



(51) International Patent Classification:

C04B 41/53 (2006.01) *C04B 26/02* (2006.01)
C04B 20/04 (2006.01) *C04B 28/04* (2006.01)

(21) International Application Number:

PCT/IB2010/054254

(22) International Filing Date:

21 September 2010 (21.09.2010)

(25) Filing Language:

Italian

(26) Publication Language:

English

(30) Priority Data:

TV2009A000187 28 September 2009 (28.09.2009) IT

(72) Inventor; and

(71) Applicant : **TONCELLI, Dario** [IT/IT]; Via San Pancrazio, 3, I-36061 Bassano del Grappa (VI) (IT).

(74) Agents: **DRAGOTTI, Gianfranco** et al.; Via Paris Bordone, 9, I-31100 Treviso (IT).

(81) Designated States (unless otherwise indicated, for every

kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, 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, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))

(54) Title: METHOD FOR MANUFACTURING ARTICLES OF CONGLOMERATE MATERIAL IN THE FORM OF SLABS CONTAINING DECORATIVE ELEMENTS

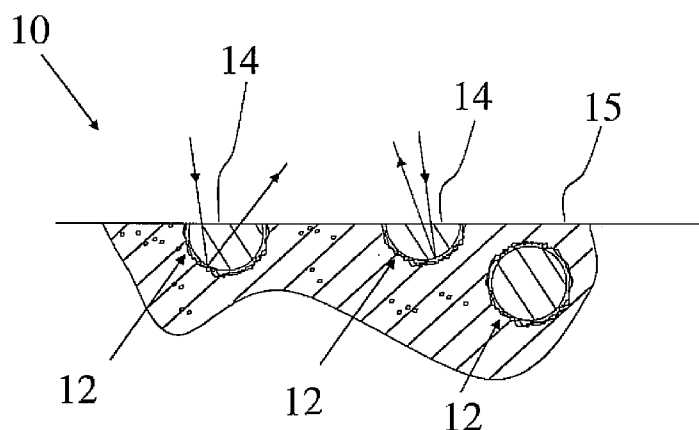


Fig.2

(57) Abstract: A method for manufacturing articles of conglomerate material in the form of slabs comprises a first step involving preparation of a mix from a granulated material and an organic or inorganic binding paste, a second step for distributing the mix thus formed inside a mould, a third step for compacting the mix contained in the mould and a fourth step for hardening of the article. Said granulated product comprises granules of transparent material with a stone-like consistency lined with a coating containing glitter.



"Method for manufacturing articles of conglomerate material in the form of slabs containing decorative elements"

DESCRIPTION

The present invention relates to a method for manufacturing an article made of conglomerate material in the form of a slab or block using compaction technology already known in the sector of agglomerated materials.

As is known, this technology comprises an initial step involving preparation of a mix comprising a granulated inert material, for example granules obtained from materials such as granite, quartz, feldspar, marble, glass or ceramic materials. A filler and a hardening binder, such as a resin or a hydraulic cement, are then added to the granulated material.

The mix is then distributed inside a mould and subjected to a compacting action which is often performed under a vacuum.

The mould which contains the compacted article is transferred to a station where the binder is hardened so as to obtain in this way a solid and firm article. Said hardening station will vary depending on the type of binder used.

If the article is in the form of a block, it is then sawn into slabs; the slabs are normally surface-finished.

It is also known to manufacture articles of agglomerated material containing decorative elements and therefore suitable for flooring and cladding or for furnishing special environments such as hotel halls, shops of various types or residential buildings.

For this purpose, decorative elements, which may be simple elements such as glass or mirror fragments or metal elements such as brass or the like, are added to the granulated material to form the mix.

Conglomerate articles are made so as to incorporate inside them reflective, coloured, decorative glass elements commonly known as "aventurine" which enrich the product and make it particularly attractive and pleasing and suitable for environments such as those indicated above.

In EP 0,521,286 it is also proposed inserting transparent granules with a mirror-like metallized surface and performing a subsequent slab smoothing operation. The exposed granules thus reflect the light internally.

