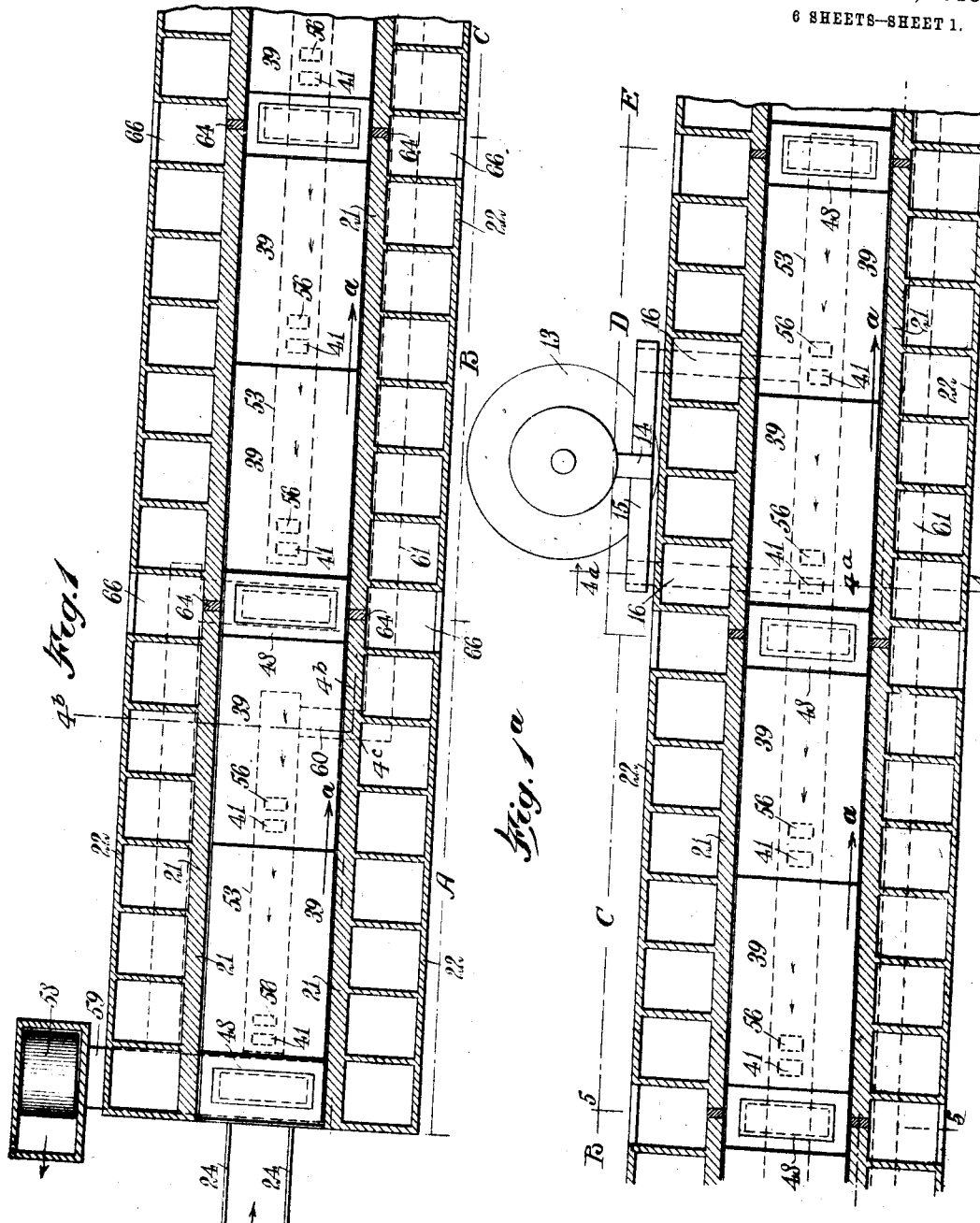


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1,075,904.

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6 SHEETS—SHEET 1.



