March 10, 1959 A. W. COFFMAN ET AL 2,876,871

WALL PANEL

Filed July 29, 1953

2 Sheets-Sheet 1

Fig. 1

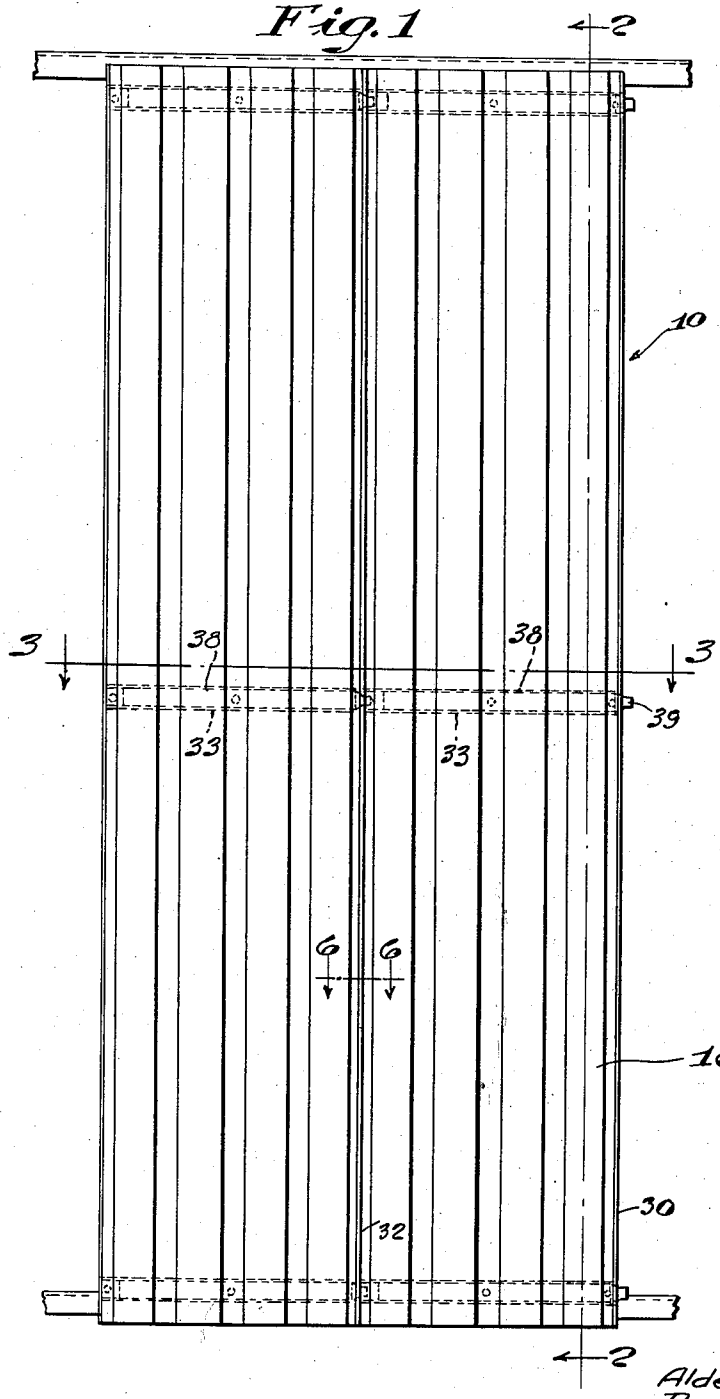
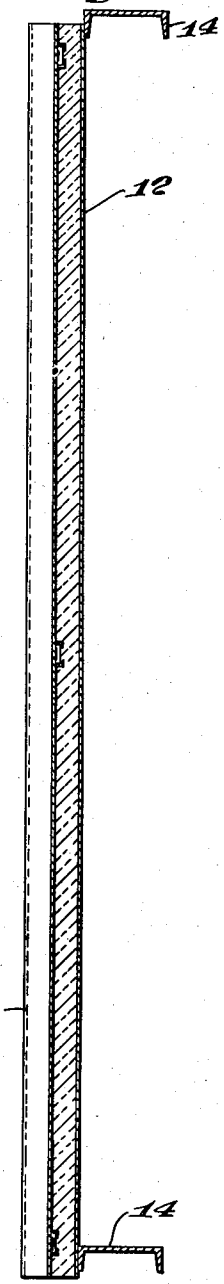


