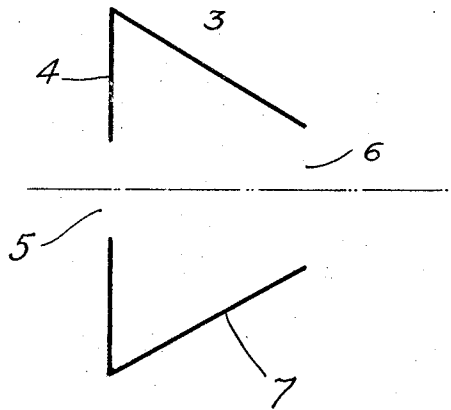


H. RODMAN.
LIGHT COKE PRODUCT AND METHOD OF MAKING SAME.
APPLICATION FILED JUNE 22, 1915.

1,334,404.

Patented Mar. 23, 1920.



INVENTOR.

Hege Rodman

BY

J. S. [Signature]

HIS ATTORNEY IN FACT.

UNITED STATES PATENT OFFICE.

HUGH RODMAN, OF EDGEWOOD, PENNSYLVANIA, ASSIGNOR TO RODMAN CHEMICAL COMPANY, OF EAST PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LIGHT-COKE PRODUCT AND METHOD OF MAKING SAME.

1,334,404.

Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed June 22, 1915. Serial No. 35,592.

To all whom it may concern:

Be it known that I, HUGH RODMAN, a citizen of the United States, and a resident of Edgewood, in the county of Allegheny and State of Pennsylvania, have made a new and useful invention in Light-Coke Product and Method of Making Same, of which the following is a specification.

This invention relates to light coke products; to the production of light coke, and also to the production of compound light coke.

By the term "light coke" I mean coke having a density less than that of coke produced by ordinary commercial methods, or coke having a density equal to or less than that of charcoal. By the term "compound light coke" I mean light coke in which other materials, such as chemicals, are evenly diffused.

An object of my invention is to produce a simple and effective method of manufacturing light coke.

A further object is to produce a method of mixing light coke with other materials or other chemical reagents.

A further object is to produce a chemical product containing coke which is more active chemically than similar products now in use and known to me.

The process of producing light coke herein set forth as an embodiment of the present invention consists broadly in subjecting coking coal to a coking heat and of simultaneously tumbling or agitating it in a mass of hot material such, for example, as coke in granular or subdivided form, as is set forth in my co-pending application No. 35,594.

In carrying out the process commercially I preferably employ crushed or powdered coal, which is introduced into a rotating kiln in such a way that it falls upon a mass of hot tumbling coke and is immediately subjected to a coking temperature without first passing through a zone of gradually increasing temperature. The coal introduced into the kiln is agitated or tumbled in the mass of coke contained in the kiln until it passes through its viscous state and so forms more coke. The resulting product is coke of low density and great porosity which is separated into a mass of relatively small pebbles or agglomerates instead of being

formed in large agglomerates such as form in the manufacture of coke by the ordinary process.

In the drawings accompanying and forming a part hereof I have illustrated diagrammatically a sectional view of a rotating kiln which may be employed in carrying out the methods herein described.

As illustrated, the kiln consists of a rotating drum 3 having a shape resembling that of the frustum of a cone. The base 4 of the frustum-shaped kiln is provided with a feed opening 5 into which the coal is fed and which is of less diameter than the discharge opening 6 located at the opposite end of the kiln. One feature of the kiln is that the tumbling floor 7 is inclined, so that the dust and small particles resulting from the abrasion of the tumbling mass of coke will gravitate toward the deepest part of the kiln and there mix and agglomerate with the incoming coal. It will be apparent that this may be accomplished by providing kilns of various shapes and that an ordinary cylindrical kiln may be employed provided its axis is inclined to the horizontal a sufficient amount to provide a pocket at the feed end.

It will also be obvious that the kiln may be of the form of an ordinary cylindrical kiln except that it is provided with a pocket or portion of increased diameter so located and arranged that the coal, prior to reaching the viscous state, is delivered to it and is tumbled therein with a relatively large subdivided mass of hot coke, in which the separate particles are free to move relatively to each other.

In carrying out my process in the manufacture of light coke, a tumbling incandescent mass, preferably incandescent coke particles of low density is maintained in the kiln 3 and crushed or powdered coal is fed onto this tumbling mass through the feed opening 5. The walls of the kiln illustrated are so formed that the kiln operates, so far as its heating qualities are concerned, as a reverberatory furnace. The heat reflected from the upper portion of the inclined wall of the kiln is directed upon and helps maintain the heat of the mass near the feed opening. The crushed coal fed into the kiln is subjected to a coking temperature and the volatile constituents liberated may be par-

tially or wholly burned within the kiln for the purpose of heating the agitated or tumbling mass. The coal is subjected to the tumbling action of the mass contained within the kiln while it is undergoing the coking operation and under these conditions the coal is agglomerated into pebbles or relatively small masses which are delivered through the discharge opening 6 of the kiln as coked masses. The density of the coke so produced is relatively low as compared to the density of coke produced by the ordinary commercial processes, and I have found that by employing a tumbling mass of free particles of approximately eighteen inches in depth at the deepest portion of the kiln, I can produce coke having a density of one-half that of ordinary coke. By varying the depth of the fuel bed and by varying the amount of coal fed to the kiln, I may vary the density of the coke produced as desired.

