

UNITED STATES PATENT OFFICE.

CHARLES M. HALL, OF NIAGARA FALLS, NEW YORK.

MANUFACTURE OF STEEL.

SPECIFICATION forming part of Letters Patent No. 575,110, dated January 12, 1897.

Application filed August 26, 1896. Serial No. 603,980. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES M. HALL, of Niagara Falls, in the county of Niagara and State of New York, have invented a new and useful Improvement in the Manufacture of Steel, of which the following is a full, clear, and exact description.

I have discovered that in the making of steel ingots and in making castings of steel important results are secured by adding to the molten steel aluminium alloyed with titanium. This alloy contains, preferably, from .75 per cent. to 2.50 per cent. of titanium, though my invention is not limited in this regard, and a somewhat higher or lower percentage of titanium may be present. It may be made by dissolving rutile or titanium oxid with alumina in the double fluoride electrolytic bath from which aluminium is now commonly reduced, and thus reducing the titanium along with the aluminium, or I may add in such bath with the alumina a titaniferous iron ore, which will yield an alloy of aluminium, iron, and titanium, or other modes of producing the alloy may be employed, since the method of its manufacture does not constitute part of my present invention.

In the practice of my invention when making steel ingots of soft steel I add the alloy to the steel, preferably when the latter is in a molten state in the ingot-mold, using it, preferably, in proportion of from two to four ounces of the alloy per ton of steel. The addition is conveniently made by dropping the alloy in small lumps into the mold during the

pouring of the steel. The consequence of the addition is to quiet the steel and to produce other beneficial results, its action being much more thorough and effective than when aluminium alone is added, for not only is the steel quieted by deoxidation, but an additional good influence, due, I believe, to the attacking of the nitrogen gases of the steel by the titanium, is also effected. The presence of the titanium in the steel is also beneficial in other respects. In the manufacture of castings a larger percentage of the alloy may with advantage be added to the steel either in the mold or in the casting-ladle, and the steel should be especially prepared for the manufacture of castings by incorporation of silicon in the usual manner. My claims are not limited to the proportion in which the alloy is to be added to the steel.

I claim—

1. In the manufacture of steel, the improvement which consists in adding to the molten steel an alloy containing aluminium and titanium.

2. In the manufacture of steel, the improvement which consists in adding to the molten steel an alloy containing aluminium and from .75 per cent. to 2.50 per cent. of titanium.

In testimony whereof I have hereunto set my hand.

CHARLES M. HALL.

Witnesses:

T. A. B. WHITING,
FREDERICK CHORMANN.