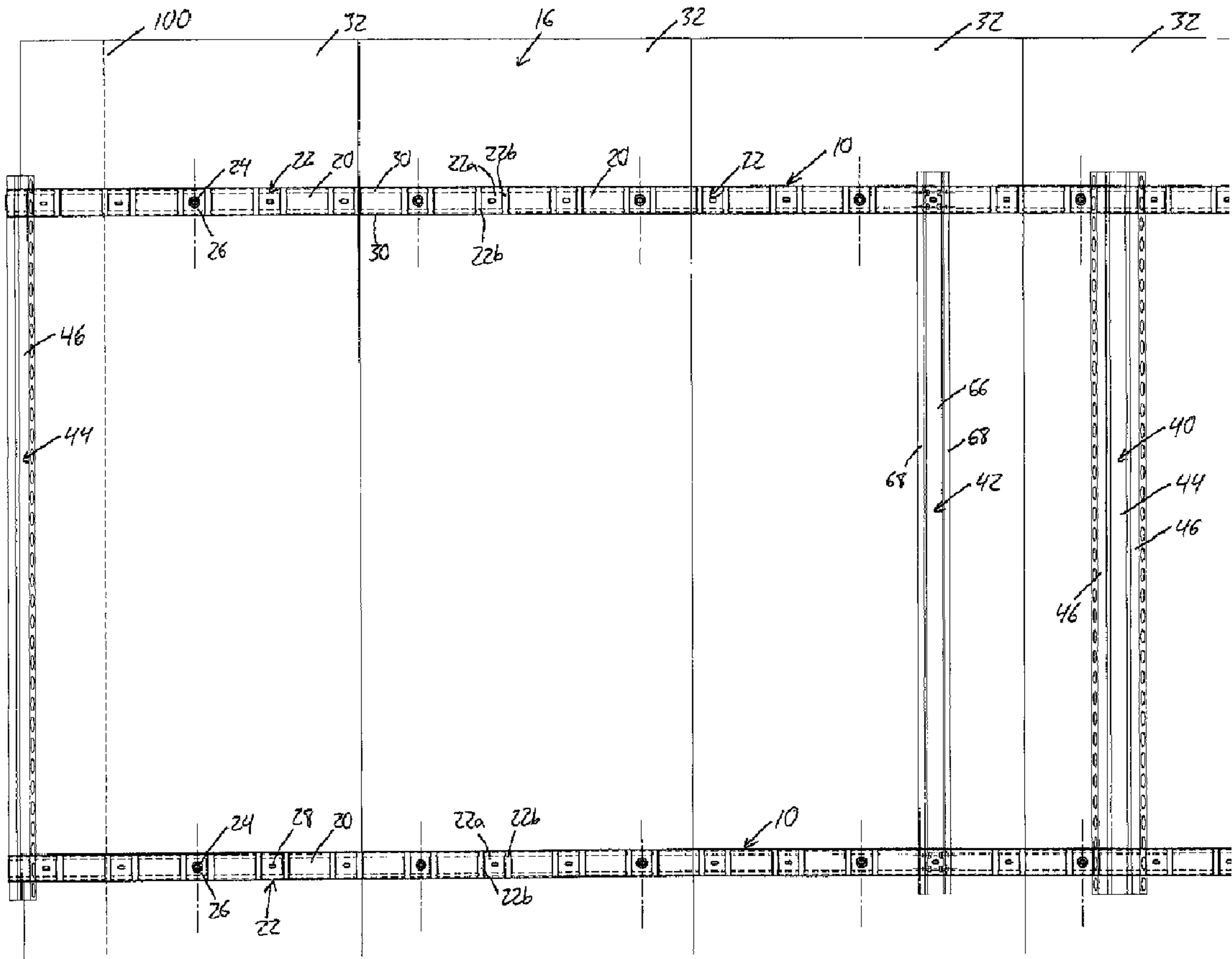




(22) **Date de dépôt/Filing Date:** 2015/10/05
(41) **Mise à la disp. pub./Open to Public Insp.:** 2015/12/10
(45) **Date de délivrance/Issue Date:** 2018/11/13
(62) **Demande originale/Original Application:** 2 907 245

(51) **Cl.Int./Int.Cl.** *E04F 13/07* (2006.01),
E04F 13/08 (2006.01), *E04F 19/06* (2006.01)
(72) **Inventeur/Inventor:**
UKRAINETZ, MICHAEL WAYNE, CA
(73) **Propriétaire/Owner:**
UKRAINETZ, MICHAEL WAYNE, CA
(74) **Agent:** ADE & COMPANY INC.

(54) **Titre : FOURRURES ONDULEES ET LEUR UTILISATION DANS LES STRUCTURES MURALES VERTICALES**
(54) **Title: CORRUGATED FURRING STRIPS AND USE OF SAME IN UPRIGHT WALL STRUCTURES**



(57) **Abrégé/Abstract:**
Corrugated furring strips are used on the outer side of an exterior insulation layer in an exterior wall construction. The corrugated furring strips support a final cladding layer at an offstanding position from the insulation, thereby providing a rainscreen. The

(57) Abrégé(suite)/Abstract(continued):

corrugated furring strips are fastened to the framework of the wall through the exterior insulation layer. Optional bridging members shaped to conformingly mate with lands and grooves of the corrugated furring straps cooperate therewith to define a support grid with improved load capacity for heavier cladding materials and more fastening location options. The insulation layer is free of any thermal bridges other than the insulation-penetrating fasteners used to support the furring and optional bridges. Thermally insulative washers isolate the furring and optional bridges from the fasteners to further improve the insulating effect of the wall.

ABSTRACT

Corrugated furring strips are used on the outer side of an exterior insulation layer in an exterior wall construction. The corrugated furring strips support a final cladding layer at an offstanding position from the insulation, thereby providing a rainscreen. The corrugated furring strips are fastened to the framework of the wall through the exterior insulation layer. Optional bridging members shaped to conformingly mate with lands and grooves of the corrugated furring straps cooperate therewith to define a support grid with improved load capacity for heavier cladding materials and more fastening location options. The insulation layer is free of any thermal bridges other than the insulation-penetrating fasteners used to support the furring and optional bridges. Thermally insulative washers isolate the furring and optional bridges from the fasteners to further improve the insulating effect of the wall.

