

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

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|----------------------|
| To:                  |
| see form PCT/ISA/220 |

## PCT

### WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

|                                                                                                             |                                                          |                                                    |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------|
| Applicant's or agent's file reference<br>see form PCT/ISA/220                                               |                                                          | <b>FOR FURTHER ACTION</b><br>See paragraph 2 below |
| International application No.<br>PCT/US2017/040888                                                          | International filing date (day/month/year)<br>06.07.2017 | Priority date (day/month/year)<br>08.07.2016       |
| International Patent Classification (IPC) or both national classification and IPC<br>INV. E04B9/12 E04B9/24 |                                                          |                                                    |
| Applicant<br>USG INTERIORS, INC                                                                             |                                                          |                                                    |

#### 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

#### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

|                                                                                                                                                                                                                                                                        |                                                                      |                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------|
| Name and mailing address of the ISA:<br><br> European Patent Office<br>P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk - Pays Bas<br>Tel. +31 70 340 - 2040<br>Fax: +31 70 340 - 3016 | Date of completion of<br>this opinion<br><br>see form<br>PCT/ISA/210 | Authorized Officer<br><br>Lopes, Claudia<br><br>Telephone No. +31 70 340-0 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------|



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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of:
  - ☒ the international application in the language in which it was filed.
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
  - a. ☐ forming part of the international application as filed:
    - ☐ in the form of an Annex C/ST.25 text file.
    - ☐ on paper or in the form of an image file.
  - b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
  - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
    - ☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
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4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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**Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

|                               |             |            |
|-------------------------------|-------------|------------|
| Novelty (N)                   | Yes: Claims | <u>1-3</u> |
|                               | No: Claims  |            |
| Inventive step (IS)           | Yes: Claims |            |
|                               | No: Claims  | <u>1-3</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-3</u> |
|                               | No: Claims  |            |

2. Citations and explanations

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1 Reference is made to the following document:

D1 US 8 925 677 B2

2 **Independent claim 1**

The present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step.

2.1 D1, Fig. 10 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

*A suspended ceiling comprising:*

*- a grid of parallel regularly spaced roll formed elongated sheet metal runners (12) suspended in a horizontal plane from overhead structure (tees 13 and wires 14), the runners (12) each having a horizontal flange having an effective vertical thickness (see Fig.2, the flange of the runner 12 has folded ends, these ends corresponding to the claimed "effective vertical thickness"),*

*- a plurality of rectangular drywall sheets (320) aligned crosswise to the runners and screwed to lower faces of the flanges with ends of the drywall sheets forming butt joints located midway between adjacent runners (column 9, line 1-6),*

*- boards (backer plate 87) overlying butt joints,*

*the boards being substantially stiffer than the drywall sheets, whereby the drywall sheet ends are drawn up towards an upper level of the flanges when the drywall sheet ends are screwed against the overlying board so that a pseudo taper is formed on the drywall sheet ends for receiving joint tape and joint compound above a lower face of major central areas of the drywall sheets (column 9, line 6-15).*

- 2.2 The subject-matter of claim 1 therefore differs from this known suspended ceiling in that *the boards overly the flanges of said adjacent runners*, and is therefore new (Article 33(2) PCT).
- 2.3 In D1 it is not described how the backer plate is fixed to the structure of the suspended ceiling. However, to install the backer plate on the flanges of the runners is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to install a backer plate.

**3 Dependent claims 2-3**

Dependent claims 2-3 do not contain any features which, meet the requirements of the PCT in respect of inventive step, because:

- claim 2: "the drywall sheets are through perforated across their central areas for acoustical performance" is also described in D1 (abstract and Fig. 10),
- claim 3: a grid as claimed is also disclosed in D1, Fig. 1 and column 2, line 42-55.

