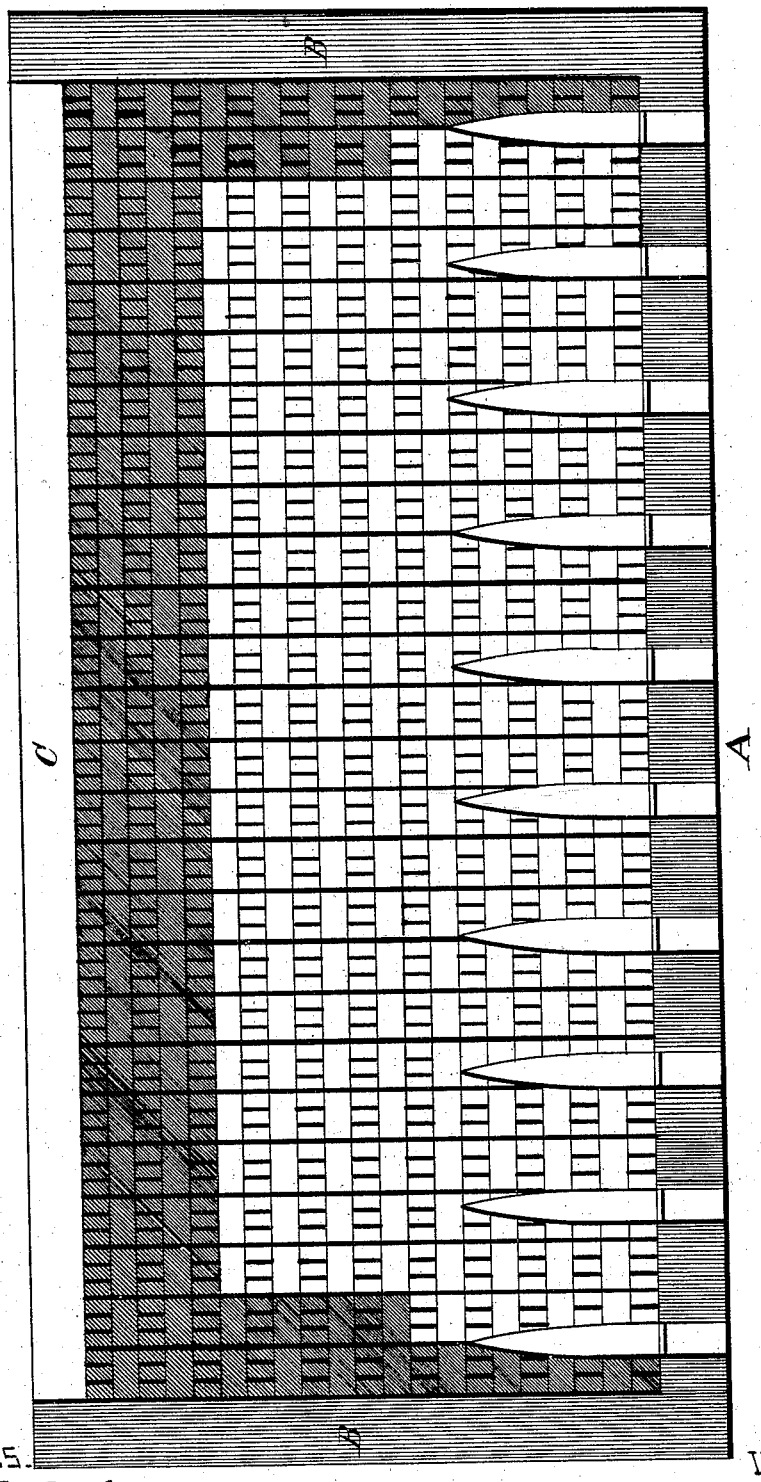
H. W. ADAMS.

PROCESS OF PREPARING MOLDED FORMS OF CLAY, AND SETTING THEM IN KILNS FOR BURNING.