CORRUGATED FURRING STRIPS AND USE OF SAME IN UPRIGHT WALL STRUCTURES

FIELD OF THE INVENTION

The present invention relates generally to building construction, and
5 more particularly to the use of corrugated furring strips that are particularly useful in steel-framed clad wall construction with a rainscreen, where potential benefits include reduced thermal bridging and improved ease of installation.

BACKGROUND

In commercial grade building construction, it is common to employ a
10 multi-layered wall construction in which vertical steel studs are covered with an external sheathing layer, over which a series of metal Z-channels are installed with rigid insulation panels between them to define an external insulation layer, over which another series of metal channels (e.g. hat-channels) are then installed as furring to support the final exterior cladding layer at a spaced distance from the underlying
15 insulation layer in order to create a rainscreen, whereby the resulting air space between the cladding and the insulation space allows drainage and evaporation to occur. This construction method is material and time intensive, requiring installation of the sheathing, addition of the Z-channels thereto, insertion of the insulation between the Z-channels, subsequent mounting of the hat-channels, and finally
20 installation of the exterior cladding. In addition, each Z-channel creates a thermal bridge across the insulation layer over the full length of the channel, thereby reducing the effectiveness of the insulation layer.

Applicant has developed a new furring product and new resulting steel wall construction that addresses the forgoing shortcomings of the forgoing conventional steel wall construction technique.

SUMMARY OF THE INVENTION

5 According to a first aspect of the invention, there is provided, in combination, an upright wall structure, an exterior cladding for said upright wall structure, and a furring strip comprising an elongated strip of material that is corrugated with alternating lands and grooves in a longitudinal direction of said elongated strip, wherein the elongated strip is mounted to an exterior side of the
10 upright wall structure in abutment therewith at the grooves of the elongated strip, and an interior side of the exterior cladding is mounted to the elongated strip at the lands thereof on an opposite side of an air space that is maintained between said exterior cladding and said upright wall structure by the elongated strip, whereby the elongated strip situates the exterior cladding across the air space from the upright wall structure
15 to create a rainscreen that enables drainage and evaporation from behind the exterior cladding.

 According to a second aspect of the invention, there is provided a finished exterior wall comprising:

 a wall structure comprising:

- 20 a plurality of framing members;
- sheathing supported on the plurality of framing members;
- an insulation layer situated on an exterior side of the sheathing

opposite to the framing members;

furring strips disposed externally of the insulation layer on an outer side thereof opposite the sheathing; each furring strip being corrugated with alternating lands and grooves in a longitudinal direction of said furring strip, the furring strips
5 being oriented with the lands held outwardly away from the insulation layer and the grooves being recessed toward the insulation layer from said lands, and the furring strips being fastened to the framing members at the grooves in said corrugated furring strips; and

exterior cladding placed over, and fastened to, the lands of the
10 corrugated furring strips, whereby the corrugated furring strips space the exterior cladding outwardly away from the insulation layer to create a rainscreen;

wherein the corrugated furring strips are abutted directly against the insulation layer with no intermediate disposed therebetween.

According to a third aspect of the invention, there is provided a method
15 of assembling a finished exterior wall, the method comprising:

on a wall structure having a plurality of framing members, sheathing supported on the plurality of framing members, and an insulation space situated on an exterior side of the sheathing opposite to the framing members:

(a) installing corrugated furring strips externally of the insulation space
20 on an outer side thereof opposite the sheathing with lands of the corrugated furring strips held outwardly away from the insulation space and grooves of the corrugated furring strips recessed toward the insulation space from said lands, including

fastening the furring strips to the framing members at the grooves in said corrugated furring strips; and

(b) installing exterior cladding over the lands of the corrugated furring strips, whereby the corrugated furring strips space the exterior cladding outwardly
5 away from the insulation space;

wherein step (a) comprises starting at one end of the wall structure, and in a single pass moving toward an opposing second end of the wall structure, inserting insulation material into the insulation space and periodically fastening the corrugated furring strips in place through inserted pieces of said insulation material
10 prior to insertion of subsequent pieces of said insulation material into the insulation space.

According to a fourth aspect of the invention, there is provided a furring strip comprising an elongated strip of material that is corrugated with alternating lands and grooves in a longitudinal direction of said elongated strip, and has at least one
15 longitudinal rib formed in said elongated strip.

According to a fifth aspect of the invention, there is provided a furring strip in combination with an upright wall structure, a plurality of fasteners by which the furring strip is mounted to said upright wall structure, and a plurality of washers respectively installed between the elongated strip and heads of said plurality of
20 fasteners, wherein the furring strip comprises an elongated strip of material that is corrugated with alternating lands and grooves in a longitudinal direction of said elongated strip and the washers are less thermally conductive than the fasteners.

According to another aspect of the invention, there is provided a furring strip in combination with a bridging member, the furring strip comprising an elongated strip of material that is corrugated with alternating lands and grooves in a longitudinal direction of said elongated strip, and the bridging member being arranged for mating
5 with the furring strip in a position lying perpendicularly thereto with a cross-sectional profile of the bridging residing in at least partially conforming placement on the furring strip in a position either occupying a respective groove of the furring strip, or overlying a respective land of the furring strip.

In disclosed embodiments, the cross-sectional profile of the bridging
10 member comprises a central portion sized and shaped to either (i) fit within the respective groove of the elongated strip between two neighbouring lands thereof or (ii) overlie the respective land of said elongated strip, and angled portions residing on opposite sides of said central span at oblique angles relative thereto to conformingly overlie groove side walls of the elongated strip on opposite sides of said central span.

15 In disclosed embodiments, the bridging member is fastened to the groove side walls of the elongated strip through the angled portions of the bridging member.

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention will now be described in conjunction with the accompanying drawings in which:

20 Figure 1 is an elevational view illustrating horizontal installation of corrugated metal furring strips to exterior sheathing during erection of a steel construction exterior wall.

Figure 2 is an elevational view illustrating vertical installation of

6

corrugated metal furring strips to exterior sheathing during erection of a steel construction exterior wall.

Figure 3A is a plan view of an outside corner of the steel construction exterior wall of Figure 1.

5 Figure 3B is a plan view of an inside corner of the steel construction exterior wall of Figure 1.

Figure 4A is a plan view of an outside corner of the steel construction exterior wall of Figure 2.

