

No. 706,035.

Patented Aug. 5, 1902.

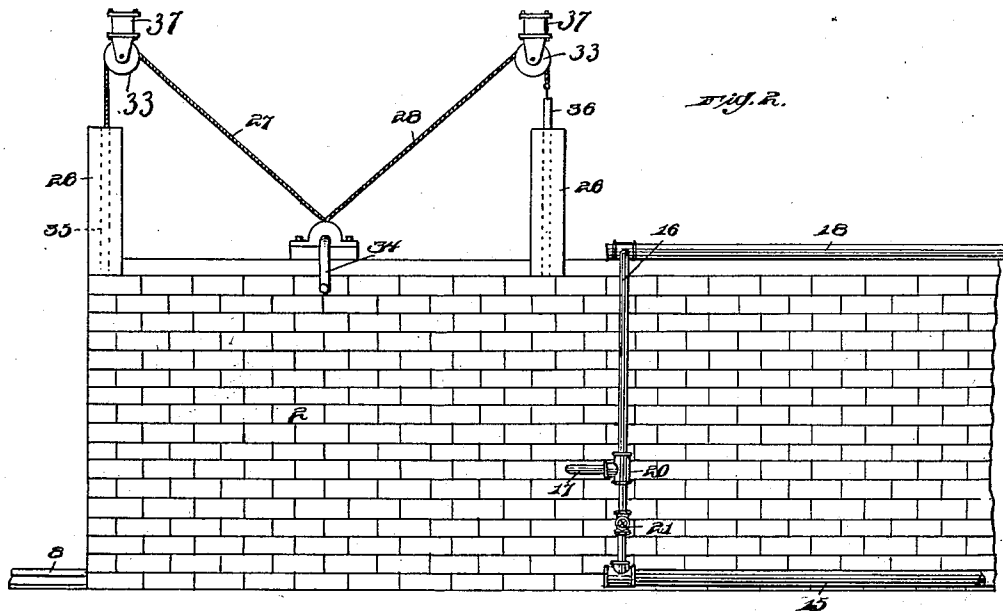
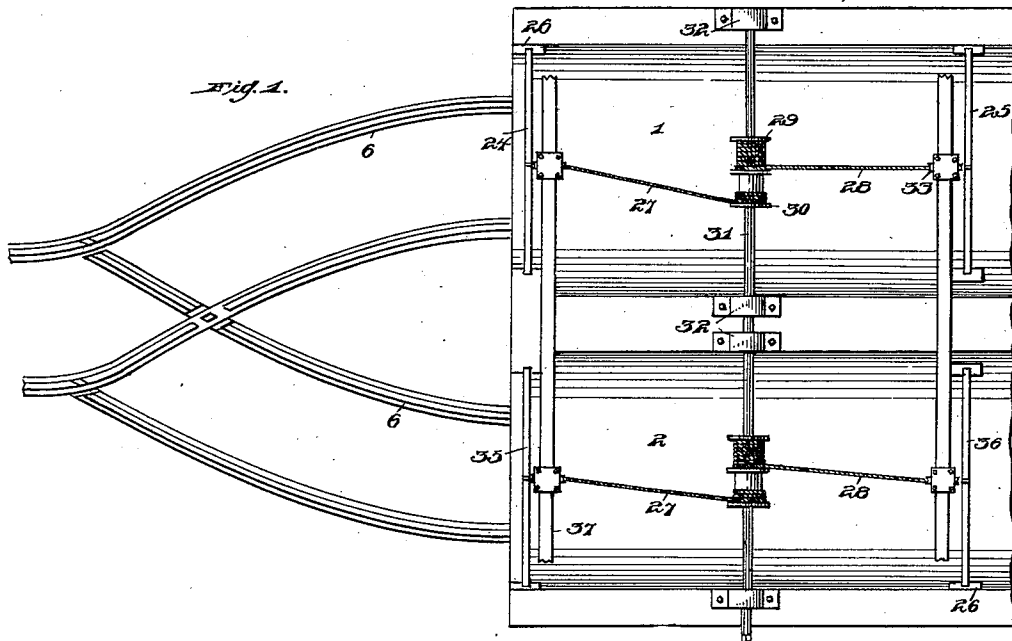
J. F. DU BOIS.