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Fig. 1b

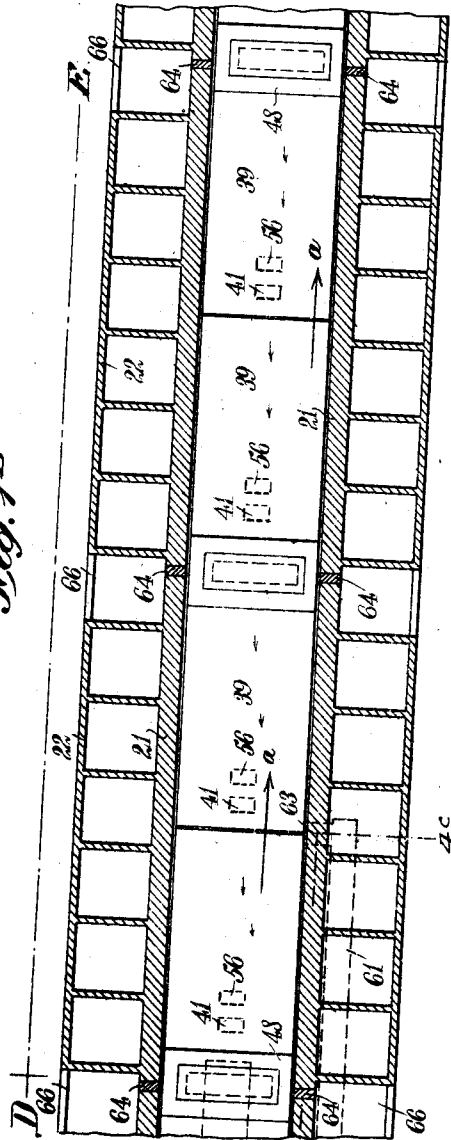
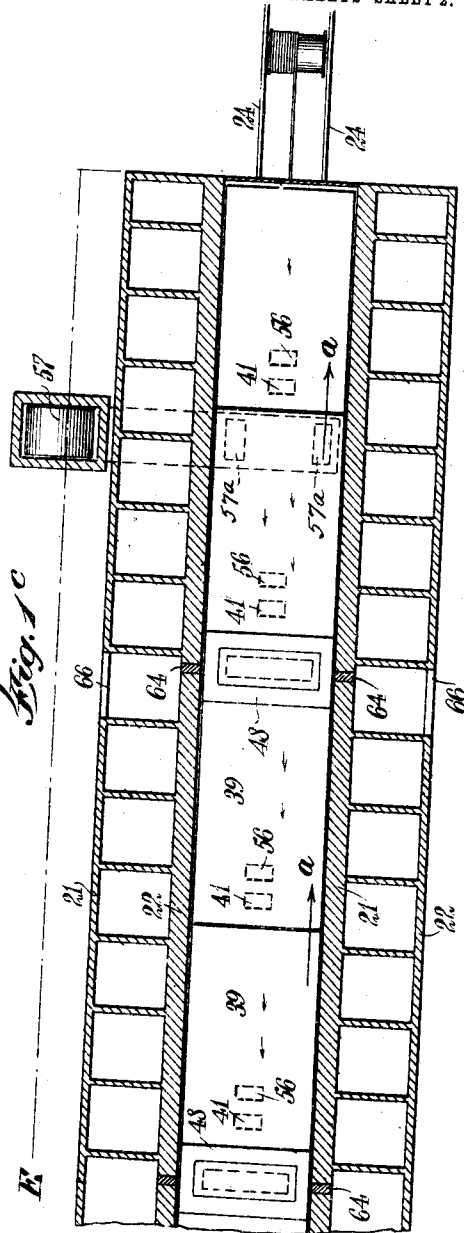


Fig. 1c



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6 SHEETS—SHEET 3.

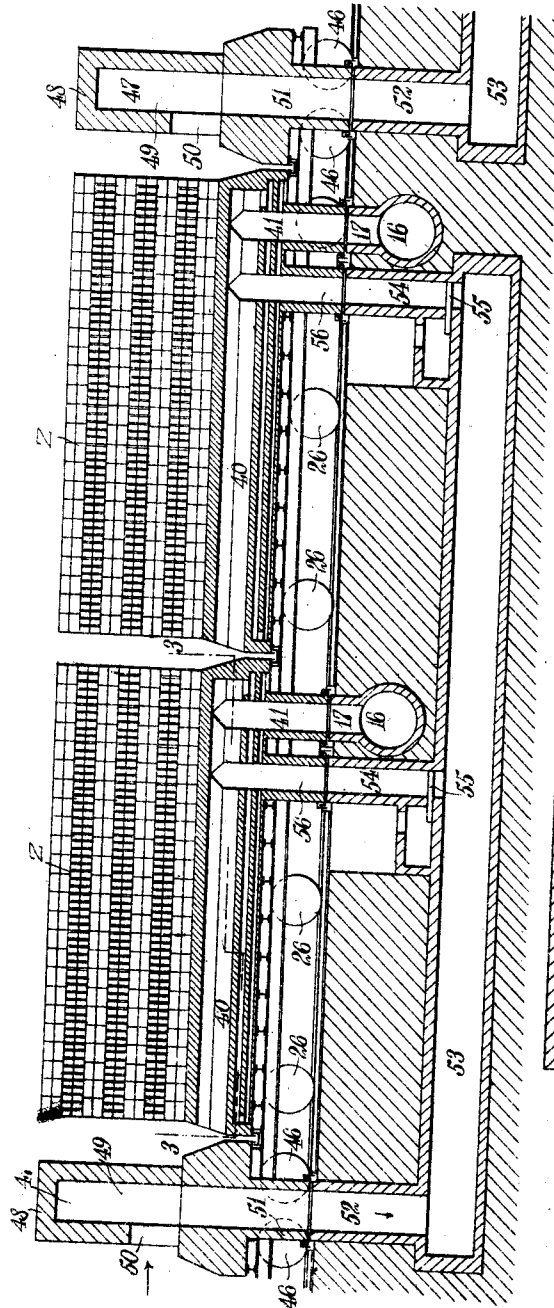
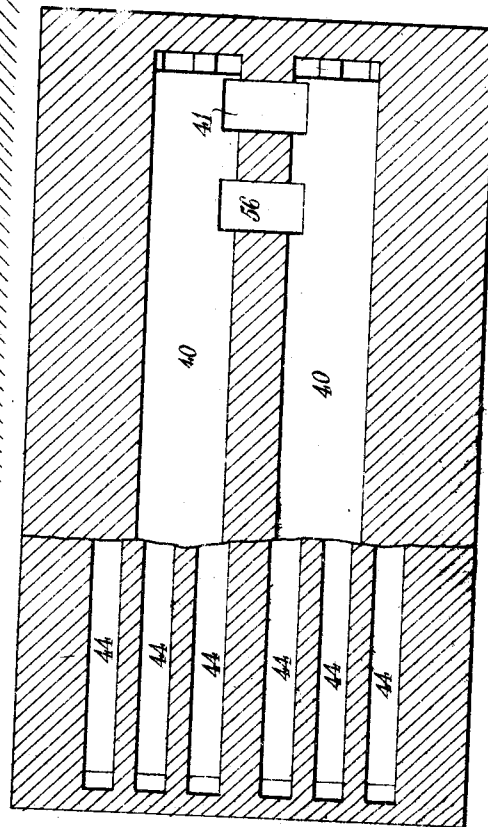


