

W. DRAYTON.
BRICK KILN.

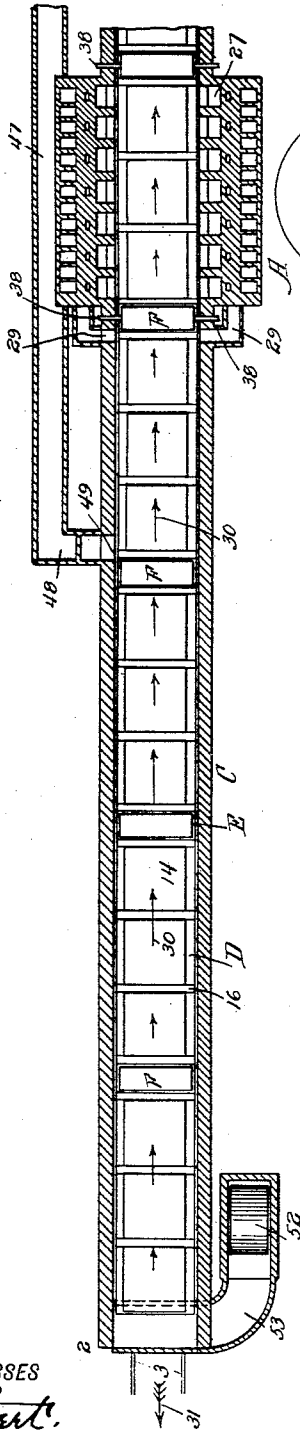
APPLICATION FILED JUNE 13, 1913.

Patented Dec. 29, 1914.

4 SHEETS-SHEET 1.

1,122,879.

Fig. 1



WITNESSES
F. D. Sweet.
C. Brudway.

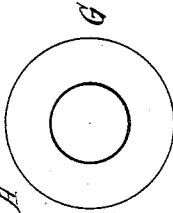
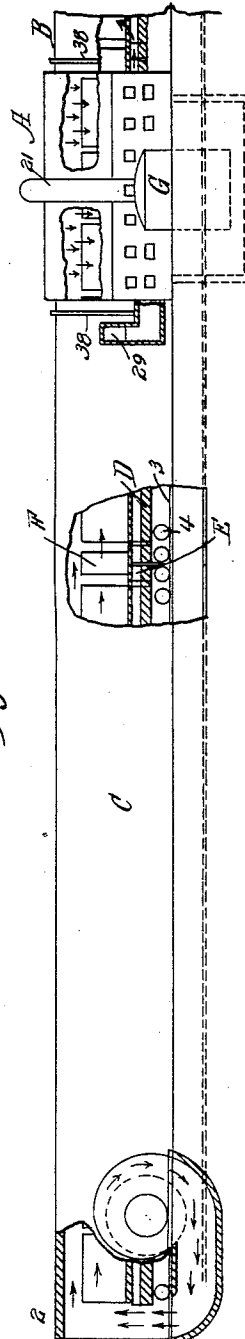


Fig. 2



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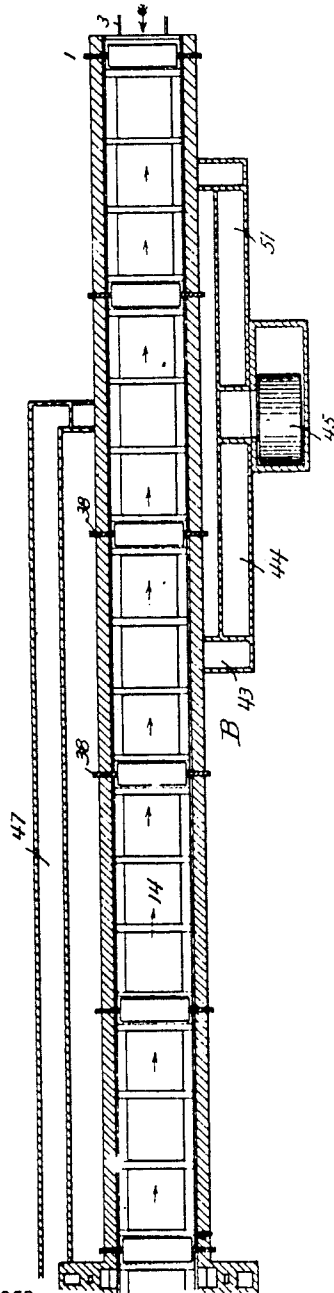
APPLICATION FILED JUNE 13, 1913.

