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(71) Applicants: **UNIVERSITI BRUNEI DARUSSALAM** [BN/BN]; Tungku Link Road, Gadong, BE1490, Brunei, Brunei Darussalam, BE1410 (BN). **PIXELA CORPORATION** [—/JP]; 25f Parks Tower, 2-10-70 Namba-naka, Naniwa-ku, Osaka, 5560011 (JP).

(72) Inventors: **KITAMURA, Toru**; 18-1-1506 Asahicho, Izumiotsu, Osaka-fu, 595-0025, Japan, Osaka-fu, 595-0025 (JP). **MATJALINA, Nur Fajrini Binti**; No 373, Spg 373 Kampong Kapok, Jln Muara BT2328, NBD, Brunei, BT2328 (BN). **TARIP, Nursyahidah Husna Binti Haji**; No.4, Spg.5, Kampong Sungai Kelugos, Tutong TB2741, NBD, Brunei, TB2741 (BN). **HUSSIN, Haji Muhammad Redza Bin Haji**; No.129, Spg 637-84-135 STKRJ Lambak

Kiri, Berakas, BB1114, NBD, Brunei, BB1114 (BN). **MAHRI, Mohammad Zul Amali Bin Haji**; No.9, Spg.33, Jln Pantai Sg. Liang, Kg Sg Liang, KC1135, NBD, Brunei, KC1135 (BN).

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(54) Title: A NOVEL COMPOSITION FOR A ROOFING MATERIAL AND METHOD OF USING THE SAME

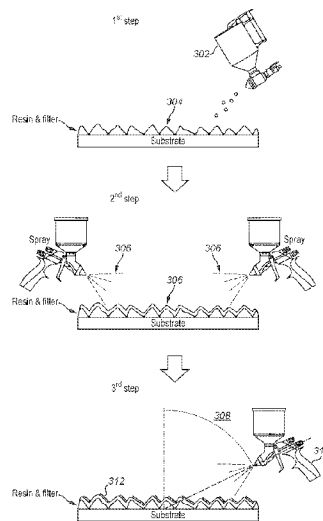


FIG. 3

(57) Abstract: A roofing material composition and a method of applying that roofing material composition using specific angles to deflect infra-red rays and provide aesthetically nice finish is disclosed. The first coat of the roofing material is light in color and the second color may be a light or a dark color. The rough surface is prepared using specific filler, resin and paint to deflect infra-red rays and reduce heating inside a building.

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A NOVEL COMPOSITION FOR A ROOFING MATERIAL AND METHOD OF USING THE SAME

CROSS REFERENCE TO RELATED APPLICATIONS

[001] The instant application claims priority to U.S. Provisional application 62068800 filed on 27th October, 2014. The pending U.S. Provisional application 62068800 is hereby incorporated by reference in its entirety for all of its teachings.

FIELD OF INVENTION

[002] The instant application discloses a roofing material composition and method of using the same to display multicolored effect and deflect infra-red rays away from roof top.

BACKGROUND:

[003] Worldwide the roofs are of dark colors. Ideally if the roof is white then it would be optimal for reflecting infra-red rays and reducing the temperature in the house. However, it is not the preferred method. Global warming has created a challenge to reduce energy conservation and reduce cost of living for aging population. There is need to solve this problem by solving this issue of a better roof top design.

SUMMARY

[004] The instant disclosure describes several embodiments for a composition for roofing material and method of applying the roofing material to the roof to display different reflective effects and colors, minimizing heat absorption onto the roof surface. In one embodiment, a roofing material for reducing the heat and increasing the deflection of the sun rays are described. In another embodiment, a roofing material comprises of filler, resin, pigment, and solvent. The pigment is a combination of one or more chemical ingredients including titanium dioxide, ferrous oxide, ferric oxide, cupric oxide, cuprous oxide, zinc oxide, carbon, nickel oxide, and cobalt oxide. The one or more chemical ingredients are fine particles of solid chemicals having the mean diameter of primary particle 10nm-200nm. In one embodiment titanium dioxide is a major ingredient to reflect sunlight IR effectively. In one embodiment, the method of applying the roofing material using specific sequence of steps and specific material is described.

[005] In one embodiment, a roofing material composition is made up of fillers such as sand or clashed mineral or combination thereof. The sand can be silica sand, beach sand, or any other type of sand. In one embodiment the sand is not only the ordinary sand but is any large particles of metal oxide having enough water resistance and resilience against outdoor weathering. The clashed minerals are minerals of small size and include, but not limited to, quartz, granite, basalt, pegmatite and calcite. In one embodiment, the clashed materials include clashed metal oxide rocks with suitable size. The filler, in another embodiment, has a diameter between 0.1mm and 3.0mm.

[006] In another embodiment, the resin is used as a component of the roofing material. In one embodiment, the resin /filler weight ratio varies between $1/3$ to $2/3$. The resin includes volatile solvent. In another embodiment resin can be resin mixture that includes resin, solvent, and pigment. In one embodiment, the solvent in resin/filler or resin mixture/filler is less than 30 weight percent as the major volatile ingredients. In an embodiment the resin/filler or resin mixture/filler is applied on the surface and is allowed to get dried. In another embodiment, the non-volatile weight percent that is the weight of the resin/filler or resin mixture/filler after the surface gets dried exceeds 70%. The resin/filler ratio is critical as resin/filler weigh ratio in case of more than $2/3$ the viscosity of this material is inadequate to form high profiled rough surface by spraying. If the resin/filler weight ratio is less than $1/3$ the adhesion of filler particles will decrease and the layer thus formed will be fragile.