CONTINUOUS BRICK KILN AND DRIER.

(Application filed Oct. 24, 1901.)

(No Model.)

4 Sheets—Sheet I.



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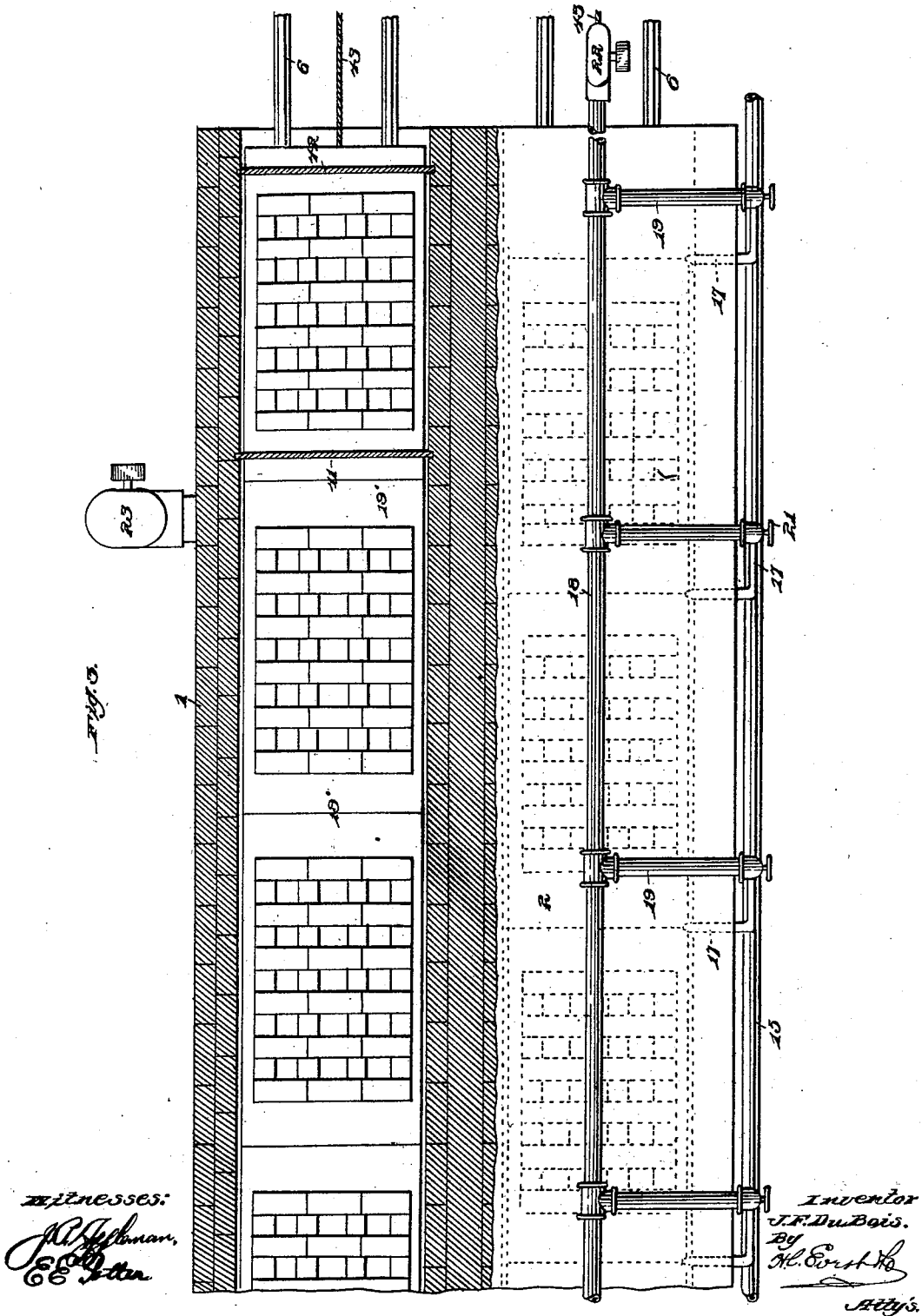
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Fig. 4.