Fig. 3

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Fig. 2

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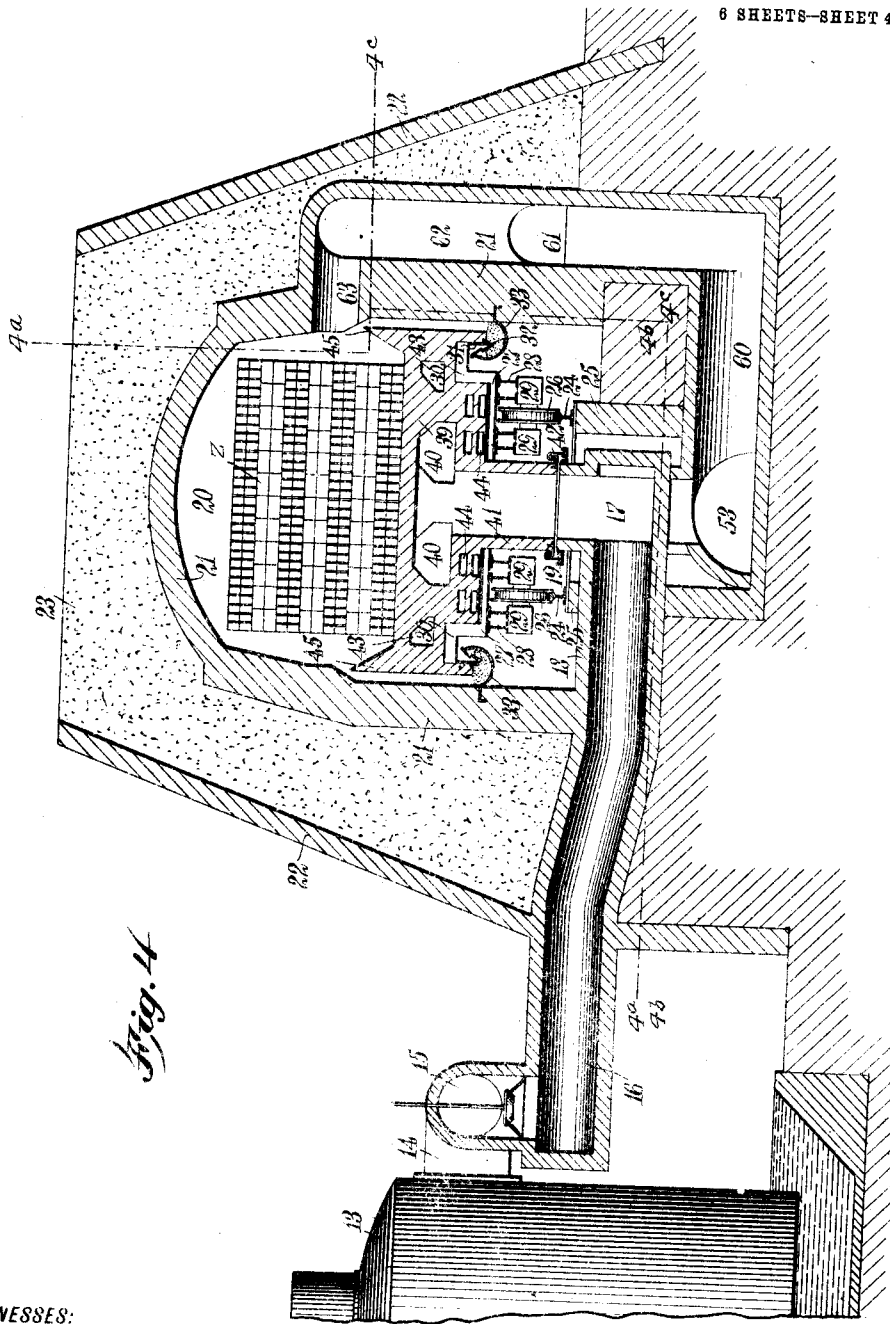


Fig. 4

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6 SHEETS—SHEET 5.

