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J. B. PIATT

2,523,920

REINFORCED WALL STRUCTURE

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2 Sheets-Sheet 1

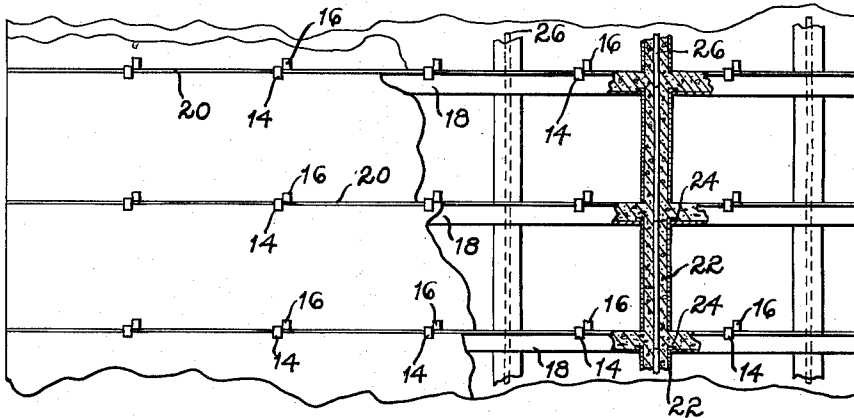


FIG. 2

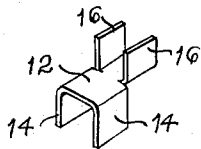


FIG. 3

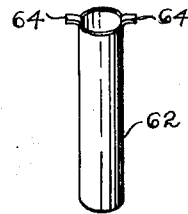


FIG. 6

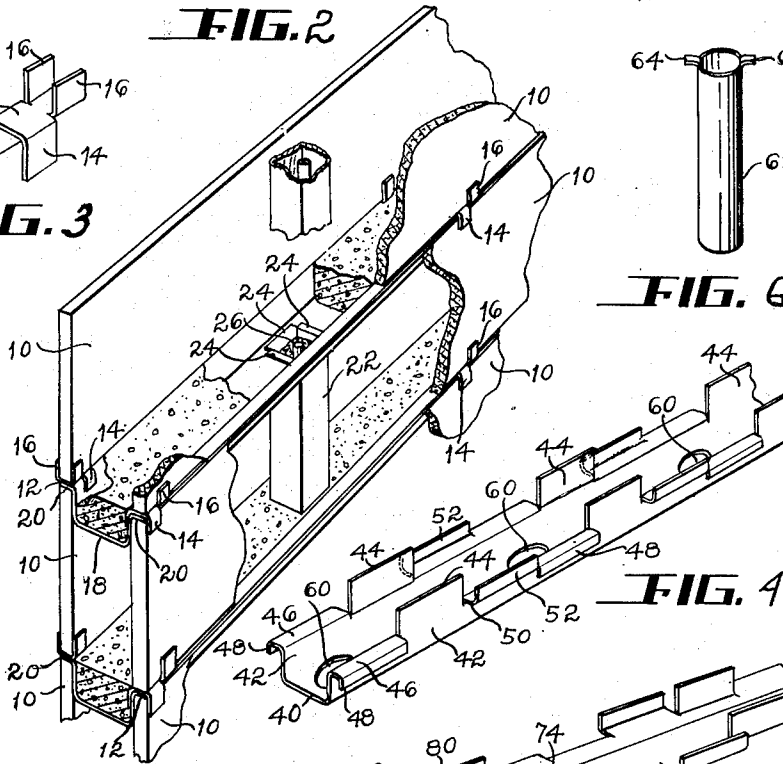


FIG. 4

FIG. 1

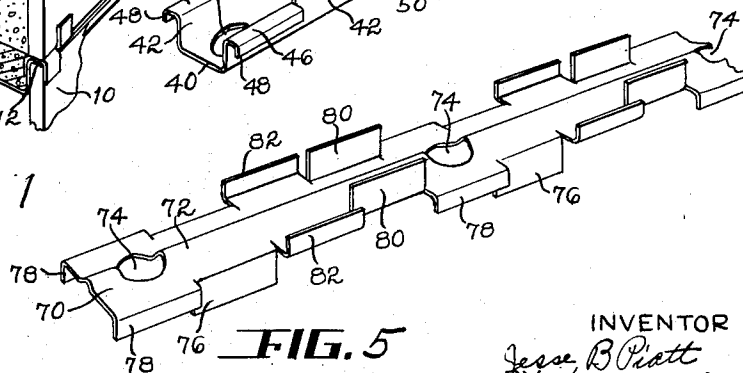


