

S. M. HAMILTON.

Improvement in Brick-Kiln.

No. 127,050.

Patented May 21, 1872.

Fig. 1.

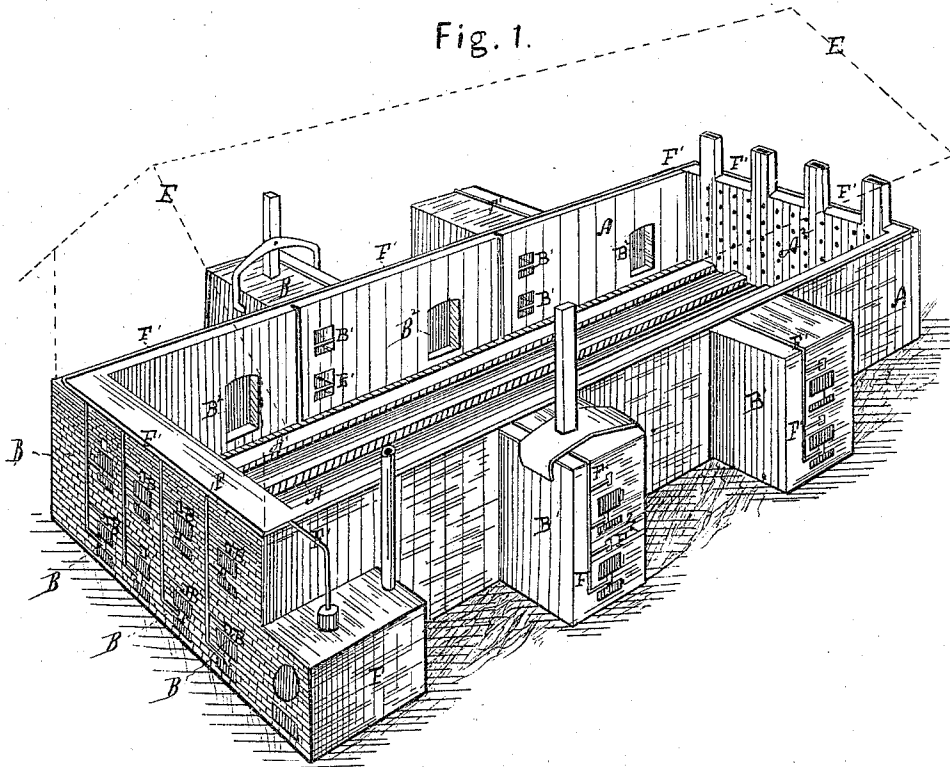
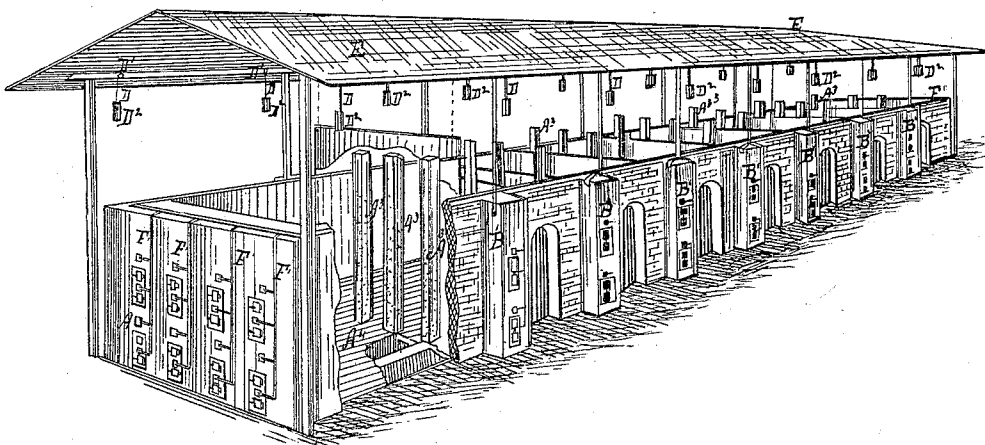


Fig. 2.