[007] In another embodiment, a method of applying the roofing material is described. In yet another embodiment a photocatalytic finish as a last layer for the roofing material is described. Other features will be apparent from the accompanying drawings and from the detailed description that follows.

BRIEF DESCRIPTION OF DRAWINGS

[008] The embodiments of this invention are illustrated by way of example and not limitation in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

[009] Fig.1 shows the concept of the invention as illustrated.

[010] Fig.2 shows the different angles that can be seen by the observer.

[011] Fig.3 shows the step wise process flow for the invention.

[012] Fig.4 shows the different angles of the spray technology and its effect.

[013] Fig.5 shows the details effect of spraying angle and reflectivity of the spraying angle of the paint.

[014] Fig.6 shows the average temperature reading against angle of applications of paint.

[015] Fig.7 shows the shows the comparison of reflectance amongst various samples.

[016] Other features of the present embodiments will be apparent from the detailed description that follows.

DESCRIPTION

[017] The instant disclosure describes a novel composition of a roofing material (composition) and the method of applying the composition of the roofing material to the roof top. Applying this composition and sequential method of applying this roofing material and subsequently the paint it deflects infra-red rays from the roof and as a result reduces the heat inside the house/ any building.

[018] We propose a special paint as a roofing material and its application method in achieving the infra-red reflection and maintain dark color tones of conventional roofing. In Fig. 1 solar light 102 hits the roof top and it is reflected 104. It also shows that from 110 angle of viewing the color of the roof top is white. When the roof top 106 that shows the serrated surface and dual paint from the 108 point of viewing the pedestrians or onlooker would see the roof top color as color of choice which may be of dark tone. As shown in Fig.1, white coloring of the roof materials is the best way to reflect sun light IR and save cooling energy for every buildings and houses but majority of the people don't prefer white for their roofs simply because of the designing aspect. Some sort of dark colored sun light reflective paint have been proposed and actually sold in the market but their reflective capabilities are far from satisfactory.

[019] We propose here a completely innovative idea which combines paints and their method of coating together to solve this problem perfectly, since otherwise it cannot be solved both practically and theoretically from the improvement approach of paint alone. The roofing material and paint as material and method of coating the same produces at least of two color tones on surfaces of roofing materials. The color tone of the roof surface varies with the direction at which the surface is being observed. The coated roofing material appears to show gradated change in color tone from a lighter tone to a darker tone when the observation angle is changed

from 0° to 90°, with respect to the normal of the surface. At normal incidence the material appears white from one angle.

[020] The surface of the roofing material is prepared to give edged roughness. Surfaces with edge roughness (rough surface) are coarse to the touch and have an average height difference exceeding 1 mm. This is achieved by painting the roof top with paints mixed with coarse fillers such as sand, silica sand, or generally clashed minerals and combination thereof. The average aggregate size of the filler has mean diameter ranging from 0.1mm to 3.0mm. In another embodiment sprinkling coarse filler on the wet substrate with applied primer is used to prepare this rough surface. In another embodiment, mixture of resin and filler can be sprayed to get more roughness. In another embodiment, resin mixture comprising resin, solvent, and pigment can be used with filler instead of resin. In this case the filler ingredient works not only to give rise to the surface roughness by itself but also to increase the viscosity and stickiness of the rough material as a whole.

[021] In Fig.2 shows that the substrate 202 houses the resin and filler layer 208 as an angular layer having two angular surfaces. Due to the inclined angles the observer can see from angle 206 view. However, the sun rays hit the roof at a 204 angular side. Fig.2 shows a view of the substrate and resin as it is coated on the roof top. The angle of the Sun and the pedestrian view has different views. This unique combination enables the user to depict different colors for the pedestrians and add ambiance to the house décor.

[022] Fig. 3 shows the three step process of applying the roofing material and paint to a roof of the house. The first step, second and third step are performed one after the other and the optional fourth step may be used for coating a photocatalytic coat. In the first step a high viscosity spray material 302 is applied on both sides of the viewing angle to the roof top to make a serrated surface 304 in form of resin and filler with angles on a substrate. In the second step a white reflective paint 306 is applied on the serrated/rough surface 304. In step 3 the spraying angle 308 is controlled and color paint 310 is applied to one side view only as 312. In another word, the method of making a roofing material comprises of making a rough surface on a substrate that is a first layer for a roof top; spraying a first coat using a first color of a first paint on the rough surface at a specific angle; and spraying a second coat using a second color of a second paint in a second specific direction at a glancing angle of at least 60 degree from the roof top to the rough surface.

[023] The first coat using a first color may be any light color or white. The second color which is a second paint may be any color of user choice. A specific angle is important for the first paint as it covers the entire rough surface. The second angle varies and have been described with examples below. The second specific direction is always only one side so it is visible from the pedestrian angle and aesthetics of the roof is visible for all viewers from the road.

[024] The following composition of the roofing material and paint is especially preferable for this purpose to give the paint the high thixotropic nature and hence form a surface feature full of edged roughness, or, many ups and downs, of which mean height difference exceeds 1mm and this leads to the sharp contrast of colors observed from different angles. The paint is prepared with the following conditions: Mean diameter of indispensable filler contained should be between 0.1mm and 0.3mm. Resin/filler or Resin Mixture/filler weight ratio is between 1/3 to 2/3. Weight ratio of resin/filler or resin mixture/filler is an important feature as ratio of more than 2/3 may increase viscosity of the material and may be inadequate to form high profiled rough surface. Similarly, the ratio of less than 1/3 will decrease adhesion of filler particles even with better roughness. However, range of 1/3 to 2/3 is optimum to have good adhesion and good rough surface. Non-volatile weight percent that is after the surface gets dried should exceed 70%. In an embodiment, a white paint coat is applied onto the entire surface. The white paint is applied evenly without any transparency on the whole surface. But if the enough brightness can be obtained in the first step process already, this process can be abbreviated. Spraying the darker colored paint by spraying in only one direction, at a glancing angle greater than 60 degree from the normal of the surface. From the angle of pedestrian side this dark color can be observed. The roof is considerably rough and can be stained quite easily by the rainfall or dust from the practical sense. This problem could be significantly minimized by the application of photocatalytic finish as the fourth step.

