

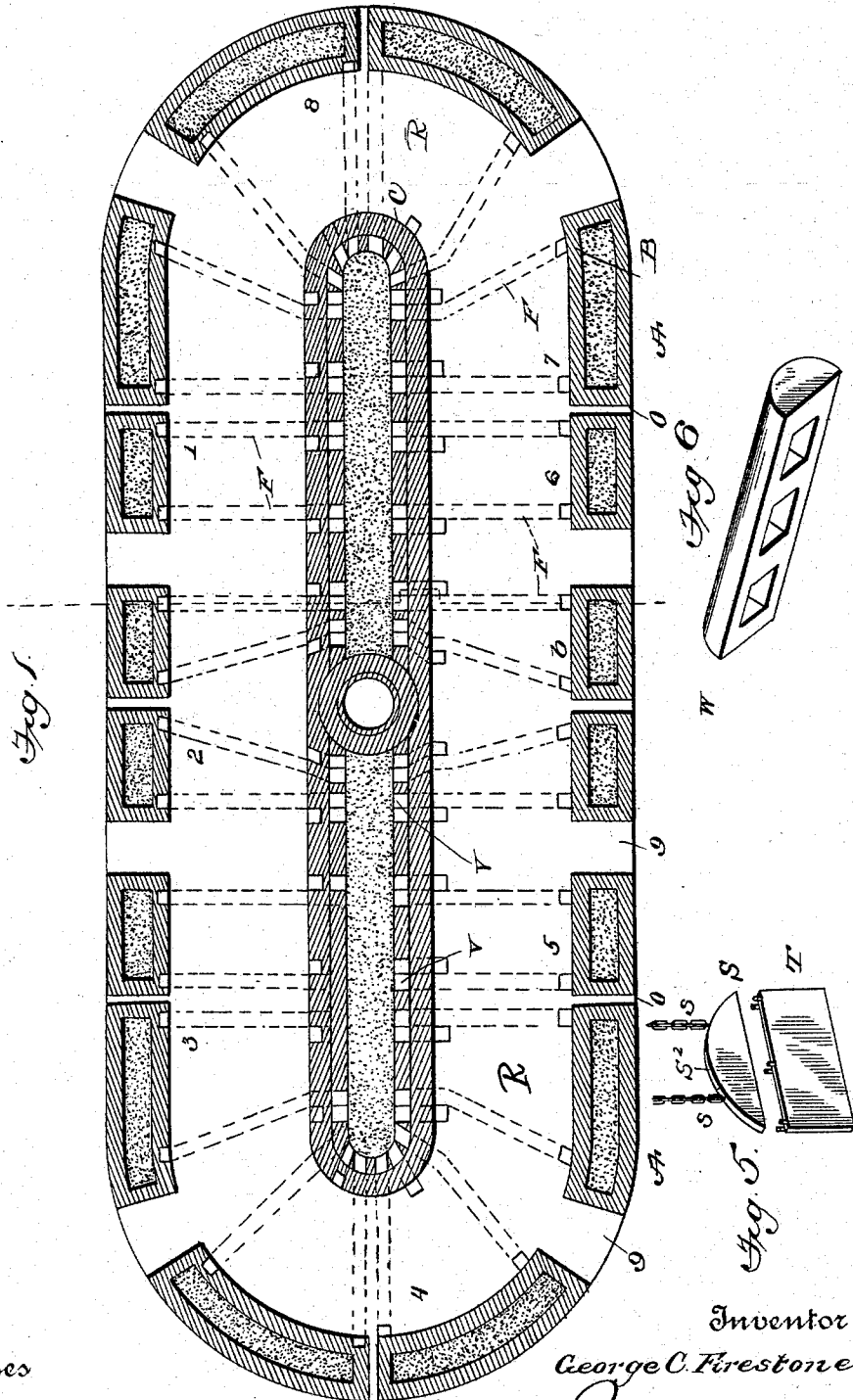
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3 Sheets—Sheet 1.