FIG. 5

INVENTOR
Jesse B. Piatt
BY
H. G. G. G. G.
ATTORNEY

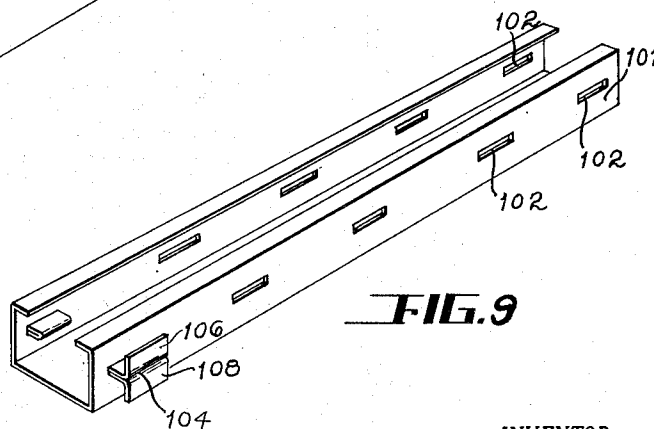
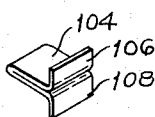
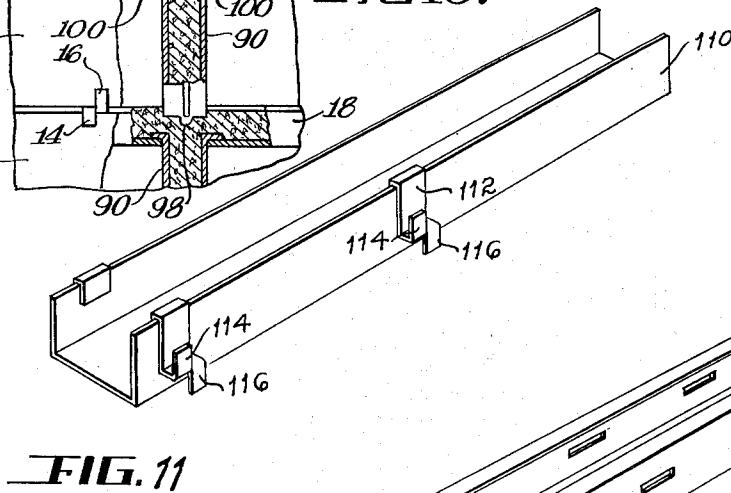
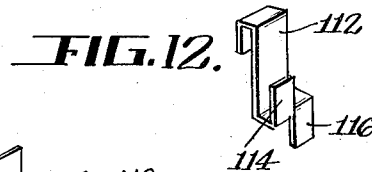
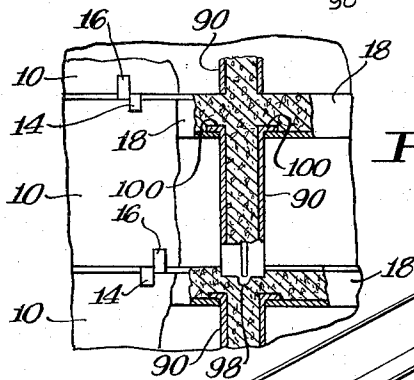
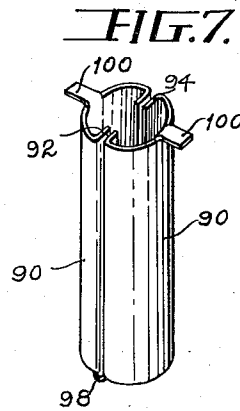
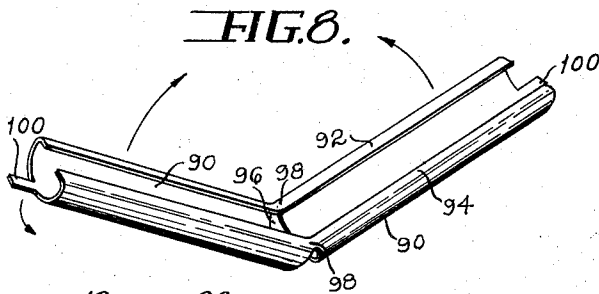
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INVENTOR.
JESSE B. PIATT

