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J. OLD.

FURNACES FOR BRICK-KILNS.

No. 187,891. Patented Feb. 27, 1877.

Fig. 1.

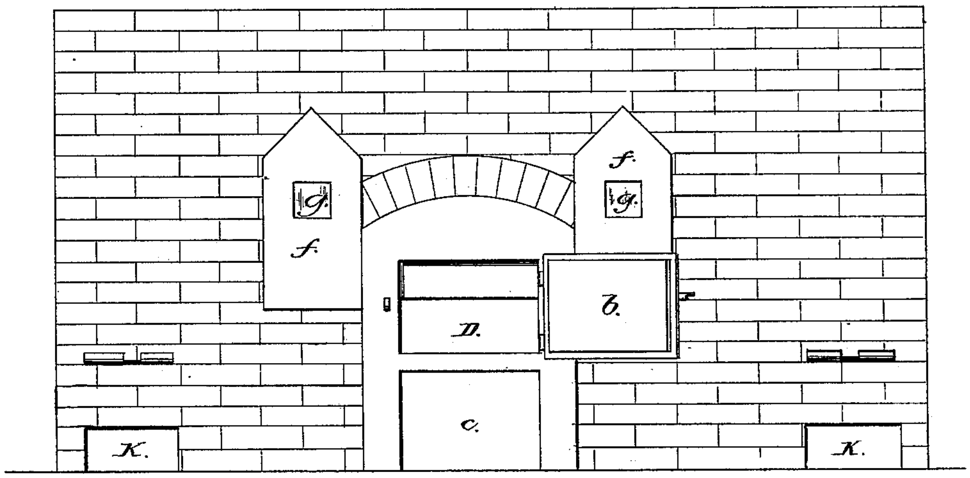
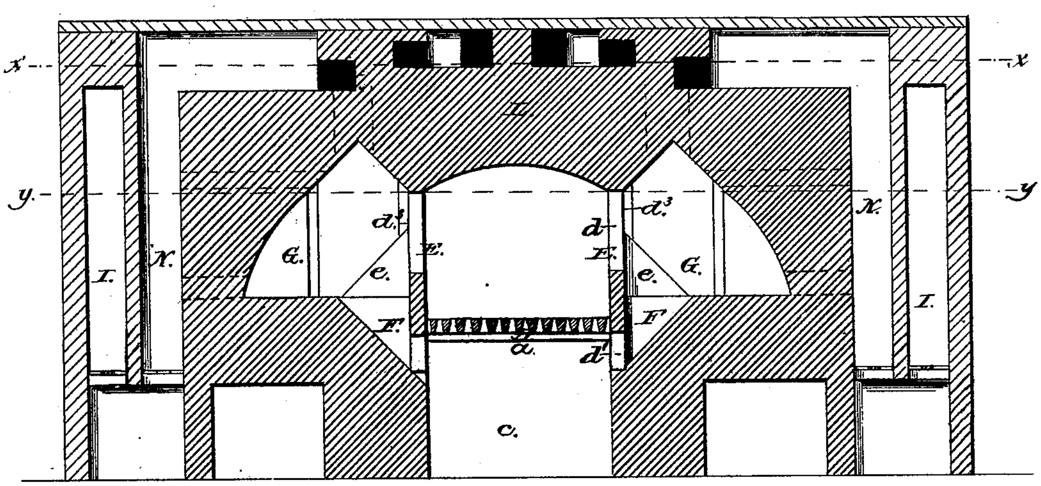


Fig. 2.



Witnesses;
Edw. W. Brown
H. W. Throckmorton.

Inventor:
James Old
By W. C. Brown
His attorney

2 Sheets—Sheet 2.

J. OLD.

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Fig. 3.

