J. Q. BENNETT & R. A. PARRY.

BRICK KILN.

APPLICATION FILED JULY 1, 1908.

986,128. Patented Mar. 7, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

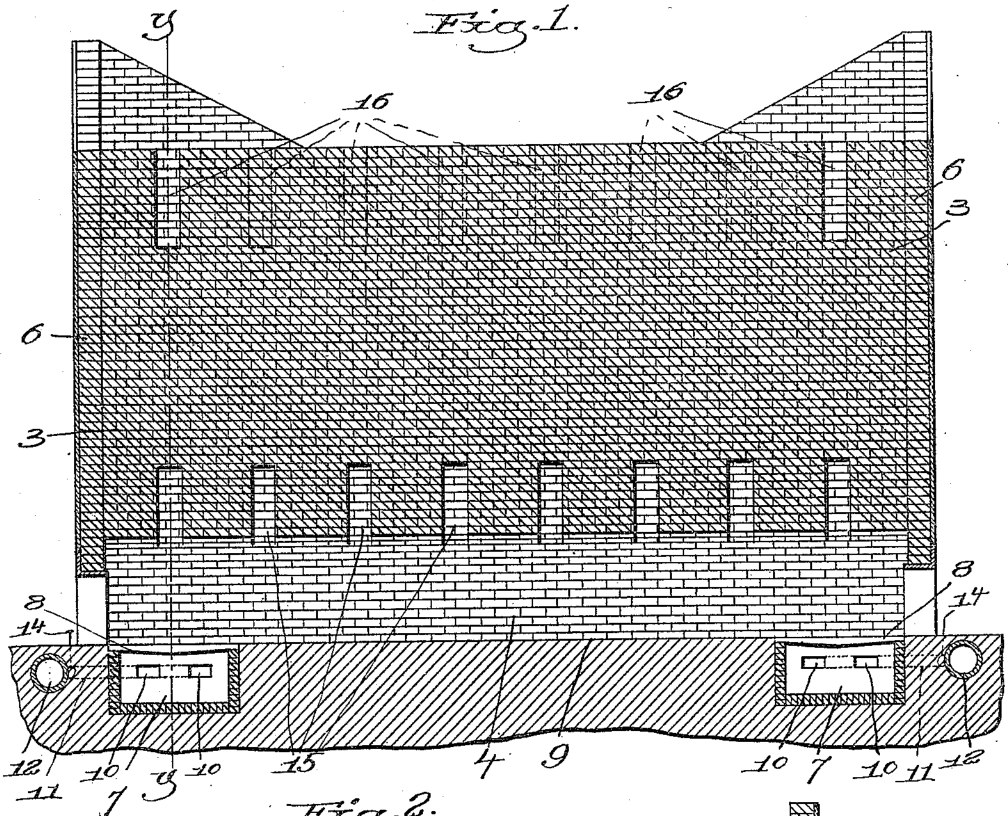
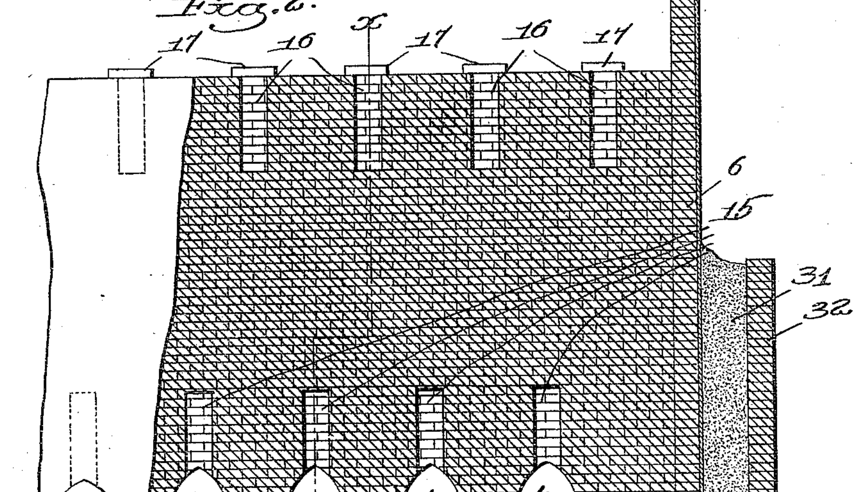


