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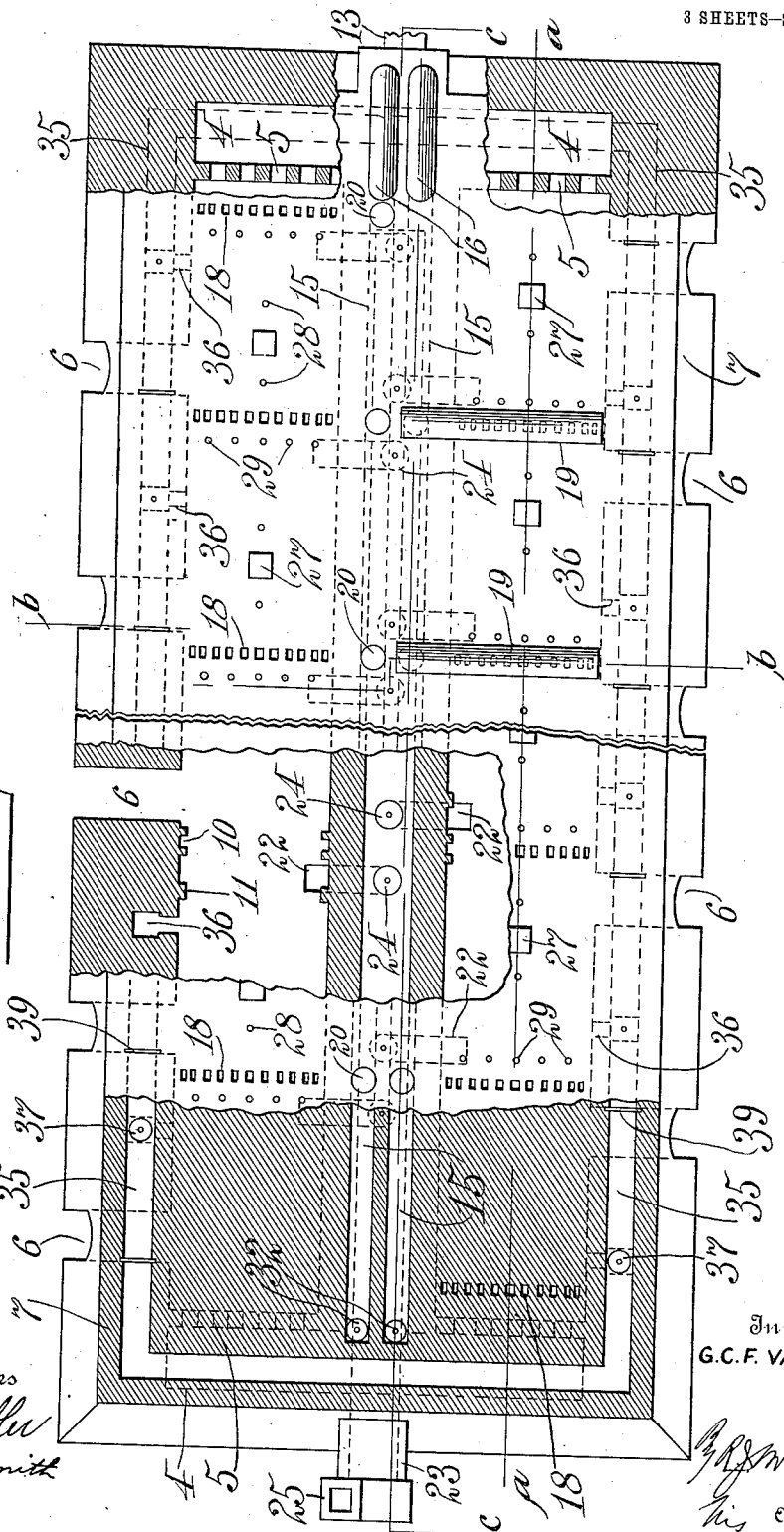
G. C. F. VATER.
SECTIONAL KILN.
APPLICATION FILED APR. 5, 1911.

