

(51) International Patent Classification:
C04B 14/14 (2006.01)

(21) International Application Number:

PCT/KR2008/002775

(22) International Filing Date:

19 May 2008 (19.05.2008)

(25) Filing Language:

Korean

(26) Publication Language:

English

(30) Priority Data:

10-2008-0013516

14 February 2008 (14.02.2008)

KR

(71) Applicant (for all designated States except US): **HAN-WHA L & C CORP.** [KR/KR]; Hanwha Bldg., 15F, #1, Janggyo-dong, Jung-gu, Seoul 100-797 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HER, Dai Young** [KR/KR]; 203-503, Samjung Apt., Yullyang-dong, Sang-dang-gu, Cheongju-si, Chungcheongbuk-do 360-210 (KR). **KO, Suk Whan** [KR/KR]; #502, Hanhwa Co. House, 504-1, Bugang-ri, Buyong-myeon, Cheongwon-gun, Chungcheongbuk-do 363-941 (KR). **CHO, Young Wook** [KR/KR]; 602-1024, Bumpyeong Jugong Apt., Bumpyeong-dong, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do 361-201 (KR). **LEE, Kyung Oh**

[KR/KR]; #104, Hanhwa Co. House, 504-1, Bugang-ri, Buyong-myeon, Cheongwon-gun, Chungcheongbuk-do 363-941 (KR).

(74) Agent: **SHINSEGI PATENT LAW FIRM**; 3F., Yoong-jun Bldg., 829-6, Yeoksam 1-dong, Gangnam-gu, Seoul 135-936 (KR).

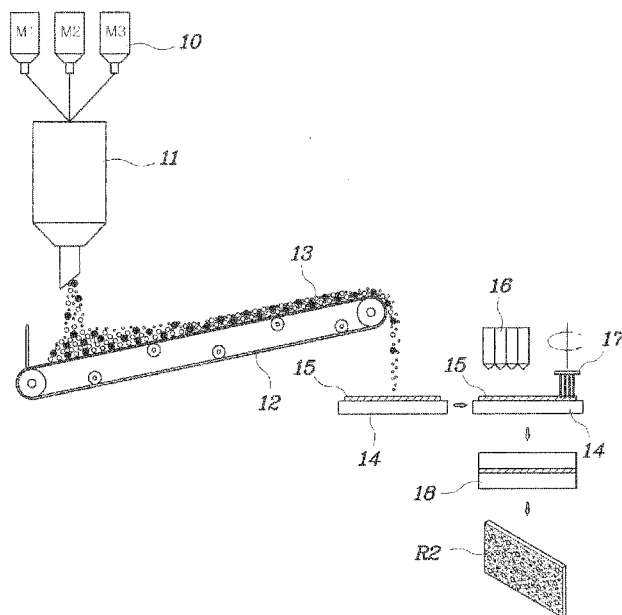
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: NATIVE ROCK COMBINED WITH RESIN HAVING MULTI COLOR VEIN AND MANUFACTURING METHOD THEREOF

[Figure 3]



(57) Abstract: Disclosed are native rock combined with resin having multi-color vein by combining natural inorganic mineral with resin, thus obtaining a compound having a multi-color tone, which is then subjected to spraying of various pigments having different colors, and a manufacturing method thereof. The manufacturing method includes combining 88-89 wt% of a plurality of types of natural mineral powder with 11-12 wt% of resin, thus preparing a compound 13 having a multi-color tone and including bulk particles; feeding the compound having a multi-color tone in a sheet form on a stacking plate 14 without additional grinding, thus forming a compound sheet 15; spraying a plurality of pigments having different colors on the compound sheet, and then stirring the compound sheet throughout the entire thickness thereof, thereby forming the compound sheet having multi-color vein; and subjecting the compound sheet to compression molding under high pressure, thereby manufacturing native rock combined with resin having a predetermined strength.



