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(54) Title: GRANITE PARQUETRY TILE ASSEMBLY METHOD

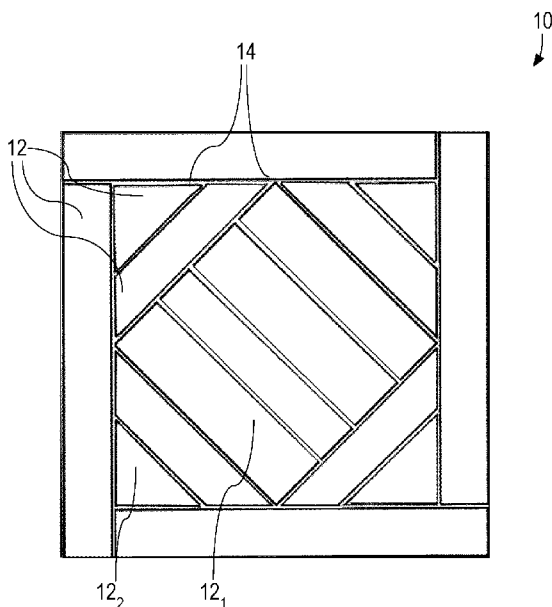


FIGURE 1

(57) Abstract: A method of assembling a tile, including: cutting a stone strip into a plurality of stone shapes; assembling said plurality of stone shapes in a tray comprising a non-stick coating and a temporary adhesive applied thereto for temporarily securing said plurality of stone shapes in a predetermined pattern; applying a resin between the assembled plurality of stone shapes and curing said resin to bond said stone shapes into a tile; removing said tile from said tray; and polishing said tile.

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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

**TITLE OF THE INVENTION**

GRANITE PARQUETRY TILE ASSEMBLY METHOD

**FIELD OF THE INVENTION**

[001] The present invention relates to a granite tile assembly method. In particular, the present invention relates to a method for assembling granite pieces into a decorative parquetry tile.

**BACKGROUND OF THE INVENTION**

[002] The prior art reveals a number of methods for assembling individual stone materials into a singular finished tile comprising a pattern, for example a mosaic or a decorative pattern.

[003] As part of the assembly methods of such tiles, stone material is prearranged and secured in place during a bonding process wherein resin or adhesive is used to permanently join the stone material pieces together to form a singular tile. Such steps generally require a frame or jig structure which maintains a spacing between the individual stone pieces to allow a resin to be injected and cured therebetween. However, the use of the frame or jig structure becomes more complex to construct as the complexity of the pattern increases. In other methods, the placement of stone pieces is achieved by bonding these pieces in a predetermined position to a backer plate prior to bonding the stone pieces together with a resin. The use of such a backer plate is to ensure that the stone pieces do not shift during curing or resin applied between them and distort the final tile design. However, backings used to provide structural support and fixation add additional material, cost and weight to a tile and require additional steps in the manufacturing process.

[004] For example, US Patent Publication 2006/0175000 (OSTERWALDER) discloses the use of an adhesive sheet, which is preferably water-soluble paper, onto which are positioned tiles, whereby this adhesive sheet is removed by means of water. As such, the need to use water adds an

additional step, which increases costs. Also, it is not possible to use resin in such tiles as the mix of water and resin is not compatible.

[005] Other prior art documents require the use of vacuum to restrain tiles placed on a jig, which increases costs.

[006] What is therefore needed is a tile assembly method that employs a simple framing structure for producing a less costly and lighter tile.

#### **SUMMARY OF THE INVENTION**

[007] In accordance with a present embodiment of the present invention there is provided a method of assembling a tile, comprising: cutting a stone strip into a plurality of stone shapes; assembling said plurality of stone shapes in a tray comprising a non-stick coating and a temporary adhesive applied thereto for temporarily securing said plurality of stone shapes in a predetermined pattern; applying a resin between the assembled plurality of stone shapes and curing said resin to bond said stone shapes into a tile; removing said tile from said tray; and polishing said tile.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

[008] In the appended drawings:

[009] Figure 1 is a top view of a parquetry tile, in accordance with an illustrative embodiment of the present invention;

[010] Figure 2 is a flowchart of a method of assembling the parquetry tile of Figure 1, in accordance with an illustrative embodiment of the present invention;

[011] Figure 3 is a perspective view of a tray used for assembling the parquetry tile of Figure 1 illustrating the deposition of a temporary adhesive thereon;

[012] Figure 4A is a top view of the tray of Figure 3 illustrating the disposition of adhesive relative to the various pieces of stone to be assembled;

[013] Figure 4B is a partial and more detailed view of Figure 4A; and

[014] Figure 5 is a cross-sectional view along line 5 of the parquetry tile of Figure 1, in a tray illustrating the adhesive used to temporary adhere the pieces to the tray and the resin used to bond the pieces together.

