

United States Patent Office.

WILLIAM J. LYND, OF GOLDEN CITY, TERRITORY OF COLORADO.

Letters Patent No. 98,607, dated January 4, 1870.

IMPROVEMENT IN USING COLORADO AND SIMILAR COAL FOR METALLURGICAL OPERATIONS.

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

To whom it may concern:

Be it known that I, WILLIAM J. LYND, of Golden City, in the county of Jefferson, and Territory of Colorado, have invented a new and useful Process of Using Colorado and other Similar Coals in Metallurgical and other Operations; and I hereby declare the following to be a full, clear, and exact description of the same.

The coals which I contemplate using are those known under the names of bituminous glance, dry bituminous, lignite, &c., at present mined in Colorado Territory, and other parts of the United States; and the object I have in view is to employ them, in the place of coke, charcoal, or anthracite, in smelting and other metallurgical operations, and for calcining limestone, burning pottery-ware, brick, &c.

To enable those skilled in the art to understand and use my invention, I will proceed to describe it, having reference, first, to the coking of the coals in connection with metallurgical operations; secondly, to the combination of coking with the calcination of limestone, or preparation of quick-lime; and, thirdly, to the combination of coking with the burning of pottery-ware, brick, &c.

1. Metallurgical Operations.

The furnaces, whether reverberatory or otherwise, should have several fire-boxes containing the coal, in number from one to six, more or less, each separated from the other by a partition-wall, and communicating by distinct flues with the basin holding the iron, or ore, or whatever is sought to be reduced.

To insure ignition, the coal when lighted should have a gentle draught for a little while, after which all air should be excluded, except by a long, narrow horizontal opening above the door of each fire-box, to admit air enough to cause the combustion of the bituminous or inflammable part of the coal.

The flames from each fire-box pass through the respective flue into the basin containing the iron, or ore, or other matter, which will thereby attain nearly a white heat, or even more, by the time the inflammable part of the coal has been consumed.

When the inflammable part of the coal has been consumed, I exclude the air from the fire-boxes by tightly closing the horizontal openings above the doors, and close tightly all the flues leading to the basin, except one. Upon the fuel of the box leading to this open flue, let the blast be thrown in any ordinary or suitable manner. During this operation, the fuel in the other fire-boxes is carbonizing.

When the fuel under the blast fails, through con-

sumption, to give the required heat, another flue may be opened, and the fuel of its fire-box similarly operated with. Thus each fire-box in turn will throw its new and intense flame upon the metal, ore, or whatever is sought to be reduced.

Each fire-box in turn can be replenished with coal, and the coking-operation, as above described, go on, so that when the last receives the blast, the first is nearly or quite ready for the renewal of the blast through it. In case it is not ready, some coke can be added to the last to keep up the heat.

The process of coking the coal for the blast and saving the heat, may be carried on without shutting the flues or entirely excluding the atmospheric air from the fuel. The process can be secured by increasing, lessening, or shutting off the draught of air admitted from beneath or elsewhere.

The same process can be similarly performed with furnaces constructed with fire-boxes without partitions, walls, or separate flues, viz, by increasing, lessening, or shutting off the draught of air admitted from beneath or elsewhere to the fuel not subject to the blast.

For some operations, pipes may be added to each fire-box, to carry off the flames, &c., of the replenished coal while coking, so as not to interfere with the blast.

If one fire-box is preferred, a furnace for coking may be placed above, with two pipes, one to let the flames of the bituminous matter, &c., of the coal enter the basin with the flames from the fire-box, the other pipe to let the inflammable matter of the replenished coal in the furnace enter, when desired, the chimney above the basin.

An aperture in the bottom of the furnace, so arranged that the blast will not interfere with the coking, will let the fuel prepared for the blast descend as it is wanted, on the principle of base-burning stoves. In this case, the fire-box may be made more shallow and greater in diameter, thereby allowing the oxygen of the air to unite more freely and completely with the carbon of the coal.

2. Calcining Limestone.

The furnaces may be two or more, ten to twenty feet in length, more or less, and three to ten feet in width, more or less, and without compartments, the coal being in one mass in each furnace. When the coal is ignited, the air is entirely excluded, except by a long, narrow horizontal opening above the door of each furnace, or by narrow horizontal openings opposite the series of lateral flues, which, to each furnace, may be in number according to length of furnace, say one flue for each two or three feet.

The flues open into the space occupied by the lime in the lime-shaft, which rises from the sides of the furnaces.

A partition-wall, raised to a proper height, will secure each furnace from derangement of draught.

The heat and flames of the burning extraneous matter given out from the coal, will raise the lime to a white heat, calcining it. When the inflammable parts of the coal are consumed, the flues must be shut closely, and the openings to let in the air hermetically closed. Thus the coal will be coked and the lime calcined.

3. *Burning Brick, &c.*

The furnaces are like the lime-kiln furnaces, and one or more for each side of kiln, which should have a permanent wall of proper thickness (at least three to four feet) and height, and should be so arranged as to be tightly closed during the burning.

The arches of the kiln should be so arranged as to receive, through the lateral flues, as in lime-burning, the flames from the furnaces, which are operated as those of the lime-kilns.

By the same process, pottery-ware can be well burned. The fuel may be in mass, as above specified, or in separate fire-boxes, as is usual in burning ware.

When the ware has attained a white heat, if more heat is required, instead of closing up the flues and excluding air for completing the coking-process, the apertures above the doors are closed, and a draught let on the fuel from beneath. The draught is increased until the required heat is attained.

In all these cases, the furnace-walls, in order to retain the heat and radiate it, so that all the heat may, as much as possible, go to the metal, or lime, or brick, should be quite thick and massive.

The process above described, of using the coals to obtain heat for burning brick, &c., is applicable, even though it is not desired to obtain coke, though the process described is, however, especially advantageous, for the reason that it affords a means of coking the coal, and at the same time burning the ware, brick, &c.

Having now described my invention, I would state that I do not limit my claim to the precise details herein given in illustration of the manner in which the invention is or may be carried into effect, for it is manifest that the same can be varied in many respects; but

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

1. The use of coals, such as specified, in smelting and other metallurgical operations, substantially in the manner set forth.

2. The use of coals, such as specified, in the operation of calcining limestone, substantially in the manner set forth.

3. The use of coals, such as specified, for burning pottery-ware, brick, &c., substantially in the manner set forth.

4. The process of coking the coals and smelting, or otherwise reducing metals, calcining limestone, or burning pottery-ware, bricks, &c., simultaneously or by one continuous operation, substantially as herein specified.

In testimony whereof, I have signed my name to this specification, before two subscribing witnesses.

WILLIAM J. LYND.

Witnesses:

WILLIAM ARMOR,

RICHARD H. HARRIS.