



US 20090301026A1

(19) **United States**(12) **Patent Application Publication**
Kaczmarek et al.(10) **Pub. No.: US 2009/0301026 A1**(43) **Pub. Date: Dec. 10, 2009**(54) **METHOD AND APPARATUS FOR
CONNECTING PERPENDICULARLY
ORIENTED STRUCTURAL BUILDING
MEMBERS****Related U.S. Application Data**

(60) Provisional application No. 61/060,442, filed on Jun. 10, 2008.

Publication Classification(51) **Int. Cl.**
E04B 1/38 (2006.01)
E04B 1/35 (2006.01)(52) **U.S. Cl.** 52/713; 52/745.21(57) **ABSTRACT**

Methods and apparatus for perpendicular attachment of a first structural member to a second structural member, or of a first structural member between a pair of parallel structural members that uses a uniquely designed angled connector bracket that is formed with angled plates from which a plurality of teeth or nails extend. The teeth on one plate are intended to be driven into the end of the first structural member, and the teeth on the other plate are to be driven into an upper or outer surface of the second structural member to effect a generally perpendicular joint between such members.

(75) Inventors: **Martin J. Kaczmarek**, Bend, OR
(US); **Joseph A. Kaczmarek**,
Sunriver, OR (US)

Correspondence Address:

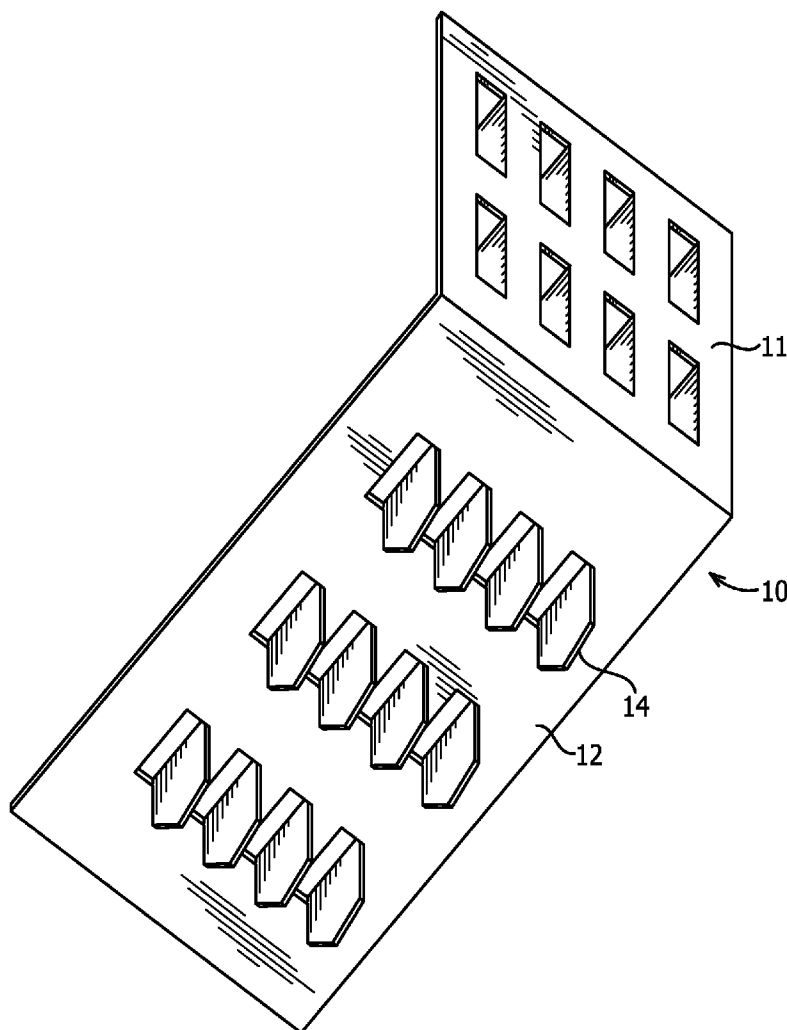
SENNIGER POWERS LLP
100 NORTH BROADWAY, 17TH FLOOR
ST LOUIS, MO 63102 (US)(73) Assignee: **MITEK HOLDINGS, INC.**,
Wilmington, DE (US)(21) Appl. No.: **12/482,239**(22) Filed: **Jun. 10, 2009**