#### **DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS**

[015] The present invention is illustrated in further detail by the following non-limiting examples.

[016] Referring now to Figure 1, and in accordance with an illustrative embodiment of the present invention, there is provided a stone tile 10 comprising a plurality of individually pre-cut stone pieces as in 12. The tile 10 illustratively comprises a parquetry design formed by the bonding of the variety of pre-cut stones as in 12 together using a resin or epoxy adhesive 14 applied between the spaces of the pre-cut stones as in 12. The pre-cut stones as in 12 illustratively comprise a variety of shapes such as triangles, squares, rectangles, trapezoids, or other shapes that are used in formation of a parquetry design. Illustratively, the pre-cut stones as in 12 may be any variety of stone such as granite, marble, limestone, other building stones or combination, having any type of texture and colour and which is generally known to have a hardness and toughness for the use in tiling applications. Depending on the application, for instance the use of the tile 10 in flooring or for decorative murals, the tile 10 is sized accordingly. Illustratively, the tile 10 may comprise a square dimension having a length and a width of approximately 24 inches and a thickness of about 0.5 inches. Of note, other sizes, shapes, thicknesses, widths, may be provided for in addition to the use of other materials such as woods, plastics, and metals, in the formation of the

tile 10. Additionally, other patterns and geometric configurations of the pre-cut stones as in 12 may be provided for forming the decorative tile 10.

[017] Now referring to Figure 2, in addition to Figure 1, in accordance with an illustrative embodiment of the present invention, there is provided a Method of Assembly 16 of the tile 10, generally comprising a series of steps as will now be described. As part of the Method of Assembly 16, a Pre-cutting 18 of an unprocessed rough stone block (not shown) illustratively comprises cutting the stone block to various sizes and shapes as depending on the design of the final assembled tile 10. Illustratively, an unprocessed stone is cut into strips of between 3/8 and 1.25 inches widths by a block saw (not shown) as is generally known in the art. The strip is then fed into a trimming saw which cuts the slab into smaller geometric pieces, such as a rectangular piece as in 12<sub>1</sub>, or a triangular piece as in 12<sub>2</sub>, or any other pre-cut stones as in 12 that have been sized and shaped so as to form a parquet patterned tile 10.

[018] Now referring to Figure 3, in addition to Figure 1 and Figure 2, the pre-cut stone pieces 12 are arranged in a tray 20 as part of an Arrangement 22 step. The tray 20 is illustratively a square shape comprising a depth and length that is capable of receiving the pre-cut stone pieces as in 12 therein in addition to accommodating the resin or epoxy adhesive 14 that is applied between the pieces 12 at a later step for bonding the pieces as in 12 together to form the singular tile 10. Preferably, a mould release agent or anti-stick spray is used. The tray 20 is illustratively comprised of a high density plastic polymer material such as polyethylene or the like that generally will not adhere to resin epoxy and is resistant to the application of heat during a curing of the resin or epoxy adhesive 14 along with the degradation due to the any contact with chemical adhesives and resins. Alternatively, a metallic tray coated with such a plastic material may also be provided for. Of note, while the tray 20 is illustratively shown to accommodate the pre-cut stone pieces as in 12 for forming a single square tile 10, the tray 20 may also illustratively comprise a shape that accommodates more than one such square tile 10, for

instance a rectangular shape that can accommodate the stone pieces as in 12 for two or more tiles 10. In the illustrated example, the tray 20 accommodates three tiles 10 by three tiles. Other configurations could be simple a row of three to six tiles long by one tile high. Still additionally, the tray 20 may be triangular, or circular, or the like for accommodating a tile 10 of different geometries.

[019] Now referring to Figures 4A and 4B, in addition to Figures 2 and 3, prior to assembling the stone pieces as in 12 within the tray 20, the tray is Coated 24 with an anti-stick coating 26 such as Teflon™ or a known non-stick plastic or silicon that generally resists a permanent bonding of a resin or epoxy or grout thereto during a later step of the Method of Assembly 16. Then, a temporary adhesive 28 is Applied 30 in lines or beads to the tray 20 so that the pieces 12 to be assembled within the tray 20 are temporarily held in place within the tray 20 by the temporary adhesive 28, such as contact glue, during the subsequent assembly steps. Illustratively, the anti-stick coating 26 and adhesive may be applied to the tray 20 by an automated process, such as a robotic arm system or the like.