[025] The coat (paint) and coating method (steps) produces at least of two color tones on flat surfaces of the roofing materials. The color tone of the coating varies with the directions at which the surface is being observed. The coated roofing material appears to show a gradual change in color tone from a lighter tone to a darker tone when the observation angle is changed from low to high with respect to the normal of the surface. At normal incidence the material appears white. Sometimes the appearance changes depending on the angle from the observer. Fig. 4 shows an infra-red reflectivity angle 0° . The spraying angle is between $0-60^\circ$. The

pedestrian angle is 80°. In a normal roof inclination, the coated roof maintains the appearance of a darker tone, and this provides the aesthetics of conventional roofing, and at the same time, the coated roof has the capability in reflecting infra-red radiation, hence, providing the capability of minimizing heat absorption onto the roof surface. That means the roof looks considerably dark color from the pedestrians observing it from the low angle but effectively reflects sun right IR coming on it from the high altitude, thus leads to the drastic alleviation of sun light heating.

[026] Table 1: The effect of different spray angles are shown how much IR reflectance is being observed:

Samples	Second Coat Spray Angle From Normal	Substrate Position at Spraying	Appearance from the Pedestrian Angle	IR Reflectance		
				Relative Reflectance of 1200nm IR at 45° incident angle	Average Temperature / °C	Appearance
A. Invention Example 1	90°	Horizontal	Black	59	35.2	Mixture of white and black
B. Invention Example 2	80°	Horizontal	Black	65	35.6	Mixture of white and black
C. Invention Example 3	70°	Horizontal	Black	53	39.5	Mixture of white and black
D. Invention Example 4	60°	Horizontal	Black	38	39.7	Mixture of white and black
E. Invention Example 5	50°	Horizontal	Black	37	40.9	Mixture of white and black
F. Invention Example 6	40°	Horizontal	Black	25	40.2	Mixture of white and black
G. Invention Example 7	30°	Horizontal	Black	22	40.5	Mixture of white and black
H. Comparative Example 1	White Smooth; wholly pure white coated cement board		White	-	33.7	White
I. Comparative Example 2	White Rough (no 2 nd coating applied)		White	100 (Standard)	34.4	White
J. Comparative Example 3	Black Smooth; conventional asphalt single roof sheet		Black	-	49.6	Black
K. Comparative Example 4	Black Rough (0°)		Black	15	48.0	Black

[027] Table 1 shows a comparison of samples A to G with K depicts the importance of spray angle which should be kept at more than 60° glancing angle. If the glancing angle is less than 60 degree then it tends be darker and so will decrease the amount of white color and will in turn decrease the polarization. The table also shows values and comparison of samples A through G and K that depicts the additional effect of spraying angle to the average temperature underneath the substrate. The average temperature decreases as second coat spray angle is increased. Comparison of samples A to G with J depicts the superiority of this invention to conventional roofing material. The average temperature underneath substrate of samples A through G are lower compared in comparison with sample J; of the conventional black smooth asphalt coat on

the roof. This indicates that samples A to G have better thermo-shield property. Sample I shows the lowest temperature reading compared to other samples. This is also especially true for spraying angle at 90° (sample A) and 80° (sample B). The average temperature in sample A and B is very close to comparative sample I which is standard conventional complete white surface. Therefore, sample A and sample B with 90 degree and 80 degree second coat spray angle from normal respectively shows better and close performance with polarization effect in comparison to standard surface using complete white color.

[028] Fig. 5 shows the vertical application of the second paint coat and its effect. If the titling angle 504 of the roof surface is at 90° then the excess spray mist 502 would fall way from the light colored surface and would not stain that part. This suggests another angle at which the roof top may be colored to avoid mixing of the surface color and obtain a distinct color demarcation.

[029] Fig. 6 shows average temperature variations against angle of applications. Samples A through G shows that there is an increase in temperature reading as the second coat spray angle is decreased. However, there is a saturation point where the temperature remains relatively constant at approximately 40° for samples D, E, F and G. Second spray angle lower than 60 degrees reads an average temperature of 40.5 degrees Celsius. There is no significant difference in the temperature observed if the second coat spray angle is 30 degrees, 40 degrees and 50 degrees.

[030] Fig. 7 shows reflectance of various examples compared to sample “I”. Table 2 and figure 7 shows that there is an increase in the relative reflectance of IR at wavelength 1200nm. The graph shows relative reflectance of IR for samples A to G, I, and K.

[031] Table 2: shows that there is an increase in the relative reflectance of the samples as the second coat spray angle increase.

Second Coat spray angle from normal	Relative reflectance at 45° incident angle
90°	59
80°	65
70°	53
60°	38
50°	37
40°	25
30°	22
0°	15

[032] In one aspect of the invention the method of using the roofing material is series of steps that uses a specific combination of resin or resin mixture with filler to create a rough edged surface on the roof with a two color roof. The two color roof deflects most of the infra-red rays of the Sun and makes the house cooler. These types of roofing material can be used for any type of roof where there is extreme heat and/ or shortage of power to cool the interior of a building.

