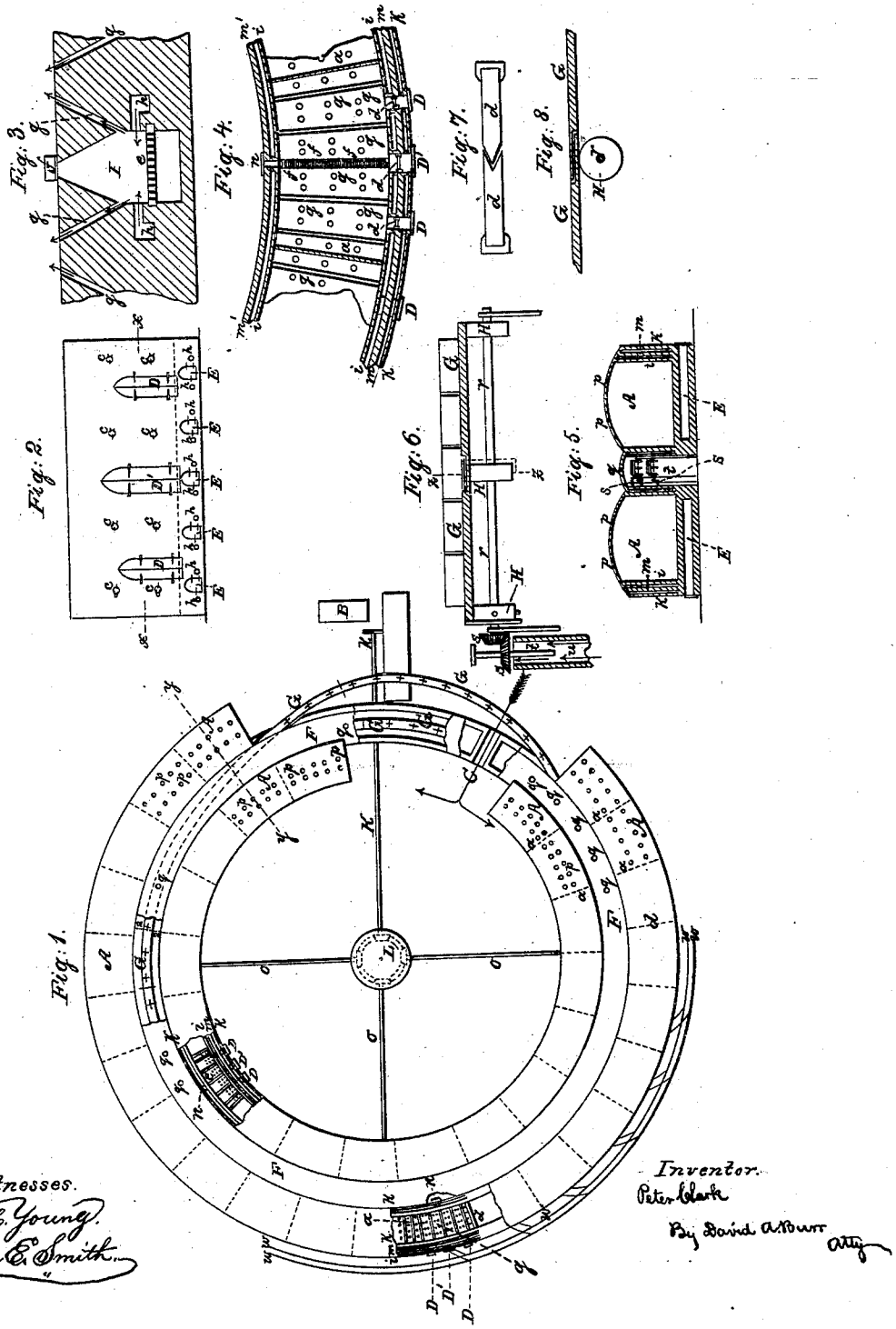
P. CLARK.

Brick Kiln.

No. 86,363. Patented Feb. 2, 1869.