Published:

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

【DESCRIPTION】**【Invention Title】**

NATIVE ROCK COMBINED WITH RESIN HAVING MULTI COLOR VEIN AND
MANUFACTURING METHOD THEREOF

【Technical Field】

<1> The present invention relates to native rock combined with resin having multi-color vein and a manufacturing method thereof, and more particularly, to native rock combined with resin, which is manufactured to exhibit multi-color vein by combining natural inorganic mineral with a resin, thus preparing a compound having a multi-color tone, which is then subjected to spraying of various pigments having different colors and stirring, and to a manufacturing method thereof.

【Background Art】

<2> Generally, marble, which is a metamorphic rock resulting from the contact metamorphism of limestone or dolomite, has been used as a decorative building material from old times thanks to the beautiful surface patterns thereof. Recently, marble is receiving attention as a material exhibiting a high-quality texture, and the demand therefor is thus greatly increased in the fields of manufacturing flooring, walls, upper panels of kitchen sinks, etc. Accordingly, as the use of natural marble, which is expensive, cannot satisfy the increased demand, various types of artificial marble are developed.

<3> Native rock combined with resin, which is a kind of artificial marble, is obtained by combining natural inorganic (silica) mineral powder with a resin to thus prepare a compound, which is then mixed with pigments and compacted under high pressure, thus exhibiting the same texture as natural marble. Depending on the type of natural mineral, the color of resin or pigment, and the stirring process, various colors and textures may be realized.

<4> Further, native rock combined with resin exhibiting the vein of marble has been developed. Conventionally, however, native rock combined with resin

having mono-color vein is mainly manufactured by subjecting a compound having a mono-color tone to spraying of one or two pigments having different colors and stirring.

<5> FIG. 1 schematically shows the process of manufacturing conventional native rock combined with resin having mono-color vein.

<6> First, natural mineral powder is combined with a resin using a mixer 1, thus obtaining a compound 3 having a mono-color tone. This compound 3 is transferred through a conveyor 2 and is then fed flat on a stacking plate 5. As such, the compound 3, which is in a bulk form greater than a predetermined size, is minutely ground using grinding rolls 4 for subsequent pigment mixing and stirring.

<7> The compound 3 having a mono-color tone is stacked to a predetermined thickness, thus forming a compound sheet 6, after which one or two pigments having different colors are randomly sprayed on the compound sheet 6 using spray nozzles 7, and then the compound sheet 6 is stirred throughout the entire thickness thereof using a stirrer 8, thereby forming the compound sheet having mono-color vein on the surface thereof. Such a compound sheet 6 is placed in a compression molding machine 9, pressed under high pressure to have a predetermined strength, and then subjected to processing treatment, including surface polishing and cutting, consequently manufacturing native rock combined with resin R1 having mono-color vein.

<8> FIG. 2 shows the surface of the native rock combined with resin R1 having mono-color vein, manufactured through the above process. As is apparent from the surface of the native rock combined with resin R1 having mono-color vein, the vein, which is randomly formed, show the texture of marble. However, the above manufacturing process is problematic in that the color tone of the vein is not various, attributable to the use of the compound 3 having a mono-color tone and one or two pigments.

<9> Further, the compound 3, which is a combination of natural mineral powder and resin, is prepared such that it has minute particles through the control of the amount of resin. The compound 3 is finely ground in the

course of passing the compound 3 through the grinding rolls 4, so that it has a more minute and uniform particle size. So, because the conventional native rock combined with resin R1 having mono-color vein is manufactured from such a compound 3 having minute and uniform particles, the pattern thereof is simple, as shown in FIG. 2.

<10> In this way, the conventional native rock combined with resin having mono-color vein, and thus a simple color and pattern, does not satisfactorily meet the requirements of consumers who prefer products having high-quality textures as decorative building material.

【Disclosure】

【Technical Problem】

<11> Accordingly, the present invention has been made keeping in mind the above problems occurring in the related art in order to meet the requirements of consumers, and provides native rock combined with resin, in which a plurality of types of natural mineral powder is combined with a resin, thus preparing a compound having a multi-color tone, which is then mixed with various pigments having different colors while the amount of resin is controlled so that bulk particles are included in the compound, thereby exhibiting multi-color vein having various colors and patterns.