[033] Although the present embodiments have been described with reference to specific example embodiments, it will be evident that various modifications and changes may be made to these embodiments without departing from the broader spirit and scope of the various embodiments.

CLAIMS:

What is claimed is:

1. The method of making a roofing material, comprising:
making a rough surface on a substrate that is a first layer for a roof top;
spraying a first coat using a first color of a first paint on the rough surface at a specific angle; and
spraying a second coat using a second color of a second paint in a second specific direction at a glancing angle of at least 60 degree from the roof top to the rough surface.
2. The method of claim 1, wherein the rough surface comprising of different peaks with average peak difference being at least 1 mm.
3. The method of claim 1, wherein the rough surface is being colored based on user preferences for multi-color effects.
4. The method of claim 1, wherein the rough surface is made of a filler, resin and paint.
5. The method of claim 4, wherein the filler is at least one of a sand, silica sand, clashed minerals and combination thereof.
6. The method of claim 1, wherein the application of second color producing the multi-color effects, wherein the multi-color effect comprising of change in a color tone from a first color to a second color when observation angle is changed from 0 to 90° with respect to a normal flat surface.
7. The method of claim 1, wherein the first color is a light color.
8. The method of claim 1, wherein the second color is a dark color.
9. The method of claim 1, wherein the first coat is not transparent.
10. The method of claim 1, wherein the rough surface at normal incidence appears to be the first color.
11. The method of claim 1, wherein the roofing material reflects an infra-red radiation.
12. The method of claim 1, further comprising:
applying layer of a photo-catalytic finish to the roofing material.
13. The method of claim 1, further comprising
removing excess first color by positioning the rough surface in a vertical to upside-down position.
14. The method of claim 1, further comprising

removing excess second color by positioning the rough surface to a vertical to upside-down position.

15. A composition of a roofing material, comprising:
 - a filler having a mean diameter between 0.1 mm and 0.3 mm;
 - a resin and the filler, wherein weight ratio of the resin and the filler is between $1/3$ and $2/3$;
 - a non-volatile weight percent exceeds 70%; and
 - a first paint and a second paint to obtain a color toned roof with a rough surface.
16. The composition of claim 15, wherein the filler is at least one of a sand, silica sand, clashed minerals and combination thereof.
17. The composition of claim 15, wherein the first color is a light color.
18. The composition of claim 15, wherein the second color is a dark color.
19. The composition of claim 15, wherein the first coat is not transparent.
20. The composition of claim 15, wherein the rough surface having different peaks with average peak difference being at least 1 mm in height from the roof top.

AMENDED CLAIMS

received by the International Bureau on 30 January 2016 (30.01.16)

- [Claim 1] The method of making a roofing material, comprising:
making a rough surface on a substrate that is a first layer for a roof top, wherein the rough surface having different peaks;
spraying a first coat using a first color of a first paint on the rough surface, wherein the first coat completely covers the rough surface of the substrate; and
spraying a second coat using a second color of a second paint at a specific angle, wherein the specific angle being any angle from 30 degree to 90 degree from normal of the substrate.
- [Claim 2] The method of claim 1, wherein the rough surface comprising of different peaks, wherein different peaks have average height difference exceeding 1 mm.
- [Claim 3] The method of claim 1, wherein the rough surface is being colored based on user preferences for multi-color effects.
- [Claim 4] The method of claim 1, wherein the rough surface is made of a filler, resin and paint.
- [Claim 5] The method of claim 4, wherein the filler is at least one of a sand, silica sand, clashed minerals and combination thereof.
- [Claim 6] The method of claim 1, wherein the application of second color producing the multi-color effects, wherein the multi-color effect comprising of change in a color tone from a first color to a second color when observation angle is changed from 0 to 90° with respect to a normal flat surface.
- [Claim 7] The method of claim 1, wherein the first color is a light color.
- [Claim 8] The method of claim 1, wherein the second color is a dark color.
- [Claim 9] The method of claim 1, wherein the first coat is not transparent.
- [Claim 10] The method of claim 1, wherein the rough surface at normal incidence appears to be the first color.
- [Claim 11] The method of claim 1, wherein the roofing material reflects an infra-red radiation.
- [Claim 12] The method of claim 1, further comprising:
applying layer of a photo-catalytic finish to the roofing material.
- [Claim 13] The method of claim 1, further comprising
wherein the second coat is sprayed at the specific angle by keeping substrate vertical to prevent staining the first color at required position.
- [Claim 14] The method of claim 1, further comprising

wherein the second coat is sprayed at the specific angle by keeping substrate upside down to prevent staining the first color at required position.

- [Claim 15] A composition of a roofing material, comprising:
a filler having a mean diameter between 0.1 mm and 3.0 mm;
a resin and the filler, wherein the resin and filler are mixed to make a mixture, wherein the filler is 3 parts and resin can vary from 1 part to 2 parts, wherein the mixture is applied to create a rough surface, wherein the mixture is applied on a substrate;
a non-volatile weight percent exceeds 70%; and
a first paint and a second paint to obtain a color toned roof with the rough surface, wherein the first paint being applied to cover the rough surface and the second paint being applied at a specific angle after applying the first paint.
- [Claim 16] The composition of claim 15, wherein the filler is at least one of a sand, silica sand, clashed minerals and combination thereof.
- [Claim 17] The composition of claim 15, wherein the first paint has a first color, wherein the first color is a light color.
- [Claim 18] The composition of claim 15, wherein the second paint has a second, wherein the second color is a dark color.
- [Claim 19] The composition of claim 15, wherein the first paint is not transparent.
- [Claim 20] The composition of claim 15, wherein the rough surface having different peaks, wherein the different peaks have average height difference exceeding 1 mm.