FIG. 1

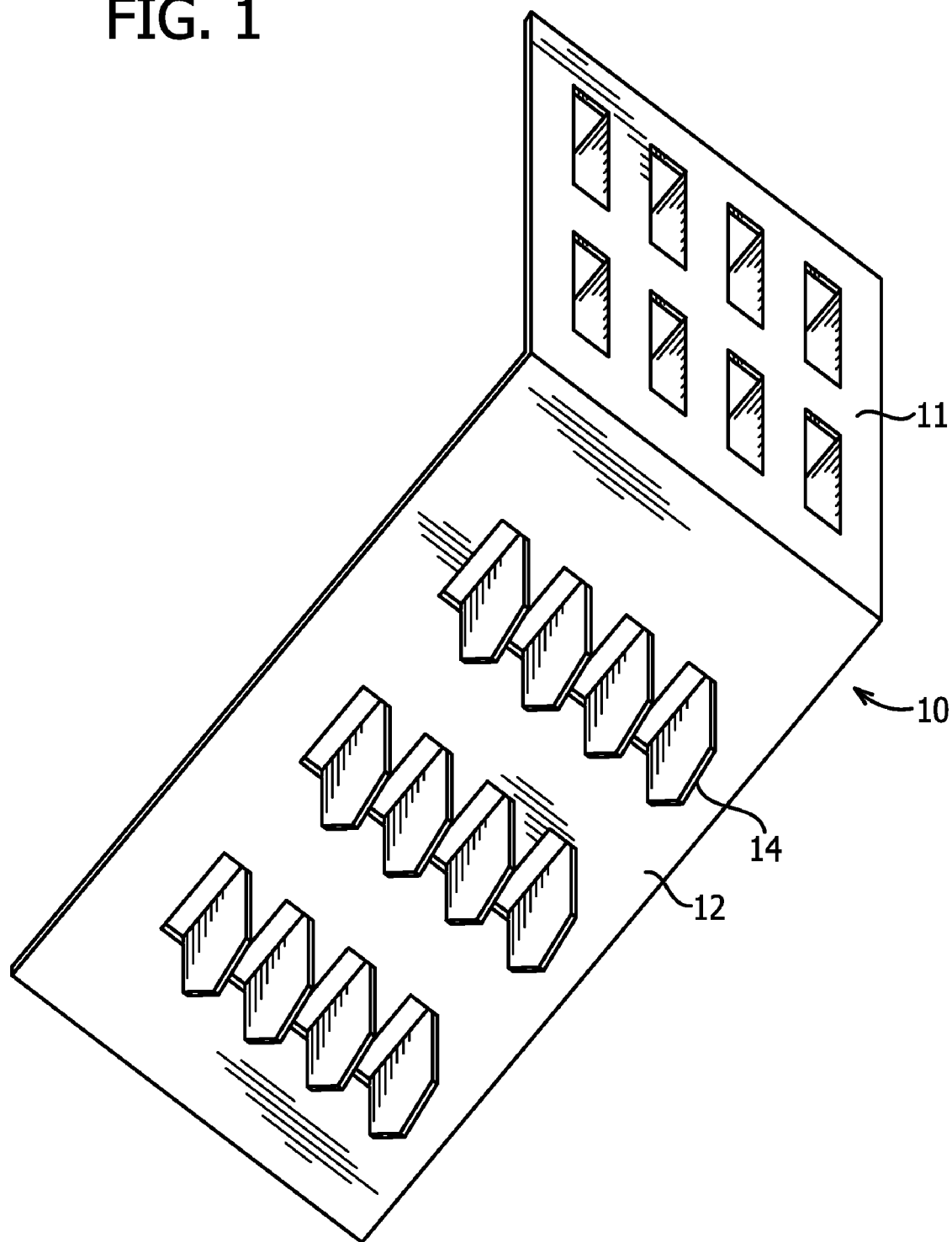


FIG. 2

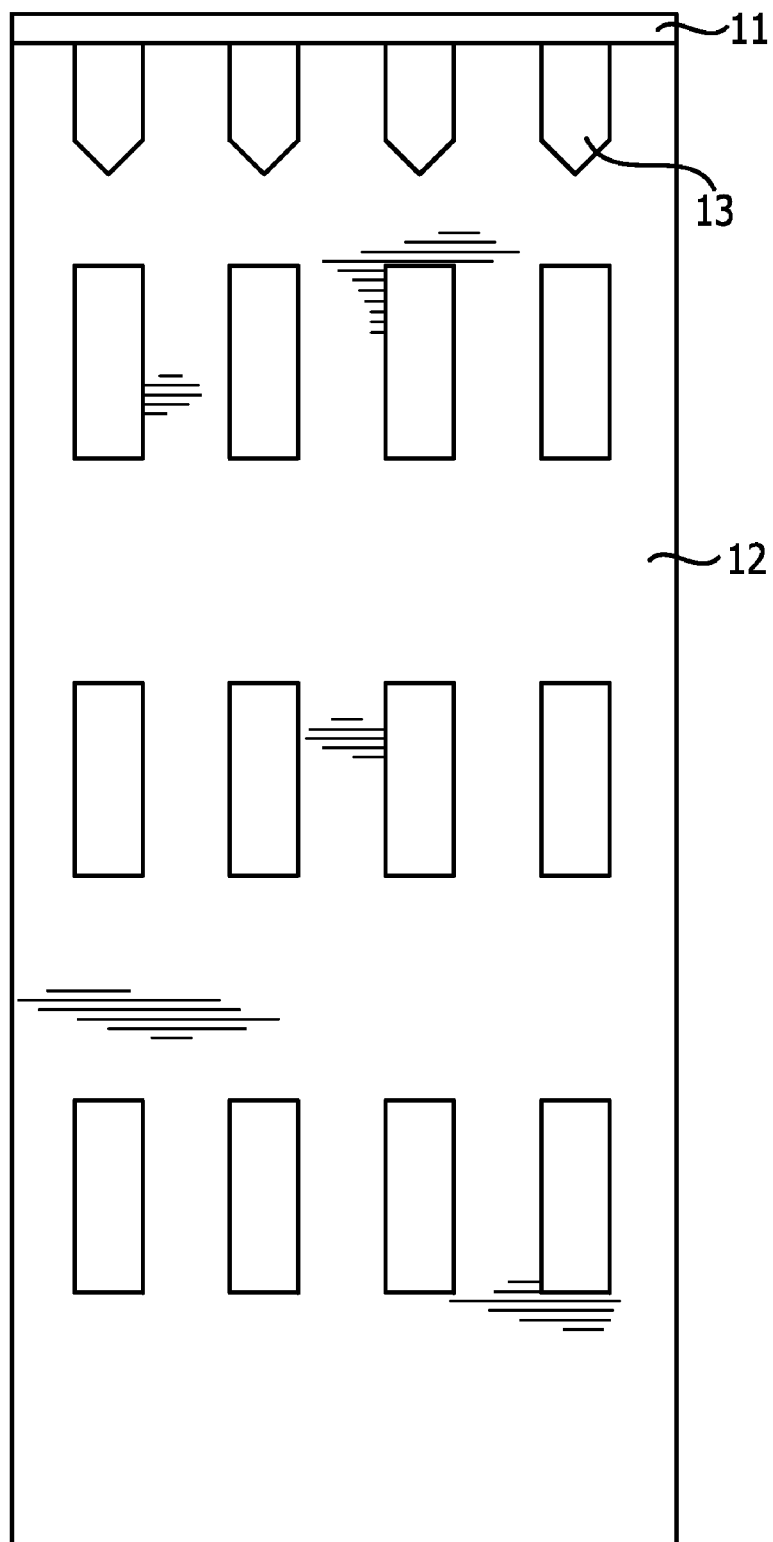


FIG. 3

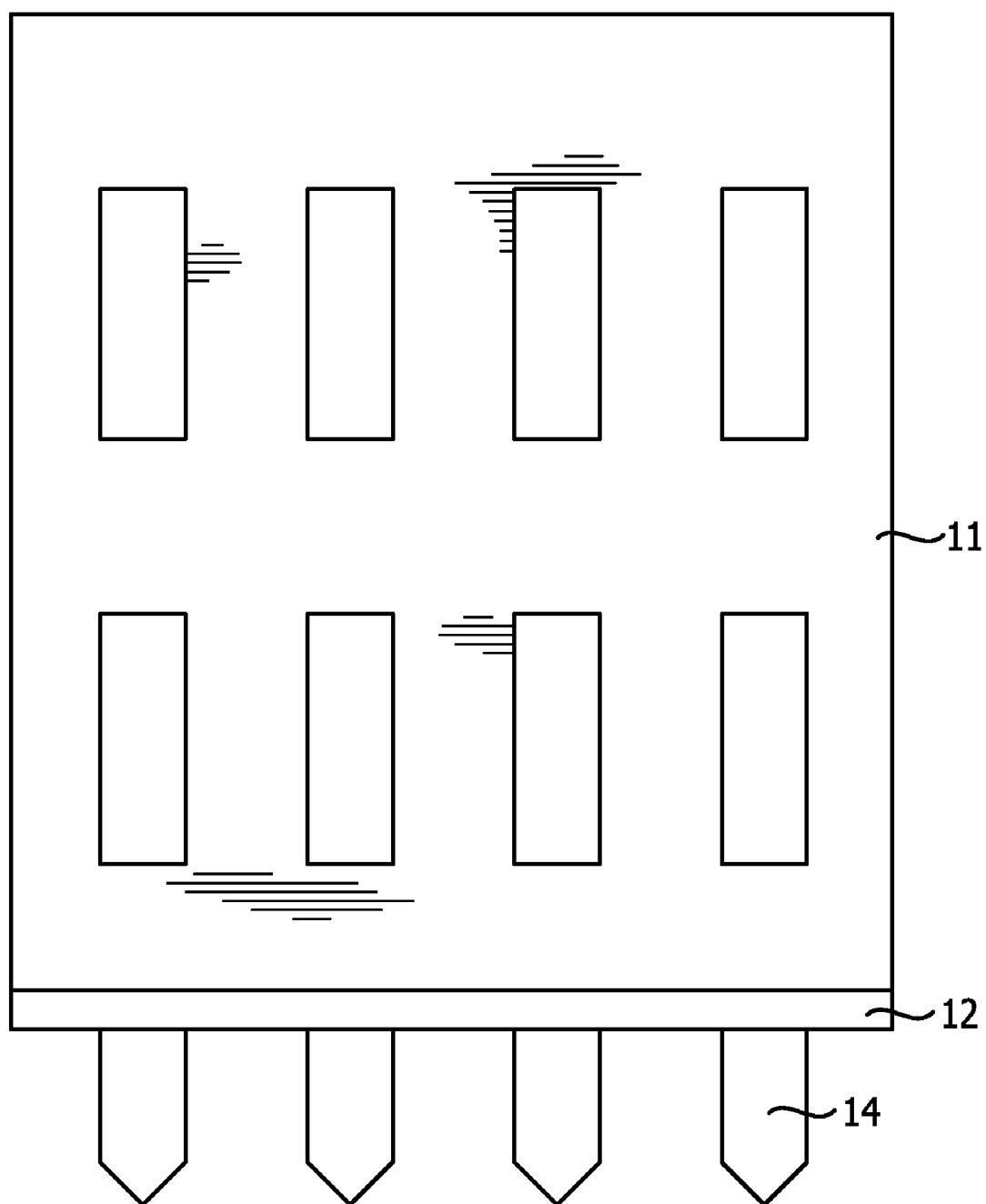


FIG. 4

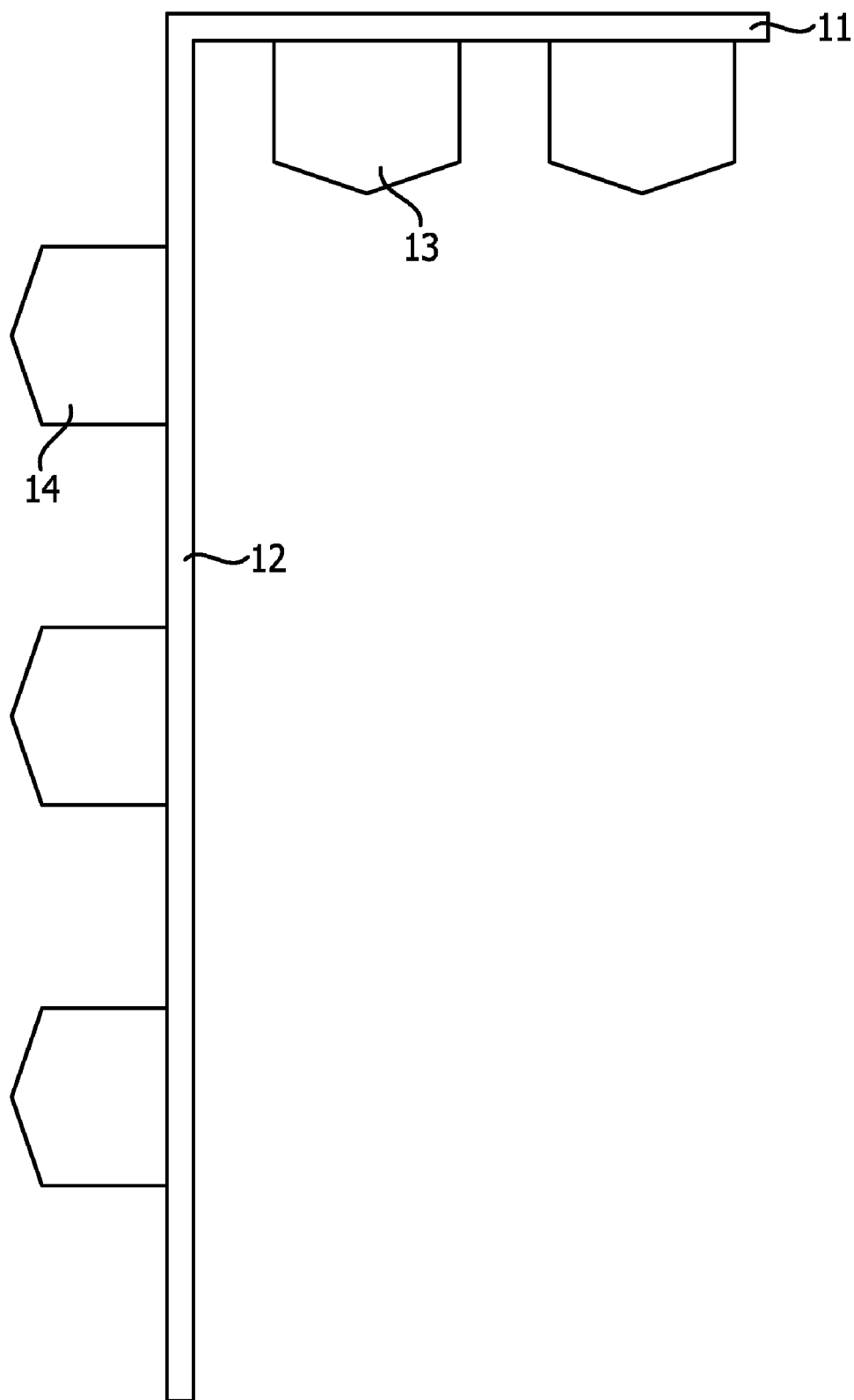


FIG. 5

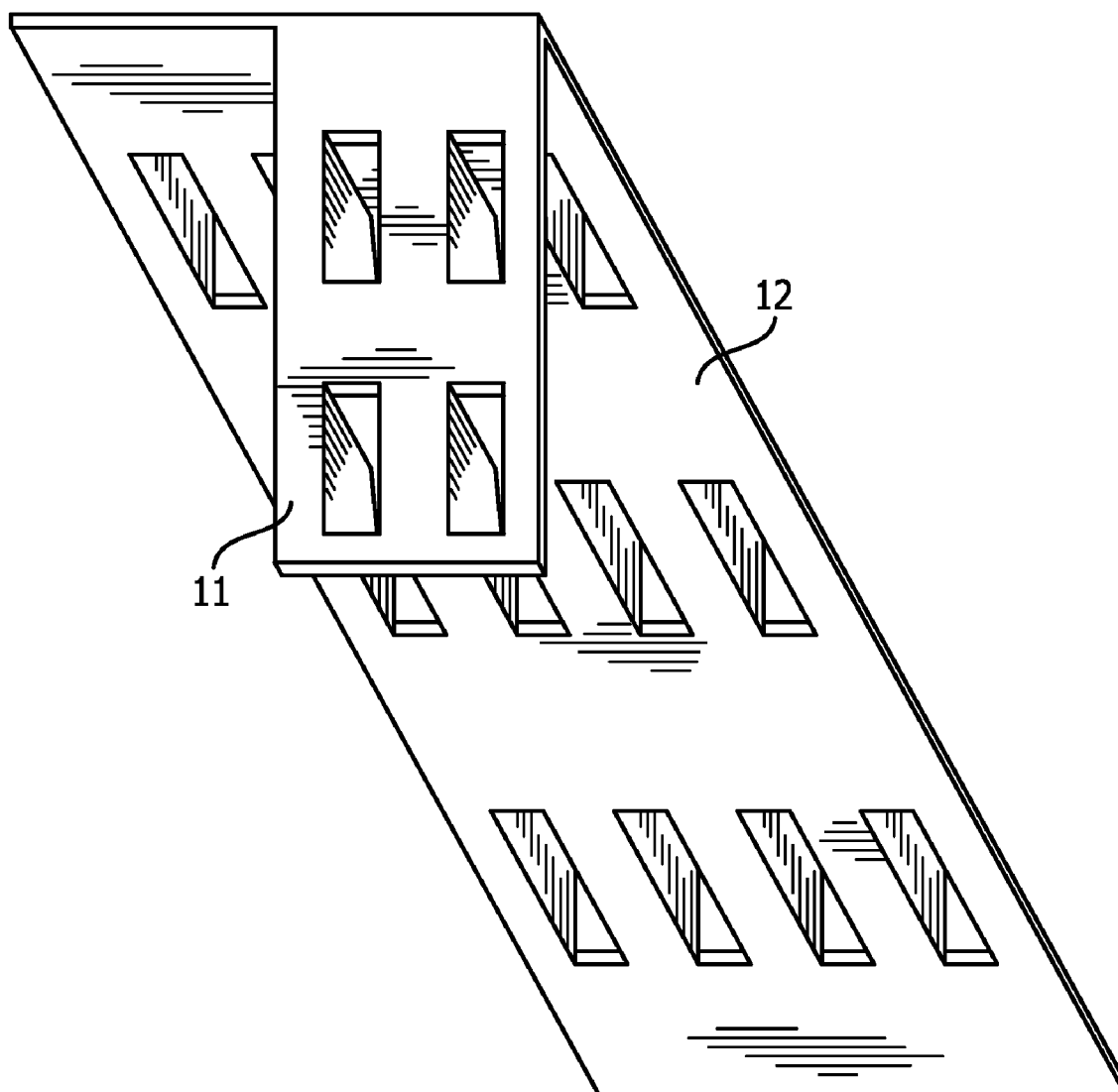


FIG. 6