[020] In some embodiments, Applicant has discovered that the use of the temporary adhesive 28 may not be necessary. For example, if the spacing between the pieces 12 in the tray is small enough, then it is possible that the pieces 12 will stay in place without the need of the temporary adhesive 28.

[021] Still referring to Figures 2, 3, 4A, and 4B the pre-cut stone pieces as in 12 are then Arranged 32 into a decorative arrangement within the tray 20, for instance by a robotic arm or the like. The temporary adhesive 28 adheres to the underside of the pre-cut stone pieces as in 12 to temporarily prevent the movement of the pieces 12 within the tray 20 during the remaining assembling procedure.

[022] Still referring to Figures 4A and 4B, in addition to Figure 3, an epoxy resin 34, or the like is Applied 36 to fill the voids 38 between adjacent stone

pieces as in 12 and cured to thereby form a permanent bond between such adjacent pieces as in 12, and thus a single stone tile 10. Part of the epoxy resin 34 may be applied to the top of the stone pieces 12. As the tray 20, made of high density plastic polymer material which resists adhering to resin, has been coated with an anti-stick coating 26, any epoxy resin 34 that seeps through the voids 38 between the stone pieces as in 12 to contact the tray 20 will not form a permanent bond therebetween to ensure that the bonded pieces as in 12 can be easily removed from temporary engagement with the tray 20. The epoxy resin 34 may illustratively be thermoset resin, such as Marine-Tex™, comprising high strength properties which is easy to apply, strong and permanent when cured and which can be painted or sealed. Illustratively, the epoxy resin 34 has an adhesive shear strength of about 4,000 psi and can be mixed, applied and cured at room temperatures, is workable for about 25-35 minutes and cures and hardens in 2-3 hours with a full cure taking 18-24 hours. If desired the curing time can be reduced by applying heat. Once cured, the pre-cut stone pieces as in 12 form a solid singular tile 10.

[023] Now referring back to Figure 2, in addition to Figure 1, once the epoxy resin 34 has cured, the tiles 10 are Removed 40 from the tray 20. The bonds formed by the anti-stick coating 26 between the tray 20 and the pre-cut stone pieces 12 are easily broken and any excess resin 34 contacting thereto does not stick to the tray 20. Once removed, the tile 10 is advantageously polished as one unitary tile 10 thereby evening any differences between adjacent pre-cut stone pieces as in 12 and removing any resin and/or adhesive, or epoxy according to methods as are generally known in the art, by pneumatic polisher for instance. It also provides for an exact thickness of a tile. Illustratively, the tile 10 may be polished in a polishing line. The tiles 10 are Cut 42 into individual tiles 10 and finished. As a result of the method, a finished unitary parquetry 10 tile is formed.



**CLAIMS:**

1. A method of assembling a tile, comprising:
  - assembling a plurality of stone strips in a tray comprising a non-stick coating and a temporary adhesive applied thereto for temporarily securing said plurality of stone strips in a predetermined pattern;
  - applying a resin between the assembled plurality of stone strips and curing said resin to bond said stone strips into a tile;
  - removing said tile from said tray; and
  - polishing said tile.
2. The method of claim 1, wherein the non-stick coating includes Teflon.
3. The method of claim 1, wherein the non-stick coating includes a non-stick plastic or silicone or a resin compatible mould release agent.
4. The method of claim 1, wherein the temporary adhesive includes contact glue.
5. The method of claim 1, wherein the resin comprises epoxy resin.
6. The method of claim 4, wherein the epoxy resin has an adhesive shear strength of about 4,000 psi.
7. A method of assembling a tile, comprising:
  - cutting a stone strip into a plurality of stone shapes;
  - assembling said plurality of stone shapes in a tray comprising a non-stick coating and a temporary adhesive applied thereto for temporarily securing said plurality of stone shapes in a predetermined pattern;
  - applying a resin between the assembled plurality of stone shapes and curing said resin to bond said stone shapes into a tile;
  - removing said tile from said tray; and
  - polishing said tile.

