

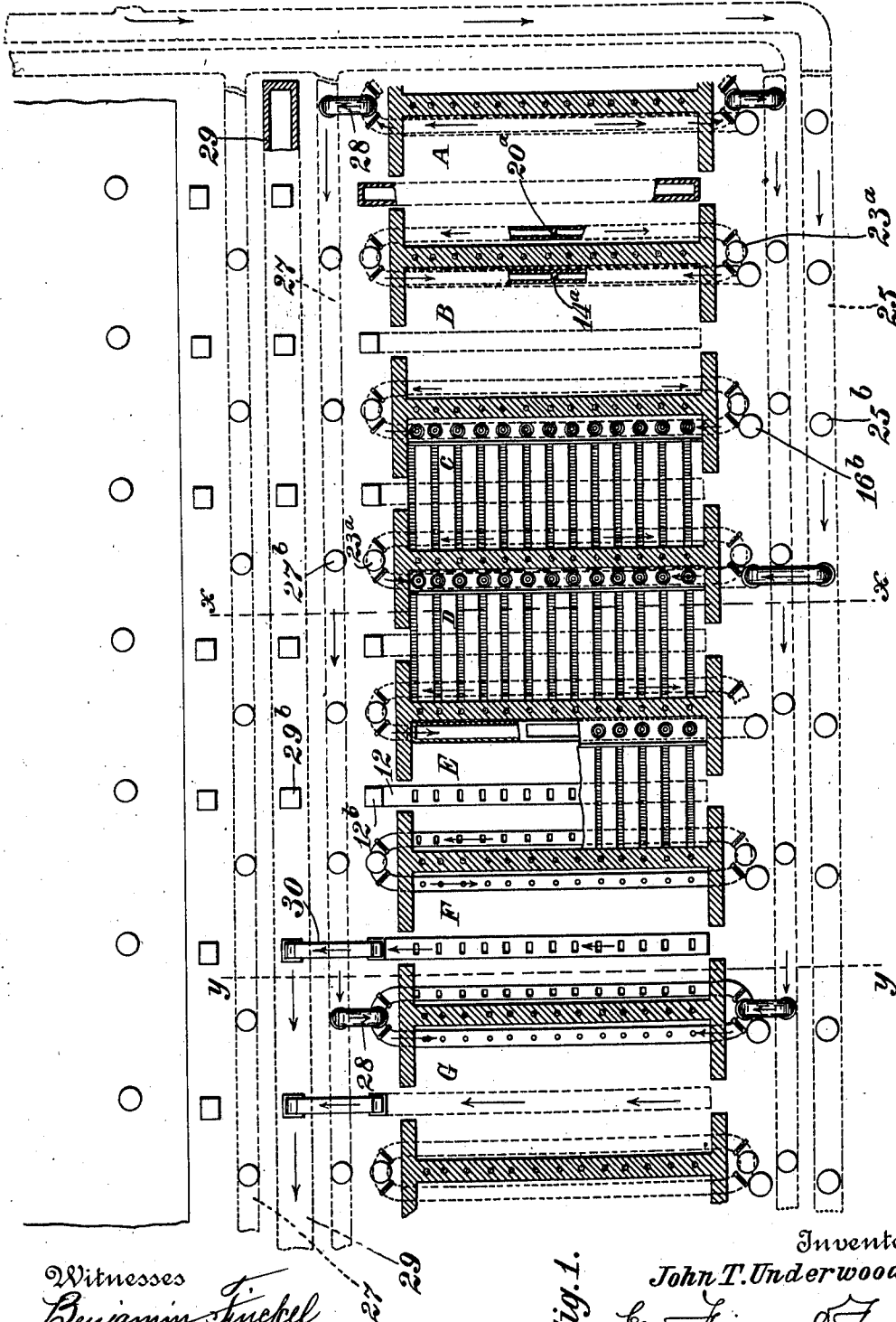
J. T. UNDERWOOD.
KILN.

APPLICATION FILED JULY 28, 1910.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.

988,411.



Witnesses
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Fig. 1.

