

UNITED STATES PATENT OFFICE

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PROCESS OF MANUFACTURING CASTINGS FROM WROUGHT-IRON AND STEEL BY ADDING ALUMINIUM.

SPECIFICATION forming part of Letters Patent No. 333,373, dated December 29, 1885.

Application filed July 8, 1885. Serial No. 171,010. (Specimens.) Patented in England July 8, 1885, No. 8,269; in France July 8, 1885, No. 170,027; in Belgium July 8, 1885, No. 69,529, and in Italy September 30, 1885, No. 18,647.

To all whom it may concern:

Be it known that I, CARL GUSTAF WITTENSTRÖM, of Stockholm, in the Kingdom of Sweden, civil engineer, subject of the King of Sweden, have invented certain new and useful Improvements in the Process of Manufacturing Castings from Wrought-Iron and Steel by Adding Aluminium, of which the following is a specification.

This invention has for its object improvements in the manufacture of castings from wrought-iron and steel, and has been patented in Great Britain by Letters Patent No. 8,269, dated July 8, 1885; in France, No. 170,027, dated July 8, 1885; in Belgium, No. 69,529, dated July 8, 1885; and in Italy, No. 18,647, dated September 30, 1885.

It is well known that one of the great difficulties in making castings from steel is to get a product which is solid, sound, homogeneous, or free from blisters or cavities. Lately the manufacture has been much improved by adding to the metal ferro-manganese and other compounds containing carbon, silicon, and manganese; but although all these admixtures make the product somewhat more solid they deteriorate the quality in other respects as the product gets harder and more brittle or red-short. It has been impossible to make castings of wrought-iron or mild steel at the same time solid and retaining their qualities and their strength.

I have found that castings of wrought-iron or mild steel may be obtained solid without changing the intrinsic quality of the metal by the addition of the metal aluminium either alone or in the shape of an alloy, such addition to be made after the iron or steel has been melted, and preferably just before the pouring is commenced. The melting point of aluminium is about 800° Fahrenheit, and the effect of such addition is to lower the melting-point of the mixture, and thereby render it more fluid, (as it at once becomes superheated,) so that the gases in the metal pass away easily, the metal runs freely into the mold, and a more perfect product is obtained. I use no fluxes whatever. I have found that the use of a minute quantity, never exceeding one

per cent. by weight, preferably from one-fifth to one-tenth of one per cent. by weight of metallic aluminium added to the molten iron has the desired influence, and even a very much smaller percentage has an appreciable influence, and the proportions stated may be departed from to some extent.

By this my new invention I have succeeded in making perfect castings from the softest wrought-iron, which castings in every respect retain their ductility and nature of wrought-iron though their tensile strength is greatly enhanced.

The iron or steel is melted in crucibles or metal smelting-furnaces of any suitable description, and the addition of the aluminium or alloy of iron and aluminium is made to the metal after it is molten, and preferably about when it is to be poured. It is convenient to provide a plug in the cover of the crucible, which is removed when the metal is completely melted. A tube is inserted into the aperture, and the aluminium to be added is passed down the tube. The tube is removed. The molten metal is then preferably stirred and the plug replaced, and the metal is ready for pouring as soon as it is quiet.

I am aware that heretofore it has been demonstrated (see Percy's Metallurgy of Iron and Steel, page 182, and the Quarterly Journal of Arts and Sciences for 1820, page 320) that by the addition to steel of about one-fourth of one per cent. of aluminium there could be obtained a product retaining its malleability and resembling "Wootz steel." Such product, however, was obtained by melting the aluminium and steel together, which would not only cause a waste of the aluminium but would render the final proportions of the two metals uncertain. Moreover, the addition of the aluminium before the iron or steel is melted would not have the effect of superheating the metal at the time the casting is effected, which is an important object of my invention. I do not, therefore, wish to be understood as claiming every way of treating wrought-iron or steel having aluminium added to it. Neither do I wish to be understood as claiming a process of treating wrought-iron or steel hav-

ing added to it aluminium, in which the aluminium and the iron or steel are fused together.

5 A superheated state of the metal is essential for the practical performance of casting into several molds. By adding the aluminium to the wrought-iron or steel and fusing them together a superheating would result in injury, as the metal would become red-short or
10 take up gases; whereas, by first melting the iron or steel and then adding the aluminium before pouring, the "superheating" (if it may be so called) produced by a sudden lowering of the melting-point does not injure the metal.

I claim—

The hereinbefore-described process of manufacturing castings from wrought-iron or steel, consisting in the admixture with the molten iron or steel of aluminium in about the proportions specified, and then casting, substantially as and for the purpose set forth.

This 15th day of June, 1885.

CARL GUSTAF WITTENSTRÖM.

Witnesses:

AUGUST LOMSON,
T. A. HERNELL.