

UNITED STATES PATENT OFFICE.

HERMAN L. HARTENSTEIN, OF CONSTANTINE, MICHIGAN. ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONTINENTAL INVESTMENT COMPANY, OF DULUTH, MINNESOTA. A CORPORATION OF MINNESOTA.

METHOD OF MANUFACTURING CARBID.

946,511.

Specification of Letters Patent.

Patented Jan. 11, 1910.

No Drawing.

Application filed February 13, 1907. Serial No. 357,140.

To all whom it may concern:

Be it known that I, HERMAN L. HARTENSTEIN, a citizen of the United States, residing at Constantine, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in the Method of Manufacturing Carbid, of which the following is a full, clear, and exact specification.

This invention relates more particularly to the manufacture of calcium carbid from limestone or lime and a carbonaceous material, such as coal, et cetera, and it has for its primary object a method in which all of the advantages of the use of coal may be secured without any of the disadvantages of such fuel, such as excessive smoke generated in the furnace during the reduction operation, and the higher or excessive voltage required by reason of the presence of the particles of hard coal in the charge being treated or reduced.

Another object of the invention is to provide an improved method for the manufacture of carbid in which the small particles of lime or limestone will be bound in intimate association with the small particles of carbonaceous material during the reduction of the calcareous material in the electric furnace.

In carrying out the invention, I employ lime and carbonaceous material in the usual or any suitable proportions as heretofore practiced in this art and the lime is obtained in the usual or any suitable way but preferably by calcining limestone which has been previously pulverized or comminuted. The lime or calcined limestone is taken from the pre-heater or calcining furnace while in its highly heated condition and is mixed with the proper proportion of carbonaceous material which, according to this invention, consists of a mixture of hard coal (anthracite coal) and a highly conductive artificial carbon, such as coke, or charcoal. I preferably employ anthracite coal screenings, which are in a more or less fine or comminuted condition and to eighty or ninety per cent. of this I add from ten to twenty per cent. of the coke or charcoal, which is also previously ground or powdered. By using a mixture of anthracite coal and coke it is practicable to utilize the cheaper grades of coke as, for example, breeze or refuse which is higher in

ash and impurities than lump coke which contains much more than the anthracite coal. These two ingredients are intimately commingled and mixed with the fine or pulverized lime or limestone while the calcareous material is in a highly heated condition and the mass is then subjected to the action of the electric current in an electric furnace until reduced to a molten bath according to the established practice of this art.

The anthracite coal is rich in carbonaceous material but its use alone is attended by objectionable results, such as excessive smoke which precludes a fair view of the electrodes when the furnace is opened for examination by the attendant from time to time during the operation; and, moreover, it produces a high resistance to the current and as a consequence requires the use of a higher voltage. These objections, however, are sufficiently overcome by the addition of a small percentage of coke or charcoal which adds greatly to the conductivity of the charge between the electrodes. The result may be still further improved and facilitated by the addition to the carbonaceous constituent of a small percentage (say from three to twenty per cent.) of bituminous coal, rich in tarry compounds, say about five per cent. This, also, is employed in a state of fine subdivision and it is mixed with the lime or calcined limestone while the latter is in a highly heated condition after coming from a pre-heater or calcining furnace and by thus intermingling the bituminous coal with the lime or calcined limestone while the latter is hot such coal is converted into coke and its bituminous constituents are more or less liquefied or softened and deposit upon the particles of calcined limestone as well as upon the particles of coke and anthracite coal and acts as a binder to hold these constituents of the carbonaceous material in intimate association with the lime, thereby giving every particle of lime its appropriate percentage of carbonaceous material and resulting in a final product which presents a degree of uniform reduction greater than that heretofore secured. The soft coal may also be preliminarily mixed with the anthracite or coke before being placed in the mixer with the highly heated limestone.

I do not herein claim the composition of matter produced as described this forming

the subject matter of a divisional application Ser. No. 384,235, July 17, 1907 (now Patent No. 889124, May 26, 1908).

The temperature is sufficiently high to convert the tar and carbon of the coal into coke, and previous to or during the process of mixing the sintering coal serves to act as a "binder" for holding together the coke, anthracite and highly heated limestone of the charged mixture, while the soft coal is likewise converted into a coke and becomes a portion of the charge mixture when it leaves the mixer and is placed in the electric furnaces.

It is understood that the particles of hot limestone and coke and anthracite coal become more or less mechanically united while the tarry matter of the soft coal is being expelled therefrom as it is converted into coke.

The volatile matter or gases that are expelled during the mixing process furnish heat by their combustion, and at the same time materially aid the mechanical mixing process, by reason of the boiling or agitation caused by the volatile matter of the soft coal in the presence of heat.

The gases produced by the addition of soft coal are also ample to prevent the admission of air into the mixture furnishing a surrounding and protecting gaseous blanket and thereby prevent any possible oxidation of other carbonaceous material (anthracite or coke) which is low in volatile matter.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:—

1. The hereindescribed method of manufacturing carbid, which comprises fusing lime and a carbonaceous material comprising anthracite coal and artificial carbon.

2. The hereindescribed method of manu-

facturing carbid, which comprises fusing lime and a carbonaceous material comprising anthracite coal, artificial carbon, and bituminous coal.

3. The hereindescribed method of manufacturing carbid, which comprises mixing lime with carbonaceous material comprising pulverized anthracite coal and pulverized artificial carbon and fusing the same together.

4. The hereindescribed method of manufacturing carbid, which comprises mixing lime with a carbonaceous material consisting of pulverized hard coal, pulverized coke or charcoal and pulverized coal which is rich in tarry matters and fusing the mixture.

5. The hereindescribed method of manufacturing carbid which comprises calcining limestone and mixing with the resultant lime, while hot, a quantity of bituminous coal in a state of fine sub-division, and subsequently fusing the mixture with an admixture of artificial carbon by the electric current.

6. The hereindescribed method of manufacturing carbid, which consists in mixing with hot lime, a quantity of coal containing tarry matter and causing the tar thereof to deposit itself upon the particles of lime, mixing with the said mixture pulverized artificial carbon while the mixture is hot and subsequently fusing the mass.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 29th day of January A. D. 1907.

HERMAN L. HARTENSTEIN.

Witnesses:

NELLIE ORTON,
DANL. G. CASH.