BUILDING OUTER WALL STRUCTURE

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ABSTRACT OF THE DISCLOSURE

Double-sheeted sheet metal wall constructions including fastening clips which secure outer facing sheets directly to liner sheets. Subgirt members are eliminated. The clips are hidden from view and arranged such that one end is secured to the liner sheet and the opposite end is connected to the outer facing sheets. The outer facing sheets can be erected vertically or horizontally regardless of the orientation of the liner sheets.

This invention relates to a building outer wall structure, and more particularly to improved means for connecting an outer decorative metal sheet to an inner supporting structure.

As is known, certain types of building wall structures, whether interior wall structures or exterior wall structures, include an exposed decorative metal sheet which is secured to an inner supporting structure. Examples of inner supporting structures include the skeletal framework of a building, an existing wall or an inner metal sheet as in the case of an insulated metal wall structure. According to present practices, subgirt elements are first secured to the inner supporting structure and, subsequently, the outer metal sheet is secured to the subgirt elements in side-by-side, abutting relation.

In one type of wall structure, clip members and channelled subgirt members serve to secure the exposed decorative metal sheet to the inner supporting structure. Wall structures of this type will be found in U.S. Patents Nos. 2,791,361, 2,620,698 and 2,857,995. In these wall structures, one end of the clip members is disposed in tight frictional engagement within the channelled subgirt members. The opposite ends of the clip members are frictionally or otherwise engaged using interengaging male or female lips, recesses comprising the aforementioned exposed decorative metal sheet. The frictional engagement of the clip members with the channelled subgirt members purportedly eliminates the rattle 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.

A wall structure of the described type is disclosed in a pending application Ser. No. 299,695, filed Aug. 5, 1963, and assigned to the assignee of the present invention and now U.S. Patent 3,500,934. The clip members shown in U.S. Patent 3,500,934 include means for engaging the channelled subgirt members whereby the facing sheets are prevented from sliding in a direction parallel with the subgirt members.

All of the above described wall structures require the use of channelled subgirt members. These subgirt members are relatively expensive to manufacture. During installation they require some precision on the part of the workmen, to assure that the subgirt members are substantially parallel to one another and that they are substantially horizontal.

Accordingly, as an overall object, the present invention provides improved fastening means for securing an exposed decorative metal sheet directly to an inner supporting structure.

Another object of the invention is to provide an improved wall structure which does not employ subgirt elements.

Still another object of the invention is to provide a novel clip member which is relatively inexpensive to manufacture and which may be quickly and easily installed.

SUMMARY OF THE INVENTION

The fastening means of the invention is particularly adapted for use in a building wall structure of the type having a plurality of load supporting elements or members from the structural framework of a building. The load supporting elements provide a plurality of spaced-apart substantially coplanar surfaces to which an outer decorative metal sheet is to be secured. The outer decorative metal sheet comprises a plurality of facing sheets which are erected in side-by-side abutting relation. The facing sheets have vertically extending interfitting male and female lips.

In accordance with the present invention, the load supporting elements have a plurality of spaced-apart substantially parallel recesses formed in the coplanar surfaces. The fastening means of the invention comprises clip members each of which includes an outer metal sheet engaging segment and a base segment. The outer metal sheet engaging segment includes a groove which receives one of the aforesaid interfitting lips of the facing sheet. The base segment is engaged with the coplanar surfaces and includes projections extending into engagement with the recesses. The projections are spaced-apart and positioned such that they extend into the groove of the outer metal sheet engaging segment in alignment with the aforesaid one of the interfitting lips. Fastener means extend through the base segments to secure the clip members to the load supporting elements. The clip members provide the sole connection between the outer metal sheet and the load supporting elements.

In accordance with the preferred embodiment of the invention, an inner metal sheet is provided which comprises a plurality of liner sheets erected in side-by-side abutting relation on the structural framework of a building. Each of the adjacent liner sheets has laterally extending flanges arranged such that a first flange of one liner sheet overlaps a second flange of an adjacent liner sheet. The aforesaid recesses are formed in the outermost one of the overlapping flanges in a manner such that one of the aforesaid coplanar surfaces is provided on each side of the recess. The base segment of each clip member is engaged with the outermost flange and fastener means extend through the base segment into the recess and through the overlapping flanges, the overall arrangement being such that the fastener means secures each clip member to the overlapping flanges and also secures the overlapping flanges one to the other.