I find that when this low density coke is mixed or impregnated with various chemicals or energizing substances, it is much more active than similar mixtures or impregnations made of ordinary coke. Moreover, the lighter weight of the material is of advantage when surface rather than weight is the requisite factor, as in chemical reaction towers and in carburizing operations.

In the manufacture of compound light coke I either mix the agglomerates formed as above described, or light coke formed in any manner, with other material, such as chemical agents, or I may introduce the compounding material into the kiln with the coking coal. This latter method is particularly valuable when mixtures of coke and insoluble chemicals, such as lime, are desired, and it offers a ready means of bringing the coke and chemicals into intimate contact throughout the mass.

As an example of manufacturing compound coke as above described, special reference may be had to the manufacturing of such coke for carburizing purposes. In manufacturing carburizing material I mix the finely powdered coking coal with the desired energizing agent. For example, I mix finely powdered coking coal with sodium carbonate and calcium hydrate so that the mixture contains 10% of sodium carbonate and 15% of the hydrate. This mixture is then fed into the kiln through the feed opening 5 and onto the tumbling mass of incandescent material contained within the kiln. The mixture entering the kiln falls upon the tumbling bed of hot coke particles and is coked without adhering to the walls of the furnace. The resulting product consists of agglomerates of coke containing uniform amounts of the chemical agents or energizing material. By providing a kiln having an inclined tumbling floor and a discharge opening so arranged that its lowest edge is

located below the lowest edge of the feed opening, the tumbling process not only produces the agglomerates above described, but operates to grade and screen the material, since the fine dust formed by the abrasion during tumbling or otherwise, is moved to the deepest portion of the kiln by the tumbling action, and only the coked masses of the largest size are discharged through the opening 6. In this way the size of the discharged masses may be regulated by varying the rate at which the mixture is fed into the kiln.

It will be apparent that this method may be employed in manufacturing compound coke containing various materials whether they are soluble or insoluble, and that the resulting product will consist of coke intimately mixed with the compounding material.

I have described the manufacture of compound light coke as applied to the production of carburizing material, but the same process may be employed in producing compound light coke for other industrial uses, such as filling for chemical reaction towers, filtering operations, etc., where extended surface and great porosity are desired. I have also found that simple light coke, made as described, may be profitably used mixed or impregnated with various chemicals and that such mixtures are more active than when ordinary dense coke is used, as well as being lighter and therefore more economical.

What I claim is:

1. The method of making light coke, which consists in feeding crushed coking coal into a heated tumbling mass of separate particles, the mass being of sufficient size relatively to the amount of coal fed thereto as to insure a separation of the coal during the coking process, in subjecting the coal to the tumbling action of said mass as it passes through the viscous state and in discharging light coke so formed from the surface of the tumbling mass.

2. The method of making light coke which consists in mixing crushed coking coal with a mass of separate particles of non-viscous material, in heating the mass and coal while subjecting it to tumbling and until the coal has passed through the viscous state.

3. The method of making light coke which consists in mixing particles of coking coal with a mass of coke particles, the mass being of sufficient size relatively to the coal contained therein to insure separation of the particles of uncoked coal as they pass through the viscous state and subjecting the mass and the coal to a tumbling action while subjecting it to a coking temperature.

4. The process of making light coke which consists in feeding particles of coking coal into a hot and tumbling mass of

non-viscous coke particles, the mass being of such size relatively to the amount of coal fed thereto as to insure a separation of the particles of uncoked coal as they pass through the viscous state, in subjecting the coal to a coking temperature while tumbling in said mass and in discharging light coke so formed from the surface of said tumbling mass.

5 5. The process of making light coke which consists in feeding coking coal into a hot, tumbling mass of non-viscous particles of previously coked coal, in subjecting the mass to a coking temperature while tumbling and in delivering light coke so formed from the surface of the tumbling mass.

10 6. The process of making light coke, which consists in subjecting a mass of particles of coking coal to a coking temperature and separating the particles of the mass so heated so that particles simultaneously passing through the viscous state do not agglomerate.

15 7. The process of making compound light coke which consists in feeding particles of coking coal into a tumbling mass of non-viscous particles of such volume relatively

to the amount of coal fed thereto as to insure a separation of the particles of coal during the process of coking, of subjecting the tumbling mass to a coking temperature and in subjecting the coal particles to a powdered compounding reagent while passing through the viscous state.

8. The process of making compound light coke, which consists in feeding particles of coking coal into a tumbling mass of non-viscous coke, said mass being of such volume, relatively to the amount of coal fed thereto as to insure separation of the coal particles during the coking process, in subjecting the coal to a coking temperature while tumbling in said mass, and bringing it in contact with a compounding reagent while passing through the viscous state.

In testimony whereof, I have hereunto subscribed my name this 21st day of June, 1915.

HUGH RODMAN.

Witnesses:

C. W. McGHEE,

E. W. McCALLISTER.