8. The method of claim 7, wherein the non-stick coating includes Teflon.
9. The method of claim 7, wherein the non-stick coating includes a non-stick plastic or silicone or a resin compatible mould release agent.
10. The method of claim 7, wherein the temporary adhesive includes contact glue.
11. The method of claim 7, wherein the resin comprises epoxy resin.
12. The method of claim 11, wherein the epoxy resin has an adhesive shear strength of about 4,000 psi.
13. A method of assembling a tile, comprising:
  - assembling a plurality of stone strips in a tray comprising a non-stick coating;
  - securing said plurality of stone strips in a predetermined pattern;
  - applying a resin between the assembled plurality of stone strips and curing said resin to bond said stone strips into a tile;
  - removing said tile from said tray; and
  - polishing said tile.
14. The method of claim 13, wherein the non-stick coating includes Teflon.
15. The method of claim 13, wherein the non-stick coating includes a resin compatible mould release agent.
16. The method of claim 13, wherein the non-stick coating includes a non-stick plastic.
17. The method of claim 13, wherein the non-stick coating includes a non-stick silicone.
18. The method of claim 13, wherein the resin comprises epoxy resin.
19. The method of claim 18, wherein the epoxy resin has an adhesive shear strength of about 4,000 psi.

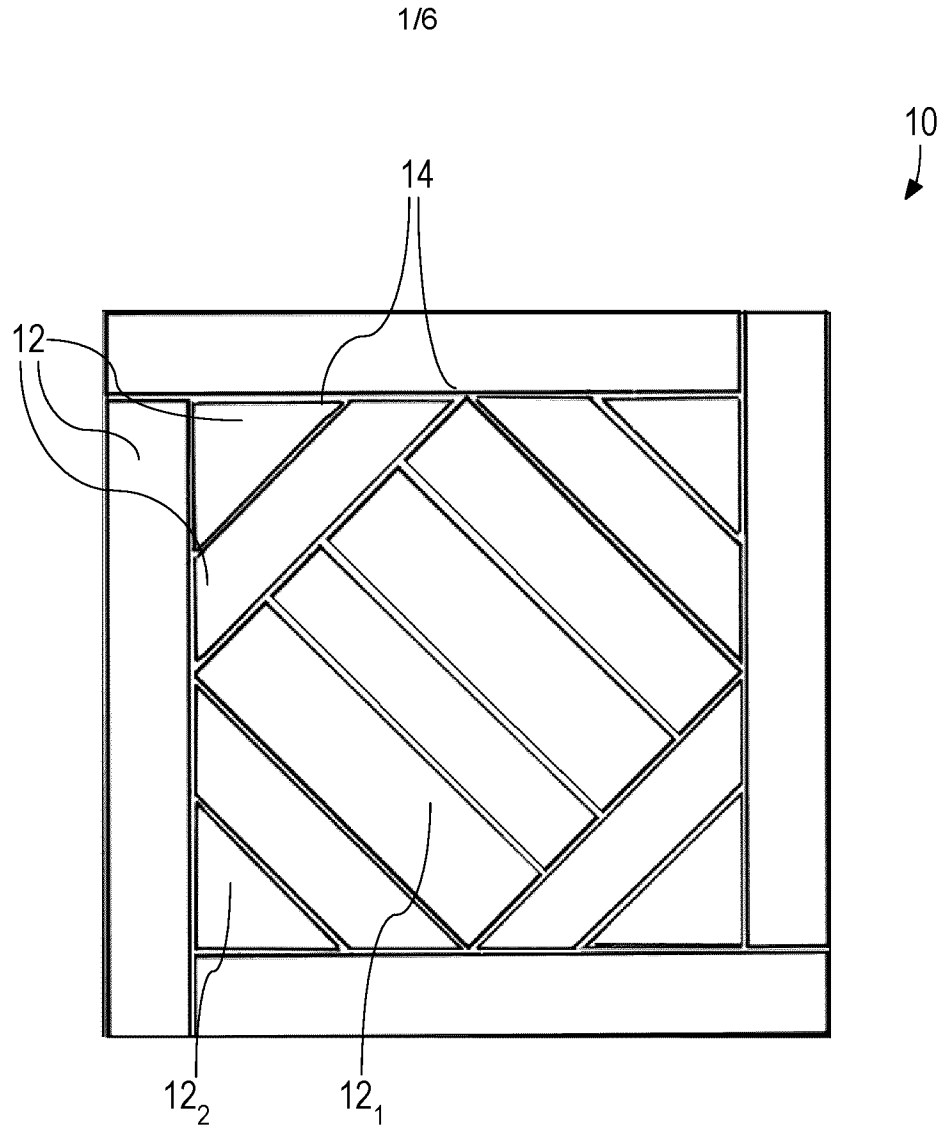


FIGURE 1

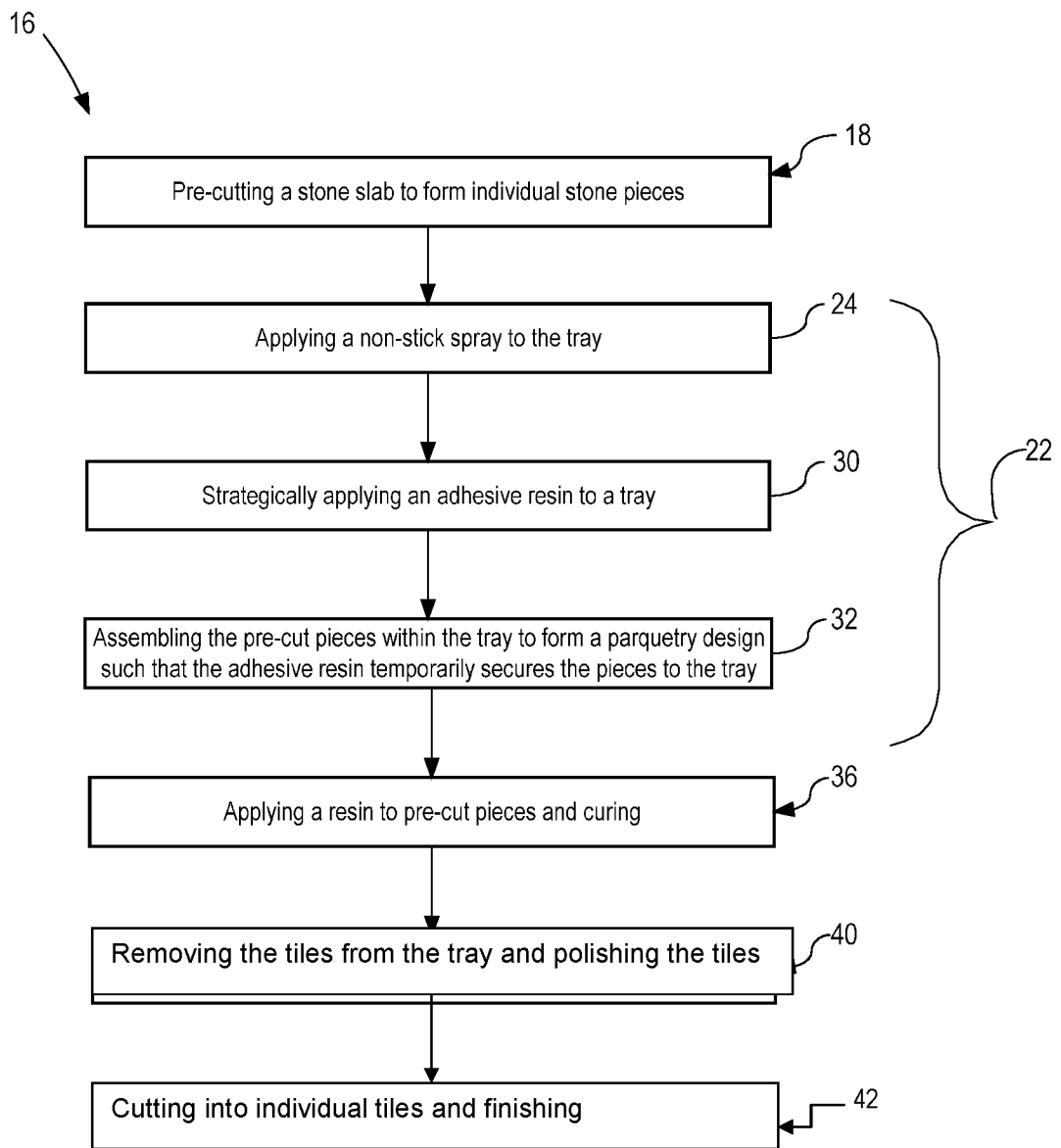


FIGURE 2

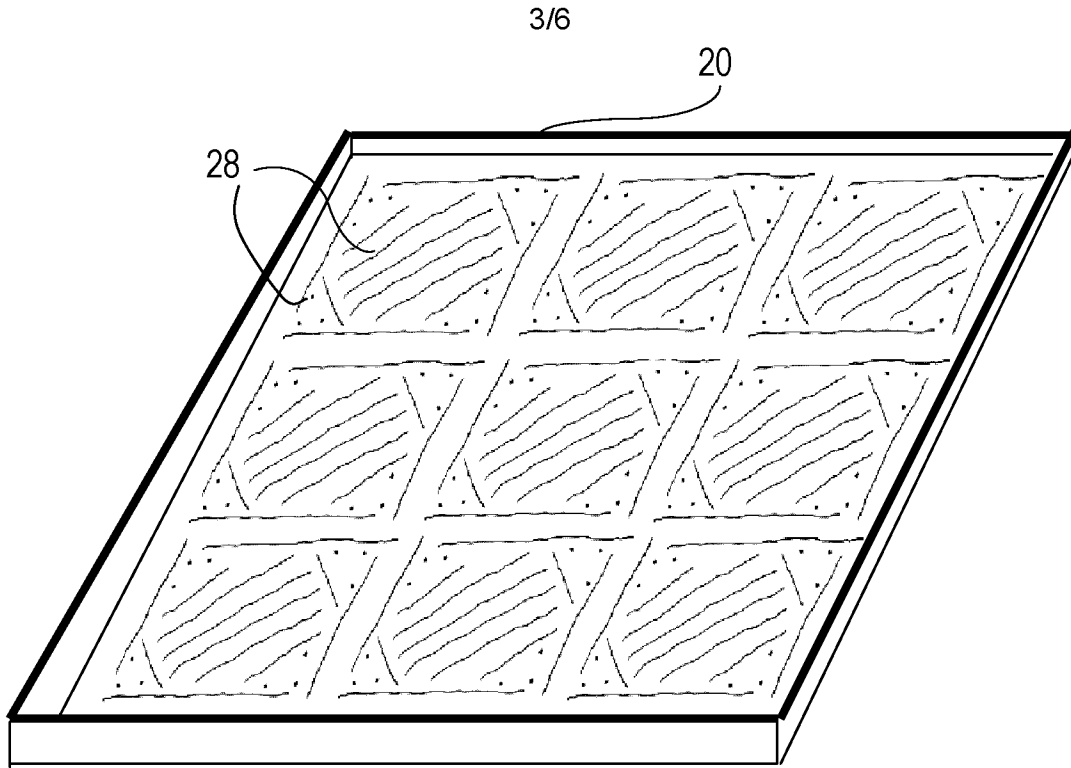


FIGURE 3

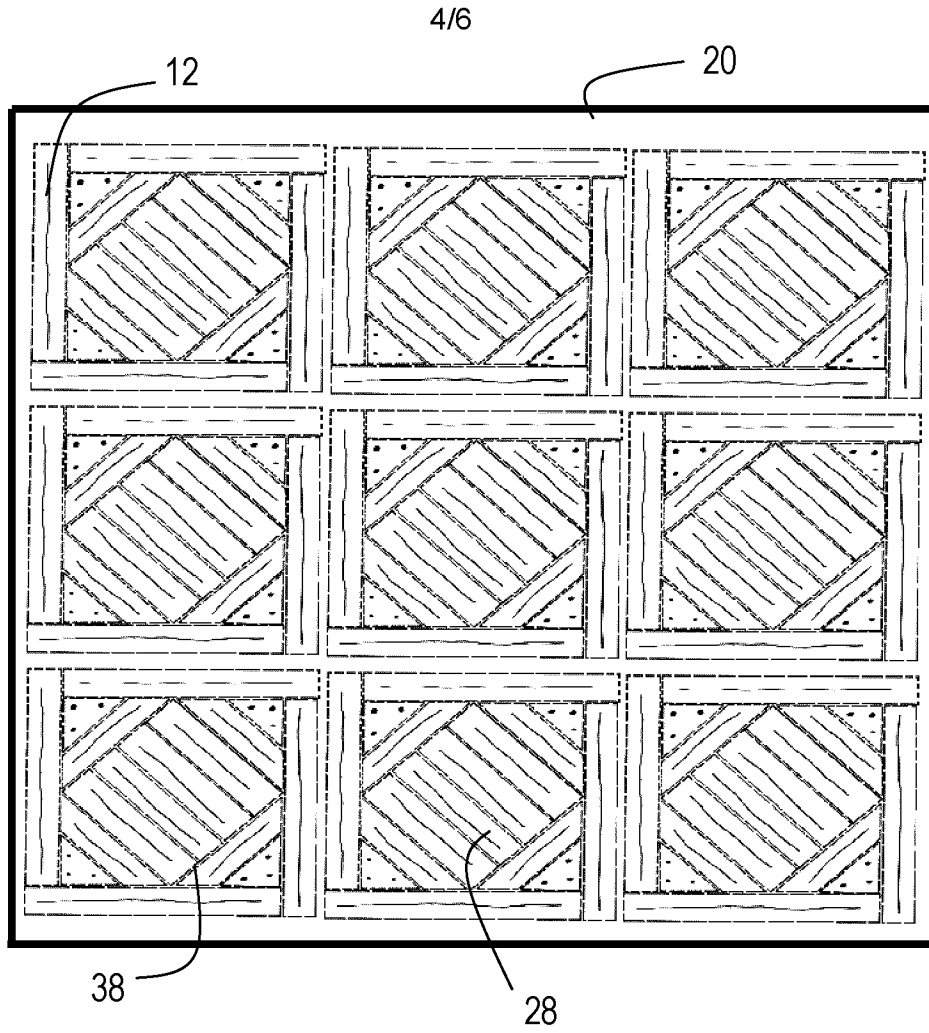


FIGURE 4A

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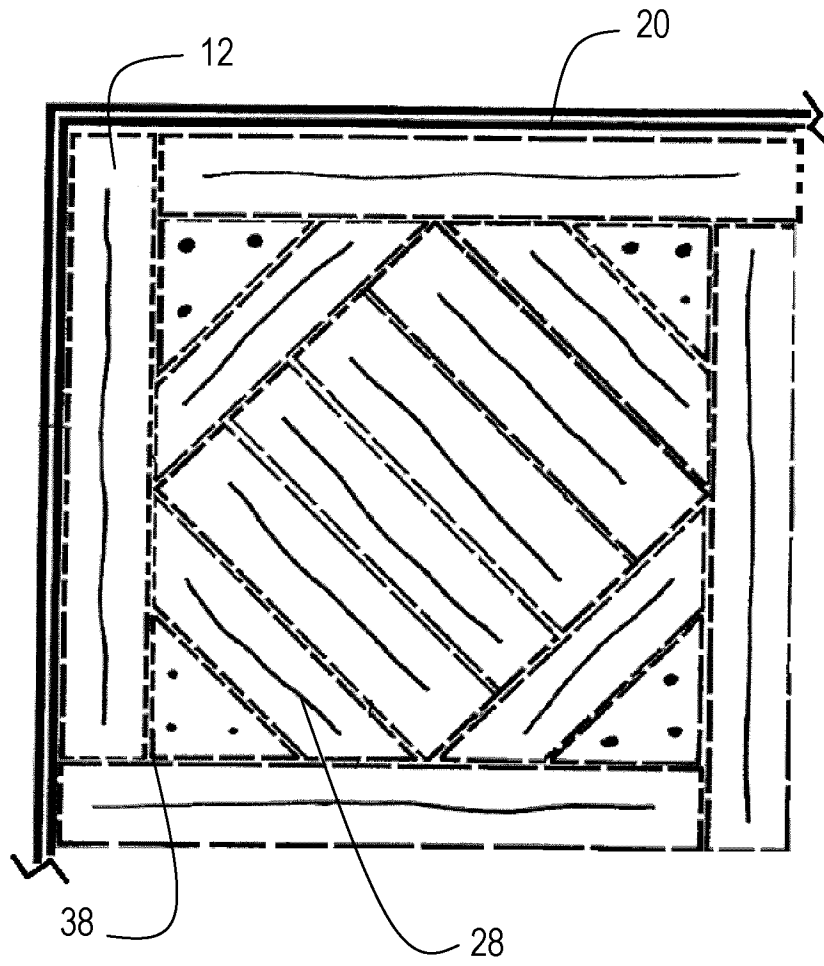


