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(54) Title: CLIP AND WALL FACING SYSTEM FOR SEGMENTAL RETAINING WALLS

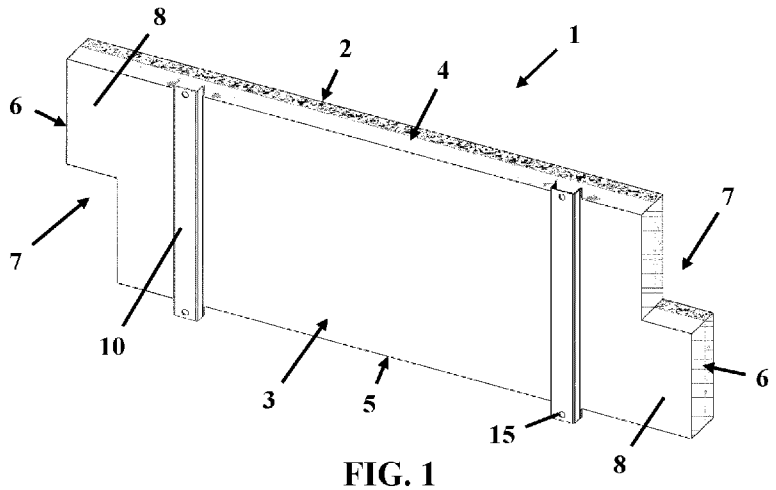

FIG. 1

(57) Abstract: A cast stone decorative wall system and tenon clip for affixing cast stone elements to a supporting wall surface, having a U-shaped fastening portion with a first fastening side and opposing sidewalls generally perpendicular to the first fastening side. An anchoring flange extends from each of the sidewalls. A hook extends from one end of the first fastening side for fastening the tenon clip to the supporting wall surface. Each anchoring flange has one or more anchors to secure the tenon clip within the cast stone element. The cast stone decorative wall system may be used with segmental retaining walls comprised of a plurality of segments.

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CLIP AND WALL FACING SYSTEM FOR SEGMENTAL RETAINING WALLS

Field of the Invention

[0001] The present invention relates to cast stone decorative wall systems and to specialized tenon clips for fastening the cast stone elements to a segmental retaining wall or similar structure.

Background

[0002] Thin stone wall cladding products are available in the marketplace. When installed, an attractive natural stone appearance is presented. However, commercialization of this decorative wall facing option is slow in acceptance in part because of an inability to easily and inexpensively attach the facing stone elements to a vertical wall structure.

[0003] Typically in the art, thin stone wall systems are installed by the so-called "lick and stick" method, which involves the use of epoxy adhesive to secure the thin stone or thin brick to plywood or OSB wall cladding, which involves the use of a metal lath with a scratch coat of Portland mortar. Such an adhered thin stone system is inherently less secure since improper application of the adhesive can lead to stones separating from the wall, which is both a nuisance and a safety problem. Such adhered thin stone systems are typically only used in lower floor applications of residential and commercial buildings as there is a bias against their use on multi-floor buildings. Further, the adhered thin stone system is not used in conjunction with other wall elements such as drainage board and weather-resistant wrap. Accordingly, thin stone products have in the main been used in commercial building applications.

[0004] Various bracket or clip systems have been developed to affix decorative veneer panels, made to look like stone, to a vertical structural wall. Although useful in particular cases, such systems lack versatility and simplicity, requiring brackets or clips with complicated structures

and/or several separate components. Such brackets or clips are difficult to secure to structural walls and require time-consuming alignment of panels.

[0005] There remains a need in the art for a more versatile, secure, and mechanically stronger thin stone wall system that is less costly, easier and faster to install and requires less skilled labor.

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Summary of the Invention

[0006] A tenon clip for affixing cast stone elements to a supporting wall surface, according to the present invention, has a U-shaped fastening portion with a first fastening side and opposing sidewalls generally perpendicular to the first fastening side. An anchoring flange extends from each of the sidewalls. A hook extends from one end of the first fastening side for fastening the tenon clip to the supporting wall surface. Each anchoring flange has one or more anchors to secure the tenon clip within the cast stone element.

[0007] In another embodiment, the hook is configured to engage with a corresponding groove in the supporting wall surface.

[0008] In another embodiment, the tenon clip is formed from a single monolithic piece of material and the hook is formed by a first bend and a second bend in the first fastening side. The first and second bends are separated by an intermediate portion and a tab extends beyond the second bend.

[0009] In another embodiment, the first fastening side has one or more slots near either or both ends and the hook is formed of a separate piece of material from the rest of the tenon clip. The hook has an engagement portion positioned against the first fastening side of the tenon clip with one or more engagement tabs configured to engage with the one or more slots to attach the hook to the tenon clip.

[0010] In another embodiment, a cast stone decorative wall system, according to the present invention, may be used with segmental retaining walls comprised of a plurality of segments. The cast stone decorative wall system has a cast stone element having a front decorative face, a rear face, a top edge, a bottom edge, and one or more tenon clips embedded in the rear face. The one or more tenon clips each have a U-shaped fastening portion with a first fastening side and opposing sidewalls generally perpendicular to the first fastening side. An anchoring flange extends from each of the sidewalls. A hook extends from one end of the first fastening side for fastening the tenon clip to the segmental retaining wall. Each anchoring flange has one or more anchors to secure the tenon clip within the cast stone element.

Brief Description of the Drawings

[0011] In order that the invention may be more clearly understood, embodiments thereof will now be described in detail by way of example, with reference to the accompanying drawings, in which:

[0012] Figure 1 is a perspective rear view of a cast stone element with embedded tenon clips, according to the present invention.

[0013] Figure 2 is a top view of the cast stone element of Fig. 1.

[0014] Figure 3 is a rear view of the cast stone element of Fig. 1.

[0015] Figure 4 is a rear view of a number of cast stone elements with embedded tenon clips of a cast stone wall system, according to the present invention.

[0016] Figure 5 is a cross-sectional view of the cast stone wall system of Fig. 4, along the lines A-A in Figure 4.

[0017] Figure 6 is a cross-sectional view of the cast stone element of Fig. 1, along the lines C-C in Figure 3.

[0018] Figure 7 is a perspective view of a tenon clip, according to the present invention.

[0019] Figure 8 is a front view of the tenon clip of Fig. 7.

[0020] Figure 9 is a side view of the tenon clip of Fig. 7.

[0021] Figure 10 is a top view of the tenon clip of Fig. 7.

[0022] Figure 11 is a front view of another embodiment of the tenon clip, according to the present invention, showing a hook attached to the tenon clip.

[0023] Figure 12A is a side view of the tenon clip of Fig. 11.

[0024] Figure 12B is a detail view of the area D in Fig. 12A.

[0025] Figure 13 is a top view of the tenon clip of Fig. 11.

[0026] Figure 14 is a rear view of a tenon clip, according to the present invention, with intermediate flanges.

[0027] Figure 15 is a side view of the tenon clip of Fig. 14.

[0028] Figure 16 is a top view of the tenon clip of Fig. 14.

[0029] Figure 17 is a top view of another embodiment of a tenon clip, according to the present invention, showing the attachment portion formed into a hook.

[0030] Figure 18 is a rear view of the tenon clip of Fig. 17.

[0031] Figure 19 is a side view of the tenon clip of Fig. 17.

[0032] Figure 20 is a side view of cast stone elements, including the clip of Fig. 17, showing the installation of the tenon clip on a SRW.

