March 25, 1952 D. A. WALLACE ET AL 2,590,588

STRUCTURE

Filed Sept. 7, 1946

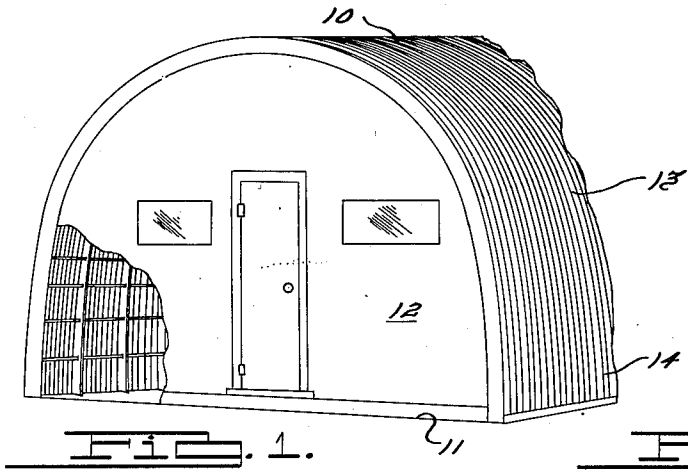


Fig. 1.

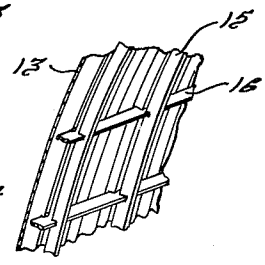


Fig. 2.

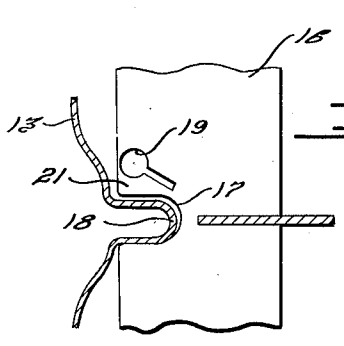


Fig. 3.

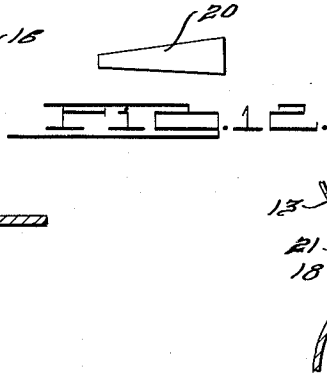


Fig. 12.

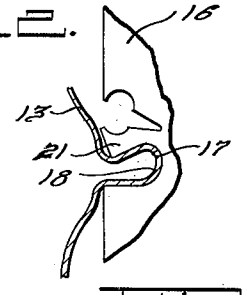


Fig. 4.

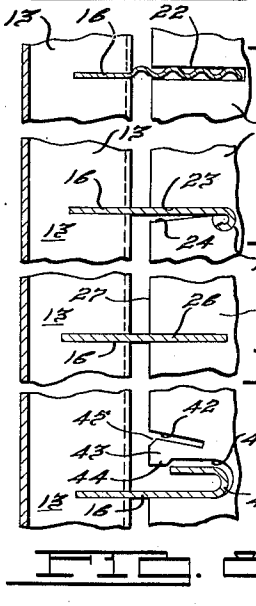


Fig. 5.

Fig. 6.

Fig. 8.

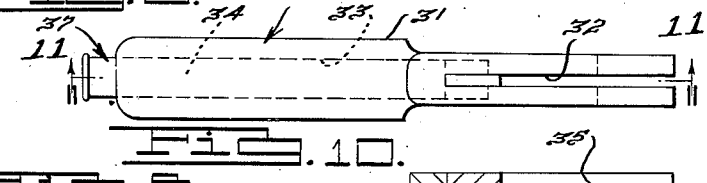


Fig. 10.

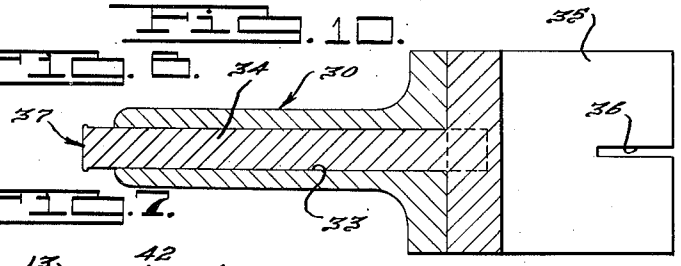


Fig. 7.

Fig. 11.

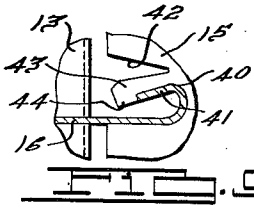


Fig. 9.