\* \* \* \*

C. Lopes

Therefore, the solution

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

|                                                                                                                                         |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Applicant's or agent's file reference<br><b>4779WO</b>                                                                                  | <b>FOR FURTHER ACTION</b>                                                               | See item 4 below                                                            |
| International application No.<br><b>PCT/US2017/040888</b>                                                                               | International filing date ( <i>day/month/year</i> )<br><b>06 July 2017 (06.07.2017)</b> | Priority date ( <i>day/month/year</i> )<br><b>08 July 2016 (08.07.2016)</b> |
| International Patent Classification (8th edition unless older edition indicated)<br><b>See relevant information in Form PCT/ISA/237</b> |                                                                                         |                                                                             |
| Applicant<br><b>USG INTERIORS, LLC</b>                                                                                                  |                                                                                         |                                                                             |

|                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                 |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
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| 1.                                                                                                                                                                                                                | This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                 |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| 2.                                                                                                                                                                                                                | This REPORT consists of a total of 6 sheets, including this cover sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                 |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                 |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| 3.                                                                                                                                                                                                                | <p>This report contains indications relating to the following items:</p> <table style="width: 100%;"> <tr> <td style="width: 5%; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 25%;">Box No. I</td> <td style="width: 70%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> | <input checked="" type="checkbox"/>                                                                                                                             | Box No. I | Basis of the report | <input type="checkbox"/> | Box No. II | Priority | <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> | Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> | Box No. VI | Certain documents cited | <input type="checkbox"/> | Box No. VII | Certain defects in the international application | <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/>                                                                                                                                                                               | Box No. I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Basis of the report                                                                                                                                             |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input type="checkbox"/>                                                                                                                                                                                          | Box No. II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Priority                                                                                                                                                        |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input type="checkbox"/>                                                                                                                                                                                          | Box No. III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability                                                                |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input type="checkbox"/>                                                                                                                                                                                          | Box No. IV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Lack of unity of invention                                                                                                                                      |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input checked="" type="checkbox"/>                                                                                                                                                                               | Box No. V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input type="checkbox"/>                                                                                                                                                                                          | Box No. VI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Certain documents cited                                                                                                                                         |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input type="checkbox"/>                                                                                                                                                                                          | Box No. VII                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Certain defects in the international application                                                                                                                |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| <input type="checkbox"/>                                                                                                                                                                                          | Box No. VIII                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Certain observations on the international application                                                                                                           |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |
| 4.                                                                                                                                                                                                                | The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                 |           |                     |                          |            |          |                          |             |                                                                                                  |                          |            |                            |                                     |           |                                                                                                                                                                 |                          |            |                         |                          |             |                                                  |                          |              |                                                       |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;">The International Bureau of WIPO<br/>34, chemin des Colombettes<br/>1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p> | <p>Date of issuance of this report<br/><b>08 January 2019 (08.01.2019)</b></p> <hr/> <p>Authorized officer</p> <p style="text-align: center;"><b>Athina Nickitas-Etienne</b></p> <p>e-mail: <a href="mailto:pct.team4@wipo.int">pct.team4@wipo.int</a></p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

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|----------------------|
| To:                  |
| see form PCT/ISA/220 |

## PCT

### WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

|                                                                                                             |                                                          |                                                    |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------|
| Applicant's or agent's file reference<br>see form PCT/ISA/220                                               |                                                          | <b>FOR FURTHER ACTION</b><br>See paragraph 2 below |
| International application No.<br>PCT/US2017/040888                                                          | International filing date (day/month/year)<br>06.07.2017 | Priority date (day/month/year)<br>08.07.2016       |
| International Patent Classification (IPC) or both national classification and IPC<br>INV. E04B9/12 E04B9/24 |                                                          |                                                    |
| Applicant<br>USG INTERIORS, INC                                                                             |                                                          |                                                    |

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- ☒ Box No. I Basis of the opinion
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|                                                                                                                                                                                                                                                                        |                                                                      |                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------|
| Name and mailing address of the ISA:<br><br> European Patent Office<br>P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk - Pays Bas<br>Tel. +31 70 340 - 2040<br>Fax: +31 70 340 - 3016 | Date of completion of<br>this opinion<br><br>see form<br>PCT/ISA/210 | Authorized Officer<br><br>Lopes, Claudia<br><br>Telephone No. +31 70 340-0 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------|



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**Box No. I Basis of the opinion**

---

1. With regard to the **language**, this opinion has been established on the basis of:
  - ☒ the international application in the language in which it was filed.
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5. Additional comments:



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**Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

|                               |             |            |
|-------------------------------|-------------|------------|
| Novelty (N)                   | Yes: Claims | <u>1-3</u> |
|                               | No: Claims  |            |
| Inventive step (IS)           | Yes: Claims |            |
|                               | No: Claims  | <u>1-3</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-3</u> |
|                               | No: Claims  |            |

2. Citations and explanations

see separate sheet

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1 Reference is made to the following document:

D1 US 8 925 677 B2

**2 Independent claim 1**

The present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step.

