

(No Model.)

2 Sheets—Sheet 1.

H. G. BUTLER.

METHOD OF BURNING CLAY TO MAKE BALLAST, &c.

No. 529,480.

Patented Nov. 20, 1894.

Fig. 1.

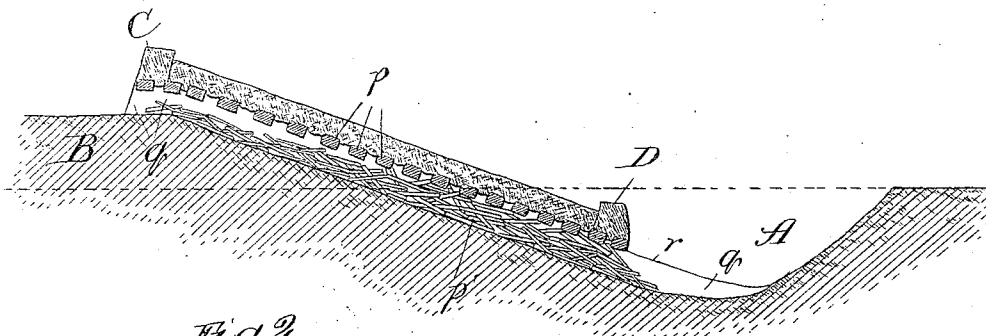
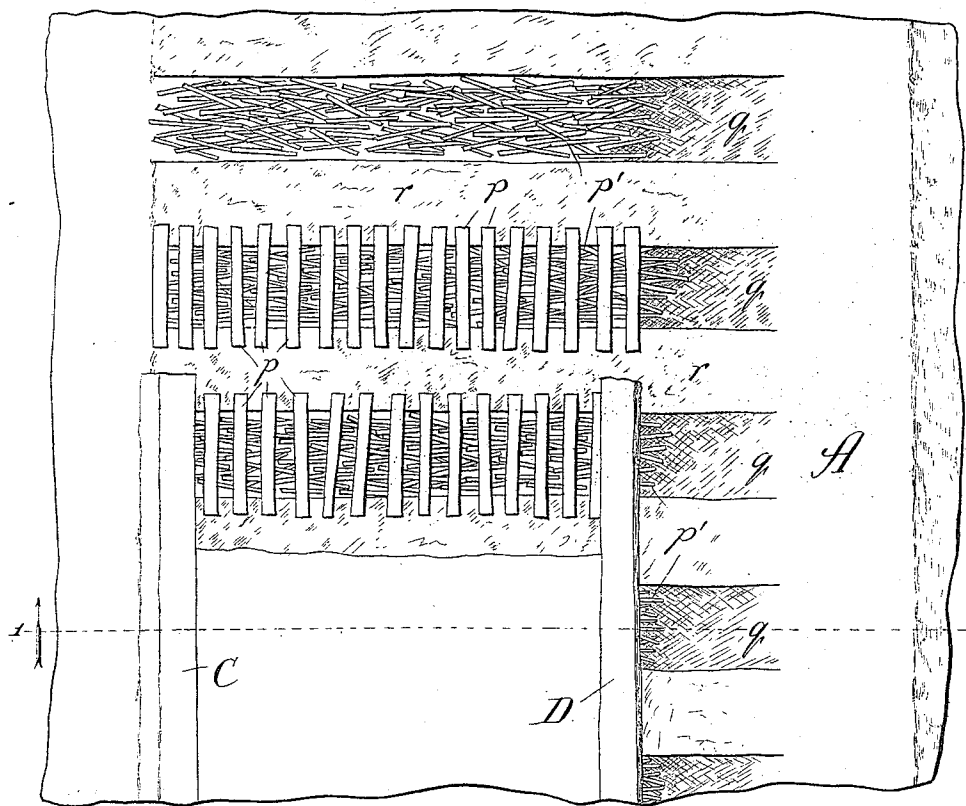


Fig. 2.



Witnesses:

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Inventor:

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Att'y

(No Model.)