Patented Dec. 29, 1914.

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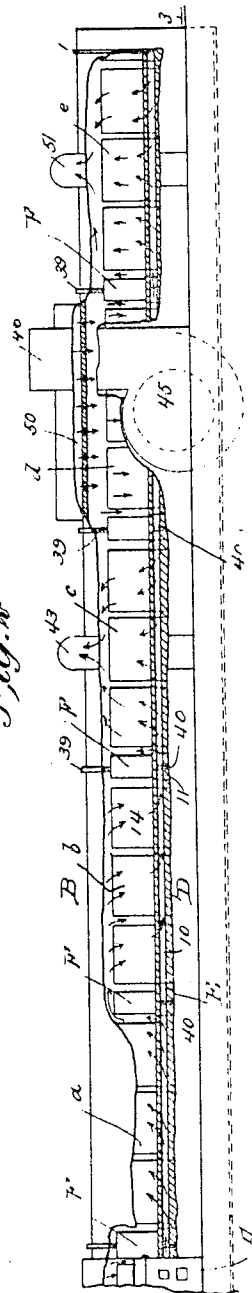
Fig. 1a



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Fig. 2a



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1,122,879.

Patented Dec. 29, 1914.

4 SHEETS—SHEET 3.

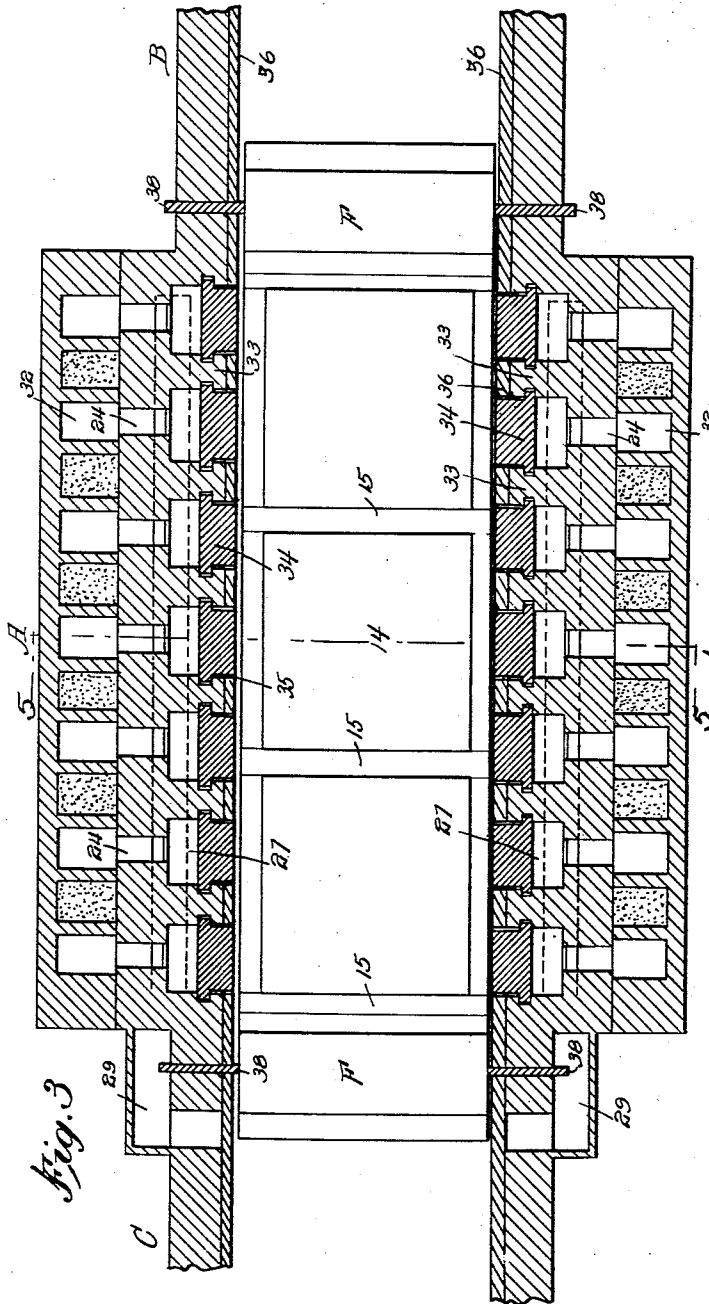