【Technical Solution】

<12> According to the present invention, a method of manufacturing native rock combined with resin having multi-color vein may comprise combining 88-89 wt% of a plurality of types of natural mineral powder with 11-12 wt% of a resin, thus preparing a compound 13 having a multi-color tone and including bulk particles; feeding the compound 13 having a multi-color tone in a sheet form on a stacking plate 14 without additional grinding, thus forming a compound sheet; spraying a plurality of pigments having different colors on the compound sheet 15, and then stirring the compound sheet 15 throughout the entire thickness thereof, thereby forming the compound sheet having multi-color vein; and subjecting the compound sheet 15 having multi-color vein to compression molding under high pressure, thereby manufacturing native rock

combined with resin having a predetermined strength.

<13>

In addition, according to the present invention, native rock combined with resin having multi-color vein may have a surface that exhibits patterns of bulk particles and multi-color vein by combining 88~89 wt% of a plurality of types of natural mineral powder with 11~12 wt% of a resin, thus preparing a compound having a multi-color tone and including bulk particles, which is then subjected to spraying of a plurality of pigments having different colors, stirring, and compression molding under high pressure.

【Advantageous Effects】

<15> According to the present invention, in the native rock combined with resin having multi-color vein and the manufacturing method thereof, the patterns of beautiful multi-color vein and bulk particles are harmonized together, thus realizing a surface texture resembling real natural rock, thereby greatly increasing product value as a high-grade decorative building material.

【Description of Drawings】

<16> FIG. 1 is a schematic view showing the process of manufacturing native rock combined with resin having mono-color vein;

<17> FIG. 2 is a photograph showing the surface of natural rock combined with resin having mono-color vein;

<18> FIG. 3 is a schematic view illustrating the process of manufacturing native rock combined with resin having multi-color vein according to the present invention; and

<19> FIG. 4 is a photograph showing the surface of the native rock combined with resin having multi-color vein according to the present invention.

【Mode for Invention】

<20> Hereinafter, a detailed description will be given of native rock combined with resin having multi-color vein and a manufacturing method thereof, according to the present invention, with reference to the appended drawings.

<21> FIG. 3 is a schematic view illustrating the process of manufacturing the native rock combined with resin having multi-color vein, according to the present invention, and FIG. 4 is a photograph showing the surface of the native rock combined with resin having multi-color vein according to the present invention.

<22> The manufacturing method according to the present invention, comprising combining natural mineral powder with a resin, thus preparing a compound, stacking the compound in the form of a sheet, spraying pigments on the compound sheet, stirring the compound sheet, thus forming the compound sheet

having vein, and subjecting the compound sheet to compression molding under high pressure, thus manufacturing native rock combined with resin, is similar to the conventional process shown in FIG. 1.

<23> However, the present invention is characterized in that the compound, having a multi-color tone and including bulk particles with various colors, is prepared, and is then subjected to spraying of various pigments having different colors and stirring, so that patterns of multi-color vein and bulk particles are exhibited, thereby realizing a high-quality marble texture resembling real natural marble.

<24> The manufacturing method of the present invention includes a first step of combining 88~89 wt% of a plurality of types of natural mineral powder with 11~12 wt% of a resin to thus prepare a compound 13 having a multi-color tone and including bulk particles; a second step of feeding the compound 13 having a multi-color tone in the form of a sheet on a stacking plate 14 without additional grinding; a third step of spraying a plurality of pigments having different colors on the fed compound sheet 15 and stirring the compound sheet 15 throughout the entire thickness thereof, thus forming the compound sheet 15 having multi-color vein; and a fourth step of subjecting the compound sheet 15 having multi-color vein to compression molding under high pressure, thereby manufacturing native rock combined with resin having a predetermined strength.

<25> More specifically, in the first step, unlike the preparation of the compound having a mono-color tone through the combination of natural mineral powder and resin as shown in FIG. 1, the natural mineral powder is combined with the resin in order to exhibit various colors, thus preparing the compound 13 having a multi-color tone, as shown in FIG. 3. The multi-color tone of the compound 13 is determined by the colors of the natural mineral itself, pigment, and assistant coloring agent mentioned below.