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IMPROVED BRICK-KILN.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, PETER CLARK, of the city of Brooklyn, in the county of Kings, and State of New York, have invented a new and useful Improvement in the Construction and Arrangement of Kilns for Drying and Burning Bricks, and other purposes; and I do hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan of my improved kiln, with portions thereof broken out, to illustrate their internal arrangement and details, the whole illustrating one general form of constructing and combining the same;

Figure 2, an elevation of one section of the kilns for burning the bricks;

Figure 3, an enlarged transverse vertical section through the floor and one of the fire-chambers of the kiln, fig. 2;

Figure 4, a horizontal section in the line *x x* of fig. 2;

Figure 5, a transverse section in line *y y* of fig. 1;

Figure 6, an enlarged detached elevation, illustrating the manner of supporting and propelling my endless-chain platform through the drying-oven, the chain being cut in section;

Figure 7, a detached enlarged view of the construction and arrangement of fire-bricks used to close the passage-ways into the burning-kilns; and

Figure 8, a longitudinal section of a portion of the endless chain, in line *z z* of fig. 6.

The nature of my invention consists in so constructing a circular or curved drying-kiln as that it may receive an endless chain or platform, to be used in combination therewith, and be carried through the same one or more times, and be made to pass continuously in, through, and out of it, by suitable propelling-machinery; and in heating said drying-kiln by the waste heat obtained in the cooling off of one or more of a series of burning-kilns combined therewith; the whole apparatus being so arranged as that different lots of bricks may be dried, burned, and cooled simultaneously, with a great economy of time, labor, and expense, and also so as to burn the bricks with more uniformity, and less wastage, than by any of the ordinary well-known processes.

To enable others skilled in the art to make and use my invention, I will proceed to describe the construction and operation of my improved kilns.

Said kilns and drying-oven, or chamber, are built of common masonry, in concentric circles, as shown in fig. 1 of the accompanying drawings, the middle division being the drying-oven, enclosed by an inner and outer tier of kilns, for burning the bricks.

These burning-kilns A A adjoin each other, and may be longer or shorter, each being separated from and made independent of the others by suitable division-walls, *a a*.

They do not extend entirely around the drying-oven F, but are discontinued on one side, (see fig. 1,) to allow room for the brick-machine, which is to be used in connection with this apparatus, and also to give room for the removal of the dried bricks from the chain-platform G G, which passes through the oven, as hereinafter described, and, moreover, to allow space for a passage-way, C, into the open area encircled by the kilns.

The circumference of the circle formed by the combined burning and drying-kilns, as well as the number of kilns, will be determined by the number of bricks to be dried and burnt, that is, by the number and capacity of the brick-machines with which they may be used.

The drying-oven, or circular chamber, F, may be made, ordinarily, four feet wide, and six feet high, or the same height as the kilns.

The kilns may be twelve feet wide, ten feet high, and twenty-five feet long, more or less.

The oven and kilns may be arched with masonry, or covered with sheet-iron.

The roofs of the kilns A A are provided with apertures, *p p*, forming vents, for the escape of smoke and vapor, covered with iron shutters, which may be opened and closed at pleasure.

These vents *p p* enable the operatives to regulate the draught, and confine and control the heat and flame in any part of the kilns.

These kilns have, each, one or more doors, D, fig. 2, one of which, D′, may be larger than the others, to facilitate the filling in and taking out of bricks therefrom.

These doorways D have sheet-iron shutters upon the outside thereof, and are also closed on the inside, while the kilns are burning, by fire-clay plates, *d d*, (see fig. 7,) made so as to interlock in the centre, and slip, at their outer edges, into grooves formed in the walls to receive them. (See figs. 4 and 7.)

Between the doorways of the kilns I form sight-holes, *c c*, fig. 2, for the purpose of inspecting the condition of the burning bricks.

These holes are fitted with tubes, extending through the walls, and closed, at their inner ends, with plates of mica, and on the outside with iron shutters.

These burning-kilns A are constructed with double walls, over permanent, arched fire-chambers.

The outer walls, when the kilns encircle the drying-chamber, as illustrated in fig. 1, are made triple, and the inner walls double, so that, in the outer wall, two air-chambers, *i k*, are formed, on each side of the central partition, *m*, therein, whilst the inner wall has but a single air-chamber, *i*.

