UNITED STATES PATENT OFFICE.

GEORGE NOCK, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO T. G. NOCK.

IMPROVEMENT IN DESULPHURIZING COKE.

Specification forming part of Letters Patent No. **28,543**, dated May 29, 1860.

To all whom it may concern:

Be it known that I, GEORGE NOCK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Desulphurizing Coke; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention consists in the removal from coke during the process of its manufacture of the sulphur which is present in greater or less quantities in most, if not all, bituminous coal (and the presence of which in coke employed in the manufacture of iron and other metals is well known to be highly injurious) by the use of a mixture of an alkaline chloride with an oxidizing agent and some easily-combustible substance, which results in the speedy volatilizing and combustion of the sulphur, which would otherwise remain combined with the coke.

In the manufacture of coke for metallurgic purposes it has long been a desideratum to free it from the sulphur, which is contained in large quantities in most, if not all, of the bituminous coals, and which by the ordinary process of coking is only partially removed from the carbonized coal, especially where the coke is manufactured in ovens. This desulphurizing of coke has been attempted by means of electricity and by other means, but hitherto unsuccessfully. By my process, however, I am enabled almost entirely to volatilize the sulphur, and what little remains, if any, is in a state of combination which renders it harmless in the manufacture of iron.

To enable others skilled in the art to make use of my improved process for desulphurizing coke, I will proceed to describe it minutely.

The process of coking or carbonizing coal may be conducted in any of the usual methods—either in ovens or in heaps without an oven—and is continued until the whole mass of coal has become red-hot and has ceased to emit in large quantities its fuliginous and volatile matters. I then throw into the oven or into the coke-heap, as the case may be, a mixture composed of a solution of chloride of sodium (common salt) in water, to which is added a quantity of peroxide of manganese, pulverized, and rosin, also pulverized. The immediate consequence of the application of this mixture to the red-hot coke is a violent combustion, during which the sulphur is liberated from the coke and is burned up or carried off to such a degree as to leave little or no sulphur in the coke, the slight quantity which remains, if any, forming a combination which renders it innoxious in the manufacture of iron.

The quantities or proportions of the chemical agents employed by me in decarbonizing Pittsburg coal, and which I find to be productive of the most satisfactory results, are as follows: I dissolve in ten gallons of water three pints (dry measure) of chloride of sodium, or common salt. To this solution I add half a pound (avoirdupois weight) of peroxide of manganese and two ounces (avoirdupois) of colophony, or common rosin, pulverized. This quantity of my mixture is sufficient for an oven containing one hundred and fifty bushels of Pittsburg coal, which contains, however, not so large a quantity of sulphur as many other varieties of bituminous or stone coal. The quantity of this mixture requisite for a given quantity of coke will vary with the proportion of sulphur in the coal undergoing the carbonizing process, and therefore cannot be exactly specified; but a workman of ordinary capacity can readily tell the proper quantity to use. So, also, the relative proportion of the ingredients of my mixture may admit of variation without impairing seriously its efficiency; and I do not desire to confine myself to the exact proportions of ingredients used, nor to the use of the precise chemical agents hereinbefore named. In place of chloride of sodium, some other alkaline chloride may be substituted, or the chlorides of the alkaline earths—as salts of lime, for instance. In lieu of the peroxide of manganese, some other substance which yields oxygen at an elevated temperature in contact with carbon—such as nitrate of potash, for instance—may be employed, and instead of rosin some other easily-combustible substance, as a modification of my process; but I have stated the ingredients and their proportions which I have found on experiment to be the most efficient in producing the desired result.

I have no doubt that my mixture might be applied to the coke at a different stage of the coking process than that which I have indicated for its use with a beneficial result in removing the sulphur; but I do not think it will be found to operate as well or remove the sul-

phur as completely if applied otherwise than I have stated.

My mixture may also be used in the desulphurizing process without the rosin where by other means there is present with the coke or other substance undergoing the desulphurizing process the necessary amount of readily-combustible material.

Although my improvement is designed especially for desulphurizing coke, it may also be employed advantageously to remove the sulphur from other mineral or metallic substances in various arts and manufactures.

I am aware that various attempts have been made to remove the sulphur from coal in the manufacture of coke by the use of electricity, and also by the use of common salt alone or dissolved in water, but with so little success as to be practically useless. My invention, however, does not consist in the mere impregnation of coke with alkaline or saline solutions simply; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The use of a mixture of an oxidizing agent—such as peroxide of manganese, nitrate of potash, or other substance which yields oxygen at an elevated temperature in contact with carbon—with an aqueous solution of chloride of sodium or other alkaline chloride, or chloride of an alkaline earth, in the process of desulphurizing coke, in the manner hereinbefore described.

2. The use of a mixture of peroxide of manganese or other substance which yields oxygen at an elevated temperature in contact with carbon and colophony (or rosin) or other easily-combustible substance with an aqueous solution of chloride of sodium (common salt) or other alkaline chloride or salt of an alkaline earth, for the purpose of desulphurizing coke, in the manner hereinbefore described.

In testimony whereof the said GEORGE NOCK has hereunto set his hand in presence of us.

GEORGE NOCK.

Witnesses:

GEO. L. MCCOOK,

AND. MCMASTER.