Jan. 31, 1967 J. C. WAIZENHOFER 3,300,934

BUILDING OUTER WALL STRUCTURE

Filed Aug. 5, 1963 3 Sheets-Sheet 1

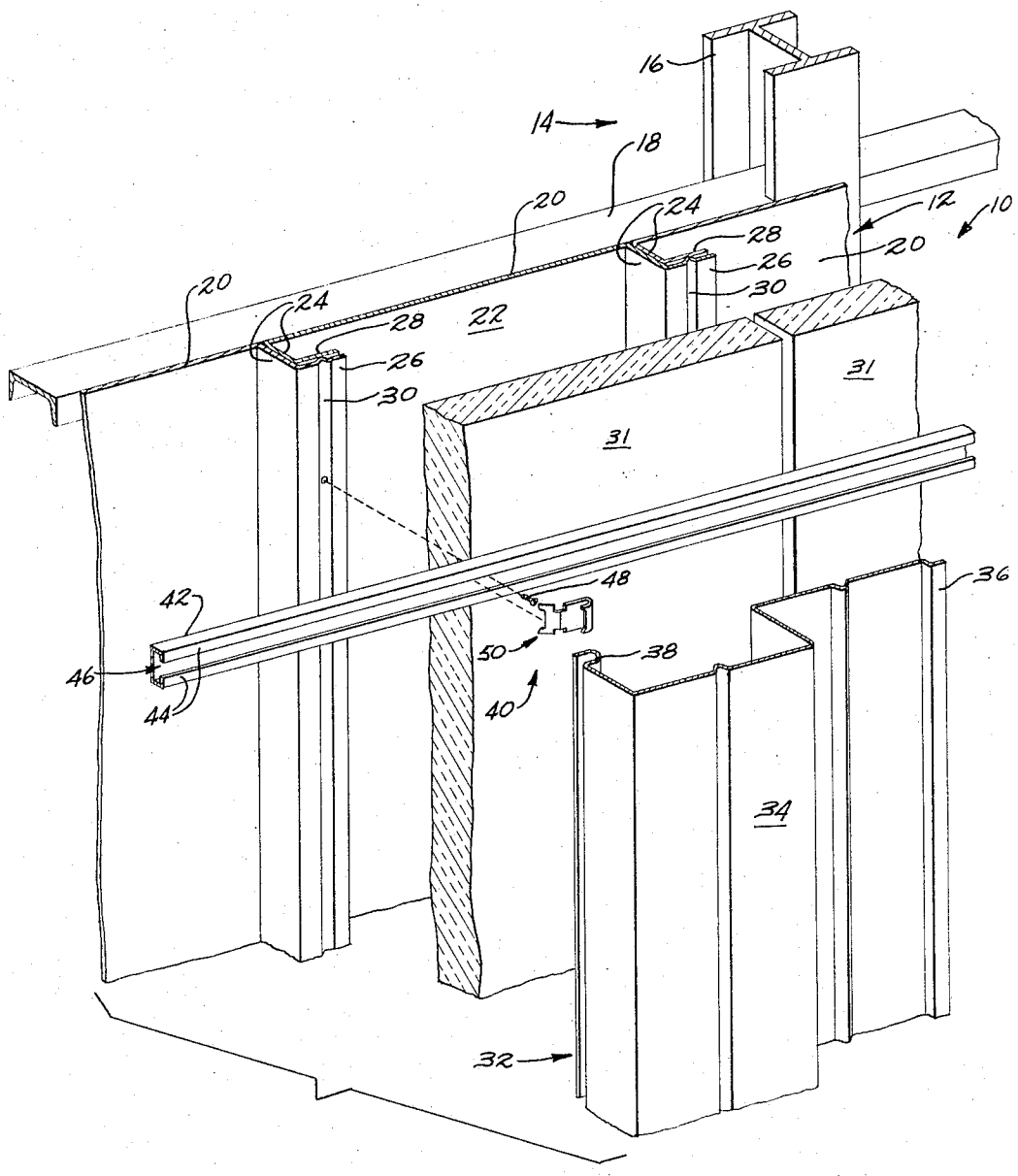


FIG. 1

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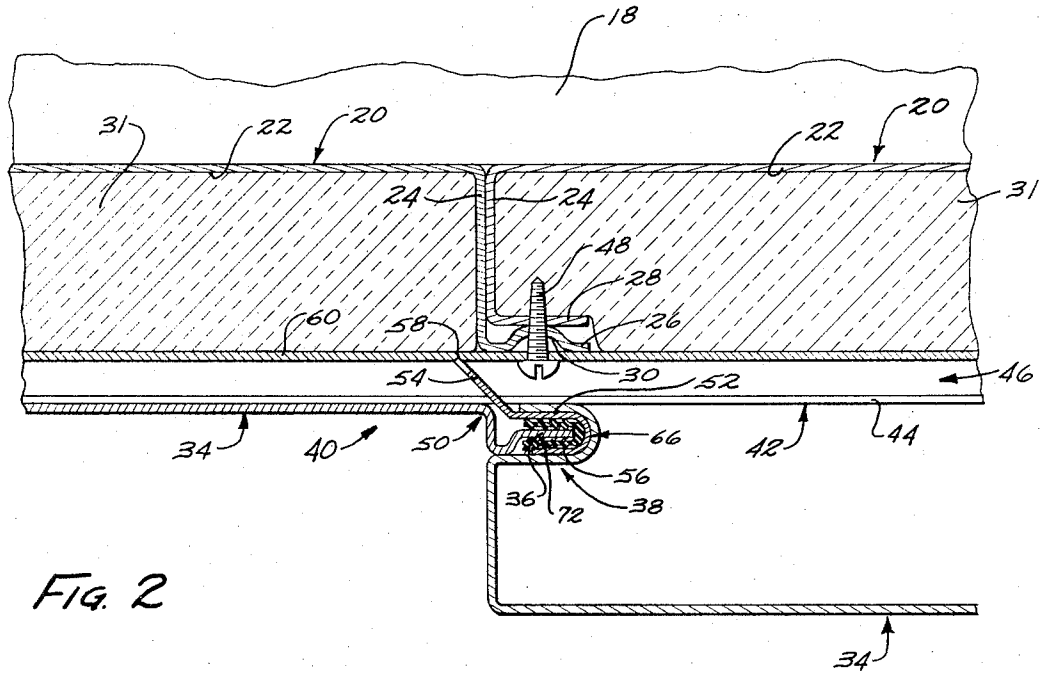