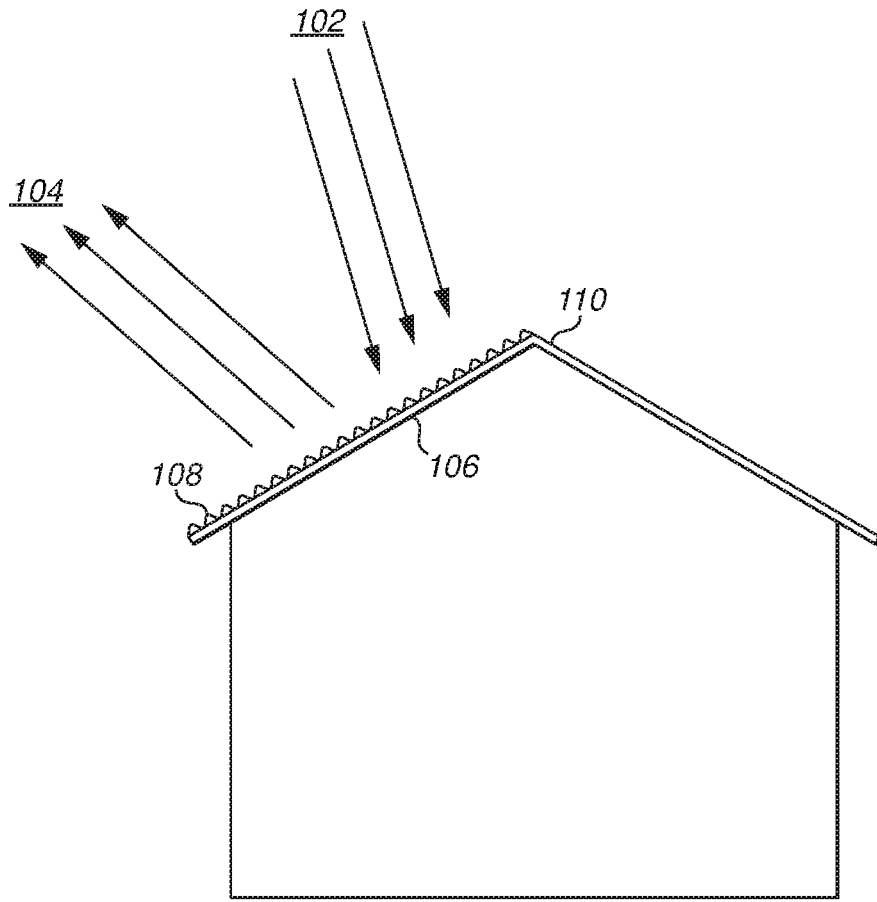


FIG. 1

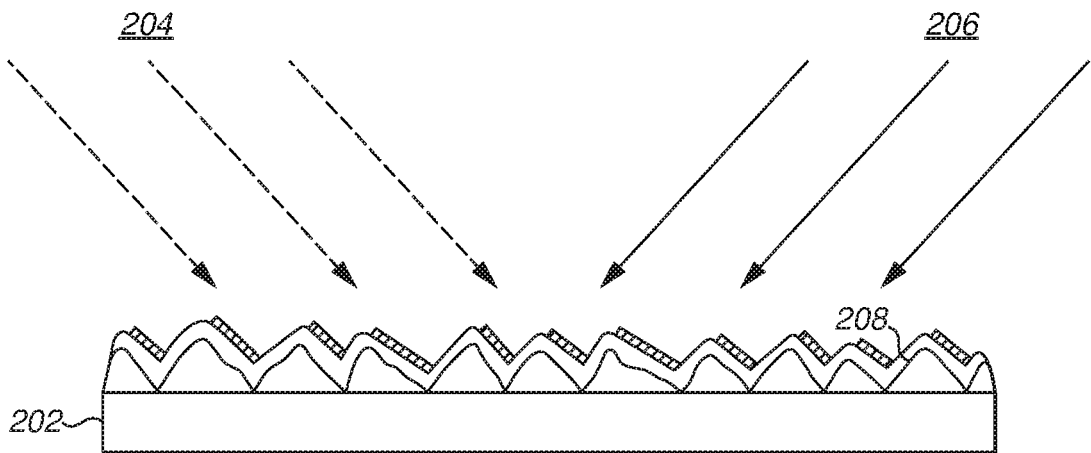


FIG. 2

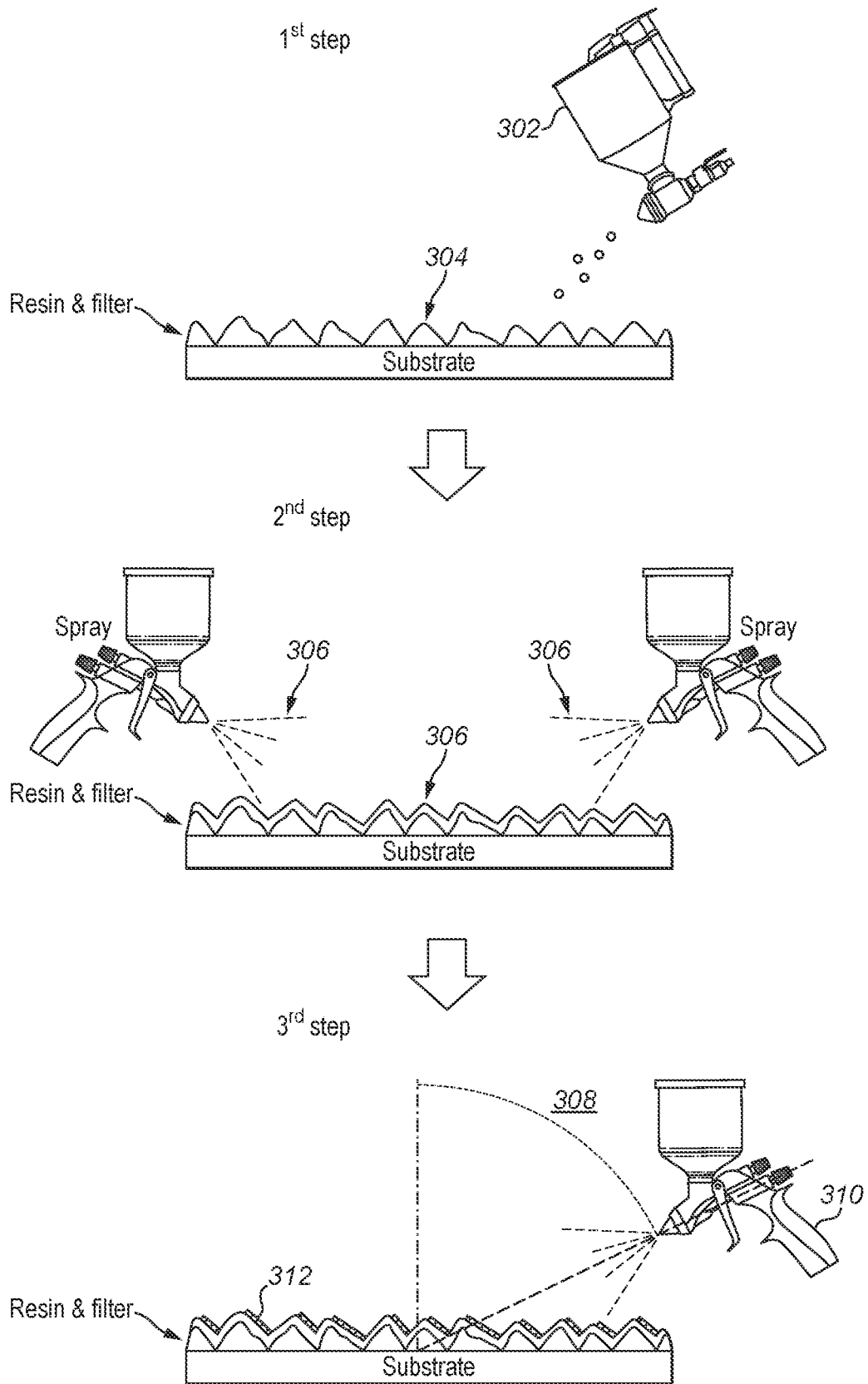


FIG. 3

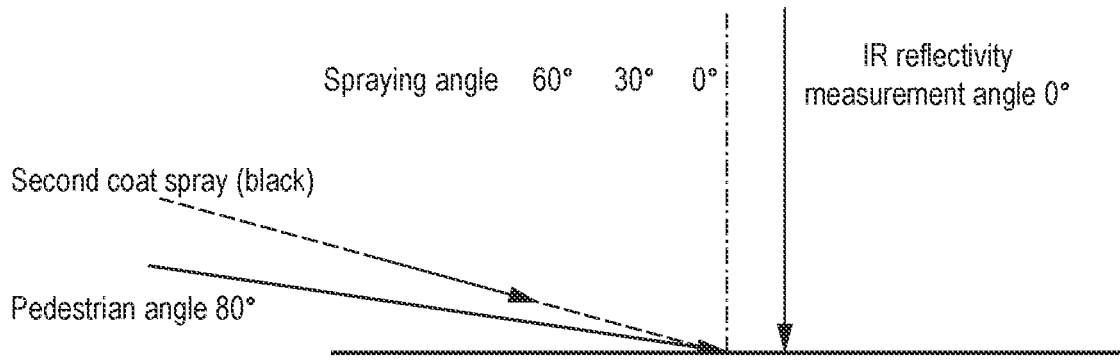


FIG. 4

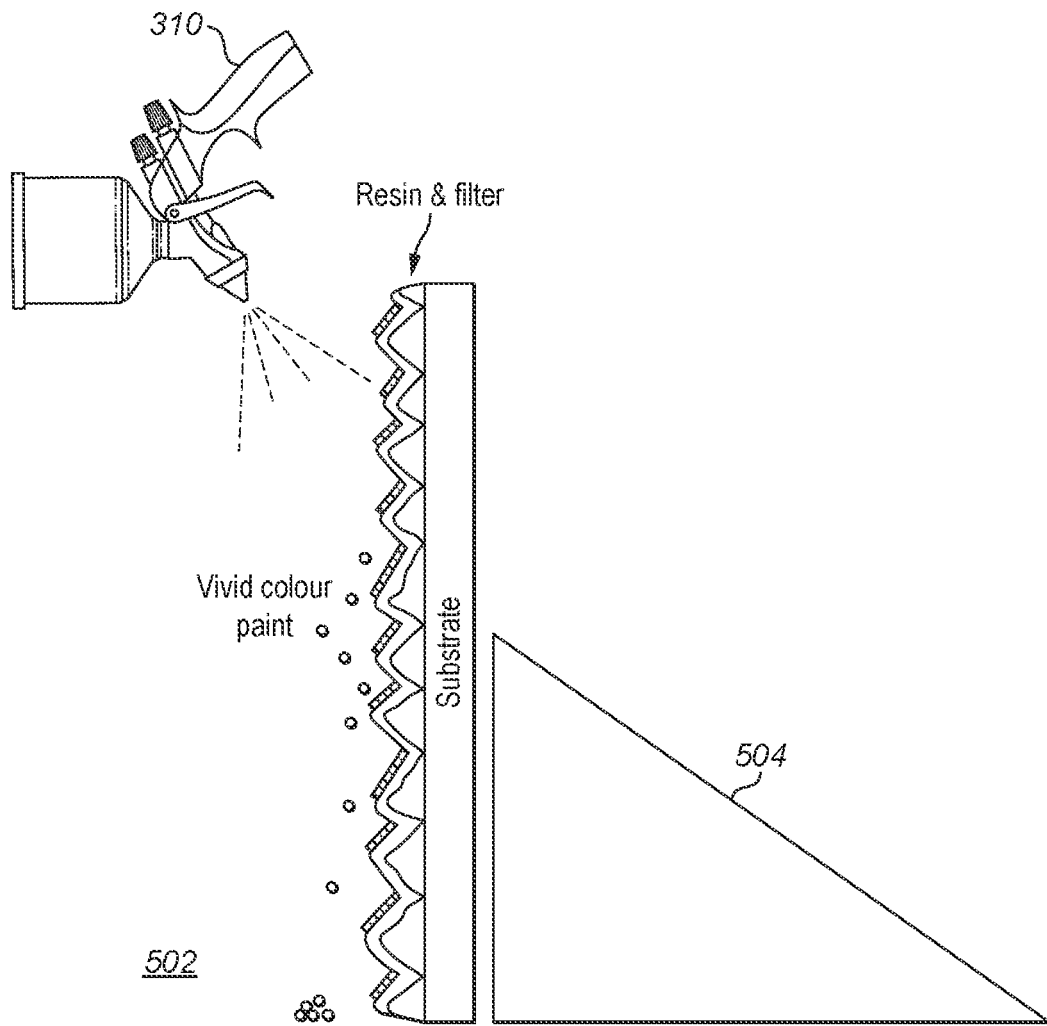


FIG. 5

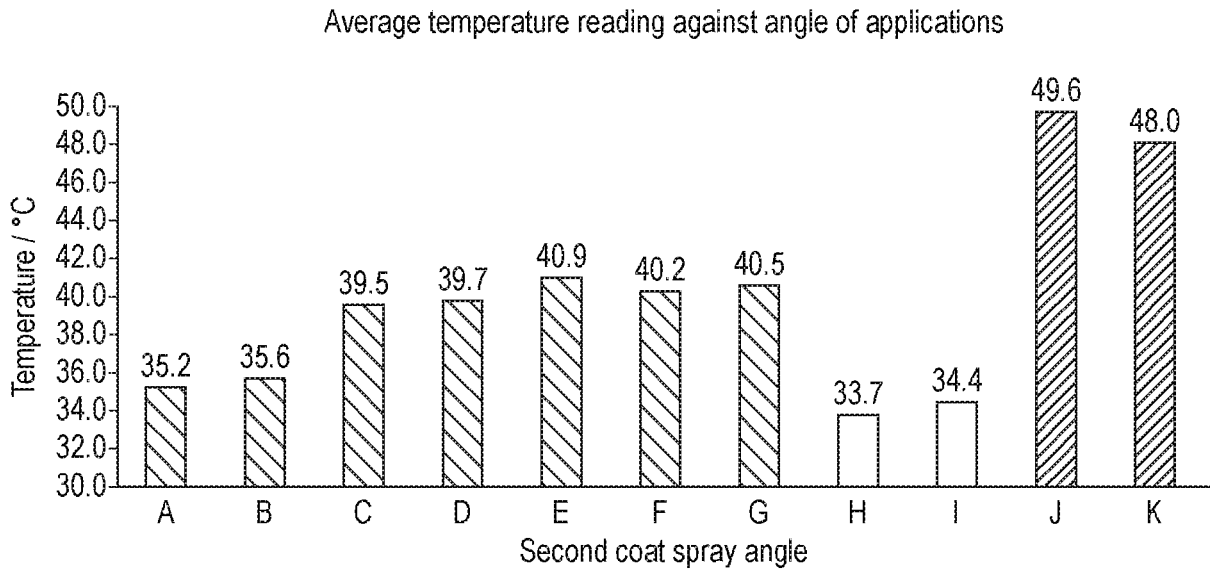


FIG. 6

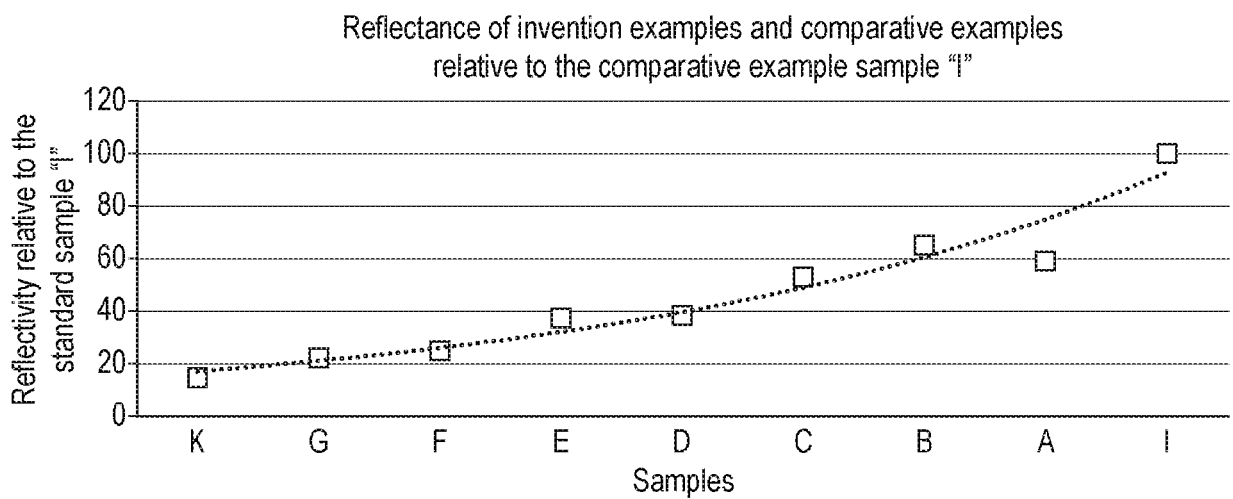


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2015/058228

A. CLASSIFICATION OF SUBJECT MATTER

B05D 1/02 (2006.01) B05D 3/00 (2006.01) B32B 27/00 (2006.01) E04D 1/10 (2006.01) E04D 5/12 (2006.01)
E04D 11/00 (2006.01) E04D 13/16 (2006.01) C09D 5/00 (2006.01)

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)

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 practicable, search terms used)

EPODOC, WPIAP: IPC, CPC, B05D1/02, B05D3, B28B11/001, B28B11/002, B28B11/04, B28B11/08 B32B27, C04B41, C08K3/36, C09D, E04D1, E04D2001/005, E04D3, E04D7, E04D11, E04D13/16/LOW, G02F1, Y02B80/30, Y02B80/34, Y10T428/26, ROOF+, TILE+, REFLECT+, DEFLECT+, COLO?R? , CHANG+, ANGL+, ROUGH+, UNEVEN?, SERRAT+, PEAK+, RIDGE?, RIB+, FIRST, SECOND, PAIR?, LAYER+, PAINT+, SUBSTRATE+ , MATERIAL+, PIGMENT+, TOP+, SPRAY+, APPL+, COOL+, FILLER?, SAND+, AGGREGAT+, GRANULAT+, FILLER?, RESIN??. POLYMER+, SOLVENT+, DARK?, LIGHT?, and similar terms.