[0033] Figure 21 is a side view of a completed SRW, assembled as shown in Fig. 20.

[0034] Figure 22 is a front view of the hook of Fig. 11, shown without the tenon clip.

[0035] Figure 23 is a side view of the hook of Fig. 22.

[0036] Figure 24 is a detail view of the area E in Fig. 23.

[0037] Figure 25 is a top view of the hook of Fig. 22.

Description of the Preferred Embodiments

[0038] The tenon clip and cast stone wall facing system, according to the present invention, provide an aesthetically pleasing stone wall appearance with ease of installation on a segmental retaining wall (SRW). The cast stone elements may be affixed to a supporting wall surface, in particular a SRW, by means of the tenon clip, which provides a convenient means of attachment and spacing between the cast stone elements and the supporting wall to allow for drainage. The tenon clips are inserted into the cast stone, during the casting process while the material is wet, thereby embedding the tenon clip within the cast stone element.

[0039] During production, when shorter clips are used that do not extend across the mould in which the cast stone elements are formed, the clips have a tendency to sink into the uncured casting material. In order to overcome this production challenge, the clips are provided with intermediate flanges, as described herein, to prevent the clip from sinking into the uncured casting material during production of the cast stone element.

[0040] As shown in Figures 1-3, a cast stone element **1** has a front decorative face **2**, rear face **3**, top edge **4**, and bottom edge **5**. The cast stone element is formed by pouring wet casting material, such as concrete, into a mold. In some embodiments, the front decorative face **2** is made up of a layer of natural stone, which is set in the mold prior to pouring wet casting material into the mold. In one exemplary embodiment, the cast stone element **1** has a height of 215 mm, a length of 620 mm, and a thickness of 40 mm, with two tenon clips **10** positioned along the length of the cast stone element **1** about 123 mm from either end **6**. The ends **6** of the cast stone element **1** may be shaped to overlap with adjacent cast stone elements **1**. As shown in Fig. 3, each end **6** has a cut-out **7** at the top or bottom edge **4** or **5**, shaped complementary to a tab **8** at the other end **6**. Alternatively, the ends **6** may be flat or have another convenient shape to facilitate engaging adjacent cast stone elements **1** to cover a supporting wall surface.

[0041] Although illustrated as extending between the top edge **4** and the bottom edge **5** in Figures 1-6, 11-13, and 17-21, the tenon clip **10**, as described below and shown in Figures 7-10 and 14-16, may extend only a portion of the height of the cast stone element **1** and be placed at either the top edge **4** or the bottom edge **5**, or both, of the cast stone element **1**.

[0042] A tenon clip **10** is, preferably, used for attaching the cast stone elements **1** to a segmental retaining wall (SRW) or other similar supporting wall structure. By inserting the tenon clip **10** into the cast stone element **1** during casting, the tenon clip **10** is embedded and securely retained therein. The tenon clip **10** has a generally U-shaped fastening portion **11** with a first fastening side **12** and two opposing sidewalls **13**. The sidewalls **13** are connected to the first fastening side **12** at the corners of the U-shape and generally perpendicular to the first fastening side **12**. An anchoring flange **14** extends from each of the sidewalls **13** and is at least partially embedded in the rear face **3** of the cast stone element **1**, as shown in Fig. 6. Preferably, the anchoring flanges **14** are entirely or substantially embedded within the cast stone element **1**, while the fastening portion **11** of the tenon clip **10** extends outwardly from the rear face **3** of the cast

stone element **1** to provide spacing between the rear face **3** of the cast stone element **1** and the supporting wall surface. Preferably, the anchoring flanges **14** are embedded in the cast stone element **1** when the concrete or other material of the cast stone element **1** is in a wet state, prior to curing. Alternatively, the anchoring flanges **14** may be inserted into angle grooves or kerfs cut into the rear face **3** of the cast stone element **1**.

[0043] The anchoring flanges **14** have one or more anchors to improve the pull-out strength and help secure the tenon clip **10** within the cast stone element **1**. As shown in Figs. 6-9, 11, 12, 15, 18, and 19, the anchors may be apertures **16** through the anchoring flanges **14** that permit the material of the cast stone element **1** to flow through the anchoring flanges **14** to secure the tenon clip **10** and prevent it from moving or slipping relative to the cast stone element **1**. Additionally, tabs **17** may be provided extending perpendicularly from the anchoring flanges **14**, parallel to the top and bottom edges **4** and **5** of the cast stone element **1**. Preferably, as shown in Figs. 3 and 6, the tabs **17** are positioned at or just beneath the top or bottom edges **4** or **5** of the cast stone element **1**, but other configurations of tabs may be used in addition to or in place of apertures **16** or other types of anchors to secure the anchoring flanges **14** within the cast stone element **1**. Preferably, the tenon clip **10** is configured such that it can be made by bending and cutting a single monolithic piece of metal. Alternatively, the hook **35** may be formed separately and attached to the tenon clip **10**, as shown in Figures 11-14.

[0044] As shown in Figures 20 and 21, the tenon clip **10** attaches to a continuous groove **28** in the top surface **29** along the front edge **31** of each segment **27** of the segmental retaining wall (SRW) **26**. The SRW **26** is made up of a plurality of individual segments **27**, each of which have a top surface **29** shaped to engage with the bottom surface **30** of a vertically adjacent segment **27** of the SRW **26**. The top and bottom surfaces **29** and **30** of each adjacent segment **27** thereby prevent or resist relative movement between adjacent segments **27**, at least in the direction perpendicular to the plane of the SRW **26**. Preferably, a ridge **32** runs along the top surface **29**

of each segment **27** that is shaped complimentary to a recess **33** running along the bottom surface **30** of each segment **27**, as shown in Fig. 20.

[0045] The groove **28** in the top surface **29** of each segment **27** of the SRW **26** is shaped to receive the hook **35** of the tenon clip **10** that is positioned at the top edge **4** of the cast stone element **1**. As shown in Figures 17-19, the hook **35** is formed from a first and second bend **36** and **37** in the fastening portion **11** of the tenon clip **10**. The first bend **36** is a 90° bend in the fastening portion **11**, away from the rear face **3** of the cast stone element **1**. The second bend **37** is another 90° bend in the fastening portion **11** in the same direction, such that the end of the tenon clip **10** is now pointing towards the bottom edge **5** of the cast stone element **1**. Between the first and second bends **36** and **37** is an intermediate portion **38** of the hook **35**, which is sized to extend from the front edge **31** of the segment **27**, over the top surface **29** to the groove **28**. Between the second bend **37** and the end of the tenon clip **10** is a tab **39**, which extends at least partially into the groove **28**.

[0046] As shown in Figure 20, a first cast stone element **1** and tenon clip **10** are in position against a segment **27** of the SRW **26**, with the intermediate portion **38** of the hook **35** extending over the top surface **29** of the segment **27** and the tab **39** extending into the groove **28**, thereby retaining the cast stone element **1** in place on the SRW **26**. A row of cast stone elements **1** may be installed in this way and then another row of segments **27** may be placed on top of the completed row. The bottom surface **30** of this next row of segments **27** rests on top of the top surface **29** of the current row, thereby trapping the hook **35** of the completed row of cast stone elements **1** within the groove **28**. As shown in Figure 20, a second cast stone element **1** may be attached to the SRW **26** by sliding the tab **39** of the hook **35** into the groove **28** on the top surface **29** of the segment **27** above the first. Each successive row of cast stone elements **1**, may be positioned resting directly on top of the row below with substantially no space therebetween. Preferably, the fastening portion **11** of the tenon clip **10** also extends below the bottom edge **5** of

the cast stone element **1**. This permits the fastening portion **11** of the tenon clip **10** extending below the bottom edge **5** of the cast stone element **1** to slide into the space between the rear face **3** of the below-adjacent cast stone element **1** and the supporting wall surface (in this case, the front edge **31** of the segment **27**). Successive rows of cast stone elements **1** and segments **27** may then be installed in a similar manner until the SRW **26** is completed, as shown in Figure 21.