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

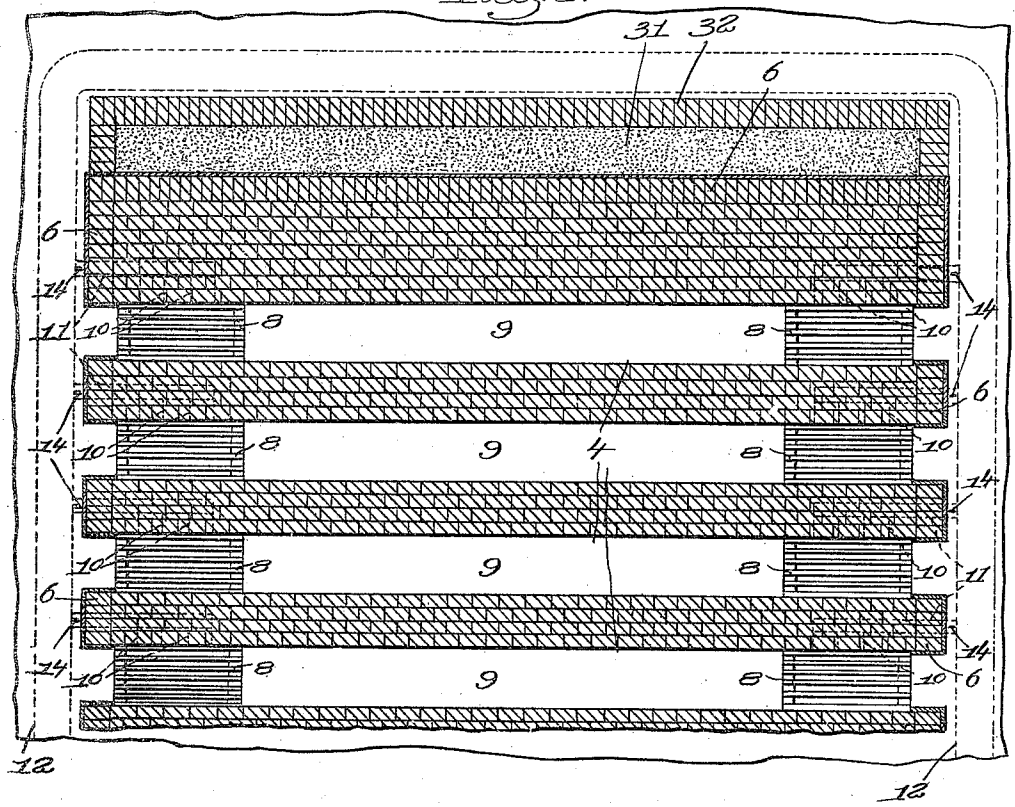
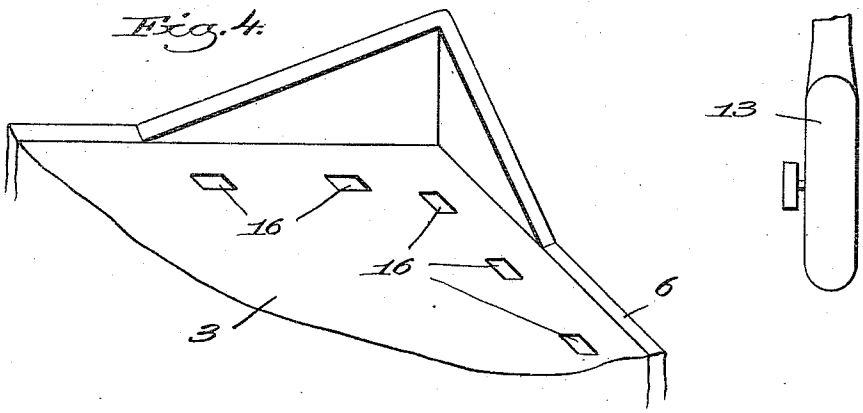


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOSIAH Q. BENNETT AND ROBERT A. PARRY, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNORS TO BOSTON BRICK COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

BRICK-KILN.

986,128. Specification of Letters Patent. Patented Mar. 7, 1911.

Application filed July 1, 1908. Serial No. 441,299.

