

United States Patent Office.

GEORGE FREDERICK ANSELL, OF BERNARD STREET, RUSSELL SQUARE,
ENGLAND.

Letters Patent No. 104,686, dated June 28, 1870.

IMPROVEMENT IN THE MANUFACTURE OF IRON AND STEEL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, GEORGE FREDERICK ANSELL, of Bernard street, Russell Square, in the county of Middlesex, England, have invented new and useful Improvements in the manufacture of Iron and Steel; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same.

This invention relates to the conversion of iron into steel, or into wrought iron, for armor-plates, railways, and for other purposes, by the use of bisulphate of potash, or the bisulphate of soda, or a mixture of the two, the same being applied in such a manner as to act throughout the mass of melted metal.

For this purpose the bisulphate may be placed at the bottom of a converting-chamber or receiver, consisting of a vessel lined with fire-clay, and furnished with a bed of sand or loam.

Into this chamber the melted metal is then to be poured, or the converting-chamber may have ridges or ledges ranged round its interior, upon which the bisulphate may be disposed, to facilitate its mingling with the molten metal.

The bisulphate may also be first heated or melted before being used, and it may be poured into the chamber or receiver, in a heated state, simultaneously with the melted metal, so that their admixture may commence in the act of being poured into the receiver.

By means of the oxygen contained in and liberated from the sulphuric acid of the bisulphate any phosphorus, sulphur, carbon, vanadium, and silicon contained in the melted metal will be eliminated by the chemical action which will take place, and will take the form of slag, which, when set, may be readily separated from the metal.

The receiver may have a tap-hole at the bottom, to run off the purified or converted metal.

The quantity of bisulphate to be employed must depend on the amount and proportion of phosphorus, sulphur, carbon, silicon, and other impurities contained in and intended to be eliminated from the iron or steel, which must be ascertained by analysis, and the quantity of bisulphate must be so proportioned as that there

may be enough to supply sufficient oxygen to combine chemically with those impurities.

The amount of bisulphate may be so proportioned to the metal under treatment, as not to remove the whole of the carbon, when steel is required to be produced, but if wrought iron be required, the amount must be so proportioned as to remove the whole of the carbon.

When steel is required to be made from this purified or wrought iron, a sufficient quantity of *spiegel-eisen*, or its equivalent, may be added, to recarbonize the iron.

Where there is a smelting-furnace, the melted metal may be run directly from it into the converter, or a succession of converters, direct, so that the conversion may be without any intermediate heating or remelting, or the metal may be run through tubes, channels, or colanders containing the bisulphate, and which will serve as converters, and may thence be discharged into molds or other receiving-vessels, where the metal will set in the form of ingots, pigs, solid cylinders, spheres, or otherwise.

The slag that may adhere to these castings may be readily separated therefrom by a hammer.

Where it is desired to eliminate phosphorus, carbon, silicon, sulphur, vanadium, or other impurities from manufactured iron or steel, the metal must be melted and treated with bisulphate, as already described.

Having now described the nature of my invention, I wish it to be understood that

I claim the use of bisulphate of potash or soda, or of a combination of these substances, for the oxidation and removal of the impurities of and from iron and steel, as herein described.

In witness whereof, I, the said GEORGE FREDERICK ANSELL, have hereunto set my hand and seal the 10th day of February, 1870.

GEORGE F. ANSELL. [L. s.]

Witnesses:

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