Fig. 2



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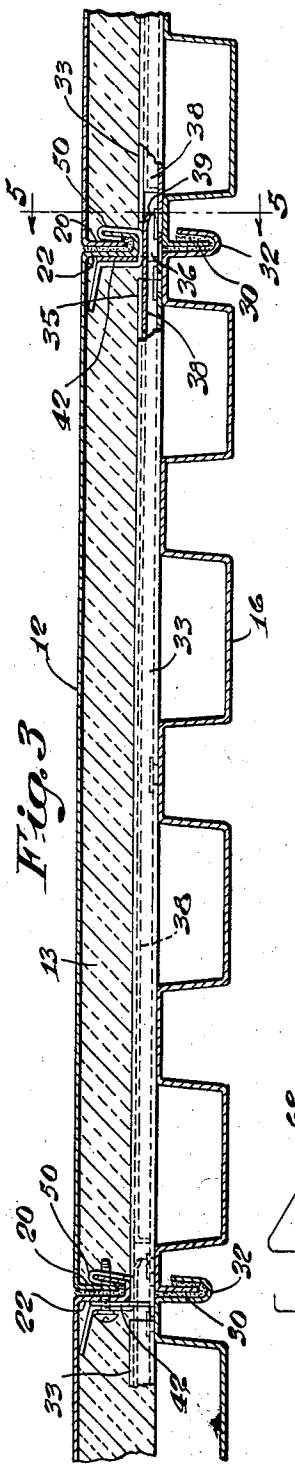

Fig. 3

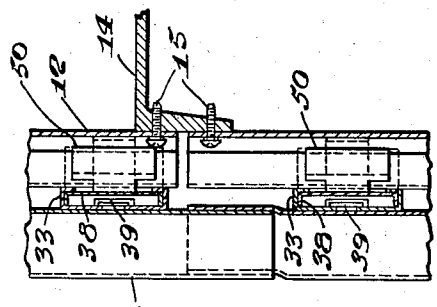

Fig. 7

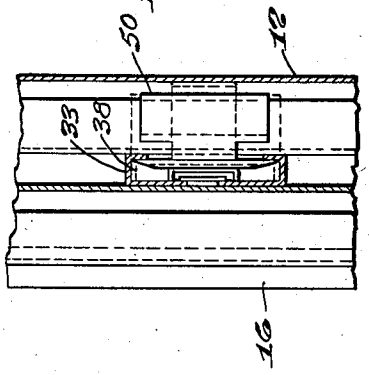

Fig. 5

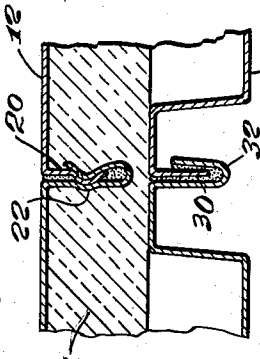

Fig. 6

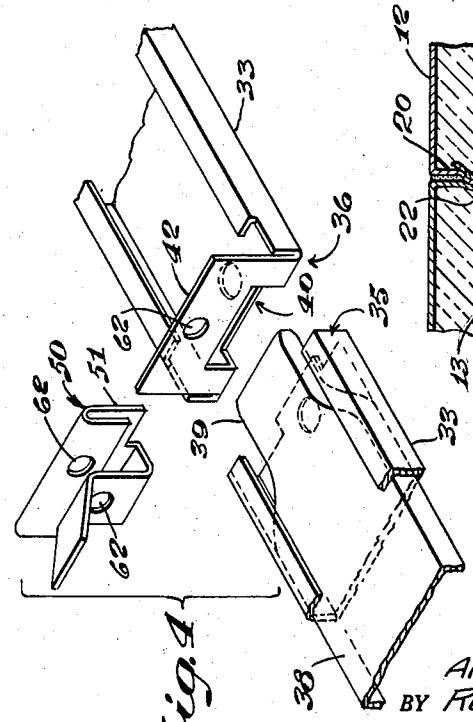

Fig. 4

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WALL PANEL

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6 Claims. (Cl. 189—34)

This invention relates to a wall panel.