To all whom it may concern:

Be it known that we, JOSIAH Q. BENNETT and ROBERT A. PARRY, citizens of the United States, and residents of Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Brick-Kilns, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to brick kilns and has for its object to provide a novel kiln constructed so that the bricks therein can be properly burned both as to color and hardness with a combination of coal and wood as fuel instead of wood alone.

Brick kilns are now commonly made by building the mass of bricks to be burned so as to form arches which extend from one side or head of the kiln to the other and in which the fuel is placed. The fuel now universally used is wood, it having been found that wood is best adapted for securing the desired dark red color and the desired hardness in the burned brick. Owing to the increasing scarcity and consequent high price of wood it is extremely desirable to use some other and cheaper fuel for the burning of brick, and heretofore various attempts have been made to construct a kiln so that coal could be used as a fuel. Among other ideas advanced it has been proposed to build a kiln with grates in the ends of the arches on which coal may be burned, the space between the grates constituting a place where wood may be burned. So far as we are aware, however, all attempts to use coal as a fuel have proved unsuccessful, partly because it has not been possible to distribute the heat throughout the kiln, the burning of coal giving too strong a local heat, and partly because when coal has been used as fuel in any manner heretofore proposed, the brick was very likely to be discolored or whitewashed during the clearing process (that is, during the initial burning process when the bricks are being dried and the water-smoke is being driven off). We have, however, devised a kiln in which coal may be used as fuel and which will burn the bricks without danger of whitewashing or discoloration.

Our invention also includes various improvements in the construction of the kiln by means of which the heat may be distributed to any desired portion of the kiln in any desired quantity, and by means of which the heads and corners of the kiln can be burned to the desired red color and hardness.

These and other features of our invention will be more fully hereinafter described and then pointed out in the appended claims.

In the drawings wherein we have illustrated the preferred embodiment of our invention, Figure 1 is a vertical section through a brick kiln constructed to be burned by our improved process, said section being taken on substantially the line *x*—*x*, Fig. 2; Fig. 2 is a vertical sectional view of one end of a kiln on substantially the line *y*—*y*, Fig. 1; Fig. 3 is a horizontal section through one end of a kiln on substantially the line *z*—*z*, Fig. 2; Fig. 4 is a detail of one corner of the kiln.

In building the kiln the bricks 3 to be burned are built up to form the arches 4 and benches 5 as usual, the arches extending from one head to the other in the kiln. The outside walls of the kiln are protected by the usual scoving 6 which is a layer of brick covered with an outer coating of plaster. At each end of each arch there is formed an ash pit 7 over which is placed a grate 8, said grates preferably being on substantially the level of the floors 9 of the arches.

In order to successfully use coal in burning a brick kiln, we find it is necessary to burn the coal with a forced draft, and for this purpose we have provided a blower 13 which is connected to two conduits 12 that extend along each head of the furnace, said conduits having ducts 11 leading therefrom, which ducts communicate with the ash pits through inlet apertures 10. The ducts 11 are shown as situated beneath the benches 5 and they open into the ash pit through the side of the latter. This construction, however, is not essential to the invention. Each duct is provided with a damper 14 so that the amount of air which is delivered to any ash pit can be regulated.

In burning the kiln, we propose to use anthracite or hard coal on the grates and wood in the space between the grates during the first or clearing process. The amount of coal which is burned on the grates at any

time, however, is so small that the necessary amount of wood can be easily passed over the coal into the central portion of the arches between the grates as the burning proceeds.

In firing the kiln the dampers 14 are regulated so as to admit the proper amount of air to each ash pit thereby to secure the requisite draft and temperature.

The process of clearing the kiln or driving off the water-smoke does not require so great a heat as the final process of settling the kiln, but it is during this clearing process that bricks are apt to become whitewashed or discolored. We have found that by using anthracite or hard coal during the clearing process and burning said coal under the regulated forced draft, the desired temperature for clearing the kiln can be produced and the process can be completed without danger of discoloring the brick. This is especially true where the anthracite coal is used in connection with wood. After the kiln has cleared, the settling thereof or the final burning of the brick requires a comparatively high heat, but there is much less danger of whitewashing the brick during this operation. We propose, therefore, to use bituminous or soft coal during the settling process because by using it in connection with the forced draft, the desired high temperature can be produced. The use of coal in this way, however, does not discolor or whitewash the brick.