FIG. 2

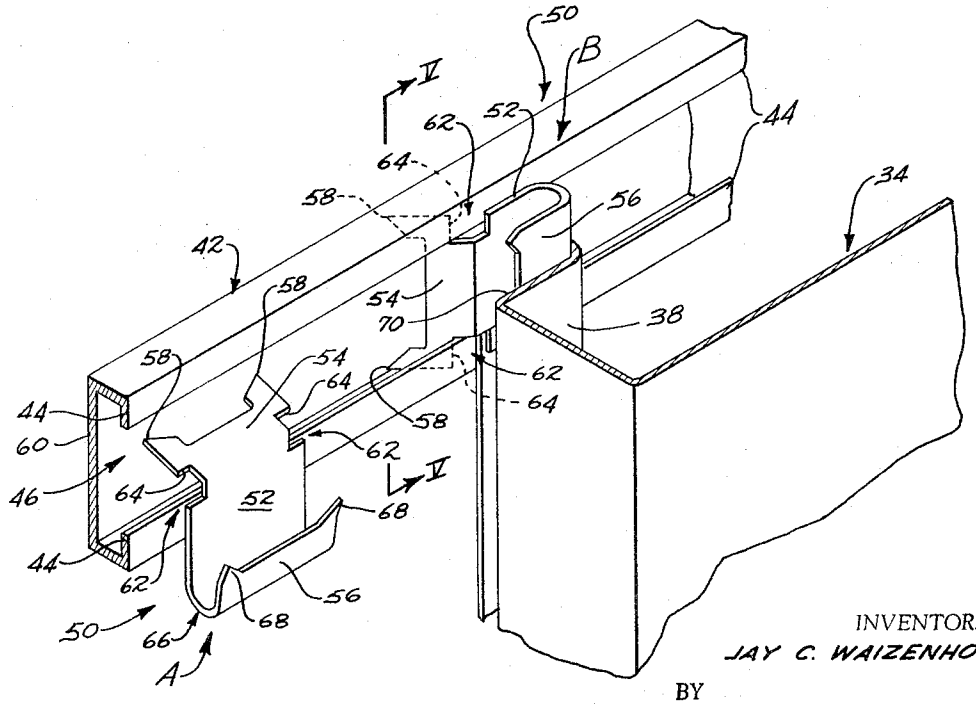


FIG. 4

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Filed Aug. 5, 1963 3 Sheets-Sheet 3

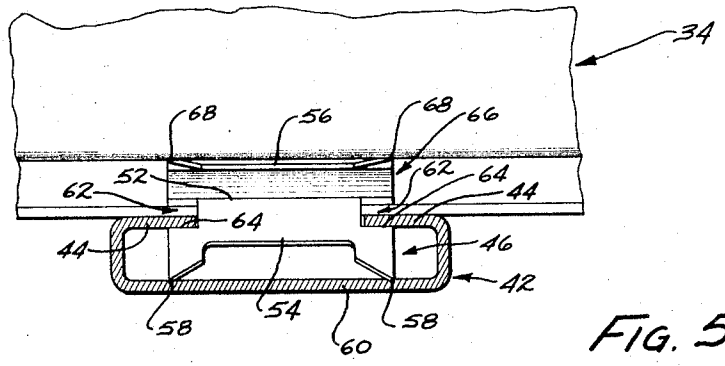


FIG. 5

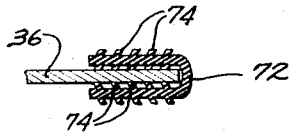


FIG. 3

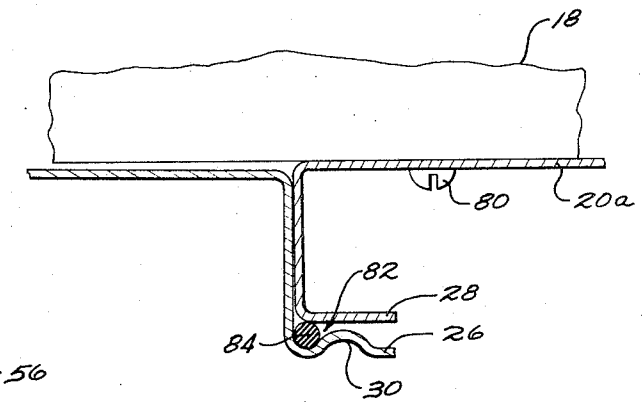


FIG. 7

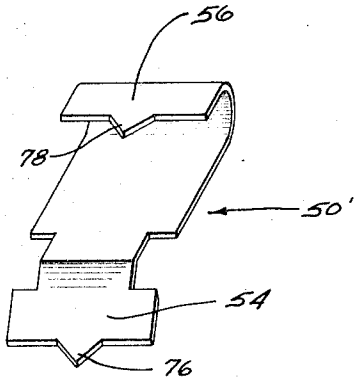


FIG. 6

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United States Patent Office 3,300,934 Patented Jan. 31, 1967

3,300,934

BUILDING OUTER WALL STRUCTURE

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Filed Aug. 5, 1963, Ser. No. 299,695
10 Claims. (Cl. 52—394)

This invention relates to a building outer wall structure, and more particularly to novel means for connecting an outer decorative metal sheath to an inner supporting structure. The present wall structure has equal utility as an interior wall structure.