BY

Henry G. Ogberg
ATTORNEY

UNITED STATES PATENT OFFICE

2,523,920

REINFORCED WALL STRUCTURE

Jesse B. Piatt, New Lebanon, Ohio

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7 Claims. (Cl. 72-16)

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This invention relates to a building construction or the like and more particularly to a building construction utilizing sheet material held in position by a plastic material held in forms, which plastic material may consist of concrete but not necessarily limited to concrete.

An object of this invention is to provide a skeleton wall construction utilizing concrete or other plastic material poured in position in situ after the adjacent sheet material has been assembled in position, the forms for at least some of the plastic material functioning as a temporary structure to hold the sheet material in position until the plastic material has been poured.

Another object of this invention is to provide a frame structure for supporting panel-like sheets, which frame structure forms a light weight network throughout the wall, bracing the wall both horizontally and vertically.

Another object of this invention is to provide a skeleton form assembly for the plastic frame structure, which skeleton form assembly is assembled with the sheets prior to pouring the plastic material.

Another object of this invention is to provide a mode of constructing a building wherein temporary forms are constructed in sections, the section being supplied with plastic material followed by the construction of a subsequent section, likewise having a plastic material poured therein, so as to progressively erect the building in sections, the sections being successively completed as soon as the plastic material has been poured.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawings:

Figure 1 is a perspective view of a portion of a wall with parts broken away and shown in section.

Figure 2 is a side elevational view with parts of the panels broken away and showing a portion of the frame structure in section.

Figure 3 is a perspective view of a clip used in retaining the panels in position.

Figure 4 is a perspective view of a portion of a channel member disclosing a modification.

Figure 5 discloses another modification.

Figure 6 is a perspective view of a tubular member adapted to be used with the modifications disclosed in Figures 4 and 5.

Figure 7 discloses another modification of a tubular form member.

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Figure 8 is a perspective view of a blank in the process of being bent into shape.

Figure 9 is a perspective view of another type of channel.

5 Figure 10 is a retaining member that may be used in connection with the channel shown in Figure 9.

Figure 11 discloses another modification of a channel.

10 Figure 12 is a hook that may be used with this channel.

Figure 13 is a side elevational view, with parts of the panels broken away, showing a frame structure using tubular members of the type 15 shown in Figure 7.

Referring to the drawings, the reference character 10 indicates sheet metal panel members that may be made from plywood, wallboard, prefabricated impregnated panels, or any other suitable sheet material. These sheets are held in position by a plurality of clips 12 provided with downwardly projecting tongues 14 and upwardly projecting tongues 16. The downwardly projecting tongues 14 overlap the outside of the top 25 edge of the panels 10 and engage the inner wall of a sheet material channel member 18 provided with outwardly projecting flanges 20. The flanges 20 are positioned between the sheets or panels. The channel member 18 is provided 30 with spaced openings in the bottom thereof receiving form members or tubular members 22 that may be square in cross sectional area or rectangular in cross sectional area and provided with flanges 24 engaging the upper side of the 35 bottom of the channel 18. The cross sectional area of members 22 is dependent upon the load to be supported, the strength of the materials used et cetera.