<26> Preferably, as illustrated in FIG. 3, the first step is composed of a double mixing process, including mixing natural mineral powder with the resin using respective first mixers (M1 to M3) 10, thus producing chips having

different mono-colors, and then mixing the three or more respective types of chips having different mono-colors together using a second mixer 11, thus preparing the compound 13 having a multi-color tone. Through such a double mixing process, it is possible to prepare the compound 13 having a multi-color tone, in which colors are readily distinguished from each other.

<27> According to the present invention, the compound 13 having a multi-color tone is prepared to include bulk particles through the control of the amount and viscosity of resin, thus exhibiting the pattern of the bulk particles on the surface of a final product. As such, the term "bulk particles" is used to distinguish it from "minute particles" constituting the surface of a final product resulting from the combination of natural mineral powder with a resin according to a typical preparation method. Because the bulk particles are formed to have various sizes in the course of combining the natural mineral powder with the resin, the particle size thereof is difficult to define. As shown in FIG. 4, however, the bulk particles B and the minute particles M are definitely distinguished from each other on the surface of the final product.

<28> The natural mineral powder includes various types of inorganic aggregate obtained in nature. The particle size of the inorganic aggregate is controlled such that 20% or more thereof passes through a 0.1 mm mesh sieve and 35% or more thereof does not pass through a 0.1 mm mesh sieve. When the particle size of the inorganic aggregate falls outside of the above range, the particles are formed to be too small or large on the surface of a final product, making it impossible to realize the texture of natural marble.

<29> The resin is controlled in terms of the amount and viscosity thereof in order to promote the formation of the bulk particles. The resin is preferably mixed in an amount of 11~12 wt%. In this way, in the present invention, the amount of resin is controlled to be relatively larger, compared to the conventional native rock combined with resin having mono-color vein in which the amount of resin is 8~10 wt%. When the amount of resin is smaller than 11 wt%, the bulk particles B are not formed as desired.

Conversely, when the amount of resin is greater than 12 wt%, the proportion of minute particles M constituting the surface of a final product is decreased, undesirably deteriorating the texture of natural marble.

<30> Further, in order to promote the formation of the bulk particles B, the viscosity of the resin is adjusted in the range of 800~1000 cps. In this way, in the present invention, the viscosity of resin is adjusted to be relatively higher, compared to the conventional native rock combined with resin having mono-color vein in which the viscosity of resin is 500~600 cps. The viscosity of the resin is controlled by adjusting the temperature inside the second mixer 11, shown in FIG. 3. When the viscosity of the resin falls outside of the above range, the bulk particles B are not uniformly formed, undesirably deteriorating the texture of natural marble, as in the determination of the amount of resin.

<31> The resin of the present invention is preferably unsaturated polyester (UPE) resin resulting from polymerization of 40~90 wt% of unsaturated polyester having one or more glycols and including saturated acid and unsaturated acid and 10~60 wt% of a monomer. The UPE resin has high bindability with natural mineral powder, and is thus mainly used as a binder in the field of artificial marble.

<32> Included in the UPE, examples of the saturated acid include phthalic anhydride, and examples of the unsaturated acid include maleic acid, fumaric acid, and itaconic acid. Examples of the monomer include styrene, vinyl toluene, N-vinylpyrrolidone, acrylate, and methacrylate.

<33> The UPE resin preferably has a molecular weight ranging from 1100 to 5000. When the molecular weight is higher, the bindability with natural mineral powder is high, thus promoting the formation of the bulk particles. In the present invention, the UPE resin having a relatively higher molecular weight is used, compared to conventional cases. When the molecular weight of the UPE resin falls outside of the above range, the bulk particles are not uniformly formed, undesirably deteriorating the texture of natural marble, as in the determination of the amount and viscosity of resin.

