Sept. 18, 1962 D. D. LASSEN 3,054,482

WALL STRUCTURE

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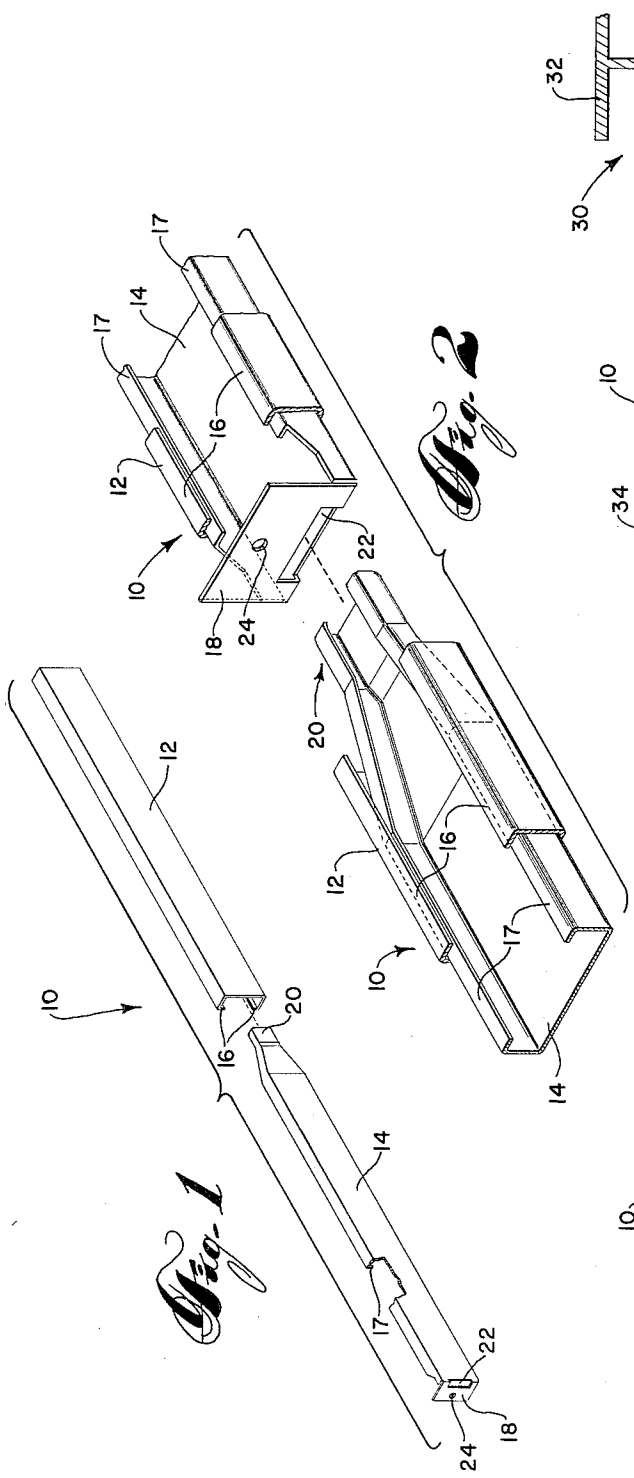


Fig. 1

Fig. 2

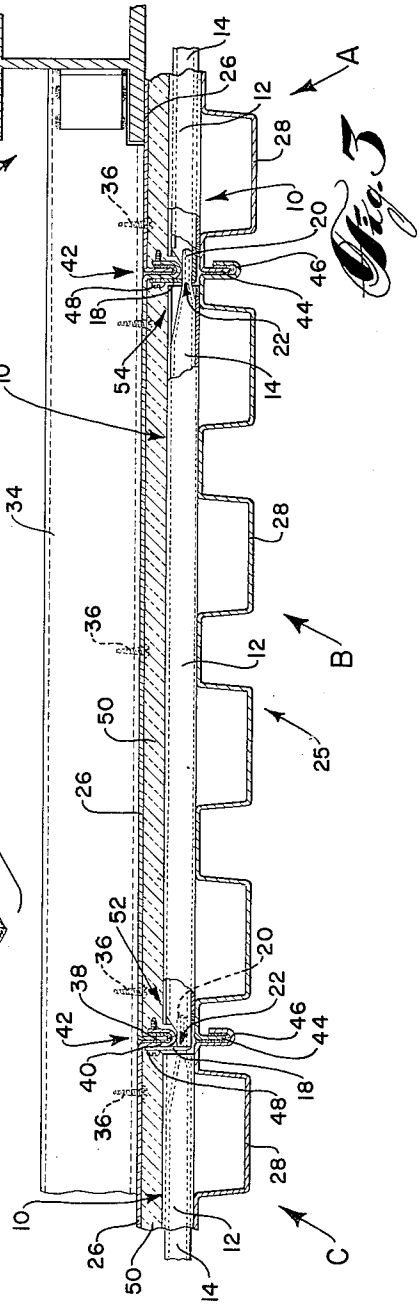


Fig. 3

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WALL STRUCTURE

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This invention relates to an improved building outer wall structure having inner and outer facing sheets. More particularly this invention relates to an improved means for connecting the inner and outer facing sheets of the wall structure.