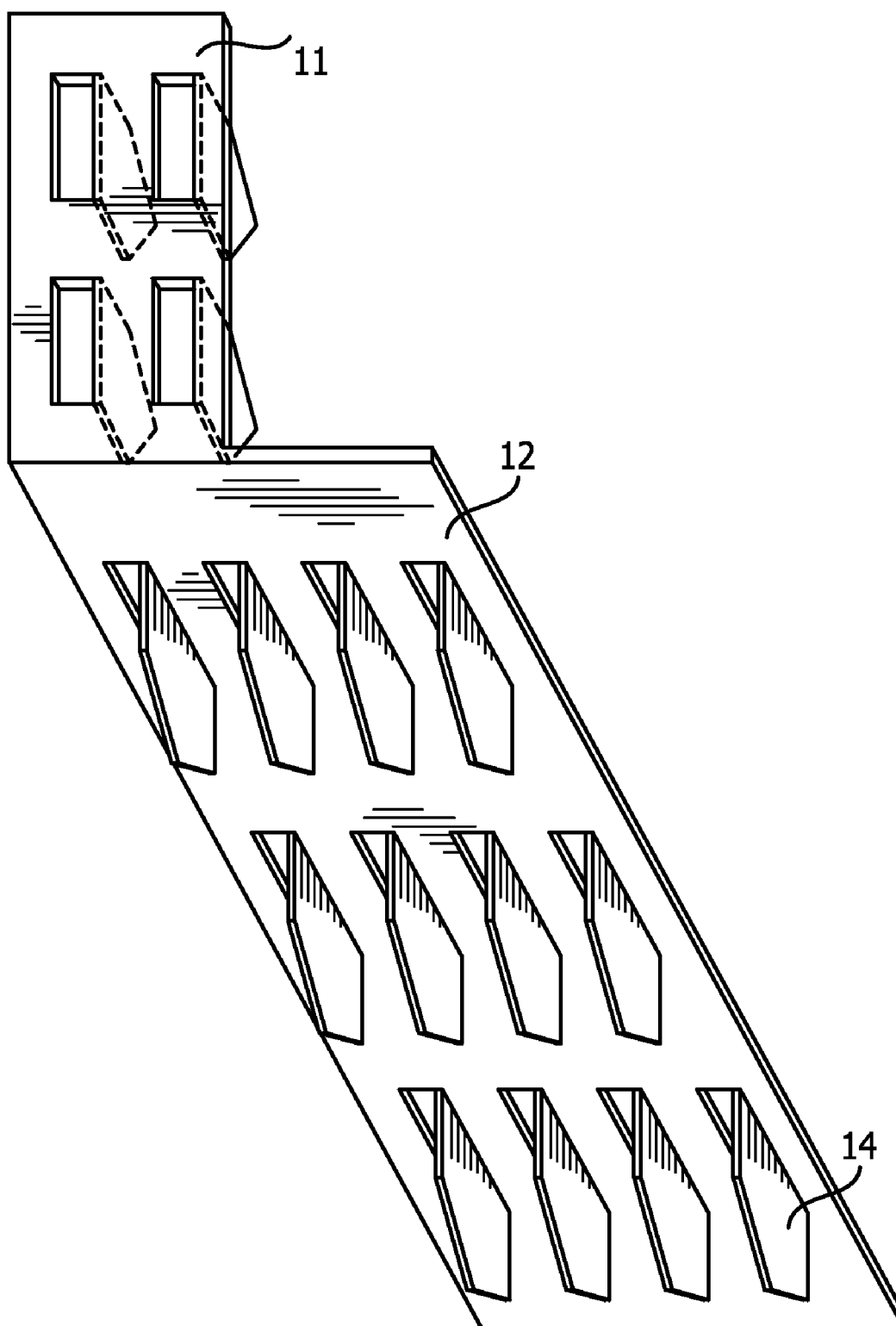


FIG. 7

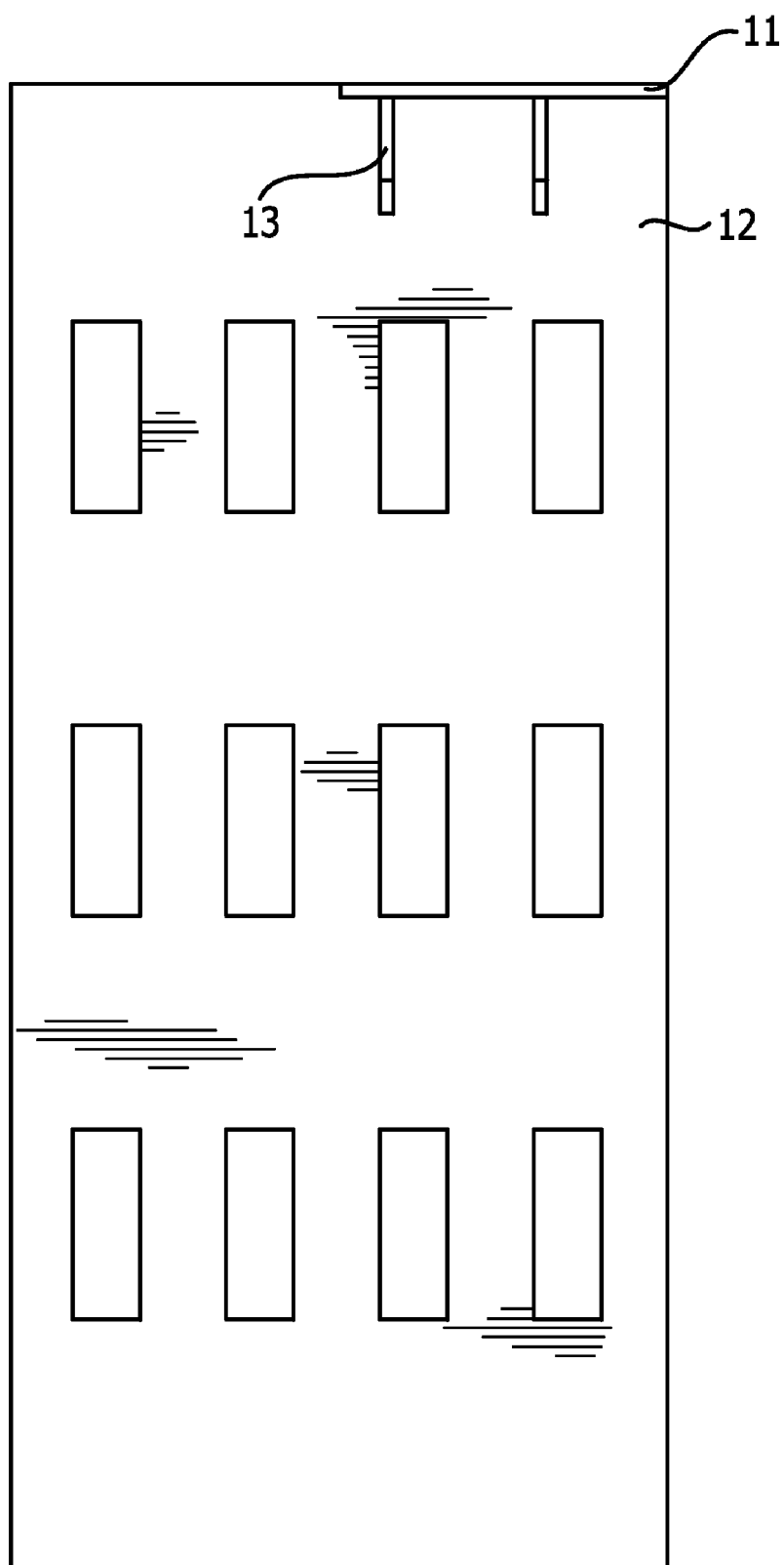


FIG. 8

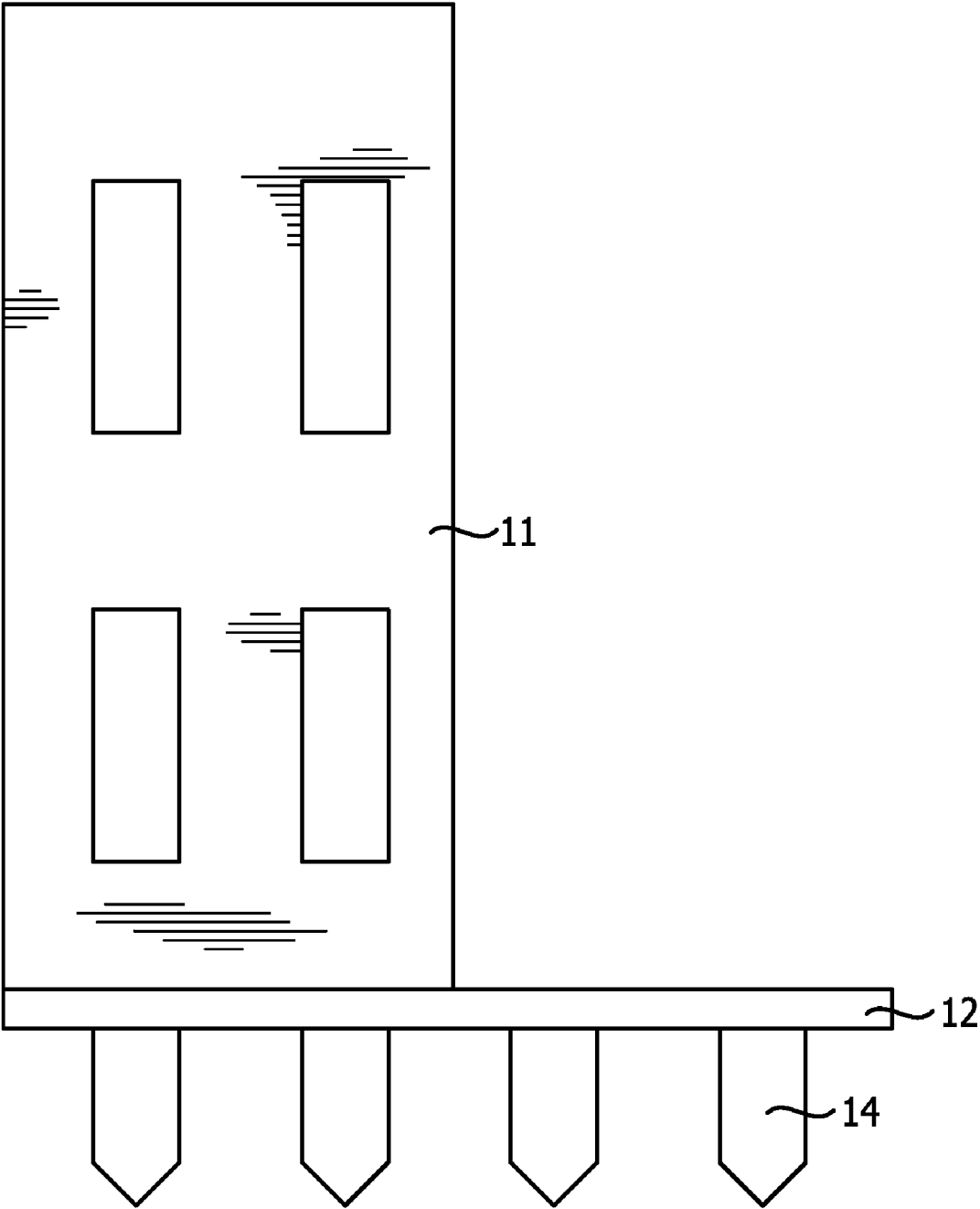


FIG. 9

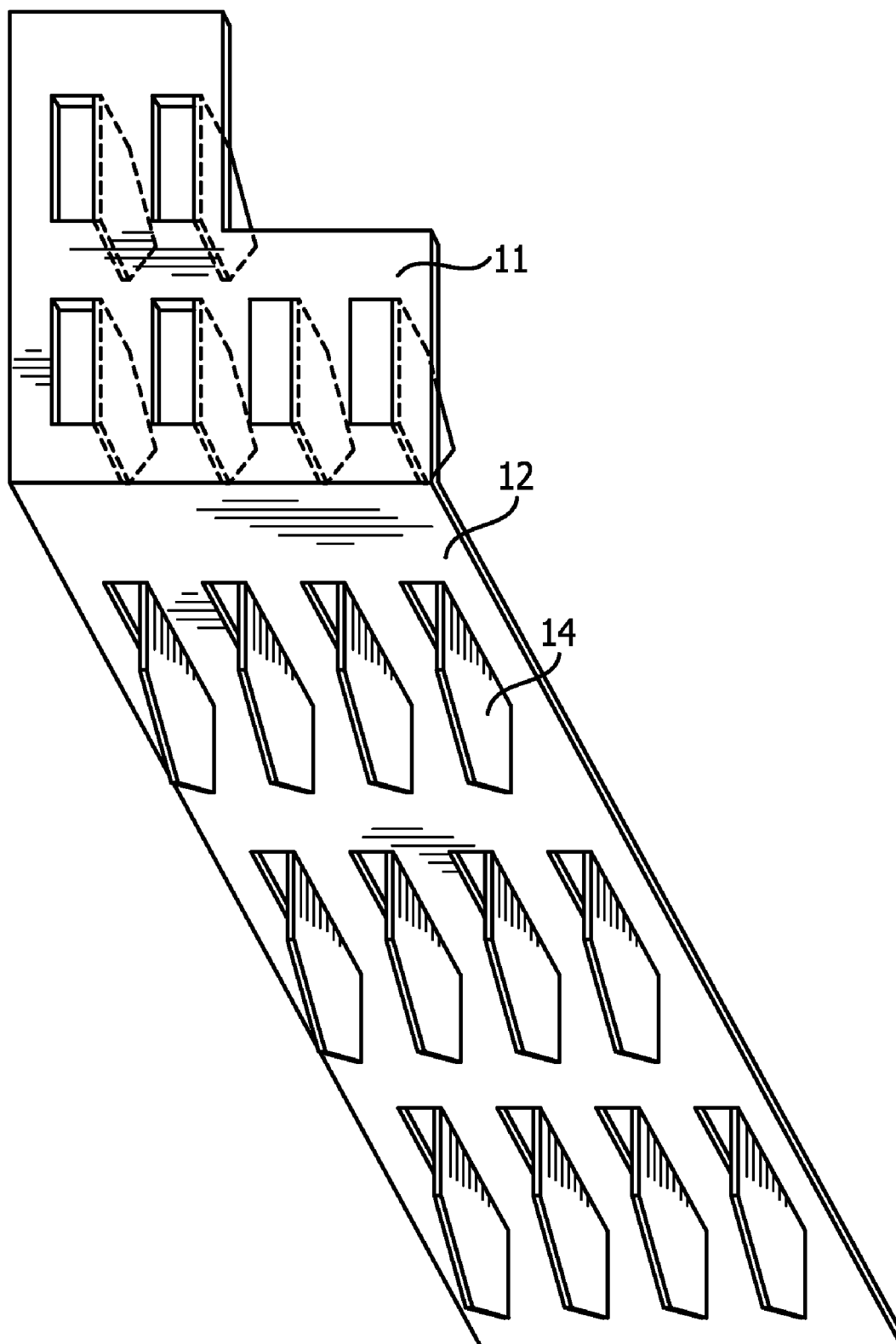


FIG. 10

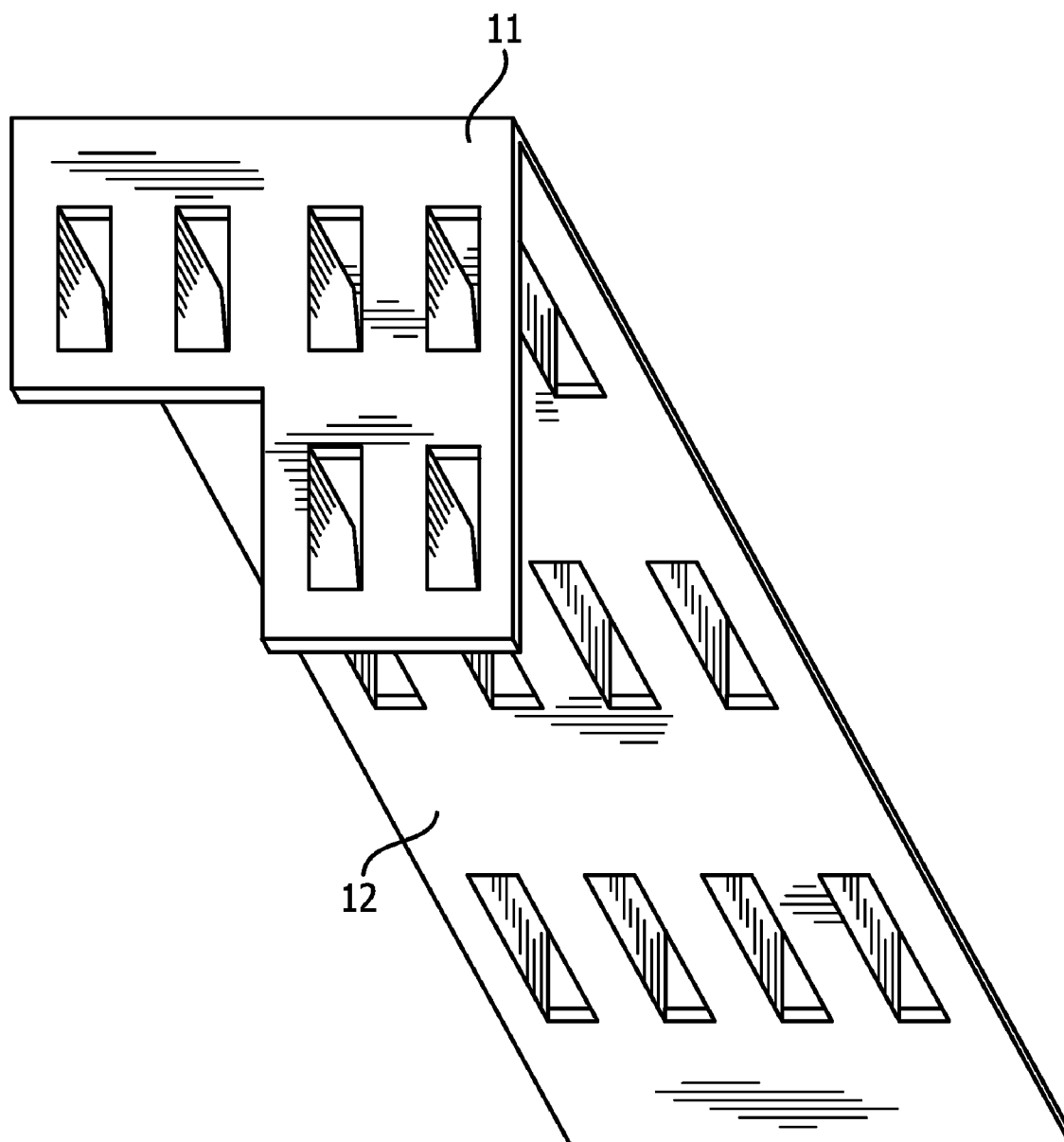


FIG. 11

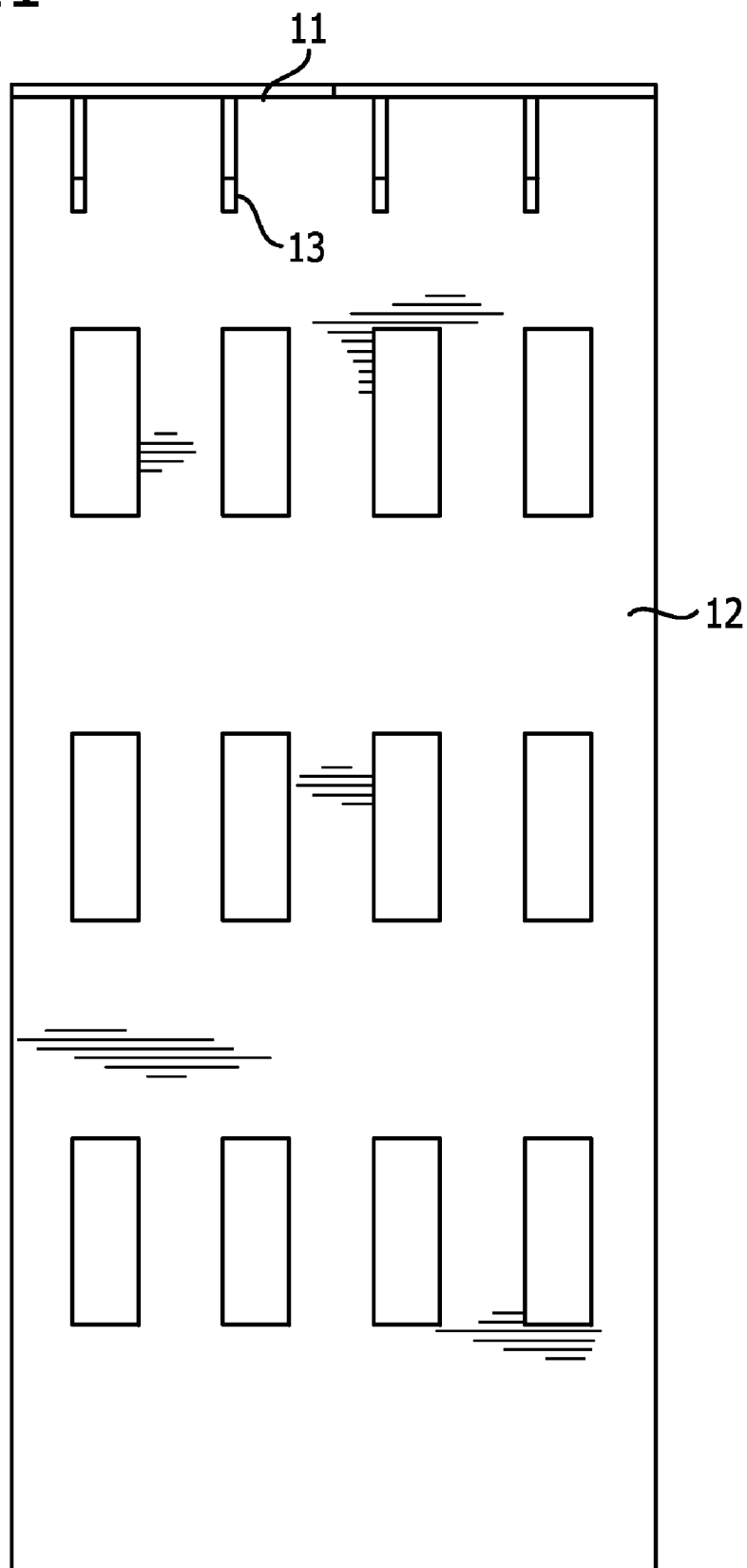


