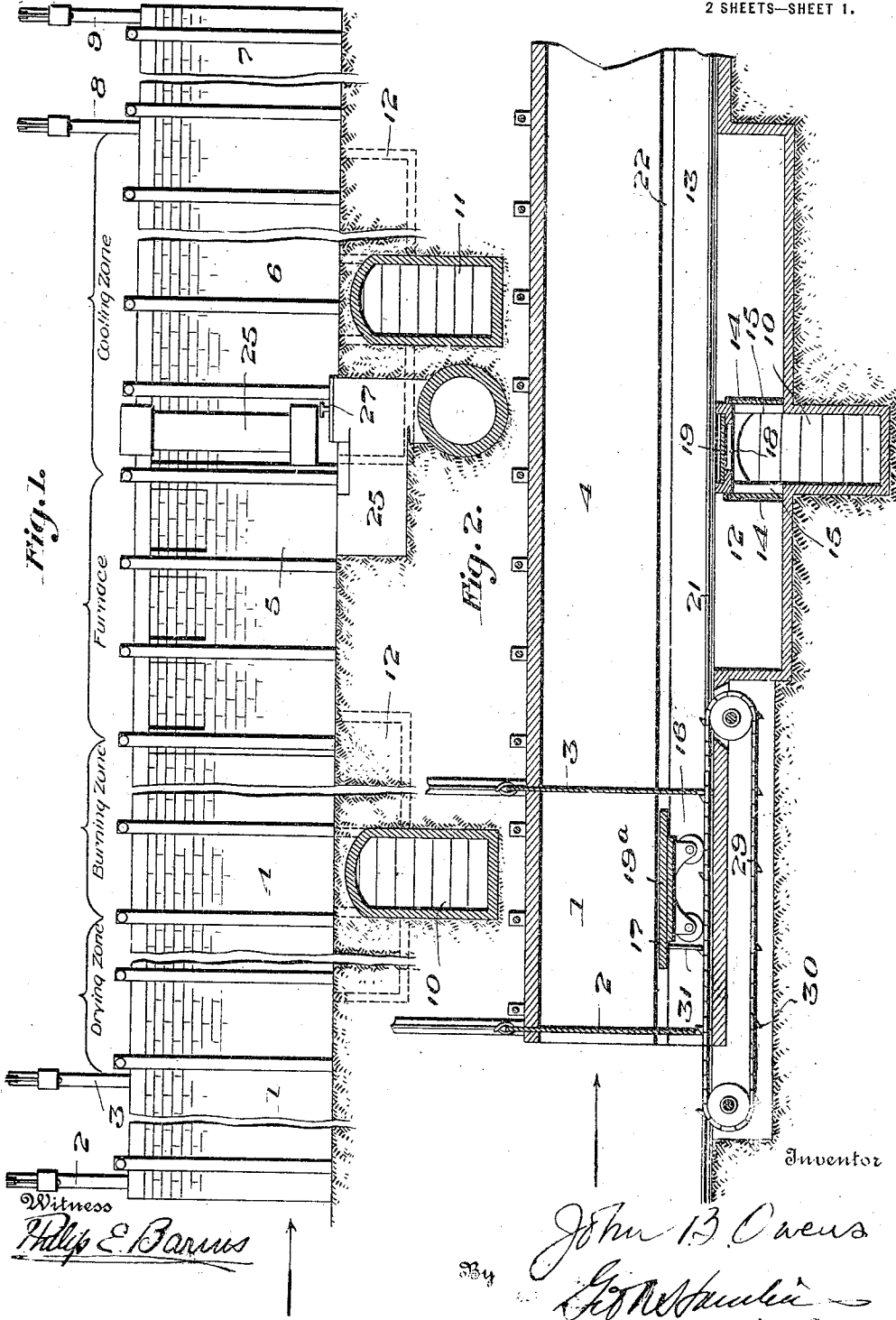


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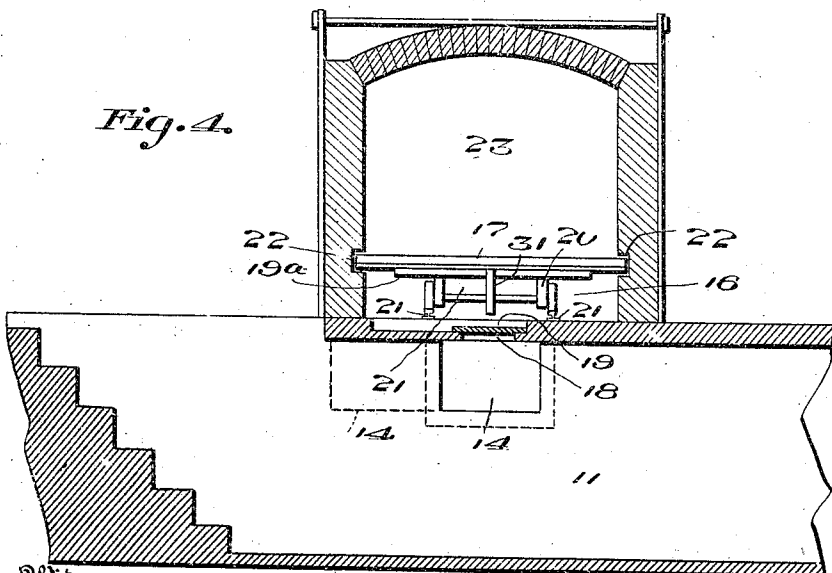
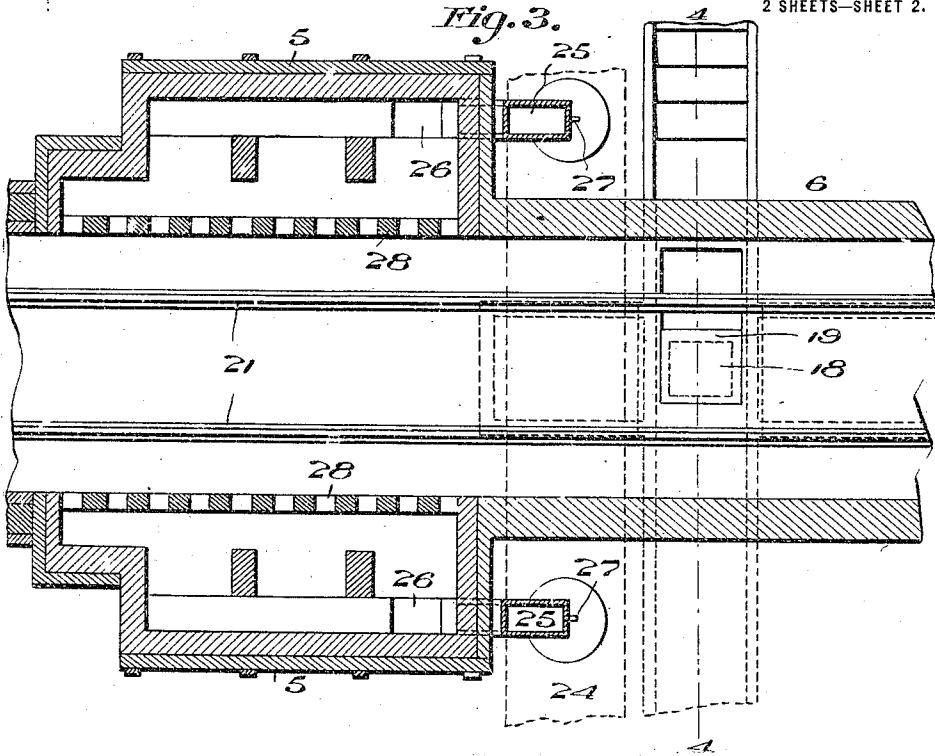


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TUNNEL KILN.  
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1,246,148.

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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

JOHN B. OWENS, OF METUCHEN, NEW JERSEY.

TUNNEL-KILN.

1,246,148.

Specification of Letters Patent. Patented Nov. 13, 1917.

Application filed March 3, 1917. Serial No. 152,443.

*To all whom it may concern:*

Be it known that I, JOHN B. OWENS, a citizen of the United States, residing at Metuchen, county of Middlesex, and State of New Jersey, have invented certain new and useful Improvements in Tunnel-Kilns, of which the following is a specification.

This invention relates to tunnel kilns and has for its object the provision of means for cooling the mechanism of cars or other conveying devices for the ware.

In tunnel kilns it has been customary to provide a sand seal or similar means to shut off the heat in the tunnel so that it will not have access to the under parts of the appliances, for instance cars, which carry the ware being burned. Such cars are usually provided with a protecting platform of refractory material. The integrity of sand seals is difficult to maintain and if the seal is broken, damage is liable to result to the wheels, trucks, tracks, and other appliances beneath the refractory platform of the car.

In an application for balanced and controllable draft for tunnel kilns, Serial No. 152,444, filed Mar. 3, 1917, I have explained my improvements by which inert air is maintained below the car platforms as an insulator from the heat above said platforms to supplement the insulating action of the platforms. The inertness of the air in the space below the platforms is occasioned by sealing that space from the outside air and preventing it from having direct connection with the draft outlet to the stack except by air leakage through the space between the tunnel walls and the edges of the refractory car platforms, and the spaces between the cars. In that application I have set forth inspection tunnels and openings therefrom, controlled by a damper, leading into the bottom of the kiln. For purposes of maintaining the balanced draft, as set forth in that application, such an arrangement is all that is necessary.