[0047] As shown in Figures 11-13, the hook **35** may be formed of a separate piece of material from the rest of the tenon clip **10** and attached to the first fastening side **12**, extending away from the sidewalls **13** and anchoring flanges **14**. Preferably, in this embodiment, the hook **35** has an engagement portion **40** that extends from the intermediate portion **38** at a 90° angle and is positioned against the first fastening side **12** of the tenon clip **10** for attachment thereto. In this embodiment, the first bend **36** is between the engagement portion **40** and the intermediate portion **38**, rather than between the first fastening side **12** and the intermediate portion **38**. The hook **35** may be attached to the tenon clip **10** in any suitably secure fashion. Preferably, the first fastening side **12** has one or more slots **18** near either or both ends of the tenon clip **10** and the engagement portion **40** has one or more engagement tabs **41** or hooks. As shown in Figures 22-25, the engagement tabs **41** are cut and bent at an angle **θ** to the engagement portion **40**, so as to slide into the slots **18** to attach the hook **35** to the tenon clip **10** and hold the tenon clip **10** in place. Preferably, the engagement tabs **41** have a triangular shape and the angle **θ** is about 150° to facilitate easy attachment of the hook **35** to the first fastening side **12** of the tenon clip **10**.

[0048] Although the examples illustrated and described herein depict the cast stone elements **1** installed on a vertical wall surface, the tenon clip **10** may also be used to attach cast stone elements **1** to a horizontal support, such as a series of horizontal, spaced apart rails. In such applications, the hook **35** may be sized and shaped complimentary to the rails, so as to fit over the rail and hold the cast stone elements **1** in place.

[0049] Optionally, the tenon clip **10** may be shorter than the height of the cast stone element **1**. A tenon clip **10** may be positioned at the top edge **4** and another at the bottom edge **5** of the cast stone element **1**. Alternatively, tenon clips **10** may be used along only the top edge **4** of the cast stone element **1**. These shorter tenon clips **10**, preferably, do not have tabs **17** at both ends and the fastening portion **11** does not extend beyond the anchoring flanges **14** at both ends. In this embodiment, tabs **17** are positioned substantially at the top or bottom edge **4** or **5** of the cast stone element **1**, the fastening portion **11** of the tenon clip **10** extends beyond the same top or bottom edge **4** or **5**, and the tenon clip **10** extends towards the other top or bottom edge **4** or **5** by a distance less than the height of the cast stone element **1**.

[0050] As shown in Figs. 14-16, the tenon clips **10** may have an intermediate flange **25** between the sidewalls **13** and the anchoring flanges **14** to prevent the tenon clips **10** from sinking in to the uncured concrete during production. As shown in Fig. 16, the intermediate flanges **25** extend from each sidewall **13**, outwardly from the U-shaped fastening portion **11** and generally perpendicular to the sidewalls **13**. In this embodiment, the tabs **17** preferably extend from the intermediate flanges **25**, rather than from the anchoring flanges **14**. As shown in Figs. 15 and 16, the anchoring flanges **14** extend from each of the intermediate flanges **25**. Preferably, the anchoring flanges **14** extend generally perpendicular to the intermediate flanges **25**, however, they may extend at other angles. For example, the anchoring flanges **14** may extend at an obtuse angle to the intermediate flanges **25**, so as to embed in the rear face **3** of the cast stone element **1** at an angle similar to that illustrated in Figs. 7-10. In this way the anchoring flanges **14** are embedded in the rear face **3** of the cast stone element **1** and the U-shaped fastening portion **11** is prevented from sinking into the uncured concrete by the intermediate flanges **25**.

[0051] A starter strip may be used to support the bottom row of cast stone elements **1** from below, from above, or from one side. The starter strip has a support flange and a base flange extending from the support flange, preferably, at a right angle. The support flange has one or

more apertures for receiving fasteners to attach the starter strip to the supporting wall surface. The base flange may have one or more drainage apertures for permitting moisture to escape from between the cast stone elements **1** and the supporting wall surface. The starter strip has a length long enough to span two or more cast stone elements **1** and, preferably, between about 3' to 12', more preferably, between 4' and 8'.

[0052] The starter strip may be straight or curved and may have an L-shaped or J-shaped cross section. Where the tenon clip **10** extends beyond both the top and bottom edges **4** and **5** of the cast stone element **1**, a J-shaped starter strip may be used to accommodate the tenon clip **10** extending below the bottom edge **5** of the cast stone element **1**. Curved starter strips may be used to span archways, windows, and the like.

[0053] Optionally, the tenon clip **10** may be shimmed with reference to the supporting wall surface to leave space between the supporting wall surface and the first fastening side **12** of the tenon clip **10**. In this way the spacing between the cast stone element **1** and the supporting wall surface may be selectively adjusted, as required, for example, to accommodate any uneven areas on the supporting wall surface. A shim feature may be provided at the rear of the tenon clip **10**, such as a raised flexible indent portion or biasing tab. An installer may incrementally depress the tab to provide the desired spacing.

[0054] The vertices of the tenon clip **10**, such as the corners of the U-shaped fastening portion **11**, the first and second bends **36** and **37**, and the point at which the anchoring flanges **14** extend from the sidewalls **13** or intermediate flanges **25**, may be structurally reinforced to prevent relative bending between the parts of the tenon clip **10**. Preferably the vertices are structurally reinforced by way of crimps, welds, or channels formed on the vertices of the tenon clip **10**.

[0055] A cast stone element **1**, according to the present invention, may be prepared by placing a tenon clip **10** in a mold with the anchoring flanges **14** facing downwardly and at least partially

immersed in the wet casting material in the mold. The tenon clip **10** is positioned with the U-shaped fastening portion **11** above the casting material and resting on the top edges of the mold. Several tenon clips **10** may be positioned across the top or bottom of the mold, or both, as required. Preferably, two tenon clips **10** are used, located to each side of the mold, as shown in Figs. 1-3. Optionally, the tabs **17** may be used to locate and guide the tenon clip **10** into position in the mold. As the casting material hardens, the tenon clips **10** become securely attached to the cast stone element **1** by means of the anchoring flanges **14** embedded within the rear face **3**. A cast stone element **1** is thereby produced, which may be attached to a supporting wall surface by engaging the hook **35** with the groove **28** of the segments **27** of an SRW **26** or by driving a fastener through the fastening aperture **15** of the tenon clip **10**.

[0056] A cast stone wall system, according to the present invention, permits the convenient and secure installation of cast stone elements **1**, with embedded tenon clips **10**, as described herein, on a supporting wall surface to provide a decorative stone finish to the wall, without using adhesives to affix the cast stone elements **1** to the wall.

[0057] The present invention has been described and illustrated with reference to an exemplary embodiment, however, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention as set out in the following claims. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed herein.