Heretofore, clip members and channeled subgirt members have been used to secure an outer decorative metal sheath to an inner supporting structure, such as, the skeletal framework of a building, an existing outer wall or to an inner metal sheath as in the case of an insulated metal wall structure. Wall structures of this type will be found in U.S. Patents Nos. 2,591,361, 2,620,906 and 2,857,995. In all of these wall structures, the clip members are disposed in tight frictional engagement within the channeled subgirt members. This frictional engagement purportedly eliminates the rattle inherent in wall structures of this type. Although the structures disclosed in the aforementioned U.S. patents effectively eliminate the rattle, the clip members used therein are relatively expensive to manufacture. Furthermore, the clip members do not provide a positive connection between each facing sheet and the subgirt members whereby the facing sheets are prevented from sliding in a direction parallel with the subgirt members.

Accordingly, the primary objects of the present invention include:

To provide a novel means for rapidly connecting an outer metal sheath to an inner supporting structure;

To provide a novel connecting means for an outer metal sheath which eliminates the rattle between the outer metal sheath and the connecting means;

To provide a novel clip member which is relatively inexpensive to manufacture and which may be quickly and easily installed;

To provide an improved wall structure wherein there is a positive connection between the outer metal sheath and the subgirt members whereby the outer metal sheath cannot slide in a plane parallel with the subgirts;

To provide an improved wall structure having no exposed fasteners; and

To provide an improved inner metal sheath having a novel construction which provides a vapor seal for the inner sheath.

These and other objects and advantages of the present invention will become apparent from the following detailed description by reference to the accompanying drawings, in which:

FIGURE 1 is an isometric exploded view of the present wall structure;

FIG. 2 is a cross-sectional view illustrating the present wall structure in assembled form;

FIG. 3 is a fragmentary cross-sectional view of a male lip of an outer facing sheath which is provided with a sealant strip;

FIG. 4 is a fragmentary isometric view illustrating a subgirt member and a clip member of the present invention;

FIG. 5 is a cross-sectional view, taken along the line V—V of FIG. 4, further illustrating the subgirt member and the clip member of FIG. 4;

FIG. 6 is an isometric view illustrating an alternative embodiment of the present clip member; and

FIG. 7 is a fragmentary cross-sectional view illustrating the method of forming a vapor seal in the inner metal sheath of the present invention.

According to the present invention, a plurality of horizontally-extending channeled subgirt members is provided which is secured to an inner supporting structure in spaced-apart, substantially parallel relation. Each of the channeled subgirt members includes a pair of opposed inturned lips whereby an elongated channel is provided.

A plurality of clip members is provided, each of which comprises a sloped portion adapted to fit within the elongated channel of the subgirt members and a flat body portion cooperating with a reversed turned flange to form a connecting lip. The sloped portion preferably includes two tangs at the end thereof which are adapted to be embedded in the surface of the subgirt members and slot means in the sides thereof preferably at the juncture of the sloped portion and the flat body portion. The slot means permit the sides of the sloped portion to extend beneath and into engagement with the inturned lips of the channeled subgirt members. Consequently, the sloped portion is, in effect, wedged between the back wall and the inturned lips of the subgirt members. Since, the tangs are embedded in the surface of the back wall, the clip members are slideable only in a direction in which the tangs are trailing. The reversed turned flange preferably includes at its end two outwardly sloped prongs which are similar to the tangs provided on the sloped portion. The reversed turned flanges preferably slope away from the flat body portion.

The outer metal sheath comprises a plurality of decorative facing sheets each of which essentially includes a male lip provided along one side edge thereof and a female lip provided along the other side edge thereof. The male lip and the female lip extend parallel with the channeled subgirt members. Hence, when erected, the connecting lip of the clip members will be inserted into the female lip of one facing sheet and the male lip of an adjacent facing sheet will be inserted into the connecting lip and the female lip of the previously erected facing sheet. The prongs provided on the end of the reversed turned flange will be embedded in the surface of the female lip.

The above-mentioned inner supporting structure to which the subgirt members are secured may comprise an existing outer wall of an old building which is to be modernized by the application of a decorative outer sheath. Alternatively, the inner supporting structure may comprise the skeletal framework of a building being erected.