FIG. 12

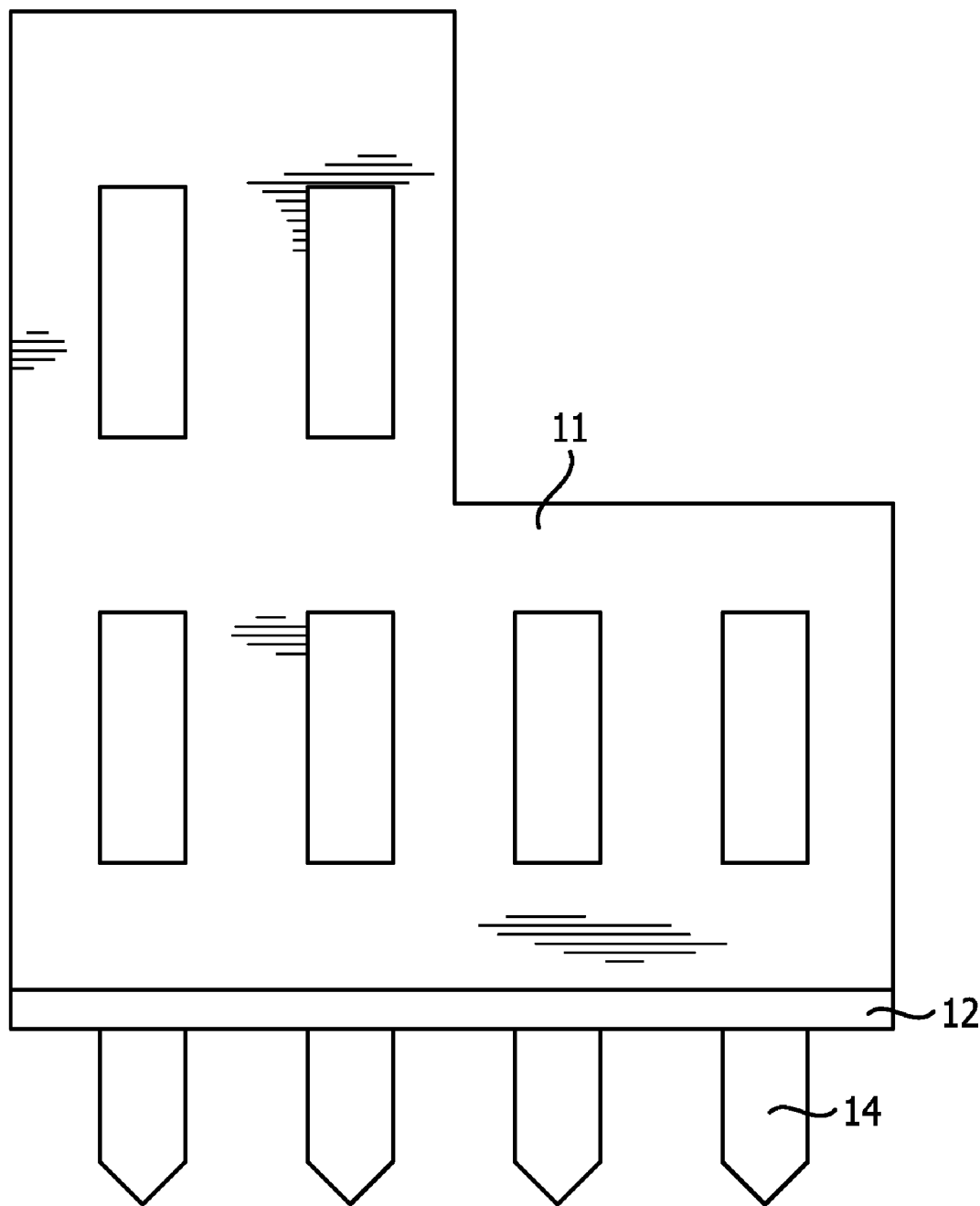


FIG. 13

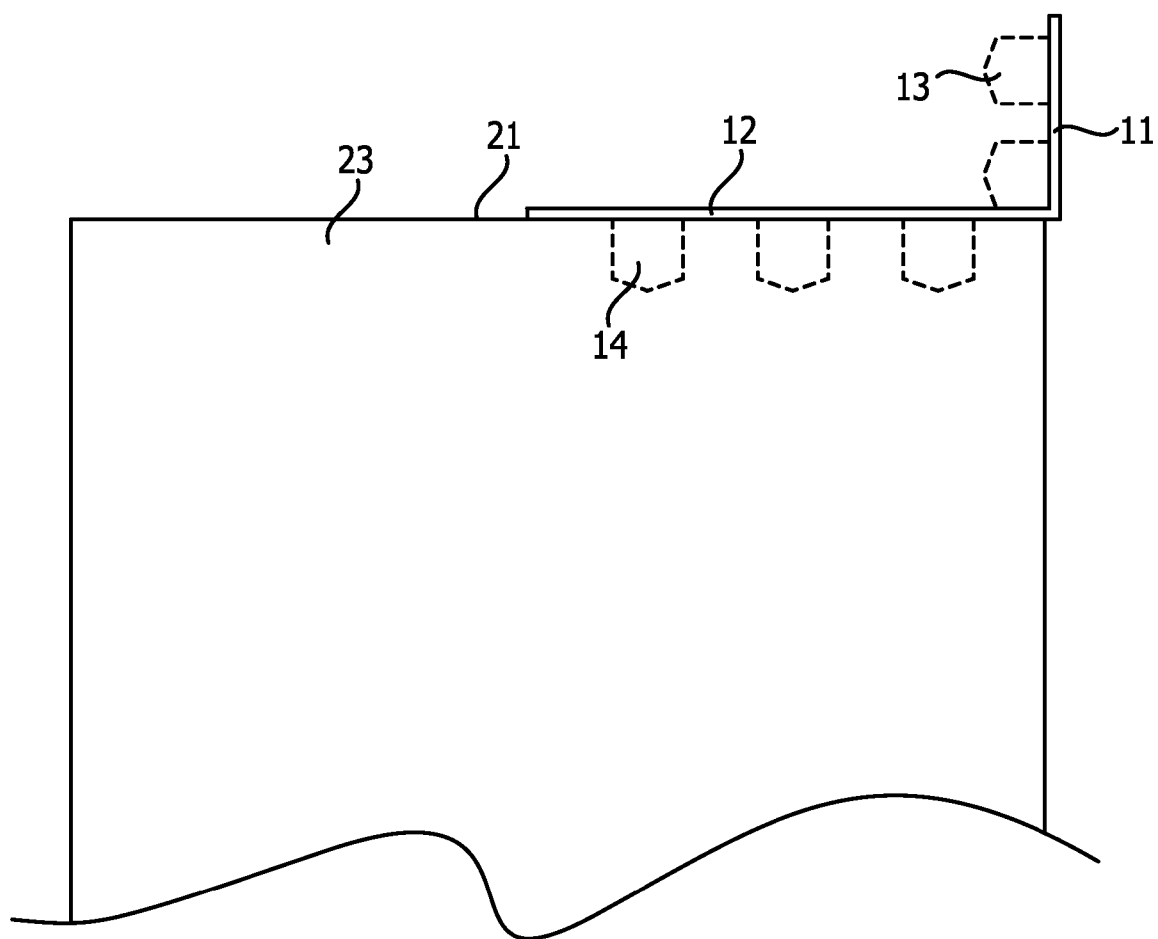


FIG. 14

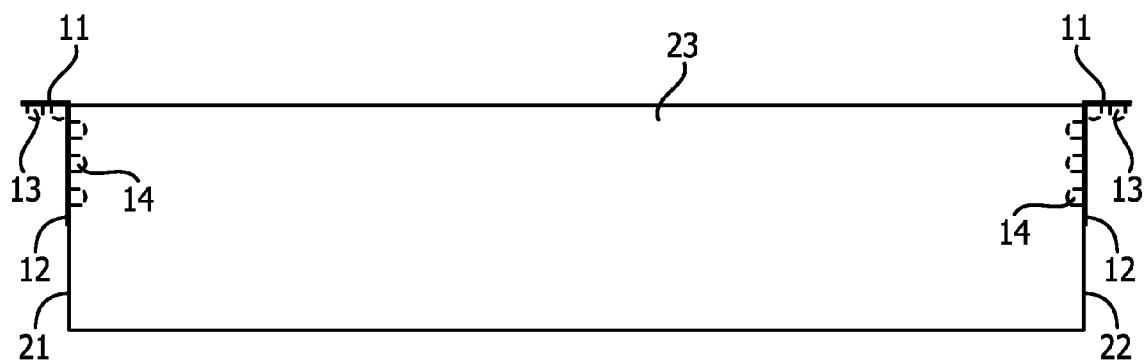


FIG. 15

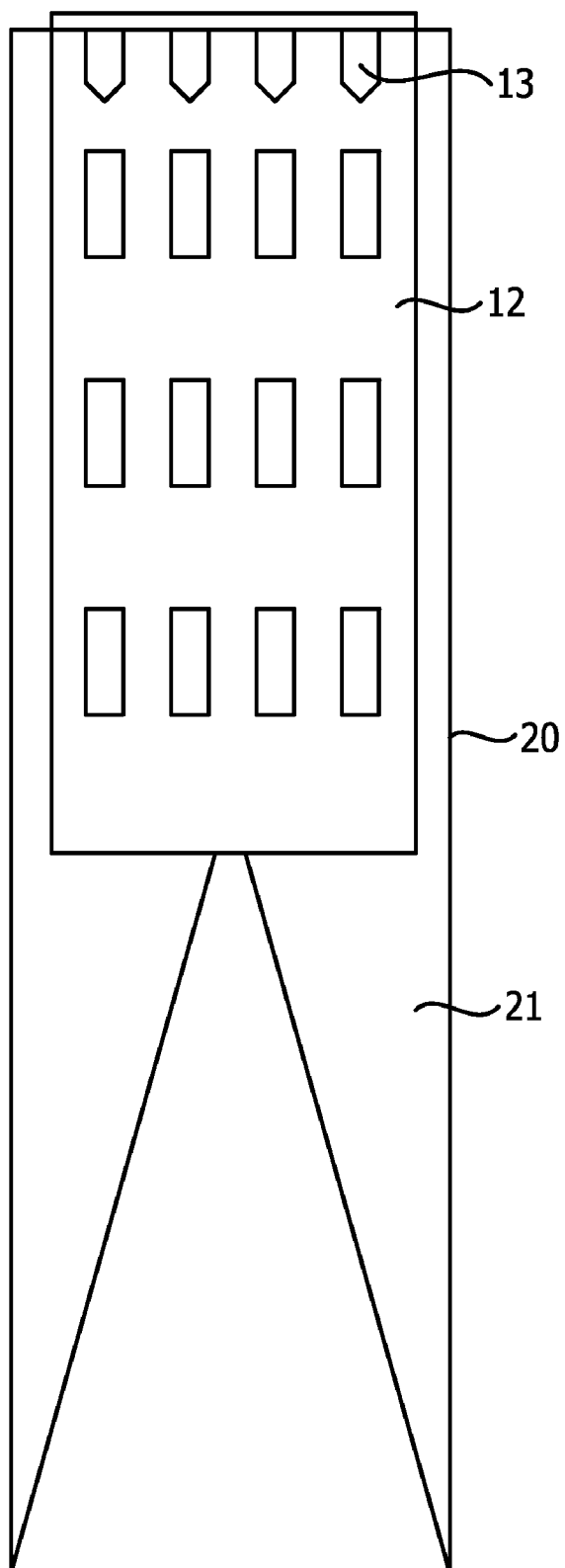


FIG. 16

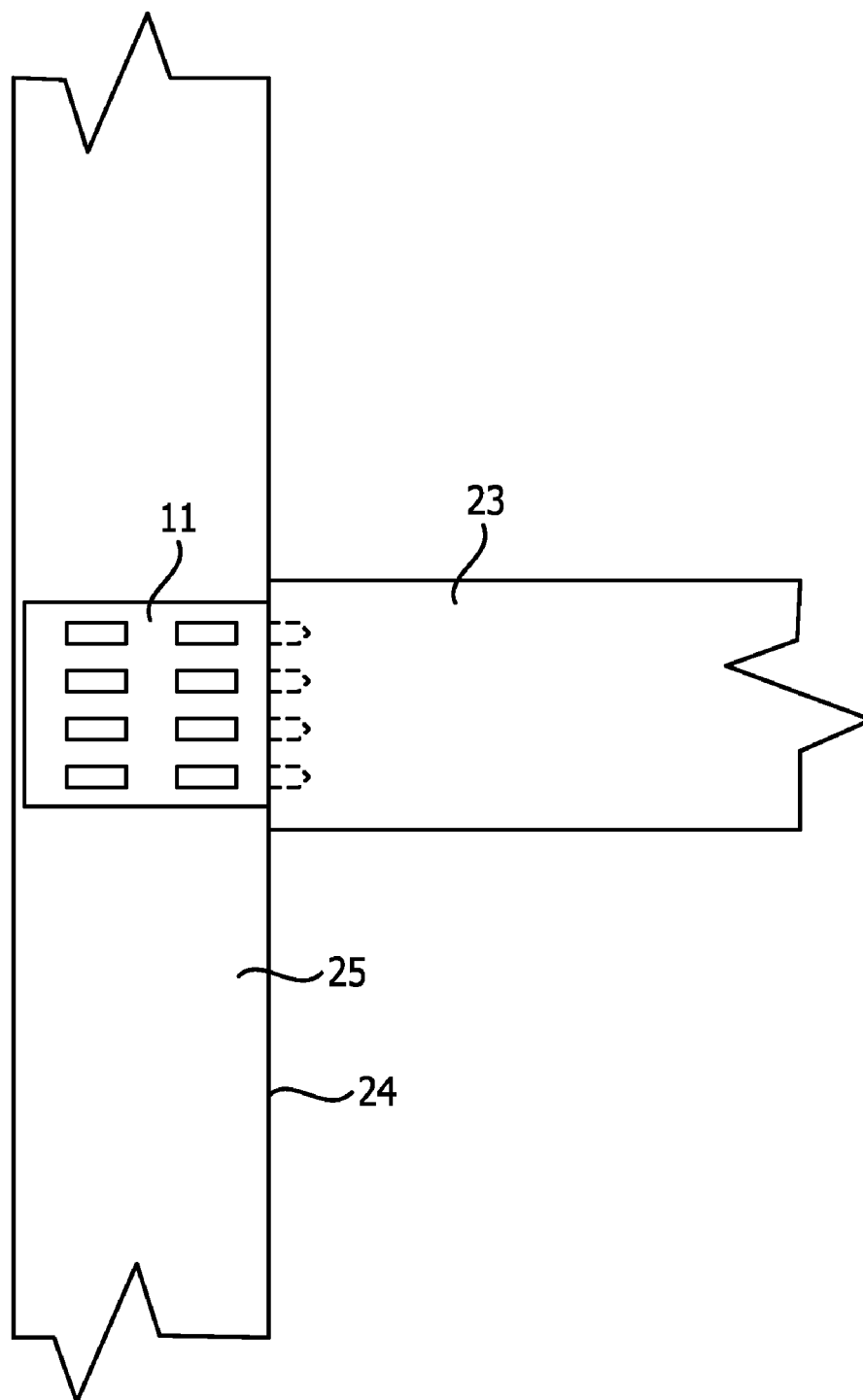


FIG. 17