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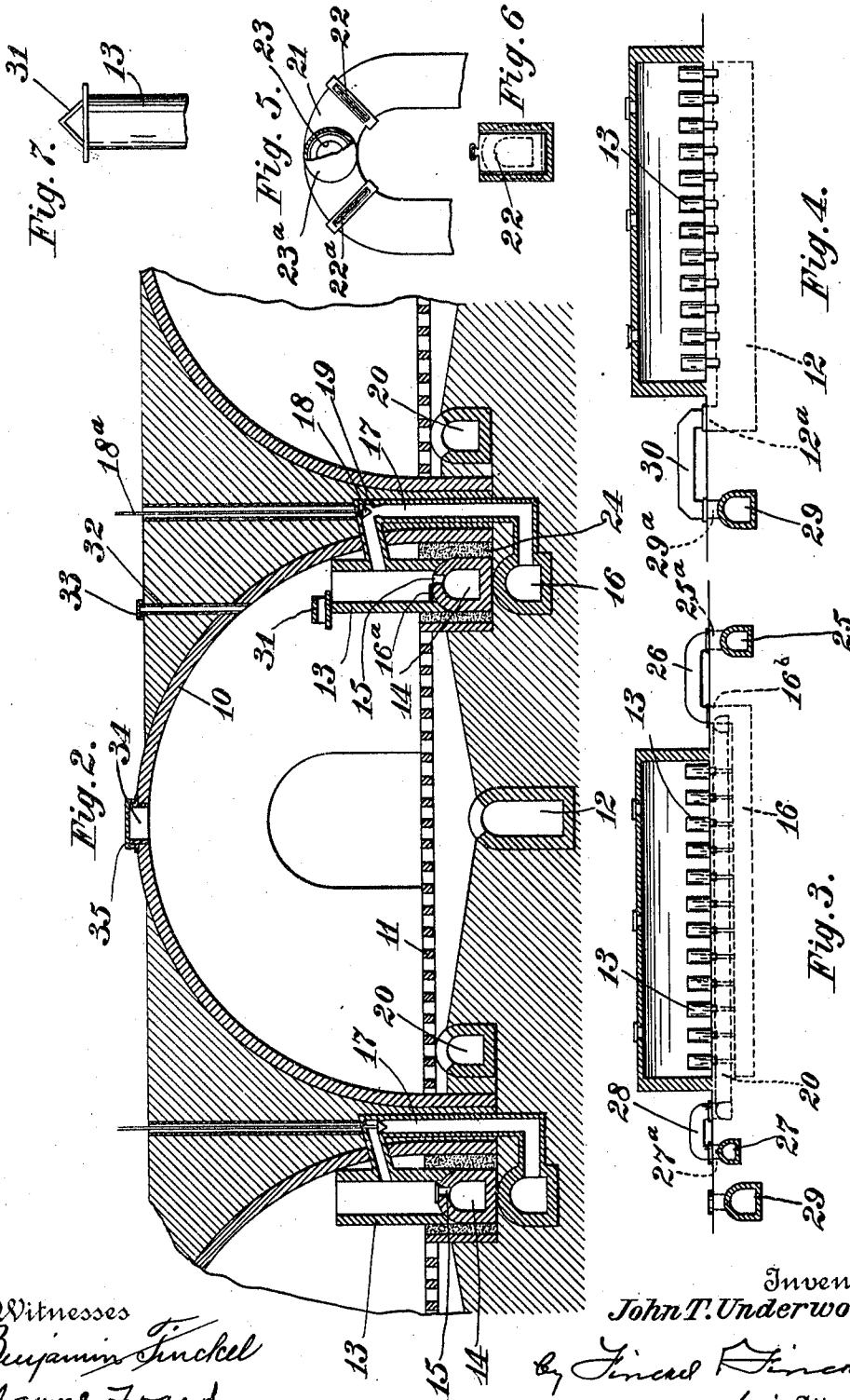
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UNITED STATES PATENT OFFICE.

JOHN T. UNDERWOOD, OF KACHELMACHER, OHIO.

KILN.

988,411.

Specification of Letters Patent.

Patented Apr. 4, 1911.

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To all whom it may concern:

Be it known that I, JOHN T. UNDERWOOD, a citizen of the United States, residing at Kachelmacher, in the county of Hocking and State of Ohio, have invented a certain new and useful Improvement in Kilns, of which the following is a specification.

This invention relates more particularly to continuous kilns for the manufacture of brick and other ware of clay.

The object of the invention is an improved and simplified construction whereby the control of the air and gas is improved and the parts are rendered more durable and less liable to destruction.

The invention is embodied in the construction herein shown and described the invention not being confined to the particular form of parts illustrated.

In the accompanying drawings—Figure 1 is a general view of a number of kiln units in plan and section, the sectioned portions being on several different horizontal planes for the purpose of illustrating the details of construction of various parts. Fig. 2 is a vertical section on larger scale of one of the units or chambers of the kiln with fractions of the contiguous units, the section being taken transversely of the unit or longitudinally of the system. Fig. 3 is a section on the line $x-x$ Fig. 1 looking to the right to show the gas and hot air supplying devices. Fig. 4 is a section on the line $y-y$ Fig. 1 looking to the right to show the draft conductor. Figs. 5 and 6 are a plan and section respectively to show the valve for the air conductors. Fig. 7 is a detail in elevation showing a salt spreading device.