The object of my present invention is the provision of inspection channels communicating with the tunnels and running lengthwise beneath the kiln and opening into the lower portion thereof, combined with a novel arrangement of dampers by which, under normal conditions of operation the control of the cooling air to the inert air space below the cars may be carried out by adjustment of a damper, in each instance. In addition thereto there are provided other dam-

pers which may normally seal the points of communication between the main inspection tunnels and the inspection channels, but are capable of being opened whenever access is to be had to the inspection channels. Under normal conditions the inspection channels are not used, but at those times when inspection of the bottom of the kiln tunnel and of the cars therein, is desirable or necessary, the dampers which control the junctures of the channels with the main inspection tunnel may be opened to permit a workman to enter such channels.

In an application for kilns, filed July 15, 1916, Serial Number 109511, I have disclosed inspection tunnels extending transversely beneath the kiln and inspection channels extending longitudinally of the kiln and opening into the bottom thereof, said channels intersecting the tunnels and provided with dampers for closing them or regulating the flow of air from the inspection tunnels into the space below the car platforms. In that application I have disclosed sand seals.

With my present improvements, inspection of the interior of the kiln may ordinarily be conducted by moving the damper or dampers by which the flow of cool air into the lower portion of the kiln, is regulated, the dampers controlling the inspection channels being closed. The same openings serve, therefore, both for regulation of the admission of cool air to the space below the car platforms and as an inspection manhole. There being times, however, when it is advisable to inspect a relatively long stretch of the kiln, or of the cars, the inspection channels running lengthwise beneath the kiln, afford means for the observer to reach any desired point after the dampers controlling the entries to the inspection channels have been opened.

In practice, the flow of outer cool air through the inspection tunnel into the kiln can be so regulated that the observer experiences no discomfort when projecting his head and shoulders into the space below the cars. The manner in which the balanced condition is maintained between the inert air space below the car platforms, and the high temperature or burning space above them, together with the air leakage around the edges of the car platforms, is fully explained in my application for balanced and controllable draft for tunnel kilns.

The embodiment of the invention shown in the drawings and hereinafter described is to be considered as illustrative, rather than restrictive, of the scope of the invention, as  
 5 other forms may be resorted to without changing the essential principle thereof.

In the accompanying drawings:

Figure 1 is a side elevation, certain parts being broken away in section, and in dotted  
 10 lines;

Fig. 2 a longitudinal detail section of the entry end of the kiln and the burning zone, showing one of the inspection tunnels and the channels and dampers, also a car and  
 15 the air-lock;

Fig. 3 a detail horizontal section constituting a continuation of the showing of Fig. 2, illustrating the furnace and another inspection tunnel, channels and dampers;  
 20 and

Fig. 4 a detail cross section on the line 4-4 Fig. 3.

The kiln has an air-lock 1 whose doors are shown at 2 and 3. After the ware has  
 25 passed from the lock 1, under the door 3, it is in the kiln proper 4, where it is first dried in the drying zone portion thereof (Fig. 1) and is heated until it reaches a point opposite the furnaces 5 (Figs. 1 and 3). The  
 30 ware is cooled as it passes beyond the furnaces 5 into the cooling zone 6 (Figs. 1 and 3), thence into the air-lock 7 having the doors 8 and 9 and finally out of the end of the kiln, the direction of travel being shown  
 35 by the arrow at the left of Fig. 1.

The stack, or other draft inducing means, is not shown, but it draws on the kiln at a suitable point as shown in my application for balanced and controllable draft for tunnel kilns.  
 40

Extending transversely beneath the kiln are inspection tunnels 10 and 11 of which there may be as many as desired. These tunnels may run under a plurality of kilns  
 45 where more than one kiln is used. Intersecting each tunnel, is an inspection channel 12 which is open at its top 13 and communicates with the bottom of the kiln; these channels extend longitudinally of the kiln.  
 50 Dampers 14 of any desired type are adapted to completely seal, or to partially or wholly expose, the openings 15 by which the channels 12 communicate with the tunnels 10 and 11; sliding dampers are shown. The top of  
 55 each tunnel 10, 11, communicates with an inert air space 16 below the car platforms 17 by an opening 18 controlled by a damper 19. Sliding dampers are shown, but other types could be employed. The cars 19<sup>a</sup>, one  
 60 of which is shown in Figs. 2 and 4, have trucks 20 and wheels which travel on rails 21 extending along the bottom of the kiln.