As a further alternative, the inner supporting structure may comprise an inner metal sheath which is secured to the skeletal framework of a building being erected. According to the present invention, an improved inner metal sheath is provided which comprises a plurality of pan sections erected in side-by-side relation. Each of the pan sections includes an outturned flange and an inturned flange provided at the ends of the side walls thereof. The outturned flange is adapted to overlap the inturned flange of the adjacent pan section whereby a vertical load supporting strip is formed. Groove means preferably is provided in the outturned flange whereby the flanges are maintained spaced from each other to form a pocket. A strip of sealant material is positioned within the pocket which sealant material creates a vapor seal for the inner sheath. The subgirt members of the present invention are secured to the load supporting strips.

The present outer metal sheath and the supporting subgirt members and clip members have been illustrated and described herein as being applied to an inner metal sheath. However, it should be understood that it is within the scope of the present invention to apply the present outer metal sheath and the supporting subgirt members and clip members directly to an existing outer

wall or to the skeletal framework of a building as described above.

Referring now to FIGS. 1 and 2, a wall structure **10** is shown in an exploded view to illustrate the component parts thereof and their order of assembly. The wall structure **10** includes an inner metal sheath **12** which is secured to a building skeletal framework **14** comprising columns **16** and girt members **18**. The inner metal sheath **12** comprises a plurality of pan sections **20** each of which includes a web **22**, side walls **24**, an outturned flange **26** at the outboard end of one of the side walls **24** and an inturned flange **28** at the outboard end of the other side wall **24**. The outturned flange **26** of one pan section **22** is adapted to overlap the inturned flange **28** of an adjacent one of the pan sections **20**. The outturned flange **26** preferably is provided with a longitudinally extending groove **30** whose function will be described later in the specification.

The inner metal sheath pan sections preferably are fabricated from steel sheet having a thickness from about 28-gage through about 14-gage. Galvanized steel sheets or similarly metal-coated steel sheets are preferred.

Batts of insulation **31** also are provided which will reside within the cavity formed by the web **22** and the side walls **24** of the pan sections **20**. The insulation batts preferably are fabricated from fibrous substances such as glass-fibers or rock wool fibers. Alternatively, foamed plastic insulation batts may be utilized, e.g., foamed polyurethane, foamed polystyrene and the like.

The wall structure **10** also includes an outer metal sheath **32** comprising a plurality of decorative facing sheets **34** each of which essentially includes a male lip **36** and a female lip **38** both of which extend parallel with the outturned and inturned flanges **26**, **28** of the pan sections **20**. The facing sheets **34** may have any one of a plurality of different profiles to provide a plurality of aesthetically pleasing outer wall surfaces. The facing sheets **34** are preferably fabricated from decorative-surfaced metal sheets, e.g. stainless steel sheets, aluminum and aluminum alloy sheets, porcelainized enameled metal sheets, plastic film-coated metal sheets, painted metal sheets, lacquered metal sheets, anodized aluminum sheets, and the like. Porcelainized enameled aluminum sheets are especially desirable.

The present wall structure **10** also includes a novel connecting means **40** comprising a plurality of channeled subgirt members **42** (only one shown) having a pair of opposed inturned lips **44** which define an elongated channel **46**. The channeled subgirt members **42** preferably are formed from a relatively soft metal such as aluminum or its alloys and are secured to the outturned and inturned flanges **26**, **28**, as for example, by means of a screw **48** or similar fastener which will extend through the subgirt member **42** and the groove **30** provided in the outturned flange **26**. The screw **48** not only secures the channeled subgirt member **42** to the outturned flange **26** but also secures the outturned flange **26** to the inturned flange **28**. A plurality of clip members **50** (only one shown) serves to connect the outer metal sheath **32** to the subgirt members **42**.

Referring now to FIGS. 2, 4 and 5, the clip member **50** preferably is formed from stainless steel whereby the outer facing sheets **34** will not be stained on exposure to weather. The clip member **50** comprises a flat body portion **52** having a sloped portion **54** at one end thereof and a reversed turned flange **56** at the other end thereof. The sloped portion **54** includes two tangs **58** which, as can be seen, are adapted to be embedded in a back wall **60** of the channeled subgirt member **42**. Slot means **62** is provided in each side of the sloped portion **54** and preferably at the juncture of the sloped portion **54** and the flat body portion **52**. Each slot means **62** provides a shoulder **64** which is adapted to extend beneath and into engagement with the lower surface of the inturned lips **44** of the subgirt member **42** as can clearly be seen in FIGS. 4 and 5.