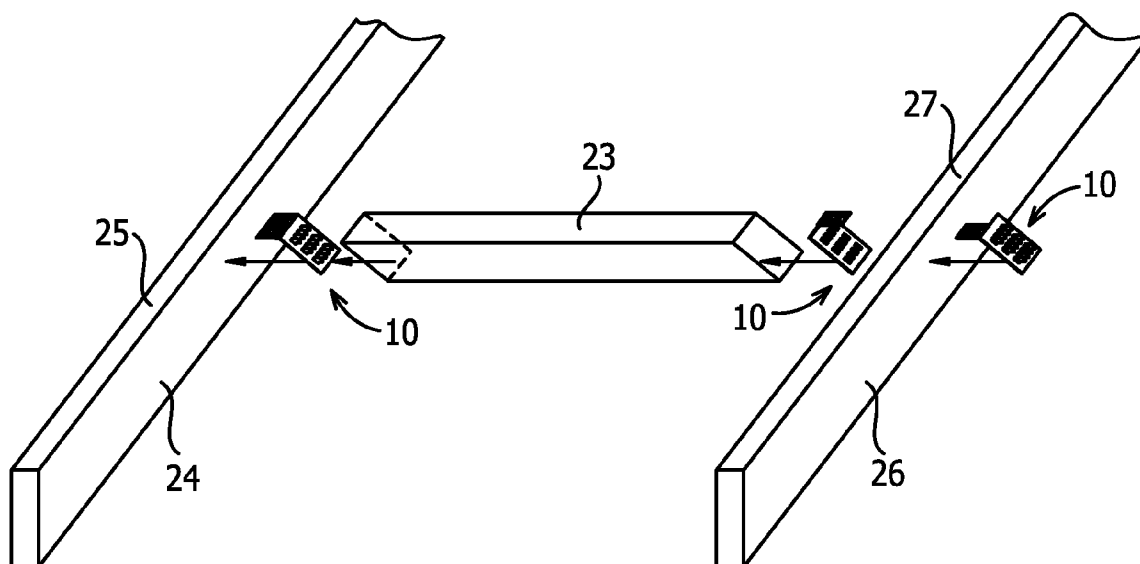


FIG. 18

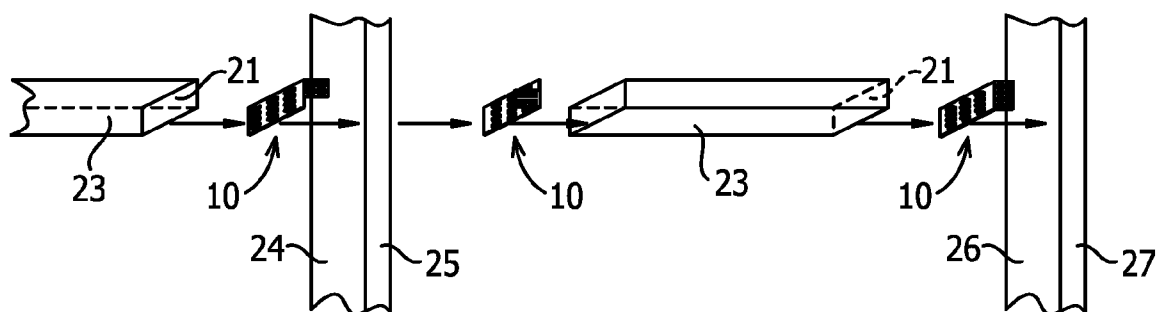
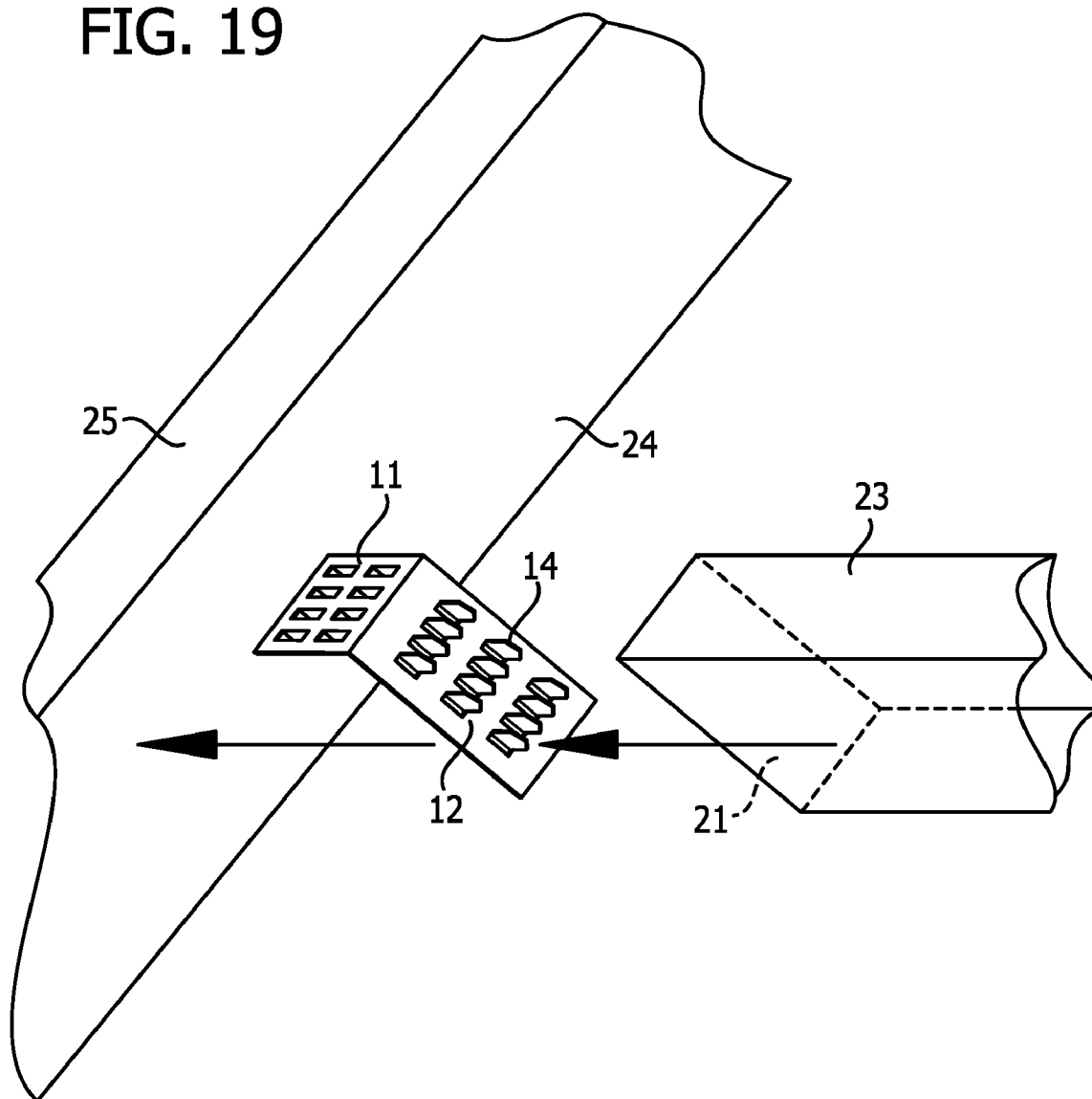


FIG. 19



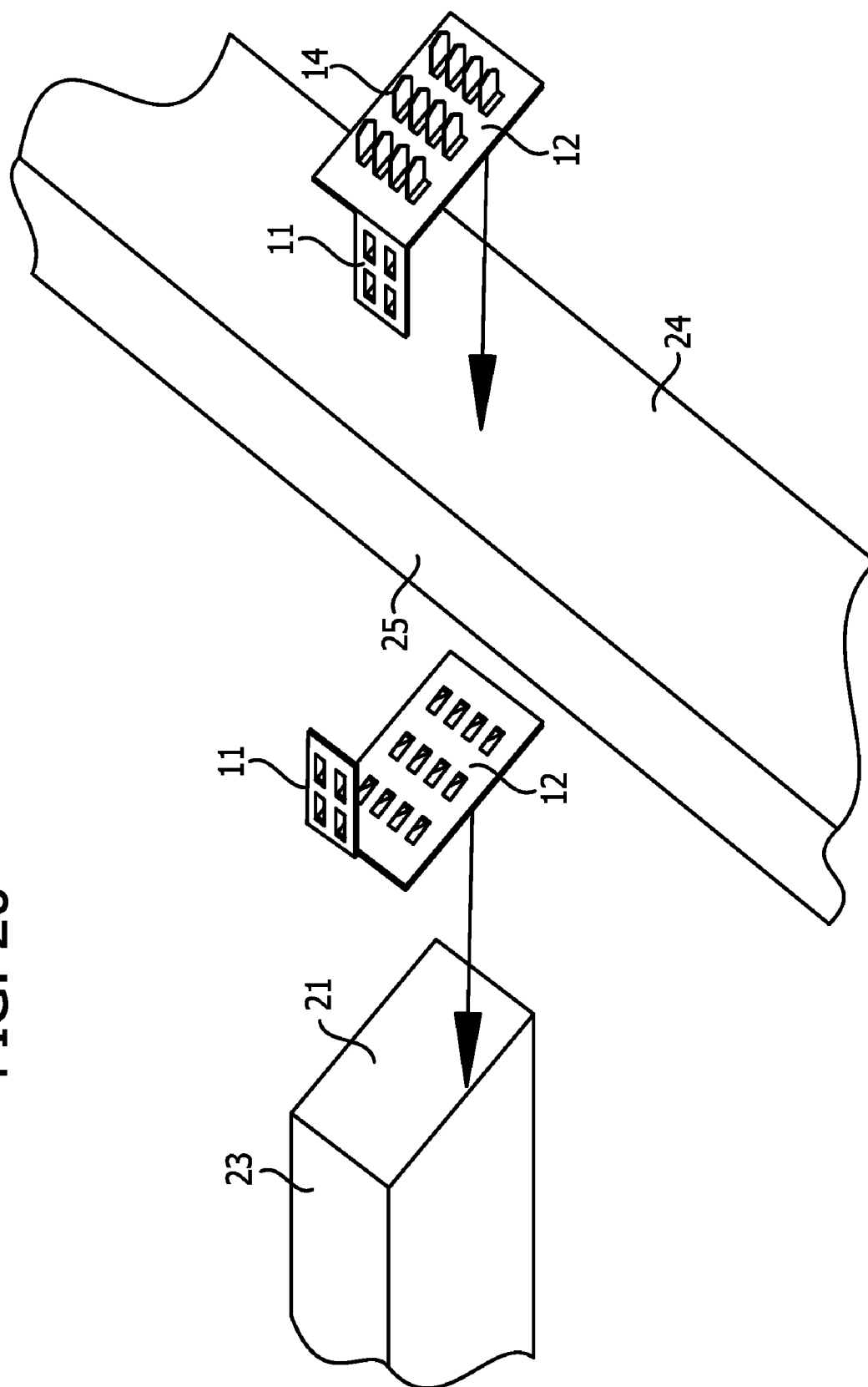


FIG. 21

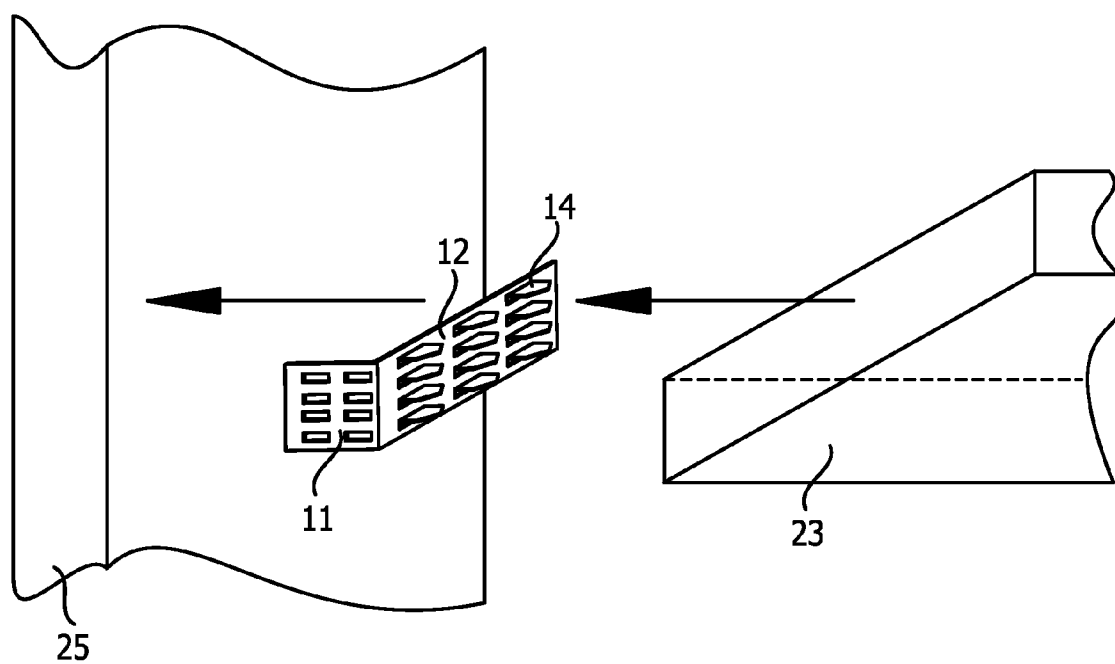
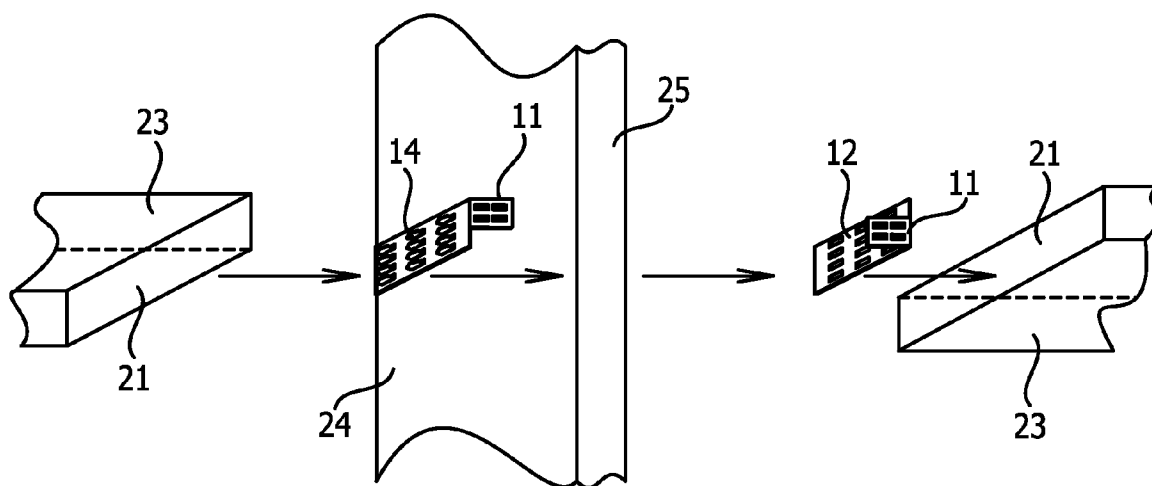


