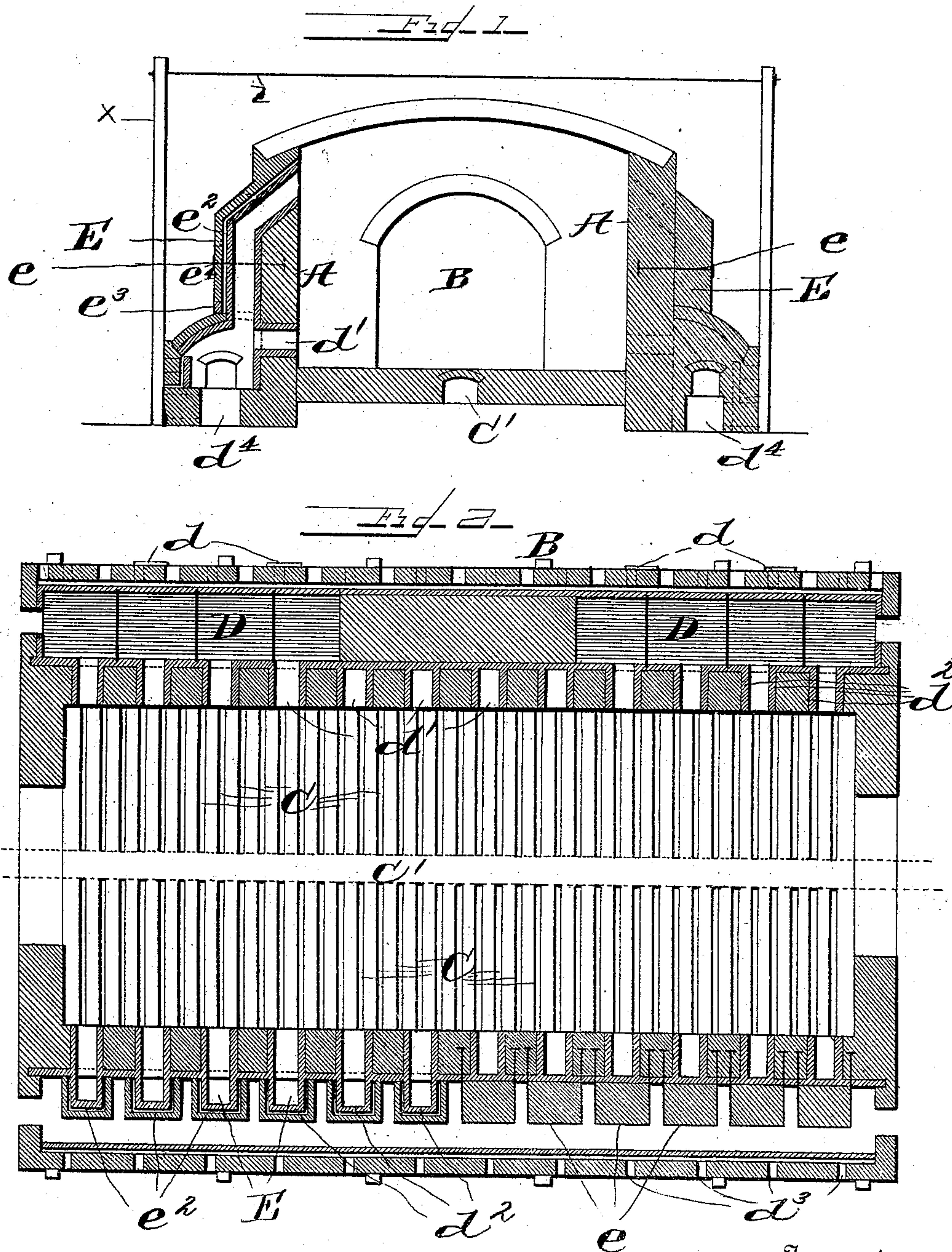


(No Model.)

C. A. SNOW.
BRICK KILN.

No. 512,334.

Patented Jan. 9, 1894.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES A. SNOW, OF BRICK HAVEN, VIRGINIA.

BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 512,334, dated January 9, 1894.