2.1 D1, Fig. 10 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

*A suspended ceiling comprising:*

*- a grid of parallel regularly spaced roll formed elongated sheet metal runners (12) suspended in a horizontal plane from overhead structure (tees 13 and wires 14), the runners (12) each having a horizontal flange having an effective vertical thickness (see Fig.2, the flange of the runner 12 has folded ends, these ends corresponding to the claimed "effective vertical thickness"),*

*- a plurality of rectangular drywall sheets (320) aligned crosswise to the runners and screwed to lower faces of the flanges with ends of the drywall sheets forming butt joints located midway between adjacent runners (column 9, line 1-6),*

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*the boards being substantially stiffer than the drywall sheets, whereby the drywall sheet ends are drawn up towards an upper level of the flanges when the drywall sheet ends are screwed against the overlying board so that a pseudo taper is formed on the drywall sheet ends for receiving joint tape and joint compound above a lower face of major central areas of the drywall sheets (column 9, line 6-15).*

2.2 The subject-matter of claim 1 therefore differs from this known suspended ceiling in that *the boards overly the flanges of said adjacent runners*, and is therefore new (Article 33(2) PCT).

2.3 In D1 it is not described how the backer plate is fixed to the structure of the suspended ceiling. However, to install the backer plate on the flanges of the runners is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to install a backer plate.

### 3 **Dependent claims 2-3**

Dependent claims 2-3 do not contain any features which, meet the requirements of the PCT in respect of inventive step, because:

- claim 2: "the drywall sheets are through perforated across their central areas for acoustical performance" is also described in D1 (abstract and Fig. 10),
- claim 3: a grid as claimed is also disclosed in D1, Fig. 1 and column 2, line 42-55.

\* \* \* \*

C. Lopes

Therefore, the solution



(51) International Patent Classification:

E04B 9/12 (2006.01) E04B 9/24 (2006.01)

(21) International Application Number:

PCT/US2017/040888

(22) International Filing Date:

06 July 2017 (06.07.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

15/205,102 08 July 2016 (08.07.2016) US

(71) Applicant: **USG INTERIORS, INC.** [US/US]; 550 West Adams Street, Chicago, IL 60661-3676 (US).

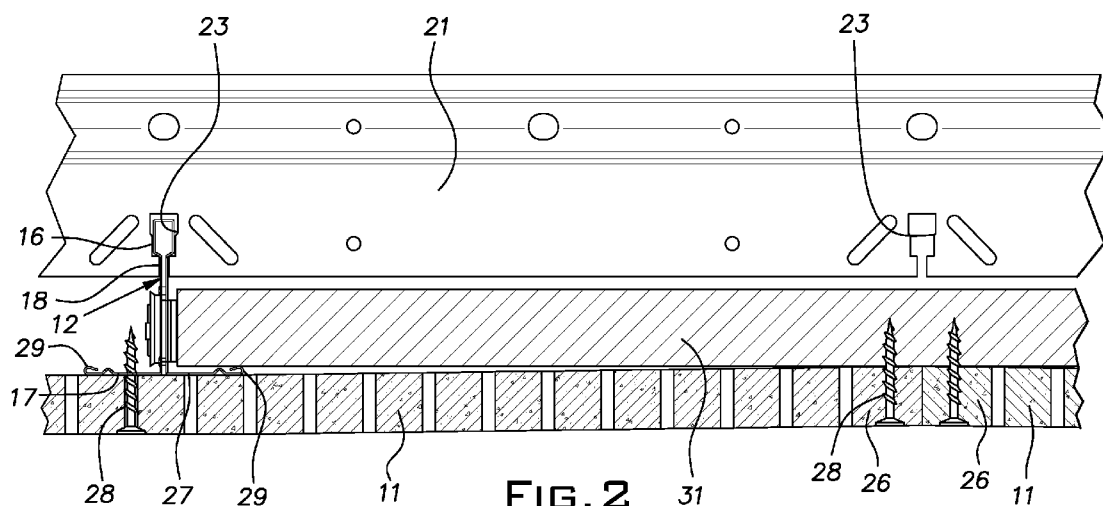
(72) Inventors: **HULKA, Samuel D.**; 103 North Cathy Ln., Mount Prospect, Illinois 60056 (US). **GULBRANDSEN, Peder J.**; 2729 Lansdale, Aurora, Illinois 60503 (US).