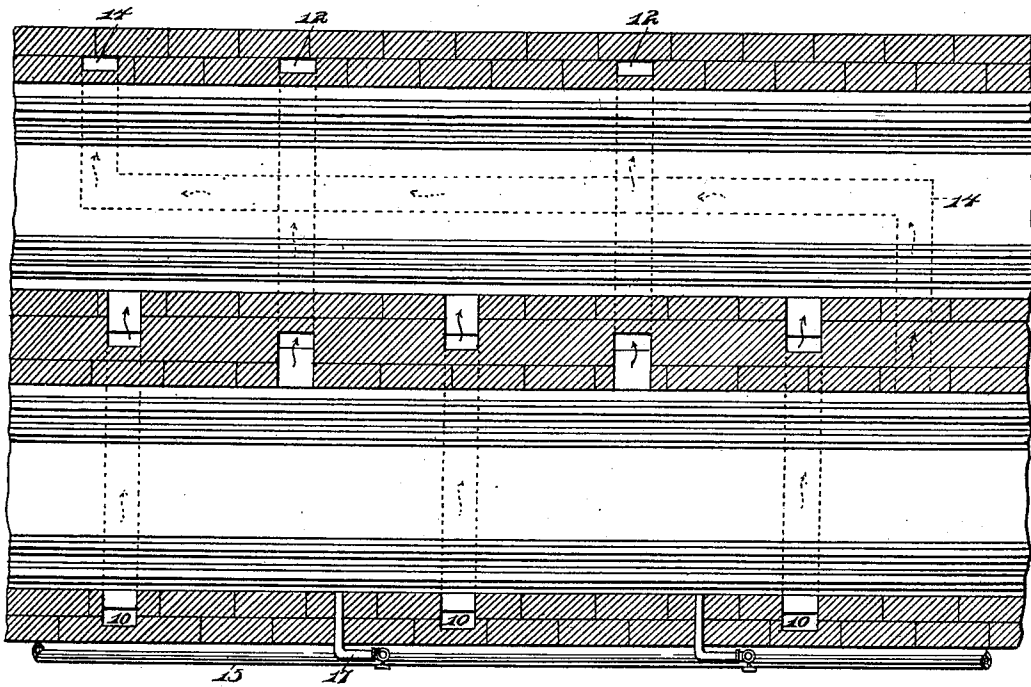
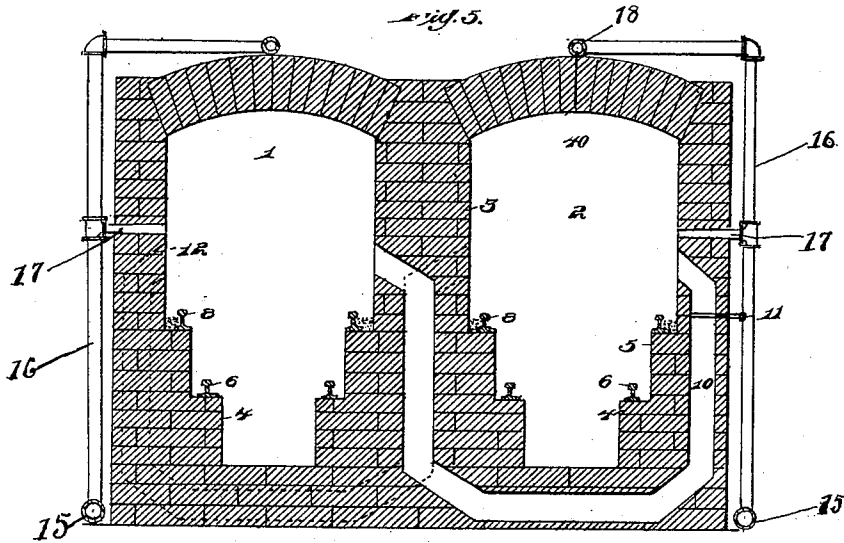


Fig. 5.