Metallization, however, is costly and the effect obtained was found to be unsatisfactory.

Therefore, the technology, although consolidated, is continuously evolving and looking for improvements in order to satisfy the increasingly more sophisticated needs of the market requiring a product which is not only durable over time, but also increasingly more attractive from an aesthetic point of view and at the same time low in cost, in order to attract a larger

number of clients and satisfy their increasingly demanding needs.

However, one of the drawbacks of this type of product is their cost, which increases substantially with the use of precious-material inserts and therefore constitutes an obstacle to achieving widespread distribution of the product.

- 5 The main object of the invention, therefore, is to provide a conglomerate article which is particularly attractive from an aesthetic point of view and which has a reasonable cost such that it may be suitable for widespread distribution and use.

This object is achieved by a method for manufacturing articles made of conglomerate stone material, comprising:

- 10 - a step for preparing a mix from a natural and/or synthetic granulated stone material, a thin filler and a hardening binder;
- a step for distributing the mix thus formed inside a mould;
- a step for compacting the mix contained in the mould; and
- a step for hardening the binder;

- 15 wherein granules of transparent material lined with a coating comprising glitter are added to the mix and, after the hardening step, a material removal operation is performed so as to obtain a surface of the article which is intended to remain visible and on which at least a few granules are exposed with their glitter-free surface.

- More specifically, after the binder hardening step and, where applicable, sawing into slabs, the
20 surface of the slab intended to remain visible undergoes a subsequent processing step, which may consist in sizing and smoothing, so that the coating of the portion of said granules embedded below the visible surface of the conglomerate article creates a reflective effect on the visible surface.

- The invention also relates to a conglomerate stone article which can be obtained from a mix
25 comprising a natural and/or synthetic granulated stone material, a thin filler and a hardening binder, said mix being distributed inside a mould, compacted and then hardened, characterized in that it comprises granules of transparent material partially incorporated within the article and having part of their surface exposed on a surface of the article and having a coating comprising glitter on their incorporated part.

- 30 The invention also relates to the granules of transparent hard material which are lined with a coating consisting of glitter.

Glitter is a special product in the form of very small reflective and shiny flakes/grains which is well known and widely used in sectors such as the painting, cosmetic and clothing sector in order to obtain an aesthetic and/or decorative effect.

- 35 It is obvious that with the use of these glitter-lined granules of material it is possible to obtain a slab of agglomerated material which, after smoothing, has a particularly attractive appearance both owing to the presence of these particular decorative elements and because

the surface decorative elements, namely those positioned in the vicinity of the visible surface, create a reflective effect after a smoothing operation carried out on their surface in order to remove at least the glitter from their exposed surface.

In order to illustrate more clearly the innovative principles of the present invention and its advantages compared to the prior art a possible example of embodiment applying these principles will be described below, with the aid of the accompanying drawings. In the drawings:

- Figure 1 shows partial schematic and cross-sectional view of an article, during an intermediate processing step, obtained according to the invention;
- Figure 2 shows a view, on a larger scale, of the article according to Figure 1 after a further processing step with mechanical removal of material from the surface, for example a smoothing and subsequent polishing operation.

In greater detail, the article of conglomerate material is obtained by means of the method, the various steps of which are described hereinbelow.

The first step envisages the preparation of a mix consisting of:

- granulated natural stone material such as marble, granite, quartz, silica sand or artificial stone materials such as ceramic or glass materials;
- an organic binder such as polyester, epoxy, acrylic or biolenic resin or an inorganic binder such as Portland cement;
- a thin powder filler consisting for example of siliceous or calcareous material;
- preferably additives are added in order to favour the hardening reaction of the binder and other pigmented additives;
- granules of transparent hard material which are lined with a coating comprising glitter.

The glitter may be applied to the granules of hard material using various techniques which can be easily imagined by the person skilled in the art.

It has been found to be particularly advantageous if the glitter adheres to the surface of the granules by means of a transparent adhesive. Advantageously, the glitter used may have a particle size of between 0.1 and 2.0 mm.