The present invention provides improvements in the wall structure disclosed in U.S. Patent 2,876,871 issued to Coffman et al. and assigned to the assignee of the present invention. More specifically the improvements taught by the present invention lie in the prefabricated outer sheet and sub-girt system of Coffman et al.

The Coffman et al. wall structure comprises inner facing sheets which are secured to the frame work of a building. The inner facing sheets have outwardly extended interlocked male and female lips to which an upturned rear end portion is secured. A sub-girt extends transversely across and is secured to an outer facing sheet by means of welding.

In the Coffman et al. wall structure, each sub-girt is preferably formed from sheet metal in a general channel shape with inwardly turned flanges at the top of side edges thereof, the whole constituting a guide member as well as a girt and functioning as a guide for a slideable locking member. The latter has its end reduced in width to form a tongue which is adapted to slide into a slot of suitable size and shape which is formed in an upturned rear end portion of the channel-shaped sub-girt of the previously erected panel unit.

Each outer facing sheet is connected to the inner facing sheets, at one side, by means of the secured upturned end portion, which is secured to the outwardly extended male and female lips and at the other side by means of the tongue which slides into an aperture of the previously erected sub-girt. The locking member is coextensive in length with its sub-girt. Thus to drive a locking member into position, a special tool must be used. Further, the driven end is hidden from view.

The Coffman et al. assembly provides a wall structure having no visible fasteners. Where visible fasteners are tolerable, a similar wall structure is disclosed in U.S. Patent Number 2,841,253, also issued to Coffman et al. and also assigned to the assignee of the present invention.

Coffman et al. (2,876,871) provide a substantial wall structure which possesses several shortcomings. For instance the outer facing sheet is secured to the sub-girt which in turn is firmly secured at one end to the inner facing sheets. Thus little, if any, thermal expansion is accommodated in the sub-girt and outer facing sheets.

Further the locking member is retained in its locked position having one end wedged into the aperture of the previously erected sub-girt. Thus, under the proper conditions, the ever present vibrations in a building and the thermal expansion of the locking member, tend to loosen the locking members. When this occurs the outer facing sheets are free to rattle under the influence of varying wind loads and the building vibration.

Still further, the sub-girts are welded to the outer facing sheets at the factory. During the stacking, transporting and handling of the outer facing sheets, the upturned end portion is occasionally bent and must be straightened before the outer facing sheets are installed. The bending and straightening of the upturned end portion leads to fatigue failure. When the upturned end portion fails, the inner and outer facing sheets are disconnected which leads to further rattling.

Another shortcoming is found when the wall structure is dismantled. The locking member is disposed entirely within the sub-girt. Thus difficulty is encountered in loosening it. Occasionally the aperture 40 becomes enlarged so that replacement of the sub-girt is necessary before re-erection.

With these comments in mind it is the primary object of this invention to provide an improved means for connecting the inner and outer facing sheets of a wall structure.

Another object of the present invention is to provide a connecting means wherein the outer facing sheets are free to undergo thermal expansion.

Still another object of the present invention is to provide a connecting means that cannot be loosened under the influence of building vibrations or thermal expansion.

A further object of the present invention is to provide a connecting means wherein the corrosion due to dissimilar metal couples is prevented.

Yet another object of the present invention is to provide an improved connecting means for the inner and outer facing sheets of a wall structure wherein the wall structure is more easily erected or dismantled in a minimum of time and with minimum labor.

A still further object of the present invention is to provide a connecting means for the inner and outer facing sheets of a wall structure wherein the connection of the outer facing sheet to the inner facing sheet is foolproof.

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 exploded isometric view of the connecting means of the present invention;

FIGURE 2 is an isometric view illustrating the opposed ends of the connecting means of the present invention, aligned in position for assembly; and

FIGURE 3 is a cross sectional view through an assembled wall structure utilizing the present connecting means.