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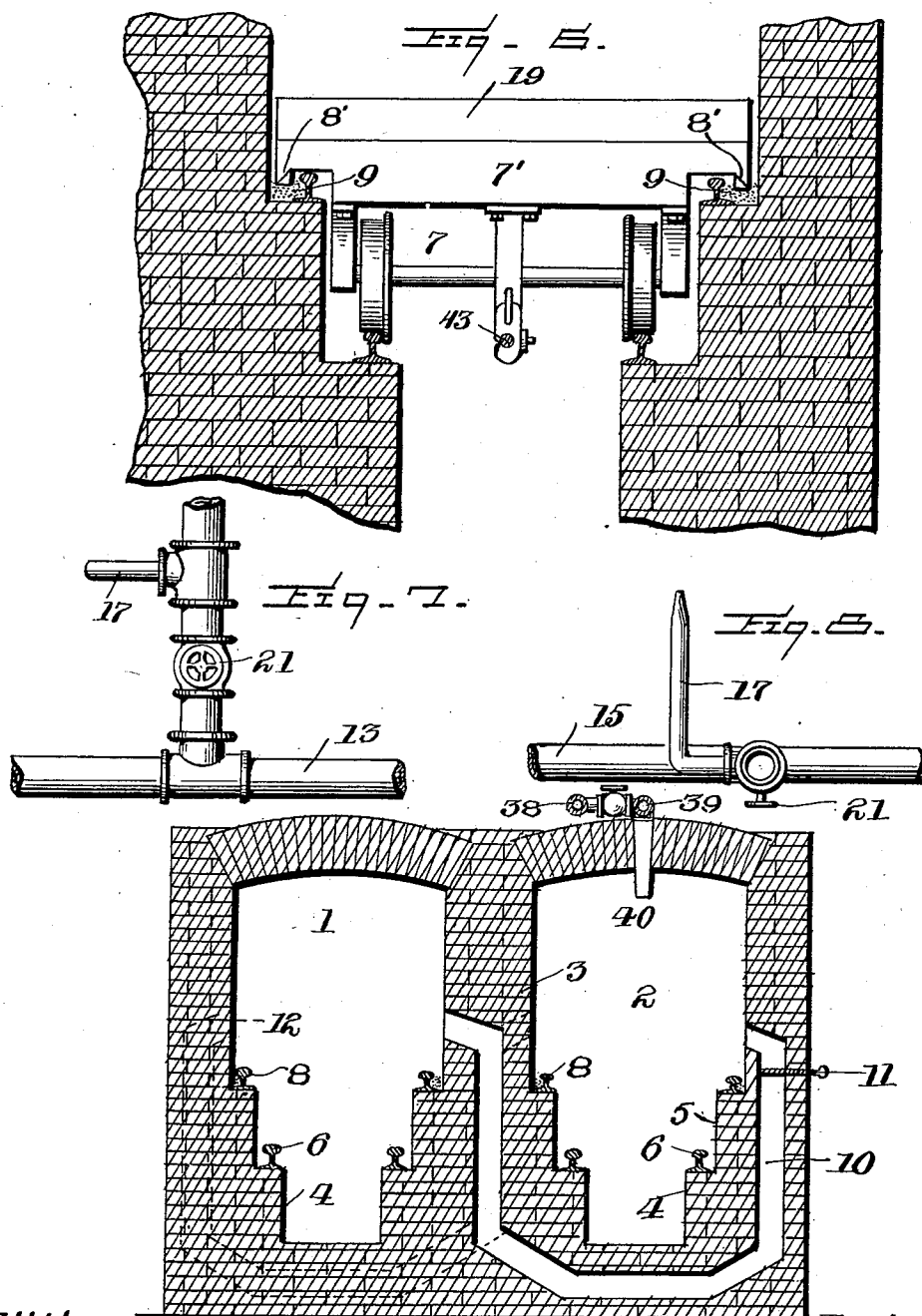
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

