

UNITED STATES PATENT OFFICE.

GEORGE CRANE, OF NEAR SWANSEA, GREAT BRITAIN.

IMPROVEMENT IN THE MANUFACTURE OF IRON.

Specification forming part of Letters Patent No. 1,024, dated November 29, 1838.

To all whom it may concern:

Be it known that I, GEORGE CRANE, a subject of the King of Great Britain, and now residing at the Yniscledwyn Iron-Works, near Swansea, in the said kingdom, iron-master, have invented or discovered a new and useful Improvement in the Manufacture of Iron; and I, the said GEORGE CRANE, do hereby declare the nature of my invention and the manner in which the same is to be performed are fully ascertained in and by the following statement thereof—that is to say:

According to the ordinary practice of obtaining iron from iron-stone, mine, or ore in this country the iron stone, mine, or ore (either calcined or in the raw state, according to its respective qualities) is put into suitable furnaces with coke produced from bituminous coal—formerly called “pit-coal,” in contradistinction to charcoal produced from wood, which was the fuel employed in this country previous to the introduction of pit-coal in the smelting and manufacture of iron. Now, as there are districts in which are to be found large quantities of iron-stone, mine, or ore in the immediate neighborhood of what is known as “stone-coal,” or anthracite coal, it has long been considered as a desirable object to employ such coal for the smelting and manufacture of iron; and although attempts have been made to apply such description of coal in the smelting and manufacture of iron, the same have failed and have been abandoned. In addition to such advantages to be obtained from the using of anthracite or stone coal in the districts where such coal is found, together with iron-stone, mine, or ore, from the practice I have had I am induced to believe such coal, from its properties, will be found to produce a quality of iron more nearly resembling iron obtained by the aid of vegetable charcoal.

Now, the object of my invention is the application of such anthracite or stone coal combined with a hot-air blast in the smelting or manufacture of iron from iron-stone, mine, or ore; and in order to give the best information in my power for enabling a workman to carry out the invention, I will describe the process or means pursued by me in doing so.

I will suppose the furnace, of an ordinary construction, to be in blast, and that the ma-

chinery and apparatus are adapted for the application of hot-air blast, as is well understood and extensively applied in many places where the ordinary fuel—coke of bituminous coal or the coal in a raw state—is employed in the manufacture of iron from iron-stone, mine, or ore, and I have found that a surface having suitable apparatus for heating the blast to about 600° of Fahrenheit a good arrangement for carrying out my invention, though so high a degree of temperature is not indispensably necessary, but I believe preferable. In charging such a furnace I throw in about three hundredweight of anthracite or stone coal or culm to each five hundredweight of calcined argillaceous iron-stone with a proper quantity of flux, as if working with the coke of bituminous coal, such charging of the furnace and the general working, with the exception of the using of anthracite or stone coal, are to be pursued as if working with coke of bituminous coal; and I would remark that the quantities above given are such as I have hitherto employed in making the best qualities of pig-iron—videlicet, No. 1 or No. 2—at my works from the anthracite or stone coal or culm; but those quantities may be varied according to local circumstances, and the refractory nature of the iron-stone, mine, or ore, or otherwise to be reduced, and the quality of iron desired to be obtained, as is the case in ordinary working, and at the judgment and discretion of the manager as heretofore. And I would remark that the anthracite or stone coal or culm may be coked in like manner to bituminous coal before charging the furnace; but from my experience I have not found that such coking is necessary or that a more advantageous result is obtained than in applying the anthracite or stone coal directly from the mine; and it is desirable to observe I have found it of advantage that the blast of hot air should be as free and unimpeded as possible, and from that account I have hitherto used only anthracite or stone coal, the smaller parts of which would not pass through a sieve of an inch mesh; but where the pillar or volume of blast is considerable—say two pounds and upwards on the square inch—this precaution is not necessary.

Having thus described the nature of my invention and the manner of carrying the same

into effect, I would have it understood that I do not claim the using of a hot-air blast separately in the smelting and manufacture of iron as of my invention when uncombined with the application of anthracite or stone coal and culm; nor do I claim the application of anthracite or stone coal in the manufacture or smelting of iron when uncombined with the using of hot-air blast; but

What I do claim as my invention is—

The application of anthracite or stone coal and

culm, combined with the using of hot-air blast in the smelting and manufacture of iron from iron-stone, mine, or ore, as above described.

In witness whereof I, the said GEORGE CRANE, have hereunto set my hand this 29th day of March, 1837.

GEORGE CRANE.

Witnesses:

A. CARPMAEL,

W. H. RITCHIE.