Reference is now directed to FIGURE 1 wherein connecting means 10, of the present invention, is illustrated in an exploded isometric view. The connecting means 10 comprises a support member 12 and a self-locking subgirt 14.

The support member 12 is U-shaped including inturned flanges 16 which are contiguous with the sides of the support member 12.

The self-locking sub-girt 14 is similarly U-shaped including inturned flanges 17.

The self-locking sub-girt 14 further includes an upturned flange 18 at one end and has its other end reduced in width and thickness to form a tongue 20. The upturned flange 18 includes a slot 22 in its lower portion and a screw hole 24 adjacent the outer portion.

Having generally described the configuration of the connecting means 10, reference is now directed to FIGURE 2. Illustrated in FIGURE 2 are the opposed ends of connecting means 10 aligned in engaging relation.

As can be seen the sub-girt 14 is slideably retained by the support member 12. Further the tongue 20 is adapted to be wedgingly engaged in the slot 22. Thus the subgirt 14 slides within the support member 12 whence its tongue 20 wedgingly engages the slot 22 of a previously erected sub-girt.

For a detailed description of the use of the connecting means 10, in a wall structure, reference is now directed to FIGURE 3. Herein illustrated, in a cross-sectional view, is a building outer wall structure 25 comprising a plurality of inner facing sheets 26 and a plurality of corrugated outer facing sheets 28,

A portion of the skeletal structure 20 of a building is also shown which comprises a vertical column 32 and

girt channels 34. The inner facing sheets 26 are secured to the skeletal structure 30, in aligned relation, by means of screws 36.

Each of the inner facing sheets 26 includes a male lip 38 and U-shaped female lip 40 on the opposed side edges. The inner facing sheets 26 are interlocked by having the male lip of one inner facing sheet project into the female lip of an adjacent inner facing sheet. The engaged male and female lips 38, 40, thus, define vertical load supporting strips 42 which are in outboard relation with the inner facing sheets 26.

The corrugated outer facing sheets 28 include a male lip 44 and U-shaped female lips 46 on the opposed side edges. The outer facing sheets 28 are interlocked by having the male lip 44 of one outer facing sheet project into the female lip 46 of the adjacent outer facing sheet.

The support member 12 is secured to and extends transversely across the outer facing sheet 28. Preferably the support member 12 is secured, to the outer facing sheet 28, by means of welding thereby providing an outer facing sheet having no exposed fasteners. Further the support member 12 is of such length that its ends terminate a short distance from the marginal side edges of the outer facing sheet 28. Thus the outer facing sheets 28 may be easily nested and shipped to the job site. With this construction there are no protruding parts which may be bent, during storage, shipping or erection. Thus the fatigue failure which occasionally occurred in the Coffman et al. (2,876,871) sub-girt is avoided.

Preferably the support member 12 is manufactured from substantially the same material as the outer facing sheet 28. Thus corrosion, due to dissimilar metal couples, is avoided. FIGURE 3 includes a fragmentary view of outer sheet 28 and inner sheet 26 labeled A, a complete view of outer sheet 28 and inner sheet 26 labeled B, and a fragmentary view of outer sheet 28 and inner sheet 26 labeled C. The sheets are erected in the building assembly in the sequence A—B—C.

As can be seen in FIGURE 3, the sub-girt 14 is slideably retained by the support member 12. The sub-girt 14 has its tongue 20 wedgingly engaged in the slot 22 of the previously erected sub-girt. Further the upturned flange 18 is secured to the next-in-line vertical load supporting strips 42 by means of a screw 48, for example, extending through the aperture 24 (see FIGURES 1 and 2). Thus the sub-girt 14 is maintained in a fixed position relative to the inner facing sheet 26. Consequently the sub-girt 14 functions not only as a sub-girt but also as a locking member which may not be loosened by the ever present vibrations in the building or by thermal expansion.

In order to minimize thermal through conduction and to further prevent corrosion due to dissimilar metals couple, the sub-girt 14 preferably is formed from sheet metal covered with asbestos felt and coated with a bituminous material. Coated metals of this type are generally described in U.S. Patent 2,764,808 issued to A. W. Coffman on October 2, 1956, and also assigned to the assignee of the present invention.

The outer facing sheet 28 is maintained in spaced outboard relation to the inner facing sheets 26 by the connecting means 10. Since the support member 12 is disposed between and spaced from the vertical load support strips 42, the outer facing sheet 28 is in effect a floating face. Thus it may undergo thermal expansion without distortion or strain.