G. C. FIRESTONE.
COMBINATION BRICK KILN.

No. 518,690.

Patented Apr. 24, 1894.



Witnesses
John D. Smith
Chas. E. Kier

Inventor
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By *John Wedderburn*
his Attorney

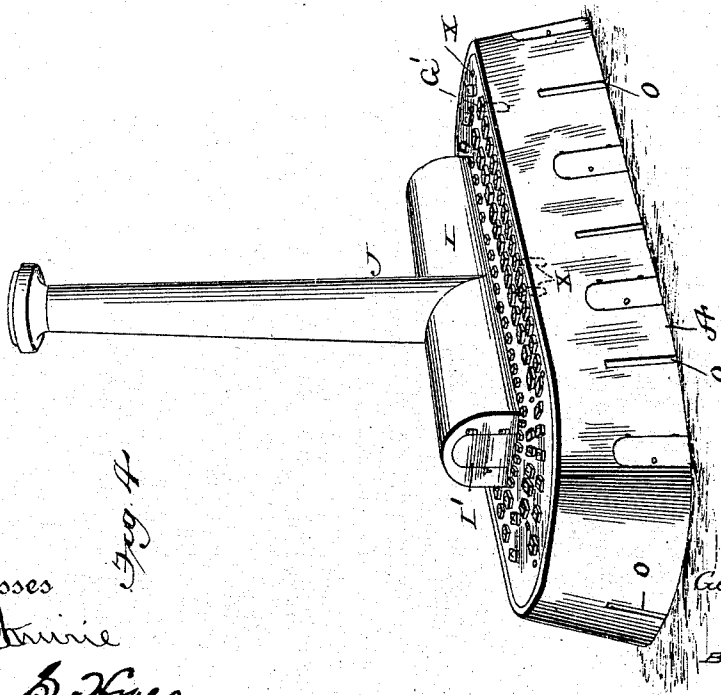
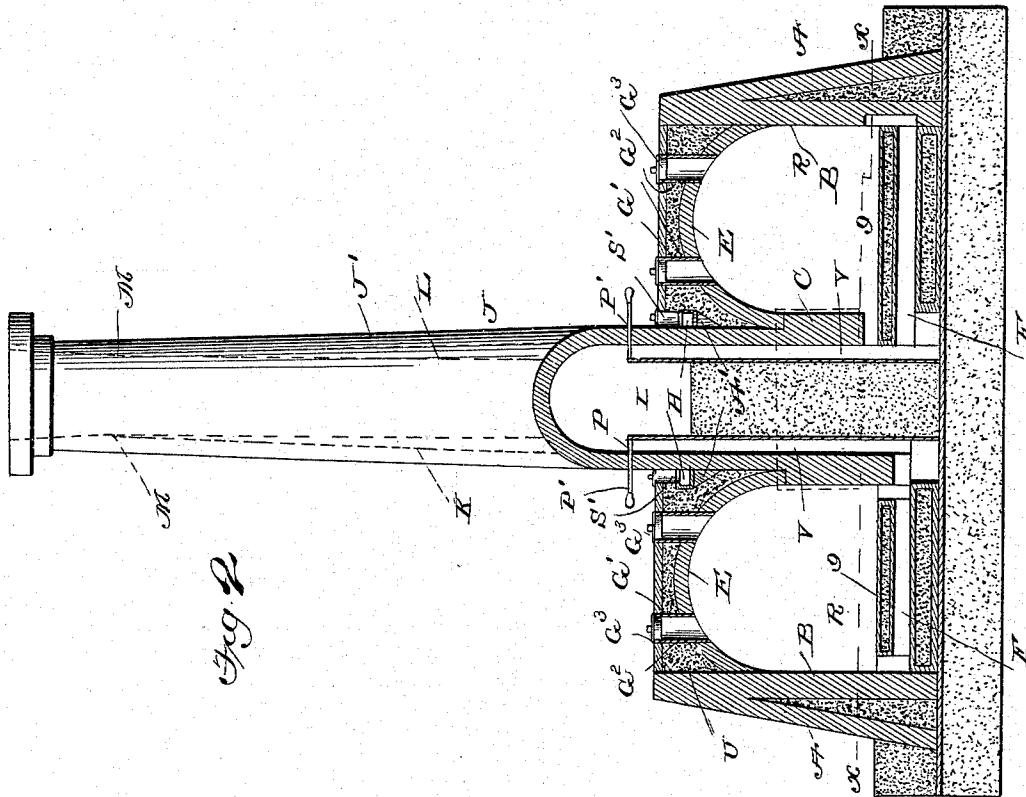
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(No Model.)