In general the object of the invention is to provide a novel insulated sheet metal wall panel which may be erected and dismantled in a minimum of time and with minimum labor.

A further object of the invention is to provide a novel wall panel structure embodying a plurality of panel units and novel means of detachably securing together the panel units to enable the wall panel structure to be quickly and easily erected and taken down when it is desired to move the structure.

A still further object of the invention is to provide a novel method of erecting the present insulated sheet metal wall panel by which the wall panel structure may be erected in a minimum of time and with minimum labor.

With these general objects in view and such others as may hereinafter appear, the invention consists in the wall panel units, in the wall panel structure and in the fastening means for the erection of the wall panel units, and the various structures and parts thereof hereinafter described and particularly claimed at the end of this specification.

In the drawings illustrating the preferred embodiment of the present invention:

Fig. 1 is a side elevation showing a portion of the assembled wall panel structure;

Fig. 2 is a cross section of the assembled panel structure illustrated in Fig. 1 taken on the line 2—2;

Fig. 3 is a cross section of the present panel structure taken on line 3—3 of Fig. 1;

Fig. 4 is a perspective view of the clip, the channel and the slidably mounted locking bar components of the present fastening means;

Fig. 5 is a cross section taken on line 5—5 of Fig. 3;

Fig. 6 is a vertical sectional detail taken on line 6—6 of Fig. 1 showing the dimpled lips preferably employed; and

Fig. 7 is a cross-sectional detail of portions of two vertical panel units of the present panel structure, showing also the structure secured to the building framework.

In general the present invention contemplates an insulated sheet metal wall panel structure comprising a plurality of panel units erected side by side and each unit comprising an inner sheet metal facing sheet adapted to be secured to the framework of the building. The inner sheet metal facing sheet of each unit is provided with outwardly extended lips on the two side edges thereof, one being a male lip and the other a female lip, and with the male lips of one panel unit projecting into the female lip of an adjacent unit. The insulated sheet metal wall panel further comprises a prefabricated outer sheet and sub-girt system, which is adapted to be erected as will be described and cooperate with the previously erected inner facing sheet to form the completed panel structure. Preferably, a plurality of sub-girts are affixed to and extend transversely across the outer sheet, and provision is made for securing the sub-girts of the outer sheet unit to the inner facing sheets through connections to the outwardly extended lips of the inner facing sheets. The outer facing sheets are each provided with a slidable locking member which is adapted during the erection of successive outer sheets to be slid into locking engagement with portions of the next previously erected panel unit of the panel structure to lock the adjacent end of the outer sheet of each panel unit to the next previously erected panel unit. In accordance with the preferred method of erection, successive adjacent inner facing sheet units are secured to the framework of the building with the contiguous male and female lips in interlocking engagement. The outer facing units comprising the outer facing sheets and the sub-girts forming a unit therewith, are then erected one after the other, starting at one marginal portion of the panel structure. As each outer section of a panel unit is being erected the free or rear end of each outer facing unit is fastened to the adjacent lips of the two adjacent inner sheets and for sliding the locking member of the outer facing unit being erected into locking engagement with the next previously erected outer facing unit, and these operations are repeated across the face of the entire panel structure to be erected. The interior of the inner facing unit is preferably filled with insulating material 13 as the erection proceeds.

Referring now to the drawings illustrating the preferred embodiment of the invention, the present wall panel structure indicated generally at **10** comprises a series of panel units adapted to be erected upon the framework of a building and to be secured thereto. Each panel unit comprises an inner facing sheet **12** which is attached to the framework of a building, herein shown as horizontally disposed steel girders **14**, by means of bolts **15** or otherwise. Each inner facing sheet is provided along its opposite marginal edges with outwardly turned lips, one lip **20** comprising a male lip and the second lip comprising a female lip **22**. As adjacent sheets **12** are erected upon the framework of a building, the male lip of one sheet is inserted into the female lip of the adjacent sheet. In erecting the panel units it is preferred to first erect all of the inner facing sheets **12**.