Further in accordance with the preferred embodiment of the invention, the aforesaid projections comprise opposite edge portions or tongues of the base segment which are bent inwardly, that is, away from the outer metal sheet engaging segment, and have a shape which corresponds with the shape of the recess. The overall arrangement is such that the tongues engage the recesses and maintain the clip member in a position such that the aforesaid one of the lips may be introduced into the aforesaid groove of the outer metal sheet engaging segment.
As will become apparent from the following detailed description, the aforesaid liner sheets may be erected vertically such that they extend parallel with the facing sheets. In this arrangement, the clip members are slideable vertically, prior to fastening, in the recesses provided in the overlapped flanges. Alternatively, the liner sheets may be erected horizontally such that they extend substantially perpendicular to the vertical facing sheets. In this arrangement, the clip members are slideable horizontally, prior to fastening, in the recesses formed in the overlapping flanges; as an added feature, facing sheets of any desired width may be connected to the horizontally extending liner sheets.

The above 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 a fragmentary isometric view of a building wall structure incorporating the fastening means of the invention;

**FIG. 2** is a fragmentary view of a clip member of the invention;

**FIG. 3** is a fragmentary cross-sectional view taken along the line III—III of FIG. 1;

**FIG. 4** is a fragmentary cross-sectional view taken substantially along the line IV—IV of FIG. 3, illustrating the manner of drilling holes for the clip fasteners;

**FIG. 5** is an isometric view illustrating an alternative arrangement of the clip member of FIG. 2;

**FIG. 6** is a cross-sectional view of a wall structure incorporating the clip member of FIG. 5;

**FIG. 7** is a fragmentary isometric view of a building wall structure illustrating an alternative arrangement of the liner sheets;

**FIG. 8** is an isometric view of a clip member employed in the wall structure of FIG. 7; and

**FIG. 9** is a cross-sectional view taken substantially through a clip member of FIG. 8, illustrating the manner of drilling holes in a load supporting element for the clip fasteners.

**GENERAL DESCRIPTION**

Reference is now directed to FIG. 1 wherein there is illustrated a wall structure indicated generally by the numeral 20. The wall structure 20 includes an inner metal sheath 22 which is secured to a building skeletal framework 24 comprising columns 26 and girder members 28. The wall structure 20 further includes an exposed or outer decorative metal sheath 30 which is secured directly to the inner metal sheath 22 by fastening means 32 of the present invention.

**INNER METAL SHEATH 22**

The inner sheath 22 comprises a plurality of liner sheets or sectional elements 34 having interengaging means along their adjacent edges. The liner sheets 34 are erected in side-by-side relation to the skeletal framework 34. Each of the liner sheets 34 is generally U-shaped and includes a flat rectangular central web 36 having perpendicular side walls 38, 40 formed along the opposite sides thereof. A first longitudinal flange 42 is provided along the outer edge of the side wall 38. The first longitudinal flange 42 extends laterally from the side wall 38 toward the side wall 40. A second longitudinal flange 44 is provided at the outer edge of the side wall 40, extending laterally away from the central web 36. The overall arrangement being such that when the sheets are erected in side-by-side relation as illustrated in FIG. 1, the second longitudinal flange 44 of one liner sheet 34 will overlap the first longitudinal flange 42 of an adjacent liner sheet 34. The overlapping longitudinal flanges 42, 44 provide a vertically extending load supporting element 45 to which the outer metal sheath 30 is to be secured. Liner sheets 34 are more fully described and claimed in U.S. patent applications Ser. No. 299,695, now U.S. Patent 3,300,934 and Ser. No. 425,517, filed Jan. 14, 1965 and now U.S. Patent 3,324,612, both assigned to the assignee of the present invention.

Referring now in particular to FIGS. 1 and 3, it will be seen that the second longitudinal flange 44 is deformed so as to provide a generally V-shaped groove or a recess 46 which is formed centrally of the second longitudinal flange 44 such that substantially coplanar surfaces 48 are provided on opposite sides of the recess 46. As indicated in FIG. 1, all of the surfaces 48 reside in substantially the same plane. An inner recess 50 is provided between the groove 46 and the side wall 40, which receives a bead 52 of sealant material. The first longitudinal flange 42 is deformed into a U-shaped configuration to provide a rib 54 which engages the bead 52 of sealant material. When the flanges 42, 44 are drawn together, as will be described, the rib 54 is embedded in and compresses the sealant material 52 to provide an effective seal.

**OUTER METAL SHEATH 30**

Referring again to FIG. 1, the outer decorative metal sheath 30 comprises a plurality of interengaging facing sheets 56 having interfitting male and female lips 58, 60 formed along the opposite longitudinal sides. A U-shaped sealing strip 62 is engaged over the male lip 58. The female lip 60 has a U-shaped configuration and is adapted to receive the male lip of an adjacent one of the facing sheets 56. It is to be understood at this time that the facing sheets 56 may have a configuration other than that specifically shown in the drawings. It is, however, essential to the invention that the facing sheets have the lateral interfitting male and female lips 58, 60.