Fig. 3

WITNESSES
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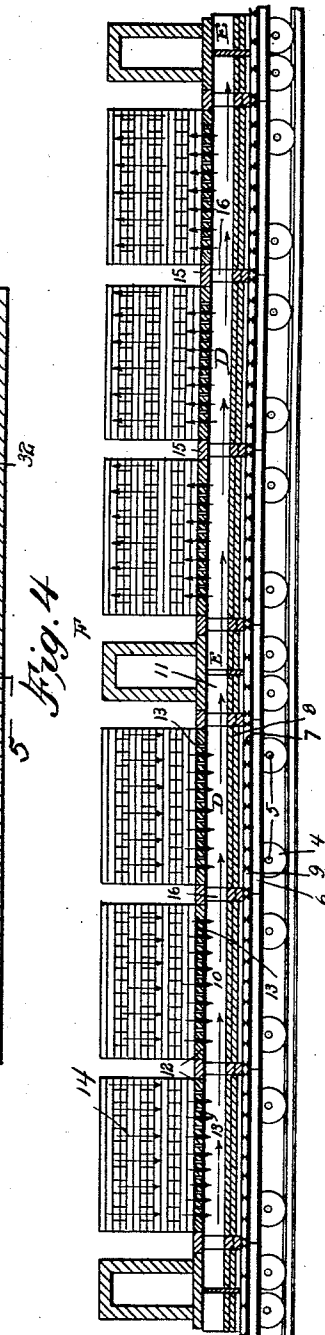


Fig. 4

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APPLICATION FILED JUNE 13, 1913.

Patented Dec. 29, 1914.

4 SHEETS-SHEET 4.

1,122,879.

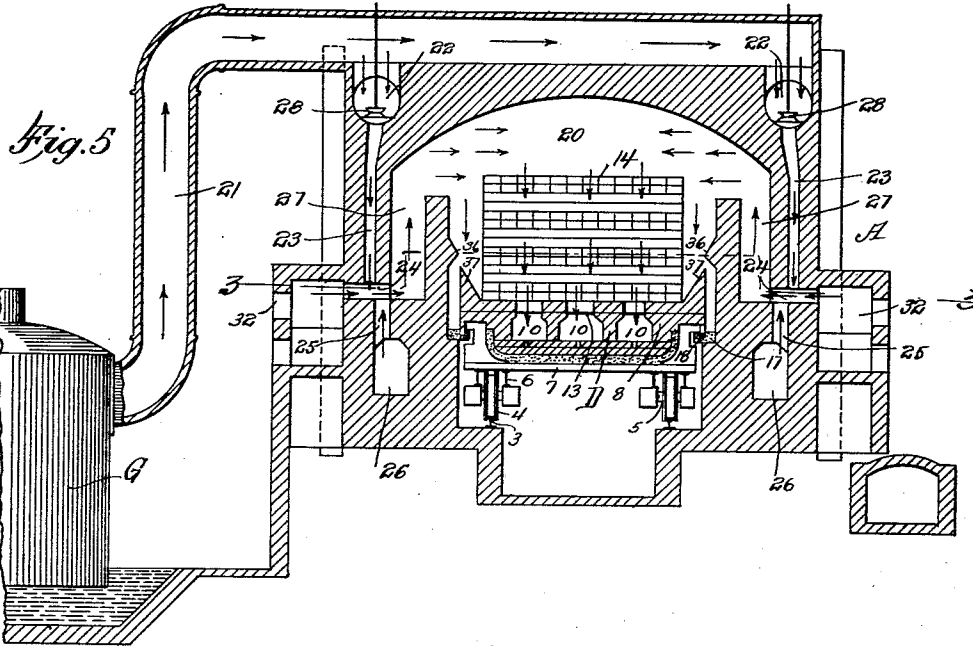
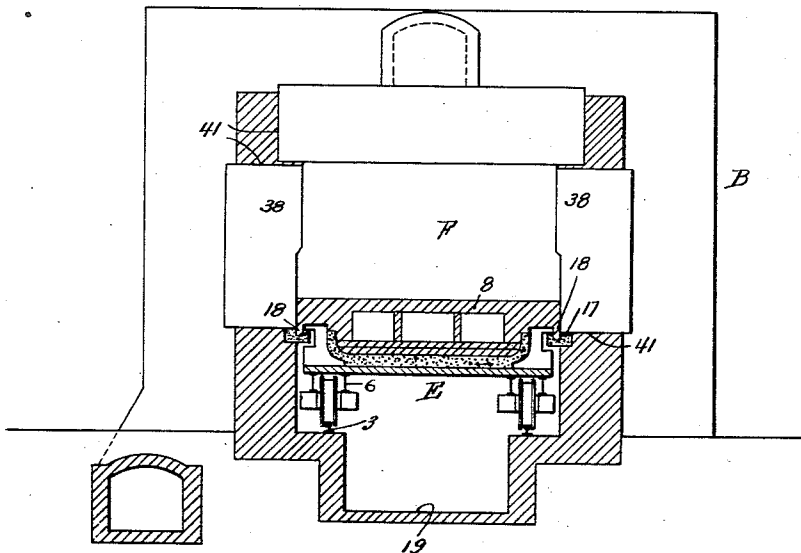