INVENTOR.
David A. Wallace
Paul Eugene Wallace
BY
Robert E. Harris
ATTORNEY.

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UNITED STATES PATENT OFFICE

2,590,588

STRUCTURE

David A. Wallace, Grosse Pointe Farms, Mich., and Paul Eugene Wallace, Omaha, Nebr., assignors, by mesne assignments, to said David A. Wallace

Application September 7, 1946, Serial No. 695,352

5 Claims. (Cl. 189—88)

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This application relates to a building structure and more particularly to an assembly of components in a metallic prefabricated building and to the individual components thereof.

A principal object of this invention is to provide a novel means by which longitudinal strips may be secured to supporting ribs for use in a building structure.

A further object of the invention is to provide a means by which strips adapted to support siding material may themselves be supported by a plurality of ribs.

Copending applications Serial Numbers 688,049, filed August 2, 1946, and 691,026, filed August 16, 1946, each now abandoned, describe means by which sheet siding elements may be secured to longitudinal strip elements by the cooperation of unique contours in the elements and the deformation of at least one of the elements. In some instances it will be found that the longitudinal strip elements referred to above are not adapted to be the ultimate support for the structure and means are provided herein to easily assemble these longitudinal strips with such ultimate supports. One example of the ultimate supports referred to is rib members secured to the foundation or floor of a building. Such rib members often extend in a vertical direction but in some buildings the ribs secured to a foundation or floor follow the entire contour of the building and even are horizontal at certain points. A typical example of a building of this type is a hemi-cylindrical building such as the famous Quonset hut. The supporting ribs in buildings of this type are substantially vertical at their point of junction with their foundation or floor and have arcuate configurations.

In certain flat wall, ceiling or roof constructions it is desirable to use relatively strong rafter or beam constructions and to supplement these rafter or beam constructions with longitudinal strips at right angles thereto which are adapted to receive and secure a surface element. The means by which supporting beams or ribs and longitudinal strips disposed in normal relationship thereto are secured together forms an object of this invention.

A further object of the invention is to provide means by which corrugated sheet metal siding elements may be assembled with rib members when the corrugations and rib members are disposed in parallel relationship.

An additional object of the invention is to provide a building structure in which the sheet siding material is secured to supporting means

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without the creation of any opening in the siding material. The elimination of openings is desirable in that they form an entrance for moisture and dirt.

In the drawings:

Figure 1 is a perspective view of a building structure provided with corrugated metal siding and supporting ribs and having the corrugations and ribs disposed in parallel planes.

Figure 2 is a perspective view of a section of the wall of the Figure 1 building.

Figure 3 illustrates an assembly of corrugated siding material in a longitudinal strip prior to deformation of the strip.

Figure 4 illustrates the Figure 3 assembly after deformation of the strip.

Figures 5 and 6 are elevations of means of securing the longitudinal strips and supporting ribs together by deformation of the strip.

Figure 7 is an elevation of a joint effected by a press fit assembly of the strip in a slot provided in the supporting rib.

Figures 8 and 9 illustrate a means to secure the strips and ribs together by deformation of the rib member.

Figure 10 is a side elevation of a tool adapted to facilitate the assembly of strips and rib members.

Figure 11 is a section on the line 11—11 of Figure 10.

Figure 12 illustrates a tapered plug used in the assembly of siding with longitudinal strips.

Referring to Figure 1 a building 10 comprising a floor 11, an end wall 12, and corrugated sheet metal exterior wall surface 13 is illustrated. The building has a hemi-cylindrical section. The corrugations 14 of the surface 13 are disposed in vertical planes.

A portion of the end wall 12 has been broken away to display the relative locations of parallel supporting ribs 15 and transversely extending longitudinal strips 16 which support the corrugated sheet metal surface 13. Figure 2 is a perspective view of a portion of the building wall illustrating in more detail the relationship between the corrugated sheet metal surface 13, the longitudinal strips 16 and supporting ribs 15.

One means of securing the corrugated sheet metal surface elements 13 to the strips 16 is illustrated in Figures 3 and 4 herein and is described and claimed in copending application Serial Number 691,026, now abandoned.

Each strip 16 is provided with a plurality of recesses 17 intersecting its outer edge. The recesses of adjacent strips are aligned in vertical

planes. The surface elements 13 are provided with channel portions 18 providing ribs having a contour adapted to be received in recesses 17 as illustrated in Figure 3. An opening 19 is provided in strip 16 adjacent the recess 17. When a tapered plug 20 (Figure 12) is inserted in the opening 19 and struck with a hammer the opening 19 is spread and ear 21 located between opening 19 and recess 17 is deformed and the recess 17 and channel rib portion 18 are constricted and the surface element 13 is secured to the strip 16. Figure 4 illustrates the assembly after the deformation has occured. A more detailed description of this means of assembly may be obtained by referring to the copending application Serial Number 691,026, now abandoned.