FIGURE 4B

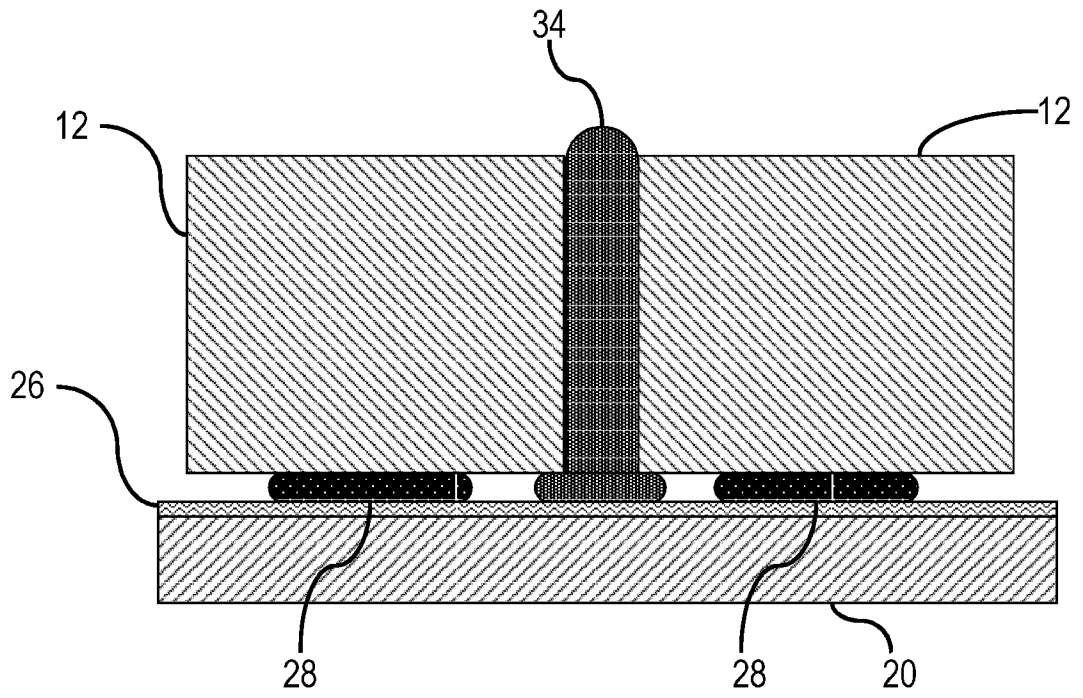


FIGURE 5



**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/CA2012/050231

<p>A. CLASSIFICATION OF SUBJECT MATTER                  IPC: <b>B28D 7/04</b> (2006.01) , <b>B44C 3/12</b> (2006.01) , <b>B44F 11/04</b> (2006.01) , <b>B44F 9/04</b> (2006.01) , <b>E04F 13/14</b> (2006.01) , <b>E04G 21/14</b> (2006.01)                  According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<p>B. FIELDS SEARCHED</p>		
<p>Minimum documentation searched (classification system followed by classification symbols)  <b>IPC</b> : B28D 7/04, B44C 3/12/LOW, B44C 5/08, B44F 1/04, B44F 9/04, E04F 13/14, E04G 21/14</p>		
<p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>		
<p>Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)  <b>DATABASES</b> : EPODOC (via EPOQUE)  <b>KEYWORDS</b> : tray, rack, back[ing,er], non_stick+, teflon, (non 3d stick+), pattern, decorat+, tile</p>		
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p>		
<p>Category*</p>	<p>Citation of document, with indication, where appropriate, of the relevant passages</p>	<p>Relevant to claim No.</p>
A	US 2006/0107610 A1 (BOSERIO) 25 May 2006 (25-05-2006) * see whole document	1-19
A	US 3,170,808 (ALMY et al.) 23 February 1965 (23-02-1965) * see whole document	1-19
A	US 4,554,118 (SEIFERT) 19 November 1985 (19-11-1985) * see whole document	1-19
A	JP 2000-64572 (OZAWA et al.) 29 February 2000 (29-02-2000) * see whole document	1-19
A	US 2006/0175000 A1 (OSTERWALDER) 10 August 2006 (10-08-2006) * see whole document * cited by applicant	1-19
<p><input type="checkbox"/> Further documents are listed in the continuation of Box C.</p>		<p><input checked="" type="checkbox"/> See patent family annex.</p>
<p>* Special categories of cited documents :</p>	<p>"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</p>	<p>"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</p>
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p>	<p>"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</p>	<p>"&amp;" document member of the same patent family</p>
<p>"E" earlier application or patent but published on or after the international filing date</p>		
<p>"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)</p>		
<p>"O" document referring to an oral disclosure, use, exhibition or other means</p>		
<p>"P" document published prior to the international filing date but later than the priority date claimed</p>		
<p>Date of the actual completion of the international search</p>	<p>Date of mailing of the international search report</p>	
<p>02 August 2012 (02-08-2012)</p>	<p>17 August 2012 (17-08-2012)</p>	
<p>Name and mailing address of the ISA/CA                  Canadian Intellectual Property Office                  Place du Portage I, C114 - 1st Floor, Box PCT                  50 Victoria Street                  Gatineau, Quebec K1A 0C9                  Facsimile No.: 001-819-953-2476</p>	<p>Authorized officer                   Casey Thomas (819) 934-3417</p>	

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT/CA2012/050231

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