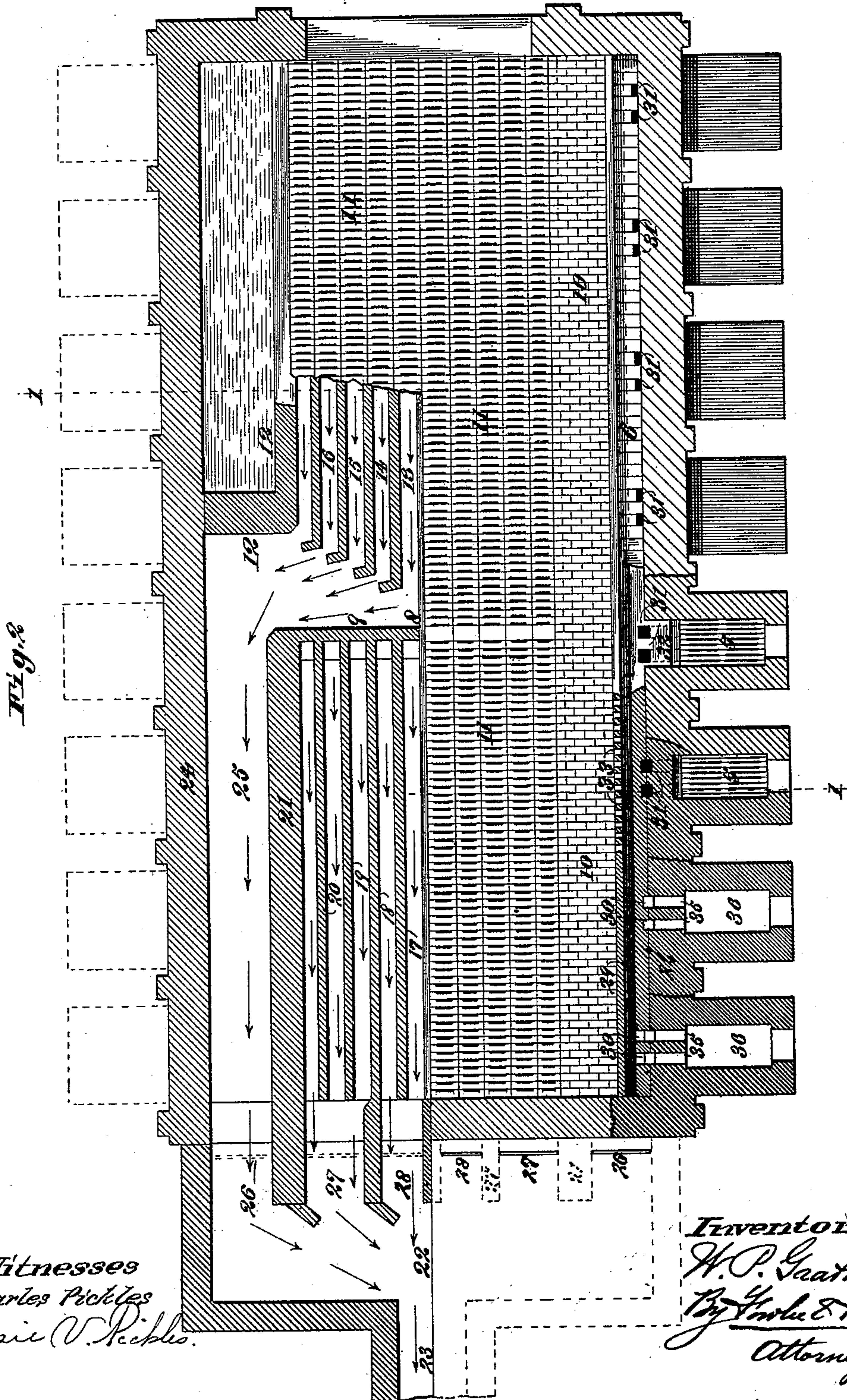
(No Model.)

2 Sheets—Sheet 2.

W. P. GRATH.  
BRICK KILN.

No. 463,601.

Patented Nov. 17, 1891.





# UNITED STATES PATENT OFFICE.

WALTER P. GRATH, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE ILLINOIS  
SUPPLY AND CONSTRUCTION COMPANY, OF ILLINOIS.

## BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 463,601, dated November 17, 1891.

Application filed May 28, 1891. Serial No. 394,375. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER P. GRATH, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Brick-Kilns, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention is designed more particularly as an improvement on an invention for which I applied for Letters Patent of the United States on the 26th day of January, 1891, the serial number of said application being 379,020.

The object of the present invention is to cause the heated gases to pass through any desired part of the kiln.

The invention also has for its object to uniformly burn all the bricks in the kiln.

The invention will be best understood by referring to the accompanying drawings, in which—

Figure 1 is a transverse vertical section of a brick-kiln made in accordance with my invention, taken on the plane of the line 1 1 of Fig. 2; and Fig. 2 is a sectional plan thereof, taken at different levels—that is, broken away at various places to illustrate the construction more clearly.