What is claimed is:

1. A tenon clip for affixing cast stone elements to a supporting wall surface, comprising:

a U-shaped fastening portion with opposing ends, a first fastening side, and opposing sidewalls generally perpendicular to the first fastening side,

an anchoring flange extending from each of the sidewalls, and

a hook extending from one end for attaching the tenon clip to the supporting wall surface,

wherein each anchoring flange has one or more anchors to secure the tenon clip within the cast stone element.

2. The tenon clip of claim 1, wherein the hook is configured to engage with a corresponding groove in the supporting wall surface.

3. The tenon clip of claim 2, wherein the tenon clip is formed from a single monolithic piece of material and the hook is formed by a first bend and a second bend in the first fastening side at one end of the tenon clip, wherein the first and second bends are separated by an intermediate portion, and wherein a tab extends beyond the second bend.

4. The tenon clip of claim 3, wherein the first and second bends are 90° bends.

5. The tenon clip of claim 2, wherein the first fastening side has one or more slots near either or both ends of the tenon clip and the hook is formed of a separate piece of material from the rest of the tenon clip, the hook having an engagement portion positioned against the first fastening side of the tenon clip with one or more engagement tabs configured to engage with the one or more slots to attach the hook to the tenon clip.

6. The tenon clip of claim 2, wherein the tenon clip has a length and the cast stone element has a height, and wherein the length of the tenon clip is less than the height of the cast stone element.

7. The tenon clip of claim 6, wherein the sidewalls and the anchoring flanges are separated by intermediate flanges that extend generally perpendicularly outwardly from the sidewalls.

8. The tenon clip of claim 2, wherein the tenon clip has a length and the cast stone element has a height, and wherein the length of the tenon clip is greater than the height of the cast stone element.

9. A cast stone decorative wall system for segmental retaining walls, wherein the segmental retaining wall comprises a plurality of segments, the cast stone decorative wall system comprising:

a cast stone element having a front decorative face, a rear face, a top edge, a bottom edge, and one or more tenon clips embedded in the rear face, wherein

the one or more tenon clips each have a U-shaped fastening portion with opposing ends, a first fastening side, and opposing sidewalls generally perpendicular to the first fastening side, an anchoring flange extending from each of the sidewalls, and a hook extending from one end for attaching the tenon clip to the segmental retaining wall, and

wherein each anchoring flange has one or more anchors to secure the tenon clip within the cast stone element.

10. The cast stone decorative wall system of claim 9, wherein each of the plurality of segments of the segmental retaining wall have a top surface, a front edge, and a groove in the top

surface along the front edge, and wherein the hook is configured to engage with the groove in the top surface of the plurality of segments.

11. The cast stone decorative wall system of claim 10, wherein the tenon clip is formed from a single monolithic piece of material and the hook is formed by a first bend and a second bend in the first fastening side at one end of the tenon clip, wherein the first and second bends are separated by an intermediate portion, and wherein a tab extends beyond the second bend.

12. The cast stone decorative wall system of claim 11, wherein the first and second bends are 90° bends.

13. The cast stone decorative wall system of claim 10, wherein the first fastening side has one or more slots near either or both ends of the tenon clip and the hook is formed of a separate piece of material from the rest of the tenon clip, the hook having an engagement portion positioned against the first fastening side of the tenon clip with one or more engagement tabs configured to engage with the one or more slots to attach the hook to the tenon clip.

14. The cast stone decorative wall system of claim 10, wherein the tenon clip has a length and the cast stone element has a height, and wherein the length of the tenon clip is less than the height of the cast stone element.

15. The cast stone decorative wall system of claim 14, wherein the sidewalls and the anchoring flanges are separated by intermediate flanges that extend generally perpendicularly outwardly from the sidewalls.

16. The cast stone decorative wall system of claim 10, wherein the tenon clip has a length and the cast stone element has a height, and wherein the length of the tenon clip is greater than the height of the cast stone element.

17. The cast stone decorative wall system of claim 16, wherein the U-shaped fastening portion extends beyond the bottom edge of the cast stone element and the hook is positioned at the top edge of the cast stone element.