In FIG. 4, the clip member **50** is shown in two positions, that is, in a first position, indicated at A, which illustrates the initial position of the clip member **50** while being installed in the subgirt member **42**; and in a second position, indicated at B, which illustrates the clip member **50** in its final installed position. The clip member **50** may be rotated in a counterclockwise direction from its position at A to its position at B. When this is accomplished, the clip member **50** will be locked in the position B by the tangs **58** which are embedded in the back wall **60** and the shoulders **64** which are engaged with the lower surface of the inturned lips **44** of the subgirt member **42**. Since the tangs **58** become embedded in the back wall **60**, it should be evident that the clip member **50** is movable only in a direction in which the tangs are trailing, i.e., in a direction to the right as viewed in FIGS. 2 and 4. The wedging of the sloped portion between the back wall **60** and the inturned lips **44** and the embedment of the tangs **58** in the back wall **60** provide a positive connection between the clip members **50** and the channeled subgirt members **42**.

As can best be seen in FIG. 4, the flat body portion **52** and the reversed turned flange **56** cooperate to form a connecting lip **66** which is adapted to fit within the female lip **38** of the facing sheets **34**. The reversed turned flange **56** is provided with two outwardly sloped prongs **68** which are similar to the tangs **58** of the sloped portion **54**. The reversed turned flange **56** preferably is sloped away from the flat body portion **52** whereby when the connecting lip **66** is inserted within the female lip **38**, the reversed turned flange **56** will be flexed toward the flat body portion **52**. Further, the prongs **68** will embed themselves in the inner surface **70** of the female lip **38** whereby the connecting lip **66** is secured to the female lip **38**. That is to say, the connecting lip **66** cannot be dislodged from the female lip **38**.

Referring now to FIGS. 2 and 3, the male lip **36** of the outer facing sheets **34** preferably is provided with a U-shaped sealing strip **72** which is engaged over both sides of the male lip **36**. The sealing strip **72** preferably comprises plastic gasketing material such as vinyl gasketing having wipers **74** formed on the inner and outer surfaces thereof. The inner surface preferably is coated with a suitable lubricant such as silicone fluids whereby the male lip **36** may be easily slipped into the sealing strip **72**. As can be seen in FIG. 2, the sealing strip **72** is disposed between the male lip **36** and the connecting lip **66** and a portion of the female lip **38** of the adjacent facing sheet **34**. Hence, the sealing strip **72** serves primarily as an efficient seal which prevents the entry of moisture into the space between the inner and outer metal sheaths **12**, **32**. The sealing strip **72** serves secondarily as a means for locking the male lip **36** within the connecting lip **66** and the female lip **38**.

It should be evident, by inspection of FIGS. 2 and 4, that the interconnection of the male and female lips **36**, **38** and the connecting lip **66** together with the embedment of the prongs **68** in the inner surface **70** of the female lip **38** provides a positive connection between the clip members **50** and the facing sheets **34**. Hence, the facing sheets **34** are positively secured to the channeled subgirt members **42**.

It should also be evident by inspection of FIG. 2 that the present invention provides a wall structure having no exposed fasteners. The clip members **50** are entirely hidden from view.

Reference is now directed to FIG. 6 wherein an alternative embodiment of the clip member is illustrated. Corresponding numerals will be employed to indicate corresponding parts already described. The clip member, shown herein and identified by the numeral **50'**, is similar to the clip member **50** with the exception that only one tang **76** is provided centrally at the end of the

sloped portion **54** and that only one prong **78** is provided centrally on the end of the reversed turned flange **56**. The tang **76** and the prong **78** serve to provide the hereinbefore described positive connections between the outer facing sheets **34** and the channeled subgirt members **42** in a manner which is similar to that of the tangs **58** and the prongs **68**.