Application filed May 3, 1892. Serial No. 431,698. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. SNOW, a citizen of the United States, residing at Brick Haven, in the county of Alexandria and State of Virginia, have invented certain new and useful Improvements in Brick-Kilns; and I do declare the following to be a full, clear, and exact description of the invention, such as it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to brick kilns in general but more particularly to that class known as combined up and down draft kilns.

The objects of my invention are many but among the most important are the following: first, to produce a combined up and down draft kiln, the furnaces and down draft flues of which are built entirely outside, and if desired independently of the walls of the kiln proper; second, to construct a cold air flue to surround the down-draft flue on three sides said flue opening into the top of the kiln independently of the hot air flue while its lower end communicates with the outside atmosphere and is provided with a suitable plug or stopper 3 to provide suitable openings in the outside wall of the furnace directly in line with the horizontal flues or up draft flues; third, to provide the furnace with several vents a certain distance back of the mouth of the furnace in order to have perfect combustion throughout the entire length of the furnace.

With these most important and the minor objects in view my invention consists in the parts and combinations of parts as will be more fully hereinafter set out.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all of the figures.

Figure 1 is a cross section of a kiln. Fig. 2 is a plan thereof.

A represents the walls of the kiln which may be constructed of any suitable material; B the door or opening usually formed in the end of the kiln.

C are the flues composing the floor of the kiln and leading into the central stack flue

C' as is usual in such kilns. Instead of the flue C' leading directly into the stack it may in a well known manner, lead into a second kiln and distribute the heat therein for the purpose of drying green brick or burning them.

D is the furnace extending the entire length of the kiln and provided with ordinary grates. Between the grates and in the center of the furnace is what is termed by the trade "a dead space." In kilns provided with furnaces extending their entire length it has been found that the coal thrown and lying between a point three feet back from the mouth of the furnace and the extreme inner end of the grate does not thoroughly burn thus resulting in a great loss of coal, imperfect combustion and an irregular heat throughout the kiln. This is caused by the fact that the air entering the mouth of the furnace is, by reason of the great heat drawn up into the first three feet of the furnace and there consumed with the result above set out and in actual experience it has been found that about three or four times as much fuel is burned in the first three feet of the furnace as is burned in the whole furnace. In order to obviate this I provide my furnace with suitable air ports or vents *d* and locate them between a point three or four feet from the mouth of the furnace and the inner end of the grate, thereby supplying the furnace with a sufficient amount of air throughout its entire length thus giving perfect combustion throughout and preventing waste of fuel.

Leading from the furnaces, through the wall of and into the kiln are flues *d'*.

*d*² represents fire brick, with which the flues and furnaces are lined.

*d*³ are openings in the outer wall of the furnace containing a clay plug which, when necessary, is pulled out to allow air to enter, as a blast and force the heat through the flues into the kiln. These openings are in line with the flues *d'*. A suitable damper, shown in dotted lines, is located in the flues *d'*.

*d*⁴ is the ash pit.

Extending from the crown of the furnace are flues E which are built entirely outside of the walls of the kiln and are tied to the kiln by means of suitable rods *e*. These flues E are lined with fire brick and on three sides of

the flue these fire brick are set about two inches from the inner surface of the flue so as to form an air space or flue e^2 . The flue E and air flue e^2 enter the kiln close to the top thereof on an angle. The lower end of the air space or flue communicates with the outside atmosphere by means of its lower end which is provided with a suitable plug or damper e^3 . The flue E is provided with a suitable damper e^4 .