No. 194,024. Patented Aug. 14, 1877.



WITNESSES.

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HENRY W. ADAMS, OF PHILADELPHIA, PA., ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN QUINCY ADAMS ZIEGLER, OF SAME PLACE.

IMPROVEMENT IN PROCESSES OF PREPARING MOLDED FORMS OF CLAY, AND SETTING THEM IN KILNS FOR BURNING.

Specification forming part of Letters Patent No. **194,024**, dated August 14, 1877; application filed November 28, 1876.

To all whom it may concern:

Be it known that I, HENRY W. ADAMS, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improved Process of Preparing Molded Forms of Clay, and Setting them in Kilns for Burning the Same, of which the following is a specification:

This invention relates to an old and well-known process of mixing a small portion of the fine coal-dust which accumulates in coal-yards with the green bricks before they are set in the kiln, in order to aid in burning them cheaper and harder.

The particular nature of my invention consists in having discovered that, by grinding coal to a fine flour, I can safely mix many times more coal with said bricks than has hitherto been done, and that by placing these bricks, tiles, pipes, pottery, or stoneware in certain localities in the kiln, I can burn a harder and better charge than any I have ever known.

To show still more plainly the nature and importance of my invention, it is important to show what the present practice is, and then to show in what respects my invention differs from it.

So difficult has the burning of bricks uniformly hard been found to be by any common mode of firing the kilns that brick manufacturers have resorted to many expedients to re-enforce the heat of the furnaces with other fuel placed in other parts of the kiln. One practice has been to mix a small quantity of the common coal-dust of the coal-yards with the mass of tempered clay, and then to mold the bricks from this mixed clay, and set them in kilns to be burned. When the heat from the furnaces, under the bottom of the kiln, becomes sufficient to raise the superincumbent courses to a red heat, the small coal in them takes fire, and produces still greater internal heat, and thus aids in producing a cheaper and harder kiln of bricks. But the quantity of coal-dust which has been so employed has been very small in consequence of its causing the bricks in which it was mixed to swell and burst, and also to be honey-combed and weak. Experience has proved, and the practice of all brick-makers who use it is founded upon it, that only about three pecks of ordinary coal-dust to one thousand bricks can be safely used. Even this small amount will often swell and burst the bricks in consequence of the coarseness of the particles of coal-dust, which constitute its principal bulk.

To comprehend more fully the nature and value of my invention, it may be here stated that it takes one ton of coal to burn four thousand bricks. One-fourth of them are salmon even then. This will average a measure of about eight fluid ounces to a brick. But the amount of coal-dust which can be safely put into a single brick to aid in burning it is only about one ounce, or about one-eighth of the amount of fuel necessary to effect its thorough burning. Any process, therefore, which can enable the brick-maker to put more of this cheap fuel into a brick to aid in burning it without injury is of great importance.

Now, my invention consists in grinding the coal to a flour and mixing many times more of it than has ever heretofore been done within my knowledge or belief with the clay composing the bricks, and placing the said bricks in those parts of the kiln which are remote from the furnaces—as, for example, the top and sides. It is possible, by grinding good coal or coke to a fine flour and mixing it very intimately with the clay, to incorporate into the clay sufficient fuel to burn a brick hard and solid without visible pores, and without losing its original shape. I have done this repeatedly, and have never yet had such a brick swell, burst, or lose its shape. From four to eight times more ground than unground coal can thus be employed, and a great improvement thus be made in burning bricks, tiles, pipes, pottery, earthen, stone, and china ware more economically and uniformly hard. Besides, by grinding the coal to a fine flour a better kind of fuel can be used than the coal-dust, which is so full of slate and dirt.

Hard coal or coke, ground to a flour and intimately mixed with clay, makes a hotter and better fuel than coal-dust. My preference

is for coke or hard coal. Any of the known modes of grinding may be resorted to—only let the coke or coal be ground very fine and be well mixed. This is a very important part of the process.