An object of the present invention is to provide an improved inner metal sheath having novel construction which provides a vapor seal for the inner metal sheath. To this end, reference is directed to FIGS. 2 and 7. As shown in FIG. 7, a pan section **20***a* is shown secured to the girt member **18** by means of a screw **80**. A pan section **20***b* is shown about to be applied to the girt member **18**. As can be seen, the groove **30** provided in the outturned flange **26** cooperates with the inturned flange **28** to form a pocket **82** which extends longitudinally of the pan sections **20***a*, **20***b*. A strip of sealant material **84** is positioned within the pocket **82** and is adapted to be compressed between the outturned and inturned flanges **26**, **28** as shown in FIG. 2. The strip of sealant material **84**, when in a compressed condition, will provide a very efficient vapor seal which prevents the ingress of moisture, debris, air and the like into the interior of the building.

It should be evident that besides providing the pocket **82**, the groove **30** also has several other advantages. For example, the groove **30** reinforces the outturned flange **26** and thereby increases the load-carrying capacity of the flanges. Furthermore, the groove **30** serves to position the drill used in drilling holes in the flanges **26**, **28** which holes receive the screws **48**. Still further, the groove **30** maintains the flanges **26**, **28** spaced apart by a predetermined distance whereby the strip of sealant material **84** is not crushed or flattened completely which would result in a loss of the sealing property of the sealant material.

Although the invention has been illustrated in connection with certain specific embodiments, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention.

I claim:

1. In a building wall structure having an inner supporting structure secured to the skeletal framework of a building and adapted to support an outer metal sheath, the improvement in said inner supporting structure comprising:

a plurality of pan sections each having a web secured to the skeletal framework and side walls extending outwardly from the side edges thereof, one of said side walls terminating in an inturned flange, the other of said side walls terminating in an outturned flange which overlaps the inturned flange of an adjacent one of said pan sections, the side walls of adjacent ones of said pan sections being substantially engaged, the side walls and overlapped inturned and outturned flanges of adjacent ones of said pan sections comprising load supporting elements; and

at least two horizontal, vertically spaced subgirt members secured to said load supporting elements, said subgirt members being positioned to receive connecting elements for securing an outer metal sheath to said inner metal sheath.

2. In a channel and clip assembly for securing an outer metal sheath to the skeletal framework of a building, the combination comprising:

a channel member having a back wall, side walls extending normally therefrom and an inturned flange contiguous with the outer end of each of said side walls, said channel member being formed from relatively soft metal; and

a clip member formed from metal which is harder than the metal from which said channel member is formed, said clip member comprising a flat body portion terminating at one end in a sloped portion having at least two tangs at the free end thereof, and slot means in each side thereof, said sloped portion being insertable within said channel member with the sides thereof extending beneath and into engagement with the said inturned flanges and with said tangs embedded in the surface of said back wall, said clip member being movable only in a direction in which said tangs are trailing.

3. The combination of claim **2** wherein said flat body portion and said reversed turned flange comprise a connecting lip adapted to fit within a female lip of an outer facing sheet, the free end of said reversed turned flange including outwardly sloped tangs embedded in the inner surface of said female lip.

4. An anchor clip for securing interengageable panels to a channeled subgirt having reentrant lips on the edges of the sides thereof, comprising:

a flat body portion;

a sloped portion at one end of said flat body portion;

slot means in each side of said sloped portion;

at least two tangs at the end of said sloped portion;

said sloped portion being adapted to fit within said channeled subgirt with the sides of said sloped portion extending beneath and engaged with said reentrant lips and with said tangs embedded in the surface of said channeled subgirt whereby said clip is movable only in a direction in which said tangs are trailing;

a reversed turned flange at the other end of said flat body portion, said reversed turned flange cooperating with said flat body portion to provide a connecting lip adapted to receiving one of the lips of said panels; and

at least two outwardly sloped prongs on the end of said reversed turned flange, said prongs being adapted to engage the inner surface of the female lip whereby said connecting lip is rigidly retained within said female lip.