2 Sheets—Sheet 2.

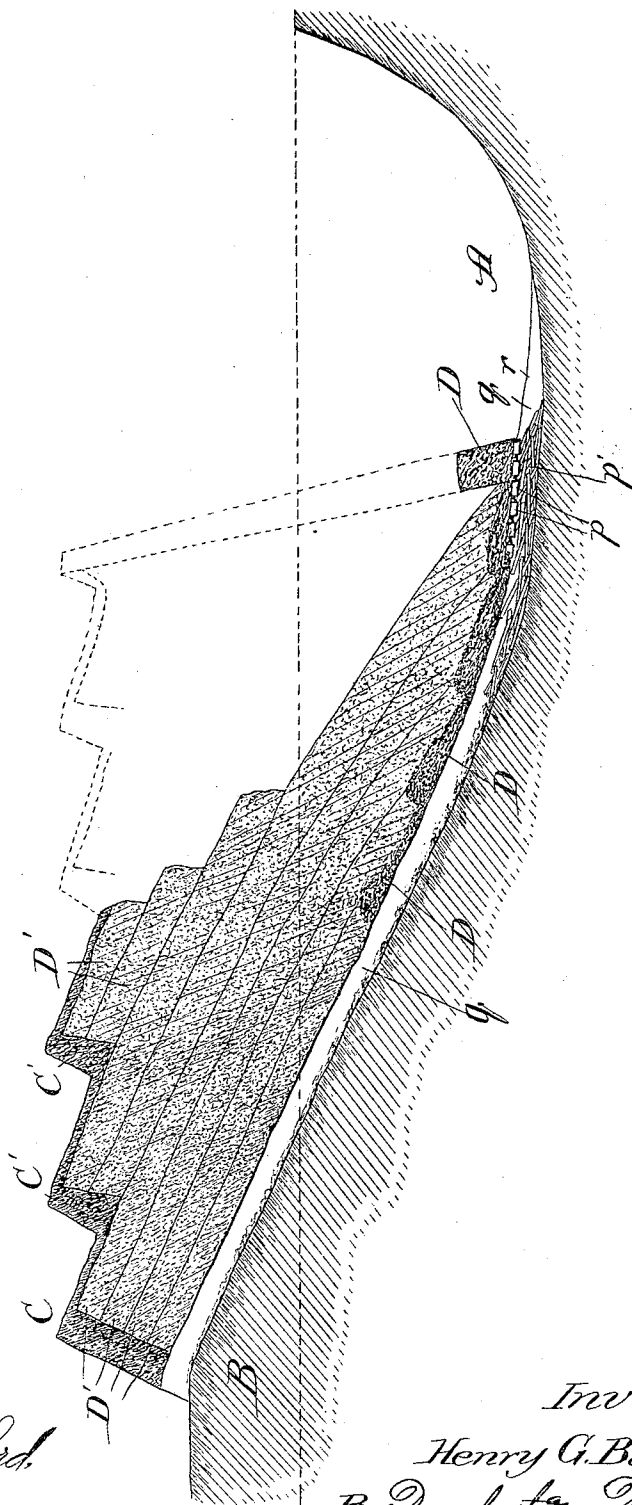
H. G. BUTLER.

METHOD OF BURNING CLAY TO MAKE BALLAST, &c.

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Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY G. BUTLER, OF KENOSHA, WISCONSIN.

METHOD OF BURNING CLAY TO MAKE BALLAST, &c.

SPECIFICATION forming part of Letters Patent No. 529,480, dated November 20, 1894.

Application filed January 27, 1894. Serial No. 498,204. (No specimens.)

To all whom it may concern:

Be it known that I, HENRY G. BUTLER, a citizen of the United States, residing at Kenosha, in the county of Kenosha and State of Wisconsin, have invented a new and useful Improvement in Methods of Burning Clay to Make Ballast, &c., of which the following is a specification.

My invention relates to an improvement in kiln-burning dirt, commonly referred to in the art as clay, to reduce it to the igneous product used as ballast for railroads, as paving material for streets, and the like; and it relates, particularly, to an improvement on the method of procedure set forth in Letters Patent of the United States No. 491,764, issued on the 14th day of February, 1893, jointly to William Butler and myself.

The procedure forming the subject of the aforesaid patent constitutes a radical departure from the practice previously observed in the art,—namely that of burning the material in the open air—inasmuch as it depends for its efficacy on burning the mass of material in a kiln and erecting the kiln-walls as the increment and burning of the mass proceed.