Sand seals are entirely dispensed with. The edges of the car platforms are received  
 65 in horizontal grooves or channels 22 in the

sides of the kiln. The free spaces where the car platforms are received in the channels, enable an air leakage to occur from the inert air space 16 into the burning space 23. The  
 inertness of the air in the space 16 is due  
 70 to the fact that this space is sealed from the outside air and has no direct connection with any draft outlet, except by leakage around the edges of the platform 17. The inert air in the space 16 acts as an insulator  
 75 from the heat in the upper portion 23 of the kiln.

The temperature in the space 16 is relatively low so that no injury can occur to the tracks, trucks, or wheels below the refractory platform 17. Indeed, a workman or inspector can introduce his head and shoulders through the opening 18, into the space 16 without any discomfort due to the temperature conditions and the same is true  
 85 regarding temperature conditions in the inspection channels 12.

The furnaces 5 may utilize any fuel desired. A main 24 for conveying producer gas to branches 25 leading to outlets 26 in the furnaces 5 is shown. Although shown underground in this case, the gas main may be constructed above the kiln or in whatever way may be most convenient. The control of the gas to the respective branches 25  
 95 had by manipulating valves 27. Checker brick work 28 may be used when producer gas is employed as the fuel, as checker work serves to distribute the heat uniformly, acts as an accumulator for holding or retaining  
 100 the heat at a point where the highest temperature is required and promotes combustion by mixing the air and gas. The form of the furnaces and the fuel therefor is immaterial to the present invention.  
 105

The cars 19<sup>a</sup>, of which one is shown in Fig. 2, may be propelled, step by step, through the kiln by any suitable means. I have shown a sprocket chain 29 having teeth  
 30 to engage a member 31 on the car. Any  
 110 suitable means may be employed for operating the chain 29.

The cars are loaded with the ware and then moved into the air-lock 1, after opening door 2, by operating the chain 29. By  
 115 using a pusher bar or other suitable means, any cars in advance of the car entering the air-lock, are pushed along within the kiln by this action. Each succeeding car, when loaded and advanced by operating the chain  
 120 29, serves as a pusher for all cars ahead of it. The door 2 may have an opening for the pusher bar to travel through. When the cars emerge, one at a time, from the air-lock  
 125 7, the ware has been successively dried, burned, and cooled. If the kiln is completely filled with cars, as a car enters air-lock 1, the car at the other end of the kiln passes out of air-lock 7, with the ware completely burned.  
 130

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

5 1. A tunnel kiln provided with an inspection channel extending lengthwise beneath the kiln and opening thereinto, a tunnel affording communication with said channel; there being provided an opening affording communication between the channel and the  
10 tunnel and another opening affording communication between the tunnel and the interior of the kiln, and independent closures for the respective openings aforesaid.

15 2. A tunnel kiln provided with an inspection channel extending lengthwise beneath the kiln and opening thereinto, a tunnel affording communication with said channel, there being provided an opening affording communication between the channel and the  
20 tunnel and another opening affording communication between the tunnel and the interior of the kiln, means closing communication between the tunnel and the channel, and a damper controlling the opening connecting the tunnel to the kiln.

25 3. A tunnel kiln provided with an inspection channel extending lengthwise beneath the kiln and opening thereinto, a tunnel affording communication with said channel,  
30 there being provided an opening affording communication between the channel and the tunnel and another opening affording communication between the tunnel and the interior of the kiln, and independent dampers  
35 for the respective openings aforesaid whereby said openings may be individually or collectively opened, closed or adjusted.

4. A tunnel kiln provided with an inspec-

tion and air-supplying tunnel and with branch channels communicating with said  
40 inspection tunnel which extend lengthwise beneath the kiln and open into the bottom thereof, said kiln being provided with an air-supplying and inspection opening communicating with the inspection tunnel in-  
45 dependently of the communication of the branch channels with said tunnel, means for closing communication between the branch channels and the inspection tunnel to nor-  
50 mally prevent passage of air from the tunnel into said channels, and a damper for the opening aforesaid whereby the admission of air from the tunnel through said opening into the kiln may be regulated and said  
55 opening uncovered for inspection purposes.

5. A tunnel kiln provided with an inspection and air-supplying tunnel and with branch channels communicating with said  
60 inspection tunnel which extend lengthwise beneath the kiln and open into the bottom thereof, said kiln being provided with an air-supplying and inspection opening communicating with the inspection tunnel in-  
65 dependently of the communication of the branch channels with said tunnel, dampers adapted to open and close communication between the respective inspection channels and air-supplying and inspection tunnel,  
70 and a damper for the air-supplying and inspection opening aforesaid, the respective dampers aforesaid being adapted for independent operation.

In testimony whereof, I hereunto affix my signature.

JOHN B. OWENS.