(74) Agent: **SHIMOLA, Howard** et al.; Pearne Gordon, 1801 East Ninth Street, Cleveland, Ohio 44114-3108 (US).

(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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: DRYWALL SHEET END JOINT



(57) Abstract: A suspended ceiling comprising SUSPENDED metal runners in a horizontal plane, the runners each having a horizontal flange having an effective vertical thickness, a plurality of rectangular drywall sheets aligned crosswise to the runners and screwed to the flanges with ends of the drywall sheets forming butt joints midway between adjacent runners, boards overlying butt joints and adjacent flanges, the boards being substantially stiffer than the drywall sheets, whereby the drywall sheet ends are drawn up towards an upper level of the flanges when screwed against the overlying board so that a pseudo taper is formed on the drywall sheet ends.

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

**Published:**

- *with international search report (Art. 21(3))*

DRYWALL SHEET END JOINTBACKGROUND OF THE INVENTION

[0001] The invention relates to drywall ceiling construction and, in particular, to a construction in which taped end joints between drywall sheets are easily concealed.

PRIOR ART

[0002] Drywall sheets are manufactured as rectangular panels with a standard width of four feet and with a regular series of lengths of 8, 10, 12, 14 and 16 feet or metric industry equivalents. The long edges or margins of the sheets are tapered at their face side. The tapered margins are provided to enable tape and joint compound to be received in a joint above the face plane of the ceiling being constructed. The ends of the sheets are not tapered because of limitations of the production process used to make the sheets. Joints between the ends of drywall sheets, sometimes called butt joints, are difficult to conceal because the thickness of the joint tape intrudes into the plane of the face of the ceiling. The butt joints in ceilings are particularly difficult to conceal, in part, because they are often highlighted by indirect lighting. Frequently, a drywall ceiling is heavily textured to mask the presence of butt joints. Texturing of a ceiling is not practical where a relatively smooth surface is specified and/or where the drywall has acoustical properties derived from a porous face.

[0003] U.S. Patents 7,578,107 and 8,898,986 illustrate examples of sheet metal strips or bars that can be used to suspend transverse sheet metal drywall grid tees. The strips or bars have regular keyhole-like slots along their length that capture the upper reinforcing bulbs of the tees. Drywall sheets are conventionally attached to the lower flange faces of the suspended grid tees with self-drilling screws.

### SUMMARY OF THE INVENTION

[0004] The invention provides a grid-based structure for a suspended drywall ceiling that facilitates concealment of drywall butt joints. In the inventive structure, grid runners or tees are suspended in a horizontal plane on parallel regularly spaced centers. Drywall sheets are fastened to lower faces of the grid tees. The drywall sheets are positioned so that their lengths are crosswise to the grid runners and their abutted ends are cantilevered midway between adjacent grid runners. A flat faced rigid bridge member is located between the adjacent grid runners and overlies the abutted ends of the drywall sheets. The bridge member is supported on the top of the flanges of the adjacent runners so that its lower surface is spaced above the plane of the bottom faces of the runner flanges by the effective thickness of the flanges. Typically, the flange is thicker at hems on its longitudinal edges. The drywall sheet ends are screwed to the bridge member.

[0005] Because the bridge member lower surface is above the plane of the runner flanges, the ends of the drywall sheets are caused to be locally bent upwardly a precise distance corresponding to the effective thickness of the runner flange.

[0006] This bending of the ends of the drywall sheets has the effect of forming a pseudo taper to receive joint tape and joint compound. The pseudo taper is adapted to fully receive the joint tape and joint compound above the plane of the major face areas of the drywall sheets. The taper is limited both vertically and horizontally so that only a narrow band of joint compound is required to flush out the joint.

[0007] The invention thus avoids butt joints where the tape and joint compound protrude from the plane of the main face areas of the drywall sheets. The invention is especially

useful in acoustical drywall ceilings such as disclosed in U.S. Patents 8,684,134, 8,770,345 and 8,925,677. Commonly, a heavy texture coat is used to conceal protruding taped butt joints. This approach is impractical with an acoustical ceiling since such coatings would block sound absorbing apertures in the drywall sheets and reduce or eliminate acoustical properties.

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

[0008] FIG. 1 is a fragmentary cross-sectional view of a butt joint of a suspended drywall ceiling taken in a vertical plane indicated at 1-1 in FIG. 3;

[0009] FIG. 2 is a view of the butt joint of FIG. 1 on an enlarged scale; and

[0010] FIG. 3 is a fragmentary schematic plan view of a suspended ceiling embodying the invention.