**FASTENING MEANS 32**

The fastening means 32 of the invention, comprises a clip member 64 which is best illustrated in FIGS. 2 and 3. In general, the clip member 64 includes an inner metal sheath engaging segment 66 and an outer metal sheath engaging segment 68. The inner metal sheath engaging segment 66 comprises a first flat body portion of base 70 having an opening 72 provided centrally therein. The first flat body portion 70 further includes tongues or projections 74 which extend at right angles to the first flat body portion 70 and project away from the outer metal sheath engaging segment 68. The tongues 74 are generally V-shaped and correspond substantially with the shape of the liner sheet recesses 46.

The outer metal sheath engaging segment 68 comprises a second flat body portion 76 which is connected to the first flat body portion 70 by an inclined web. The second flat body portion 76 terminates at its opposite end in a reverse turned flange 80 which cooperates with the second flat body portion 76 to provide a groove 82 adapted to receive one of the aforesaid lips 58, 60 of the facing sheets 56. Specifically, the groove 82 of FIGS. 2, 3 is adapted to receive the male lip 58 of the facing sheets 56. The reverse turned flange 80 is provided with two outwardly sloped prongs 84 which, as will be described, are adapted to be embedded in a surface of the female lip 60 of the facing sheets 56.

To connect the facing sheets 56 to the inner metal sheath 22, a number of the clip members 64 are first inserted in the female lip 60 of the facing sheets 56. That is to say, the outer metal sheath engaging segment 68 of the clip member 64 is adapted to be embedded in a surface of the female lip 60, as best shown in FIG. 3. The first flat body portion 70 is then engaged with the coplanar surfaces 48 of a load supporting element 45. The tongues 74 project into and engage the recess 46 thereby providing alignment between the clip.
member 64 and the vertical load supporting element 45.

To secure the clip member 64 to the vertical load supporting element 45, a hole must be drilled in the load supporting element 45 to receive a screw 86 in the manner shown in FIG. 3. In this respect, the tongues 74 serve an additional function. As can be seen in FIG. 2, the opening 70 is positioned centrally between the tongues 74. Consequently, when the tongues 74 are engaged in the recess 46, see FIG. 4, the opening 72 is automatically positioned directly above the recess 46. Hence, a drill indicated in dash-dot outline at 88, may be inserted through the opening 72 for the purpose of drilling a hole (not shown) in the overlapping flanges 42, 44.

ALTERNATIVE EMBODIMENT—CLIP MEMBER

Reference is now directed to FIG. 5 wherein an alternative embodiment of the clip member, indicated generally by the numeral 92, is illustrated. Corresponding numerals will be employed to identify corresponding parts heretofore described.

The clip member 92 differs from the clip member 64, FIG. 2, in that the outer metal sheath engaging segment 68 includes an upright wall 93 having a reverse turned flange 94 which terminates in an upturned flange 95. The reverse turned flange 94 and the upturned flange 95 cooperate with the second flat body portion 76 to provide a groove 96 adapted to receive the female lip 60 of the facing sheets 56. Two inwardly sloped prongs 98 are provided on the reverse turned flange 94 and are adapted to engage an outer surface of the facing sheet 60.

When employing the clip member 92, the ejection of the facing sheets 56 is somewhat different from the manner of ejection of the facing sheets 56 when the clip members 64 are employed. Referring now to FIG. 6, a number of clip members 92 are first secured at spaced locations along the length of the vertical load supporting elements 45. That is to say, the first flat body portion 70 of each of the clip members is applied to the load supporting elements 45, a hole is drilled in the overlapping flanges 42, 44, and a screw 86 is applied to secure the clip member 92 to the load supporting element 45. At the left side of FIG. 6, there is shown a fragment of a previously erected facing sheet 56A. The next-to-be-erected facing sheet 56B is positioned in the manner shown in dotted outline. Thereafter, the facing sheet 56B is moved toward the facing sheet 56A so that the male lip 58 is introduced into the female lip 60 of the previously erected facing sheet 56A. Simultaneously, the female lip 60 of the facing sheet 56B is introduced into the groove 96 of the clip member 92. Thereafter, subsequent facing sheets (not shown) are erected in sequence until the entire outer wall structure has been completed. In this system, the clip members 92 are first secured to the vertical load supporting elements 45. The number of clip members will depend on the length of the facing sheet 56 to be erected.

ALTERNATIVE ARRANGEMENT—WALL STRUCTURE

Reference is now directed to FIG. 7 wherein a wall structure 100 of an alternative arrangement, is illustrated. Corresponding numerals will be employed to identify corresponding parts heretofore described.