The means by which longitudinal strips 16 are secured to supporting ribs 15 will now be described. In the preferred construction of the building this assembly of the longitudinal strips 16 and supporting ribs 15 would be effected prior to the assembly of the surface element 13 with the longitudinal strip 16. Referring to Figure 5 the supporting rib 15 is illustrated as provided with a slot 22 extending inwardly from and normal to an outer edge of the rib 15. The strip 16 is formed of relatively thin sheet metal of less thickness than the dimension of slot 22 measured in the direction parallel to the rib 15. The ribs 15 are disposed in parallel relationship and the slots 22 of adjacent ribs are aligned, preferably in a plane normal to the ribs 15. It will thus be seen that individual strips 16 may be assembled so that each strip 16 penetrates aligned slots 22 of the ribs 15. The strips 16 by reason of their thinness, and if desired by reason of the characteristics of the metal used, are relatively deformable compared to the ribs 15. The individual strip 16 when subjected to a force located in the plane of strip 16 and aligned with the axis of the slot 22 is bottomed in the slot 22 and deformed in the slot 22 as illustrated in Figure 5. This deformation has been found to assume a wavy contour with the crests and bases of the waves engaging the side walls of the slot 22 and effecting a frictional engagement of the strip 16 with the rib 15 thereby securing them together. The sheet metal siding element 13 may then be secured to the strips 16 as illustrated in Figures 3 and 4 and described above.

In Figure 6 an alternative means of assembling a longitudinal strip and a supporting rib by deformation of the strip is illustrated. Each rib member 15 is provided with a plurality of spaced slots 23 extending inwardly from an outer edge thereof and directed generally normal to that edge. The slots of adjacent rib members are aligned. Each slot 23 preferably has an entrant portion 24 of relatively great width to facilitate the entrance of a strip 16 into the slot. The upper edge of the slot 23 is preferably normal to the outer edge of the rib 15 throughout most of the length of the slot. The inner portion of the slot 23 has a width substantially equal to the thickness of the rib 16 and is deflected from the outer portion of the slot. In Figure 6 the inner portion 25 of the slot 23 is illustrated as being deflected to a substantially U-shape. The strip 16 is relatively deformable compared to the rib 15. It will thus be seen that when a portion of the strip 16 penetrates the slot 23 and has a force applied thereto normal to the outer edge of the rib 15 the strip 16 is forced into the slot and assumes the deformed contour of the slot. In Figure 6 the leading edge of the strip assumes the U-shape contour of the slot 23 and the strip 16 and rib 15 are thereby locked together. A surface element 13 and strip 16 may then be assembled as illustrated in Figures 3 and 4.

In Figure 7 the rib 15 is illustrated as provided with a plurality of spaced slots 26. The slots 26 are normal to the outer edge 27 of the rib 15. The slots are rectangular in shape. The strips 16 have a thickness substantially equal to the length of the minor axis of the rectangular slots 26. A press fit of a strip 16 in the aligned slots 26 provided in adjacent ribs 15 is thus facilitated. The sliding elements 13 may be assembled with the strips 16 as illustrated in Figures 3 and 4.

Figures 10 and 11 illustrate a tool adapted to facilitate the application of force to the strips 16 as required in the assemblies of Figures 5, 6, and 7. This tool 30 comprises a stationary portion 31 having a slot 32 therein adapted to receive a rib 15. The rib 15 supports the portion 31. The portion 31 is provided with a track or cylinder 33. A movable portion 34 of the tool 30 has a portion adapted to cooperate with cylinder 33 and slide therein. The moveable portion also is provided with a base 35 containing a slot 36 adapted to receive a strip 16 therein. The moveable portion 34 is also provided with a head 37 extending beyond the stationary portion 31. The slots 32 and 36 are disposed in planes which are perpendicular to each other. It will thus be seen that when a strip 16 is assembled in a slot of a rib 15 that the tool 30 may be positioned with its slot 32 receiving the rib 15 and its slot 36 receiving the strip 16. When the head 37 of the tool 30 is struck with a hammer the force and motion are transmitted by the moveable portion 34 of the tool 30 and guided by the cylinder or track 33. Thus the force is applied in the desired direction and undesired deflection of strip 16 outside of the slot in rib 15 is prevented by the cooperation of the head 35 and slot 36 in the tool.