This central partition, *m*, of the outer wall is made thick and solid, to support the kiln, and the inner partition, *m′*, of the inner wall is made to correspond thereto.

The air-chambers thus formed in the walls prevent them from breaking and cracking from too great and

rapid expansion and contraction in the operation of the kilns, the thinness of the inside partition (built of fire-brick) permitting a free expansion and contraction thereof, independently of the thick main wall *m*, which is protected by the interposed air-chamber *k*.

The arched fire-chambers E of the kilns (see figs. 2, 3, and 6) extend from the front to the rear of the kilns, and are fitted with grate-bars over ash-pits, in the usual manner.

They are so contracted at the top as that a common fire-clay brick, *f*, figs. 3 and 4, may be set lengthwise, on edge, across the opening therefrom into the kiln; and I use these bricks to form a grating over these openings, leaving spaces between them, for the passage of the flame and heat up into the kiln.

To facilitate the heating of the kilns, and distribute the fire more evenly, I provide lateral flues, *g g*, extending up diagonally from the roofs of the fire-chambers E, on either side thereof, through the floor of the kiln, opening into the same at equal distances apart (See fig. 4, and also section of these lateral flues in fig. 3.)

On either side of each fire-chamber E, I form also horizontal cold-air flues, *h h*, fig. 4, extending parallel thereto, from front to rear, and provided, at suitable intervals, with lateral branches, opening into the fire-chamber just above the grate-bars, *e*, therein.

These lateral flues are opened and closed, each, by a separate valve, controlled by an iron rod, extending to the front, so that any one of them may be opened at pleasure, and a current of air be thereby thrown into any part of the fire-chamber, to quicken the fire at that point.

These cold-air flues are closed exteriorly by suitable iron shutters.

Through the rear wall of each burning-kiln A, encircling the drying-oven F, (both in the inner and outer series,) an opening, or flue, *n*, is made into said drying-oven.

This flue-opening (which may be about six inches square) is closed by an iron valve, or damper, operated by a rod, extending up to the roof of the kiln.

When the bricks have been properly burned in any one kiln, the flue *n* may be unclosed by turning the valve, and the waste heat of the kiln, as the bricks are cooling, allowed to pass into the drying-oven, to dry the fresh bricks passing through the same.

The temperature thus obtained in the drying-oven F may be kept under control by means of the valves in the flues *n*.

The drying-oven F may be made to form an entire circle, as shown in the drawing.

Through its roof, vent-holes *q q*, provided with shutters, are formed, at convenient intervals, to permit the vapor from the drying bricks to escape.

Intermediate these vent-holes, trap-doors may be placed, affording access to iron steps leading into the oven.

Some of the vent-holes *q* may be fitted with mica plates, through which the condition of the bricks passing through the oven may be inspected at pleasure.

I contemplate forming fire-places in this oven, on which to kindle fires, to heat the same, when required, before heat can be obtained from the kilns.

The walls of the kilns and oven are all tied together, and strengthened and secured, by transverse rods and braces of iron.

Through the drying-oven F, an endless chain, forming a platform, for the fresh-made bricks, is made to pass continuously once or twice, with a spiral coil.

This chain-platform is constructed of sheet-iron plates, G G, which may ordinarily be made one-quarter of an inch in thickness, eight feet long, and thirty inches wide.

These plates are united in a continuous chain by means of tongues projecting centrally from one end of each, fitting into a recess in the next, and secured by a simple pivot-pin, as shown in figs. 6 and 8.

The chain is supported, along its entire length and circuit, by means of suitable friction-rollers, H H, fixed upon axles, *r*, extending across under the chain.

The inner roller, H′, on each axle, is provided with a small flange, to keep the chain from slipping, and the outer roller, H, is left free to turn loose upon the axle.

The chain passes under or close by the brick-machine; thence directly into the drying-oven F, entering the same at the top; and thence, following a gentle incline down through the same, with one or more turns, finally emerges therefrom at the bottom, and passes on up to the machine again.