Fig. 6



WITNESSES

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UNITED STATES PATENT OFFICE.

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BRICK-KILN.

1,122,879.

Specification of Letters Patent.

Patented Dec. 29, 1914.

Application filed June 13, 1913. Serial No. 773,568.

To all whom it may concern:

Be it known that I, WILLIAM DRAYTON, a citizen of the United States, and a resident of Greendale, in the county of Hocking and State of Ohio, have invented a new and Improved Brick-Kiln, of which the following is a full, clear, and exact description.

This invention relates to the art of brick-making and deals with that type of kiln in which is carried on simultaneously the operation of burning one or more stacks of bricks, cooling one or more stacks of burnt bricks, and preheating one or more stacks of green bricks, the bricks being moved periodically through the successive stages from the receiving to the discharge end of the tunnel or kiln.

The invention has for its general object to improve and simplify the construction of kilns of this character so as to be reliable and effective in use and so designed as to have a large burning capacity and at the same time be economical in operation.

Another object of the invention is the provision of means whereby the tunnel or kiln is divided into a plurality of chambers communicating with each other in such a manner that there is an up draft through the stack or stacks of brick in one section and a down draft through the stack or stacks of brick in a succeeding section, whereby the effective heating can be carried on in a comparative short length of kiln, this dividing of the kiln into chambers being accomplished by portable partition trucks mounted between the brick-carrying trucks and cooperating dampers that are inserted between the partitions and the walls of the tunnel so as to cause the draft to follow downwardly in one chamber, thence under a separating partition, upwardly in the next chamber, thence over the successive separating partition, downwardly through the next chamber, and so on indefinitely.

Another object of the invention is the provision of a furnace intermediate the ends of the kiln, which furnace is adapted to receive air from the cooling section of the kiln, and a suitable fuel is mixed with this heated air to burn in the combustion chamber of the furnace, the products of combustion being drawn downwardly through the bricks placed in the furnace, and then conducted through the trucks carrying such bricks and discharging into the preheating

section of the kiln to heat the green bricks therein.

A further object of the invention is the employment of a draft system whereby air is conducted through the cooling section of the kiln and divided into two parts at the inner end of said section, one part of this air, which is heated by cooling the bricks, being supplied to the furnace to mix with the fuel for combustion, and the other part of the air being conducted to the receiving portion of the preheating section of the kiln for heating the green bricks, which green bricks are further heated in their progress toward the furnace by the products of combustion received from the latter.

