(Specimens.)

C. H. LAND.

MANUFACTURE OF REFRACTORY CARBON.

No. 379,960. Patented Mar. 27, 1888.

Fig. 1.

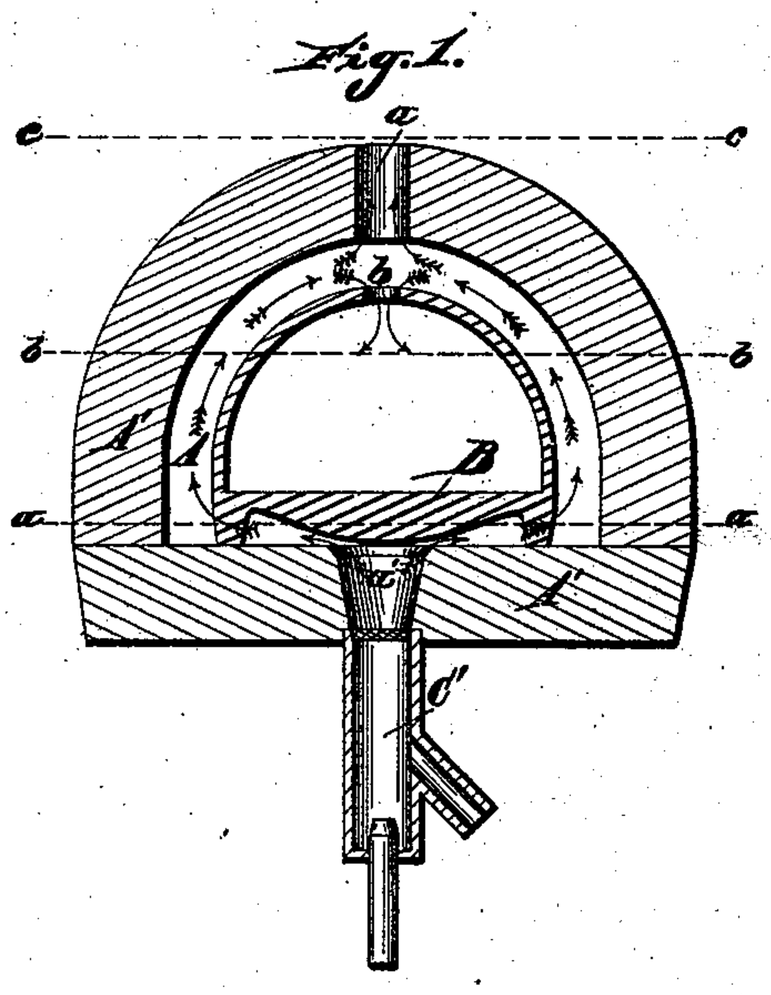

Fig. 2.

WITNESSES.

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MANUFACTURE OF REFRACTORY CARBON.

SPECIFICATION forming part of Letters Patent No. 379,960, dated March 27, 1888.

Application filed April 22, 1886. Serial No. 199,822. (Specimens.)

To all whom it may concern:

Be it known that I, CHARLES H. LAND, of Detroit, county of Wayne, State of Michigan, have invented a new and useful Improvement in Manufacture of Refractory Carbon; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improved process of producing a highly-refractory carbon.

I carry out my invention as follows:

In the drawings, Figure 1 is a vertical cross-section of a furnace by which my improved process is carried out. Fig. 2 is a longitudinal vertical section of the same.

In the said drawings, A represents the combustion-chamber of a hydrocarbon blast-furnace, inclosed by any suitable wall, A′. B is an oven or muffle located therein. The wall of the combustion-chamber is provided with one or more escape-flues, *a*.

C C′ represent Bunsen burners, into which hydrocarbon vapors are introduced. D D′ representing, also, ordinary air or oxygen tubes forming a part of said burners, the burners communicating with the combustion-chamber through orifices *a′* in the wall A′.

The peculiar mechanism shown in the accompanying drawings forms a part of a separate and accompanying application for Letters Patent, Serial No. 199,823, and forms no particular feature of this application, but is here shown and described to illustrate my improved process.

E represents a bed of carbonaceous matter located in the oven or muffle. Any suitable carbonaceous substance may be employed in my improved process; but I prefer to use anthracite coal on account of its greater density and its peculiar and distinct qualities.