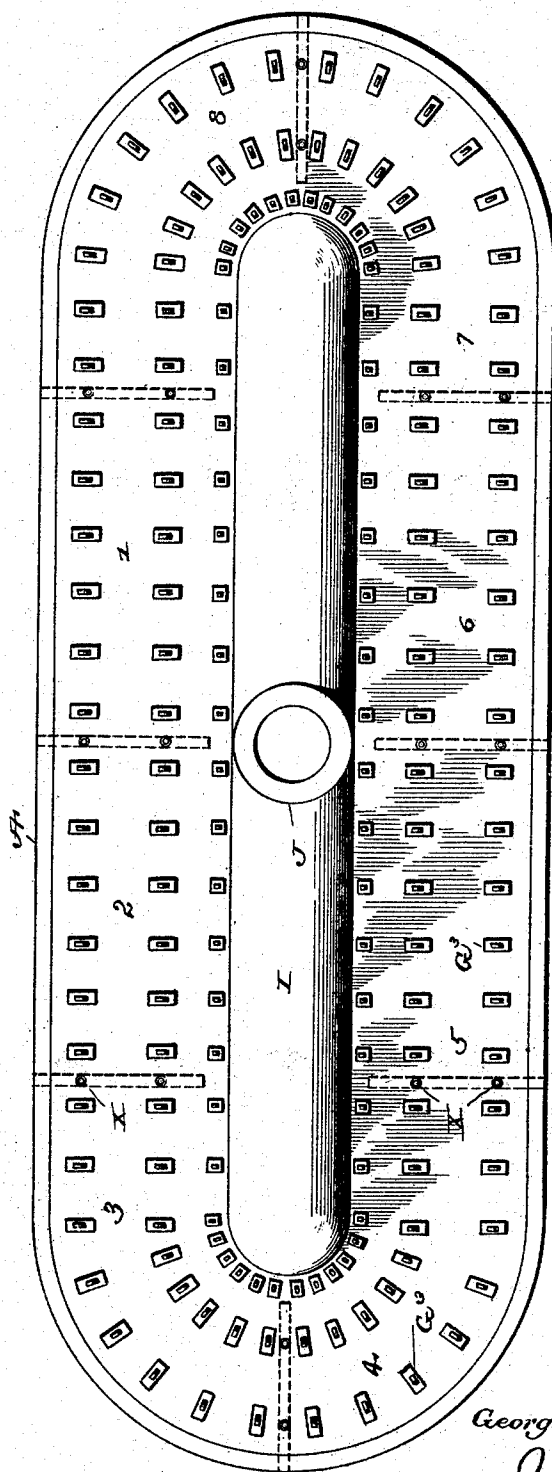
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Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE C. FIRESTONE, OF BENICIA, CALIFORNIA.

COMBINATION BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 518,690, dated April 24, 1894.

Application filed July 26, 1893. Serial No. 481,506. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. FIRESTONE, a citizen of the United States, residing at Benicia, in the county of Solano and State of California, have invented certain new and useful Improvements in Brick-Kilns; and I do hereby 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.