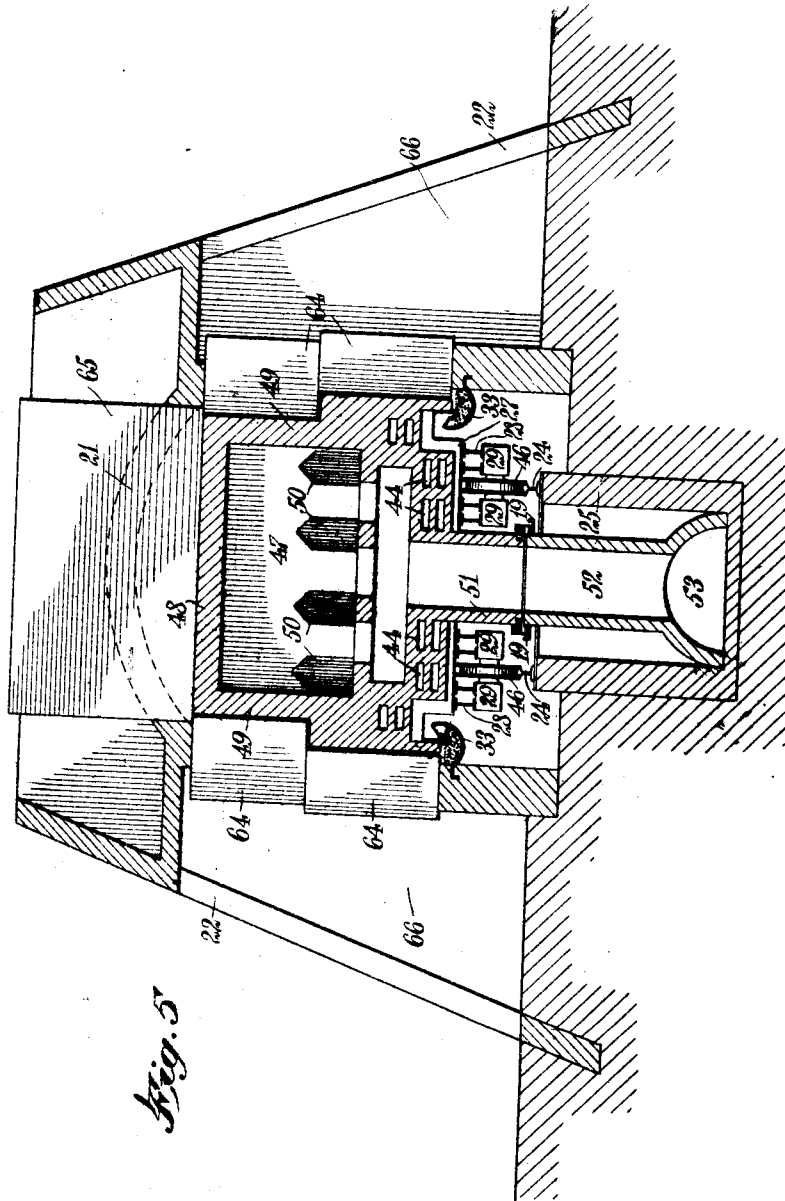


Fig. 5

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6 SHEETS—SHEET 6.

