

UNITED STATES PATENT OFFICE.

HUGH RODMAN, OF PITTSBURG, PENNSYLVANIA.

CASE-HARDENING OR CEMENTING MATERIAL.

949,448.

Specification of Letters Patent.

Patented Feb. 15, 1910.

No Drawing.

Application filed May 21, 1909. Serial No. 497,555.

To all whom it may concern:

Be it known that I, HUGH RODMAN, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Case-Hardening or Cementing Material, of which the following is a specification.

This invention relates to case-hardening or cementing material.

I have found, as described by me in a co-pending application for Letters Patent, Serial No. 496,271, filed on or about May 15, 1909, that the ordinary coke of commerce when pulverized or granulated and intimately mixed with proper proportions of an energizing substance, such as lime and soda-ash, caustic soda or barium carbonate, has the property given to it of rendering it active as a case-hardening or cementing material. By energizing substance, I mean such material, not necessarily carbonaceous material, as will when added to an inactive carbonaceous substance, render such carbonaceous substance active, as a carbonizing agent. It is difficult, however, in the case of insoluble substances to get and maintain the intimate mixture necessary, and in the case of soluble substances it is difficult to get enough of the substance into the pores of the coke.

I have found that I am able to obtain intimate mixtures of coke and energizing substances, such as lime, soda-ash, caustic soda or barium carbonate, or mixtures thereof, by mixing the proper proportions of energizing substance with coking coal, preferably finely powdered, and then heating the mixture at a temperature sufficient to coke the coal. The result is an impregnated coke which may be crushed and screened to the size desired for commercial case-hardening or cementing material. In appearance the resulting product closely resembles non-impregnated coke, but, however, it is a little softer and will absorb moisture more rapidly.

I have found that, if desired, case-hardening or cementing may be carried on during the process of coking the mixture of coal and energizer and the resulting product may later be crushed and screened for use as a commercial case-hardening or cementing material and apparently has all of the properties it would have had if the case-hardening or cementing had not been carried on during the coking operation.

I have found in practice that excellent case-hardening or cementing material may be produced by mixing ten parts by weight of powdered lime and five parts of powdered soda-ash with one hundred parts of slack coking coal and then subjecting the mixture to a temperature of about 1500° Fahrenheit until the coal is thoroughly coked. I have also found that an intimate mixture of lime and coke may be obtained by coking the mixture of slack coking coal and lime-stone. When this is done the lime-stone obviously is changed to lime, and the resulting product is coke impregnated with lime. Lime-stone prior to being calcined, is not useful as an energizing substance because of its surface-attacking properties. I have also found that other coking materials than bituminous coal may be used and I have obtained excellent results from crude oil and the heavy hydrocarbons resulting from the distillation of crude oil.

Having thus described my invention, what I claim is:

1. The method of producing cementing or case hardening material which comprises coking a mixture of coking material and a substance which after the coking has energizing properties.

2. The method of producing cementing or case hardening material which comprises coking a mixture of coking coal and a substance which after the coking has energizing properties.

3. The method of producing cementing or case hardening material which comprises coking a mixture of coking material and energizing substance.

4. The method of producing cementing or case hardening material which comprises coking a mixture of coking coal and energizing substance.

5. The method of producing cementing or case hardening material which comprises coking a mixture of coking material and soda ash.

6. The method of producing cementing or case hardening material which comprises coking a mixture of coking material, soda ash and limestone.

7. The method of producing cementing or case hardening material which comprises coking a mixture of coking coal and soda ash.

8. The method of producing cementing or case hardening material which comprises

coking a mixture of coking coal, soda ash and limestone.

9. Cementing or case hardening material containing a coked mixture of coking material and a substance which after the coking has energizing properties.

10. Cementing or case hardening material containing a coked mixture of coking coal and a substance which after the coking has energizing properties.

11. Cementing or case hardening material containing a coked mixture of coking material and energizing substance.

12. Cementing or case hardening material containing a coked mixture of coking coal and energizing substance.

13. Cementing or case hardening material containing a coked mixture of coking material and soda ash.

14. Cementing or case hardening material containing a coked mixture of coking material, soda ash and limestone.

15. Cementing or case hardening material containing a coked mixture of coking coal and soda ash.

16. Cementing or case hardening material containing a coked mixture of coking coal, soda ash and limestone.

17. Cementing or case hardening material containing a coked mixture of carbonaceous material and lime.

In testimony whereof, I have hereunto subscribed my name this 12th day of May, 1909.

HUGH RODMAN.

Witnesses:

C. W. MCGHEE,
GEO. C. WALKER.