5. In an outer building wall structure having an inner metal sheath secured to the skeletal framework of a building, an outer metal sheath, and fastening means for securing said outer metal sheath to said inner metal sheath, the improvement in said inner metal sheath comprising:

a plurality of U-shaped panel members having a web secured to the said skeletal framework and side walls extending outwardly from the side edges thereof, one of said side walls terminating in an inturned flange, the other of said side walls terminating in an outturned flange which overlaps the inturned flange of an adjacent one of said panel members, the side walls of adjacent ones of said panel members being substantially engaged;

rib means formed in one of said flanges for maintaining said flanges in spaced-apart relation whereby a pocket is formed which extends longitudinally of said panel members; and

a strip of sealant material disposed within said pocket, said strip of sealant material being compressed by said inturned and outturned flanges whereby a vapor seal is formed.

6. The improvement of claim **5** wherein said rib means is formed in said outturned flange.

7. The improvement of claim **5** wherein said rib means is formed centrally of said outturned flange and extends longitudinally of said panel members.

8. The improvement of claim **7** including fastener elements extending through said flanges in the region of said rib means for securing said flanges together.

9. In a building outer wall structure, the combination comprising:

an inner metal sheath comprising a plurality of pan sections erected in side-by-side abutting relation, each of said pan sections comprising a web secured

to the skeletal framework of a building, side walls extending normally therefrom, an inturned flange contiguous with the end of one of said side walls, and an outturned flange contiguous with the end of the other of said side walls and adapted to overlap the inturned flange of the adjacent one of said pan sections;

at least two horizontal subgirts secured in vertically, spaced-apart, substantially parallel relationship to said flanges of said inner metal sheath, said subgirts being C-shaped whereby an elongated open channel is provided;

a plurality of clip members having a sloped portion including at least two tangs at the end thereof, said clip members being adapted to fit within said channel and transversely thereof whereby said tangs are embedded in the surface of said subgirt, said clip member also having a flat body portion contiguous with said sloped portion and disposed exteriorly of said subgirt, said flat body portion terminating in a reversed turned flange extending parallel with said flat body portion to form a connecting lip; and

an outer metal sheath comprising a plurality of facing sheets each including an outturned flange and an inturned flange terminating in a reversed turned flange, said outturned flange comprising a male lip, said inturned and reveresd turned flanges comprising a female lip, said male and female lips extending parallel with said subgirt, said connecting lips of said clip members receiving the lip of one of said facing sheets whereby one side of said sheet is connected to said subgirts, and the male lip of the adjacent one of said facing sheets being positioned within the female lip of said one of said facing sheets.

10. In a building outer wall structure, the combination comprising:

an inner metal sheath comprising a plurality of pan sections erected in side-by-side abutting relation, each of said pan sections comprising a web secured to the skeletal framework of a building, side walls extending normally therefrom, an inturned flange contiguous with the end of one of said side walls, and an outturned flange contiguous with the end of the other of said side walls and adapted to overlap

the inturned flange of the adjacent one of said pan sections;

spacer means associated with one of said flanges for maintaining said flanges spaced from one another to form a pocket, a strip of sealant material disposed within said pocket for sealing said inner metal sheath;

at least two subgirts in horizontal, spaced-apart, substantially parallel relationship to each other and secured to said flanges of said inner metal sheath, said subgirts being C-shaped whereby an elongated open channel is provided;

a plurality of clip members having a sloped portion including at least two tangs at the end thereof, said clip members being adapted to fit within said channel and transversely thereof whereby said tangs are embedded in the surface of said subgirt, said clip members also having a flat body portion contiguous with said sloped portion and disposed exteriorly of said subgirt, said flat body portion terminating in a reversed turned flange extending parallel with said flat body portion to form a connecting lip; and

an outer metal sheath comprising a plurality of facing sheets each including an outturned flange and an inturned flange terminating in a reversed turned flange, said outturned flange comprising a male lip, said inturned and reversed turned flanges comprising a female lip, said male and female lips extending parallel with said subgirt, said connecting lips of said clip members being positioned within the female lip of one of said facing sheets whereby one side of said sheet is connected to said subgirts, and the male lip of the adjacent one of said facing sheets being positioned within the connecting lip of said clip members and the female lip of said one of said facing sheets.

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