



(No Model.)

2 Sheets—Sheet 2.

H. H. EVERHARD.  
KILN.

No. 545,463.

Patented Sept. 3, 1895.

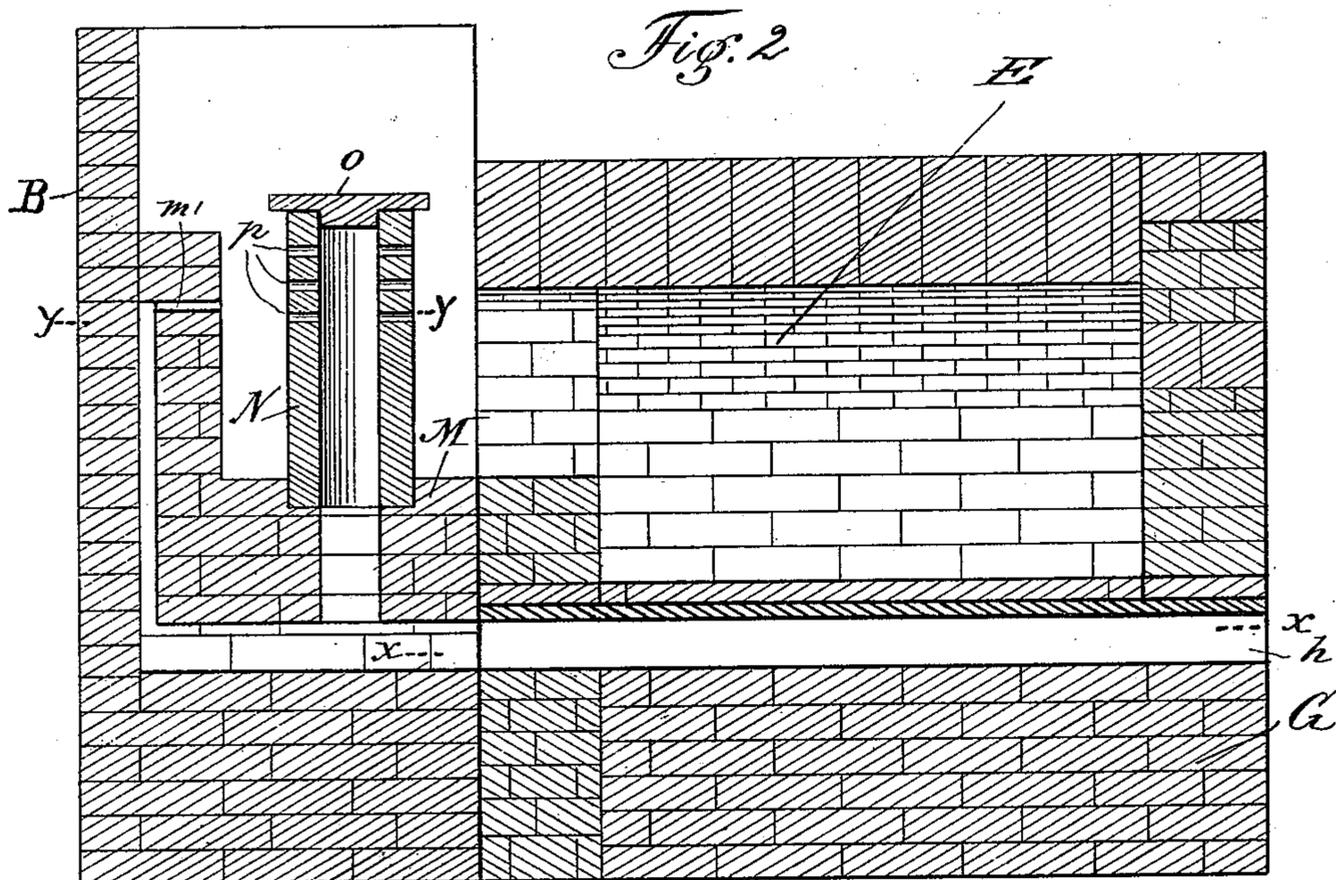


Fig. 3

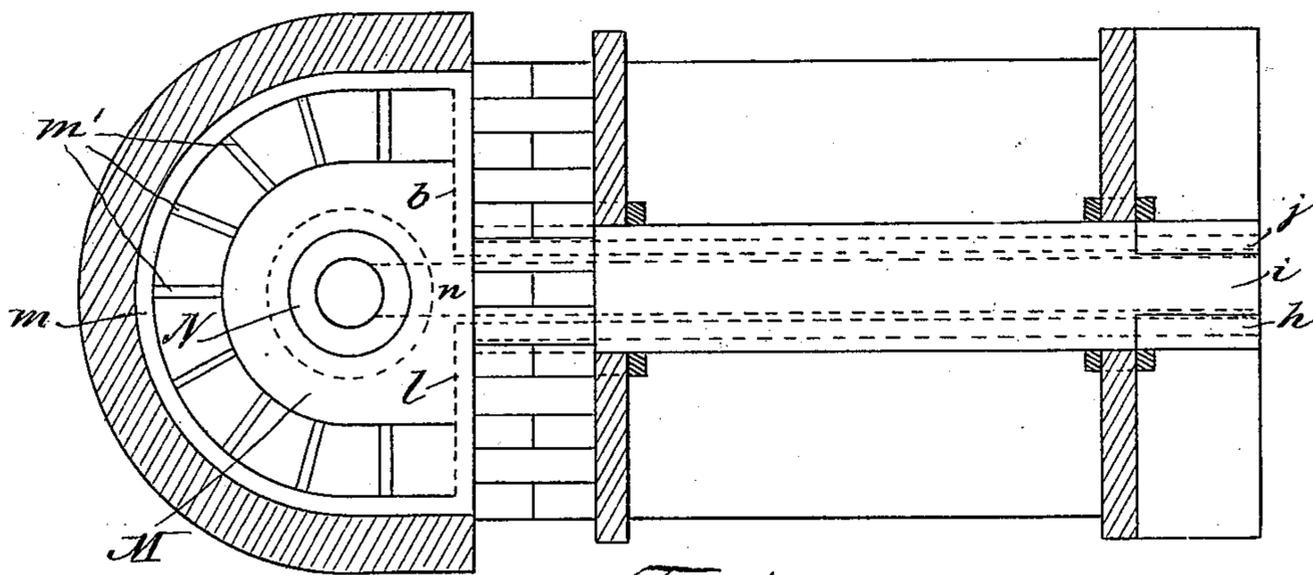
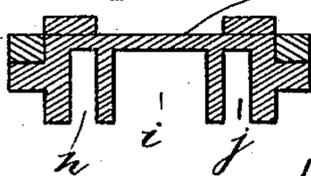


Fig. 4 I



WITNESSES

*Geo. Hiller*  
*Chas. V. Miller*

INVENTOR

*Henry H. Everhard*  
 By *W. K. Miller*  
 Attorney

# UNITED STATES PATENT OFFICE.

HENRY H. EVERHARD, OF MASSILLON, OHIO.

## KILN.

SPECIFICATION forming part of Letters Patent No. 545,463, dated September 3, 1895.

Application filed May 6, 1895. Serial No. 548,256. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY H. EVERHARD, a citizen of the United States, and a resident of Massillon, county of Stark, State of Ohio, have  
5 invented a new and useful Improvement in Kilns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

10 My invention relates to improvements in kilns adapted for burning brick or other clay products; and it consists of certain features of construction and combination of parts, as will be hereinafter described and claimed.

15 Figure 1 of the drawings is a view in perspective of the kiln embodying my invention. Fig. 2 is a vertical section centrally through the fire-box and bag. Fig. 3 is a transverse section on lines *xx* and *yy* of Fig. 2. Fig. 4 is  
20 a transverse section of the air-conduit. Fig. 5 is a vertical section of a central bag-flue shown in Fig. 1.

