

# UNITED STATES PATENT OFFICE.

ALFRED E. HUNT, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS TO PERCIVAL ROBERTS, JR., OF PHILADELPHIA, AND BENJAMIN TALBOT, OF PENCOYD, PENNSYLVANIA.

## MAKING INGOTS OR CASTINGS OF IRON OR STEEL.

SPECIFICATION forming part of Letters Patent No. 585,036, dated June 22, 1897.

Application filed September 29, 1896. Serial No. 607,351. (No specimens.)

*To all whom it may concern:*

Be it known that I, ALFRED E. HUNT, a citizen of the United States, and a resident of Pittsburg, Pennsylvania, have invented certain Improvements in Making Ingots or Castings of Iron or Steel, of which the following is a specification.

The object of my invention is to provide for the addition of carbon to ingots or castings of soft steel and at the same time to "quiet" the metal by preventing or reducing ebullition or boiling of the same during or after the pouring of the metal into the mold, thereby producing solid ingots or castings of increased tensile strength and otherwise improving the same, all as hereinafter more fully set forth.

My invention consists in adding to the molten steel a small quantity of carbid of silicon, or, as it is commercially termed, "carborundum," which consists of a combination of carbon and silicon in certain proportions—usually about seventy per cent. of silicon to thirty per cent. of carbon.

When a steel ingot or casting is being produced which is to contain more than one-tenth of one per cent. of silicon in the finished steel, I prefer to add the carbid of silicon to the steel when the latter is being poured into the ladle, the carbid being placed in definite quantity, according to the result desired, in an envelop of paper or other readily-combustible material, which is deposited in the ladle either before, with, or after the usual addition of ferromanganese, or if the ingots or castings are of sufficiently large size the carbid of silicon may be added to the liquid steel while the ingot or casting is being poured.

Carbid of silicon added to ingots of soft steel not only serves to increase the percentage of carbon therein, and thereby increase the tensile strength of the metal, but it also "quiets" the metal by preventing or reducing ebullition of the same, a portion of the silicon being oxidized and the unoxidized portion, together with the carbon, remaining in the metal. It also gives to steel the property

of making sounder and more perfect castings than can be obtained without its use.

As a result of the "quieting" of the metal the outside surfaces of the ingot rapidly solidify and harden, thus preserving the shape of the ingot and preventing exposure of fresh surfaces of the metal to the air by the boiling of the metal in the mold. I thereby diminish the quantity of oxid of iron in the metal, reduce the amount of "crop" to be removed from the top of the ingot after the latter has been rolled or forged, and permit the ingot to be stripped from the mold more rapidly than usual and removed in a hotter condition to the heating-furnace preparatory to the subsequent rolling or forging.

The carbid of silicon may be added to the bath of metal in a Bessemer converter with the effect, by its oxidation, of increasing the heat and fluidity of the metal, and if added to cast-iron the carbid has a softening effect upon the same.

Carbid of silicon constitutes a very efficient substitute for the ferrosilicon now extensively employed in metallurgical furnaces for the purpose of adding silicon to the metal, as a much smaller quantity of the carbid has to be used, and said carbid is practically free from the phosphorus which is frequently found in combination with ferrosilicon.

Carbid of silicon does not lower the melting-point of iron or steel, the melting-point of the carbid being much higher than that of iron or steel, although in practice it has been found that when the carbid is placed in a bath of molten iron or steel it readily gives up its silicon and carbon to the metal. When used in connection with ferromanganese, the carbid permits of a material reduction in the amount of ferromanganese employed.

The quantity of carbid of silicon employed in carrying out my invention may be varied in accordance with the desired conditions in the finished steel, although I may say that I have obtained very good results by the addition to three thousand pounds of steel of five pounds of the carbid.

Having thus described my invention, I name to this specification in the presence of  
claim and desire to secure by Letters Pat- two subscribing witnesses.  
ent—

ALFRED E. HUNT.

As an improvement in the process of mak-  
5 ing ingots or castings of iron or steel, the ad-  
dition of carbid of silicon to the molten metal.

In testimony whereof I have signed my

Witnesses:

GEO. H. CLAFF,

EDITH O. KNESTER.