The philosophy of my invention and the secret of my success are very obvious. By fine grinding and intimate mixing of the coal-flour and the clay the impalpable particles of the coal, being isolated from each other and surrounded by clay, consume without making large pores like unground and coarse coal-dust; and clay, having the singular property of contracting by heat, shrinks and causes the brick to close up all its fine pores and become about one-fourth of an inch smaller in every direction than before it was burned, and a solid, homogeneous body, hard, red, and ringing like pig metal.

Having thus explained the nature of this part of my invention, I will now show how these molded forms of clay, thus mixed with ground coal, are to be arranged in kilns for burning them, in order that the fuel thus mixed with the bricks and other aforesaid things may be utilized to the best advantage. It is well known that heat diminishes in intensity as it advances from the source of its generation. The consequence is that the great heat created by the furnaces of a brick-kiln, though more than sufficient to burn the arches hard, is insufficient to raise the top and sides of the kiln to the proper intensity necessary to make hard bricks. Salmon bricks, disintegrating by the action of the elements, and tender, spongy, and worthless earthen and pottery ware are thus manufactured too abundantly for profit.

To remedy this evil and burn kilns of these articles more uniformly hard, in less time, and with less cost for fuel, I set my kilns in the usual way and distribute my semi-fuel bricks in those places where the heat from the furnaces is likely to be deficient. I put more ground coal into some bricks than into others, so as to accommodate the amount of fuel to the amount of heat necessary to be created in any particular locality of the kiln. The heart of a kiln above the arches, and inclosed by the top and sides within a thickness of two feet, more or less, is generally burned in a tolerably satisfactory manner. The only defect is, the ascending courses of the bricks are burned less and less hard as they rise, and consequently grow paler in color, and require sorting in order to build a front wall of a house with bricks of the same beautiful hue.

By arranging my fuel-bricks, or other similar goods, on the sides and top of the kiln, say, two courses round the walls, more or less, and six courses, more or less, on the top, a good result is obtained. The heat which is lost by absorption by the walls, and the waste from the top are, to a great extent, made up by the additional heat generated by the combustion of the coal thus disseminated in the very substance of each brick, and which not only burns itself, but gives out heat to aid in burning its neighbor. The bricks and other wares most remote from the fires should contain more ground coal than those nearer the arches and heart of the kiln.

In my drawing I have shown a kiln of bricks set preparatory to burning.

The drawing shows a section and exposes the sides and top of the kiln set with my semi-fuel bricks, or bricks composed of ground coal and clay, in the proportion of about two hundred and fifty pounds of coal flour to one thousand bricks.

A represents the kiln. C shows its top, and B B the sides.

The life of my invention is this: I have invented a new process of mixing a larger quantity and a better quality of fuel in bricks and other similar materials than ever before known by me, and locating these bricks and goods in kilns for burning them, where it is necessary to re-enforce the diminishing heat of the furnaces by the combustion of new fuel in each brick itself, by which means the whole charge of the kiln is more economically, rapidly, and uniformly burned, and its commercial value very greatly enhanced.

Having thus explained what I consider to be the nature and value of my invention, what I claim, and desire to secure by Letters Patent, is—

The process herein described of making, setting, and burning bricks or other molded forms of clay, consisting in mixing with portions of the clay for forming a kiln of bricks a quantity of finely-powdered mineral coal, equivalent to from three to eight ounces of such coal, or thereabout, or an equivalent bulk of similarly-powdered coke, for each molded brick of the usual dimensions, or similar proportions for other sizes, and then placing them, thus constituted, at points in the kiln most remote from the furnaces or fire-arches, as at the sides and top, to the end that the temperature of the kiln, when burning, shall be substantially uniform throughout, and that the bricks or charges, as a consequence, shall, at the completion of the process, be of a uniform hardness.

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Witnesses:

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