As illustrated more particularly in Fig. 2 a unit or chamber consists of a semi-circular arch or dome 10 having a perforated or open work floor 11 the spaces or openings of which lead to a central draft duct 12 and also to a hot air exit duct 20 to be hereinafter more particularly described. The duct 12 has a discharge 12^a externally of the chamber. Along one and the corresponding side of the floor in each chamber is a series of burners 13 each consisting of a hollow cylindrical pocket built of brick, the pockets of the series being each located in upright position upon a horizontally arranged hot air duct 14 having an opening 15 into each of the pockets. The opening 15 is provided with a slab 16^a constituting a valve by means of which the size of the exit through the

opening can be increased or diminished to regulate the quantity of hot air supplied to the burner from the duct 14.

The character 16 designates a gas duct, also arranged along one side of the chamber, but below the hot air duct 14, as seen at the right hand side of the unit shown in Fig. 2. The gas duct 16 has a lateral branch 17 leading upward through the filling between the adjacent arches and into the burner 13 above the air inlet 15. Said duct 16 also has an inlet 16^b beyond the chamber through which gas is supplied from the main branch. The supply of gas from the lateral branch 17 to the burners is controlled by a valve 18 seating on a seat 19 in the vertical portion of the branch 17 said valve having a rod handle 18^a extending to the top of the filling between the upper sides of the arches so as to be there accessible for manipulation.

At the side of the unit or chamber opposite that containing the burners 13 and below the open work floor is a duct 20 for the discharge from the chamber or as hereinafter described of the products of combustion or hot air. The ducts 20 and 14 are connected to each other at each end and beyond the chambers by U-shaped connections 21 in each of which are slide gates or valves 22 and 22^a. In each of the said U-shaped connections and between the valves 22 and 22^a is an opening 23 closable by a cap 23^a.

The burners 13 and ducts 14 in each chamber are footed in sand 24 so as not to be disturbed or destroyed by the expansion of the floor due to heat. The ducts 20 and 14 are each divided by a transverse partition 20^a and 14^a respectively so as to cause the discharging or entering of hot air to be divided or received more nearly equally with reference to the opposite ends of the chambers.

The gas supply main 25 which is underground is traced in Fig. 1 by dotted lines and said main has outlets or feeds 25^a opposite each chamber and any particular duct 16 can be connected with the gas main by means of a removable U-shaped pipe 26 (see Fig. 3) that fits at one end on the outlet 25^a of the main and at the other end on the inlet 16^b of the duct 16 to supply gas to said duct 16 and thence to the burners 13.

The character 27 designates a by-pass or hot air conductor for conducting the hot air from a cooling chamber to a chamber in which green brick or ware has been placed for the drying or "water-smoking" process.

This hot air conductor 27 is provided with openings 27^a opposite the U-shaped horizontal connections 21 at each end of the chamber, and said connections 21 are connected with the hot air conductor 27 by means of removable U-shaped pipes 28 fitting on the openings 27^a and the openings 23.

The character 29 designates the main draft duct said duct being provided with an ordinary suction fan for drawing the air therefrom in the direction indicated by the arrow. The duct 29 is provided with an opening 29^a opposite the discharge 12^a; and 30 designates a U-shaped pipe to connect the discharge 12^a with the discharge 29^a.

The openings 23 and 27^a are provided with suitable removable covers as seen at 23^a and 27^b respectively for closing them when not connected with the ducts 12. The outlet 25^a and inlet 16^a are formed with suitable removable covers 25^b and 16^b respectively to close them when those openings are not connected to supply gas to the burners of a chamber. The discharges 12^a and 29^a are provided with suitable removable covers 12^b and 29^b respectively when those openings are not connected as described.

31 is a salt spreading device to be placed at one edge of the flame end of the burner. This spreading device is of inverted V-shaped form and the roof of the chamber is provided with an opening 32 immediately above the place of the distributor through which opening salt can be supplied to the distributor. Salt is commonly used to fuse or glaze the surface of bricks. The upper edge of said openings 32 is provided with a cap 33 for keeping the openings closed when salt is not being supplied.

The roof of the chamber is provided with the usual cooling vent 34 that is closed with a cap 35 when the kiln is to be heated or kept hot.