Heretofore in all down draft kilns the bag or fire wall is used. Now it has been found by experience that the intense heat coming from the furnace against these fire or bag walls makes it intensely hot and melts the brick placed against or near it. The heat passes up the fire or bag wall and should be spread over the entire kiln but by reason of the fire or bag wall being intensely hot a circulation or draft is created at this point and of sufficient strength to draw the heated air directly over the bag or fire wall down the sides of the same to the bottom of the kiln from which point the stack flue C' draws it off thereby preventing the brick in the center and at the top of the kiln from getting sufficient heat to properly burn them. Thus it will readily be seen that this is fatal to the proper distribution of the heat over the kiln and that the brick will be irregularly burned. To overcome this melting of brick near the bag or fire wall the green brick have been placed a little distance from the said wall thus leaving a space between them and the wall from the top to the bottom but it has been found that this does not obviate the objection inasmuch as the space between the green brick and the fire or bag wall forms a flue down which the heat rushes by reason of the intensely hot fire or bag wall, with the same fatal effect. Another objection to the fire or bag wall is that in actual operation it will crack near the bottom and at other places by reason of the intense heat and the heat that should pass up the bag takes the shortest course to the stack by rushing through these cracks by reason of the draft of the stack thus frequently making a kiln of brick a total loss because if these bag or fire walls crack after the kiln has been "fired up" there is no possible way in which it can be patched up without tearing out the whole kiln and to do that the fire would have to be drawn, kiln cooled and this cooling of the kiln before the brick are thoroughly burned would destroy the entire kiln of brick. Thus it will be seen that the patching up of such cracks is impracticable. A still further objection to the fire or bag walls is that they take up too much valuable space inside of the kiln.

I obviate all of the above objections set out in entirely dispensing with the fire or bag wall and building my heat flues entirely outside of the kiln. The entire wall of the kiln proper is between the heat flues and the brick and the kiln walls being about twenty-seven inches thick it will be seen that no appre-

ciable amount of heat will be conveyed by the kiln wall but to prevent even a small amount of heat being conveyed I face the said wall with fire brick as above set out. The air space e^2 catches all heat from radiation and throws it back into the kiln at the top. If my heat flue should crack I can readily discover such crack and "patch it up" without interfering with the operation of the kiln. Still another advantage of having the heat flue entirely outside is that the entire space inside of the kiln is unobstructed and can therefore be utilized. Further the brick placed against or near the wall of the kiln will not melt, &c. There are many minor advantages in this construction that will be obvious to one skilled in the art, therefore not set out or explained herein.

The operation is as follows:—Presuming that the kiln has been "stacked" and fired and that it is to be used on the down draft principle, the dampers in the flues d' are closed, of course. The heat ascends in the flues E and passes into the kiln on an angle and strikes the dome of the kiln where it is evenly distributed entirely over the kiln and the goods therein. It is then drawn down through the brick to the flues C, into the stack flue C' and thence to the stack. The air space or flue e^2 catches all radiating heat and when the plug e^3 is pulled out the cold air from the outside rushes in and forces the radiated heat out of said flue into the kiln around the heat flue E thus creating a draft or suction around the mouth of the flue E thereby drawing the direct heat out of the flue E and "shooting" it with itself to the crown of the kiln where it is evenly distributed. When the plug e^3 is withdrawn a certain amount of cold air enters the top of the kiln through the flue e^2 and is introduced into the interior of the kiln to overcome an excess of heat in the top thereof and secure uniform burning of the brick. A further object of the air flue e^2 is to introduce cold air to mingle and ignite with the gases at the top of the kiln thus securing the perfect combustion of the gases at that point.

When it is found that the combustion is imperfect in the furnace I open one or more of the air vents or dampers to allow air to enter under the grates of the furnace.

X are braces held together by means of the tie rods z thus bracing the kiln.

When used as an updraft kiln I close the downdraft flues E as well as the flue leading to the stack and open suitable ports in the crown of the kiln (not shown) thus permitting the heat to pass through the flues d' , up through the brick and out through the top of the kiln.

A flue built on the outside of a brick kiln is shown in my application filed February 17, 1892, Serial No. 421,813, but not claimed therein as I reserved the right to claim it in this application. The application which was filed as above was allowed April 1, 1892.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A combined up and down draft brick kiln consisting of the horizontal flues, the
5 vertical flues and an air space on one or more sides of each of said vertical flues extending the entire length of said flues and adapted to be closed at its lower end, said vertical flues
10 built entirely outside of the kiln walls, substantially as and for the purposes specified.

2. A combined up and down draft brick kiln consisting of the furnaces D provided with dampers below and blast openings above the
grates thereof, the horizontal flues, in line

with said blast openings and provided with 15
suitable dampers, the vertical flues built entirely outside of the walls of the kiln and the air space or flue surrounding the vertical flue and extending its entire length and a suitable
20 plug to close said air flue at the bottom, all combined as and for the purposes specified.

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

CHARLES A. SNOW.

Witnesses:

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M. DORIAN.