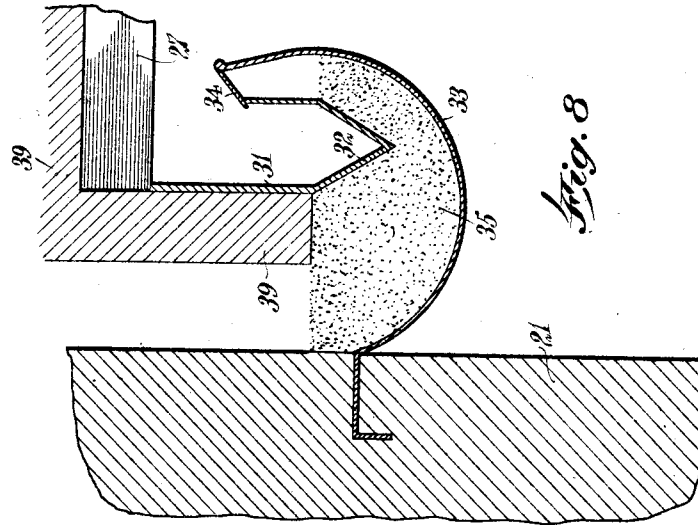


Fig. 8

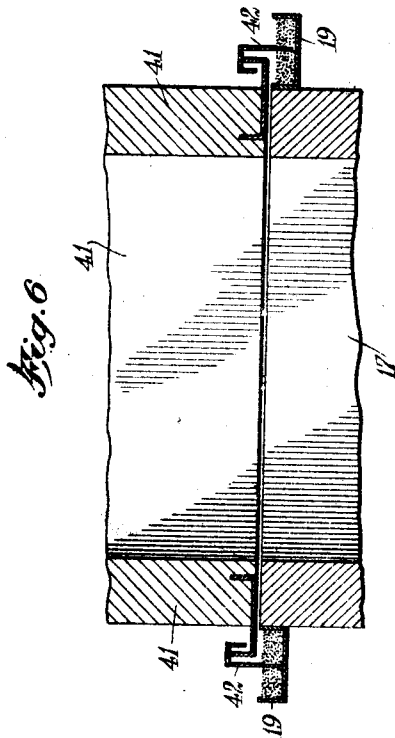


Fig. 6

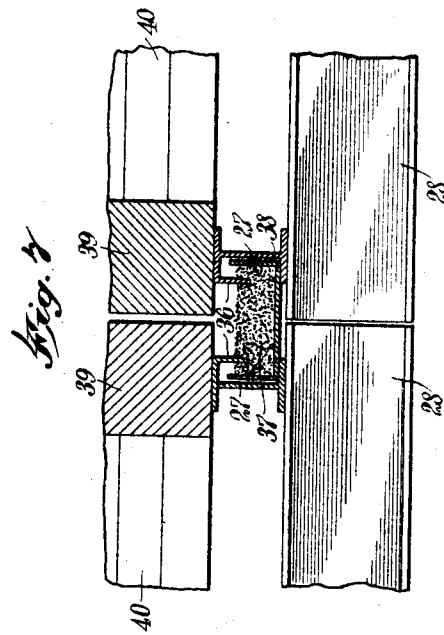


Fig. 7

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UNITED STATES PATENT OFFICE.

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1,075,904.

Specification of Letters Patent.

Patented Oct. 14, 1913.

Application filed August 29, 1910, Serial No. 579,544. Renewed March 5, 1913. Serial No. 752,254.

To all whom it may concern:

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

Among the principal objects which the present invention has in view are: to provide a kiln having a tunnel-like structure, constructed and arranged to convey material being handled through the said kiln by stations; to provide a plurality of platforms portably arranged to carry the material being handled; to provide a system of seals to prevent the admission of heat to the metal frame and rotating parts of the above mentioned platforms; to provide a plurality of portable partitions arranged in conjunction with the above mentioned platforms to confine the heat within certain areas; to provide a heat circulating and transfer system whereby the heat units are utilized to the greatest advantage; to provide an air circulating system for the kiln whereby is prevented the pocketing of air; to provide a burning system employing producer gas fuel and means for mixing burned atmospheric air; and to provide portable platforms having a structure adapted to resist heat of a degree higher than that required for the burning of the material being handled.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a fragmentary view in horizontal section, showing the arrangement of a portion of a kiln constructed and arranged in accordance with the present invention; Fig. 1^a is a fragmentary view on similar plane, forming a portion of the general plan of the kiln in conjunction with that shown in Fig. 1; Fig. 1^b is a continuance of the view shown in Fig. 1^a; Fig. 1^c is a continuance of the view shown in Fig. 1^b; Fig. 2 is a longitudinal vertical section of a station formed in the kiln; Fig. 3 is a detail view, on an enlarged scale and in horizontal section, taken on the line 3—3 in Fig. 2, showing the construction and arrangement of one of the portable platforms; Fig. 4 is a vertical cross section, taken on the line 4^a—4^a; 4^b—4^b; 4^c—4^c; in Figs. 1, 1^a, and 1^b, showing the arrangement of the supporting platform and

the tunnel kiln in conjunction with a gas producer plant and delivery duct therefor; Fig. 5 is a detail view, on an enlarged scale, taken on the line 5—5 in Fig. 1^a, showing the construction and arrangement of one of the portable partitions and the filling members therefor used in conjunction with the tunnel; Fig. 6 is a detail view, on an enlarged scale and in vertical section, showing the construction and arrangement of a sand seal for preventing the leakage of air from the delivery ducts; Fig. 7 is a detail view, in vertical section and on an enlarged scale, of the sand seal interposed between platforms to prevent the leakage of heated air to the structural members of the platforms below the floor thereof; and Fig. 8 is a detail view, on an enlarged scale and in vertical section, of the heated air seal disposed in the tunnel sides to prevent the leakage of heated air from the burning chamber of the tunnel.

The tunnel as formed according to the present invention is illustrated in Figs. 1, 1^a, 1^b, and 1^c; the said figures are to be read together. In practice the tunnel is stretched out to form one continuous passage, preferably in straight extension, although this is not a necessary condition, as results more or less advantageous may be obtained by forming the tunnel in a circle or in the form of a plurality of parallel extensions suitably connected, with the means for transferring the portable platforms or trucks at the connecting ends of the alleys. When constructed in the straight line extension the preferred arrangement is that shown, wherein a producer gas furnace 13 is directly connected to deliver its fuel in the section marked D. The furnace 13 is of any approved construction and arrangement, and is provided with a delivery outlet 14, which is connected with a lateral drum 15. The drum 15 is connected at both ends thereof to delivery ducts 16, 16. The delivery ducts 16, 16 open into vertical passages 17, which are extended upward above the floor 18 of the tunnel. The vertical passages 17, may be circular in form and surrounded by a circular upturned channel 19. The channel 19 is of sufficient depth to contain sand, or other suitable packing material, which is adapted to prevent the passage of heated air therethrough. The tunnel 20 is shaped in cross section substantially as shown in Fig. 4 of the drawings, having an inner masonry wall 21 and buttress walls 22, 22. Between the wall 21

and the walls 22, 22 is disposed a suitable filling material 23, adapted to prevent the radiation of heat therethrough.