The fresh bricks made by the machine may be delivered therefrom directly upon the chain-platform, which will carry them down through the drying-oven, the motion of the platform being so regulated, in proportion to its length, as that the bricks shall be dried perfectly in their passage through the same, so that, when they come out, they can be loaded directly upon cars running upon the tram-ways *w w*, fig. 1, to the burning-kilns.

The inclination of the chain-platform down through the drying-oven is such as that the weight of the fresh-made bricks loaded thereon will materially assist in producing a forward movement of the chain. This movement is secured and regulated, however, by means of bevel-wheels, *s s*, fig. 6, upon upright shafts, *t t*, in the drying-oven, gearing into corresponding wheels upon the ends of a suitable number of the axles supporting the chain.

The flanged wheels H′ of these driving-axles are provided with teeth, which, in their revolution, engage in notches or slots cut in the plates of the endless chain passing over them, and thus serve to propel the same forward.

The upright shafts *t* are protected from the heat of the oven by enclosing-tubes or walls, *u*, fig. 6, of sheet-iron or fire-brick, which may be kept cool by air-passages opening to the outer air.

Motion is communicated to these upright shafts *t* by means of horizontal shafts, *o o o*, radiating from the centre of the circle of kilns, provided with suitable spur-wheels, gearing into corresponding wheels at the foot of said upright shafts *t*, the radiating horizontal shafts *o o o* being all set in motion from a main shaft, K, (communicating with and driven by the brick-machine,) by means of suitable bevelled gearing, L, as illustrated in fig. 1 of the drawings.

I ordinarily use upright driving-shafts *t t*, placed at four quarterly points in the drying-oven, to propel the endless chain, but, where an additional amount of motive-power is required, additional spur-wheels may be employed at intermediate points, and, instead of being driven by shafting, as hereinbefore described, the spur-wheels may be secured upon horizontal shafts, extending outwardly beyond the walls of the kilns, to be driven by pulleys upon these outer ends, carrying belts connected to the horizontal shafts O O.

Instead of using an endless chain, of hinged plates, running over fixed rollers, I contemplate using, as an equivalent therefor, a chain or train of cars or platforms upon wheels, running upon a fixed inclined track through the kiln, or an inclined platform, formed continuously in an unbroken circle, or in two or more separate sections, and running upon wheels.

In burning bricks with the kilns above described, any fuel may be used, and bricks may be thoroughly and equally burned, with proper fuel, in from fifteen to twenty-five hours.

When in full operation, the bricks are being filled into one set of kilns, taken out of another, burning in

another, and cooling in another, all at the same time, whilst the fresh-made bricks are drying continuously in the enclosed drying-oven F so fast as made.

The size and form of the different parts of my apparatus may be varied; yet, by preserving the same relative combinations, the same effect will be produced, and I contemplate such variations.

By making the drying-oven wider, the chain-platform G G may be carried therein spirally, not only down through the same, with one or more turns, but also be made to return upward therein, so as to come out therefrom at the top on the same level upon which it entered; or, it may be carried from one circular oven to another on a tangential line, thus uniting two circular ovens, to obtain a sufficient distance in the movement of the platform.

My improved circular drying-oven, and its inclined endless chain or platform, may be used independently of the kilns for burning bricks, the necessary heat being obtained from other sources to make it available in drying hops, fruits, peat, &c.

It is not essential that the drying-oven should have the kilns A arranged on both sides thereof, as illustrated in the drawings. It may be made to operate successfully with an outer or inner tier of kilns alone.

Having thus fully described my invention,

I claim therein as new, and desire to secure by Letters Patent—

1. An endless-chain drying-platform, passing into, through, and out of a curved or circular drying-oven, or kiln, when so arranged and combined therewith as to have a continuous downward inclination through the same, substantially in the manner and for the purpose herein set forth.

2. The combination of the single continuous drying-oven F with the series of independent, distinct brick-burning kilns A A, constructed by the side of said oven, and having, each, separate communication therewith by means of flue-openings *n n*, substantially as and for the purpose herein described.

Witness my hand to the foregoing specification.

PETER CLARK.

Witnesses:

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