Reinforcing rods 26 may extend through the 40 tubular members 22. These reinforcing rods are preferably broken or interrupted at the termination of each section.

The structure is preferably assembled in tiers. The channel members 18 are laid on top of a pair of panel members 10. The lower margins of the panel members 10 supporting the newly laid channel member 18 are held in position by the upstanding portion of the clips or fastening members 12 overlying the channel immediately 50 below. The clips or fastening members 12 are then inserted along the top margin of the channel 18 and the panels 10 of the tier in the process of assembly. After the channel member has been mounted in position and clips 12 assembled, the form members 22 are inserted into the apertures in the bottom of the channel 18. The re-

enforcing rods 26 are preferably positioned in the center of member 22. As best shown in Figure 2 of the drawing, the form members are not long enough to extend the full vertical distance from the bottom of one channel to the bottom of an adjacent channel for a purpose explained hereinafter.

Concrete, or any other suitable plastic, is then poured into the upper ends of the forms 22 through the apertures or holes formed by form members 22, so as to flow into the channel member 18 located therebelow through the clearance provided between the lower ends of the forms 22 and the adjacent channel. The concrete is preferably quite fluid, so that it will flow into the channel. The upper channel is not filled at this time. The form member 22 need not be filled to the top, as it will be filled when the subsequent tier is inserted. The concrete, together with the form members 22, cooperate to form vertical columns. Panel members 10 forming the subsequent tier are then put into position, channels 18 hooked on top, members 22 passed through the apertures in the bottom of the channel member, the reinforcing rods inserted and the operation repeated.

Thus, the building is erected tier by tier. The panels may be any suitable height, as for example, one foot, sixteen inches, twenty-four inches, more or less. The apertures in the bottom of the channels are preferably so spaced that the concrete frame work forms square areas. The concrete does not come in contact with the panels, thereby reducing heat losses and reducing the chances of condensation forming along the concrete frame structure. The channel members and the form members may be made from sheet metal or from plastic material and for some purposes possibly from fabricated sheet material formed into proper shape or contour. The clips or fastening members 12 are made from any sheet material, preferably sheet metal.

After the tiers have been constructed so as to complete the walls, a channel member may be inserted along the top and in due course filled with concrete, so as to provide a plate.

The cracks between adjacent panels, between abutting ends of the panels and along the corners are preferably caulked by a suitable caulking compound. The wall thus constructed is provided with dead air spaces between the channels that function as insulation. The panels may be made from insulating material, which adds to the insulation of the building. The concrete, together with the form members and the channel members, form a rigid frame structure formed in situ.

In Figure 4 a modified channel member has been shown. In this modification the channel 40 has been provided with side walls or flanges 42 having upwardly extending tongues 44 parallel to the side walls or flanges 42, horizontally disposed flange portions 46 merging into downwardly projecting flanges 48 and horizontally disposed flange portions 50 merging into upwardly projecting flanges 52. The downwardly projecting flanges 48 cooperate with the side walls 42 to grip the upper margin of the panels. The panels inserted above the channel have their lower edges supported by the tongues 44 and the flange portions 52. By this arrangement the clips 12 are not required, in that the clips are, so to speak, built into the margins of the channels. In the modification disclosed in Figure 4, round apertures 60 are located in the bottom of the channel,

so as to accommodate tubular form members like the tubular form member 62, shown in Figure 6, provided with ears 64, for suspending the tubular form member upon the bottom of the channel.

Whether the form members be rectangular, as form member 22, or round as form member 62, depends upon the material that is available and the requirements of the building.

In Figure 5 a ribbed sheet metal member 70, provided with a rib 72 and a plurality of apertures 74 has been shown. This member is provided with pairs of downwardly deflected flange portions 76, adapted to be mounted on the inside of the upper margin of the panel and downwardly projecting flange portions 78, adapted to engage the outer upper margin of the panel, so as to hold the panels in position and to provide a support for the tubular member 62 and a base for supporting concrete poured between the panels, in a manner similar to the concrete poured into the channels in the preferred embodiment. Member 70 has also been provided with upwardly projecting flanges 80, adapted to engage the inner side of the lower margin of the panels and flanges 82, adapted to engage the outer side of the lower margin of the panels. This modification eliminates the use of a clip and functions as a support for concrete that may be poured between the overlying panels, so as to provide a rigid support for the lower margins of the panels, which concrete is preferably poured through the tubular members 62 which are eventually filled with concrete and form the studding for the wall.