#### **DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0011] A suspended ceiling 10 includes rectangular drywall sheets or panels 11 attached to grid runners 12. The drywall sheets 11, as is conventional, are gypsum based and are typically 4 foot wide by, 8, 10, 12, 14 or 16 feet long and 3/8, 1/2 or 5/8 inch thick. Dimensions recited in this disclosure are intended to include industry metric equivalents. Normally, the long edges of the sheets 11 are tapered for receiving joint compound and joint tape when the sheets are abutted along their long edges.

[0012] The illustrated grid runners 12 are of the T-style with an upper reinforcing bulb 16, a lower flange 17, and a vertical web 18 between the bulb and flange. The grid runner or tee 12 can be roll formed from a single elongated strip of sheet metal, typically, G40 hot dipped galvanized steel as known in the art.



[0013] A comparatively flat ceiling construction is obtained by using sheet metal hanger bars known in the industry and from U.S. Patents 7,578,107 and 8,898,986 for example. The bars 21, suspended in a common horizontal plane by wires 22, are mutually spaced in parallel rows on, for example, 4 foot centers in a direction perpendicular to that of the subsequently erected tees 12. The bars 21 are positioned endwise relative to one another so that they present rectangular holes 23 in mutual alignment for capturing the reinforcing bulbs 16 for vertical overhead support of the tees 12.

[0014] FIG. 3 schematically illustrates an example of a layout of 4 foot by 8 foot drywall sheets 11 and grid tees 12 on 16 inch centers, the latter being determined by the regular spacing of holes 23 in the support bars or hanger bars 21. As indicated, the sheets 11 are arranged with their lengthwise direction perpendicular or crosswise to the longitudinal direction of the tees 12. The sheets 11 are further arranged so that their ends 26 are cantilevered and abutted at locations spaced midway from adjacent grid tees 12.

[0015] The sheets 11 are attached to lower faces 27 of the grid tees 12 with self-drilling screws 28 that penetrate both the sheets and the tee flanges as is conventional. Inspection of FIG. 2 shows that longitudinal edges of the grid tee flanges 17 are folded up into hollow hems 29 that increase the flange effective thickness, measured vertically across bottom to top of the flange elements. By way of example, but not limitation, the effective thickness can preferably be between about 0.50 inch to about 0.55 inch.

[0016] A bridge element 31 in the form of a flat rectangular rigid board is located in the grid space overlying abutted ends 26 of two drywall sheets 11. The illustrated bridge 31 is a flat board with nominal planar dimensions of 4 foot by 15-7/8 inch and with a thickness of 5/8 inch. Preferably, the

width dimension is greater than the gap between adjacent flanges 17 so that the board 31, once positioned, cannot readily fall off the flanges 17. The board 31 is substantially more rigid (at least twice as rigid) than conventional drywall sheets. The abutted ends 26 of the sheets 11, preferably after the sheets are first secured to the adjacent tees 12 by screws 28, are drawn up to the bottom surface of the bridge board 31 by suitable screws 28. In this manner, the ends of the drywall sheets 11 are bent upwardly a precise distance that approaches the effective thickness of the tee flanges 17. The effect is to provide a pseudo taper on the drywall sheet ends 26. This pseudo taper on both of the abutting sheet ends 26 forms a space of limited but adequate vertical dimension for completely receiving joint tape and joint compound above the plane of the main non-tapered face areas of the drywall sheets 11. This enables the sheet 11 to be taped with a flatness that makes the butt end joints imperceptible when painted without significant texture. Joint tape is typically about .006 inch to .009 inch thick and 2 inch wide. The board is sufficiently rigid to draw the drywall ends up when screwed to it so that the pseudo taper 1-1/2 inch in from a butt joint edge is elevated at least .009 inch. A suitable board product is 5/8 inch FIBEROCK® Aqua-Tough™ interior panels marketed by United States Gypsum Company.

**[0017]** The disclosed inventive suspension arrangement is particularly suitable for use with acoustical drywall products such as disclosed in the aforementioned U.S. patents. As disclosed in these patents, the drywall sheets are perforated throughout their major areas through both face and rear paper covering and the face covering is, in turn, covered with a non-woven pervious scrim. Ultimately the scrim is painted to conceal the holes while maintaining sufficient porosity to allow air passage and therefore sound transmission into the

perforations. The present inventive arrangement enables butt joints of the acoustical drywall sheets to be readily taped and finished without a heavy and/or textured appearance coating to conceal the joints.