Patented Oct. 15, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

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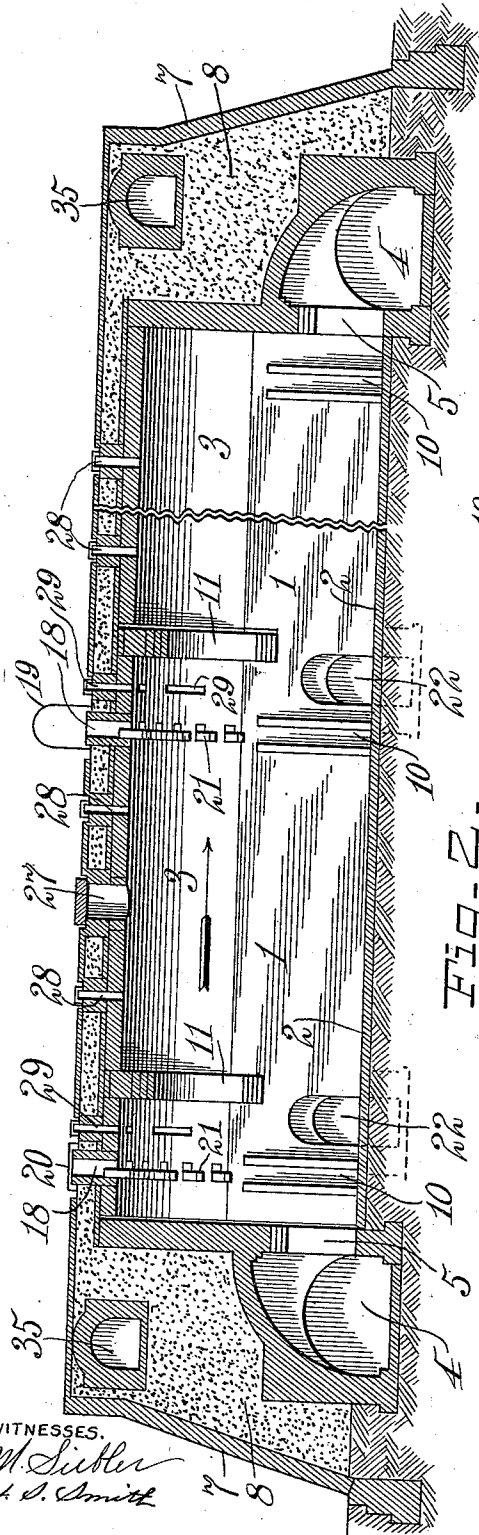


Fig. 1.

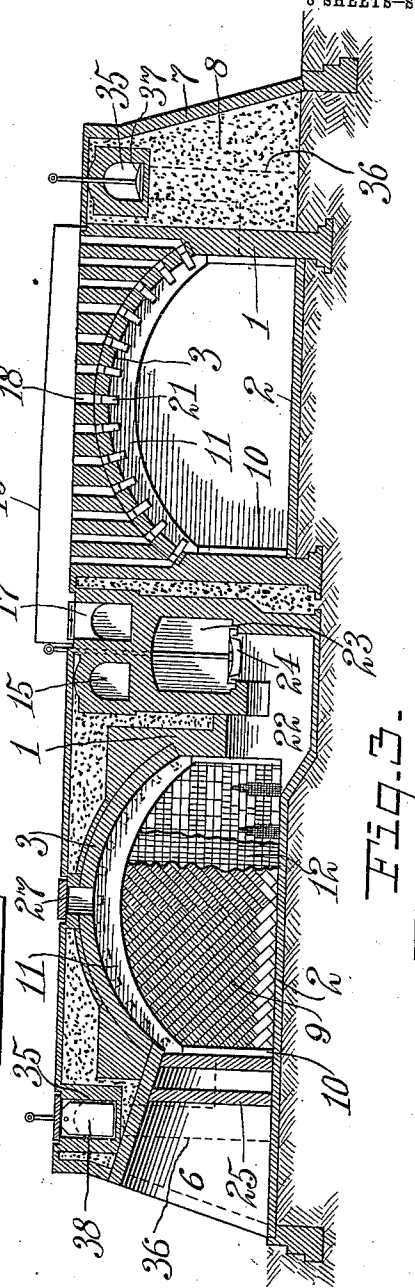


Fig. 2.

WITNESSES.