FIG. 22



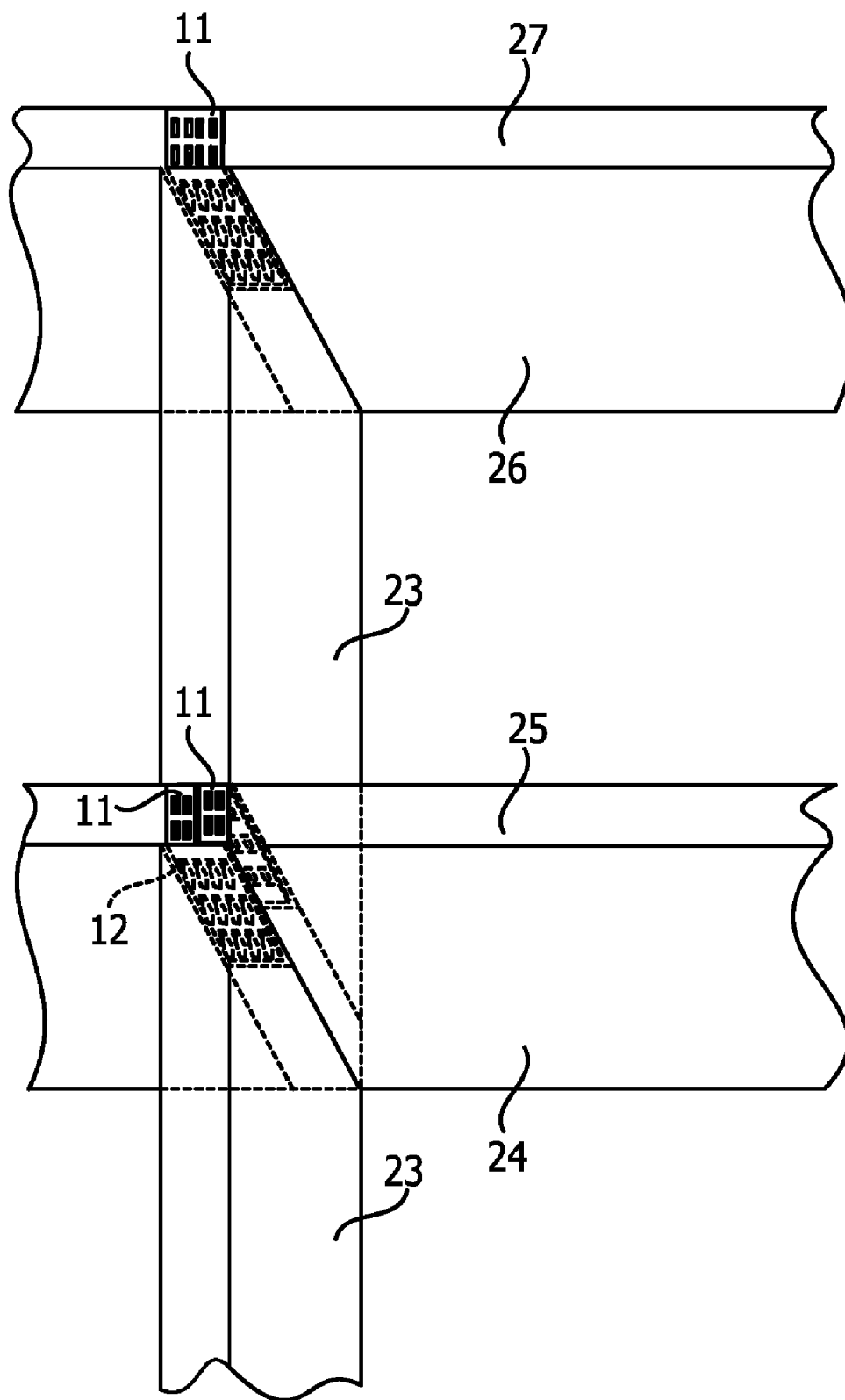


FIG. 24

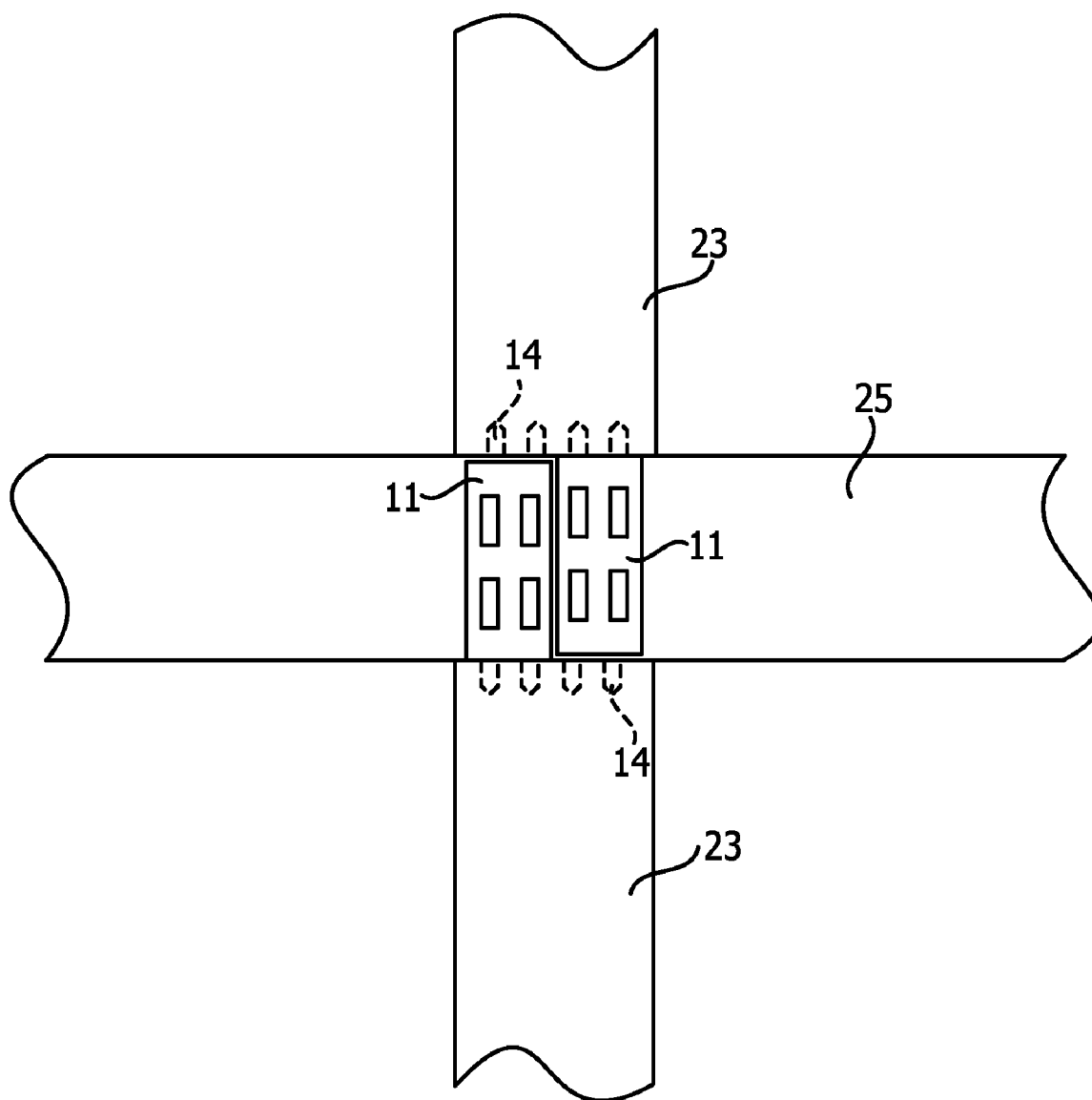


FIG. 25

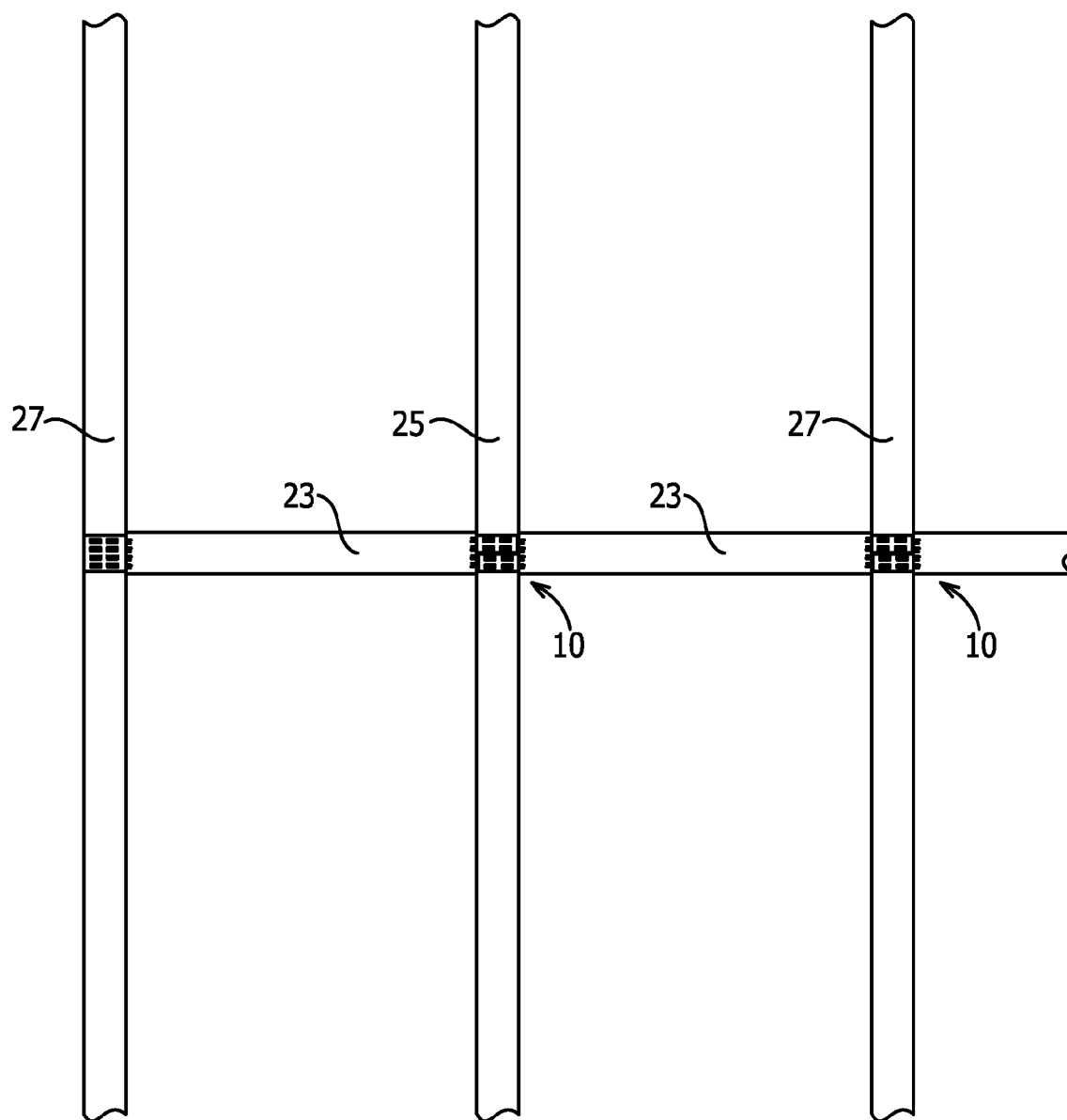


FIG. 26

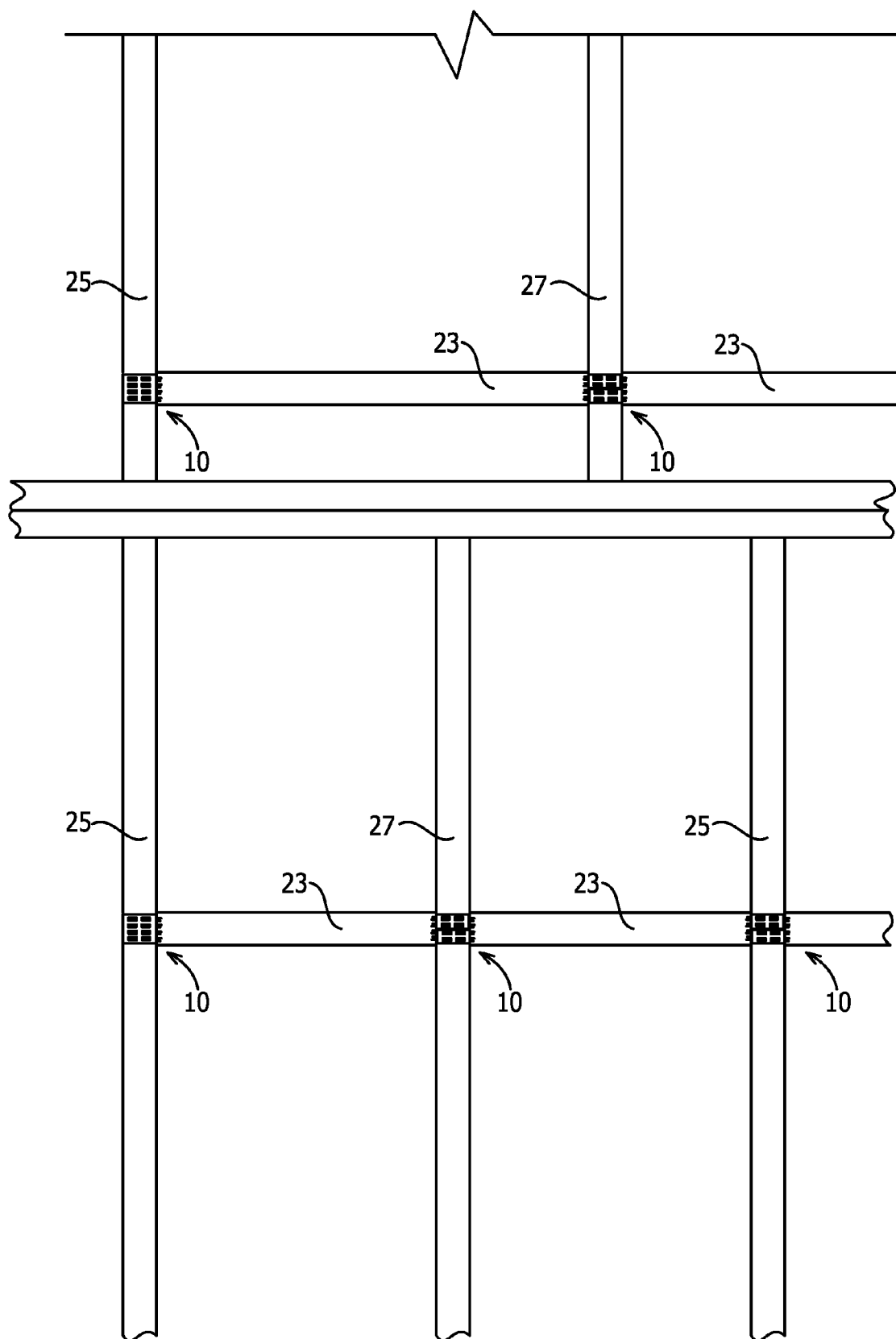


FIG. 27

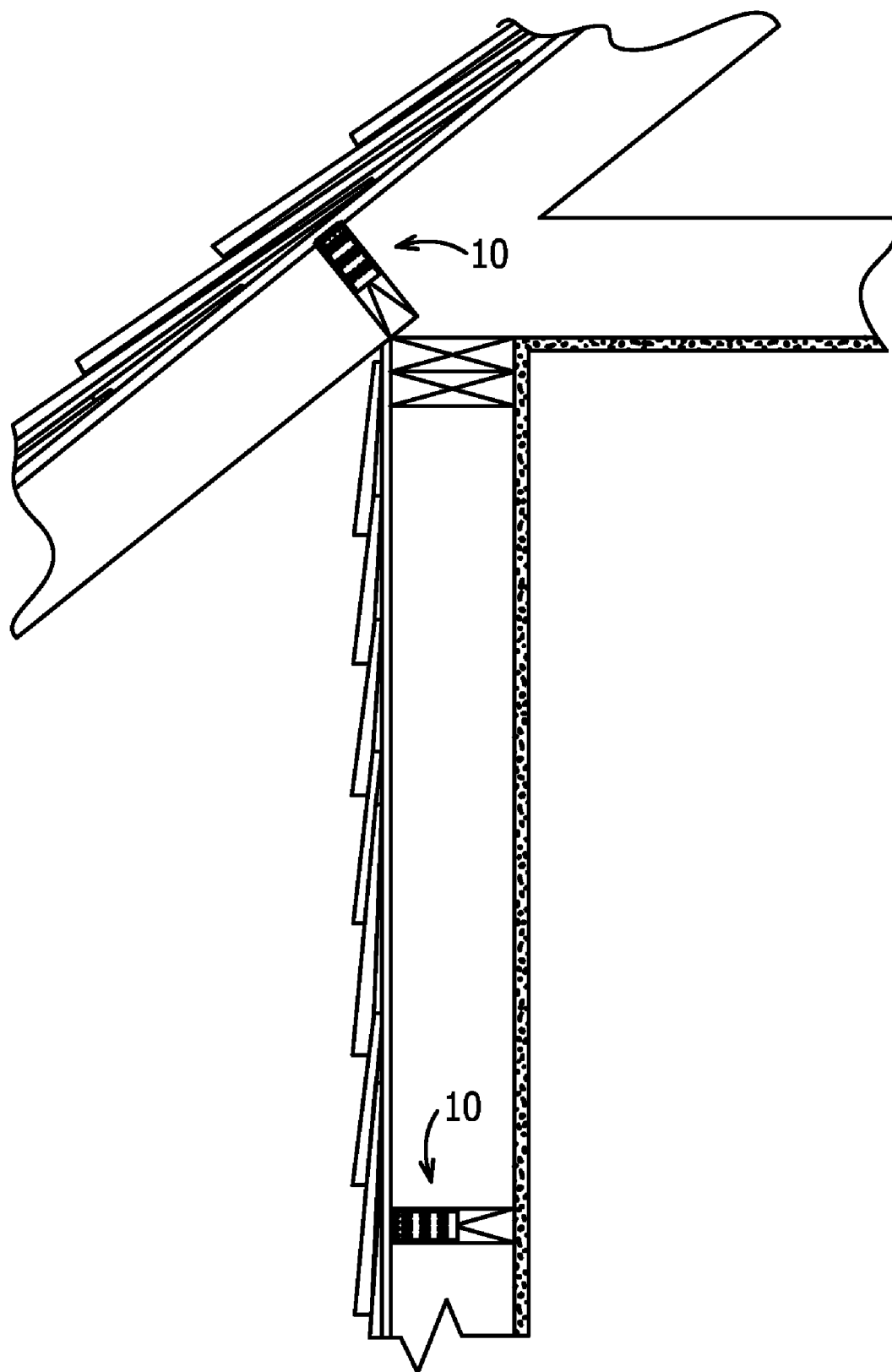


FIG. 28

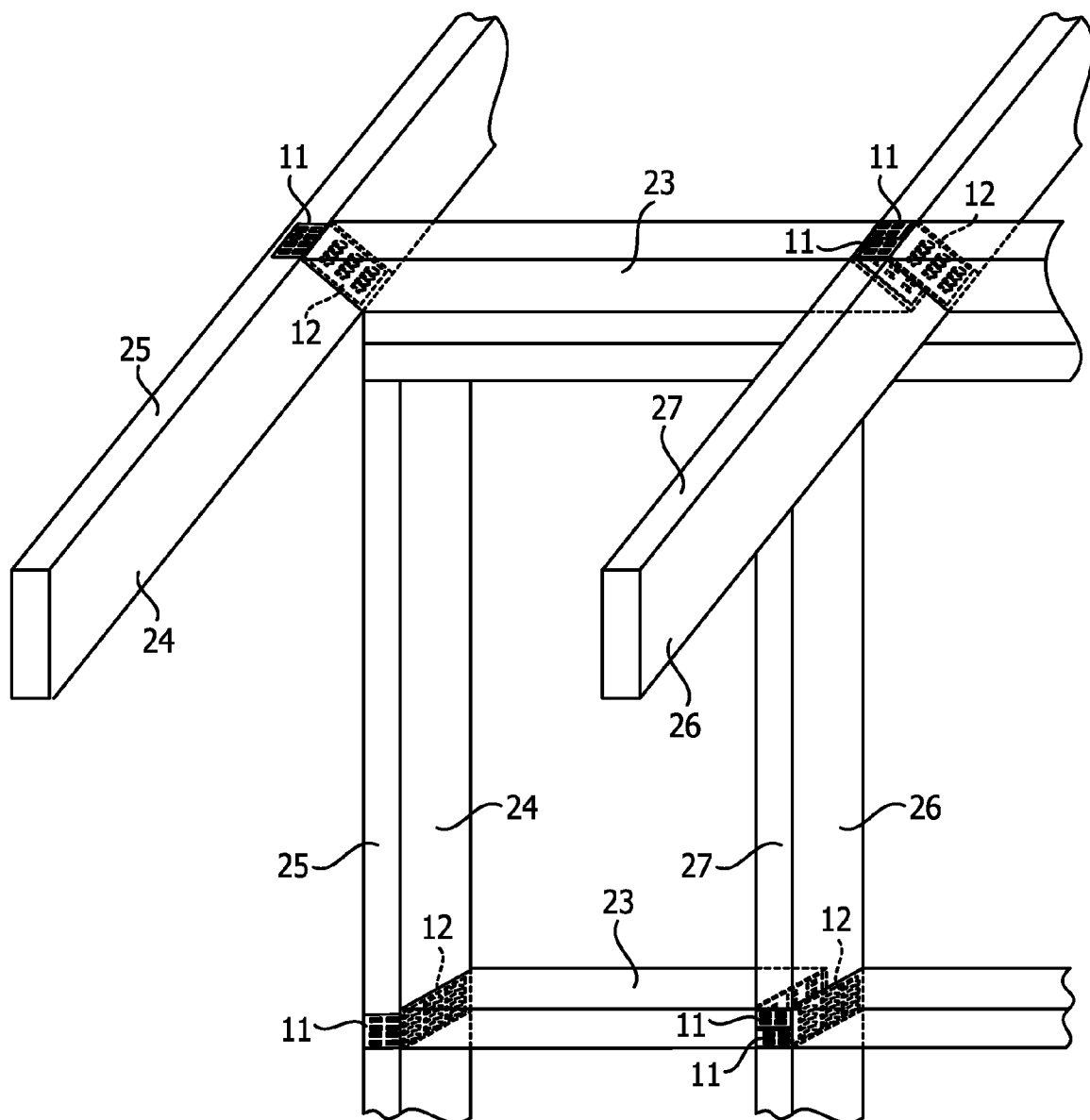


FIG. 29

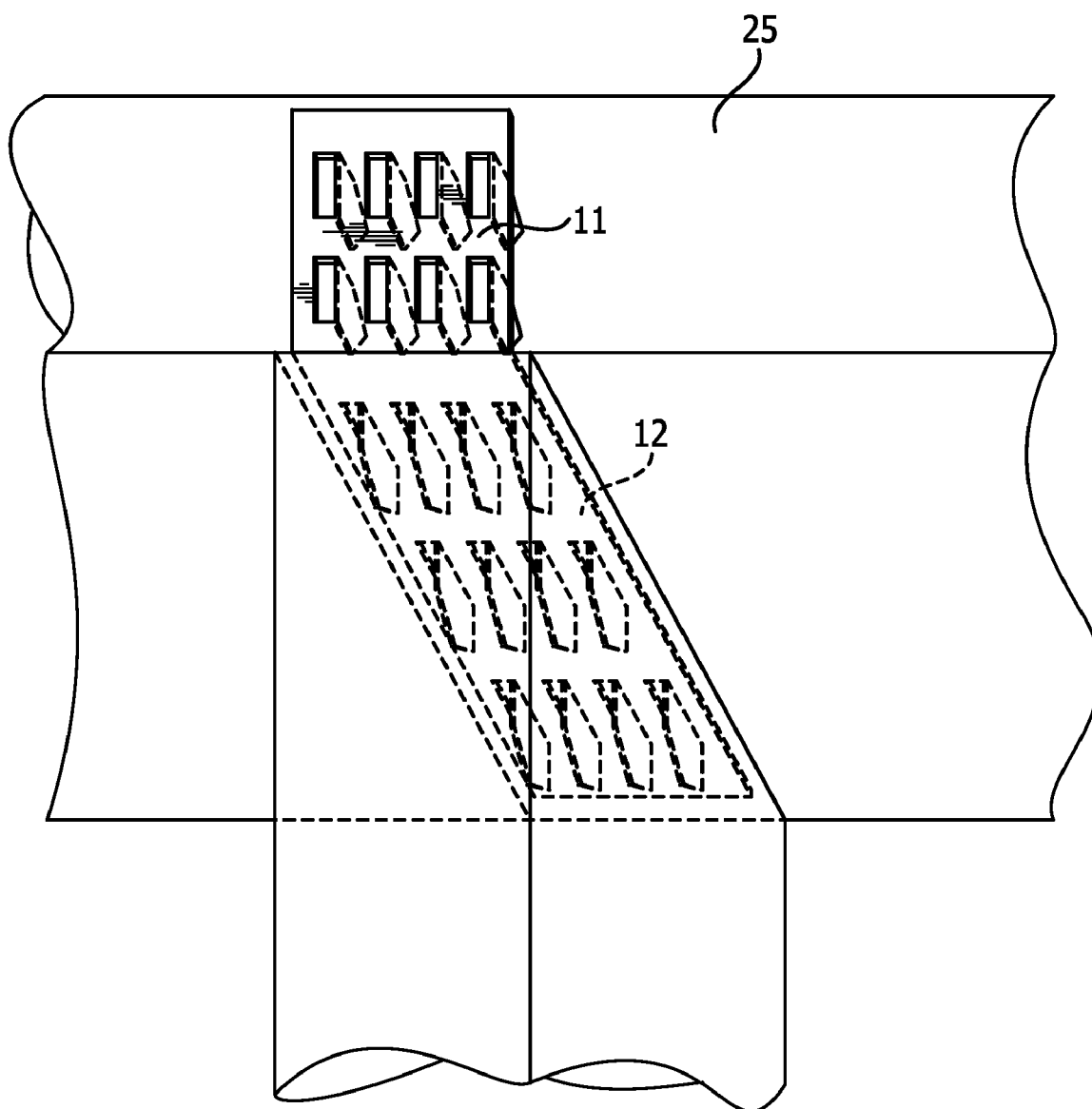


FIG. 30

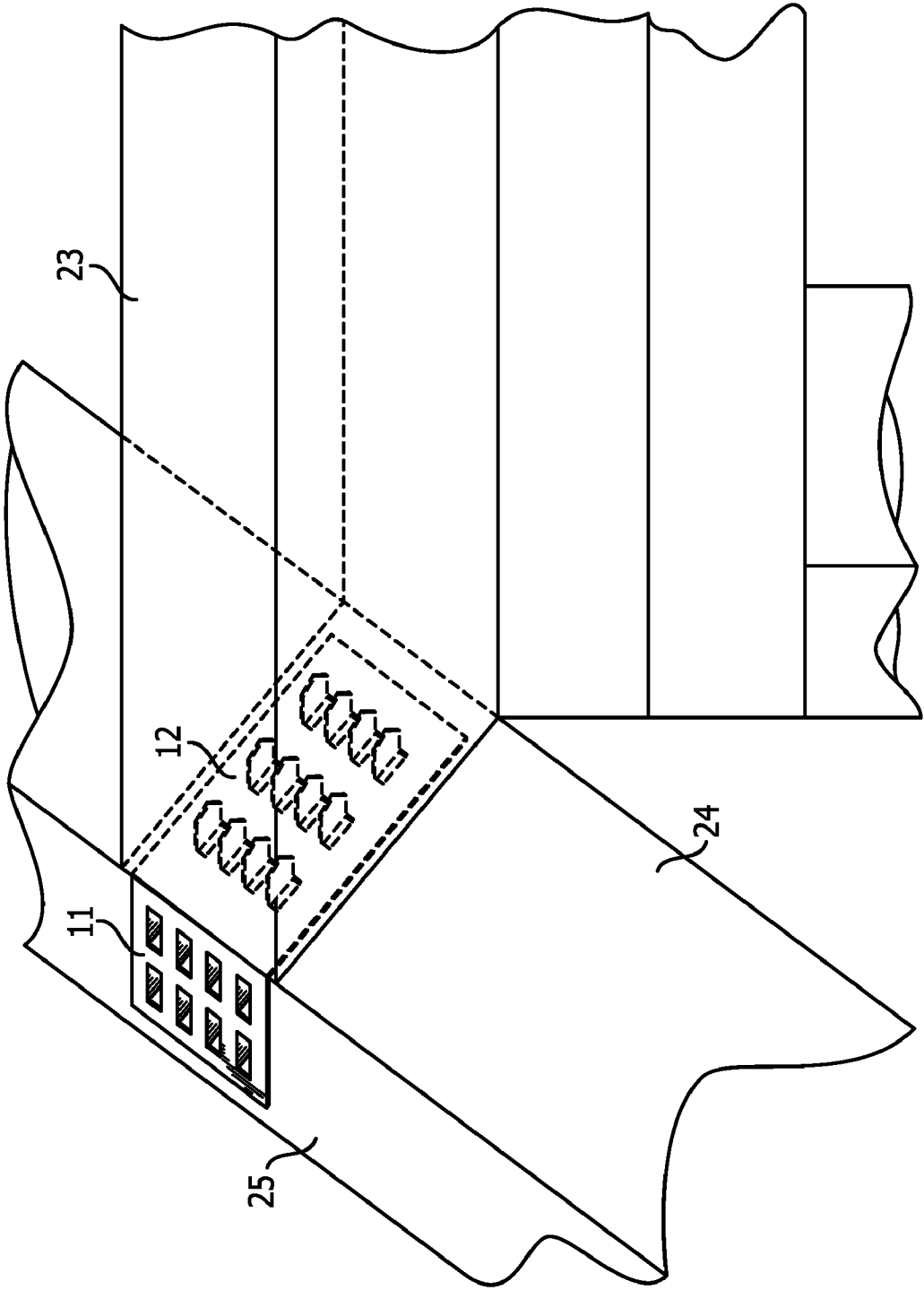
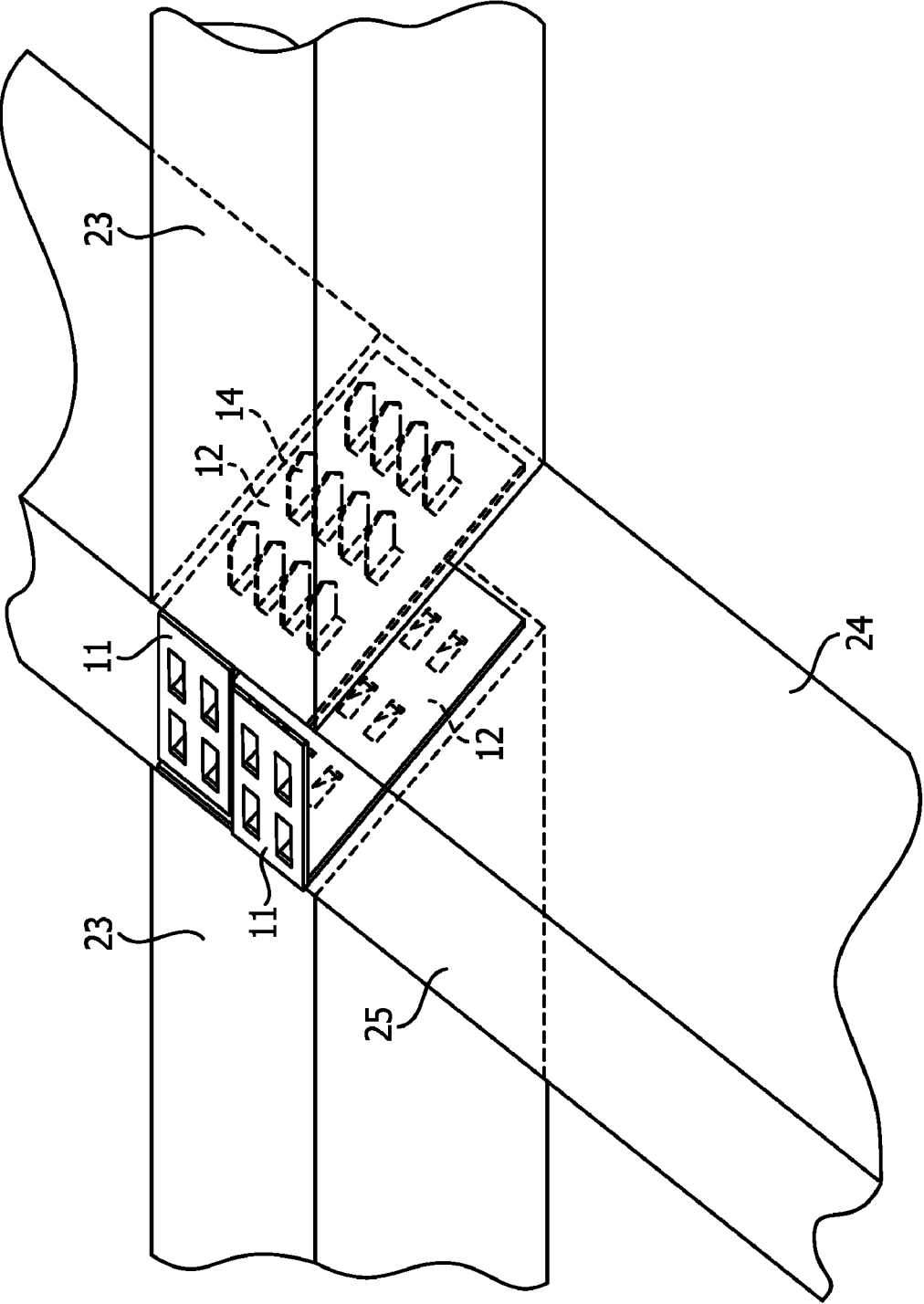


FIG. 31



METHOD AND APPARATUS FOR CONNECTING PERPENDICULARLY ORIENTED STRUCTURAL BUILDING MEMBERS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a non-provisional of U.S. Patent Application Ser. No. 61/060,442, filed Jun. 10, 2008, which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a method and apparatus for constructing building framing, and more particularly to unique connectors for attaching structural building members together in a generally perpendicular orientation, and related methods of use. The invention also relates to metal plates formed into a bracket from which teeth or nails project for driving into the structural members to effect a generally perpendicular joint between such members, and related methods of use. The invention is particularly applicable to the connection of bird blocks, vent blocks and/or freeze blocks to rafters or trusses; for the connection of joist blocking to floor or ceiling joists; for sheer/fire blocking to studs; to connect fascia to rafter tails (tack headouts in before they are nailed off) and a variety of other perpendicular uses in framing; and for related methods of use.

BACKGROUND OF THE INVENTION

[0003] Using wood or other framing material is commonplace in constructing buildings and other structures. Typical building framing structures may include horizontal floor and ceiling structures, such as beams, purlins and joists; vertical framing members for walls having openings for such things as windows and doors; trusses for roofing; and other structures. When constructing or installing these and other building framing structures, it is often necessary to join a piece of lumber generally perpendicular to another piece of lumber; or to join a cross member between two existing generally parallel members. Examples include, without limitation, attaching a block of lumber perpendicular to a truss, rafter, floor or ceiling joist, wall stud, etc.; attaching a block of lumber between a pair of parallel trusses, between a pair of parallel rafters, between a pair of parallel ceiling joists, between a pair of parallel floor joists, between a pair of parallel wall studs; connecting sheer or fire blocking to one or more studs; or other permanent or temporary installation or attachment of perpendicular lumber to or between other parallel members.