Applicant(s)/Inventor(s) name searched in internal databases provided by IP Australia.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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

 Further documents are listed in the continuation of Box C See patent family annex

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"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
30 November 2015

Date of mailing of the international search report
30 November 2015

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
Email address: pct@ipaustralia.gov.au

Authorised officer

Telma Mantas da Silva
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. 0262256107

INTERNATIONAL SEARCH REPORT

International application No.

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

PCT/IB2015/058228

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2012/048006 A1 (COOL ANGLE LLC) 12 April 2012 Abstract; Figures 6, 10A-15B; Paragraphs [0003], [0014], [0046]-[0047], [0049], [0050], [0056]-[0062], [0069],[0075], [0079], [0086]-[0088], [0091], [0094]	1-14
Y	Abstract; Figures 6,10A-15B; Paragraphs [0003], [0014], [0046]-[0047], [0049], [0050], [0056]-[0062], [0069],[0075], [0079], [0086]-[0088], [0091],	15-20
X	US 1877481 A (T. C. PROUTY) 13 September 1932 Figures 1-2; Page 1 lines 1-3 & lines 64-72; Page 2 lines 12-17	1, 2, 11, 12
X	US 2010/0215946 A1 (WENSEL et al.) 26 August 2010 Abstract; Paragraphs [0029], [0032]-[0033], [0043]-[0044].	15-16
Y	WO 2007/064511 A1 (3M INNOVATIVE PROPERTIES COMPANY) 07 June 2007 Page 4 lines 6-17 & 24-31; page 5 lines 1-2 & lines 21-26; page 15 lines 3-9	15-20

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including
2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

Supplemental Box**Continuation of: Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- Claims 1-14 are directed to a method of making a roofing material .The steps of this method *per se* are specific to this group of claims.
- Claims 15-20 are directed to a composition of a roofing material. The feature of a composition of a roofing material comprising a filler, resin, first and second paints are specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only feature common to all of the claimed inventions and which provides a technical relationship among them is a roofing material comprising a rough surface, a first and second paint. However this feature does not make a contribution over the prior art because it is already disclosed for example in WO 2012/048006 A1 (COOL ANGLE LLC) 12 April 2012.