- <34> In this way, in the preparation of the compound 13 having a multi-color tone through the combination of the plurality of types of natural mineral powder having different colors and the resin according to the present invention, the amount, viscosity and molecular weight of resin, which is used as the binder, are controlled, thus forming the bulk particles, whereby beautiful patterns of the bulk particles are exhibited in a final product, which is a major characteristic of the present invention.
- <35> Additionally, the compound 13 having a multi-color tone may be mixed with diverse assistant coloring agents for exhibiting more various colors. Examples of the coloring agent include TiO_2 -R, Aisol Red, Lake Red, Hostaperm Red, Raven series, carbon black, Chrome Yellow, Panax Blue, chromium oxide green, and iron oxide yellow. The viscosity of the assistant coloring agent preferably ranges from 100 to 1000 cps.
- <36> In the second step, as shown in FIG. 3, the compound 13 having a multi-color tone, prepared through the first step, is taken out in a predetermined amount from the second mixer 11, transferred through a conveyor 12, and then fed in the form of a sheet on the stacking plate 14.
- <37> As seen in FIG. 1, additional grinding rolls 4 are conventionally mounted downstream of the conveyor 2 to feed the uniform and minute compound 3 having a mono-color tone. However, in the present invention, there is no need for grinding rolls 4 because the bulk particles formed in the first step should be maintained without change in subsequent processes. Like this, the reason why the grinding rolls 4 are not used in the second step is that the beautiful patterns of the bulk particles are formed on the surface of a final product, which is the characteristic of the present invention.
- <38> In the third step, when the compound sheet 15 having a predetermined thickness is prepared on the stacking plate 14 through the second step, a plurality of pigments having different colors, preferably, four or more pigments having different colors, are sprayed on the compound sheet 15 through spray nozzles 16, after which the compound sheet 15 is physically stirred throughout the entire thickness thereof using a stirrer 17 equipped

with a plurality of brushes, thereby realizing the compound sheet 15 having multi-color vein.

<39> Because the pigments, which are sprayed in the third step, are merely physically stirred, without a chemical reaction with natural mineral powder or resin constituting the compound 13, established colors are not changed, and the other colors are naturally shown. Further, the stirrer 17 in a brush form is used to reproduce the multi-color vein of marble, thereby realizing a texture resembling real natural rock.

<40> In the fourth step, the compound sheet 15 having multi-color vein is placed in a compression molding machine 18, and is then subjected to compression molding under high pressure, thereby manufacturing native rock combined with resin R2 having a predetermined strength. Furthermore, in order to satisfy the curing conditions for maintaining the strength of the final product, the UPE resin may be added with an initiator, for example, peroxyester, and a promoter, for example, a cobalt salt of organic acid.

<41> The native rock combined with resin, resulting from the fourth step, is processed to have a better surface texture through a polishing process, and is then cut to a predetermined size, thereby completing a final product.

<42> The native rock combined with resin having multi-color vein, manufactured through the method of the present invention as set forth above, has a surface in which patterns of multi-color vein and bulk particles are exhibited by combining 88~89 wt% of the plurality of types of natural mineral powder with 11~12 wt% of the resin, thus preparing the compound 13 having a multi-color tone and including bulk particles, which is then subjected to spraying of a plurality of pigments having different colors, stirring, and compression molding under high pressure.

<43> FIG. 4 shows the multi-color vein V and the bulk particles B. Thanks to the multi-color vein V and the bulk particles B, the native rock combined with resin according to the present invention represents more various and beautiful surface textures than those of the conventional natural rock shown in FIG. 2.

<44> Therefore, in the present invention, a compound 13 having three or more color tones and including bulk particles is mixed with four or more pigments having different colors, thus realizing various veins and patterns. Thereby, the natural rock according to the present invention can realize a texture resembling real natural rock and can thus be used as a high-grade decorative building material suitable for interiors having a natural appearance.

【CLAIMS】**【Claim 1】**

- <46> A method of manufacturing native rock combined with resin having multi-color vein, comprising:
- <47> combining 88~89 wt% of a plurality of types of natural mineral powder with 11~12 wt% of a resin, thus preparing a compound 13 having a multi-color tone and including bulk particles;
- <48> feeding the compound 13 having a multi-color tone in a sheet form on a stacking plate 14 without additional grinding, thus forming a compound sheet;
- <49> spraying a plurality of pigments having different colors on the compound sheet 15, and then stirring the compound sheet throughout an entire thickness thereof, thereby forming the compound sheet having multi-color vein; and
- <50> subjecting the compound sheet 15 having multi-color vein to compression molding under high pressure, thereby manufacturing native rock combined with resin having a predetermined strength.