Disposed in the tunnel 20 and lengthwise thereof, are metal tracks 24, 24. The tracks 24, 24 are mounted upon foundation piers 25, 25 extended lengthwise of the tunnel. The tracks 24, 24 are provided to support carrying wheels 26, 26. The carrying wheels 26, 26 support the portable trucks forming the sectional floors of the burning chambers of the kiln. The floors are supported on steel beams 27, 27 disposed transversely of the tunnel and tracks 24, 24. The beams 27 are supported by double longitudinal I-beams 28, 28, which are rested upon bearing boxes 29, 29. The bearing boxes 29, 29 provide bearings for the journals of the shafts with which the wheels 26, 26 are provided. The steel beams 27, 27 are provided with an upward and outward extension 30, at the outer ends whereof are mounted longitudinally disposed side plates 31. The side plates 31 are provided at the lower ends with inverted V-shaped channels 32, 32. The channels 32, 32 are slidably extended within gutters 33, 33 fixedly mounted on the side wall of the tunnel 20 and extended lengthwise and throughout the same. When the gutters 33, 33 are filled with sand or other sealing material to prevent the passage of heated air, as shown substantially in Fig. 4 of the drawings, and the V-shaped channels 32 are extended into the said sand, the heat which is introduced into the tunnel 20 above the floor of the said trucks is prevented from passing from the upper portion of the tunnel to the lower portion thereof wherein are disposed the tracks 24 and the structural body and wheels for the trucks, as above described. It is to prevent any radiation of the heat from the sand contained within the gutters 33, that there are provided the gates 34, which exclude the relatively cool air of the lower part of the tunnel from contact with the surface of the sand 35 placed in the said gutters 33. The V-shaped channels 32, 32 are exposed on their upper surfaces to the air. In this manner over-heating of the metal composing the channels is prevented. It will be observed that the air will circulate in the channels so formed to the very bottom thereof.

The framing structures of the trucks are closely connected, as shown particularly in Figs. 2 and 7 of the drawings. Where the frames are abutted the transverse beams 27, 27 situated at the ends of the trucks are provided with depended flanges 36, 36, which are arranged to extend within the sand 37 disposed within an upwardly opening box 38. The box 38 is extended from side to side of the tunnel and thus prevents the leakage of the heated air between the

frames and floors of adjacent trucks. The trucks are connected to form a continuous joint with the tunnel 20 and a substantially unbroken floor for the tunnel. The floor thus formed is protected by a refractory material 39 shaped substantially as shown in cross section in Figs. 4 and 5 of the drawings. The material thus provided and supported by the trucks constitutes the bed of the burning chamber of the kiln. The bed 39 of the kiln is provided with a series of ducts 40, 40 extended lengthwise of the bed and opening outwardly into the burning chambers formed in the said tunnel. The bed on each truck is provided with a circular depended funnel 41, adapted to register with the passage 17 used for delivery of the gas fuel from the producer 13. The funnel 41 has mounted thereon an annular ring 42, the depended edge whereof is adapted to extend into the sand channel 19 to form a seal therein. The ring 42 is vertically disposed to permit the same to be raised out of and lowered into the channel 19, when in the course of operation the successive trucks are moved into alignment with the passages 17. The passages 17, 17, it will be understood, are disposed only in the section of the tunnel marked D and opposite the gas producer furnace 13. It will be understood that in the operation of this kiln the preheated air which is delivered through the ducts 53 and 54 to the ducts 40, 40 ignite the gas delivered from the producer through the ducts 16 and 41. The burning gas is delivered from the ducts 40, 40 into the body of the kiln to be carried therein toward the entrance end of the said kiln. The beds of the portable sections thus become the kiln furnace. The bed 39 is provided with any suitable number of spaces 43, 43 to lighten the construction. The bed is also provided with a series of longitudinally extended flat passages 44, 44 for promoting the circulation of the relatively cooler air of the tunnel below the bed 39 to reduce the temperature of the said bed adjacent to the steel beams 27, 27 and 28, 28. A portion of the air delivered through the passages 44 is carried into the chamber to assist the combustion within and through the bricks piled upon the said bed.

The beds 39, 39 are provided with lateral upwardly extended side flanges 45, 45. The flanges 45, 45 are provided to guide any bricks or parts thereof which may fall from the stack resting upon the said beds as arranged thereon for burning. The trucks thus constructed are united, as stated, to form the supporting beds for the brick stacks Z. The bricks are stacked in any approved manner, the object being to provide a circulation throughout the individual members in the stack. The trucks having the bed 39 may be united in couples or in a series of more than two, according as the

section D of the tunnel be elongated or shortened. With reference to the formation of these sections the partition trucks are disposed. The partition trucks are arranged to
 5 separate the brick carrying trucks and to form partitions to aline with the walls of the tunnel to form longitudinal separated chambers therein.