Since to comprehend my present improvement the aforesaid patented process should be understood, I here present a general description of the latter. After laying, on or adjacent to ground covering dirt suitable for reduction to ballast by burning, and along a (temporary) line of railway, a long pile of kindling material, preferably in and upon transverse trenches affording base flues produced by piling in ridges the upper dirt of poorer quality in the ground, and coal has been spread on the pile of kindling, clay, dug from the side or sides of the line of the fire, and which should be moist, is piled on the bed of kindling; and the pile is ready to be walled in at its sides and ends, as by banking with earth, preferably of the variety, including sod, too poor to be reduced readily by burning to a good quality of ballast, the fire is then lighted, and allowed to burn for a considerable time, when a layer of coal and then a fresh layer of clay are piled upon it, and the kiln-walls are continued as to their height, and the piling on of alternate layers of coal and clay, and continuation of the inclosing walls are proceeded with thus throughout the burn-

ing, till the pile reaches dimensions beyond which it is impracticable to continue it, or until it contains the quantity of material for an order of the ballast.

The patented process furthermore provides for building successively and burning additional fires at one side of the original fire in the trench formed by the removal of the clay to be burned, thus to increase the transverse dimensions of the kiln, by employing as the inner wall for each new fire the adjacent kiln-wall, the material of which becomes thus so thoroughly embedded in the glowing mass of the pile as to be burned into an acceptable quality of ballast, and the patent sets forth other minor details in the procedure, which may be observed more or less accurately, or departed from, in my improved procedure.

It will readily be apparent, that as the width of the kiln increases by the addition, abreast of the original fire, according to the patented manner of procedure, of successive piles, the aggregate kiln eventually grows beyond the reach from the track, at one side of the longitudinal trench formed by digging the clay, of the boom of the operating mechanism commonly provided on a car on the track for working a scraper to dig the clay and carry it to and deposit it on the pile, the track being shifted away from the trench as the width of the latter increases by the digging; and as the height to which the kiln may be allowed to extend is limited within bounds of practicability, as is also the length of boom that may be employed, the width of the kiln is accordingly limited.

The primary object of my present improvement is to provide a method of procedure whereby it shall be thoroughly practicable to continue the kiln to any desired width; and it is further my object to improve the aforesaid patented method of burning clay in a kiln in matters of detail, all as hereinafter described.

The accompanying drawings portray, as clearly as the nature of the invention will permit, my improvement.

Figure 1 is a section taken at the line 1 on Fig. 2 and viewed in the direction of the arrow; Fig. 2, a plan view in the nature of a plan-diagram; and Fig. 3, a view like that presented by Fig. 1, but representing a kiln

completed in accordance with my improvement.

A trench A is dug along one side of a railroad-track (not shown) and the soil first so dug is piled upon the level ground, at the side of the trench farthest from the track, in a bank B, and ridges *r* are formed with dirt to extend transversely of the trench and afford base-flues *q* between them for the super-structure comprising the kiln-walls and their contents. While these flue-forming ridges and the bank are not indispensable, I prefer to provide them; and when they are employed, they should extend transversely through the base of the entire kiln, thus also up along the sloping side of the trench A down which the kiln-structure is extended. In the flues and across the tops of the ridges is piled kindling-wood. Indicated at *p* and *p'* in Fig. 2. Then coal is spread upon the kindling and a layer of clay is piled thereon; and the incipient fire thus laid is inclosed on all sides between walls, the side-walls being denoted in Figs. 1 and 2 respectively by the reference-letters C and D. The pile is then lighted to cause it to burn throughout its length, and the burning is allowed to continue for a desired period of time, when additional coal and clay are piled thereon and the height of the kiln-walls is accordingly increased, the inferior material for the walls, or some of it, at least, being taken from the bank B, if desired. When the kiln has been increased in depth by the successive imposition of several such layers, and the height of the walls has been accordingly increased, a second kiln is prepared in front, or along the trench-side, of the first, the wall D of the first kiln being precipitated down the side of the trench to form the bed, or a covering on the kindling-bed, of the new kiln, for which another front wall D is built, the end-walls being accordingly extended. Upon this aggregated kiln the material for reduction into ballast is piled in layers to extend from the new front wall back to the permanent rear-wall C, the height of the walls being always continued to reach to or about the plane of the sloping top of the mass within the kiln. When a desired number of layers of the material has been thus imposed and allowed to burn, the second front wall D is precipitated and a third kiln built, in the manner described of the second; and the widening and height above the bank B of the original kiln may be thus continued till it becomes impracticable for the feeding-machinery to carry the material back to the rear wall.