Witnesses

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G. T. Clausen

Inventor

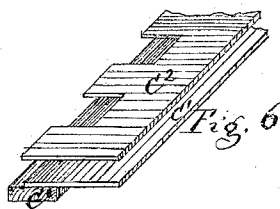
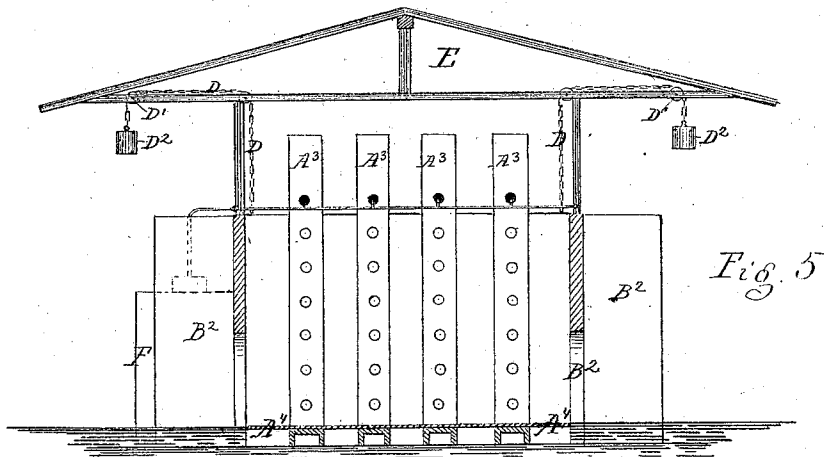
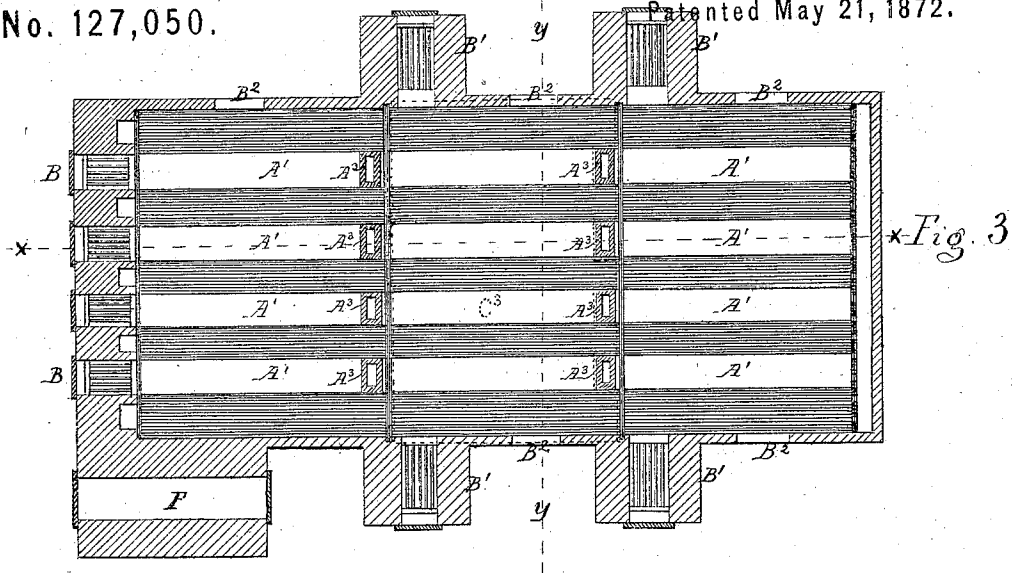
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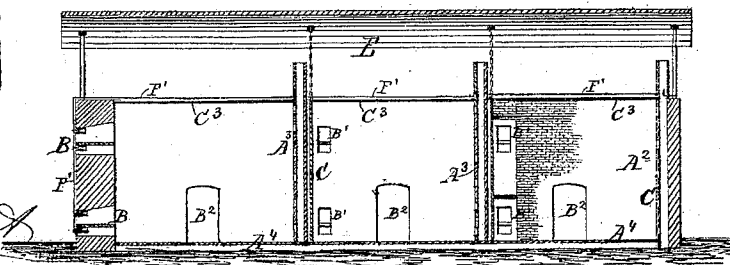
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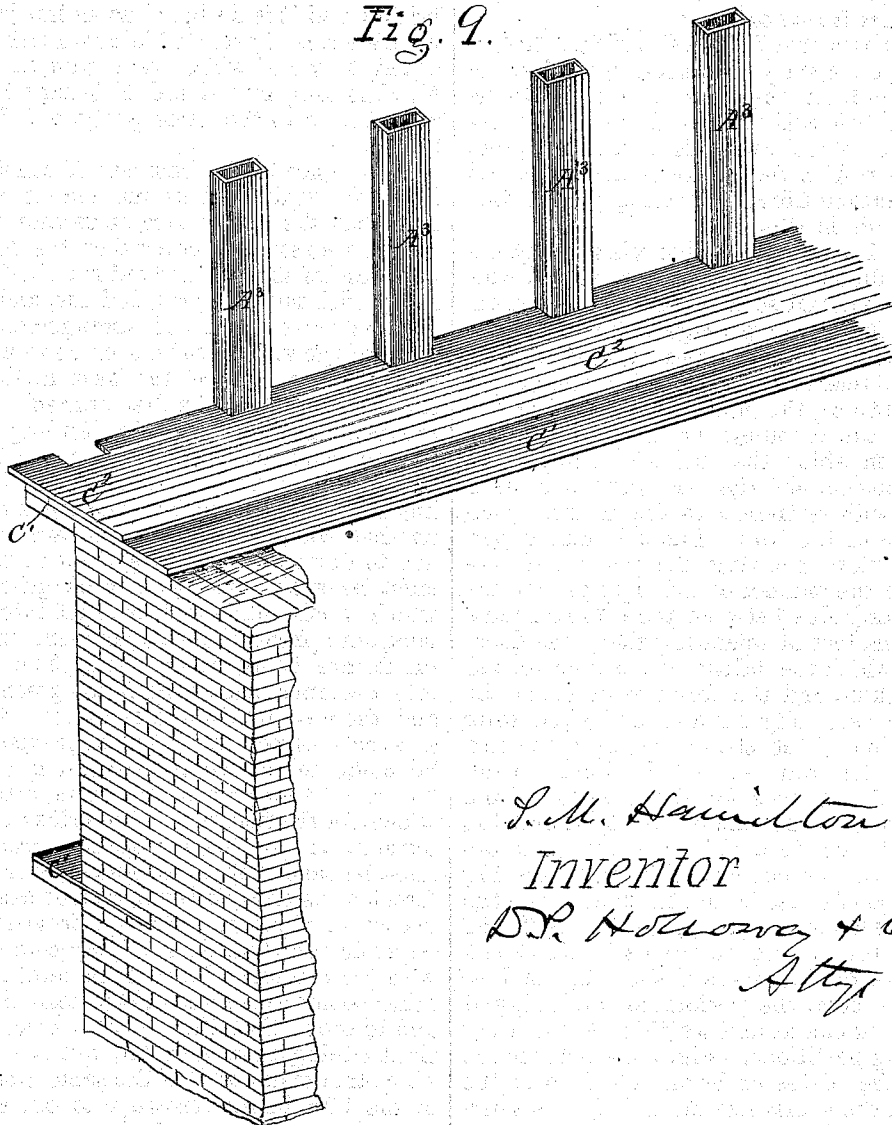
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Fig. 9.