Therefore in the light of this document this common feature cannot be a special technical feature. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a posteriori*.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IB2015/058228

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
WO 2012/048006 A1	12 April 2012	WO 2012048006 A1	12 Apr 2012
		AU 2011312092 A1	02 May 2013
		CA 2813728 A1	12 Apr 2012
		CN 103154404 A	12 Jun 2013
		EP 2625347 A1	14 Aug 2013
		MX 2013003799 A	04 Nov 2013
		US 2011183112 A1	28 Jul 2011
		US 8007898 B2	30 Aug 2011
		US 2012088071 A1	12 Apr 2012
		US 1877481 A	13 September 1932
US 2010/0215946 A1	26 August 2010	US 2010215946 A1	26 Aug 2010
		US 8894901 B2	25 Nov 2014
		AU 2007359712 A1	09 Apr 2009
		AU 2007359712 B2	06 Mar 2014
		BR PI0722120 A2	08 Apr 2014
		CA 2699731 A1	09 Apr 2009
		CN 101815747 A	25 Aug 2010
		CN 101815747 B	15 Jan 2014
		EP 2195370 A1	16 Jun 2010
		KR 20100065334 A	16 Jun 2010
		MX 2010003544 A	01 Jun 2010
		NZ 583925 A	30 Mar 2012
		US 2015123308 A1	07 May 2015
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WO 2007/064511 A1	07 June 2007	WO 2007064511 A1	07 Jun 2007
		US 2007218251 A1	20 Sep 2007

End of Annex