【Claim 2】

- <51> The method according to claim 1, wherein the combining comprises mixing natural mineral powder with the resin, thus preparing three or more respective types of chips having different mono-colors, and then mixing the three or more respective types of chips having different mono-colors together, thus preparing the compound 13 having a multi-color tone.

【Claim 3】

- <52> The method according to claim 1 or 2, wherein the natural mineral powder has a range of particle size in which 20% or more thereof passes through a 0.1 mm mesh sieve and 35% or more thereof does not pass through a 0.1 mm mesh sieve.

【Claim 4】

- <53> The method according to claim 1 or 2, wherein the resin has a viscosity adjusted in a range of 800~1000 cps in order to promote formation of the bulk particles.

【Claim 5】

<54> The method according to claim 1 or 2, wherein the resin is an unsaturated polyester resin resulting from polymerization of 40~90 wt% of an unsaturated polyester having one or more glycols and including saturated acid and unsaturated acid and 10~60 wt% of a monomer.

【Claim 6】

<55> The method according to claim 5, wherein the unsaturated polyester resin has a molecular weight of 1100~5000.

【Claim 7】

<56> A native rock combined with resin having multi-color vein, a surface of which exhibits patterns of bulk particles and multi-color vein by combining 88~89 wt% of a plurality of types of natural mineral powder with 11~12 wt% of a resin, thus preparing a compound 13 having a multi-color tone and including bulk particles, which is then subjected to spraying of a plurality of pigments having different colors, stirring, and compression molding under high pressure.

【Claim 8】

<57> The natural rock according to claim 7, wherein the natural mineral powder has a range of particle size in which 20% or more thereof passes through a 0.1 mm mesh sieve and 35% or more thereof does not pass through a 0.1 mm mesh sieve.

【Claim 9】

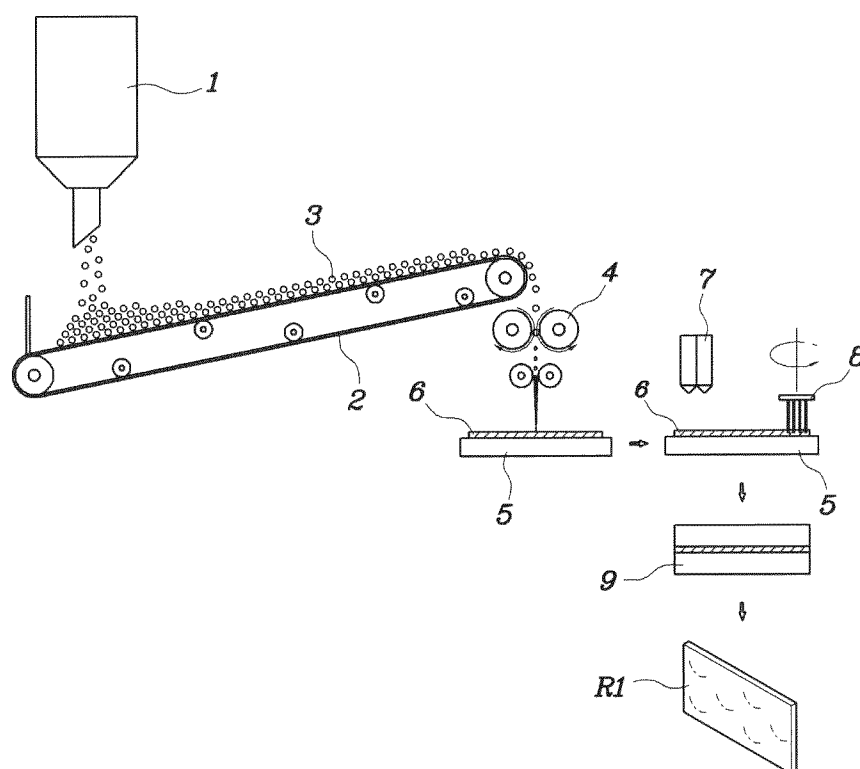
<58> The natural rock according to claim 7, wherein the resin is an unsaturated polyester resin resulting from polymerization of 40~90 wt% of an unsaturated polyester having one or more glycols and including saturated acid and unsaturated acid and 10~60 wt% of a monomer.