10 Figure 4B is a plan view of an insider corner of the steel construction exterior wall of Figure 2.

Figure 5A is an isolated view of a bridging member that spans between the corrugated furring strips of Figures 1 and 2 in a positon overlying matching lands of the two corrugated furring strips.

15 Figure 5B is a cross-sectional view of the bridging member of Figure 5A as taken along line B – B thereof.

Figure 5C is a cross-sectional view of the bridging member of Figure 5A as taken along line C – C thereof.

20 Figure 6A is an isolated view of a support brace for providing auxiliary support to the bridging member of Figure 5A at an intermediate location between the corrugated furring strips.

Figure 6B is a cross-sectional view of the support brace of Figure 6A as viewed along line B – B thereof.

Figure 6C is a cross-sectional view illustrating the bridging member and support brace of Figures 5C and 6B in cooperative assembly with one another.

Figure 7A is an isolated view of another bridging member that spans between the corrugated furring strips of Figures 1 and 2 in a position occupying
5 matching grooves of the two furring strips.

Figure 7B is a side view of the bridging member of Figure 7A.

Figure 7C is a cross-sectional view of the bridging member of Figure 7A, as viewed along line C – C thereof, in combination with fasteners for attaching the bridging member to the corrugated furring strips.

10 Figure 7D is a cross-sectional view similar to Figure 7C, but showing the bridging member thereof in cooperative assembly with one of the corrugated furring strips.

In the drawings like characters of reference indicate corresponding parts in the different figures.

15 DETAILED DESCRIPTION

Figures 3A and 3B illustrate a construction of a steel framed externally insulated exterior wall using corrugated metal furring strips 10 to support the final exterior cladding layer 18 of the finished wall. The wall features a series of vertically upright steel studs 12 horizontally spaced apart from one another at regular intervals
20 to form a structural framework of the wall, and a layer of exterior sheathing 14 fastened to the studs 12 at outwardly facing edges thereof. A layer of insulation 16 resides opposite the studs on the external side of the sheathing 14, and may feature

semi-rigid mineral wool, rigid insulation, insulation panels, structural insulated panels (SIP), or other thermal insulation. Each furring strip 10 is mounted opposite the sheathing 14 on the outer side of the insulation layer 16, and is fastened to the studs 12 through the insulation layer 16 and underlying sheathing 14. The finished wall is
5 completed by the installation of cladding 18 over the furring strips 10, which act to space the cladding 18 outwardly away from the underlying insulation layer 16 in order to create a rainscreen having an open airspace behind the cladding 18 for drainage and evaporation purposes.

Each corrugated furring strip 10 has a longitudinal direction in which its
10 corrugated shape alternates between lands 20 and grooves 22. In longitudinal planes parallel to the longitudinal direction of the furring strip 10, the lands 20 are flat or linear in shape, and the grooves are trapezoidal. A floor or bottom 22a of each groove 22 lies coplanar with the floors or bottoms of the other grooves, and parallel to the lands 20, which are likewise coplanar with one another. The floor or bottom 22a of each
15 groove is obliquely joined to the two neighbouring lands 20 by angled side walls 22b of the groove's trapezoidal shape. The furring strips 10 are installed in an orientation placing the floor or bottom 22a of each groove against the outer side of the insulation layer 16 (i.e. the side thereof facing outwardly away from the interior space of the building). The lands 20 are thus held outwardly away from the insulation layer 16 by
20 the angled side walls 22b of the grooves, while the bottom 22a of each groove is recessed toward the insulation layer from the lands 20. To support the furring strips 10, threaded fasteners 24 are driven through the furring strips 10 at select grooves 22

that align with the studs 12 of the wall's structural framework.

Figures 1 and 3 illustrate horizontal installation of the furring strips, in which case the longitudinal direction of each corrugated furring strips spans horizontally across multiple studs 12 and is accordingly fastened to more than one such stud. While the bottoms of the fastened grooves are held against the insulation by the fasteners, drainage and airflow vertically across the horizontal furring strip is allowed by the open space between the insulation and the lands 20 on both sides of each fastened groove.

Figures 1 and 4 illustrate vertical installation of the furring strips, in which case the longitudinal direction of each corrugated furring strip spans vertically along a singular studs 12 at a position aligned therewith across the insulation and sheathing layers, and so each furring strip is fastened only to a respective single stud at vertically spaced positions therealong. If the framework of the wall features bridges or blocks spanning horizontally between adjacent studs, furring strips may additionally be fastened to such components of the framework at grooves of the furring strips that align therewith. The open space between the insulation layer and each land enables airflow across the vertical furring strip to communicate the airspaces or cavities on opposite sides of each furring strip with one another.

To minimize thermal bridging between the interior and exterior of the finished wall, each threaded fastener 24 is fitted with a washer (26) of thermally insulative material that has lower thermal conductivity than the threaded fastener 24 and the corrugated furring strip, whereby the head of the fastener 24 is separated

10

from the floor or bottom 22a of the groove 22 by the washer 26 in order to thermally isolate the furring strip 10 from the fastener 24. The fasteners 24 are the only members traversing the insulation layer 16, thus reducing the amount of thermal bridging compared to conventional steel wall construction techniques in which Z-channels traverse the external insulation layer. Together with the insulative washers 26 that reduce conductive heat transfer from the fasteners 24 to the corrugated metal furring strips 10, the insulation layer of the finished wall structure is particularly effective.

As shown in Figures 1 and 2, the floor or bottom 22a of each groove 22 in each furring strip 10 features a predefined fastener opening 28 having an oblong shape that is elongated in the longitudinal direction of the furring strip 10. The width of the oblong shape (measured perpendicularly of the longitudinal direction along the minor axis of the oblong shape) slightly exceeds to the diameter of the threaded fasteners 24 to accommodate passage of the respective fastener 24 through the fastener opening without requiring drilling of the metal furring strip during installation. The length dimension of the fastener opening 28 measured in the longitudinal direction on the major axis of the oblong shape exceeds the width of the fastener opening in order to accommodate a degree of longitudinal adjustment of the fastener position along the floor or bottom of the groove to enable proper alignment of the fastener with a respective stud 12 of the wall framework in the case of horizontal installation of the furring strip 10.