The outer section of each panel unit comprises an outer sheet metal facing sheet **16** which is preferably corrugated and also provided along its marginal edges with corresponding male and female lips **30**, **32**. The inner face of the outer facing sheet **16** is provided with a plurality of sub-girts **33** extending at spaced intervals transversely across the inner face of the sheet, and as herein shown, each sub-girt **33** comprises a U-shaped channel member secured as by welding to the inner face of the outer sheet **16** and which is preferably of a length with relation to the width of the outer sheet **16**, so that the forward end **35** thereof terminates a short distance within the margin of the sheet and the rear end **36** projects slightly beyond the margin of the sheet, as illustrated in Fig. 3. Provision is made for securing the sub-girt **33** at its forward end to the sub-girt of the previously erected unit of the panel structure being erected by a slidable locking member **38**, as will be described, to thus secure one outer section to the next previously erected outer section. At the rear end of each section provision is made for attaching the rear end of the sub-girts of one section to the cooperating male and female lips immediately adjacent thereto, as indicated in Fig. 3.

Referring now to Fig. 4, each sub-girt is preferably of sheet metal formed into general channel shape with inwardly turned flanges at the top of the side edges thereof, the whole constituting a guide member as well as a girt and functioning as a guide for a slidable locking member **38**. The latter has its end reduced in width and constitutes a tongue **39** adapted to be slid into a slot **40** of suitable size and shape formed in an upturned rear end portion **42** of the channel shaped sub-girt of the previously erected panel unit.

In order to secure the rear end portion of each outer facing sheet to the previously erected inner facing sheets, it is preferred to utilize a clip 50 formed of sheet metal and bent into the shape illustrated in Fig. 4. The clip is provided with a hooked portion 51 designed to hook over the free and upturned end of the female lip of the second of two abutting inner facing sheets and to be threaded through the opening or slot 40 in the upturned rear end portion 42 of the sub-girt. In practice a plurality of these clips 50 will be mounted upon the free end of the female lip as described at spaced intervals along the length of the sheet corresponding to the positions of succeeding sub-girts of the unit. In this manner the rear end of the outer facing unit is secured to the previously erected inner facing units which as above described have been bolted or otherwise secured to the framework of the building.

In the general operation of erecting the present panel units, the inner facing sheets are secured to the framework of the building, as above described, and then starting at the right-hand marginal edge of the panel structure the first outer facing unit is erected by first projecting the locking member into a suitable slot or locking opening formed in the finishing or end member of the panel, and then the rear end of the first outer facing unit is secured to the female lip of the inner facing unit of the second panel unit by the clip 50, as above described. The insulating material will have been positioned within the first facing unit prior to the erection of the first outer facing unit. After the first outer facing unit has been thus erected, the succeeding outer facing units are then erected in a similar manner with the locking members 38 projected by force supplied to the rear end thereof into a locking position, such as is shown in Fig. 3, wherein the tongue 39 is inserted in the slot 40 in the upturned end of the rear portion of the sub-girt of the previously erected panel unit.

In practice we may prefer to additionally fasten the clips, lips and upturned end of a panel of a sub-girt by a screw threaded through field drilled holes 62 in the clip and upturned end of the sub-girt, as shown in Figs. 3 and 4. This type of fastening may be used if found of advantage at one or more intermediate sub-girts in the length of each panel unit and serves to prevent any relative vertical displacement of one panel unit with relation to the next panel unit.

In some instances we may prefer to produce the sub-girt from protected metal of the type wherein a fibrous sheet is bonded to a steel core sheet by an interposed body of metal adhesive, such as the zinc of a galvanizing coating, and in such instances the well known button type of weld may be used to secure the sub-girts to the outer facing sheets when the sub-girts are made of such protected metal. As illustrated in Fig. 6, in order to provide a tight connection between the male and female lips of adjacent sections of the inner sheet, we may prefer to dimple the components of such lips, as illustrated in Fig. 6, and this operation may take place in the field. The interlocked lips of both outer and inner facing units may be caulked with a suitable caulking compound.