【Claim 10】

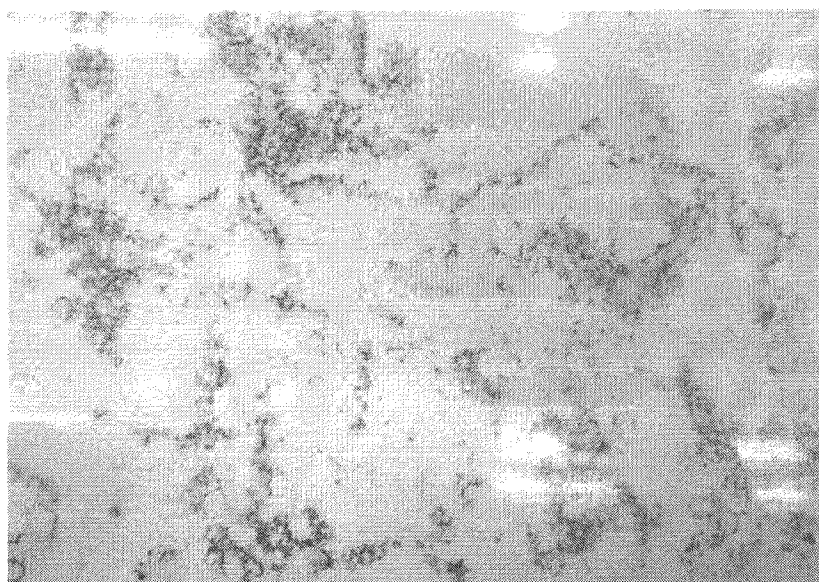
<59> The natural rock according to claim 9, wherein the unsaturated polyester resin has a molecular weight of 1100~5000.