The quantity of granules is such that the percentage by volume, relative to the total volume of the resin and the granules themselves, is between 40% and 60% and is preferably equal to 50%. The particle size of the granules of inert material is between 0.1 mm and 8 mm and preferably between 0.5 mm and 5 mm.

The quantity of granules of transparent hard material lined with a coating consisting of glitter depends on the desired aesthetic effect; it may for example constitute a portion equal to 1-20% of the mix.

The mix is rendered homogeneous by means of a mixing operation which is performed inside special mixers.

Then the mix thus prepared is distributed inside a mould.

During the next step it is envisaged compacting, for example by means of vibration or vibrocompression under a vacuum, thus obtaining a compacted product.

Finally, during the last step hardening of the binder is performed, so as to incorporate in a permanent manner the granules of inert material. Hardening may be performed in hot or cold conditions, or at room temperature, depending on the type of binder.

If the hardened article is a block, it is sawn into slabs.

Figure 1 shows on a larger scale, a surface zone of an article, generally denoted by 10, following hardening, with inside granules 11 lined with a layer of glitter 12 (the granules 11 in Figures 1 and 2 are schematically shown with a spherical shape, but in reality normally they have an irregular and jagged form). A transparent adhesive 13, if used, may be present as an intermediate layer.

Figure 2 shows the zone of the article after the following processing step which envisages a mechanical operation with removal of material from the surface in order to expose the granules and form transparent "windows" 14 on their surface which is exposed on the visible side 15 of the article. This mechanical material-removal operation may coincide with a sizing and smoothing step carried out on the slabs.

In this way, the portion of each exposed granule which remains embedded underneath the visible surface reflects the light since the glitter on its surface reflects the incident light which passes through the granule, producing an aesthetic effect which is particularly pleasing and attractive.

The operation of mechanical removal of material or smoothing of the surface of the article intended to remain visible may be more or less deep depending on the desired optical effect.

In particular, smoothing, as shown in Figure 2, removes at least a superficial part of the granule until a flat surface, which allows entry and emission of the reflected light and which is perfectly coplanar with the remaining surface of the article, is obtained.

It can therefore be understood that the glitter-lined granules must be made of material which is sufficiently hard (for example, having a hardness substantially comparable to the hardness of the remainder of the article) and sufficiently transparent.

The article may be bonded with resins and therefore undergo catalysis at temperatures which may be as high as 140°C; therefore, the glitter-lined granules must withstand a temperature of at least 160°C and moreover must not be prone to attack by organic solvents such as styrene, contained in the resin used.

The granules to be lined with glitter may, for example, be made of transparent quartz or glass.

The particle size of the granules, in the same way as the particle size of the granulated material used, is preferably between 0.1 and 8 mm.

Moreover, the colour of the coating composed of glitter may vary. For example, in order to

create a notable aesthetic effect the glitter used may be gold or silver coloured so as to obtain gold or silver-lined granules such that the finished product may be even more attractive for customers.

It is evident that any variant or modification which is functionally or conceptually equivalent
5 falls within the scope of protection of the present invention.

For example it is possible to use other materials for lining with glitter, provided that they are sufficiently hard and transparent and therefore, in addition to quartz and glass, materials such as glass ceramics, fluorite, etc., could be used.

The granules may also be made of semi-transparent material so that, with their coloured mass,
10 they provide colouring for the light which passes through them and is reflected by the glitter.

The granules may have an irregular or more or less regular geometrical shape.

The use of glitter provides, among other things, an irregular reflective surface which multiplies the light rays reflected towards the outside of the surface of the article and reflects them in random directions. This enables a very effective and aesthetically innovative and
15 pleasing light effect to be obtained, compared, for example to the formation of a simple continuous and/or uniform mirror coating on the surface of the granules.

The operation involving mechanical removal of material may be performed to a smaller depth, such that it may consist of only a simple brushing operation in the case where the binder is particular soft and/or the surface granules project from the surface after hardening
20 of the mix (for example, following no or only limited pressing of the mix).

These granules, after brushing, are lined with glitter only along the portion embedded beneath the surface of the article and, being made of transparent material, the incident light, which passes through the projecting granule and is reflected by the glitter, produces a particularly pleasing aesthetic effect. Moreover, this effect is combined with an irregular surface of the
25 article.