With these objects in view, and others as will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, and wherein similar reference characters are employed to designate corresponding parts throughout the several views, Figure 1 is a horizontal section of the cooling and furnace sections of the kiln; Fig. 1^a is a horizontal section of the preheating section of the kiln and is intended to be read in connection with Fig. 1 to represent a complete horizontal section of the kiln; Fig. 2 is a side view of Fig. 1 with portions broken away; Fig. 2^a is a side view of Fig. 1^a with portions broken away; Fig. 3 is an enlarged horizontal section of the furnace taken on the line 3—3, Fig. 5; Fig. 4 is a longitudinal section of a portion of the train of trucks or cars showing the manner of dividing the train into sections by the separating portable partitions, whereby a down draft is produced through the bricks in one section of the train and an up draft in the adjacent section of the train; Fig. 5 is a central vertical section taken transversely through the furnace on the line 5—5, Fig. 3; and Fig. 6 is a transverse section of the kiln in a plane coincident with one of the portable partitions.

Referring to the drawing, A designates the furnace section of the kiln, and between the furnace A and the receiving end 1 is a preheating section B, in which the green bricks are heated before they reach the fur-

nace A; and between the furnace A and the delivery end 2 is a cooling section C, the said sections A, B and C being arranged in a line and forming a continuous tunnel-shaped structure and extending entirely through the tunnel are track rails 3, on which travel the brick-carrying trucks D and the partition-carrying trucks E. The train composed of the trucks D and E is formed into a plurality of sections each consisting of several trucks D, and the sections of the train are separated by the trucks E that carry the separating partitions F.

Each truck is composed of sets of wheels 4 mounted on axles 5 that support longitudinal I-beams 6, and on the I-beams are transverse beams 7 closely arranged to form a support for the platform 8 of the truck, there being between the transverse I-beams 7 and the platform 8 a layer of mineral wool or the like to insulate the under structure of the truck from the heat utilized in burning the bricks carried by the platform. The platforms 8 of the brick-carrying trucks are formed with a plurality of longitudinally-extending passages 10, and aligning with these passages are passages 11 in the platforms of the trucks E that support the separating partitions F, which partitions are made of fire brick or any other suitable heat-resisting substance. The floor portion 12 of the trucks D is provided with numerous perforations or ports 13 so as to communicate with the vertical passages formed in the stacks or piles of bricks 14 carried by the trucks, so that it is possible to cause an up or down draft to be produced through the piles of bricks for burning or preheating the same. Between adjacent trucks D and between trucks D and trucks E are arranged fillers 15 which are provided with ports 16 to communicate with the passages 10 and 11 in the trucks, said fillers being so constructed as to provide for expansion and contraction. As shown in Fig. 4, the platforms of adjacent trucks do not come in contact although the fillers 15 bridge the space between the platforms, and as the under structure, or particularly the longitudinal beams 6 of adjacent trucks, approximately contact, the fillers can be supported on such I-beams, and it is to be understood that the adjacent trucks are adapted to be suitably coupled together in the forming of the train. A seal is formed between the sides of the platforms and the side walls of the kiln to prevent the heat from obtaining access to the under structure of the trucks, and for this purpose a channel or trough 17 extends longitudinally along and is supported by each side wall of the tunnel or kiln, as clearly shown in Figs. 5 and 6, and into the sand contained in the troughs extend depending flanges or tongues 18 formed on the trucks D and E,

as shown in Figs. 5 and 6 respectively, and also on the fillers 15, the flanges on the latter not being shown. The bottom of the tunnel is formed with a channel or pit 19 of such depth as to permit operators to traverse the tunnel under the trucks of the train for any desired purpose, and this passage formed on the trucks also serves to provide for the circulation of air to keep the under structure of the trucks cool.