Each furring strip 10 features a pair of longitudinal ribs 30 at each end

20, and a matching pair of longitudinal ribs at the floor or bottom 22a of each groove 22. The two ribs of each pair lie parallel to the central longitudinal axis of the furring strip 10 at symmetric positions on opposite sides thereof, and so each rib thus resides adjacent a respective side edge of the furring strip. The longitudinal ribs 30 are of
5 radiused curvature in cross-sectional planes lying normal to the longitudinal direction, and serve to reinforce the strength of the corrugated strip. During manufacture, each strip may be pressed into its corrugated form from an initially flat strip-shaped blank, which for example may have been punched or cut from a larger metal sheet, and then punched in one or more operations to create the oblong fastener openings 28 and the
10 longitudinal reinforcement ribs 30. While the drawings show separation of the ribs on the floor of each groove from the ribs on the adjacent lands, i.e. a lack of illustrated connecting ribs on the side walls of the groove that join up with the ribs on the lands and the groove floors, the furring strip may alternatively feature full-length ribs continuously spanning the entirety of the strip from one end to the other. In such
15 instance, the continuous full-length ribs may be pressed into the sheet or blank prior to forming thereof into the final corrugated shape.

Figure 1 illustrates horizontal installation of the corrugated furring strips 10 during erection of a steel-framed, externally insulated wall. Here, the insulation layer 16 is formed by elongated rectangular insulation panels 32 that are mated
20 together side-by-side in upright orientations over the underlying stud framework of the wall. Each furring strip 10 spans across a plurality of the insulation panels 32 and is fastened to the regularly spaced framework studs 12 through the insulation panels.

12

To accomplish this, the insulation panels and furring strips 10 may be installed together during a single pass along the sheathed wall framework from one end to the other. Starting at one end, a first insulating panel, or first set of two or more insulating panels, are placed up over the sheathing, and then one of the furring strips is held up
5 at a selected height and a first threaded fastener 24 is driven into a stud at this starting end of the sheathed wall structure through the underlying first insulation panel. At any subsequent studs likewise already covered by the initially placed insulation panel(s), a respective fastener 24 (accompanied by a thermally insulative washer 26) is driven into the stud 12 through insulation layer 16 at the respective
10 groove 22 of the corrugated furring strip 10. This placement and fastening of a corrugated furring strip is repeated at another height on the same wall at a positioned spaced from and parallel to the first strip, for example to accomplish the illustrated two-strip furring configuration of Figure 1. The next insulation panel (or next group of panels) is then inserted behind the furring strips and shifted back toward the first end
15 of the wall framework in order to mate with the last inserted insulation panel at the upright side edge thereof, at which point the furring strips can be fastened into the next stud 12 through this latest insulation panel. These steps are repeated until the installer reaches the second end of the wall framework, where this same process can be repeated along the next side of the building until the full perimeter of the building
20 has been furred.

Figure 2 illustrates vertical installation of corrugated furring strips 10. Here, the insulation layer 16 is again formed by elongated rectangular insulation

panels 32, but this time mated together in horizontal orientations stacked one atop the other over the underlying stud framework of the wall. Each furring strip 10 spans vertically across a plurality of the insulation panels 32 and is fastened to a respective singular stud 12 of the wall framework. Again, the insulation panels and furring strips 5 10 may be installed together during a single pass along the sheathed wall framework from one end to the other. Starting at one end, a first set of two or more insulating panels are stacked atop one another over the sheathing, and then one of the furring strips is aligned over the first stud at this first end of the sheathed wall framework and fastened into place using a series of threaded fasteners 24 driven into the first stud 10 through the insulation panels at grooves of this first furring strip, again using the insulative washers 26. At any subsequent studs likewise already covered by the first stack of insulation panel(s), an additional respective furring strip is likewise fastened in place in alignment with the respective wall stud 12. The next set of insulation panels are then stacked up and mated side-to-side with the previous stack, with 15 corresponding furring strips then respectively fastened to the studs residing behind this latest stack of insulation panels. These steps are repeated until the installer reaches the second end of the wall framework, where this same process can be repeated along the next side of the building until the full perimeter of the building has been furred.

20 In the forgoing installation processes, the insulation and furring strip are installed in conjunction and do not require two separate steps, substantial additional fasteners, adhesives or supplementary layers of additional metal framing or furring, as

is traditionally required. Cladding is subsequently installed over the lands of the furring strips, whereupon the corrugated strips provide for a complete separation of cladding and substrate, and a full thermally-broken rain screen system is achieved.

As different types of cladding will vary in weight and required structural support, the fastening of the furring strips to the studs may alone be sufficient for some types of cladding, but not others. Accordingly, bridging members 40, 42 may be used to perpendicularly interconnect two or more corrugated furring strips 10 as shown in Figures 1 and 2 to form a more rigid support grid for carrying the final cladding layer of the finished wall assembly. Use of the bridging members can also serve other purposes, for example to provide for additional fastening locations at areas other than the furring strips themselves, for example at panel joints or at locations of wall penetrations where mechanical, electrical or other protuberances are present or required.

Figure 5 shows a first type of bridging member 40 configured to mate with the corrugated furring strips in positions overlying the lands 20 thereof, and is therefore referred to herein as a land-covering bridging member 40. The land-covering bridging member 40 is an elongated metal channel of trapezoidal cross-sectional profile, which has a central span 44 and two side walls 46 extending obliquely downward from opposing sides of the central span. As best shown in Figures 5B and 5C, the thickness of each side wall 46 may be doubled up by bending of the channel back over itself at the lower end of the side wall 46 to increase the strength of the channel profile. The angle of divergence between the side walls 46 of

the land-covering bridging member 40 matches the angle of divergence between the angled sides 22b of the trapezoidal grooves 22 in the furring strips 10, and the width of the central span 44 between the two side walls 46 of the land-covering bridging member 40 matches or slightly exceeds the width of each land 20 of the corrugated furring strips 10. As a result, each land-covering bridging member 40 is matable with each furring strip 10 in a position embracing over a respective one of the lands and reaching downwardly into the two adjacent grooves 22. In width, the side walls 46 of the land-covering bridging member 40 are equal to or slightly shorter than the side walls of the grooves 22 so that the land-covering bridging member 40 conforms to the underlying furring strip 10, with the central span 44 of the land-covering bridging member 40 sitting flush atop the respective land 20 of the furring strip and the side walls 46 of the land-covering bridging member 40 likewise sitting generally flush atop the adjacent sides 22b of the two neighbouring grooves 22.