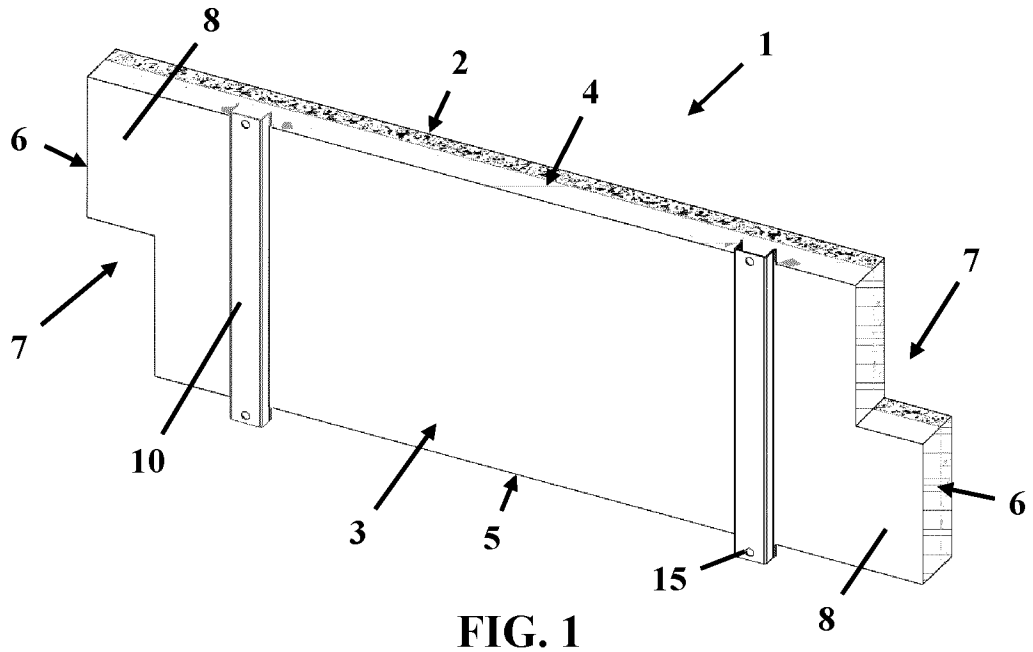

FIG. 1

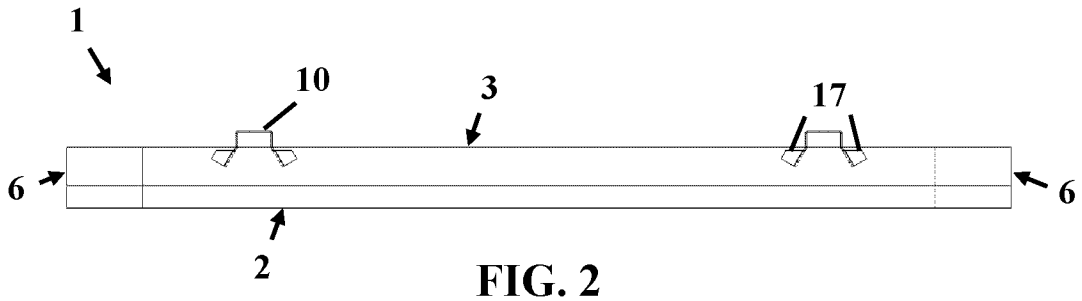

FIG. 2

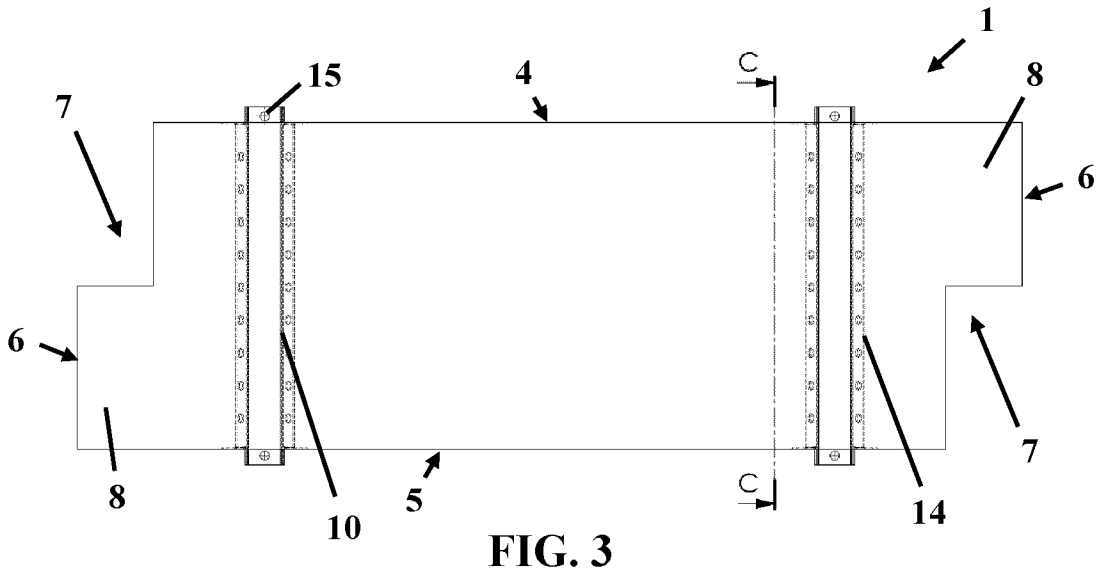

FIG. 3

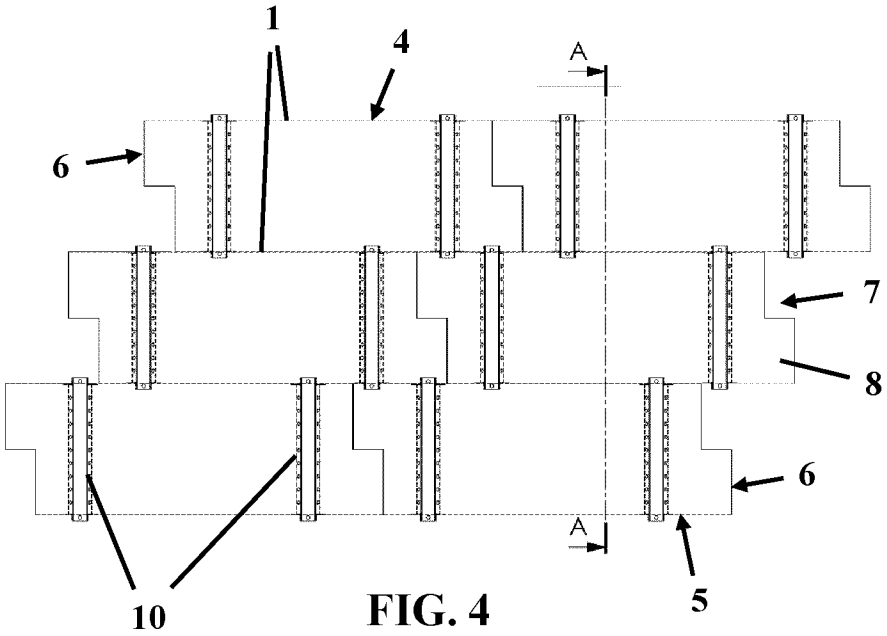

FIG. 4

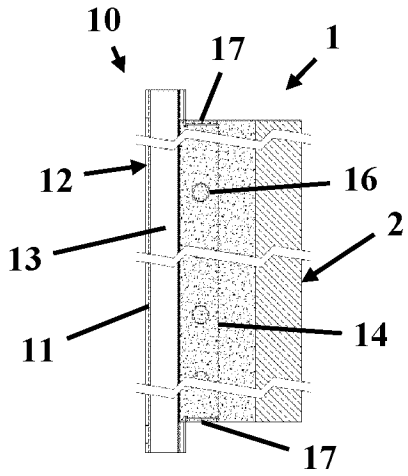

FIG. 6

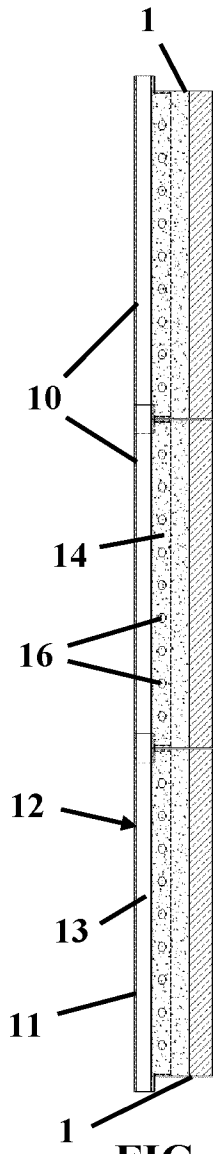

FIG. 5

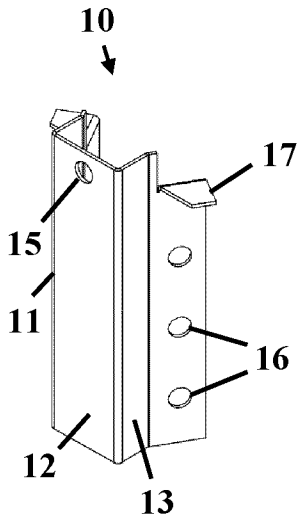

FIG. 7

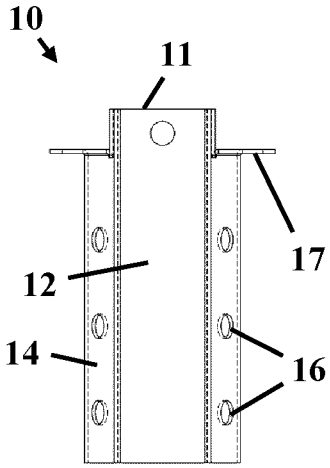

FIG. 8

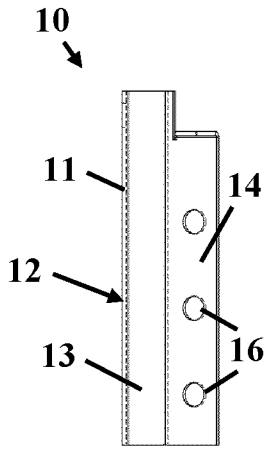

FIG. 9

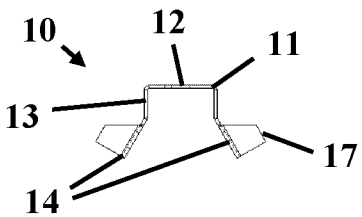

FIG. 10

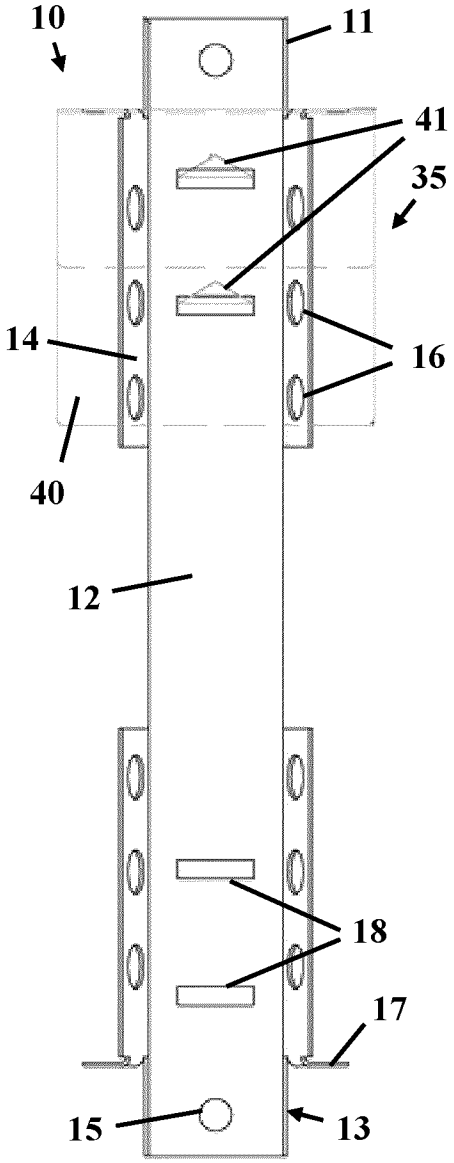

FIG. 11

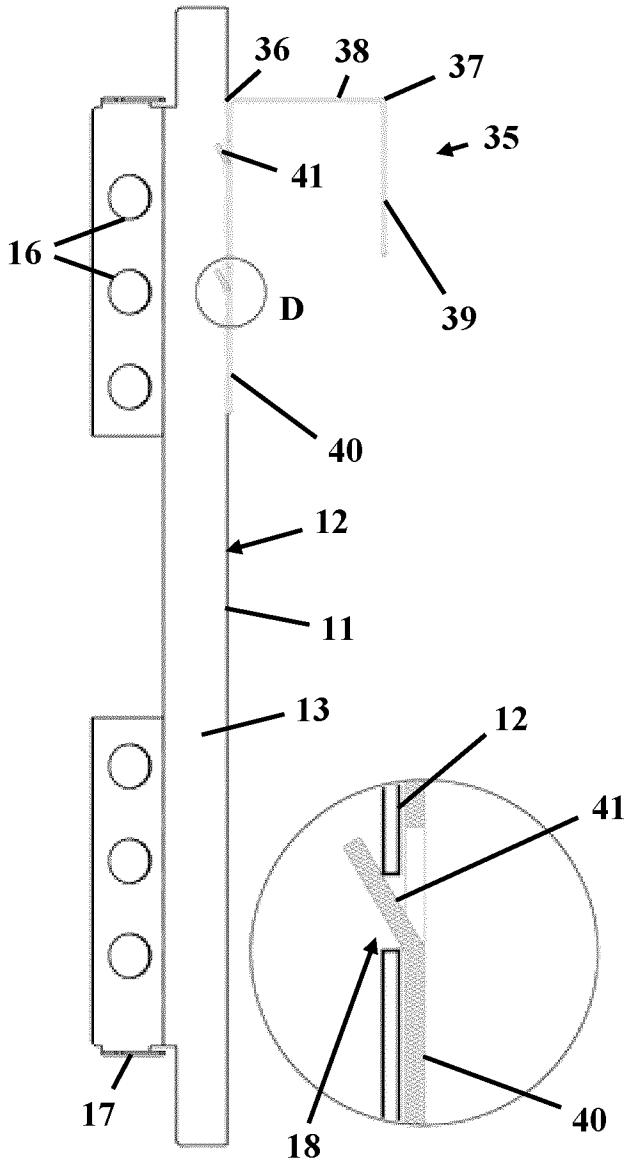

FIG. 12A FIG. 12B

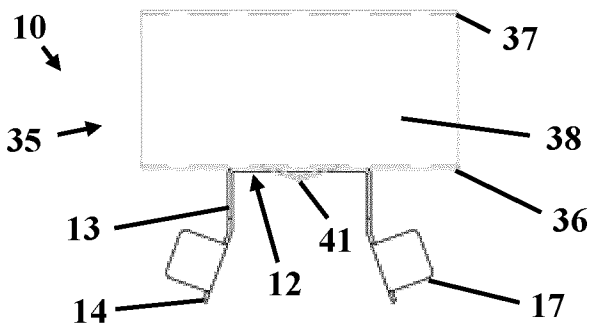

FIG. 13

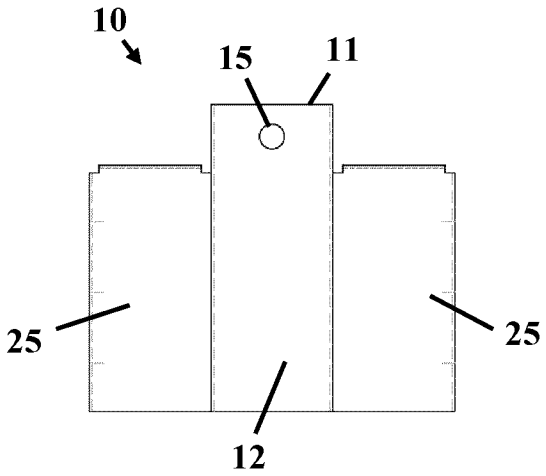

FIG. 14

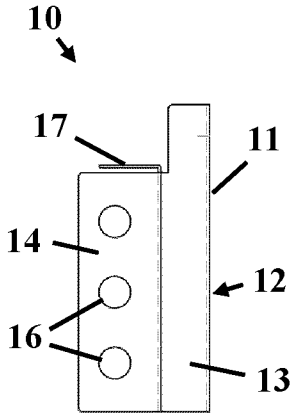

FIG. 15

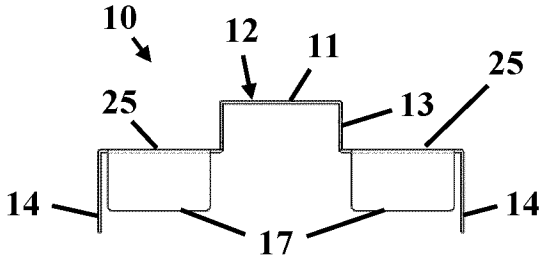