[0004] Presently, perpendicularly attaching a first lumber member to a second lumber member is accomplished using ordinary nails. One end of the first lumber member is oriented perpendicularly adjacent to the side of the second lumber member. One or more nails are driven through the opposite side of the second lumber member into the end of the first lumber member to hold it in place. Similarly, installing a first lumber member perpendicularly between second and third parallel lumber members is accomplished in much the same way, with nails being driven through the sides of the second

and third lumber members into the ends of the first lumber member. Installing such perpendicular members is very tedious and time consuming.

SUMMARY OF THE INVENTION

[0005] In one aspect of the present invention, a connector for forming a joint between a first structural member and a second structural member comprises a first plate member having inner and outer surfaces. The outer surface has a plurality of teeth extending from it. A second plate member is connected to the first plate member at an angle. The second plate member has opposite upper and lower surfaces. The lower surface has a plurality of teeth extending from it.

[0006] In another aspect of the invention, a connector for forming a joint between a first structural member and a second structural member comprises an L-shaped bracket having a pair of plates. The first of the plates has opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it. The second of the plates has opposite upper and lower surfaces. The lower surface has a plurality of teeth extending from it.

[0007] In yet another aspect of the invention, a system for attaching a cross member between a pair of parallel members comprises a pair of connectors for attaching each end of the cross member to one of the parallel members. Each connector comprises a first plate member having opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it. Each connector further comprises a second plate member extending from the first plate member at an angle. The second plate member has opposite upper and lower surfaces. The lower surface has a plurality of teeth extending from it.

[0008] In yet another aspect of the invention, a system for attaching a cross member between a pair of parallel members comprises a pair of connectors for attaching each end of the cross member to one of the parallel members. Each connector comprises an L-shaped bracket having a pair of plates. The first of the plates has opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it. The second of the plates has opposite upper and lower surfaces. The lower surface has a plurality of teeth extending from it.

[0009] In still another aspect of the invention, a structure for use when constructing wooden structures comprises a first wooden member and a second wooden member oriented parallel to the first wooden member. A third wooden member extends between and connects the first and second wooden members. The third member is positioned generally perpendicular to the first and second members. The structure further comprises first and second connectors. The first connector includes a first plate member having opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it engaging an end of the third wooden member. The first connector also includes a second plate member extending from the first plate member at an angle. The second plate member has opposite upper and lower surfaces. The lower surface has a plurality of teeth extending from it engaging an upper surface of the first wooden member. The second connector includes a first plate member having opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it engaging an opposite end of the third wooden member. The second connector further includes a second plate member extending from the first plate member at an angle. The second plate member has opposite upper and

lower surfaces. The lower surface has a plurality of teeth extending from it engaging an upper surface of the second wooden member.

[0010] In still another aspect, the invention includes a method of securing a joint between a first structural member and a second structural member employing a connector comprising a first plate member having opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it. A second plate member extends from the first plate member at an angle. The second plate member has opposite upper and lower surfaces. The lower surface has a plurality of teeth extending from it. The method comprises the steps of driving the teeth of the first plate into an end of a first building support member. The first building support member is positioned generally perpendicular to and above a second building support member such that the second plate is above an upper surface of the second structural member. The teeth of the second plate are driven into the upper surface.

[0011] In yet another aspect, the invention includes a method of securing a building cross member between parallel first and second structural members employing a pair of connectors. Each connector comprises a first plate member having opposite inner and outer surfaces. The outer surface has a plurality of teeth extending from it. A second plate member extends from the first plate member at an angle. The second plate member has opposite upper and lower surfaces, the lower surface having a plurality of teeth extending from it. The method comprises the steps of driving the teeth of a first plate of the first connector into an end of the building cross member. The teeth of a first plate member of the second connector are driven into an opposite end of the building cross member. The building cross member is positioned between and above the first and second building support members such that the second plate of each connector is above an upper surface of each of the second and third structural members. The teeth of the second plates are driven into the upper surfaces.

[0012] Other objects and features will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a rear perspective of a first embodiment of the present invention;

[0014] FIG. 2 is a front view of the first embodiment;

[0015] FIG. 3 is an enlarged bottom view of the first embodiment;

[0016] FIG. 4 is a left side view of the first embodiment;

[0017] FIG. 5 is a front perspective of a second embodiment of the present invention;

[0018] FIG. 6 is a rear perspective of the second embodiment;

[0019] FIG. 7 is a front view of the second embodiment;

[0020] FIG. 8 is a bottom view of the second embodiment;

[0021] FIG. 9 is a rear perspective of a third embodiment of the present invention;

[0022] FIG. 10 is a front perspective of the third embodiment;

[0023] FIG. 11 is a front view of the third embodiment;

[0024] FIG. 12 is a bottom view of the third embodiment;

[0025] FIG. 13 is a fragmentary side view of a structural member to which an embodiment of a connector of the present invention has been attached at one end;

[0026] FIG. 14 is a side view of a structural member to which an embodiment of the connector of the present invention has been attached at both ends;

[0027] FIG. 15 is an enlarged end view of a structural member to which an embodiment of the connector of the present invention has been attached;

[0028] FIG. 16 is a top view of a perpendicular joint between two structural members using an embodiment of the connector of the present invention;

[0029] FIG. 17 is a separated perspective showing placement of embodiments of the present invention in a building structure;

[0030] FIG. 18 is another separated perspective showing placement of embodiments of the present invention in a building structure;

[0031] FIG. 19 is a separated perspective detail showing a placement of an embodiment of the present invention in a building structure;

[0032] FIG. 20 is another separated perspective detail showing a placement of an embodiment of the present invention in a building structure;

[0033] FIG. 21 is another separated perspective detail showing a placement of an embodiment of the present invention in a building structure;

[0034] FIG. 22 is another separated perspective detail showing a placement of an embodiment of the present invention in a building structure;

[0035] FIG. 23 is a perspective showing embodiments of the present invention installed in a building structure;

[0036] FIG. 24 is a top detail showing an embodiment of the present invention installed in a building structure;

[0037] FIG. 25 is a top view showing several installations of embodiments of the present invention in a building structure;

[0038] FIG. 26 is a side view showing several installations of embodiments of the present invention in a building structure;

[0039] FIG. 27 is a cut-away side environmental view showing installations of the present invention in a building structure;

[0040] FIG. 28 is a perspective of the installations of FIG. 27;

[0041] FIG. 29 is an enlarged perspective of a joint between two structural members using an embodiment of the connector of the present invention;

[0042] FIG. 30 is another enlarged perspective of a joint between two structural members using an embodiment of the connector of the present invention; and

[0043] FIG. 31 is an enlarged perspective of a pair of joints between structural members using an embodiment of a connector of the present invention.

[0044] Corresponding reference characters indicate corresponding parts throughout the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0045] Referring to the exemplary embodiments illustrated in the drawings wherein like reference characters designate like or corresponding parts throughout the several views, and referring particularly to the exemplary embodiments of FIGS. 1 through 12, it is seen that these illustrated embodiments of the present invention includes a member that has been bent at an elbow forming an angled connector bracket 10 having a first plate 11 and a second plate 12. The bracket 10 is prefer-

ably made of metal, but other materials may be used. In some embodiments, bracket 10 may be formed from two or more separate plates that are securely joined together, such as by welding. In one embodiment, the plates are unitary and partially defined by bends formed in sheet stock. The first plate 11 (sometimes referred to as the “upper” plate regardless of orientation) has an upper surface and lower surface facing opposite the upper surface. A plurality of teeth or nails 13 extend outward and away from the lower surface. Although the teeth 13 may extend from the lower surface at other angles without departing from the scope of the present invention, in one embodiment the teeth extend from the lower surface at an angle of about ninety degrees. The second plate 12 (sometimes referred to as the “side” plate regardless of orientation) has an inner surface and outer surface facing opposite the inner surface. A plurality of teeth or nails 14 extend outward and away from the outer surface. Although the teeth 14 may extend from the outer surface at other angles without departing from the scope of the present invention, in one embodiment the teeth extend from the lower surface at an angle of about ninety degrees.

[0046] In one preferred embodiment, the angle of the elbow between plates 11 and 12 is approximately ninety degrees (90°) such that the bracket 10 has a generally L-shaped cross section, as shown in FIG. 4. In one preferred embodiment, teeth 13 and 14 are punched from their respective plates 11 and 12 such that bracket 10 is in the form of a pair of connected nail plates. In one preferred embodiment, the first plate 11 is preferably, but not necessarily shorter than the second plate 12. It should be appreciated that teeth 13 and 14 may be provided in any regular or irregular pattern. The teeth may also have different lengths without departing from the scope of the present invention. Although the teeth may have different widths without departing from the scope of the present invention, in one embodiment the teeth extend from the lower surface at an angle of about ninety degrees.

[0047] The connector bracket 10 of the present invention is designed to form a secure, generally perpendicular, joint between a structural member 20 and another structural member 24 (see FIG. 16). Teeth 14 of the second plate are intended to engage an end 21 of a structural member, such as a wooden board or block such as cross member 23, as shown in FIGS. 13 and 15, to attach the second plate to the end of the member. Teeth 13 of the first plate are intended to engage an upper surface 25 of a support member 24, such as a beam or joist, to attach the first plate to the upper surface of the support member. It should be appreciated that if plate member 12 is placed flush against the side of the support member 24, then the orientation of the structural member 23 relative to the support member 24 will be generally perpendicular. However, if a non-perpendicular orientation is desired, a gap may be provided between plate 12 and the side of the support member 24 so the gap defines an angle at which the member 23 will extend relative to the other member 24.

[0048] To use the connector bracket 10 of the present invention, the nails or teeth 14 on the outside surface of plate 12 are driven into the end 21 of a first building support member 20, such as a lumber block. The first member 20 is then positioned perpendicular to and slightly above the side of a second structural member 24 to which it is to be attached, so the plate 12 is against the side of the second structural member 24 and the upper plate 11 of the connector is above an upper surface 25 of the second structural member 24. The nails or teeth 13 in the upper plate 11 are driven into the top 25 of the second

structural member 24 and the first structural member 20 moves down relative to the second structural member 24.

[0049] To install a typical cross member 23 perpendicularly between two parallel members 24 and 26, two connector brackets 10 of the present invention are used. The nails 14 of the plate 12 of each connector bracket are driven into each of the opposite ends 21, 22 of the cross member 23, as shown in FIG. 14. The cross member 23 is then positioned between the two parallel members 24, 26 to which it is to be attached, against and slightly above the sides of the parallel members. The plates 12 of the connector brackets 10 are positioned against the sides of the parallel members, and the upper plates 11 of the connectors 10 are positioned above upper surfaces 25, 27 of the parallel members 24, 26. The nails or teeth 13 in the upper plates 11 of the connector brackets 10 are driven into the tops 25, 27 of the parallel members to secure the cross member 23 in place. The cross member 23 moves down relative to the parallel members 24, 26, as the nails 13 are driven into the parallel members. Examples of such completed structures are shown in FIGS. 16, 23, 27 and 28.

[0050] In alternative embodiments such as those illustrated in FIGS. 5-8 and FIGS. 9-12, plate 11 does not have the same width as plate 12. In some of these embodiments, the upper plate 11 may be only about half the width of plate 12. The half-width (or smaller) or cut out section of the upper plate 11 is useful where multiple cross members 23 are to be installed end to end along a line between a plurality of existing parallel members 24 and 26 in order to avoid metal on metal contact. In such cases, brackets 10 of the present invention will be used to support a first cross member 23 on one side of a parallel member 24, and another cross member 23 directly across from it on the other side of the parallel member 24, as shown in FIGS. 18 and 22-26. These half-width upper plate embodiments allow each plate 11 to attach to a portion of upper surface 25 of the parallel member, leaving another portion of this space for the upper plate 11 of the other (inverted) bracket 10 used to attach the other cross member. It should be appreciated that in other embodiments, the second plate member may have other widths.

[0051] It should be appreciated that the methods and apparatus of the present invention may also be used and adapted for use with numerous different structural components such as building frames, wall panels, and the like for attaching perpendicular members and/or inserting cross members between parallel members.

[0052] Having described the invention in detail, it will be apparent that modifications and variations are possible without departing from the scope of the invention defined in the appended claims.

[0053] When introducing elements of the present invention or the preferred embodiments(s) thereof, the articles “a”, “an”, “the”, and “said” are intended to mean that there are one or more of the elements. The terms “comprising”, “including”, and “having” are intended to be inclusive and mean that there may be additional elements other than the listed elements.

[0054] In view of the above, it will be seen that the several advantageous results are attained.

[0055] As various changes could be made in the above constructions and methods without departing from the scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A connector for forming a joint between a first structural member and a second structural member comprising:

a first plate member having inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom, and

a second plate member connected to said first plate member at an angle, said second plate member having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom.

2. The connector of claim 1 wherein the second plate member extends from the first plate member at an angle of about 90 degrees.

3. The connector of claim 1 wherein the angle between said first and second plate members is between 5 and about 265 degrees.

4. The connector of claim 1 wherein said second plate member has a width equal to that of said first plate member.

5. The connector of claim 1 wherein said second plate member has a narrower width than said first plate member.

6. The connector of claim 1 wherein said first plate member has a length greater than that of said second plate member.

7. A connector for forming a joint between a first structural member and a second structural member comprising an L-shaped bracket having a pair of plates, the first of said plates having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom, and the second of said plates having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom.

8. A system for attaching a cross member between a pair of parallel members comprising a pair of connectors for attaching each end of said cross member to one of said parallel members, each connector comprising:

a first plate member having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom, and

a second plate member extending from said first plate member at an angle, said second plate member having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom.

9. The system of claim 8 wherein the teeth extending from each of the outer surfaces of said first plate members are adapted to engage an end of said cross member.

10. The system of claim 8 wherein the teeth extending from each of the lower surfaces of said second plate members are adapted to engage an upper surface of one of said parallel members.

11. A system for attaching a cross member between a pair of parallel members comprising a pair of connectors for attaching each end of said cross member to one of said parallel members, each connector comprising an L-shaped bracket having a pair of plates, the first of said plates having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom, and the second of said plates having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom.

12. A structure for use when constructing wooden structures, comprising:

a first wooden member;

a second wooden member oriented parallel to said first wooden member;

a third wooden member extending between and connecting said first and second wooden members, said third member positioned generally perpendicular to said first and second members;

a first connector comprising

(a) a first plate member having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom engaging an end of said third wooden member, and

(b) a second plate member extending from said first plate member at an angle, said second plate member having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom engaging an upper surface of said first wooden member; and

a second connector comprising

(a) a first plate member having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom engaging an opposite end of said third wooden member, and

(b) a second plate member extending from said first plate member at an angle, said second plate member having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom engaging an upper surface of said second wooden member.

13. A method of securing a joint between a first structural member and a second structural member employing a connector, said connector comprising a first plate member having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom, a second plate member extending from said first plate member at an angle, said second plate member having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom, the method comprising the steps of:

a. driving the teeth of said first plate into an end of a first building support member;

b. positioning said first building support member generally perpendicular to and above a second building support member such that said second plate is above an upper surface of said second structural member; and

c. driving the teeth of said second plate into said upper surface.

14. A method of securing a building cross member between parallel first and second structural members employing a pair of connectors, each connector comprising a first plate member having opposite inner and outer surfaces, the outer surface having a plurality of teeth extending therefrom, a second plate member extending from said first plate member at an angle, said second plate member having opposite upper and lower surfaces, the lower surface having a plurality of teeth extending therefrom, the method comprising the steps of:

a. driving the teeth of a first plate of said first connector into an end of said building cross member;

b. driving the teeth of a first plate of said second connector into an opposite end of said building cross member;

c. positioning said building cross member between and above said first and second building support members such that the second plate of each connector is above an upper surface of each of said second and third structural members; and

d. driving the teeth of said second plates into said upper surfaces.

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