Placement of the land-covering bridging member 40 over a set of matching lands on the installed furring strips 10 places the land-covering bridging member 40 in a position spanning perpendicularly across the furring strips 10. Each side wall 46 of the land-covering bridging member 40 features a series of vent holes 48 therein that are uniformly spaced apart in relatively close proximity over the full length of the land-covering bridging member 40. Where these vented side walls of the land-covering bridging member 40 overlies the corrugated furring strips, the land-covering bridging member 40 can be attached to each of the furring strips by driving a respective self-tapping screw fastener 50 through the vent hole 48 in one or both of

the bridging member's side walls into the angled side wall 22b of the respective groove 22 of the furring strip 10. Accordingly, the head of the screw fastener 50 resides within the groove 22, and therefore does not project beyond the plane of the lands 20 and interfere with flush mounting of the cladding 18 against the gridwork of furring strips and bridging members. Other means of securing the land-covering bridging member 40 to the furring strips may be employed, for example using mating features built-into these components to provide a snap-lock fit or other self-locking attachment therebetween, for example similar that mentioned below for the groove-occupying bridging member.

While the described flush-mounted conformance of the land-covering bridging member 40 to the furring strips means that the land-covering bridging member 40 will be spaced from the underlying insulation layer 16 by at least the thickness of the furring strips 10 at the bottom of floor of the grooves, thereby allowing airflow across land-covering bridging member 40 from one side thereof to the other in the finished wall structure, the vent holes 48 in the side walls 46 improve this allowable airflow, while also allowing drainage. For strengthening purposes, the central span 44 of the land-covering bridging member 40 features a pair of symmetrically disposed longitudinal ribs 30 on opposite sides of the central longitudinal axis of the bridging member 40, for example, just like those of the corrugated furring strips 10.

The attachment of each land-covering bridging member 40 to the furring strips reinforces the mounting of the furring strips to the studs 12 in order to provide a

substantially rigid support grid on which to carry the cladding. Further reinforcement of the support grid can be provided by installation of the support brace 52 shown in Figure 6, which cooperates with the bridging member 40 at an intermediate position therealong between the furring strips 10. The support brace 52 is similar to a short length of hat-shaped channel with short upturned retention tabs 54 on opposite sides of the channel-profile. The support brace 52 thus has a three-sided central rectangular channel 56 that opens downwardly, a pair of legs 58 that extend laterally outward from opposite sides of the open side of the channel 56, and a respective upturned retention tab 54 at the distal end of each leg 58. The coplanar legs 58 lying perpendicular the side walls of the central channel 56 define a base plane of the support brace 52. In the installed position of the brace 52, this base resides against a support surface defined by the outer side of the insulation layer 16. The three-sided central channel 56 of the support brace 52 stands off from the base plane to one side thereof in order to abut against an underside of the central span 44 of the land-covering bridging member 40, and thereby provide support to same.

The central span 44 of the land-covering bridging member 40 has recessed areas 60 therein at spaced apart positions along the member's longitudinal direction. These recessed areas 60 reside between the furring strips 10 in the final assembled state of the support grid. Each support brace 52 is placed beneath a respective one of these recessed areas 60, and the height of the support brace 52 measured from the underside of the base legs 58 to the topside of the central rectangular channel 56 is generally equal to the distance from the plane of the outside

surface of the insulation layer to the underside of the recessed area 60 of the land-covering bridging member 40. Accordingly, the topside of the support brace's central channel 56 abuts against the recessed area 60 of the land-covering bridging member 40. Each recessed area 60 features a predefined fastener hole 62 at a central location of the recess to enable driving of threaded fastener 64 through a
5 corresponding aperture 63 in the central channel 56 of the support brace 52 and onward through the insulation layer 16 to a suitable anchor point in the wall framework (e.g. in a stud, or bridge/block thereof). The fastener 64, shown in Figure 6C, thereby couples the support brace 52 and overlying bridging member 40 together, and
10 secures the same to the rigid wall framework. A thermally insulative washer 65 is again used with this insulation-piercing fastener 64 to minimize thermal bridging by thermally isolating the fastener 64 from the underlying bridging member 40.

The upturned tabs 54 at opposing sides of the support brace 52 angle inwardly toward one another at an angle of convergence generally matching the angle
15 at which the two side walls 46 of the land-covering bridging member 40 converge toward the central span 44 thereof, and the width of the support brace's base between the two tabs 54 generally matches the width of the open side of the land-covering bridging member 40, as measured across the distal ends of the angled side walls 46 thereof. As shown in Figure 6C, the land-covering bridging member 40 is placed over
20 the support brace 52 into a position in which the recessed area 60 of the bridge member's central span 44 abuts flush against the topside of the support brace's central channel 56, and the tabs 54 of the support brace clip externally over the

bottom ends of the side walls 46 of the land-covering bridging member 40 below the vent holes 48 therein. Accordingly, the support brace engages to the underside of the land-covering bridging member in a snap-fit therewith that maintains the support brace in proper alignment beneath the recessed area 60 of the land-covering bridging member until the fastener 64 is driven through the aligned fastener hole 62 and aperture 63 in the two snapped-together components 40, 52.

Figure 7 shows the other type of bridging member 42 which is also used to perpendicularly join two or more corrugated furring strips 10 together, as shown in Figures 1 and 2, but does so at matching grooves 22 of the furring strips 10, rather than at matching lands 20 thereof. This second bridging member 42, therefore referred to as a groove-occupying bridging member 42, is an elongated metal channel having a somewhat W-shaped cross-sectional profile. The cross-sectional shape features a downwardly opening three-sided rectangular channel 66 at its center, much like the support brace 52 of Figure 6, but instead of two flat legs extending perpendicularly outward from the sides of the central three-sided rectangular channel 66, the groove-occupying bridging member 42 features two angled wings 68 extending obliquely upwardly and outwardly from the open lower side of the central three-sided rectangular channel 66 at acute angles from the two opposing side walls thereof. The angle at which the wings 68 diverge from one another is generally equal to the angle at which the two side walls 22b of each groove 22 in the corrugated furring strips diverge from one another, and the width of the central three-sided rectangular channel 66 measured between the two angled wings 68 is generally equal

20

to the floor-width of each such groove 22.