The construction of the furnace A is shown in detail in Figs. 3 and 5, and in the present construction the furnace is adapted to use gaseous fuel as the combustible, and this fuel is of such a nature that it is mixed with a suitable quantity of air before burning in the combustion chamber 20. The gas is made by a producer G of any approved construction and is led therefrom by a flue or pipe 21 to the top of the furnace where the pipe communicates with horizontal flues or manifolds 22 extending longitudinally in the walls of the furnace at the top thereof near the sides. The manifolds or horizontal flues 22 have downwardly-extending passages 23 which terminate in throats 24 into which the gas discharges to meet air which is discharged to passages 25 that communicate with horizontal ducts 26 extending longitudinally in the side walls of the furnace. The gas and air pass out of the throats or passages 24 into the fire pockets 27, from which the burnt gases pass upwardly and inwardly toward the center of the combustion chamber 20, completely enveloping the bricks 14 stacked on the trucks and finally passing through the stacks of bricks and entering the passages 10 in the platforms of the trucks. From these passages 10 the gases are conducted into the preheating section B of the kiln. The supply of gas to the furnace may be controlled by valves 28 at the upper ends of the passages 23. The air supply for the furnace is derived from the inner end of the cooling section C of the kiln, and for this purpose the passages 26 are separately connected through ports 29 with the section C, so as to receive air therefrom, which is heated in the process of cooling the hot bricks as they are led away from the furnace, the course of the cooling air being indicated by the arrows 30, Fig. 1, and the direction of travel of the bricks being indicated by the arrow 31.

For the purpose of starting the furnace the side walls of the furnace are provided with fire boxes 32 which communicate through the throats or passages 24 with the combustion chamber, and after the furnace is under way the fire boxes 32 are closed and the supply of fuel is taken from the producer G. The side walls of the combustion chamber 20 are formed by piers 33, Fig. 3, which are spaced apart to form the fire

pockets 27, and between these piers are fire brick or other plates 34 having tongue and groove connections or joints 35 for the piers, which joints provide for expansion and contraction of the lateral walls of the combustion chamber. On the piers and plates 34 are breasts 36 which overhang the flanges 37 on the trucks, which flanges prevent bricks that might fall from the piles during the burning operation from lodging between the trucks and walls of the kiln. The breasts 36, in fact, extend the whole length of the tunnel.

During the burning operation in the furnace A, communication between the latter and the cooling section C is cut off by side dampers 38, an upper damper 39 and a bottom damper 40, all of which dampers cooperate with one of the portable partitions F. These dampers are in the form of flat plates, and those at the sides and top of the kiln are slidable in pockets 41, while the damper 40 under the portable partition F is mounted in the truck E for such partition. Corresponding dampers are arranged between the furnace A and preheating section B of the kiln to cooperate with another portable partition F, but in this instance the damper 40 in the partition truck E is open, as shown for instance at the middle of Figure 4, and consequently the products of combustion pass downwardly through the bricks in the furnace A and enter the passages 10 of the trucks, and from these passages the gases flow to the right under the partition F at the right end of the furnace and enter the preheating section B. In the preheating section B dampers or baffle plates 38, 39 and 40 are employed for dividing the preheating section into chambers *a*, *b*, *c*, *d* and *e*. Communication between the chambers *a* and *b* is afforded at the top of the intermediate portable partition F by the upper damper 39 being removed, and consequently there is an up draft through the bricks in the chamber *a* and a down draft through the bricks in the chamber *b*. The chambers *b* and *c* communicate with each other through the truck from the partition F between such chambers, as the damper 40 of the said truck is in open position. In this manner the draft through the chambers of the preheating section is alternately up and down successively. The top of the chamber *c* is connected with an outlet duct 43 which extends downwardly along one side of the kiln and connects by a horizontal duct 44 with a rotary fan or blower 45 which discharges the product of combustion upwardly into the air through the exhaust duct 46. The compartments *d* and *e* are adapted to be heated by hot air which is taken from the cooling section C of the kiln by means of a duct 47 at the side of the kiln opposite from the gas producer, said duct 47 having its end 48 connected by

