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(1882 - 1927)

Sainte Marie aux Mines (FR)

Patents (details)

1 - Production of high grade iron or steel

GB patent	267939
Application date	16 March 1927
Co-inventor	PIWOWARSKY Eugen

High grade alloyed and unalloyed steels are to-day made according to the following processes :

- 1. Smelting, refining and finishing in an electric arc-like furnace.*
- 2. Smelting in a Siemens-Martin furnace or by taking the molten material from a converter, and then casting the smelting in an induction or arc-like furnace where it is fined, refined, alloyed and finished.*
- 3. Smelting, fining, refining, alloying and finishing in an acid or basic Siemens-Martin furnace.*
- 4. The use of crucible furnaces.*

All these processes require a more or- less good and pure charge, and furthermore require a certain addition of highly carbonised (expensive) iron (pig iron and broken castings) being added to the charge, require extensive working plant and are hampered by high costs of production (re-smelting) with a high percentage of loss total, in particular of the valuable special elements.

Now the present invention has reference to a new manner of production by the combination of a cupola furnace as preliminary smelting apparatus with an electric reverberatory or crucible furnace suitable for use as a refining furnace. The production of a low carbonised (steellike) smelting in the cupola furnace is accompanied by considerable advantages, inter alia :

- (a) The possibility of the widest possible use of small pieces of metal with only a small addition of highly carbonised charge material, or the latter may be entirely omitted, whereby the costs for raw material are substantially reduced.*
- (b) The plant, working and smelting costs also result substantially less than those for the processes mentioned above under 1-3.*
- (c) The loss totals in particular when smelting alloyed small pieces are much lower with the cupola furnace than when re-smelting in the Martin furnace.*
- (d) Technical working, adaptability to the smelting conditions of the finishing furnace, is much more favourable.*

The above mentioned furnace combination, which presents still further advantages in connection with the production of high grade steel material on the score of efficient production working security and economy, represents such an ideal solution of the problem that its introduction into the German steel and fine steel industry can hardly fail to be of revolutionary importance.

Corresponding patents

GB (1), LU, FR, ES (2)

2 - Process for the production of technical alloys of diverse structural condition and varying properties

GB patent	267964
Application date	18 March 1927
Co-inventor	PIWOWARSKY Eugen

This invention relates to a process for the production of technical alloys of diverse structural condition and varying properties.

The present processes of obtaining alloys for particular purposes are based on producing alterations in :

- 1) The chemical composition.*
- 2) The speed of solidification and cooling*
- 3) The heat treatment of the solidified alloy.*

The temperatures at which the alloys are cast, are determined by the thickness and the size of the ingots to be cast or of the casting mould and are therefore adjusted to the degree of fluidity required in each particular case.

The present invention is based on the surprising observation that under the same melting and pouring conditions, the structural condition and the mechanical properties of technical alloys can be systematically adjusted within wide limits apart from the methods set forth in the above headings 1 to 3 and independently of the temperature at which they are cast, by altering the maximum temperatures attained in the liquid state, especially by increasing the temperatures of the molten alloy to very high, hitherto unusual ranges of super-heating.

Thus for example, it has been observed that tin bronzes containing 10 to 14% tin, when cast at an even-pouring temperature lying in the vicinity of 75° C. above the melting point, underwent an increasing granular coarsening if it had been heated prior to casting to temperatures of about 150° C. to 250° C. to 350° C. and so forth above their respective melting points whilst the remaining structural properties such as the eutectics the microscopical degree of fineness of the constituents of the granules, and the like continuously improved.

In conjunction with these structural alterations the mechanical properties of the thus treated alloys were naturally also considerably altered in spite of the same chemical composition and the uniform pouring temperature.

Similar observations could also be made in connection with copper-aluminium alloys (rich in copper) and aluminiumcopper alloys (rich in aluminium).

On the basis of the aforesaid recognition similar results may be expected particularly in cases where the chemical composition of the alloy in question is in the vicinity of the heterogeneous condition of the solid state, that is to say at least two different kinds of crystals must be present.

The present invention which is based on extensive and entirely new recognitions relating to the molecular structure of fluid solutions opens up numerous possibilities of development to modern metallurgy.

Corresponding patents

LU, FR, ES