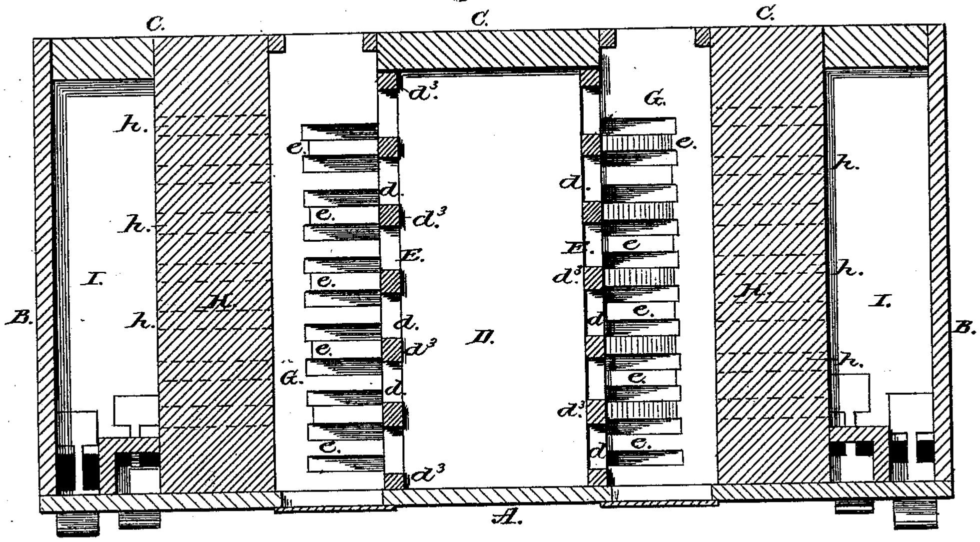


Fig. 4.

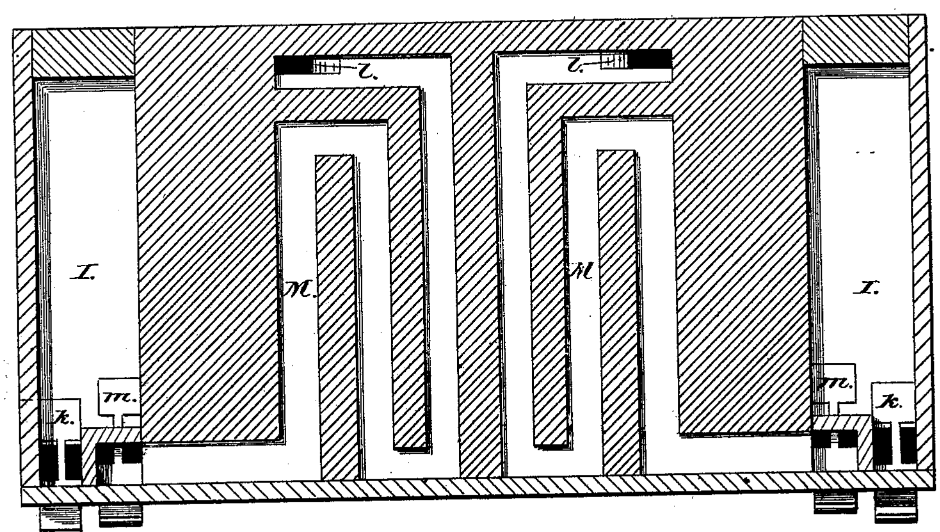
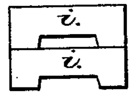


Fig. 5.



Witnesses:
Edw. W. Donn
H W Throckmorton.

Inventor:
James Old
By W. C. Donn
His attorney

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES OLD, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN FURNACES FOR BRICK-KILNS.

Specification forming part of Letters Patent No. **187,891**, dated February 27, 1877; application filed September 9, 1875.

To all whom it may concern:

Be it known that I, JAMES OLD, of Allegheny city, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces for 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to certain improvements in the construction and arrangement of furnaces for brick-kilns, &c.; the objects of which are to reduce the number of fires necessary for the burning of the bricks, and to effect a more complete combustion of the gases and smoke.

It consists, first, in placing the furnaces within the walls of the kiln, opposite the piers, pillars, or benches, as they are variously called, with a flue on either side leading to the arches, which serve to convey the products of combustion within the kiln, and also as combustion-chambers for the gases and smoke; secondly, it consists in providing air-passages outside the flues, communicating with them and the exterior, whereby a limited quantity of air is supplied to the flues for consuming the gases and smoke; and, lastly, it consists of a system of air flues or spaces in the crown of the furnace for the purpose of supplying air, previously heated, to the flues and draft-chambers.

In the drawings, forming part of this specification, Figure 1 is a front elevation of the furnace and walls of the kiln. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a horizontal section on line *y y*, and Fig. 4 is a horizontal section on line *x x*. Fig. 5 represents the bricks used for closing the flues.