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CONTINUOUS BRICK KILN AND DRIER.

SPECIFICATION forming part of Letters Patent No. 706,035, dated August 5, 1902.

Application filed October 24, 1901. Serial No. 79,765. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. DU BOIS, a citizen of the United States of America, residing at Bellaire, in the county of Belmont and State of Ohio, have invented certain new and useful Improvements in Continuous Brick Kilns and Driers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in a system for the drying and burning of brick.

The object of the invention is to construct a continuous drier and kiln, the one being in communication with the other and being so arranged and constructed that the bricks after being loaded on the hacks or cars and placed in the drier are moved therethrough and from thence to the kiln without the necessity of any rehandling.

Briefly described, my invention consists of a continuous drier-and-kiln system, comprising a drier and a kiln which are practically one, being built side by side, one tunnel being the drier and the other tunnel being the kiln, with flues leading from the kiln-tunnel to the drier-tunnel.

In the art of manufacturing brick as carried on with my invention the brick are loaded upon the hacks or cars of especial construction and are started in the cool end of the drier-tunnel and are advanced therethrough a car length at a time at stated periods. When the drier-tunnel is filled, the first car of brick that was introduced into the tunnel has been sufficiently dried to be removed to the kiln and is transferred from the drier-tunnel to the kiln-tunnel, being passed therethrough a car length at a time at stated periods. In order to accomplish the objects of the invention, I employ double doors at the exit end of the drier-tunnel and like doors at the inlet end of the kiln-tunnel. These doors in each tunnel are spaced apart a distance equal or slightly greater than the length of one of the hacks or cars upon which the brick are loaded. Means is provided whereby when the hack or car has reached the exit end of the drier-tunnel the outer door may be elevated and the inner door lowered, so that the temperature in the remainder of the drier-tunnel will not be effected by the opening of

the tunnel at the exit end. The car is then run out of the drying-tunnel and switched on the track leading into the kiln-tunnel, the outer door of which is elevated to permit the car to enter the tunnel, which door is again lowered after the car is in the kiln.

The improved form of apparatus by means of which this system may be advantageously carried out will now be described in detail.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and wherein like numerals of reference indicate corresponding parts throughout the several views, in which—

Figure 1 is a top plan view of a part of the drying-tunnel and kiln-tunnel, showing the arrangement of the doors and also showing a portion of the tracks. Fig. 2 is a side elevation thereof. Fig. 3 is a top plan view with the drier-tunnel in horizontal section. Fig. 4 is a longitudinal sectional view of a part of the drier and kiln. Fig. 5 is a transverse vertical sectional view of the same. Fig. 6 is a transverse vertical sectional view of a part of one of the tunnels, showing the hack or car therein, also showing how the air-tight seal is affected to prevent the escape of the heated air from the tunnel. Fig. 7 is a detail plan view of a part of the gas and air feeding pipes. Fig. 8 is a top plan view of the same. Fig. 9 is a transverse vertical sectional view of the drier and the kiln tunnels, showing a modified arrangement for introducing the air and gas to the kiln.

