(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 August 2008 (21.08.2008)

PCT

(10) International Publication Number
WO 2008/098525 A1

(51) International Patent Classification:
C22B 1/248 (2006.01)

(21) International Application Number:
PCT/CZ2007/000100

(22) International Filing Date:
7 November 2007 (07.11.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PUV 2007-18555
14 February 2007 (14.02.2007) CZ

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

WO 2008/098525 A1

(54) **Title:** THE SAND MIXTURE FOR THE PRODUCTION OF SHAPED PIECES ON THE BASIS OF FINE GRAINED ALUMINUM GRANULATE OR ITS ALLOYS

(57) **Abstract:** The sand mixture for the production of shaped pieces on the basis of fine grain aluminum granulate or its alloys. The subject matter of the invention consists in the fact that the mixture contains 85 to 99 percent by weight of granulate with the grain size in the range of values from 0.001 to 4.5 mm and 1 to 15 percent by weight of the bond, where the bond consists of water solution of the hardener and the binder, eventually completed with the linseed oil.

The sand mixture for the production of shaped pieces on the basis of fine grained aluminum granulate or its alloys

Art Domain

The technical solution concerns the composition of sand mixture for the production of shaped pieces on the basis of fine grained aluminum granulate or its alloys, used mainly as deoxidizing addition into the melt at production of the steel.

Present prior art

For the production of granulates from aluminum scrap, used as deoxidizing additions into the melt at steel production, are being used several methods. The oldest and the most frequent method is re-melting of aluminum scrap in gas or electric smelting furnaces. The granulate is produced by dispersion and fast cooling of liquid metal with irregular shape of the particles. At sudden cooling rises on the surface of the granules oxidized crust, which is only mildly disadvantageous at final use of granulate, because does not have any vital influence on final quality of produced steel, into whose molten mass is added. Among the disadvantages of this method of production belongs high energy demand factor of the production process where furthermore rise dangerous wastes as slags and scrapings and which is also associated with the rise of emissions from smelting furnaces.

Further known method of production of aluminum granulate is multiple grinding of sheet metal in hammer grinders with different perimeters of sieves. Arisen grit is then sorted on the separators, which separate particular particles according to their weight into different fractions, only some of these can be used for the purposes of steel deoxidizing. The fractions with small specified weight of

the particles would by sucked into suction pipes or would burn immediately at infilling into smelting on the surface of the smelt and would not have any deoxidizing effect. The disadvantage of this method of the production is apart from arise of different fractions also high energy demand factor.

This severity is also characteristic for the method of aluminum scrap grinding on adjusted hammer grinder without sieves or even with them, where comes to gradual palletizing of particular aluminum pieces. Rising pellets have different dimensions, shapes and sizes and for the use of steel deoxidizing must be consequently sorted on sieves with meshes according to relevant norms or claims of the customer. This is also labour intensive and complicated, whereas the non-disintegration of pellets at longer time storage is not guaranteed.

Likewise it is known the way of processing of aluminum scrap according to CZ patent 297501, where the entering material is after sorting into particular material classes in first phase adjusted in order to reach the straight and flat pieces, which are then sorted according to the width into different categories from thinnest to thickest, and in the second phase is this way sorted material shaped into sheet metals or straight wires, which are then cut and after sorting according to the weight stamped in matrices into desired shape and size of the granulate. At this way of processing of the aluminum scrap arises certain part of particles with granulity in the range of values from 0.001mm to 4.5mm, whose stamping into shaped pieces by the use of classical methods is practically impossible because it is not possible to guarantee their non-disintegration and further parameters, which are normative given and required for following processing of the shaped pieces.

The introduced solution is proposed to put forward to use such composition of sand mixture for the production of shaped pieces which would enable processing of the fractions of fine grained aluminum granulate or its alloys at keep of normative required conditions of the shaped pieces for further use.

The essence of the technical solution

The above mentioned target is reached through technical solution of sand mixture for the production of the shaped pieces on the basis of fine granulated aluminum or its alloys, wherein the essence of the solution consists in fact that the mixture contains 85 to 99 percent by weight of granulate with grain size in the range of values from 0.001 to 4.5mm and 1 to 15 percent by weight of bond, where bond consists of water dilution of hardener and binder, completed eventually with linseed oil.

The further essence of the solution is that the hardener is chosen form the group of materials including sodium silicate and potassium silicate and that the binder is created by glucose high molecular polymer preferably with modified starch.

In advantageous carry out the components of the bond are created by the mixture of 0.01 to 7 percent by weight of hardener, 0.01 to 7 percent by weight of binder, 1 to 10 percent by weight of water, eventually completed with 0.01 to 5 percent by weight of the linseed oil.

At the use of given mixture for stamping of fine grained granulate is guaranteed creation of compact product in the form of shaped piece, which is possible to trouble free use in further processing in the steel works at the production of steel.

The examples of carry out of the solution

The particular examples of the mixture composition according to the technical solution are these:

Example 1:

- Aluminum granulate with grain size in the range of values from 0.5 to 1.5mm .....90 percent by weight
- Sodium water glass [Na_2O. $nSiO_2$] ..... 5 percent by weight
- Modified starch .....2.5 percent by weight
- Water .....2.5 percent by weight

Example 2:

- Aluminum granulate with grain size in the range of values from 0.001 to 0.5mm .....95 percent by weight
- Potassium water glass [K_2O. $nSiO_2$] ..... 2 percent by weight
- Modified starch .....1 percent by weight
-Water .....2 percent by weight

Example 3:

- Aluminum granulate with grain size in the range of values from 1.5 to 4.5mm .....85 percent by weight
- Sodium water glass [Na_2O. $nSiO_2$] ..... 6 percent by weight
- Modified starch .....4 percent by weight
- Linseed oil .....1 percent by weight
-Water .....4 percent by weight

The preparation of the mixture runs in mixing device, into which are dosed, in strictly set order, its particular ingredients; mean granulate, the hardener and the binder with the water and eventually the linseed oil. The hardener and the binder are mixed with the water in given rates and sprayed into mixing device on aluminum granulate. Herewith forms compact viscosity sufficient material, which is ready for stamping on matrices of cylinder rotary press. The whole process is continual with precise setting of dosing of each component.

The industrial utility

The technical solution can be advantageously used at the production of granulates, used especially as deoxidizing additions into steels smelt, but also of granulates used for another industry fields, for example in chemical production.

CLAIMS

1. The sand mixture for the production of shaped pieces on the basis of fine grain aluminum granulate or its alloys, **wherein** the mixture contains 85 to 99 percent by weight of granulate with the grain size in the range of values from 0.001 to 4.5 mm and 1 to 15 percent by weight of the bond, where the bond consists of water solution of the hardener and the binder, eventually completed with the linseed oil.

2. The sand mixture according to the claim 1, **wherein** the hardener is chosen from the group of materials including sodium silicate and potassium silicate.

3. The sand mixture according to the claim 1, **wherein** the binder is created by high molecular glucose polymer, preferably by modified starch.

4. The sand mixture according to the claims 1 to 3, **wherein** the bond components are created by the mixture of 0.01 to 7 percent by weight of the hardener, 0.01 to 7 percent by weight of the binder, 1 to 10 percent by weight of the water, eventually completed with 0.01 to 5 percent by weight of linseed oil.

INTERNATIONAL SEARCH REPORT

International application No
PCT/CZ2007/000100

A. CLASSIFICATION OF SUBJECT MATTER
INV. C22B1/248

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C22B B22C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
4 June 2008	17/06/2008

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International application No
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Information on patent family members

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