My invention relates to that class of brick kilns known as continuous, and which are so constructed as to be used both as a kiln and as a drying house, whereby drying house, shed, yards, &c., are dispensed with and a kiln is made that is adapted to burn all kinds of clay articles, and thus cause a saving of fuel, time and labor.

My invention consists in the peculiar construction and arrangement of the various parts as will be hereinafter fully described and pointed out in the claims.

In the drawings: Figure 1 is a horizontal section on line $x-x$ of Fig. 2. Fig. 2 is a central transverse vertical section. Fig. 3 is a top plan view. Fig. 4 is a perspective view. Fig. 5 is a detail view of the partition doors. Fig. 6, is a perspective view of the movable heated air conductor.

My kiln which may be of any desired dimensions, is usually elliptical in shape, and in the construction, I make the outside wall of two thicknesses, A, and B, as shown in Fig. 2, and fill in the intervening space with dirt and sand, or either.

Along the longitudinal center of the kiln, is built a central wall C, which may be single or double, on the inside of which are built the smoke flues V, the space between the central walls or the inner walls of the two sides of the kiln being filled with sand or dirt or both.

Between the inner wall B, of the double outer wall, and the central wall C, is a large space which entirely encircles said central wall, and on the inside of said inner wall, which forms a burning chamber R. This chamber is divided into sections by movable doors S. The length of the sections depending on the desired capacity thereof.

Under the floor 9, of the burning chamber R, and extending from the inner wall B, to the central wall C, are the draft flues F, each

being separate and distinct from the other, as shown in Figs. 1 and 2. I have shown two styles of the flue holes. One side shows the flues entering the burning chamber through the floor; each of said flue connections begins with the inside edge of the central wall C, and the inner wall B, and runs open into the floor of the burning chamber various distances. On the other side of the central wall, I show a form in which the flues enter the burning chamber through the central wall C, and the inner wall B, the bottom of the mouths of these flues being even with or above the top of the floor 9, of the burning chamber. The flues entering the burning chamber through the floor next to the inner wall B, and those entering the burning chamber through the inner wall B, each run separately under the floor of the burning chamber, through central wall C, and then enter separate vertical flues; and those flues which enter the burning chamber through the floor next to the central wall C, and those entering the burning chamber through the central wall C, each enter separate and distinct vertical flues, as shown in Fig. 1, the vertical flues being inside of the central wall C, and the horizontal flues running underneath the floor of the burning chamber.

In Fig. 2, is shown the vertical flue V, which runs above the roof of the kiln and empties into the smoke collecting chamber. On the top of each flue is a sliding valve or damper P, which has a horizontal shaft P' extending through the wall of the smoke collecting chamber to the outside thereof. Each of said valves or dampers P, can be operated from the roof of the kiln, and from the inside of the smoke collecting chamber. Extending from the central wall C, to the inner wall B, is an arched roof E, which covers the burning chamber, and is provided with a number of fire apertures G'. They are arranged at suitable distances apart both longitudinally and transversely, and they may be either round, square, or elliptical in shape; fitted within them are the iron cylinders G², which are provided with the lids or covers G³. The central wall C, is constructed with a shoulder A', which extends entirely around it, and upon which is built the heat conducting channel H, said channel being provided with aper-

