UNITED STATES PATENT OFFICE.

CONRAD GAUTSCH, OF MUNICH, GERMANY.

PROCESS OF CASTING COPPER AND COPPER ALLOYS.

No. 898,638. Specification of Letters Patent. Patented Sept. 15, 1908.

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To all whom it may concern:

Be it known that I, CONRAD GAUTSCH, citizen of Germany, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in Processes for Casting Copper and Copper Alloys; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In casting copper or copper alloys, the presence of oxid of copper tends to prevent the attainment of a perfectly even structure of the casting. Both copper and its alloys remain honeycombed to a certain extent. For the same reason it has hitherto been impossible to add copper or its alloys to iron or steel in very large quantities or at least in such large quantities, as to impart to the latter metals greater hardness or strength of resistance, than that of the ordinary alloys. In order to enable the addition of iron and the like, the assistance of other metals such as zinc aluminium or nickel has been requisitioned, which act to a certain extent as carriers for the iron.

According to the present invention bicarbonate of soda is added to the copper, which renders it possible to add the desired mixtures in much greater quantities, particularly to steel, the alloy as also the pure copper being entirely free from porosity and metal alloys being obtained (bronzes) which possess exceptional powers of resistance against wear and mechanical influences.

Although it is known to add hydrates and alkalies to copper, this has hitherto always been effected simultaneously with an energetic feed of oxygen and exclusively for the purpose of freeing the copper from foreign metals and more particularly arsenic.

Thus the present process consists in adding to the metal—copper or mixtures of copper, tin, old metal and iron steel or the like—besides the usual addition of phosphorus (which as is known tends to reduce the copper oxid formed) a suitable quantity of bicarbonate of soda, without any special oxygen feed, a part being advantageously added right at the commencement and a part after the metal has been melted. The amount of bicarbonate of soda added may be from one to two fifths per cent.

The result of the addition of the bicarbonate of soda is to render the quality of the molten metal much thinner, that is to say more fluid, or less viscous, so that it will homogeneously take up the mixtures of steel or other metals added, in very considerable quantities, thus producing alloys having exceptional hardness and of a density hitherto unsurpassed.

The effect of the addition of bicarbonate of soda, as far as the same could be observed in the melting process appears to be that the same melts at a temperature approaching closer to that of molten copper than do the substances heretofore employed, the said bicarbonate decomposing to form carbonate of soda and carbonic acid

$$(2NaHCO_3 = Na_2CO_3 + CO_2 + H_2O)$$

and causing the mass to foam, so that a part from the intimate mixture of the molten metal, the oxids and protoxids of copper are dissolved and thus pass out of the molten mass into the slag. This effect of the bicarbonate of soda in dissolving the oxid is proved by the presence of considerable quantities of oxid and protoxid of copper in the slag floating on the cast metal. The particular advantage of bicarbonate of soda in the present case is that it does not easily melt and that consequently its activity is developed just when the copper and other metals begin to melt.

I claim as my invention:—

1. In the process of casting copper and copper alloys, the step which consists in adding to the metal bicarbonate of soda, substantially in the absence of free carbon.

2. In the process of casting copper and copper alloys, the step which consists in adding bicarbonate of soda to the metal, then melting the latter and then adding more bicarbonate of soda.

3. In the process of casting copper and copper alloys, the step which consists in adding during the melting process from one to two-fifths percent. of bicarbonate of soda.

4. In the process of casting copper the step

which consists in adding bicarbonate of sodium to molten pure copper.

5. In the process of casting copper, the step which consists in adding bicarbonate of sodium to pure copper, then melting the latter, and then adding more bicarbonate of sodium to the molten copper.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CONRAD GAUTSCH.

Witnesses:
ULYSSES J. BYWATER,
LOUIS F. MUELLER.