CLAIMS

1. Method for manufacturing articles made of conglomerate stone material, comprising:

- a step for preparing a mix from a natural and/or synthetic granulated stone material, a
5 fine filler and a hardening binder;
- a step for distributing the mix thus formed inside a mould;
- a step for compacting the mix contained in the mould; and
- a step for hardening the binder;

10 wherein granules of transparent material lined with a coating comprising glitter are added to the mix and, after the hardening step, a material-removal operation is performed so as to obtain a surface of the article which is intended to remain visible and on which at least at least a few granules are exposed with their glitter-free surface.

2. Method according to Claim 1, characterized in that said glitter adheres to the surface of the granules by means of a transparent adhesive.

15 3. Method according to Claim 1 or 2, characterized in that the material-removal operation comprises a step involving smoothing of the surface of the article intended to remain visible.

4. Method according to any one of the preceding claims, characterized in that the percentage by volume of said granules with a coating comprising glitter ranges between 40%
20 and 60% of the total volume of the resin and the granules.

5. Method according to any one of the preceding claims, characterized in that said coated granules consist of transparent quartz.

6. Method according to any one of the preceding claims, characterized in that said granules consist of glass.

25 7. Method according to any one of the preceding claims, characterized in that said glitter is coloured.

8. Method according to Claims 1 to 7, characterized in that said coloured glitter has a gold and/or silver colour.

9. Method according to any one of the preceding claims, characterized in that said
30 granules have a particle size of between 0.1 mm and 8 mm and in particular between 0.5 mm and 5 mm.

10. Conglomerate stone article which can be obtained from a mix comprising a natural and/or synthetic granulated stone material, a fine filler and a hardening binder, said mix being distributed inside a mould, compacted and then hardened, characterized in that it comprises
35 granules of transparent material partially incorporated within the article and having part of their surface exposed on a surface of the article and having a coating comprising glitter on their incorporated part.

11. Article according to the preceding claim, characterized in that said glitter adheres to the surface of the granules by means of a transparent adhesive.

12. Article according to Claim 10 or 11, characterized in that the part of the surface of the granules which remains exposed on the surface of the article is coplanar with said surface
5 of the article.