a port 49 with the inner end of the cooling section C slightly in advance of the point where air is taken from such section for supplying the furnace, and the opposite end of the duct 47 is connected with a distributing duct 50 on the top of the chamber *d*, the hot air passing from the duct 50 downwardly through the stacks of bricks in the chamber *d*. From this chamber *d* the heated air passes into the chamber *e* under the intermediate separating partition F, and the top of the chamber *e* is connected by a duct 51 with the fan 45, which fan produces a suction not only through the chambers *d* and *e*, but also through the chambers *a*, *b* and *c* of the preheating section B and also through the furnace A. The draft is not only produced by the fan 45, as a fan 52 is arranged at the delivery end 2 of the kiln and is connected therewith by a duct 53 so as to discharge atmospheric air into the cooling section C, in order to deliver a blast of air therethrough, there being no dampers in the section C to cooperate with the portable partitions F.

The furnace and the chambers of the preheating section are of such length as to accommodate three brick-carrying trucks, but it is to be understood that the furnace and chamber may be of any desired length.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the method of operation and of the apparatus shown will be readily understood by those skilled in the art to which the invention appertains, and while I have described the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a kiln, the combination of a section, brick-carrying trucks movable therethrough, partition means entrained with the trucks, said trucks and partition means having passages, dampers cooperating with the sides and tops of alternate partition means, and dampers cooperating with the sides and bottoms of the remaining partition means, whereby said section is divided into parts communicating alternately at the top and bottom, whereby up and down drafts are produced in the successive parts of the section.

2. A kiln comprising a preheating section, a furnace section, a cooling section, a device for producing a draft of air through the cooling section, a device for sucking the air through the kiln in a direction opposite to the direction of travel of the material being treated, means for connecting the in-

ner end of the cooling section with the furnace to supply heated air to the latter, said preheating section having separate outlets arranged respectively adjacent the brick-receiving end and at a point intermediate such end and the furnace, and means for connecting the inner end of the cooling section with the preheating section at a point between the said outlets, whereby the heated air received from the cooling section will divide and pass to the said outlets.

3. A kiln comprising a preheating section, a furnace section, a cooling section, means for dividing the preheating section into chambers, means for connecting the end of the cooling section adjacent the furnace section to an intermediate chamber of the preheating section, and a suction device connected with spaced chambers at opposite sides of the said intermediate chamber, whereby the heated air from the cooling section enters said intermediate chamber and flows in opposite directions, said suction device being connected with a chamber between said intermediate chamber and the furnace for drawing products of combustion from the latter to a portion of the preheating section.

4. A kiln comprising a preheating section, a furnace section, a cooling section, a train of brick-carrying trucks and partition trucks in the kiln, means for separating the furnace from the cooling section, means cooperating with the partition trucks in the preheating section for dividing the preheating section into communicating chambers in which there is an up draft through the bricks in one chamber and a down draft in an adjacent chamber, the draft in the cooling section being longitudinal thereof.

5. In a kiln of the class described, the combination of a chamber, a brick-carrying truck including a platform provided with a longitudinal passage and ports in the floor of the platform communicating with the

said passage, a partition truck having a passage communicating with the passage of the truck, a damper for controlling the passage in the partition-carrying truck, a partition on the said latter truck, and dampers in the wall of the chamber cooperating with said partition for controlling communication of the said chamber with an adjacent chamber.

6. In a kiln of the class described, the combination of a tunnel or section, brick-carrying trucks therein having alining passages, a partition truck between the first-mentioned trucks having a passage alining with the passages of the brick-carrying trucks, fillers disposed between the trucks and having passages communicating with the passages of the trucks, a damper mounted in the partition truck to control the passage thereof, a partition on the partition truck, and dampers in the tunnel cooperating with the said partition for controlling communication between adjacent chambers of the tunnel.

7. In a kiln, the combination of a furnace having longitudinally-extending fuel ducts at its top and longitudinally-extending air ducts in its bottom, fire pockets in the sides of the furnace, passages leading from the said ducts to said pockets for supplying air and fuel thereto, a truck in the furnace having a longitudinal passage and ports communicating with the passage, whereby a down draft is produced through the bricks on the truck, and means for sealing the sides of the truck with the sides of the furnace to protect the under structure of the truck from the heat.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM DRAYTON.

Witnesses:

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CHARLES T. COFFEY.