Accordingly, as shown in Figure 7D, insertion of the groove-occupying bridging member 42 into one of the grooves 22 with the central three-sided rectangular channel 66 opening downwardly acts to seat the groove-occupying bridging member 42 within the groove in a conforming manner, in which the two angled wings 68 of the groove-occupying bridging member 42 reside flush against the two side walls 22b of the respective groove 22. Each angled wing 68 features a respective set of apertures 70 therein near each end of the groove-occupying bridging member 42. The distance between the two sets of apertures 70 in each angled wing 68 matches the distance by which two corrugated furring strips 10 are spaced apart from one another in the assembled support grid. Accordingly, a respective self-tapping fastener 72 can be driven through one or more of the apertures 70 in each set in order to fasten the groove-occupying bridging member 42 to the side walls 22b of the grooves 22 in the furring strips. In addition to anchoring of each groove-occupying bridging member 42 to the respective corrugated furring strips with threaded fasteners, the bridging member 44 and furring strips may be arranged to self-couple to one another by way of a clip-like connection, for example through use of small tabs pressed into the bridging during manufacture, which can then be snapped into receiving openings on the furring members. This clipped snap fit connection would temporarily secure the two components together while the fasteners 72 are installed to form a more robust attachment between them.

Fastening of both types of bridging members 40, 42 to the side walls of

the grooves places all the fastener heads inside the grooves 22, where they won't project beyond the plane of the lands 20 of the furring strip in the finished support grid. This prevents the fasteners from interfering with flush mounting of the cladding layer 18 atop the support grid in the final step of the wall construction. To enable driving of the self-tapping fasteners 72 perpendicularly through the angled wings 68 of the groove-occupying bridging member 42 and underlying angled side of the furring strip groove 22 without interference from the central rectangular channel 66 of the bridging member 42, a respective fastener depression 73 is provided at the topside of the channel 66 at a position aligned with each fastener hole 70 in the wing 68. The depression 73 slopes downwardly and outwardly away from the center of the rectangular channel's topside 66a to the respective side wall 66b of the rectangular channel, thus defining a recessed area at the corner of the three-sided central channel 66. The depression or recess is sloped at an angle of ninety degrees to the plane of the respective wing 68. Accordingly, each depression 73 defines a sloped pathway along which the respective fastener 72 can be driven through the wing 68 of the groove-occupying bridging member 42 at a proper ninety degree angle thereto. Each predefined fastener aperture 70 and its respective fastener depression 73 thus collectively define a fastening guide for driving the respective fastener 72 into the side of the furring strip groove 22 at the appropriate angle.

With reference to Figure 7B, a series of notches or cut-outs 74 are provided at regularly spaced intervals over the length of the groove-occupying bridging member 42 at the bent corner between each angled wing 68 and the

respective side wall of the central three-sided rectangular channel 66. These act similar to the vent holes 48 of the land-covering bridging members 40 to improve the allowed airflow across the groove-occupying bridging member 42 within the assembled support grid. These notches or cut-outs 74 may be formed by punching
5 holes into a flat metal blank along the intended bend lines on which the blank is subsequently folded during a pressing operation to create the cross-sectional profile of the groove-occupying bridging member 42. This way, a single linear array of holes produces openings in both the angled wing 68 and the adjacent side wall of the central three-sided rectangular channel 66.

10 A height of the central channel 66 of the groove-occupying bridging member 42 is equal to a height or depth of each groove 22 in the corrugated furring strips 10 such that the topside of the channel 66 resides flush with the coplanar lands 20 of the corrugated furring strip 10 in the installed position of the groove-occupying bridging member 42, in which the open bottom side of the central channel 66 is
15 seated against the bottom or floor 22a of the respective groove 22. This way, placement of a cladding layer 18 in abutment against the lands 20 of the furring strips 10 will likewise place the cladding layer 18 in abutment against the central channel 66 of the groove-occupying bridging member 42 for robust support of the cladding layer.

When reinforcement of the furring strips by bridging members is
20 required, for example to ensure adequate support for the cladding layer that is to be installed over the corrugated furring strips, either the land-covering bridging members or the groove-occupying bridging members 42, or a combination thereof, may be used

to cooperatively form a more rigid support grid with the corrugated furring strips. Figures 1 and 2 illustrate use of both types of bridging members to span between parallel corrugated furring strips. Figure 2 additionally shows the use of support braces 52 to further reinforce the land-covering bridging members 40 at intermediate points thereon between each parallel pair of corrugated furring strips 10. Once the furring strips, and any optional bridging members, are installed over the insulation layer 16, the cladding 18 can be placed up over the furring strips or support grid, and fastened thereto through the lands 20 of the corrugated furring strips 10. Some of these lands 20 may be overlaid with the optional land-covering bridging members 40, in which case a threaded fastener driven through the cladding 18 and into the corrugated furring strips is driven through the overlying bridging member 40 in the process, thereby further strengthening the fastened connection between the bridging member and the furring strip, and giving the cladding fastener more material to bite into to better support the cladding layer 18.

15 In one example, the furring strips may be pre-formed light gauge, galvanized metal strip, 50mm wide, 25mm in height, and of any length limited only by ease of use and fabrication. The fasteners 24 by which the furring strips are mounted to the wall framework through the simulation may, for example, be full depth screws, c/w, 30mm diameter phenolic washers to provide the described thermal break. Use of
20 stainless or non-conductive fasteners will significantly reduce or eliminate thermal bridging at the exterior wall.

The land-covering bridging members 40 may be pre-formed 18-gauge galvanized metal strip, reinforced with rolled edges and the aforementioned radiused channels or ribs along its length. The recessed areas or localized depressions 60 may be spaced apart from one another at 406mm or 610mm intervals to match typical wall framing intervals at which the studs are spaced apart from one another, and the furring strips are preferably spaced apart by the same interval during installation so that each support braces reside centrally between two furring strips. The braces allow optional standalone installation of the land-covering bridging members in matching orientation to wall framing members (e.g. studs) behind the insulation layer. The land-covering bridging members may also be used to provide closures at corners of the building where different walls meet, for example by folding a land-covering bridging member around an outside corner of the building. This is shown in Figure 1, where broken line 100 denotes the interior side of the insulation layer of an “out-of-plane wall” that lies perpendicularly from the “in-plane” wall (i.e. the wall that features the solid-line insulation layer 16 residing “in the plane” of the drawing sheet). A folded land-covering bridging member 44' overlies a half-land on each of the two illustrated corrugated furring strips 10 on the “in-plane” side of the building, and folds around a corner of the building to the “out-of-plane” side of the building, where the remainder of the folded bridging member 44' overlies a half-land on each of another two corrugated furring strips. The half lands of the furring strips on the two sides of the building meet up with one another at the corner, and each side wall 46 of the folded bridging member 44' resides on a side wall 22b of the furring strip groove 22 that is nearest the

building corner on each of the two furring strips on a respective one of the two adjacent sides of the building.