In the accompanying drawings the reference-numeral 1 indicates the drier, and 2 the kiln. Both of these are in the form of tunnels placed side by side and may be constructed of brickwork or any suitable masonry, being separated from each other by a central partition 3. The brickwork and masonry out of which the tunnels are constructed are so arranged interior of the respective tunnels as to form offsets or ledges 4 5 one above the other, the former projecting out in the tunnel a greater distance than the latter. On the ledge or offset 4 is placed the rails 6, which form the track for the wheels of the hack or car 7. Upon the offsets or ledges 5 are placed the rails 8, the space between these rails 8 and the inner wall of the tunnel having placed

therein a filling of sand or like substance 9, the particular function of which will be hereinafter more specifically referred to. The drier-tunnel 1 is in communication with the kiln-tunnel 2 by means of a series of flues 10, arranged in the outer wall of the kiln and extending downwardly and in under the kiln-tunnel and then upwardly through the partition between the two tunnels, where they discharge into the drier-tunnel on a level with the entrance to the flue from the kiln-tunnel. These flues are controlled by dampers 11, which may be placed therein in the outer wall of the kiln-tunnel, as shown, or at any suitable or convenient point in the flue. This arrangement of flues serves to conduct the heated air from the kiln to the drier and discharge the same into the latter at one side of the tunnel. In order that the heated air from the kiln may be discharged into the drier at each side of the latter, I also provide a series of flues 12, which lead downwardly through the central partition from the inner wall of the kiln-tunnel, extending underneath the drier-tunnel and upwardly through the outer wall of the drier-tunnel, discharging into the latter at a point on a level with the discharge of the flues 10 and also on a level with the inlet of the flues 12. As heretofore referred to, I employ two doors, by means of which the hot air may be retained in the drier-tunnel when the car or brick is being removed therefrom, and in order to conduct the heated air from the kiln-tunnel to that portion of the drier-tunnel that is located between these doors I have arranged a flue 14, which leads from the one side of the kiln-tunnel downwardly through the central partition and along underneath the drier-tunnel, upwardly through the outer wall of the drier-tunnel, discharging into the drier-tunnel at a point on a level with the inlet to the said flue from the kiln-tunnel.

In the manufacture of brick, especially in localities where natural gas is largely used as fuel, the heat to the kiln is furnished by means of this fuel, and in the apparatus I have shown to clearly illustrate the system I have shown a means for using this form of fuel, though of course it will be understood that where necessary or desired furnaces for the employment of other fuels may readily be employed in connection with the kiln. In the accompanying illustration, however, 15 represents a gas-supply pipe, which is placed along the side of the kiln at the base thereof and is provided with stand-pipes 16, extending upwardly along the side of the kiln. Connected onto these stand-pipes are burner-jets 17, which project through the outer wall of the kiln, so as to discharge the gas into the kiln, where it is ignited and produces a heat necessary for burning the brick. In order to supply a sufficient quantity of air to the gas to effect the desired combustion, I arrange an air-pipe 18, preferably placed along the top of the kiln and connected by branches 19 to

each of the stand-pipes 16. A union 20, placed in the stand-pipes 16 at a point where the burner-jets 17 are connected, may be in the form of a gas-and-air mixer, if desired. A valve or stop-cock 21 is preferably placed in each stand-pipe, so that the gas to the burner-jets may be cut off at one or more points, if desired. The air to the pipe 18 may be supplied by a fan or like device 22, suitably located, and in order to create a suction and cause a circulation of the heated air from the kiln-tunnel to the drier-tunnel I preferably employ a suction-fan 23, placed outside of the drier-tunnel and having communication therewith at a suitable point.