The tubular form members, whether they be rectangular or round, are arranged in spaced relation from the bottom of the channel member or form member extending along the bottom of the tier, so that when the concrete is poured into the tubular member it is permitted to flow into the channel member or the form member separating the tiers. The only weight that is supported by the concrete in the tubular member during the pouring operation is its own weight, in that the concrete used in the subsequent tier is not poured until after the concrete has set in the tubular member sufficiently to sustain the weight. Furthermore, the clearance between the lower ends of the tubular members and the next lower channel members relieves the pressure of the soft concrete and allows the excess water forced out from the concrete during the setting of the concrete to escape. In view of this fact, the pressure of the concrete at the very bottom of each vertical column of concrete is considerably less than if one were to use one long continuous vertical tube extending all the way from the upper edge of the wall to the bottom of the wall. Thus by using a plurality of short sections rather than one long section there are a number of advantages in addition to the ease of handling the short sections.

The tubular members in successive tiers are aligned vertically, so that when the wall is completed, the tubular members form continuous studding-like supports extending from the bottom to the top of the wall to thereby support the weight of the structure. The reinforcing rods, if used to reinforce the concrete in the tubular members, reinforce the wall from bottom to top. The concrete below the tubular member, spreading out into the channels, strengthens the wall, so as to resist stresses, thereby maintaining the wall in a vertical position. The channels are preferably filled with concrete from one tubular member to each of the adjacent tubular members, so

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that the concrete in the channels between the panels gives rigidity to the wall.

When the concrete has been poured, the channel-like members 18 encase three sides of the horizontally disposed tiers of concrete and the tubular members cooperating with the channel members completely encase the vertical columns with the forming members, so that the form members reinforce the concrete—both the horizontal spans of concrete and the vertical spans of concrete.

Figures 7 and 8 disclose a tubular member that is formed from a single sheet curved so as to form a semi-cylindrical member 90, having a pair of diametrically disposed marginal flanges 92 and 94, and a transverse slit 96 in the center, so as to permit the ends to be brought together. By bringing the ends together, a tubular member is formed having the bottom held together by the flange portions 98 and the top held together by the edges of the hole in the bottom of the channel. Suitable tongues 100 are used in suspending the tubular member from the channel 18 or the channel 40 or form member 70, as the case may be.

In the modification disclosed in Figures 9 and 10, another type of a horizontally disposed channel has been shown. The channel 101 has the walls thereof provided with slots 102 adapted to receive clips or supporting members 104 that may be made from sheet metal and folded so as to provide a pair of flanges 106 and 108. The main body of 104 is projected into the slots 102 and the flanges 106 and 108 are adapted to engage the outside of the panels both above and below the channel member 101. One side of the panels abuts the side wall of the channel and the opposite side is held by the flanges 106 and 108.

In the modification disclosed in Figure 11, the channel 110 is adapted to receive clips 112, each provided with a hook portion adapted to engage the wall of the channel. The clip members 112 terminate in a pair of flange portions 114 and 116, the flange portion 114 projecting upwardly and the flange portion 116 projecting downwardly.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. In a wall structure including horizontally disposed channel members arranged in parallel tiers, said channel members having apertures in the bottom thereof, form members projecting downwardly through the apertures in the bottom of the channel member toward the adjacent channel member located below, and concrete filling said form members and the channel members to provide a reinforced concrete frame structure, said form members being shorter than the distance between adjacent channel members and having openings in the bottom ends thereof whereby a restricted amount of the concrete poured into the upper ends of said form members can flow out through the bottom ends of the form members into the channel member located below.