【DRAWINGS】

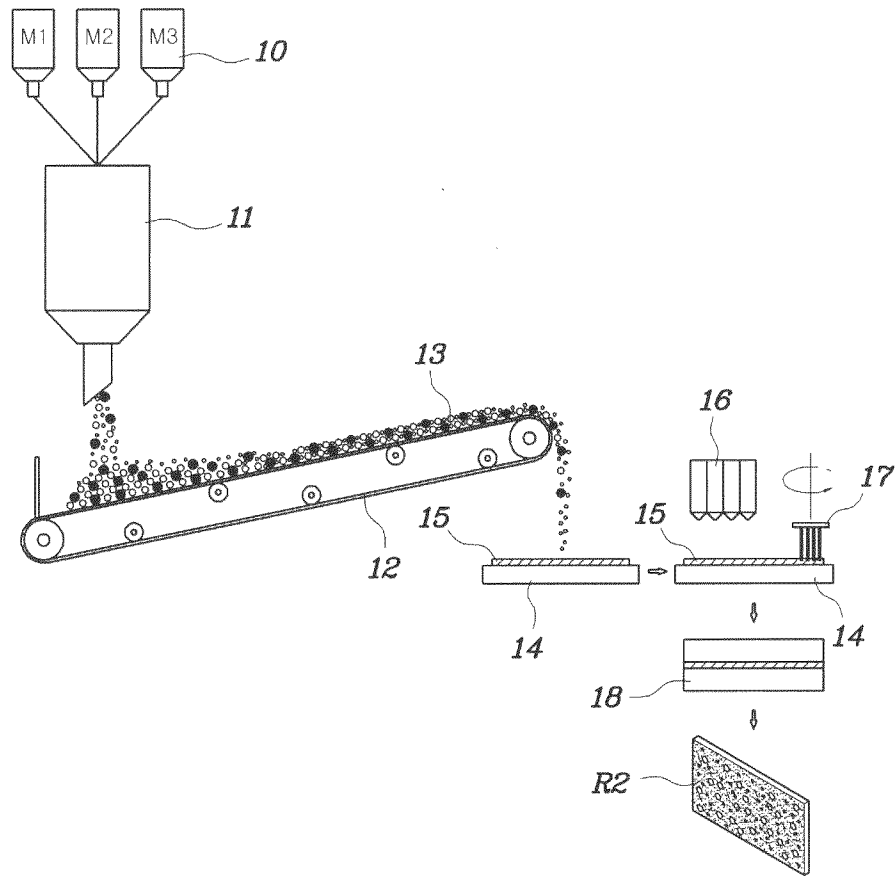
【Figure 1】



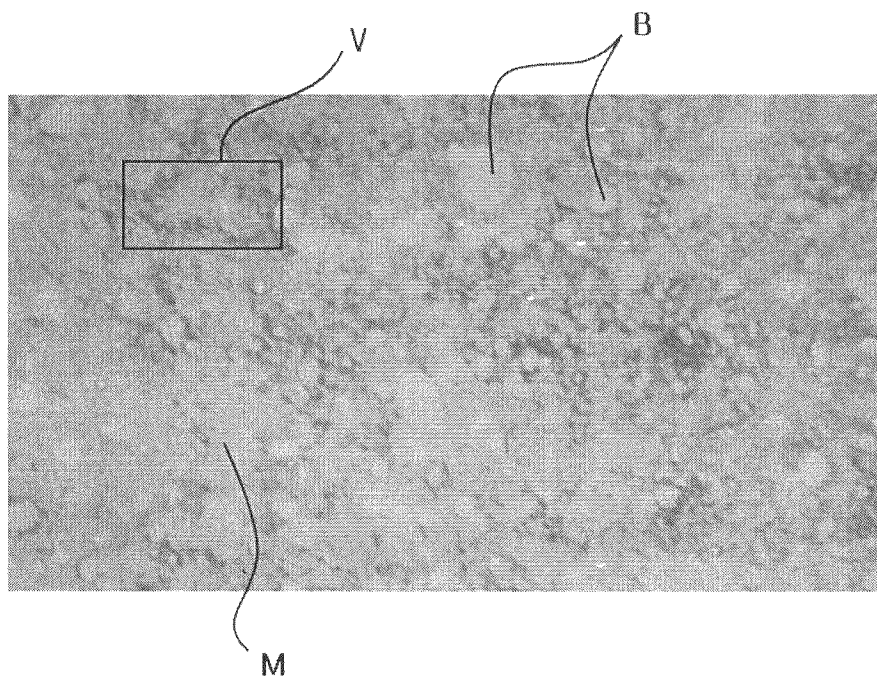
【Figure 2】



【Figure 3】



【Figure 4】



A. CLASSIFICATION OF SUBJECT MATTER*C04B 14/14(2006.01)i*

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)

IPC 8 C04B

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KPA, PAJ, FPD, USPATFULL) in KIPO, CA online & keywords: native rock, marble, resin, vein, pattern

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2006-0114497 A (LG CHEM. LTD.) 07 November 2006 See the whole document	1-10
Y	KR 10-0728589 B1 (CHEIL INDUSTRIES INC.) 08 June 2007 See the whole document	1-10
Y A	KR 10-2004-0070123 A (HYOWON CO., LTD.) 06 August 2004 See the abstract; page 2; claim 1	4-6, 9, 10 1-3,7,8
A	KR 10-1999-0039632 A (HYOSUNG CO.) 05 June 1999 See the abstract; claims 1-5	1-10
A	KR 10-2002-0014495 A (JEON, JAE SEOUK) 25 February 2002 See the abstract; claims 1-10	1-10



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 application or patent 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 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

29 OCTOBER 2008 (29.10.2008)

Date of mailing of the international search report

29 OCTOBER 2008 (29.10.2008)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Jang, Ki Wan

Telephone No. 82-42-481-5567



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/002775

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2006-0114497 A	07.11.2006	NONE	
KR 10-0728589 B1	08.06.2007	KR 10-2006-0069193 A	24.07.2006
KR 10-2004-0070123 A	06.08.2004	NONE	
KR 10-1999-0039632 A	05.06.1999	NONE	
KR 10-2002-0014495 A	25.02.2002	NONE	