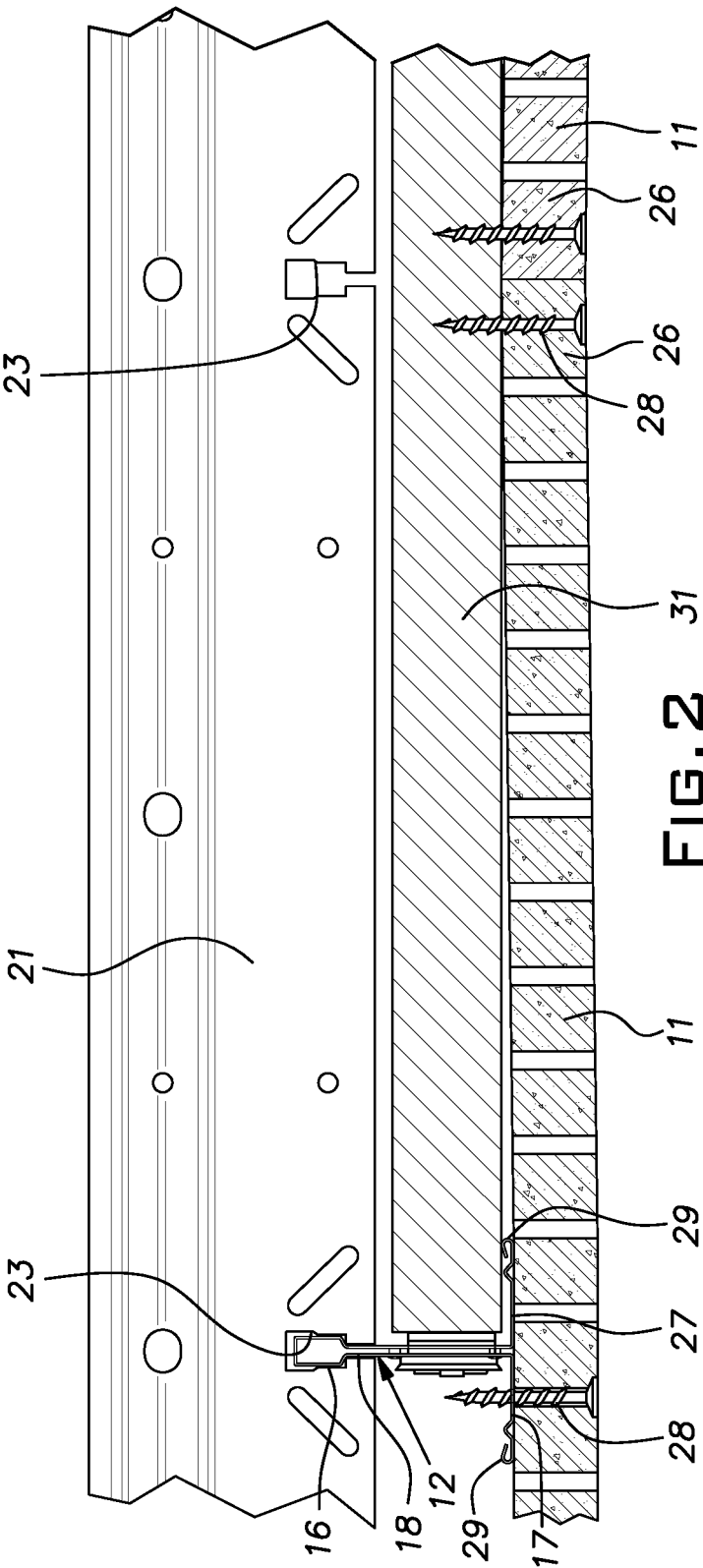
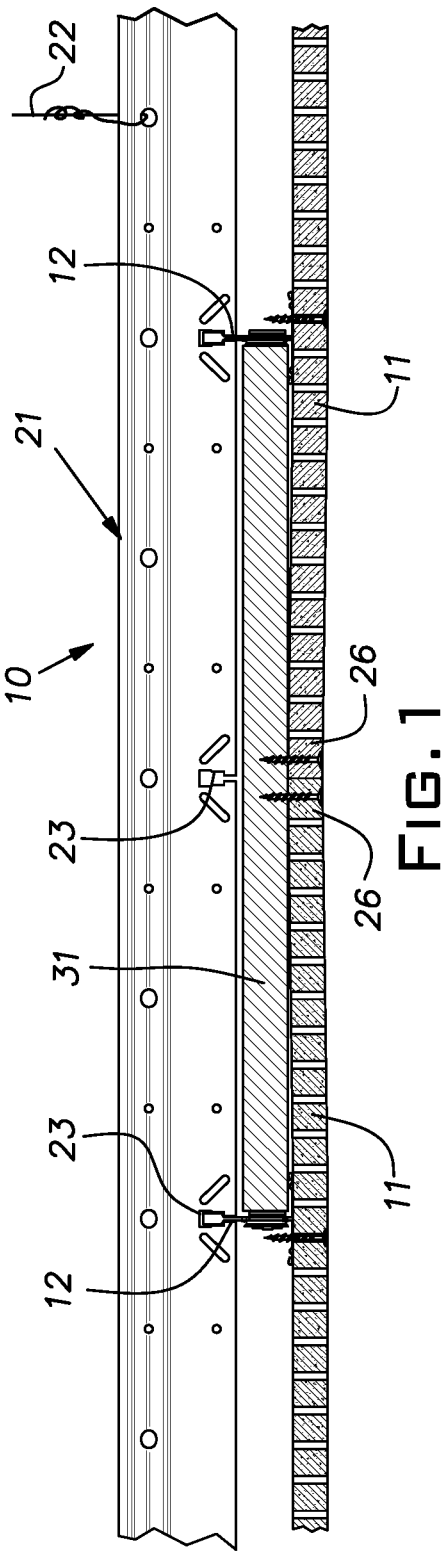
5   **[0018]**   It should be evident that this disclosure is by way of example and that various changes may be made by adding, modifying or eliminating details without departing from the fair scope of the teaching contained in this disclosure. The invention is therefore not limited to particular details of  
10 this disclosure except to the extent that the following claims are necessarily so limited.