2. In a wall structure including horizontally disposed channel members arranged in tiers, said channel members having apertures in the bottom

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thereof, form members projecting downwardly through the apertures in the bottom of the channel member toward the adjacent channel member located below, concrete filling said form members and the channel members to provide reinforced concrete frame structure, said form members being shorter than the distance between adjacent channel members and having openings in the bottom ends thereof whereby a portion of the concrete poured into the upper ends of said form members can flow out through the bottom ends of the form members into the channel member located below, and means holding the channel members of adjacent tiers in proper spaced relationship.

3. In a wall structure including horizontally disposed channel members arranged in tiers, said channel members having apertures in the bottom thereof, form members projecting downwardly through the apertures in the bottom of the channel member toward the adjacent channel member located below, concrete filling said form members and the channel members to provide reinforced concrete frame structure, said form members being shorter than the distance between adjacent channel members and having openings in the bottom ends thereof whereby a portion of the concrete poured into the upper ends of said form members can flow out through the bottom ends of the form members into the channel member located below, and means for holding said tiers in proper spaced relationship, said last named means comprising side panel members fastened to said channel members.

4. In a wall structure including horizontally disposed channel members arranged in tiers, said channel members having apertures in the bottom thereof, form members projecting downwardly through the apertures in the bottom of the channel member toward the adjacent channel member located below, said form members comprising open ended tubular elements smaller in cross section than said apertures so as to be insertable down through said apertures and being provided with radially projecting flanges adjacent the upper end thereof for limiting the downward movement of said form members within said apertures, and concrete filling said form members and the channel members to provide reinforced concrete frame structure, said form members being shorter than the distance between adjacent channel members whereby a portion of the concrete poured into the upper ends of said form members can flow out through the bottom ends of the form members into the channel member located below.

5. In a wall structure including horizontally disposed channel members arranged in tiers, said channel members having apertures in the bottom thereof, form members projecting downwardly through the apertures in the bottom of the channel member toward the adjacent channel member located below, and concrete filling said form members and the channel members to provide reinforced concrete frame structure, said form members being shorter than the distance between adjacent channel members and having openings in the bottom ends thereof whereby a portion of the concrete poured into the upper ends of said form members can flow out through the bottom ends of the form members into the channel member located below, said form members comprising opposed channel members hinged together at the bottom and free to spread adjacent the upper ends thereof into frictional

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engagement with the walls of said apertures in response to the outward pressure of the concrete as it is poured into said form members whereby the upper ends of the form members are frictionally held within said apertures against upward movement.

6. In a wall structure including horizontally disposed channel members arranged in tiers, said channel members having apertures in the bottom thereof, form members projecting downwardly through the apertures in the bottom of the channel member toward the adjacent channel member located below, concrete filling said form members and the channel members to provide reenforced concrete frame structure, said form members being shorter than the vertical distance between adjacent channel members and having openings in the bottom ends thereof whereby a portion of the concrete poured into the upper ends of said form members will flow out through the bottom ends of the form members into the channel member located below, and means holding said tiers in proper spaced relationship, said last named means comprising side panel members secured to the side walls of said channel members by means of removable clips, said clips having a first portion secured to said channel members and having a second portion in holding engagement with said panel members.

7. A wall structure including horizontally disposed sheet metal channel members arranged in parallel tiers and adapted to receive concrete, said channel members having apertures in the bottom and having substantially vertically disposed side walls, panel members mounted adja-

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cent said vertically disposed side walls and extending the full height between adjacent tiers of channel members, means securing the upper edges of said panel members to said channel members with the panel members in contact with the side walls of said channel members so as to hold the panel members and channel members in fixed relationship relative to one another, and form members suspended from said channel members and projecting downwardly through the apertures in the bottom of the channel members toward the adjacent channel member located below, each of said form members being supported wholly from the channel member immediately thereabove, and each of said channel members being supported wholly by the panel members immediately therebelow prior to the pouring of the concrete.

JESSE B. PIATT.

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