The same marks of reference indicate the same parts in the two views.

In my previous invention, hereinbefore referred to, I subdivided the kiln beneath the floor into four independent sections and the flues leading from the two sections in the front part of the kiln pass beneath the flues leading from the two sections at the rear of the kiln. This construction necessitates inconvenience in constructing the kiln, and when the dampers of the lower flues are raised they of necessity cut off the draft through the upper flues, which are directly over them. The present construction obviates these difficulties.

5 are the furnaces, and 6 main flues leading therefrom to the kiln 7, which is of the ordinary construction, having an arched top or roof, against which the heated gases rising

through the main flues impinge, the said heated gases being deflected downward through the mass of brick stacked up from the floor of the kiln. I divide the kiln longitudinally, preferably, by a central partition-wall 8 beneath the floor thereof. The kiln is also divided transversely beneath the floor by a wall 9, which does not extend clear across the kiln, but stops short of the walls thereof. The floor of the kiln near the side walls is covered with bricks 10, which fit closely together and leave no perforations between them. The rest of the floor of the kiln is covered with bricks 11, having spaces between them, making a perforated floor.

The kiln is symmetrical (*i. e.*, of the same construction) on each side of the division-wall 8, and the front part thereof beneath the floor, between the division-wall 8 and a wall 12, which divides the blank part of the kiln from the rest thereof, is provided with longitudinal parallel walls 13 14 15 16, which stop short of the transverse partition 9. The kiln at the rear is divided beneath the floor into two sets or series of independent flues by longitudinal parallel division-walls 17 18 19 20 21, which run from the central transverse partition 9 to the rear of the kiln, the walls 18 and 21 preferably passing beyond the rear wall of the kiln into a chamber 22, common to all of the flues, and from which the gases pass *via* a connection 23. The space between the walls 21 and the side walls 24 form flues 25, which pass beneath the imperforate floor 10 at the rear of the kiln to the common chamber 22, whence the gases are delivered to a smoke-stack (not shown) through the connection 23. The flues formed by walls 8, 13, 14, 15, 16, and 12 all empty into the flues 25, which in my previous invention passed beneath the flues at the rear of the kiln, but which in the present instance passes to each side of such flues.

The flues 25 in the present invention are provided with dampers 26, by which the flow of heated gases through said flues and their communicating flues may be regulated. So, also, the flues formed by the walls 21 and 18 are provided with dampers 27, whereby the flow of heated gases through the flues formed



by the walls 18, 19, 20, and 21 at the rear of the kiln may be controlled. In like manner the flues 8 and 18 are provided with dampers 28, whereby the flow of heated gases through the flues formed by the walls 8, 17, and 18 may be graduated. It will be noted that the depth of the flue 25 is greater than the flues formed by the walls 8, 17, 18, 19, 20, and 21, as will be seen by reference to Fig. 1, in order to give the same cross-sectional area to the exit-flues for the communicating flues beneath the floor at the front of the kiln as to the exit-flues for the communicating flues beneath the floor at the rear of the kiln.

It will be obvious from the foregoing that by suitably controlling the two sets of dampers 26, 27, and 28 the heated gases may be caused to pass through any of the desired sections of the kiln, and thus when upon observation it is found that any part of the kiln is not receiving sufficient heat and another part too much the gases may be excluded from the latter part of the kiln and caused to pass to the former part. It will be noticed, further, that the dampers 26 when opened or closed do not in any way interfere with the flues formed by the walls 8 and 18 and 18 and 21, respectively.

In my previous construction, for which I have made application for Letters Patent as aforesaid, additional bage were provided, whereby the flame from the furnace may pass through those bricks near the lower part and sides of the kiln. In some patented constructions also a direct communication between the furnace and the part of the kiln referred to is afforded. In all these constructions the flame which passes through the additional openings reaches the bricks directly, and the heat is so intense thereat that the bricks are more or less discolored near the openings in burning. In the present invention I provide means whereby the force of the flame in passing to the part of the kiln referred to is broken and the flame cannot play directly upon the bricks at such places. The bricks are therefore well burned at the places mentioned, and the whole mass of bricks throughout the kiln are of one uniform color.