It will be observed from an examination of the drawings that the furnace is so constructed that when in operation the force of the blast drives the products of combustion from beneath the muffle, where they are generated, around the muffle, as shown by the arrows, a considerable portion of the products of combustion being driven into the interior of the muffle through any suitable number of orifices, *b*, preferably located in the top of the muffle. this location being in the region of the formation of pure carbonic acid or carbon dioxide, which, owing to its greater specific gravity, naturally descends into the muffle, while any carbonic oxide or carbon monoxide formed in the combustion-chamber would speed its excess by escaping at the top through the vents *a* in consequence of the force of the blast, and a constant supply of carbon dioxide is caused to circulate through the muffle and is pushed forward to the open mouth of the muffle, (shown at B′,) thereby offering a positive and efficient counter-resistance to the encroaching atmosphere, thereby thoroughly preventing the entrance of oxygen into the muffle and all consequent danger of oxidation. This blast may be forced thus through the muffle and through the open end of the wall of the combustion-chamber, as indicated by the arrows in Fig. 2 at a^2. The wall and muffle thus being permitted to be left open enables the operator to accomplish the process in an open hearth, and makes it very convenient to pass the coal or other carbonaceous matter into the oven and to withdraw the same as soon as it is properly reduced. I have discovered that by submitting carbonaceous matter, preferably anthracite coal, to the effects of the products of combustion in this or an analogous manner its impurities are driven off to a very perfect degree, while at the same time all tendency of oxidation is overcome, leaving the commodity an exceedingly pure carbon. This carbon is removed from the furnace and pulverized, after which it is resubmitted to the action of the products of combustion in the oven or in crucibles under a very intense heat—say 3,240° Fahrenheit—and immediately withdrawn to the open air, completing the operation, when it will be found that a very pure, dense, and exceedingly refractory carbon has been obtained. By withdrawing the powdered product immediately into the open air it cools so quickly as to prevent any danger of oxidation. This carbon has superior qualities for imparting valuable conditions to all substances where a pure carbon is needed, as in the refining of ores, the conversion of iron into steel, the tempering of steel, and imparting a better

grain or texture to all kinds of manufactured steel and iron. This resulting carbon is also adapted for the prevention of the oxidation of metals when exposed to high temperatures. It is also found to possess superior qualities for the improvement of fire-bricks, retorts, muffles, crucibles, &c., showing itself to be in such conditions a highly-refractory carbon.

By the use of anthracite coal a product is secured in this manner which imparts to iron and steel by its action on them a fineness of grain and texture remarkable for its hardness and at the same time for its toughness and elasticity. It has been found that this resulting product combined with fire-clay makes fire-bricks, retorts, &c., of superior refractibility. Its great advantage in the manufacture of metals is illustrated by the fact that by simply putting common wrought-iron into the crucible and covering it with the carbon, then bringing it up to a high heat, the iron will in a very short period of time be converted into steel, while by treating steel instruments with this carbon under a high heat and then plunging them into water a remarkably fine temper can be quickly secured and the surface of the instrument left free from oxidation or decarbonization.

Heretofore in the closed ovens, retorts, or heaps used in the manufacture of carbons it has been impossible to eliminate all the volatile constituents, while in my improved method this elimination of the volatile impurities or constituents is thoroughly accomplished, while, moreover, the purified carbon thus reduced becomes also thoroughly impregnated with carbonic acid, making it exceedingly refractory, notwithstanding the highest temperatures to which it may be submitted without liability of burning, even in an open crucible in an ordinary atmosphere.

Instead of pulverizing the products after the carbonaceous matter has been treated in the manner hereinbefore described, a pulverized or finely-powdered coal might be used at the outset. For this purpose the slack might be utilized.

What I claim is—

The within-described process of producing a refractory carbon, consisting in subjecting carbonaceous matter in an open muffle located in a furnace to the products of combustion under pressure, whereby a counter-resistance is offered to expel oxygen from the muffle, prevent ignition of said matter, and drive off determined elements therefrom, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

CHARLES H. LAND.

Witnesses:
N. S. WRIGHT,
M. B. O'DOGHERTY.