

UNITED STATES PATENT OFFICE.

SAMUEL H. BROWN, OF BOSTON, MASSACHUSETTS.

COMPOUND FOR CARBURIZING METALS.

SPECIFICATION forming part of Letters Patent No. 465,828, dated December 29, 1891.

Application filed December 30, 1890. Serial No. 376,263. (No specimens.)

To all whom it may concern:

Be it known that I, SAMUEL H. BROWN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in a Compound for Carburizing Metals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in compounds for carburizing metals, more especially low-grade iron or homogeneous steel or Bessemer steel.

The object of my invention is to so combine the ingredients composing the compound that when confined in a retort heated to a proper temperature and containing the metal to be treated they shall carburize such metal in a very short space of time. Such a carburizing compound is particularly adapted to the treatment of stock for spring shoe-shanks, where the introduction and confinement of such stock within a retort for a few minutes is sufficient to give them the proper temper. The degree or amount which the metal is to be carburized is determined somewhat by the proportions of the ingredients. Thus for one hundred pounds of metal I generally employ thirty-three pounds of the compound, or thereabout, and this amount is to be varied according to the size of stock or mass of metal—the smaller the pieces of metal the less the quantity of compound required.

This compound embodying my invention contains bone-carbon, tungstic acid, calcined lime, soda-ash, and sal-ammoniac. The proportions of the ingredients above mentioned for one hundred pounds of the mixture are preferably as follows: eighty-seven per cent. bone-carbon, eight per cent. calcined lime, four per cent. soda-ash, one-half of one per cent. tungstic acid, and one-half of one per cent. sal-ammoniac.

My method of procedure is as follows: First place the above ingredients, with the iron to be carburized, in the retort; secondly, close the lid of the retort partially, allowing space for the free oxygen to escape as heat is applied to the retort; lastly, upon elimination of the oxygen, which requires but a few minutes, close the retort and hermetically seal it. There is then a vacuum, or nearly so.

The several ingredients act upon the metal in the following manner: The soda-ash frees the oxygen from the metal and opens the pores or molecules of the same, while the calcined lime eliminates the oxygen which is set free or which may be contained in the retort. The bone-carbon then commences to throw off its carbon, and by the aid of the ammoniacal gas generated from the sal-ammoniac a pure cyanogen gas is produced which permeates the metal. The pores of the latter being open, as stated, and devoid of oxygen, the cyanogen gas enters, carrying with it the free tungstic acid, thereby carburizing and hardening the metal. The tungstic acid acts to give greater hardness to the metal. Cyanide of silver may substituted for the tungstic acid with equally good results.

It may be well to explain that in introducing the compound the carbon, the lime, and the tungstic acid are allowed to heat first, being placed in the hottest part of the retort, while the sal-ammoniac is kept in the front, near the door. Hence while the sal-ammoniac is being decomposed into its several parts the ammonia-gas is set free, and passing over the other specified ingredients helps to generate pure cyanogen gas, which is the hardening agency.

When the metal is properly carburized, it is removed from the retort and plunged into water or other suitable bath. In compounding the above formula I do not desire to be limited to the exact proportions therein given, as they may be varied in quantity, some increased and others diminished, in accordance with the quality or form of the metal or the amount of carburization desired.

What I claim is—

1. A compound for carburizing metals, composed of bone-carbon, tungstic acid, calcined lime, soda-ash, and sal-ammoniac in substantially the proportions specified.

2. A compound for carburizing metals, containing the following ingredients: bone-carbon, calcined lime, soda-ash, and sal-ammoniac in substantially the proportions hereinbefore set forth.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL H. BROWN.

Witnesses:

H. E. LODGE,

E. K. BOYNTON.