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UNITED STATES PATENT OFFICE.

SILAS M. HAMILTON, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. 127,050, dated May 21, 1872; antedated May 6, 1872.

To all whom it may concern:

Be it known that I, SILAS M. HAMILTON, of the city and county of Baltimore and State of Maryland, have invented certain Improvements in Brick-Kilns; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification, in which—

Figure 1 is a perspective view of my improved kiln as it appears when empty, with the floor removed so as to show the flues underneath it for the passage of heated air or gases from the furnaces, and showing also the perforated rear end wall, the steam-generator and its furnace, the pipes for conducting the steam to the chimneys or uptakes, and the furnaces in which the fuel which burns the brick is placed, and the arrangement of such furnaces with references to the different compartments of the kiln. Fig. 2 is also a perspective view, showing the perforated uptakes and the manner of arranging them, the sliding partitions between the compartments and the manner of operating them, the doors through which the bricks are passed to and from the kiln, and the furnaces in which the fuel is burned. Fig. 3 is a plan view, showing the location of the steam-generator, the furnaces in the front end of the kiln, the uptakes, and the flues for the passage of the heated gases or air under the floor, and the perforated rear wall. Fig. 4 is a vertical longitudinal section on line *x x* of Fig. 3, showing the method of constructing the flues across the kiln, the manner of piling the bricks in the kiln, and the sliding partitions. Fig. 5 is a transverse vertical section, showing the flues under the floor, the perforated uptakes, and the ropes or chains and weights for operating the sliding partitions. Fig. 6 is a perspective view of the plates or bricks which form the covers of the transverse flues. Fig. 7 is a perspective view of the block which is to be inserted in the furnaces where the steam-pipes enter. Fig. 8 is a sectional elevation of the same. Fig. 9 is a perspective view, showing the manner of applying the plates covering the transverse flues.