The operation as before indicated is a continuous one. For example referring to the seven kilns in the lower part of Fig. 1 which are lettered A, B, C, D, E, F, and G from right to left, the parts are shown as arranged for burning ware in kiln D. Assuming the operation to be taking place and that the kiln C contains ware and is quite hot and the kilns B and A contain cooling ware, the process may be described as follows: Hot air from B and C is mainly conducted to the burners in D where it is mixed with the gas for combustion. The chamber G contains green brick but said chamber is cut off from communication with all the said chambers except A which latter is connected with G by means of the connecting yokes 28 said yokes effecting such communication through the air duct 27. The draft in duct 29 causes the hot air from chamber A to flow into the chamber G for water smoking or drying the green ware. The hot air from chamber D

after combustion is drawn through chambers E and F where it further dries ware that has been water-smoked as in chamber G. The chambers F and G are dissociated from each other when desired by closing the valve 22, the valve 22^a, being opened, but both said chambers are connected with draft duct 29 by means of the yokes 30. The kilns A, B, C, &c., become cool enough in succession for the removal of ware and as it is removed, a kiln, freshly filled with green ware beyond that designated G, is added to the series, and this addition can take place in an adjacent parallel series as indicated above the lettered series.

With this invention a reducing fire can be obtained by cutting off the air supply to the burners and a proper oxidizing fire had by supplying air to the burners and controlling the same at will. The heat and fires it will be observed are controlled externally of the kilns.

It will be observed that with the herein described construction the processes of oxidizing, reducing, and water-smoking can all be carried on at the same time and continuously. For example, let it be assumed that the ware in kiln B is ready to be cooled, and that the ware in kiln C is ready for the reducing fire. A reducing fire is then obtained in kiln C by closing all the dampers that admit air to or take air from that kiln (except that the middle or main draft flue or tunnel is left open) and leaving merely the gas supply with sufficient air for its partial consumption. To obtain an oxidizing fire in said chamber C the damper 22 is moved to open its passage and the connecting members 28 applied to connect the chamber A with the by-pass from which heated air passes to the chamber C. A portion of the hot air from the chamber A can also be sent through the chamber D or E or any of those beyond. The products of combustion from a chamber in which a reducing fire is used should ordinarily be discharged directly into the draft flue and not conducted to a chamber in which an oxidizing fire is used otherwise faulty coloring of the ware in the oxidizing chamber might ensue. With this construction it will also be observed that should it become necessary to repair a kiln such kiln can be skipped in the burning operation and allowed to cool sufficiently to permit the repairs without interrupting the operations in the other kilns.

Some of the features herein shown and described are claimed in an application for patent filed by me August 26, 1909; Serial Number 514,813.

What I claim is:

1. In a kiln of the kind described, in combination, a plurality of chambers, a discharge and an intake duct in each of said chambers, an external by-pass duct common

to the plurality of chambers, movable tubular devices external to the chambers for connecting the discharge of any of said chambers through the by-pass with the burner of another of said chambers, a draft duct independent of the by-pass and common to the plurality of chambers and movable tubular devices for connecting any of said chambers therewith.

2. In a kiln of the kind described, in combination, a discharge duct within the kiln chamber and an intake duct within an adjacent kiln chamber, a connection for the two ducts externally of the chambers, two valves in said external connection, said connection being provided with a vent, a by-pass common to the chambers and a movable tubular connection for said vent and the by-pass.

3. In a kiln of the kind described, in combination, a plurality of chambers, gas burners in said chambers, means for supplying fuel gas to said burners, means for supplying air to said burners, conductors for conducting the products of combustion or heat from one chamber to the burner of an adjacent chamber with means for controlling said conductors, a draft flue common to said chambers, means for connecting any of said chambers with said draft flue, a by-pass independent of the draft flue also common to said chambers and means whereby any of said chambers can be connected with another chamber through said by-pass.

4. In a kiln of the kind described, a burner, a salt table on said burner at the flame end thereof, the crown of the kiln being provided with a conductor of salt to said table or receptacle.

5. In a kiln of the kind described, a burner, a salt table including an arched shaped member adapted to be supported at the flame end of the burner and to permit the products of combustion from the burner to pass between the same and the burner, and means permitting the supply of salt to said table from the exterior of the kiln while the same is in operation.

6. In a kiln of the kind described, in combination, a plurality of chambers, gas burners in said chambers, means for supplying fuel gas to said burners, means whereby air may be supplied to said burners, conductors for conducting the products of combustion or heat from one chamber to the burner of an adjacent chamber with means for controlling said conductors, a draft flue for said chambers, means for connecting a chamber with the draft flue, a by-pass independent of the draft flue common to said chambers and means whereby any of said chambers can be connected with another chamber through said by-pass, substantially as described.

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Witnesses:

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