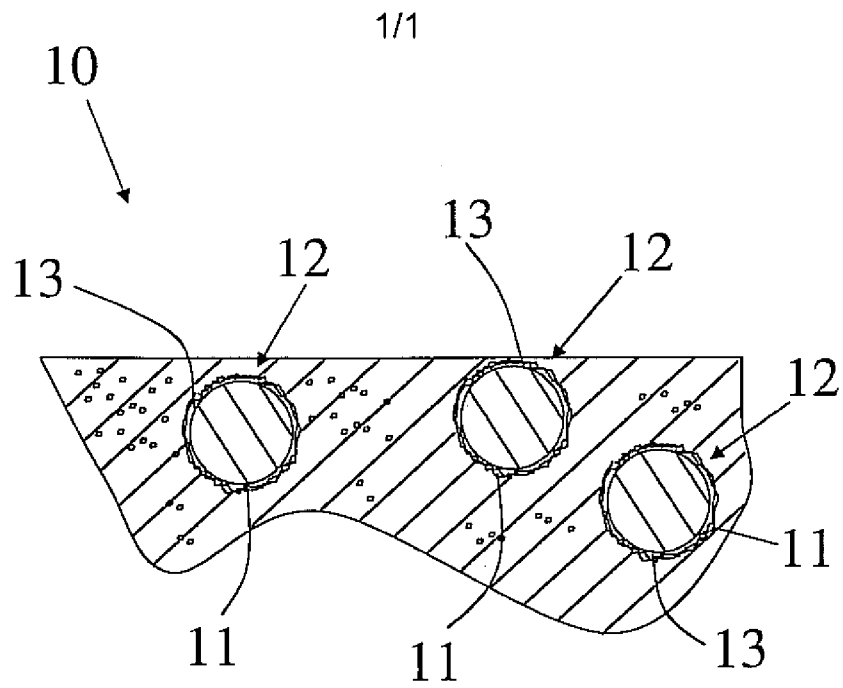


Fig.1

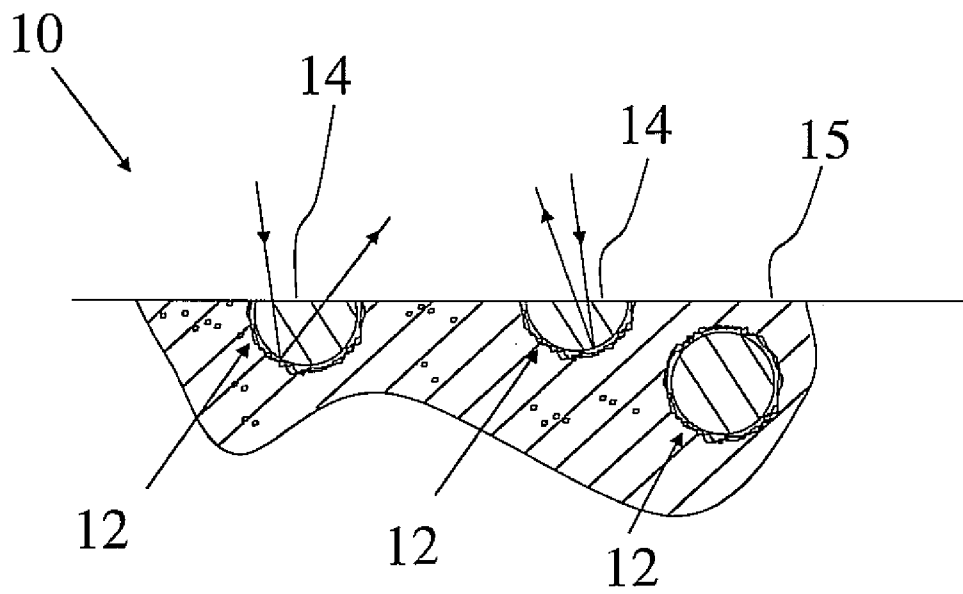


Fig.2

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2010/054254

A. CLASSIFICATION OF SUBJECT MATTER INV. C04B41/53 C04B20/10 B44C5/04 C04B26/02 C04B28/04 ADD.		
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) C04B B44C		
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		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/091698 A1 (MAROHN HEINZ [DE]) 13 May 2004 (2004-05-13) paragraph [0074] - paragraph [0090]; claims 1-14	1-12
Y	US 6 517 915 B1 (BANUS CHRISTOPHER T [US]) 11 February 2003 (2003-02-11) column 1, line 42 - line 45 claim 19	1-12
A	FR 997 495 A (LECHAT EDMOND) 7 January 1952 (1952-01-07) the whole document	1-12
A	JP 57 179257 A (SHIKOKU CHEM) 4 November 1982 (1982-11-04) * abstract	1-12
-/--		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
2 December 2010		21/12/2010
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Bonneau, Sébastien

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2010/054254

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BROUWERS ET AL: "Self-Compacting Concrete: Theoretical and experimental study", CEMENT AND CONCRETE RESEARCH, PERGAMON PRESS, ELMSFORD, NY, US LNKD- DOI:10.1016/J.CEMCONRES.2005.06.002, vol. 35, no. 11, 1 November 2005 (2005-11-01), pages 2116-2136, XP005158772, ISSN: 0008-8846 * abstract -----	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2010/054254

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004091698	A1	13-05-2004	AT 417028 T 15-12-2008
		AU 2002304877 A1	08-10-2002
		CA 2442556 A1	03-10-2002
		WO 02076904 A2	03-10-2002
		DE 10291207 D2	15-04-2004
		DK 1412302 T3	14-04-2009
		EP 1412302 A2	28-04-2004
		ES 2325915 T3	24-09-2009
US 6517915	B1	11-02-2003	NONE
FR 997495	A	07-01-1952	NONE
JP 57179257	A	04-11-1982	JP 1413397 C 27-11-1987
		JP 62020231 B	06-05-1987