Corresponding letters refer to corresponding parts in the several figures.

This invention relates to kilns for burning

bricks; and it is designed as an improvement upon a series of patented kilns which have preceded it, two of which were granted to Silas M. Hamilton, and dated February 15, 1870, and another to the same party, dated March 22, 1870.

Experience in the business of constructing kilns for burning bricks has demonstrated the fact that the observance of certain rules or laws is necessary in order that the best practical results shall be arrived at: First, economy of fuel must be provided for, and to this end the construction and arrangement of the parts of the kiln must be such as to utilize all or very nearly all of the heat arising from the combustion of the fuel burned. Second, provision must be made for dividing the kiln into compartments, so that the surplus heat from one compartment can be used in expelling the water-smoke from the green bricks in another compartment and in burning them; and to this end the arrangement of the parts must be such that any heated gases or air which would otherwise pass off into the atmosphere from the compartment in which bricks are being burned shall be conducted into a compartment containing green bricks, and there so distributed as to heat the mass as evenly as possible. Third, provision must be made for an equable division or distribution of the heat in the compartment in which, for the time being, the bricks are being burned; and for this purpose the arrangement must be such that the temperature in the different parts of such compartment can be regulated at pleasure. Fourth, provision must be made for the filling of each compartment with green bricks while the temperature in the other compartments is at any desired height; and in order that this may be accomplished tight sliding partitions are furnished, which effect this result and at the same time admit of the kiln being thrown into one compartment.

The object of this invention is to furnish a kiln which shall meet the requirements above stated; and to this end it consists in a novel construction and arrangement of some of its parts, they being designed to facilitate the operations above alluded to, as will be more fully described hereinafter.

A A in the drawing refer to the compart-

ments of the kiln, of which there may be any number, from two upward; but for convenience and economy in time I prefer to construct the kiln with from six to eight such compartments, they being arranged as shown so as to form one continuous kiln, some of the compartments of which may be filled and emptied while bricks are being burned in the others. The walls of this kiln may be made of common bricks or of stone, or of any other suitable material, their thickness being sufficient to give the required strength to the structure. A¹ A¹ refer to a series of flues for the passage of heated air or gases. The office of these flues is to conduct the heat caused by the combustion of the fuel in the furnaces of the rear compartment, while bricks are being burned therein, under the floor of the kiln, to the green bricks in the front one, or any of the compartments in rear of it, for the purpose of drying the bricks therein or for expelling therefrom the water-smoke. A² refers to a perforated wall which is built up in the rear end of the kiln in such a manner as to leave a space between it and the outer end wall of the kiln, in order that the heat may pass from the rear compartment to the space between the walls at all points, and from such space through the flues A¹ A¹ to the front compartment, or any one in rear of it.

When the first compartment is filled with green bricks, and it is desired to have a portion of the heat from the rear compartment pass under the floor of the kiln, a jet of steam is admitted into the uptakes in the rear of the front compartment, which induces a draught through the flues and the uptakes. Or when it is desirable to take away any of the heat from the burning bricks or from the same after they have been burned, caps are placed upon the upper ends of the uptakes, which are between the front and rear compartments, and a jet of steam is admitted to the front ones, which has the effect to draw the heat either from the rear furnaces or from the bricks in the rear compartment through the flues, and thus utilize the heat in expelling the water-smoke from the green bricks in the front compartment. The same operation may be performed with reference to all of the other divisions of the kiln. A³ A³ refer to perforated chimneys or uptakes, which may be made of clay and burned like bricks, or they may be made of iron or any other suitable material. These chimneys are to be perforated upon their front sides—and, if found necessary, upon their edges—with a series of holes, small holes or apertures extending from a point near their lower ends to a point near the upper surface of the bricks when piled in the kiln for burning. The position or arrangement of these uptakes with reference to the flues A¹, and to the sliding partitions, is clearly shown in Fig. 3, it being such that their lower ends communicate directly with said flues, and that their rear surfaces come nearly in