In order to prevent the escape of any quantity of hot air from either the drier or kiln, I employ double doors at the exit end of the drier-tunnel and at the inlet end of the kiln-tunnel. I have shown in this illustration a door so employed and also a convenient means for operating the same, whereby the one door is elevated and the other door is simultaneously lowered. In the drier-tunnel the door 24 is placed at the exit end thereof and the door 25 some distance back from the end of the tunnel, this distance being about the length of one of the hacks or cars employed for handling the brick. The doors operate in guides 26, arranged on top of the drier, and are connected by cords 27 28 to drums 29 30, respectively. These drums are mounted on a common shaft 31, journaled in suitable bearings 32, arranged on the top of the drier. The cords 27 28 are passed over pulleys 33, which are suitably suspended some distance above the doors in order that as the shaft 31 is rotated the cords 27 28 will serve to elevate one door and lower the other at the same time. The shaft 31 is of a length to extend across both the kiln and drier and is provided on either end with a suitable crank 34. The front door 35 is placed in the kiln in alinement with the door 24 in the drier and the rear door 36 is placed in the kiln in alinement with the door 25 in the drier. These doors 36 35 are connected by cords 27 28 to drums 29 30, placed over the kiln, the cords passing over pulleys 33, all the construction being identical with that described above for the drier. The pulleys 33 are suspended from a suitable framework 37, arranged above the drier and kiln. The tracks lead from the drier and kiln and converge at a slight distance in front of the drier and kiln, and a suitable switch is arranged so that the car may be switched from the drier-track to the kiln-track in order to enter the kiln.

In Fig. 9 of the drawings I have shown a modified form for supplying fuel to the kiln. This consists of arranging an air-pipe 38 and gas-pipe 39 both on the top of kiln instead of the arrangement shown in Fig. 2. The burner-jets 40 are then projected down through the top of the kiln-wall into the kiln.

The drying-tunnel has two doors 41 42, arranged at the entrance end of the same, these

doors being constructed to operate in the same manner as the doors at the exit end of the drying-tunnel and those at the inlet end of the kiln-tunnel. They are, however, spaced apart less than a car length, so that when lowered they will engage on the bed-plate of the car or hack, as shown in Fig. 3. These doors are operated alternately to permit the cars being entered into the tunnel and to prevent the escape of the heat while a car is being introduced. The cars are moved along by a cable 43, having hooks (not shown) for engagement with the cars to move the same along as the cable is operated.

In operation the door 24 will be closed when the car is first introduced into the end of the drier-tunnel and the door 25 will be elevated. The cars are successively loaded and passed into the drier-tunnel from the brick-machine, each succeeding car forcing the previous one along the tunnel one length of the car. When the first car introduced is at the exit end of the drier-tunnel, the shaft 31 is operated so as to lower the door 25 and elevate door 24, thus at the same time lowering the door 36 and elevating the door 35, so that the car may be moved from the drier-tunnel and switched by means of the track into the kiln-tunnel, at which time doors 24 35 are again closed, this operation opening doors 25 36, so as to allow the car to pass into the space occupied by the car just removed from the drier-tunnel into the kiln-tunnel, thus making the operation continuous. Each car thus passed into the kiln-tunnel forces the previous one along a distance equal to the length of itself, so that by the time the car arrives at the exit of the kiln-tunnel it has remained therein a sufficient time to accomplish the burning and firing of the brick. The arrangement of the double doors at the exit end of the drier-tunnel and the inlet end of the kiln-tunnel enables me to provide an uninterrupted draft, and in practice the brick are preferably piled on the car about six inches from the ends of the latter, so that the doors when they descend will engage the floor of the car and form a seal to prevent the escape of any of the heated air. The exit end of the kiln-tunnel, it will be understood, is open at all times. The car 7 is constructed with a bed 7', which has overlapping flanges 8', that project into the sand or other filling 9, that is placed in the space between the rails 8 and the inner walls of the tunnels, so as to prevent any escape of the heated air. On top of this bed-plate 7' I preferably place a bed-plate 19', as shown in Fig. 6 of the drawings.

The brick are piled a short distance from the ends of the car for two reasons: first, so that the doors when they descend will engage the floor of the car, and, secondly, so as to form a space between the brick on each two cars, and into this space the gas or heat-producing fuel is projected. When the brick are piled, say, six inches from the end of each car, it will be observed that the gas is pro-

jected into a twelve-inch combustion-space and the heat is drawn by the exhaust-fan through the piles of bricks.