The groove-occupying bridging members may be pre-formed 18-gauge galvanized metal strip, with folds arranged to reinforce its cross-sectional profile, and may be configured to clip into the grooves of the corrugated furring members, and optionally further fastened with self-tapping fasteners. Even if the cut-outs or notches were omitted from the groove-occupying bridging member, a drainage space is provided therebeneath by the thickness of the main furring strips in order to provide a complete rain screen regardless of the horizontal or vertical installation direction. Both types of bridging members are used for bridging or blocking of the furring strips to create an overall support grid, which provides additional strength, backing and/or blocking for variations in cladding orientation and sizes.

The support brace 52 may be pre-formed 18-gauge galvanized metal piece, 50mm wide, with a folded profile to clip into the land-covering bridging members. The brace's profile allows for solid bearing of the base of the brace against the insulation/sheathing, and provides support directly under the top of the bridging member's central channel for fastening into the wall framing, similar to fastening of conventional strapping installations.

Although not detailed in the drawings, stretcher clamps may be provided, for example in the form of pre-formed light-gauge galvanized metal strip, 38mm wide and 203mm in length, and reinforced with radiused ribs or channels along its length. Three fastener locations are punched to allow for use in localized

reinforcement of the corrugated metal furring strips 10. These can be used in vertical orientations to match wall framing, or in horizontal applications, but only where blocking has been installed in wall framing to suit. Although not shown, adjustable clips may be provided for hidden fastener cladding installation. Such clips may be supported off of the lands of the primary furring strips, and off of one or both types of bridging members 40, 42 in the horizontal furring installation format.

It will be appreciated that the specific material and dimensional details presented above are for exemplary purposes only, and may be varied without effect on the functionality of the present invention.

Since various modifications can be made in my invention as herein above described, and many apparently widely different embodiments of same made within the scope of the claims without departure from such scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

CLAIMS:

1. A furring strip in combination with a bridging member, the furring strip comprising an elongated strip of material that is corrugated with alternating lands and grooves in a longitudinal direction of said elongated strip, and the bridging member
5 being arranged for mating with the furring strip in a position lying perpendicularly thereto with a cross-sectional profile of the bridging member residing in at least partially conforming placement on the furring strip in a position either occupying a respective groove of the furring strip, or overlying a respective land of the furring strip.
2. The combination of claim 1 wherein the cross-sectional profile of
10 the bridging member comprises a central portion sized and shaped to either (i) fit within the respective groove of the elongated strip between two neighbouring lands thereof or (ii) overlie the respective land of said elongated strip, and angled portions residing on opposite sides of said central portion at oblique angles relative thereto to conformingly overlie groove side walls of the elongated strip on opposite sides of said central portion.
- 15 3. The combination of claim 2 wherein the bridging member is fastened to the groove side walls of the elongated strip through the angled portions of the bridging member.
4. The combination of any one of claims 1 to 3 wherein the cross-sectional profile of the bridging member is shaped to conformingly overlying the
20 respective land of the elongated strip and reach downwardly into adjacent grooves on opposite sides of said respective land.
5. The combination of claim 4 wherein the cross-sectional profile of

the bridging member includes a central span for overlying the respective land of the elongated strip, and side walls angling downward from the central span on opposite sides thereof to reach into the adjacent grooves of the elongated strip.

6. The combination of claim 5 wherein said side walls of the bridging member have vent holes therein to allow airflow or drainage across the bridging member.

7. The combination of claim 5 or 6 wherein the bridging member is fastened to the elongated strip at the side walls of the cross-sectional profile of the bridging member.

8. The combination of any one of claims 4 to 7 in combination with a support brace arranged for placement beneath the bridging member at an area therebeneath that is unoccupied by the elongated strip in order to provide support to the bridging member at position spaced outwardly away from said elongated strip.

9. The combination of claim 8 wherein the support brace comprises a base for placement against a support surface beneath the bridging member and a standoff reaching outwardly from a plane of said base to abut against the bridging member at a part of the cross-sectional profile that is arranged to overlie the respective land at the elongated strip.

10. The combination of claim 9 wherein the part of the cross-sectional profile of the support brace that is arranged to overlie the respective land of the elongated strip comprises a recessed area at one or more positions along the bridging member, and the support brace is arranged to abut against the bridging member at said

recessed area.

11. The combination of claim 10 wherein the support brace resides beneath the bridging member at the recessed area thereof in abutment with an underside of said recessed area, and a fastener is engaged through the support brace
5 and the bridging member into an underlying support surface with a head of the fastener disposed within the recessed area of the bridging member.

12. The combination of claim 10 or 11 wherein the bridging member comprises a predefined fastener hole therein at the recessed area.

13. The combination of any one of claims 9 to 12 wherein the support
10 brace comprises upturned retention tabs arranged at opposite sides of the base to clip externally over opposing sides of the bridging member and hold the support brace and bridging member in alignment with one another.

14. The combination of any one of claims 4 to 13 wherein the cross-sectional profile of the bridging member is trapezoidal.

15. The combination of any one of claims 1 to 3 wherein the cross-sectional profile of the bridging member is sized and shaped for receipt in the respective groove of the elongated strip.

16. The combination of claim 15 wherein the bridging member comprises a channel that opens downwardly toward a floor of the respective groove of
20 the elongated strip and is equal in height to said respective groove in order to place a topside of the channel flush with the lands of the elongated strip when an open side of the channel is seated against the floor of the groove.

17. The combination of claim 2 or 3 wherein:

the cross-sectional profile of the bridging member is sized and shaped for receipt in the respective groove of the elongated strip;

the bridging member comprises a channel that opens downwardly toward
5 a floor of the respective groove of the elongated strip and is equal in height to said respective groove in order to place a topside of the channel flush with the lands of the elongated strip when an open side of the channel is seated against the floor of the groove; and

the angled portions of the cross-sectional profile of the bridging member
10 comprise wings extending upward from a bottom of the channel at opposite sides thereof for abutment against opposing sides of the respective groove in the elongated strip.