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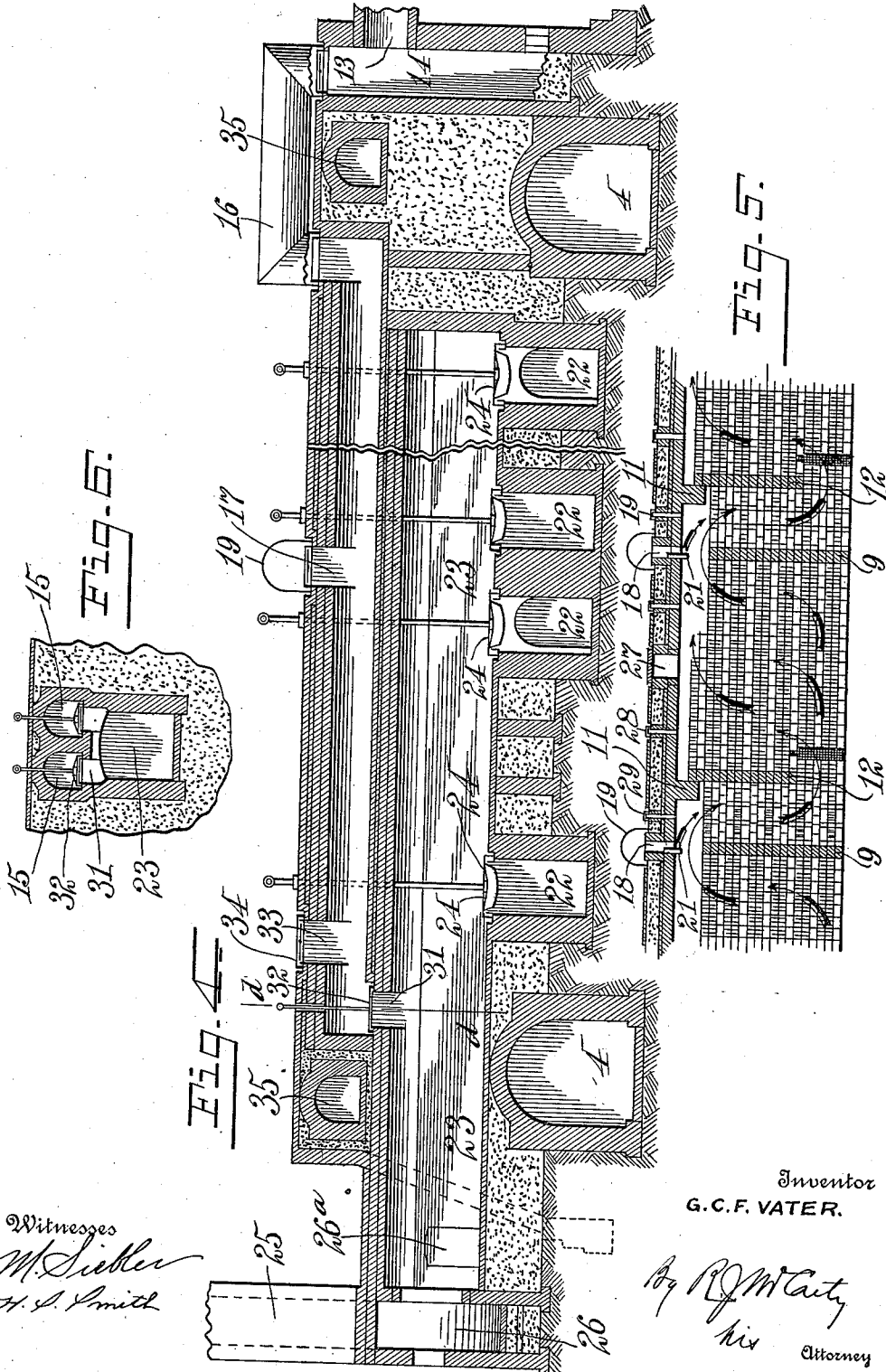
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

GEORGE C. F. VATER, OF DAYTON, OHIO, ASSIGNOR TO THE C. W. RAYMOND COMPANY,
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SECTIONAL KILN.

1,041,379.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE C. F. VATER, a subject of the Emperor of Germany, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Sectional Kilns; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in continuously and progressively fired sectional kilns for clay ware, which consist of a plurality of sections in which the green ware to be baked is placed in advance of the section being fired, and the baked ware is removed from the sections in the rear of the section being fired.

The object of the invention is to provide an improved gas flue arrangement by means of which the kiln is fired by what is known in the art as "producer gas" and which will allow the flues to be relieved of the deposits of tar, etc., characteristic of "producer gas," without placing the kiln out of use.

Another object of the invention is to provide an improved water smoking flue, by means of which the heat from the cooling ware is utilized to gradually expel the moisture from the green ware preparatory to burning.

While in the drawings I have shown the invention as applied to a tunnel kiln, in which the various sections are formed by the particular arrangement of the ware, it will be understood that the invention is also adapted to a compartment kiln in which the various sections are formed by the construction of the kiln itself.