The erection of one of the outer facing sheets 28 (B) will now be described. For the purpose of explanation the end portion, of the support member 12 which is adjacent to the male lip 44 of outer facing sheet 28, will be designated by the numeral 52. The opposed end portion, of the support member 12, will be designated by the numeral 54.

The sub-girt 14 is slid into the support member 12 with the tongue 20 protruding slightly from the end portion 54. The female lip 46 of the outer facing sheet 28 next is hooked over the male lip of the previously erected outer facing sheet 28 (A). The outer facing sheet 28 is then pivoted about the hooked male and female lips towards the inner facing sheet 26. Concurrently the tongue 20 is inserted into the slot 22 of the previously erected sub-girt 14 and wedgingly engaged therein. The upturned flange 18 engages the load supporting strip 42 and secured thereto by means of the screw 48. It should be noted that the tongue 20 of the sub-girt 14 must be pushed into positive engagement with the slot 22, of the previously erected sub-girt 14, before the upturned flange 18 is secured in place. The connecting means 10 thus provides a foolproof installation since the screw 48 cannot be inserted unless the panels and fastening means are correctly assembled.

When the present wall structure is to be dismantled, the screw 48 is first removed. The end of the last erected sub-girt 14 is visible and may be easily gripped for removal without damage to the slot 22. In this respect, the fastening means differs from that of the Coffman et al. (2,876,871) assembly.

From the foregoing description it will be apparent that the present invention provides an improved connecting means which permits the outer facing sheets to undergo thermal expansion. Further the present invention provides an improved connecting means for the inner and outer facing sheets of a building wall structure wherein the wall structure is more easily erected or dismantled in a minimum of time and with minimum labor and wherein the connection of the outer facing sheet to the inner facing sheet is foolproof.

Still further the present invention provides an improved connecting means that cannot be loosened by the influence of building vibration or thermal expansion. The present invention further provides an improved connecting means wherein the corrosion due to dissimilar metals couple is avoided.

According to the provisions of the patent statutes, I have explained the principle, preferred embodiment and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. In a building outer wall structure having a plurality of aligned interlocked inner facing sheets secured to the skeletal structure of said building, a plurality of spaced vertical load supporting strips maintained in outboard relation to said inner facing sheets and secured to the skeletal structure, a plurality of aligned interlocked corrugated outer facing sheets in spaced outboard relation to said inner facing sheets and in outboard relation to said vertical load supporting strips, and means for connecting the said outer facing sheets to said vertical load supporting strips, the improvement in said means for connecting said outer facing sheets comprising:

a support member secured to and extending transversely across the said outer facing sheet,

a self-locking sub-girt including

an upturned flange at one end and

a slotted opening in the lower end of said upturned flange,

said self-locking sub-girt being slideably retained by the said support member whereby the other end of said sub-girt is wedgingly engaged in the slotted opening of the upturned flange of the adjacent sub-girt, and

means for securing the said upturned flange to the next-in-line of said vertical load supporting strips,

said self-locking sub-girt having a length greater than the width of said outer facing sheet,

said support member having ends which terminate a

short distance from the marginal side edges of said outer facing sheet.

2. In a building outer wall structure having a plurality of aligned interlocked inner facing sheets secured to the skeletal structure of said building, a male lip and a U-shaped female lip on the opposed side edges of each of said inner facing sheets, the male lip of one inner facing sheet projecting into the U-shaped female lip of an adjacent inner facing sheet in interlocked relation, a plurality of aligned interlocked corrugated outer facing sheets in spaced outboard relation to said inner facing sheets and in outboard relation to said interlocked male and female lips, and means for connecting the said outer facing sheets to the said interlocked male and female lips, the improvement in said means for connecting the said outer sheets comprising:

a support member secured to and extending transversely across the said outer facing sheet,

a self-locking sub-girt including

an upturned flange at one end and

a slotted opening in the lower end of said upturned flange,

said self-locking sub-girt being slideably retained by the said support member whereby the other end of the said sub-girt is wedgingly engaged in the slotted opening of the upturned flange of the adjacent sub-girt, and

means for securing the said upturned flange to the next-in-line of said interlocked male and female lips,

said self-locking sub-girt having a length greater than the width of said outer facing sheet,

said support member having ends which terminate a short distance from the marginal side edges of said outer facing sheets.

3. The improvement according to claim 1 wherein the said self-locking sub-girt comprises metal covered with asbestos felt and coated with a bituminous material.

4. The improvement according to claim 2 wherein one end of said support member terminates short of said interlocked male and female lips and the other end terminates short of the upturned flange of the adjacent self-locking sub-girt.

No references cited.