For the purpose of this application I have shown my invention as applied to a round or  
25 circular kiln; but it may with equally good results be applied to any of the usual forms of kilns, as the prime object of the invention is to provide means whereby the fuel may be more perfectly consumed, the time of burning shortened, and the initial cost of the output greatly  
30 reduced.

A denotes the kiln-wall, and B the inside "bags," which will be described hereinafter.

35 C denotes the fire-wall, in which is provided a desired number of fire-boxes, as D. A description of one will suffice for any number.

The fire-boxes D, of which, as before stated, there may be any desired number, are constructed substantially as shown, and for convenience and economy are constructed entirely outside of the kiln-wall, so that they may be repaired or rebuilt without interfering with the kiln-wall. The peculiarities of the fire-box consist in providing a single fire-  
45 chamber E, having two separate and distinct sets of grate-bars F and underneath the single fire-chamber two separate ash-pits G G'. In front of this structure is placed a removable cast-metal plate J, secured to the walls by the  
50 staples *a* and wedge *b*, in which are provided

stoke-holes *c c'*, through which fuel is passed to the fire-chamber E, and doors *d*, by which the stoke-holes are closed, and openings *e*, that lead to the separate ash-pits G G', which are closed by the doors *f*. 55

In the ash-pits G are provided water-pans K, the object of which will be explained further on.

At the top portion of the dividing-wall H, between the two sets of grate-bars F, are provided conduits *h i j*, formed of an inverted triple U-plate L, as shown in Fig. 4, over which is placed a layer of brick *k*. The outside conduits *h* and *j* lead from the front of the fire-box through the kiln-wall and  
60 connect with conduits *l*, that lead to the circular conduit *m* in the bag-wall B, at the upper end of which are provided a series of apertures *m'*, connecting the conduit *m* with the inside of the bag B. The central conduit  
65 *i* leads from the front of the fire-box, through the kiln-wall, into a connecting-conduit *n* in the foundation M, that leads up to and into a circular or cylinder formed tile N, located about central to the bag B. The upper end  
70 of the tile N is closed with a cap *o*, and about the upper end portion of the cylinder is provided a series of apertures *p*, that form passages from the inside of the cylinder N into the bag. 80

P denotes an aperture leading through the wall A from the fire-chamber into the bag, through which the gas generated in the fire-chamber may pass into the bag.

The central circular flue N may be constructed, if preferred, of segmental brick, or may be of other form, if preferred. The object of the structure is to provide a vertical flue central, or thereabout, to the bag and provided with apertures or passages extending  
85 from the inside of the tube or cylinder N to the bag B. 90

In operation the brick or other articles to be burned are placed in the kiln in the usual way and the kiln closed, and for the first  
95 twelve or fifteen hours may be fired in the usual way, or until the so-called "water-smoke" has been driven from the kiln, after which the invention is brought into full operation as follows: There now being a bed of 100

incandescent coals on the two grates F in the fire-chamber, fresh coal is passed into the right-hand side of the fire-chamber through the stoke-hole *c'*, the doors being all closed excepting the lower left-hand door G under the incandescent fire. The hot gases passing from this fire will engage the gas passing from the fresh fuel in the right-hand side of the chamber as they pass through the aperture P in the kiln-wall, by which the gas from the fresh fire is ignited as it passes into the bag B. This operation is continued until all of the boxes have been so fired, after which fresh fuel is placed on the grate on the left-hand side of the fire-chamber, the door below closed, and the door under the right-hand side opened. The heated gas from the incandescent fire on the right-hand side of the chamber will now ignite and consume the gas passing from the fresh fuel on the left-hand side of the fire-chamber.