From the description thus far it will be observed that the present structure of panel unit and its method of erection reduces to a minimum number of field operations required, such as drilling holes for the reception of fasteners to secure the units together. The outer and inner sections comprising each unit are substantially prefabricated so that when the material arrives at the job it may be erected with minimum field labor, and the method of erecting the successive units requires minimum labor, as all of the operations of fastening the sub-girts by means of the clips to the lips of the previously erected inner facing sheets requires a minimum drilling, whereas the erection of the outer facing sheets involves merely the application of pressure to the rear end of the locking bar 38 by a suitable tool to project the locking end 39 into the previously formed slot in the upturned end of the sub-girt of the previously erected panel unit, and conversely, when it is desired to dismantle the panel unit structure the reverse operations may be performed, and by means of a suitable hooked tool the locking bar 38 may be slid to the left, viewed in Fig. 3, to thereby withdraw the locking tongue 39 from the slot in the upturned end of the next unit.

As thus described it will be seen that the present panel structure provides economies in both labor and materials compared to prior structures, effecting economies in labor costs both in the prefabrication and in the erection of the panel units, and that the present panel structure also provides a highly flexible structure in that it may be erected or dismantled simply and quickly. Furthermore, when the panel structure embodies sub-girts 33 and clips 50 provided with a protective covering, such as a fibrous sheet bonded to the metal, thermal conductivity through the panel is reduced to a minimum. It will also be seen that when the panel structure is produced from uncovered metal, the structure may be erected with no exposed surface fasteners visible.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. An insulated sheet metal wall panel structure adapted to be mounted on the framework of a building, comprising a plurality of panel units erected side by side, each unit comprising an inner sheet metal facing sheet adapted to be secured to said framework and having outwardly extended lips on the two side edges thereof, one lip being a male lip and the other a female lip, said male lip of one panel unit projecting into the female lip of an adjacent panel unit, a pre-fabricated outer sheet and sub-girt system including a metal facing sheet having a plurality of spaced, lightweight sheet metal sub-girts secured to and extending transversely across said outer facing sheet, each sub-girt having an upturned portion at one end, means for securing said upturned portions to the outwardly extending lips of the inner facing sheet, each upturned portion having a slotted opening, locking members slidably retained on each of said sub-girts, said locking members being slidably moved into locking engagement within the slotted openings of the unit adjacent thereto to connect the respective sub-girt and its associated outer facing sheet to said unit adjacent thereto, a body of insulation filling the space within the inner facing sheets and the lips thereof, and means for connecting the adjacent marginal side edges of said outer facing sheets.

2. An insulated sheet metal wall panel structure as defined in claim 1 wherein the outer facing sheets are corrugated and the sub-girts are secured to and form a unit with the inner face of the corrugated outer sheets, and wherein one end of each slidable locking member is smaller in width than the slotted opening of the adjacent panel unit whereby said locking member may be moved transversely and received within said slotted opening to interlock the panel unit of said locking member with said adjacent panel unit.

3. On insulated sheet metal wall panel structure as defined in claim 1 wherein the sub-girts are channel shaped to slidably guide said locking member.

4. An insulated sheet metal wall panel structure as defined in claim 3 wherein the forward end of each channel shaped sub-girt terminates a short distance from the adjacent marginal portion of its outer sheet, and wherein the upturned rear end of each sub-girt projects a short distance beyond the adjacent marginal edge of its outer sheet.

5. An insulated sheet metal wall panel structure as defined in claim 4 wherein the slidable locking member is coextensive in length with its sub-girt and is slidable

into locking position with an adjacent sub-girt by pressure applied to the rear end of the locking member.

6. An insulated sheet metal wall panel structure as defined in claim 5 wherein the means for securing the upturned portion to the outwardly extended lips of the inner facing sheets includes a bendable metal clip hooked over said female lip and extended downwardly and laterally through said slotted opening and then upwardly parallel to the upturned portion.

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