In order to prevent the bricks of the benches which form the sides of the arches at the point where the grates are located from being injured by the strong local heat developed by the coal, we propose to plaster the ends of these bricks with fire-clay plaster as shown at 25.

The forced draft feature is an important element in securing the desired result because by means of this feature it is possible to better distribute the heat through different parts of the kiln.

The hottest part of the kiln is naturally directly over the arches and the bricks at this portion, therefore, become burned before the bricks in the other part of the kiln are done. This would be especially true where coal is burned which gives a strong local heat without the attenuated flame which is secured in burning wood. In order to distribute the heat more evenly through the kiln, we propose to build the kiln with flues 15 formed in the bricks as they are laid up which flues are situated directly over the crowns of the arches and extend upwardly into the mass of bricks through ten to twenty courses. These flues serve as means to permit the extreme heat developed at the crown of the arches to rapidly pass into the body of the brick and distribute itself more evenly throughout the body of the brick.

The heads and the corners of the kiln are the places where it is most difficult to properly burn the brick, this being so because of the difficulty encountered in conducting the heat to these parts of the kiln. This is especially true where coal is burned which gives a strong local heat. To overcome this difficulty and to make it possible to burn the coal as above described, we propose to build in the kiln near the top and around the outer edge of the kiln flues 16 or chimneys as we have termed them, said chimneys being formed in the brick when the latter are laid up in building the kiln. These chimneys extend from the top of the kiln down through ten to twenty or more courses of brick as desired. They are normally closed by covers 17 which are readily removable. These chimneys are not used at all during the clearing process but during the latter part of the settling process the covers are removed and fine coal, coke or other similar fuel is introduced into the chimneys. At this time the bricks in the kiln are thoroughly heated through although the bricks at the heads and in the corners have not been heated sufficiently to properly burn them. They are, however, hot enough so that when the coal or other fuel is introduced it ignites and generates a strong local heat at these remote corners of the kiln where it is difficult to conduct the heat from the arches. The fuel in the chimneys can be replenished from time to time as necessary. In this way additional heat can be developed and distributed through the corners and tops of the heads which augments the heat distributed to these parts from the fuel burning in the arches, and thus provides sufficient heat at these points to properly burn the brick to the desired red color.

As an additional means of carrying the heat to the corners, we propose to build the scoving at the corners above the top of the kiln as shown in Fig. 4 to form walls which partially surround and protect the chimneys at the corners. We have found from experiment that the addition of these protection walls serves to create added draft in the chimneys at the corners and thus helps to draw the heat into the corners.

The construction herein described permits us to use a combination of coal and wood in burning the kiln and yet to distribute the heat generated throughout the kiln in such a way that all the bricks of the kiln will be evenly burned and the use of the anthracite coal during the clearing process and the bituminous coal during the settling process enables us to clear the kiln without discolor-

ing the brick and also enables us to produce the requisite high heat for settling or finally burning the brick.

At the ends of the kiln and outside of the scoving we use what we term sand hicks for preventing loss of heat by radiation at these points. These sand hicks each comprise a wall 32 of brick or other material built up outside of the scoving to form a pocket in which the sand 31 is placed. The sand hicks serve to prevent loss of heat by radiation at the ends of the kiln.

Having fully described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. The method of laying brick to form a brick kiln which consists in laying the green brick at the bottom of the kiln to form the usual benches and arches and then laying the brick immediately above the arches so as to form flues which extend upwardly into the body of the brick from the tops of the arches but which terminate a considerable distance below the top of the kiln, and in laying the brick forming the top of the kiln so as to form chimneys in the brick which are located adjacent the exterior wall of the kiln part way to the top of the flues.

2. In a brick kiln, the combination with grates at the ends of the arches, of ash pits beneath the grates, means to deliver regulated quantities of air to the ash pits, and a scoving forming the exterior wall of the kiln and extending upwardly beyond the mass of brick to be burned at the corners of the kiln.

3. A brick kiln having a scoving forming the exterior wall thereof and extending upwardly beyond the mass of brick to be burned at the corners of the kiln.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

JOSIAH Q. BENNETT.
ROBERT A. PARRY.

Witnesses:
LOUIS C. SMITH,
THOMAS J. DRUMMOND.