In Figure 8 a means of assembling a rib 15 and a strip 16 by the deformation of a portion of the rib and the incidental deformation of a portion of the strip 16 is illustrated. The rib 15 is provided with a recess 40. The strip 16 is formed with the leading portion 41 thereof bent back upon itself to form a substantially U-shaped section. This portion 41 may be continuous or in the nature of tabs struck out of the strip 16 and bent back upon the strip 16 at intervals corresponding to the distances between ribs 15. The portions 41 are adapted to be received in recesses 40. In the vicinity of the recesses 40 the ribs 15 are provided with slots 42 extending inwardly from the outer edges of the ribs 15. The slots 42 in combination with the recesses 40 form deformable ears 43 in the rib members 15. A tapered instrument may be inserted in the widened entrant portion 45 of slot 42 and when a force is applied in the direction of the axis of the slot 42 the ear 43 is deformed into the recess 40 thereby constricting the recess 40 and deforming portion 41 of the strip 16 to secure the strip 16 and rib 15 together. Figure 8 illustrates the components prior to the deformation and Figure 9 illustrates the components after deformation. It is to be understood that recesses 40 of adjacent ribs 15 are aligned to receive a strip 16 as illustrated in Figure 2. The ear 43 is preferably provided with an inwardly extending tab portion 44 and the portion 41 of the strip 16 preferably is limited in its length so that it does not extend outwardly of the recess 40 beyond the tab por-

tion 44. Thus when the ear 43 is deformed the tab 44 forms a positive lock with the extreme end of the portion 41 of strip 16. The surface element 13 may be assembled with the strip 16 in the usual manner as illustrated in Figures 3 and 4.

We claim:

1. In combination in a prefabricated building construction, a sheet metal building frame rib having a slotted edge, a sheet metal cross frame member having a margin secured within said slotted edge of the frame rib member and extending cross-wise of the frame rib member to opposite sides thereof, the opposite margin of said cross frame member being slotted, and a sheet metal sheathing panel having an inturned rib secured within the slotted margin of said cross frame member.

2. In combination in a prefabricated building construction, a sheet metal frame rib member having a slotted edge, a sheet metal sheathing panel having an infolded attachment rib extending parallel to and in spaced relation to said slotted edge of the frame rib member, and a cross frame member against the outer edge of which said panel member is disposed and having an outer edge slot within which said infolded rib is received, one side portion defining said cross frame slot being deformed into interlocking relation with said rib, the inner margin of said cross frame member being disposed within the slotted margin of said frame rib member and held therein by the interengagement of the opposing portions of the cross frame member and the frame rib member within the frame rib slot.

3. In a prefabricated building construction, a sheet metal frame rib having an edge with an inwardly extending slot therein, the inner end portion of the slot having a rounded contour and being enlarged laterally to one side of the slot, and a sheet metal cross strip having a margin in said slot and engaging against one side of the slot, the terminal portion of said margin being turned generally complementary to the curved inner end of the slot and having a terminal flange extending into said lateral enlargement of the slot and with the edge of the terminal flange directed generally outwardly, said rib having a portion disposed outwardly at said slot enlargement and opposing said terminal flange edge to retain the cross strip against withdrawal from the slot, the outer margin of said cross strip being disposed to receive and support a covering panel.

4. In a prefabricated building assembly, a relatively heavy gauge sheet metal frame rib having an edge including a slot extending inwardly therefrom and diminishing in width toward the bottom of the slot, the bottom of the slot having an enlargement toward one side and with the most restricted portion of the slot immediately adjacent the enlargement, and a transverse frame strip of sheet metal of a gauge deformable as compared to the frame rib and of a thickness substantially equal to the width of the slot at its most restricted portion, said frame rib having a margin in said slot and with the terminal portion of the margin deformed laterally into said slot engagement and with the edge of the deformed portion of the margin directly generally outwardly and into retaining opposition to the outermost portion of the frame rib defining said enlargement adjacent to said restricted portion of the slot to retain the strip against withdrawal from the slot.

5. In assembling prefabricated building components including a frame rib of sheet metal of substantial gauge having a slot in an edge thereof including a rounded bottom and a lateral enlargement adjacent said rounded bottom, within which slot a sheet metal transverse strip of lighter gauge and deformable relative to the frame rib is to be assembled, inserting a margin of the strip in said slot, and applying force to the opposite margin of the strip normal to said opposite margin and directed into said slot until the margin of the strip in the slot is deformed into a terminal curl against said rounded bottom and into said slot engagement.

DAVID A. WALLACE.
PAUL EUGENE WALLACE.

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