Referring to the annexed drawings, Figure 1 is a top plan view of the invention, partially in section, with intermediate portions broken away; Fig. 2 is a section on the line *a a* of Fig. 1; Fig. 3 is a section on the line *b b* of Fig. 1; Fig. 4 is a section on the line *c c* of Fig. 1; Fig. 5 is a longitudinal view through a portion of one of the tunnels showing the arrangement of the ware to form the various sections; and Fig. 6 is a section on the line *d d* of Fig. 4.

Throughout the specification and drawings, similar reference characters indicate corresponding parts.

Referring more particularly to the drawings, 1—1 represent the side walls of two parallel tunnels which are provided with floors 2 and arched tops 3 resting upon the side walls 1—1. The tunnels thus constructed are connected at their ends by means of cross flues 4 through ports 5; and the outer walls of the tunnels are provided with openings 6 through which access may be had to the interior of the kiln. Lying parallel with the outer walls 1 and with the ends of the tunnels, are walls 7 which are removed a sufficient distance to allow the space therein to be filled with earth 8, thereby forming an insulation and thus preventing the radiation of the heat from the tunnels. In the tunnels of the kilns thus constructed, is placed the clay ware, which is illustrated in the drawings as brick and which are so arranged as to form the various sections or compartments as follows: The brick are laid up loosely within the kiln to allow the flame to pass therethrough; and near the end of each section is a lower baffle wall 9 the edges of which enter grooves 10 in the walls of the tunnels. The bricks of the walls 9 are placed close together and are arranged in layers which lie on an incline toward the center of the wall. The wall 9 does not reach to the top of the tunnel, but provides an air passageway at the top thereof. A wall thus constructed will prevent the air passing therethrough to any great extent, and will allow the wall to contract without forming openings therein, when the brick shrink during the process of burning. Extending across the top of the tunnels in proximity to each of the grooves 10, is a drop arch 11 along the side of which is mounted an upper baffle wall 12, the bricks of which are placed close together at the top and are so arranged as to form openings therein at the bottom. The lower baffle wall 9 is instrumental in directing the air or products of combustion upwardly through the brick between the major intervening space between the baffle walls; while the upper baffle wall 12 is instrumental in directing the air and products of combustion down between the brick in the minor intervening space between the baffle walls, as is shown by the arrows in Fig. 5. The upper

baffle wall 12 forms the end of each section and may be covered with paper, which is afterward removed, to prevent the gases passing into the sections of the tunnel in which the green or finished ware is being set or removed.

The fuel for firing the kiln is supplied from a gas producer (not shown) which is preferably of the water sealed or pressure type. The gas is therefore supplied to the kiln under pressure, which allows the heat to be easily controlled. The producer connects with the kiln through a flue 13 which enters a chamber 14 at one end of the kiln. Extending longitudinally of the length of the kiln between the tunnels, are two gas flues 15, one for each of the tunnels and which are connected to the chamber 14 by breeching 16. The flues 15 are provided with openings 17, one for each section, and which are adapted to be connected with burner openings 18 by portable breeching or gas conductors 19. The breeching 19 is placed over the openings 17 and burner openings 18 of those sections which are being fired; and when said openings 18 are not in use, they may be closed by suitable cover plates 20. The burner openings 18 may be provided with gas spreaders 21 which are instrumental in effectually distributing the flame through the ware. The products of combustion, after having passed through the sections which are being fired, pass through several of the sections in advance thereof, and out of the kiln through lateral passageways 22, and a main flue 23, thereby heating the advance sections. There is a lateral passageway 22 for each section, and said passageways are situated between the grooves 10 and the drop arch 11 at the end of each section. The openings between the passageways 22 and the main draft flue 23 are controlled by damper valves 24, and said main draft flue extends between the inner walls 1 of both tunnels and is common to both. The air to support combustion within the sections being fired, enters the opening 6 of one of the previously fired sections and passes through the sections which are cooling. The air therefore enters the fired section in a highly heated condition. There is an opening 6 for each section, and after the ware has been placed in any one section, its respective opening 6 is closed by wickets 25 which are afterward opened to allow the air to enter the sections or compartments. The main draft flue 23 communicates at the end of the kiln opposite the producer, with a stack 25, which may be provided with a fan (not shown) within a chamber 26 at the bottom thereof. The draft flue 23 may also be provided with a wicket 26^a to allow access to the interior thereof for the purpose of cleaning or repairs. Each of the sections may be provided with vent openings 27 and

test holes 28. There is also provided in proximity to the burner openings 18, openings 29 which allow the condition of the flame to be ascertained.