In Fig. 3 of the drawings, which represents the completed aggregate kiln, I represent the accumulation of layers extending from each precipitated wall D backward, as a stratum D'.

When the kiln has attained the height and width referred to, I build on the top of the mass in the kiln at a distance from the wall C about equal to the width of the foundation for a new extension or kiln, a secondary wall

C', whereby it may be reached by the feeding-machinery, and being built on a slope, the height of the secondary wall can correspond with that of the wall C and still form a back for additional strata D' of the material imposed on the pile. Thereafter, when the sloping strata reach to the height of the first wall C', another secondary wall C' is erected, about the same distance from the first that the latter is from the wall C, and to the height thereof, to back additional strata; and as the kiln-sections between the back-walls are thus abandoned, they should be covered over with mud, or other material that will pack readily, to confine the heat below. The building is thus continued to any desired extent; and the final wall D is meantime built up to the height of the walls C, C'. 70 75 80 85

The foregoing procedure is rendered entirely practicable by building the kiln on a slope, which facilitates the merging with the kiln of each new addition and permits the layers of clay to be continuous over the whole. 90

As a still further advantage to my improvement may be stated that, by enabling the lighting of the fire to be performed at the lower side, better combustion is occasioned through the mass of material by reason of the better draft afforded, and in consequence the lower and cheaper grades of fuel may be used. Moreover, by presenting the top-surface of the kiln on a slope, it may be the more extensively supervised and enables the operator of the feeding-apparatus the more evenly to distribute the clay over it. 95 100

Finished ballast may be taken for use from the back of the kiln while the burning is proceeding toward the opposite side. To do this the back wall C, after having become cooled, is torn down, and the material thereof may be used, by spreading it on the ground, to make a foundation for a loading-track; and a sufficient amount of the unburned material is cleaned off the top to permit the loading to be proceeded with while the kiln-building is going on at the front side. The unburned material thus cleaned off may be thrown to the ground at the back, if desired, or carried toward the front and used for the walls C' and D and for covering and sealing the fire. 105 110 115

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

1. In kiln-burning clay to produce ballast and the like, the method of constructing and operating the kiln, which consists in building walls inclosing the mass of the material to be burned and burning said material, continuing building said walls as the increment and burning of said mass proceed, building another kiln in front of the first with a front wall and merging it with the first kiln by precipitating the front wall of the latter and piling material to be burned in layers extending between the original rear wall and the new front wall, substantially as described. 120 125 130

2. In kiln-burning clay to produce ballast and the like, the method of constructing and

operating the kiln, which consists in building walls inclosing the mass of material to be burned on a slope and burning said material, continuing building said walls as the increment and burning of said mass proceed, building another kiln on the slope in front of the first with a front wall and merging it with the first kiln by precipitating the front wall of the latter down the slope and piling material to be burned in sloping layers extending from the original rear wall to the new front wall, substantially as described.

3. In kiln-burning clay to produce ballast and the like, the method of constructing and operating the kiln, which consists in building walls for inclosing the mass of material to be burned on a slope and burning said material, continuing building said walls as the increment and burning of said mass proceed, building successively at intervals down the slope additional walls and piling the material to be burned in sloping layers to extend between the original rear wall and the lower front wall, building a second rear wall at a suitable distance from the first upon the mass of material in the kiln and continuing the piling of material to be burned between such second rear wall and the final front wall, substantially as described.

4. In kiln-burning clay to produce ballast and the like, the method of constructing and operating the kiln, which consists in building walls for inclosing the mass of the material to

be burned on a slope and burning said material, continuing building said walls as the increment and burning of said mass proceed, building successively at intervals down the slope additional front walls and piling the material to be burned in sloping layers to extend between the original rear wall and the lower front wall, precipitating a front wall down the slope preparatory to building the next front wall, building a second rear wall at a suitable distance from the first upon the mass of material in the kiln, and continuing the piling of material to be burned between such second rear wall and the final front wall, substantially as described.

5. In kiln-burning clay to make ballast and the like, by progressively widening and increasing the height of the kiln and its contents in burning the latter, the method of preventing the growth of the kiln from extending, beyond the reach of the feeding apparatus, the exposed surface of the bed of material on which to pile further material to be burned, which consists in building on the said bed, in succession as required, and at suitable intervals from the original rear kiln-wall and from each other, secondary kiln-walls C', substantially as described.

HENRY G. BUTLER.

In presence of—

M. J. FROST,

W. N. WILLIAMS.