18. The combination of claim 17 wherein the bridging member is fastened to the respective groove of the elongated strip at the opposing sides thereof
15 through the wings of the bridging member.

19. The combination of any one of claims 15 to 18 wherein the bridging member is fastened to the respective groove of the elongated strip at opposing sides thereof.

20. The combination of claim 18 or 19 wherein the bridging member
20 comprises predefined fastening guides at which the bridging member is fastenable to the elongated strip by driving a fastener through said predefined fastening guides.

21. The combination of claim 17 wherein the wings of the bridging

member have predefined fastener apertures therein, and the channel of the bridging member has recessed corner areas aligned with said predefined fastener apertures therein to provide a predefined pathway along which fasteners are drivable through said wings to affix the bridging member to the elongated strip.

5 22. The combination of any one of claims 15 to 21 in further combination with a second furring strip, wherein the bridging member spans between a pair of aligned grooves on the two furring strips.

 23. The combination of any one of claims 1 to 14 in further combination with a second furring strip, wherein the bridging member spans between a pair of
10 aligned lands on the two furring strips.

 24. The combination of any one of claims 1 to 23 wherein the bridging member is a profiled piece of metal channel.

 25. The combination of any one of claims 1 to 24 comprising a predefined fastener opening in each groove of the elongated strip.

15 26. The combination of claim 25 wherein each predefined fastener opening is elongated in the longitudinal direction of the elongated strip.

 27. The combination of any one of claims 1 to 26 wherein each groove of the elongated strip has at least one longitudinal rib formed therein.

 28. The combination of claim 27 wherein each groove of the elongated
20 strip comprises two longitudinal ribs disposed on opposing sides of a lateral center of the groove.

 29. The combination of any one of claims 1 to 28 wherein each land of

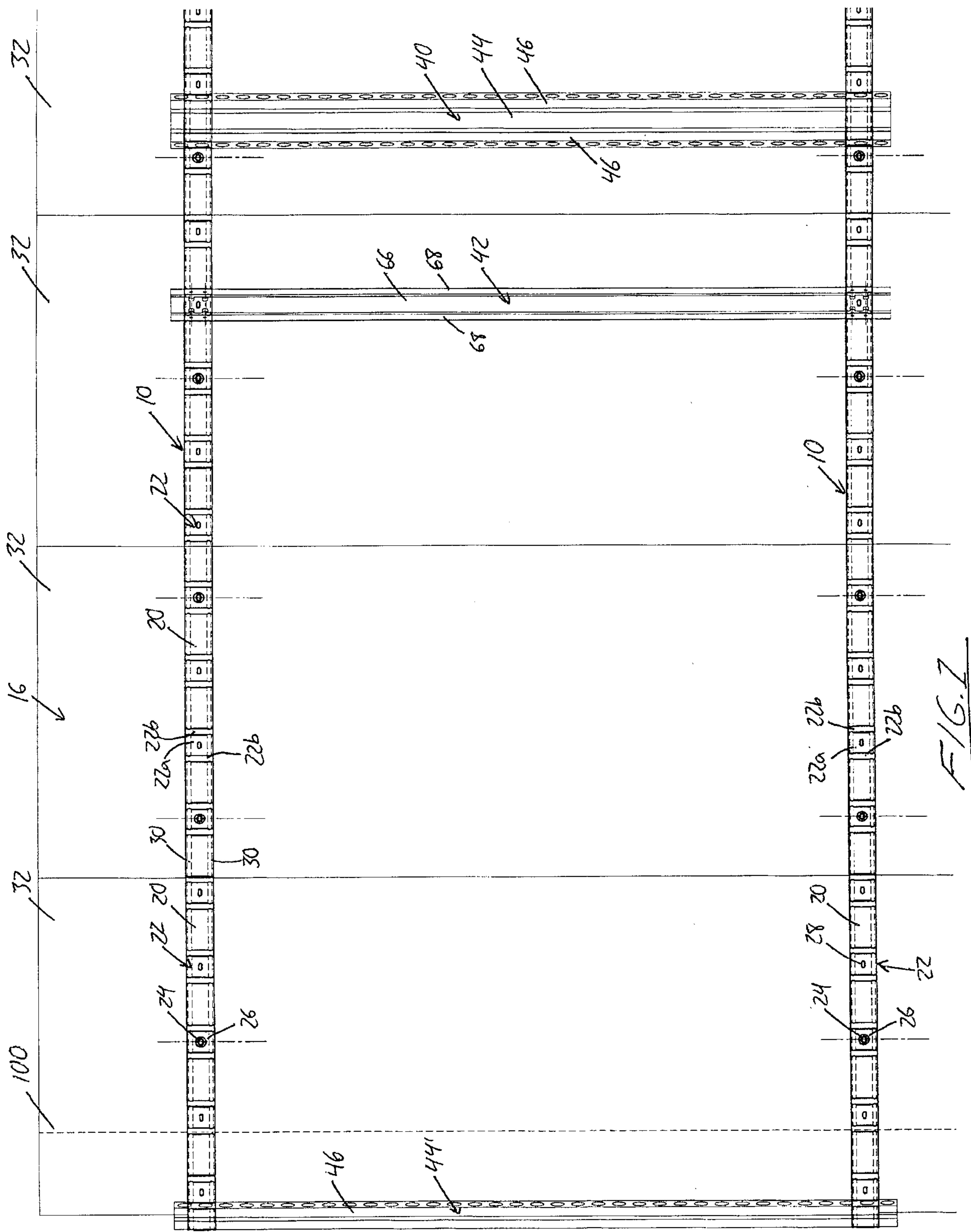
the elongated strip has at least one longitudinal rib formed therein.

30. The combination of claim 29 wherein each land of the elongated strip comprises two longitudinal ribs disposed on opposing sides of a lateral center of the land.

5 31. The combination of any one of claims 27 to 30 wherein each longitudinal rib has a curved profile in transverse cross-sectional planes lying normal to the longitudinal direction of the elongated strip.

32. The combination of any one of claims 1 to 31 wherein each groove of the elongated strip has a trapezoidal profile in longitudinal cross-sectional planes
10 lying parallel to the longitudinal direction of the elongated strip.

33. The combination of claim 32 wherein each land of the elongated strip is flat in the longitudinal cross-sectional planes.



F/G.1