contact with the sliding partitions, thus, to some extent, forming a guide for such partitions. A⁴ refers to the floor of the kiln, which forms the cover for the flue A¹. B B refer to the furnaces of the front compartment, they being located in the front wall of the kiln, and supplied with a grate, upon which the fuel lies while being burned, and with an ash-pit and doors in the usual manner. The rear ends of these furnaces, of which there may be any required number in proportion to the width of the kiln, communicate with the front compartment of the kiln so that the heat in passing from them comes directly in contact with the bricks to be burned. There are two series of these furnaces, one above the other, in order that when the bricks in the lower portion of the kiln have been sufficiently burned the fires in the lower series may be extinguished, and others lighted in the upper series, and thus the bricks in the lower portion of the compartment be prevented from being overheated. B¹ B¹ refer to a series of furnaces, which are arranged upon the sides of the kiln, there being two double-tier furnaces to each compartment of the kiln. These furnaces are constructed, in all respects, like those above described, and are arranged with one grate above the other, and with their inner ends communicating with the compartment to which they belong, for the purpose above described. B² B² refer to doors or passages, which are formed in the side walls of each compartment of the kiln, they being of sufficient size to permit a man to walk in or out, or, if desired, to permit of a horse and cart passing in or out, for the purpose of carrying in or removing the bricks. C C refer to sliding partitions, which may be made of cast-iron, but which are best when made of sheet-iron. They are to be of sufficient length to extend across the kiln, or they may be made in sections and held in guides secured to the uptakes, or to the walls of the kiln; their width being such as to cause their upper edges to be about flush with the upper surface of the brick in the kiln when their lower edges rest upon the floor thereof. These partitions are made to slide up and down in grooves formed in the side walls, or in irons placed thereon for that purpose, or they may be made to slide horizontally in slots in the walls, they forming the divisions between the different compartments. C¹ refers to a tile or cover, which is made of such material as fire-bricks are composed of. The form of this tile or cover is shown in Fig. 6 of the drawing, where it will be seen that it has one thick and one thin part, the object of which is to have the thick portion form the cover of certain passages, which are to be left in the mass of bricks as they are set for burning, and which are to extend transversely across the compartment into the side furnaces thereof, as will be more fully described hereinafter, while the thinner portion extends into or onto the bricks as they are piled in the kiln, for the purpose of keeping

it in place, its position being clearly shown in Figs. 4 and 9. The transverse flues above referred to are formed by the green bricks as they are piled in the kiln, their positions being shown in the figure last alluded to. The plates or tiles C^1 are supported in their positions by their thin portions, which extend into the mass of green bricks, their opposite edges bearing against the sliding partitions, which arrangement renders them easy of application and removal. C^2 refers to a plate of metal, or it may be of burned clay or of fire-brick, which has a series of notches formed in one of its edges, they being so arranged as to permit them to fit upon the edges of uptakes while their under surfaces rest upon the covers C^1 , thus forming a tight joint around such uptakes, and preventing the escape of any heat at these points.

C^3 refers to the covering of this kiln, which may be of metal, or of clay, or any other suitable material. $D D$ refer to ropes or chains, one of which is attached to each end of the sliding plates C , from which point it passes over pulleys $D^1 D^1$ attached to the roof of the kiln or to posts erected for that purpose, its other end being supplied with a weight, D^2 , in order that, when it becomes necessary, the partitions may be raised up out of the way, and thus additional facilities offered for removing the bricks from the kiln, and also for allowing the heat to pass from one compartment to another. E refers to a roof, which may be placed over the entire kiln, if desired, it being supported upon posts, the lower ends of which rests in caps or plates of iron placed upon the side furnaces $B^1 B^1$, as shown in Figs. 1 and 2, said caps or plates being provided with flanges for keeping them in position, the posts being made to support the pulleys or sheaves $D^1 D^1$, and at the same time to extend over and shelter the steam-generator. The posts may be secured upon the top of the furnaces by means of bent rods bolted to the posts and bent over the furnaces, to the sides of which they may be secured in any suitable manner. F refers to a steam-generator furnace, it having placed in it a generator for the purpose of generating steam for supplying jets to induce draught through the different parts of the kiln. This furnace is located in any convenient position; in this instance it is at one end of the kiln, and upon the outside thereof. It is to be supplied with the usual grates and ash-pit, and the generator is to be furnished with steam-pipes $F^1 F^1$, which lead the steam from the dome to the different points of the kiln where it is to be used.