## WHAT IS CLAIMED IS:

1. A suspended ceiling comprising a grid of parallel regularly spaced roll formed elongated sheet metal runners suspended in a horizontal plane from overhead structure, the runners each having a horizontal flange having an effective vertical thickness, a plurality of rectangular drywall sheets aligned crosswise to the runners and screwed to lower faces of the flanges with ends of the drywall sheets forming butt joints located midway between adjacent runners, boards overlying butt joints and the flanges of said adjacent runners, the boards being substantially stiffer than the drywall sheets, whereby the drywall sheet ends are drawn up towards an upper level of the flanges when the drywall sheet ends are screwed against the overlying board so that a pseudo taper is formed on the drywall sheet ends for receiving joint tape and joint compound above a lower face of major central areas of the drywall sheets.

2. A suspended ceiling as set forth in claim 1, wherein the drywall sheets are through perforated across their central areas for acoustical performance.

3. A suspended ceiling as set forth in claim 1, wherein the grid runners are suspended in spaced parallel alignment from metal support bars arranged crosswise to the grid runners and gripping the grid runners at reinforcing bulbs adjacent upper portions of the grid runners.



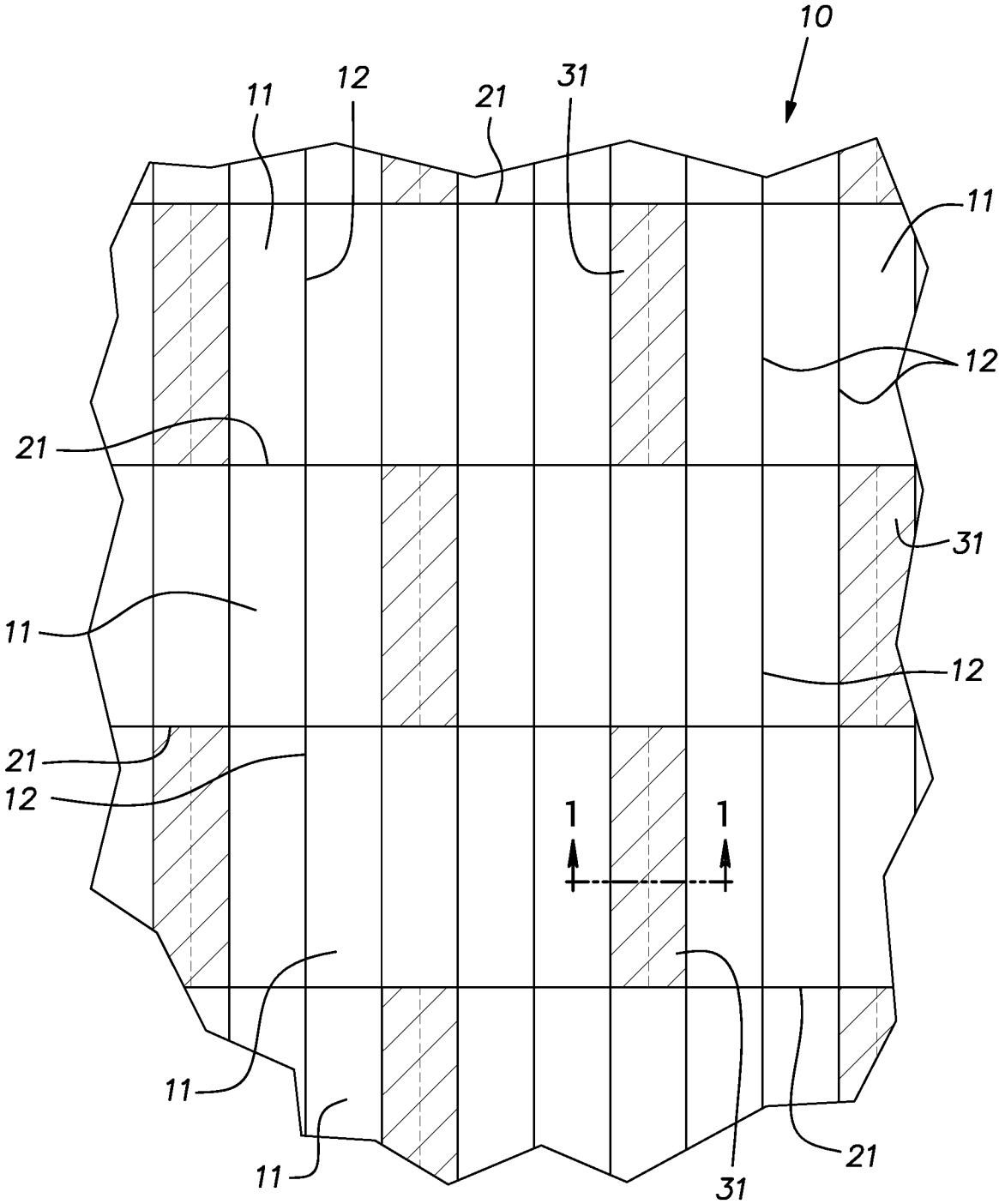


FIG. 3

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2017/040888

A. CLASSIFICATION OF SUBJECT MATTER  
INV. E04B9/12 E04B9/24  
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)  
E04B

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)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                             | Relevant to claim No. |
|-----------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | US 8 925 677 B2 (USG INTERIORS LLC [US])<br>6 January 2015 (2015-01-06)<br>column 9, line 1 - line 15; figures 1,2,10<br>----- | 1-3                   |
| A         | US 4 237 669 A (HUNTER GEORGE S [US])<br>9 December 1980 (1980-12-09)<br>the whole document<br>-----                           | 1-3                   |
| A         | US 4 392 336 A (GANSSLE JACK L [US])<br>12 July 1983 (1983-07-12)<br>the whole document<br>-----                               | 1-3                   |
| A         | US 5 799 458 A (FERGUSON MYRON R [US])<br>1 September 1998 (1998-09-01)<br>the whole document<br>-----                         | 1-3                   |
| A         | US 3 675 383 A (PAOLETTI JOHN P)<br>11 July 1972 (1972-07-11)<br>the whole document<br>-----                                   | 1-3                   |



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

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"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

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Date of the actual completion of the international search

14 September 2017

Date of mailing of the international search report

21/09/2017

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

Lopes, Claudia

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/040888

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 8925677                                | B2                  | 06-01-2015                 | NONE                |
| US 4237669                                | A                   | 09-12-1980                 | NONE                |
| US 4392336                                | A                   | 12-07-1983                 | NONE                |
| US 5799458                                | A                   | 01-09-1998                 | NONE                |
| US 3675383                                | A                   | 11-07-1972                 | NONE                |