Referring to the drawings, A represents the front walls of the furnace; B B, the side walls, and C is the rear where the kiln is built. D is the fire-chamber, built within the walls, opposite the piers and between two arches. The fire-chamber is provided with the grate *a*, door *b*, and ash-pit *c*. The sides or bridge-walls E of the furnace have the interstices *d* above the fuel-chamber, and d^1 below, and the piers d^3, which extend upward to the crown L of the furnace, are strengthened by the buttresses *e*. The interstices d^1 below the fuel-chamber permit the air from the ash-pit to pass up into the flues through the air-spaces F in the walls on either side of the fire-chamber; and the interstices *d* above the fire allow the products of combustion to roll over the sides into the flues G, from whence they pass into the arches of the kiln. The flues G are formed in the interior walls H of the kiln, parallel to the fire-chamber, opposite or in line with the arches, so that the heat and gases from the fire pass into them, and are thence conveyed into the arches of the kiln. The flues G, in addition to conveying the heat to the kiln, also serve as combustion-chambers for the gases and smoke arising from the fire, which pass through the interstices *d*, and their volume or mass is broken by the piers d^3, so that when they enter the flues, the air conveyed thither readily mixes with them and causes their rapid combustion. The outer ends of the flues are closed by the doors *f*, provided with the mica windows *g*, through which the state of the flame and the burning of the brick can be observed. To supply air for the combustion of the smoke and gases in the flues G the walls H are provided with the passages *h*, which communicate with the flues G and the air-flues I, which are made between the side walls of each adjoining furnace. The air for the purpose is supplied from the exterior through the opening K in the front wall, and the supply is regulated by the dampers *k*. The air, in passing through flues I and passages *h*, is raised in temperature by the heated walls, so that when it enters the flues G it mixes with the products of combustion without absorbing any perceptible amount of heat from them. The air passages or flues I are also used to regulate the temperature of the arches. In this case, where one arch is burning too rapidly, the heat-flue leading into it is closed near its rear end by the bricks *i*, which are passed in through the doors *f*. This, of course, cuts off the heat, and, by means of the dampers *g*, more or less cold air can be admitted to the arch.

From this description, it will be readily understood that the arrangement of the fire-

chamber with relation to the flues G enables two of the arches of the kiln to be heated by one fire; and each arch has a combustion-chamber, where the gases and smoke are mixed with air and consumed, thus effecting a more complete combustion and supplying each arch with a heavier and more intense flame than in kilns of other construction.

In order that as little heat may be wasted as possible in supporting the combustion, either of the fuel or the gases and smoke, the heat in the walls of the furnace is utilized for the purpose of tempering the air supplied for that purpose. To produce this effect, the crown L is provided with air-reservoirs, where air from the exterior is heated by heat stored in the walls, and conveyed either to the combustion-chambers of each furnace, or to the ash-pits of opposite furnaces. These reservoirs consist of several connected passages, M, which ramify through the crown of the furnace and communicate, through passages *l*, with the combustion-chamber of said flues, and with the exterior through the vertical shafts N. The cold air enters the shaft N through the opening K, which is provided with a damper, *m*, and passes thence into the passages M, and is there heated. From here it is conveyed into the flues G, through the openings *l*, where it mixes with the gases and smoke, and supports their combustion. When it is desired to use heated air for draft purposes, the openings *l* are closed and the passages M are made to connect with pipes which are built in the top of the kiln, and are carried to the opposite side and terminated in the ash-pit or draft-chambers of the furnace. The air, in its passage through the reservoirs and pipes, receives a high degree of heat, and the combustion of the fuel being supported by this heated air, considerable economy in its consumption is effected.

The pipes connected with the passages M may also be terminated in the passages *l* in the crown of the opposite furnace, if it is desired to have the air for supporting the combustion intensely heated. The air for this latter purpose is carried from a low point—as the opening K in the front wall, or from a well provided for the purpose—and is discharged at either of the two points described, the force of the draft from the furnace being sufficient to maintain a draft through the passage-ways.

This furnace is adapted to the heating of steam-boilers and other like purposes, and the construction of the side walls may be applied to any style of furnace or fire-place, as well as the one specially described.

Having thus described my invention, what I claim to be new, and desire to secure by Letters Patent, is—

1. The fire-chamber D, arranged with relation to the flues G and the arches of the kiln, substantially as described.

2. The side walls E, provided with the interstices d d^1 and piers d^2, in combination with the fire-chamber and combustion-chambers, substantially as described.

3. The air-flues I, provided with dampers *k* and the passages *h*, in combination with the flues G, substantially as described.

4. The combination of the reservoir M, flues or shafts N, passages *l*, and flues G, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of August, 1875.

JAMES OLD.

Witnesses:
JOHN FITZSIMMONS,
ANDREW HUMBERT.