In Figs. 1 and 5 the arrangement of these pipes is clearly shown, where it will be seen that they extend from the dome of the generator to the upper surface of the wall of the kiln and entirely around the same, with branches leading to all of the furnaces of the kiln, both above and below or only above or below the fuel, in order that the intensity of the temperature may be regulated according to the condition of the burning bricks. There are also

pipes running across the kiln directly in front or in rear of the uptakes, but in such a position as to be out of the way of the sliding partitions. These cross or transverse pipes are so placed as to be near the uptakes, only leaving room enough between them for the placing therein of a cock or valve with which to regulate the flow of steam into the uptakes.

The advantage of this particular arrangement of the steam-pipes with reference to the uptakes is that the longitudinal portions thereof, being firmly secured to the side walls of the kiln, enables the cross or lateral portions in conjunction with their short branches, which are firmly secured in the uptakes, to form a reliable support for such uptakes, and thus aid materially in retaining them in their vertical position.

F^2 refers to bricks or blocks, which have a passage through them for the passage of steam and air. They are to be placed in the walls of the furnaces at about the points indicated in Fig. 1. The construction of these bricks is shown at Figs. 7 and 8, where it will be seen that the aperture through them is funnel-shaped or largest near the ends, in order that, when the steam-pipe enters near the outer end, a space may be left for the entrance of a jet of air around said pipes, and so that the air and steam may spread or expand as it leaves their inner ends.

The operation of this kiln will be as follows: The parts having been constructed and arranged substantially as described, the green bricks are wheeled or drawn through the side doors B^2 , and so piled in the compartments as to leave a free circulation of the heat between them, and so as to leave lateral flues, as shown in Figs. 4 and 9, the covers of these flues being formed as above described and shown in the figures last referred to. When the compartments or some of them have thus been filled, fires are lighted in the front furnaces $B B$, and at the same time in the steam-generator furnace. When steam has been raised, the valves leading into the front row of uptakes are opened, and thus heat is caused to pass evenly through the bricks, and the temperature is increased by the use of the steam-jets leading to said furnaces to any desired extent. When the bricks in this compartment are burned or before, if necessary, caps may be placed over the uptakes, and the steam-jets opened into the next row of uptakes, and the sliding partitions raised, when the heat from the first compartment will be drawn into the one in rear of it, and there be utilized in drying and burning the bricks; and this operation is to be repeated until the entire series of compartments have had their contents burned, the surplus heat from the rear compartment being drawn through the flues in or below the floor of the kiln to the front compartment or to any of those in rear of it, except the one in which the bricks are being burned by means of the steam-jets applied to the uptakes.

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What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a brick-kiln, constructed substantially as shown and described, I claim the arrangement of the furnaces, vertically-sliding partitions, perforated uptakes, and horizontal flues, substantially in the manner and for the purpose set forth.

2. I claim the tile or brick C¹, when constructed substantially as described, for the purpose of forming the cap or cover for the transverse flues, herein described.

3. I claim the notched plate or brick C², in combination with the tile C¹ and uptakes A³, substantially as shown and described.

4. The tubular bricks F², when the aperture is made flaring from the center of the brick

toward both sides, as shown, and for the purpose set forth.

5. I claim the combination and arrangement of the steam-pipes, the tubular bricks, and the furnaces B¹, substantially as shown.

6. The combination and arrangement of the roof E, its supporting-posts, and the socket-plates, which secure the posts to the top of the furnaces B¹, substantially as shown and described.

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

SILAS M. HAMILTON.

Witnesses:

JOS. T. K. PLANT,

W. A. BOSS.