The partition trucks are mounted on
 10 wheels 46, 46 similar in all respects to the wheels 26, 26 on the brick carrying trucks. The framing structure of the trucks is similar. The principal difference in the trucks is in the formation of the chamber 47 raised
 15 above the bed of the truck. The chamber 47 is box-like in form, having a solid top 48 and solid sides 49, 49. The end walls of the chamber 47 are pierced to form openings 50, 50. The openings 50, 50 permit the air
 20 from one chamber to pass into the chamber 47. (See Fig. 2 of the drawings.)

Depended from the bed of the partition trucks is a funnel 51. The funnel 51 in each truck is adapted to register with the
 25 passages 52. The passages 52 deliver downward into a longitudinal passage 53. The passage 53 is provided with distributing passages 54, 54. The distributing passages 54, 54 deliver the air from the passage 53
 30 into the chamber succeeding each of the partition trucks, the air being distributed having been delivered through the partition trucks to the said passage 53. The delivery of the air through the passages 54, 54 is controlled by a slide gate 55 disposed at the extreme
 35 of each of the passages 54. The passages 54 are raised above the floor 18 of each chamber to register with a funnel 56 carried on each of the brick bearing trucks. The funnel 56 opens into the ducts 40, 40
 40 in the bed 39, the air delivered from the said funnel 56 mixing with the gas delivered from the funnel 41. The air thus delivered, it will be remembered, is air which
 45 is received from the chamber in which the material which has been burned is cooling, thereby reusing the heated air given off in the cooling radiation for maintaining the temperature in the burning chamber or section D. From each of the sections the heated
 50 air is delivered through the funnel 51 in each of the partition trucks to the next succeeding section or chamber, aiding in raising the heating temperature in the said chamber. In this manner the heat produced
 55 by the gases from the burner 13 is carried successively backward from the section E to the chamber D and thence to sections C, B and A. The mixed air and gases
 60 are finally drawn through the tunnel by an exhaust fan 58. To maintain the circulation of air a forcing fan 57 is provided at the opposite or delivery end of the tunnel to deliver through a duct 59 to the passage 53.

65 It is desired to dry the bricks as the same

are delivered to the tunnel by submitting them to a preliminary heating. For this purpose it is arranged to use the heat radiated from the bricks when delivered from the burning chamber, this heat being transferred from the station succeeding the burning chamber to the entrance chamber of the tunnel. It is this heat, which may be denominated as conserved heat, which serves to drive out or absorb the water in the green bricks
 70 preliminary to the same entering the burning chamber. For this purpose the passage 53 disposed at the receiving end of the tunnel and under the initial or receiving station therein, being the section A shown in the drawings at Fig. 1, is connected by means of the passages 60, 61, 62, and 63 with the cooling station or section E shown in the drawings at Fig. 1^b. The heat radiated from the cooling bricks delivered from the station D is mixed with the air introduced through the passages 57^a, 57^a from the fan 57 and is delivered to section A at the entrance end of the tunnel through the passages 63, 62, 61, 60 and 53, and the funnels 56, 56 in the floor of the said section. The heat thus delivered from the bricks leaving the tunnel is utilized for preliminarily heating the bricks being introduced into the tunnel. The heated air and vapor
 80 drawn from the green bricks is drawn off by means of the fan 58 through the duct 59 and chamber 47.

It will be understood that the entire circulation of air is from the delivery end of the tunnel to the receiving end, this circulation being helped out and partially induced by the fan 57 at the one end and the fan 58 at the other. The air radiated from the material being treated while in the sections adjacent to the delivery end of the kiln, is carried back and delivered into the burning chamber or section D. From the burning chamber or section D it is delivered through the chamber 47 of the partition trucks to the next succeeding chamber, and so on, being delivered from each chamber to the next succeeding chamber until delivered to the exhaust fan 58. At each successive step, as it passes from section to section, it aids in the heating of the brick carried by the trucks and stacked upon the beds 39, 39. By means of the slide gates 55, 55 any section may be cut out or the delivery thereto controlled.

The partition trucks are constructed to freely pass through the tunnel 20. The outer walls of the truck bodies are square and arranged substantially as shown in Fig. 5 of the drawings. The side walls 49 and the top 48 are squared to receive in butted relation the baffle plates 64, 64 and 65. The buttress walls 22, 22 are parted to form recesses 66, 66 to operate the baffles 64, 64, while the baffle 65 extends above the filling
 120
 125
 130

material 23. When in the operation the partition and other trucks are moved, the baffle plates 64, 64 and 65 are drawn away from the sides of the partition trucks to permit the same to be moved freely. When, however, the train of trucks is arrested in opposite position, the baffle plates 64, 64 and 65 are moved from operative position to close the passage of the tunnel 20.

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

1. A kiln, comprising an elongated continuous kiln tunnel having heat confining walls; a portable carrying bed disposed to move through from end to end of said tunnel; a heat generator in open communication with said tunnel; a plurality of portable partitions arranged to divide the said tunnel into chamber sections; air circulating engines to move the air in said tunnel toward the material receiving end of said tunnel; and a duct in direct communication with the chamber section adjacent the receiving and the delivery ends of said tunnel to transfer the heated air from the section at the delivery end to the section at the receiving end of said tunnel.