tures in its upper wall, which are in alignment with openings S'. This channel H, may be built of various sizes and shapes. An arched dome is built over the central wall C, with the smoke stack J in the longitudinal center of the smoke collecting chamber I, the latter chamber being provided with a door, I'. The smoke stack J, is composed of one outside, and two inside walls, J', and K, and L, respectively, to a point in about one third of the distance from the top of the stack where the two inner walls come together as at M. The outside walls J', are inclined from the bottom to the top, and the middle walls K, are on the same incline from the bottom to the point marked M, and the inside walls L, are vertical from the bottom to the point M, but from the point M, to the top of the chimney, the inside walls grow larger and flare outwardly, producing a better draft with a shorter smoke stack than is generally required. All the water smoke from brick and other clay articles, as well as the smoke from green or wet fuel, condenses and congeals after it has traversed a certain distance up a smoke stack or chimney whose inner walls converge, or are vertical, and consequently retards its exit therefrom. If there is an expansion of the inside walls, which expansion begins below the point where the condensing and congealing would begin, the exit of the smoke is made with greater velocity than from a chimney made considerably higher, but with converging or vertical inside walls; said smoke stack may be built in various shapes and styles. The outer wall A, inclines inwardly from bottom to top, and there meets the inner wall B, as shown in Fig. 2. The space between the inner wall B, and the central wall C, is spanned by the arched dome E, which makes an unlevel space between said walls, which is filled with dirt and sand, or either, and covered by a layer of brick, all of which is to be on a level or below the top of the inner wall B, and made level to the central wall C. This filling constitutes the roof and is lettered U, in Fig. 2. The fire apertures G', extend through this roof into the burning chamber R, and the heated air apertures S' extend through the roof or side into the heat conducting channel H.

The kiln is built with a burning chamber R, and divided into sections by movable doors S, which enter slots O, in the inner and outer walls B and A. Said movable doors are made in two sections S², and T, the top of the upper one being made semi-circular in shape. The top of the upper section is made in this shape to fit the roof of the burning chamber, and has chains s, attached to it, which extend through suitable openings X, made for that purpose in the roof of the burning chamber, and held until the lower section T, is placed in position, and then forms a support for the upper section. The holes through which the chains pass are lined with metallic

tubes, which are provided with suitable lids to cover them. The lower section has three or more ears or lugs attached to each side of the upper edge thereof, between which lugs the upper section fits, and is held against lateral movement.

The kiln may be built in various sizes, and divided into various number of sections. The sections in Figs. 1 and 3, are marked 1, 2, 3, 4, 5, 6, 7, and 8. One section of green brick is put into the kiln, one section of burned brick taken out, and one section of brick burned every day.

In starting my kiln, I fill section 1, with green brick, putting arches therein, the same as setting brick in an old Dutch kiln. Then I fill sections 2, 3, 4 and 5 with green brick, close the entrance archways in sections 1, 2, 3, 4, and 5, and also the vertical slots between sections 1 and 2, 2 and 3, 3 and 4, 4 and 5. I then put in my movable partition door between sections 5 and 6. The slide valves or dampers on sections 1, 2, 3 and 4, are then closed, and the valves or dampers on section 5, are opened. It will be understood that sufficient openings will be formed to make the fire arches accessible. Fires are now started in the burning chamber in the arches built in section 1. As soon as the water smoke is taken off, and the bricks are in a condition to receive intense heat, I feed fuel through the fire apertures G', in said section 1. The heat arising from the fires in said section 1, passes through the adjacent sections 2, 3, 4 and 5, before it passes into the smoke stack or chimney, the heat having been entirely exhausted before it leaves the burning chamber.

Dry pressed brick, direct from the press, are set in the kiln for burning. By the time section 1, is burned, section 6, is set for burning. The entrance archway of said section is closed, and the partition door taken from between sections 5 and 6, and the vertical slot between the said sections closed, and said partition door placed between sections 6 and 7. The slide valves or dampers on section 5, are closed and opened on section 6, the fire in section 1, being allowed to die out, and said section 1, to cool. This process goes on until the brick in section 1, are cool, when the said brick are removed therefrom, after which time one section is put in, one burned, and one taken out every day.