FIG. 16

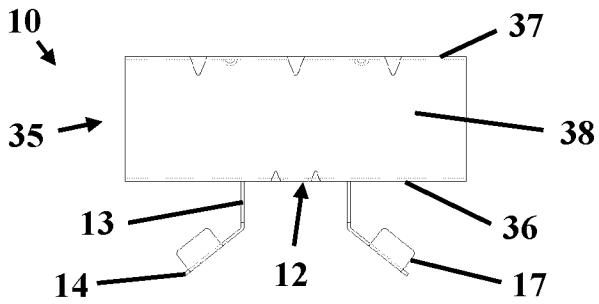

FIG. 17

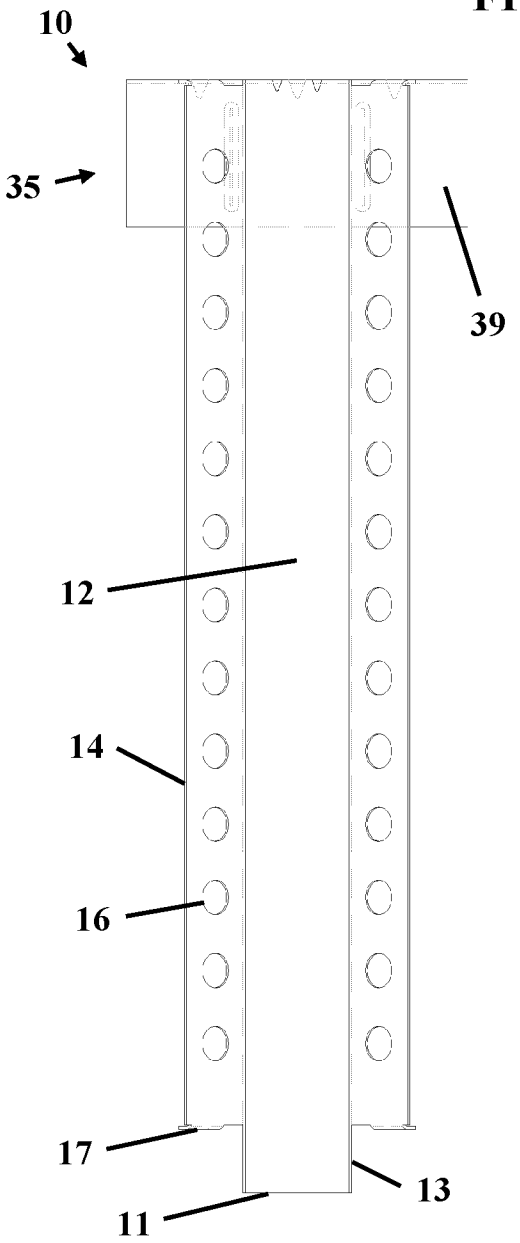

FIG. 18

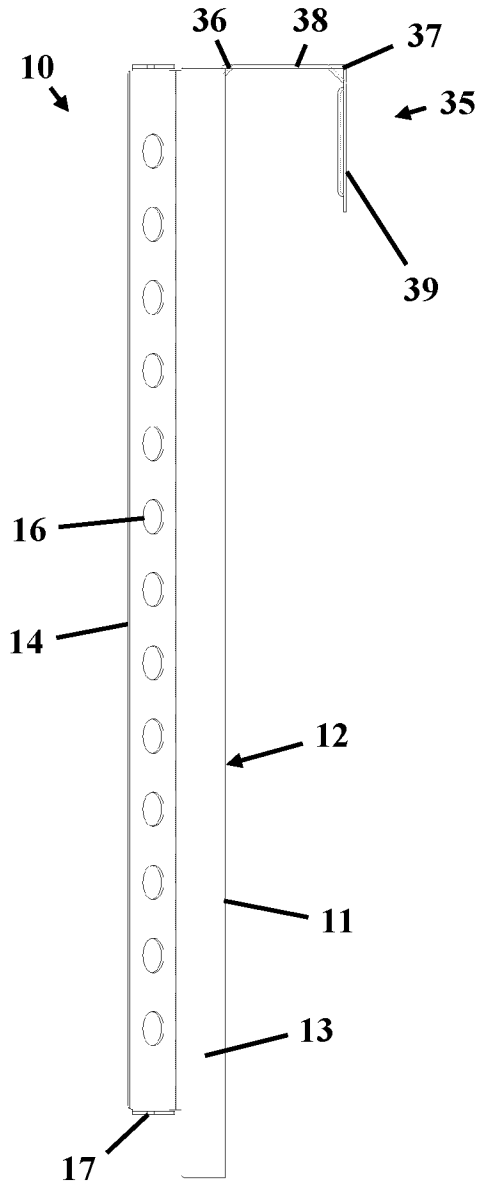

FIG. 19

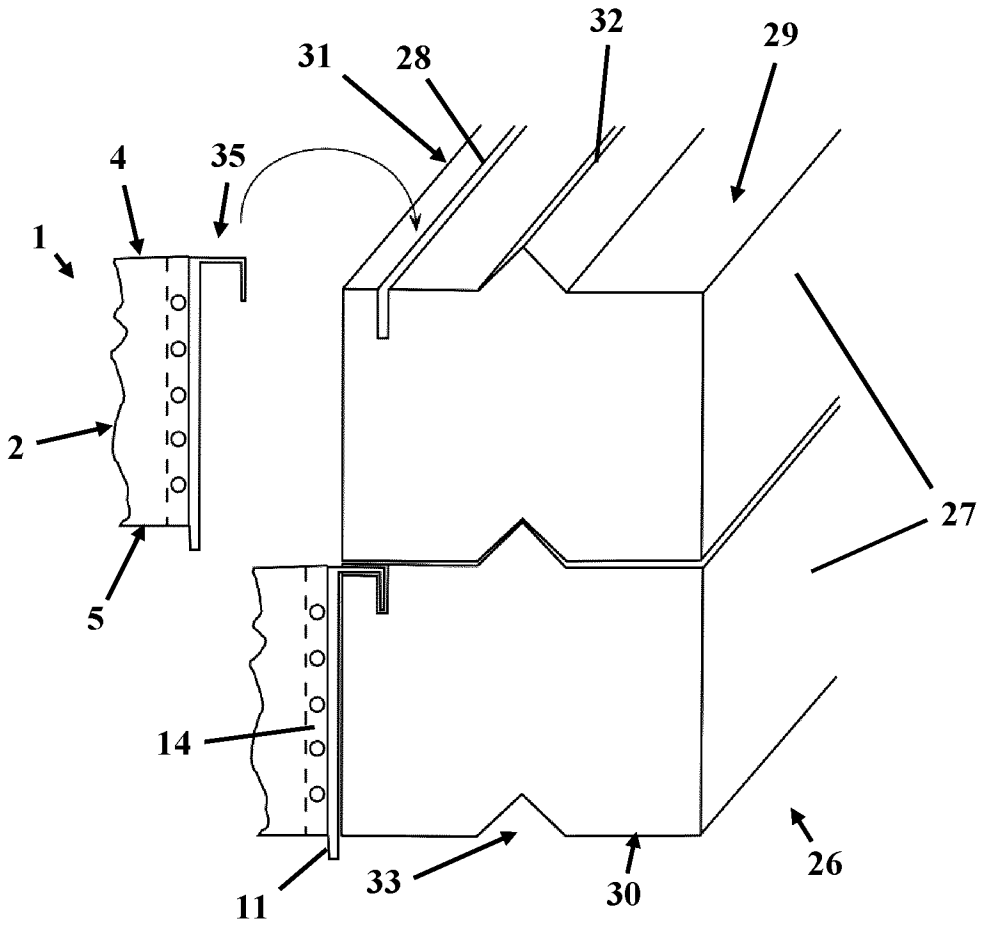

FIG. 20

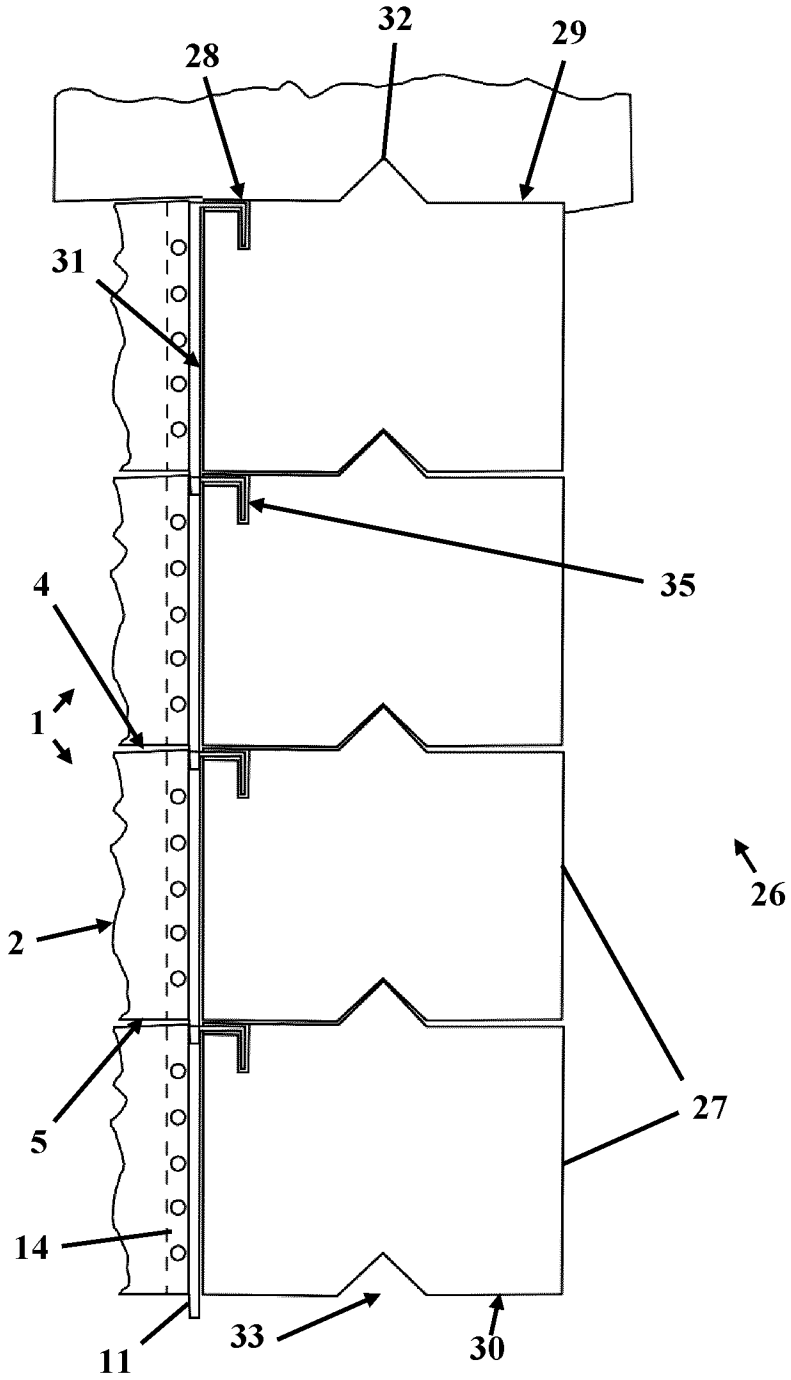

FIG. 21

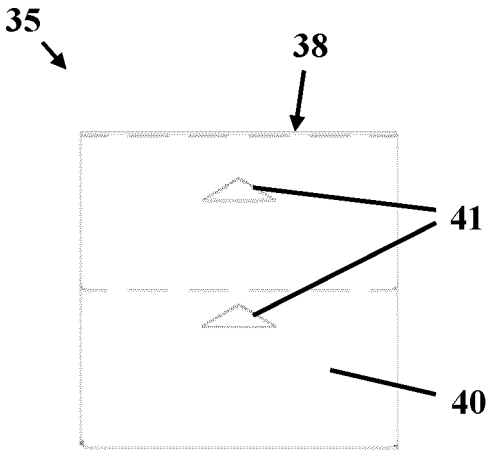

FIG. 22

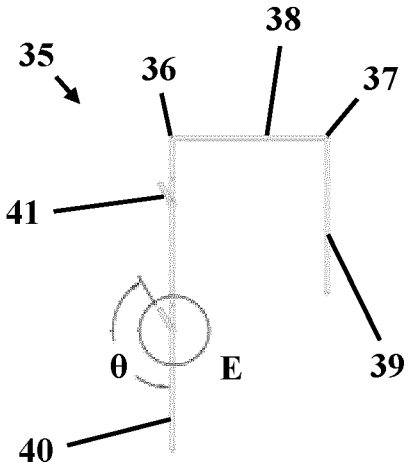

FIG. 23

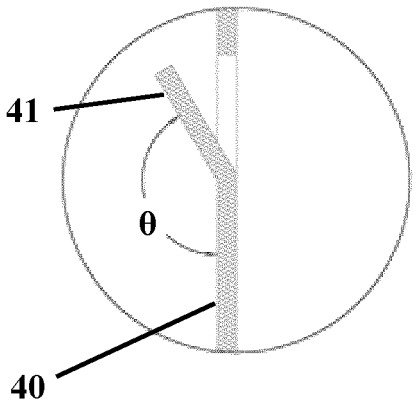

FIG. 24

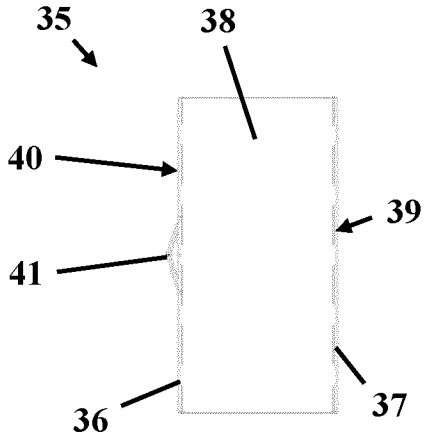

FIG. 25

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2022/051705

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***E04F 13/072*** (2006.01) , ***E02D 29/02*** (2006.01) , ***E04F 13/14*** (2006.01) , ***E04F 13/21*** (2006.01) , ***E04F 13/26*** (2006.01)