The object of the dividing-wall H between the ash-pits G G' and the closing of the lower doors *f* is to shut off the air from the fresh fire to allow the gas to be formed more slowly and perfectly, the alternate firing of the two sides of the fire-chamber, as herein described, to be continued to the finish of the kiln. To further support and complete the combustion of the gas or free carbon that has passed into the bag, a current of air, heated by its passage through the conduit *i* (which is made hot by reason of its location adjacent the two fires) into the central vertical tube or flue N, and through the passages *p* into the bag B, and in conjunction with this described current of heated air other heated currents of air have passed through the heated conduits *h* and *j* in the fire-box E to conduits *l* and *m* in the bag-wall, and through the passages *m'* into the bag at a point opposite the passages *p* in the central flue N, at which point they impinge the gas as it rises in the bag and ignites whatever there may be of free carbon or unconsumed gas before it reaches the top of the bag, thus rendering the combustion of all the gas generated in the fire-chamber complete and an entire consumption of all the fuel; and to further assist in the combustion of the fuel and intensify the heat, water is placed in the pans K, placed in the ash-pits G G', which is evaporated by the fire above, and as steam passes through the body of incandescent fuel on the grate-bars above it forms to a certain extent a water-gas that is consumed with the gas provided by the fuel. The heat hereinbefore referred to as "gas" or the resultant of consumed or ignited gas is drawn down through the kiln and through the floor into flues that are not shown that lead to the stack in the usual way; but so perfect is the combustion or consumption of the fuel that no smoke is seen to escape from the stack after the so-called "water-smoke" has been driven off. After the burning has

been completed the front plates J may be removed to and used on another kiln, and for this reason are so made that they may be conveniently detached, removed, and attached to another kiln.

Having thus fully described the nature and object of my invention, what I claim is—

1. The combination with a kiln, of a bag having a vertical conduit with passages leading therefrom to the inside of the bag, a fire box comprising a single fire or fuel combustion chamber, extending from one wall of the said fire box to the other, and having two separate sets of grate bars at the sides thereof, two ash pits, one under each set of grate bars, a wall separating the ash pits, an aperture or passage leading through the kiln wall from the fire chamber to the bag a vertical tube within the bag, an air conduit leading from the front of the fire box between the grate bars to the vertical tube or flue within the bag, said vertical tube or flue having apertures or passages at its upper portion leading into the bag, and corresponding conduits leading to the vertical conduit in the bag wall, the said passages of which wall correspond or register with the passages in the central flue, and the front plate having openings to correspond with the two sets of grate bars and the two ash pits, and doors to close said openings, substantially as set forth.

2. The combination with a kiln of a bag and a fire box, the latter having one fire or fuel combustion chamber provided with two separate sets of grate bars, one at each side of said chamber, a passage smaller than said chamber leading to the bag inside the kiln, a vertical tube or flue central to the bag having at its upper portion apertures leading from the said flue into the bag, a conduit leading from the front of the fire box into the last named flue, the ash pits under the separate grates, a wall separating the ash pits, and a front door plate provided with doors, substantially as set forth.

3. The combination with a kiln, of a bag, and a fire box having a single combustion chamber communicating with the interior of said bag and provided with two sets of grate bars having beneath them two ash pits separated by a wall, a vertical flue or tube about central to the bag, said tube provided at or near its upper end with apertures which lead into the bag, and a conduit leading from the front of the fire box to the central tube or flue, substantially as set forth.

4. The combination with a kiln, a bag, a vertical tube central thereto and a fire box communicating with said bag, the bag having in its wall a vertical conduit which terminates a distance below the upper end of the bag and which communicates with the interior of the bag through a horizontal passage; the vertical tube having apertures at or near the upper end in line or approximately in line

with the aforesaid horizontal passage of the  
bag; the fire box having two separate sets of  
grate bars, and two ash pits below the grate  
bars, said ash pits being separated by a wall;  
5 a conduit leading from the front of the fire  
box to the vertical conduit of the bag, and a  
conduit leading from the front of the fire box  
to the tube or flue central to the bag, sub-  
stantially as set forth.

In testimony whereof I have hereunto set  
my hand this 30th day of April, A. D. 1895.

HENRY H. EVERHARD.

Witnesses:

W. K. MILLER,  
CHAS. R. MILLER.