In the wall structure 100, the liner sheets 34 are erected on the skeletal framework 24 in a horizontal orientation. Consequently, the load supporting elements 45 as well as the recesses 46 extend horizontally. In this arrangement, clip members 102 are employed to connect the facing sheets 56 directly to the load supporting elements 45, in the manner described above.

The clip member 102, as illustrated in FIG. 8, has two tongues 74 aligned longitudinally along the first flat body portion 70. One tongue 74 is provided at the extreme edge of the first flat body portion 70 whereas the second tongue 74 is cut from the inclined web 75. The tongues 74 project at right angles to the first flat body portion 70 away from the second flat body portion 76. As shown in FIG. 9, the overall arrangement is such that the first flat body portion 70 will engage the coplanar surfaces 48 and the tongues 74 will project into and engage the recess 46. The opening 72 is disposed centrally between the tongues 74 such that the opening 72 will be positioned directly above the recess 46. Consequently, the opening 72 serves as a guide for a drill, shown in dash-dot outline 88, employed in drilling a hole (not shown) in the overlapping flanges 42, 44. Again, the tongues 74 provide alignment between the clip member 102 and the load supporting element 45 during the drilling operation. Furthermore, the tongues 74 automatically position the groove 82 in a vertical orientation, that is, in a position for receiving one of the aforesaid lips 58, 60. Specifically, as shown in FIGS. 7, 8 and 9, the groove 82 is adapted to receive the male lip 58 of a facing sheet 56. It should be understood however that the groove 82, may, if desired, be modified to receive the female lip 60 of a facing sheet, such as described in connection with the clip member 92 of FIG. 5.

SUMMARY

The present fastening means permits facing sheets to be connected directly to load supporting elements thereby eliminating the need for subgirt elements employed in similar prior art wall structures. Furthermore, the arrangement of the fastening means is such that each clip member performs multiple functions during erection of a wall structure.

I claim as my invention:

1. In a building wall structure having a plurality of load supporting elements providing a plurality of spaced-apart substantially coplanar surfaces, said load supporting elements comprising a plurality of sectioned elements having interengaging means along their adjacent edges, an outer metal sheath comprising a plurality of facing sheets with vertically extending interfitting male and female lips, said facing sheets being erected in side-by-side relation, and fastening means for securing said outer metal sheath to said load supporting elements, the improvement in said fastening means comprising:

   each said load supporting element having a recess formed in said coplanar surfaces;

   clip members, each having

   an outer metal sheath engaging segment including a groove receiving one of said lips of said facing sheets, and

   a base segment engaging said coplanar surfaces and including projections extending into engagement with a said recess, said projections being spaced-apart and positioned to orient said groove in alignment with said one of said lips; and

fastener means extending through said base segments for securing said clip members to said load supporting elements.

2. The improvement as defined in claim 1 wherein said base segment has an opening positioned centrally between said spaced-apart projections and wherein a said fastener means extends through said opening, into said recess and into threaded engagement with said load supporting element.

3. The improvement as defined in claim 1 including an inner metal sheath secured to the structural framework of said building, said inner metal sheath comprising a plurality of liner sheets erected in side-by-side relation and including vertically extending, overlapping flanges between adjacent ones of said liner sheets, said overlapping flanges comprising said load supporting elements.

4. The improvement as defined in claim 3 wherein said fastener means threadedly engages said overlapping flanges to secure said overlapping flanges one to the other.

5. The improvement as defined in claim 1 wherein each of said outer metal sheath engaging segments receives a said male lip of said facing sheets.
6. The improvement as defined in claim 1 wherein each of said outer metal sheath engaging segments receives a said female lip of the said facing sheets.

7. An anchor clip for securing panels having interfitting male and female lips, to load supporting elements each having one vertical surface and a recess adjacent said vertical surface, comprising:
   a first flat body portion;
   spaced-apart aligned tongues, one on each of two opposite sides of said first flat body portion, said tongues being inclined relative to said first flat body portion and having a shape corresponding substantially with the shape of said recess;
   said first flat body portion having an opening positioned centrally between said tongues;
   said first flat body portion being adapted to engage said vertical surface with said spaced-apart aligned tongues projecting into and engaged with said recess whereby said opening is positioned directly above said recess;
   a second flat body portion spaced outwardly from said first flat body portion;
   an inclined web connecting adjacent ends of said first and second flat body portions; and
   a reverse turned flange at the other end of said second flat body portion, said reverse turned flange cooperating with said second flat body portion to provide a groove adapted to receive one of said lips of said panels.

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