CPC: E02D 29/02 (2020.01) , E04F 13/14 (2020.01) , E04F 13/21 (2020.01) , E04F 13/26 (2020.01) , E04F 13/072 (2020.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See extra sheet

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

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

Questel Orbit: cast+, anchor+, hook+, veneer+, clip+, stone, cladding

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CA3098047 A1 (HUFF) 3 June 2021 (03-06-2021) *Figure 7, [0026], [0027]*	1, 9
A	US8065850 B1 (MORAN) 29 November 2011 (29-11-2011)	1, 9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

*	Special categories of cited documents:
"A"	document defining the general state of the art which is not considered to be of particular relevance
"D"	document cited by the applicant in the international application
"E"	earlier application or patent but published on or after the international filing date
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed
"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&"	document member of the same patent family

Date of the actual completion of the international search 06 December 2022 (06-12-2022)	Date of mailing of the international search report 16 January 2023 (16-01-2023)
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.: 819-953-2476	Authorized officer Simon Webster (819) 639-7673

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2022/051705

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CA3098047A1	29 May 2021 (29-05-2021)	US2021164234A1	03 June 2021 (03-06-2021)
US8065850B1	29 November 2011 (29-11-2011)	US2010011688A1 US7841147B2	21 January 2010 (21-01-2010) 30 November 2010 (30-11-2010)