2. A kiln, comprising an elongated continuous kiln tunnel having heat confining walls; a portable carrying bed embodying a plurality of separate sections flexibly connected to form a train extended throughout said tunnel and disposed to move from end to end of said tunnel; a heat generator in open communication with said tunnel intermediate the ends thereof; a plurality of portable partitions arranged to divide the said tunnel in chamber sections; air circulating engines to move the air in said tunnel toward the material receiving end of said tunnel; and a plurality of ducts for transferring the heated air from chamber section to chamber section adjacent in directions counter to the movement of the material under treatment.

3. A kiln, comprising an elongated continuous kiln tunnel having heat confining walls; a portable carrying bed embodying a plurality of separate sections flexibly connected to form a train extended throughout the said tunnel and disposed to move from end to end thereof; a heat generator in open communication with said tunnel intermediate the ends thereof; a plurality of portable partitions arranged to divide said tunnel in closed chamber sections; air circulating engines to move the air in said tunnel toward the material receiving end of said tunnel; a plurality of ducts for transferring the heated air from chamber section to chamber section adjacent in directions counter to the movement of material under treatment; means extensible between said bed and sides of said tunnel to prevent the passage

of heat from above to below said bed; and movable plates extending between said portable partitions and the body of the tunnel, said plates being constructed and arranged to prevent the passage of heat lengthwise said tunnel between said sections.

4. A kiln, comprising an elongated continuous kiln tunnel having heat confining walls; a portable carrying bed embodying a plurality of separate wheel supported trucks having each a bed for carrying material being handled, said trucks being connected to form a train extended throughout the said tunnel and disposed to move from end to end thereof; a heat generator in open communication with said tunnel intermediate the ends thereof; a plurality of portable partitions arranged to divide said tunnel in chamber sections; air circulating engines to move the air in said tunnel toward the material receiving end of said tunnel intermediate the ends thereof; ducts for transferring the heated air from chamber section to chamber section adjacent in directions counter to the movement of material under treatment; and movable plates extending between said portable partitions and the body of the tunnel, said plates being constructed and arranged to prevent the passage of heat lengthwise said tunnel between said partitions.

5. A kiln, comprising an elongated continuous kiln tunnel having heat confining walls; a portable carrying bed embodying a plurality of separate wheel supported trucks each having a bed for carrying material being handled, said trucks being connected to form a train extended throughout the said tunnel and disposed to move from end to end thereof; a gas producer heat generator in open communication with said tunnel to deliver gas for combustion in said tunnel; a plurality of portable partitions arranged to divide the said tunnel in chamber sections; air circulating engines to move the air in said tunnel toward the material receiving end of said tunnel; a plurality of ducts for transferring the heated air from chamber section to chamber section adjacent in directions counter to the movement of the material under treatment; means extensible between the said trucks and sides of said tunnel to prevent the passage of heat from above to below the said trucks; and movable plates extending between said portable partitions and the body of the tunnel, said plates being constructed and arranged to prevent the passage of heat lengthwise said tunnel between said partitions.

6. A kiln, comprising a tunnel, a plurality of portable partitions formed to close the said tunnel and disposed transversely there-

in; a metal structural frame disposed below said partitions to support the same; a plurality of carrying wheels mounted on said structural frame to carry the same; and
 5 a plurality of filling pieces slidably mounted in the walls of said tunnel to be extended therein to complete the partitions thereof.

7. A kiln, comprising an elongated continuous tunnel; an air circulating system for
 10 said tunnel; ducts in open communication between said tunnel and said air circulating system, and having upwardly extended duct
 terminals; a plurality of partitions shaped to conform to the cross section of said tunnel;
 15 a structural frame supporting said partitions; a plurality of carrying wheels for supporting said structural frame; a passage formed in said partitions open to said tunnel on one side of said partitions; and a sepa-
 20 rated duct member arranged to register with the said duct terminal of said air circulating system.

8. In a kiln, comprising an elongated continuous tunnel, carriers movable in said tunnel, a seal to prevent the heat in the upper
 25 part of said tunnel passing below said carriers, comprising a plurality of continuous channels extended from the walls of said tunnel; a suitable heat non-conducting ma-

terial filling said channels; and a plurality
 30 of inverted channeled partition members each mounted on a side of said carriers adjacent said channels and extending within said channels and bedded in the heat non-conducting material therein.

9. In a kiln comprising an elongated continuous tunnel, carriers movable in said tunnel, a seal to prevent the heat in the upper
 part of said tunnel passing below said carriers, comprising a plurality of continuous
 40 channels extended from the walls of said tunnel; a suitable heat non-conducting material filling said channels; a plurality of inverted channeled partition members each
 45 mounted on a side of said carriers adjacent said channels and extending within said channels and bedded in the heat non-conducting material therein; and a flexible
 cover resting above said channels to close
 50 the space between the sides of said channels and said partition members.

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

WILLIAM DRAYTON.

Witnesses:

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 EDWARD W. WILLIAMS