"Producer gas," as it comes directly from the producer, contains considerable tar or gummy substance of an inflammable nature and which will be deposited on the walls of flues 15. To prevent the flues 15 from becoming obstructed thereby, means are provided for burning out these deposits. The ends of said flues 15 opposite the producer, communicate with the main draft flue 23 through ports 31 controlled by damper valves 32. There is a flue 15 common to each tunnel, and when the kiln is being fired on one side, the flue on the other side of the kiln may be allowed to burn out by opening its respective damper valve 32. To prevent the flame being communicated to the opposite flue, and to allow air to enter to support combustion, the respective breeching 16 of the flue which is burning out may be removed. To prevent the hot gases or products of combustion injuring the fan within the chamber 26, openings 33 are provided in the flues 15 controlled by cover plates 34. The openings 33 allow sufficient air to enter the flue to reduce the temperature of the products of combustion to a limit that will not damage the fan.

Green brick or ware when it is placed in the kiln, contains some moisture which it is desirable to expel before being subjected to the baking heat. This moisture is expelled by heat obtained from the cooling brick or ware which are in the sections in the rear of the sections being fired, and which process is known as "water-smoking."

At the top of the kiln and near the outer edge thereof, is a continuous water-smoking flue 35 which connects with each of the sections or compartments by individual down-takes 36 controlled by valves 37. The flue 35 may be divided into two divisions by means of slide dampers 38 adapted to enter suitable grooves 39 situated between the valves 37.

With a "water smoking" smoking arrangement as thus constructed, two sections of green brick may be independently water-smoked from two sections of cooling brick. When in use, the valves 37 of those sections which contain the cooling brick and those which contain the green brick are opened, which allows the "water-smoking" flue to communicate with those sections. To divide the flues 35 into two divisions, one of the dampers 38 is placed in the groove 39 between the sections containing the green ware, while another damper 38 is placed in the groove 39 between the two sections containing the cooling brick from which it is desired to obtain the heat. To create a circulation in the two divisions of the flue 35, the two sections of the kiln containing the

green ware are placed in communication with the main draft flue 23 by partially opening the respective valves 24. The air enters the sections containing the cooling brick, through the side openings 6, the wickets 25 having previously been partially or wholly broken depending upon the amount of air required.

It will be noted that, by this arrangement, the section which is being "water-smoked" and which contains the greener ware, which is farthest removed in the front of the fired section, and which will contain the freshest brick, will be in communication, and will receive its heat from the coolest section which is farthest removed from the fired section in the rear. The water-smoked section containing the green ware, which is nearer the fired section in the front, will be in communication with, and will receive its heat from the warmer cooling section which is nearer the fired section in the rear, consequently, as the cooling section farthest removed from the fired section will be at the lower temperature, the greenest brick in the first water-smoking section will be subjected to a lower degree of heat than the brick in the other water-smoked section. The water-smoking heat is therefore applied gradually to the green ware, which prevents the clay becoming cracked or otherwise deteriorated.

In a kiln of this type, each section thereof is filled with ware during a certain period of time, and the section which is being fired is advanced at each period of time. The direction of firing is shown by the arrows in Figs. 1 and 2. The green brick is placed within the sections in front of the fired sections, and are first water-smoked, then pre-heated and finally fired. The sections in the rear of the fired sections are cooling, while

the two sections in the extreme rear will be connected with the water-smoking flue.

Without limiting myself to the precise arrangement shown and described, which may be varied within the scope of the claims, I claim:

1. In a kiln of the type specified, parallel rows of kiln sections each of which is provided with burner openings, a main draft flue common to all of said sections, and gas flues, one for each row of kiln sections, means for connecting the gas flues with the burner openings, said gas flues having ports which communicate directly with the atmosphere so that air may enter to reduce the temperature of the products of combustion, said gas flues being also provided with valve controlled openings which lead to said main draft flue, whereby when one kiln section in one row is being fired the flue of the other row of sections may be burned out.

2. In a kiln of the type specified, a plurality of kiln sections, a continuous water smoking flue common to all of said kiln sections, a valve-controlled passageway leading from said flue to each of said sections, and dampers in said flue between the passageways dividing the flue into two parts thereby permitting the air radiated from two cooling sections to be independently conducted to other sections, whereby the temperature in said last named sections may be gradually raised, and means for creating a draft in said flue and sections, substantially as specified.

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

GEORGE C. F. VATER.

Witnesses:

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J. C. BRANNOCK.