By the construction it will be observed that a continuous kiln and drier is attained, and many advantages are obtained in the economy of labor and fuel. It is necessary to handle the brick but once—namely, at the time they are placed on the car—eliminating danger of damage to the product by handling.

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

1. The herein-described system for drying and burning brick, comprising a drying-tunnel and a kiln-tunnel with tracks arranged therein, a vertically-movable door arranged at the exit of the drying-tunnel and a like door arranged at the inlet to the kiln-tunnel, and means whereby said doors are simultaneously elevated, as and for the purpose described.

2. The herein-described continuous system for drying and burning brick, comprising a drying-tunnel and a kiln-tunnel, a track arranged in each tunnel, a pair of vertically-movable doors arranged in the drying-tunnel adjacent the exit end thereof, a pair of vertically-movable doors arranged in the kiln-tunnel adjacent the inlet end thereof, and means whereby the outer door of each tunnel is simultaneously raised with the lowering of one door of each tunnel, as and for the purpose described.

3. The herein-described continuous system for drying and burning brick comprising a drying-tunnel and a kiln-tunnel placed side by side and in communication the one with the other, tracks arranged in said tunnels and connected adjacent to one end of the tunnels whereby the car may be switched from one tunnel to the other, and doors arranged in pairs in each tunnel and operative to retain the heat in the tunnel while the car or hack is being moved from one tunnel to the other.

4. The herein-described system for continuously drying and burning brick, comprising a drying-tunnel and a kiln-tunnel, flues leading from both sides of the kiln-tunnel to both sides of the drying-tunnel, and doors arranged adjacent to the exit end of the drying-tunnel and to the inlet end of the kiln-tunnel, as and for the purpose described.

5. A continuous brick drying and burning apparatus comprising a drying-tunnel and a kiln-tunnel placed side by side, flues establishing communication between the kiln-tunnel and drying-tunnel, said flues leading from both sides of the kiln-tunnel into the drying-tunnel, and means for establishing an uninterrupted draft through said flues, substantially as described.

6. An apparatus for the continuous drying and burning of brick, comprising a drying-tunnel and a kiln-tunnel with a track extending the length of each, flues establishing com-

munication between said tunnels, dampers for controlling the said flues, a pair of doors arranged adjacent to the exit end of the drying-tunnel and a like pair of doors arranged adjacent to the inlet end of the kiln-tunnel, and means for elevating the outer pair of said doors simultaneously with the lowering of the inner pair, for the purpose described.

7. The herewith-described system for the continuous drying and burning of brick, comprising a drying-tunnel and a kiln-tunnel, flues leading from both sides of the kiln-tunnel to both sides of the drying-tunnel, means for establishing an uninterrupted draft through said flues, a track throughout each tunnel to receive the cars or hacks carrying the brick, a supplemental track in each tunnel above the car-track, and means for forming a seal around the supplemental track in connection with the car, substantially as described.

8. The herein-described continuous system for drying and burning brick, comprising a drying-tunnel and a kiln-tunnel, flues leading from both sides of the kiln-tunnel to both sides of the drying-tunnel, and means for es-

tablishing an uninterrupted draft through said flues, the brick being passed into the tunnel on cars, there being a space between the piles of brick on the adjacent cars, which space serves as a combustion-chamber, and means for forming a seal around the car-bed, substantially as described.

9. The herein-described continuous system for drying and burning brick, comprising a drying-tunnel and a kiln-tunnel, flues leading from both sides of the kiln-tunnel to both sides of the drying-tunnel, and means for establishing an uninterrupted draft through said flues, tracks in said tunnels, the brick being passed through the tunnels on cars traveling on said tracks, the said brick being piled on the cars so as to produce a combustion-chamber between the piles of bricks on adjacent cars, and means for feeding fuel into said space, substantially as described.

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

JAMES F. DU BOIS.

Witnesses:

JOHN NOLAND,
E. E. POTTER.