In starting my kiln with stiff or soft mud brick, I dry a sufficient number of brick to fill six sections, and then set them in sections 1, 2, 3, 4, 5 and 6. In the same way I set dry pressed brick, that is, with fire arches built, in section 1. While section 1, is being burned, from one to five empty sections are being filled with green brick, said brick being placed in, in different ways, but mostly by being put on pallets, said pallets placed on cars and run into said empty sections. If only one section is filled, partition doors are put in at each end of said section, and

the door of said section closed. The movable hot air flues W, are placed over the apertures in said section, and over the apertures S' of the hot air conducting channel H, in alignment therewith, and the side valves or dampers on said section opened. Section 1 is now burned, and the movable sheet iron hot air flues W are placed over the apertures G', in said section 1, and the apertures S' in the heat conducting channel H in alignment therewith, the heat from the cooling brick passes through these flues and channel and through the section of green brick to the smoke stack or chimney, thereby drying the green brick with a warm air current. Should from two to five or more sections be filled with green brick at once, the movable hot air attachment flues attached to the section of green brick should be placed upon that section of green brick nearest the section of burned brick and the slide valves or dampers opened upon the section of green brick farthest from the section of burned brick, the partition doors placed at each end of the green brick and all of the entrance archways entering said sections, and all the vertical slots between said sections closed, thereby giving a current of heated air from one end to the other of the sections filled with green brick. As soon as section 1, is burned, the fire is allowed to cool by using the heat arising from said section, to dry the green brick as hereinbefore described. Said green brick being dried by a process not costing anything. Hence my kiln costs no more to be used as a drying house and a brick kiln, than to be used as a brick kiln alone. Immediately after section 1 is burned, the partition door between sections 5 and 6, is taken out, and the vertical slot between said sections closed, and the entrance archway of section 6, closed, and said partition door put in between sections 6 and 7. The slide valves or dampers on section 5, are closed and opened on said section 6, and the fire started in section 2. While section 2, is being burned, the green brick have been dried by the heat of section 1, and said green brick set for burning in section 7, and more green brick set for drying in other empty sections by the time said section 2, is burned. The foregoing process is gone through with every day, there being one section of green brick dried, and one section set for drying, one section burned, and one section taken out every day.

The entrance archway to each section is to be in the center thereof, and built of various sizes, and the fuel fed through the fire apertures G' is to lie upon the floor marked 9, from wall to wall of the burning chamber.

Having thus described my invention, what I claim is—

1. A combined continuous brick kiln and drying house, divided into a number of sections by removable sliding partition doors composed of upper and lower sections, substantially as shown and described.

2. A partition door for dividing a brick kiln into sections, consisting of a lower section provided with vertically extending guidelugs on each side, and an upper section adapted to fit between said lugs, substantially as shown and described.

3. A brick kiln provided with a series of separate flues entering the burning chamber through the floor, running beneath the floor of said burning chamber, and entering separate vertical flues, which enter a smoke collecting chamber above the roof, substantially as described.

4. In a brick kiln, the combination with the burning chamber, having a series of separate flues entering through the floor, of separate vertical flues connected therewith, and slide valves or dampers on top of said vertical flues, and means substantially as shown and described for operating said valves or dampers.

5. In a brick kiln, the combination with the burning chamber, of a smoke collecting chamber above the same, provided with an arched roof and round or square ends, having door therein, and a smoke stack in the center thereof, as and for the purpose set forth.

6. A smoke stack or chimney for brick kilns, comprising the walls J, K, and L, and having its inner upper bore flared outwardly, as and for the purpose set forth.

7. In a brick kiln, the combination with a wall supporting the smoke collecting chamber, and provided with a shoulder thereon, of a heat conducting channel upon the said shoulder and between the said wall and the arched dome of the burning chamber, as shown and described.

8. In a brick kiln, the combination with the inner and outer walls thereof, provided with slots cut therethrough, of a movable sliding sectional partition door, the lower section of which is adapted to enter said slots, and the upper section of which is provided with chains or ropes passing through apertures in the roof of the burning chamber, as shown and described.

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

GEORGE C. FIRESTONE.

Witnesses:

T. W. DILLON,
JAMES BARRY.