To carry out that part of my invention I arrange beneath the main flues 6 chambers 29, the outer wall of which near the bottom is provided with holes 30, which communicate with a passage-way 31, leading downward from the throat 32 of each furnace. The inner wall of the chambers 29 is furnished with holes 33 at the middle or near the top of said chambers, the object being to prevent the holes 30 and 33 from registering with each other. The passage-ways 31 are provided with dampers 34, by which the volume of the flame and heated gases through said passage-ways may be graduated. The flues 6, together with the passage-ways 31 and chambers 29, make the kiln a double-down-draft one. By closing the dampers in pas-

sage-ways 31 the kiln may be converted into a single-downdraft kiln, inasmuch as the flow of gases through the passage-ways 31 and the chambers 29 is prevented by the said dampers when closed. I am aware that kilns have heretofore been constructed having the ordinary up-and-down draft in connection with a side draft, in which the flame plays directly upon the bricks near the sides and lower part of the kiln; but in this construction no provision is made whereby the kiln can be converted into a downdraft kiln alone and the side draft cut off. Where an ordinary downdraft kiln is used alone in burning bricks, the bricks in the upper part of the kiln are in effect burned twice—that is to say, during the first part of the burning the heat is consumed in driving off the moisture from the bricks in the upper part of the kiln of bricks, and this moisture is driven through the bricks at the lower part of the stack. The bricks at the upper part of the stack are therefore burned first, and after being burned the process is continued in order to burn the bricks at the lower part of the kiln which have not yet been burned to any extent. It is thus evident that the bricks at the upper part of the kiln are in effect burned twice—that is to say, are subjected to heat after they are burned and during the whole time the bricks in the lower part of the kiln are being burned.

My invention affords a double-downdraft kiln, whereby the bricks at the lower part of the kiln are subjected to a downdraft independent of the downdraft to which the bricks in the upper part of the kiln are treated with. I am thus enabled to save time in burning bricks and also to burn the mass of bricks more uniformly, in that it is not necessary to subject the bricks in the upper part of the stack to heat after they are burned, for the reason that the burning of the lower and upper portions of the bricks takes place at one and the same time. At the lower end of the passage-ways 31 is a passage-way 35, communicating with each ash-pit 36, by which cold air from the outside of the kiln may be admitted into the chambers 29 and to those bricks near the sides and bottom of the kiln. The flame passes from the furnaces 5 downward through the passage-ways 31 to the holes 30 into the chambers 29, and here the flame is broken and prevented from playing directly upon the bricks at the sides and lower part of the kiln. The heated gases rising from the flame are emitted from the chambers 29 to the bricks near by through the holes 33. In some kilns now in use and in my previous invention the flame from the furnace may play directly upon the bricks at the sides and bottom of the kiln. This has a deleterious effect upon the bricks and is obviated by the present invention. In the present invention, also, the furnaces are arranged considerably above the level of the floor of the kiln to better carry out the object of my



invention, and with this end in view the floor of the ash-pit is made to come about level with the floor of the kiln.

I have pointed out in my previous application for patent at length the advantage of supplying heat more or less directly from the furnaces to the bricks at the sides and bottom of the kiln and of not relying upon the single downdraft alone for burning the bricks at such places. No further explanation of this object is therefore thought necessary herein.

Having fully set forth my improvements, what I desire to claim, and secure by Letters Patent of the United States as my invention, is—

1. A downdraft brick-kiln having ordinary main flues and subdivided beneath the floor at the front and rear of the kiln into independent sections, flues leading from the sections beneath the floor at the rear of the kiln emptying into a common chamber or passage-way, other flues leading from the independent sections at the front of the kiln and passing to each side of the independent sections at the rear of the kiln and emptying into said common passage-way, and dampers in the rear of the kiln for controlling the said flues, substantially as described.

2. The combination, to form a downdraft brick-kiln, of the ordinary main flues 6 and the floor composed of a perforated central part 11 and an imperforated part 10 near the sides of the kiln, a longitudinal dividing-wall 8 and transverse partition 9 beneath the perforated part of said floor, the walls 13, 14, 15, 16, and 12 at the front of the kiln beneath the floor forming flues, as described, and walls 17, 18, 19, 20, and 21 at the rear of the kiln beneath the perforated floor also forming flues, as described, passage-ways 25 to each side of the flues at the rear of the kiln and beneath the

imperforated part 10 of the floor into which flues the flues at the front part of the kiln empty, a common passage-way or chamber 22, into which all of said flues empty, and dampers between said passage-way or chamber and said flues, substantially as and for the purpose described.

3. A downdraft brick-kiln provided with ordinary main flues disposed along the sides thereof and having a passage-way leading from the throat of the furnace to the bricks at the sides and lower part of the kiln, with an interposed chamber in said passage-way, substantially as and for the purpose described.

4. A downdraft brick-kiln having a chamber 29 beneath the ordinary main flues 6 thereof and a passage-way 31 leading from the furnace to said chamber through holes 30 in the lower part of said chamber, the said chamber communicating, on the other hand, with the lower part of the kiln through holes 33 above the perforations 30, substantially as and for the purpose described.

5. The combination, in a downdraft brick-kiln, of furnaces arranged along the sides thereof, main flues extending upward therefrom, a passage-way also extending from each of said furnaces to a chamber adjacent to the sides and lower part of the kiln, and dampers in said passage-way between the furnace and said chamber, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand and affixed my seal, this 22d day of May, 1891, in the presence of the two subscribing witnesses.

WALTER P. GRATH. [L. S.]

Witnesses:

A. C. FOWLER,  
J. F. WESTON.