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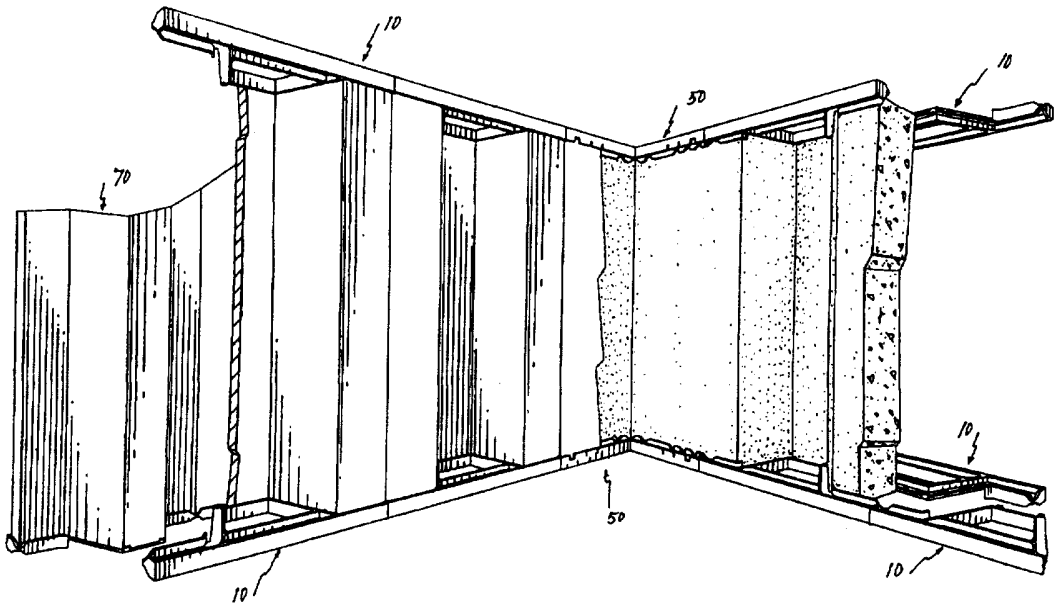

(57) Abstract

A concrete form system and a concrete wall poured using the form system wherein the wall has a horizontal length and a vertical height and a pair of generally planar faces, the wall having a plurality of recesses formed in at least one of the faces, with each of the recesses extending in a substantially vertical direction. There is also taught a method of arranging a form system. In preferred embodiments, the wall has recesses formed in both the faces such that the wall has an overall corrugated configuration; the invention provides an arrangement wherein the use of concrete is minimized while still achieving sufficient strength.

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CONCRETE FORM SYSTEM

The present invention relates to a concrete wall structure and more particularly, relates to a form system for concrete walls.

The use of concrete forms for the molding of a concrete wall is well known in the art and widely practiced. Conventional concrete forms are made by securing either panelling such as plywood or individual boards to reinforcing studs. The individual forms are placed in the desired position and after the concrete is set, the forms are removed. The use of these forms is expensive since reuse of the lumber is limited and a substantial amount of labour is required to build the forms.

One of the considerations involved in the pouring of concrete walls is the strength of the wall which is required for the building. Thus, the tensile strength and compressive strength are properties which must be taken into consideration in designing the concrete wall. Factors which are involved in determining the final properties include the type of concrete mix and the thickness of the wall. Naturally, one can increase some of the strength properties by pouring thicker walls; this will however increase the cost. Naturally it is desirable to use as little concrete as possible to achieve the required properties.

It is an object of the present invention to provide a concrete form system which is easy to assembly and use.

It is a further object of the present invention to provide a concrete form system wherein the amount of concrete used to achieve a given strength wall is minimized.

It is a further object of the present invention to provide a method for forming a concrete wall.

It is a further object of the present invention to provide a concrete wall wherein the use of concrete is minimized.

According to one aspect of the present invention, there is provided an improvement in a concrete wall having a horizontal wall length and a vertical height and a pair of generally parallel faces, the improvement being wherein the wall has a plurality of recesses formed in at least one of the faces, each of the recesses extending in a substantially vertical direction.

In a further aspect of the present invention, there is provided a form system for a concrete wall, the form system comprising a lower panel retaining member and an upper panel retaining member, a plurality of panels, each of the aforementioned members having means to receive and retain a marginal edge of a panel, the retaining means being designed to be arranged such that the panels extend in a generally corrugated configuration.

In a further aspect of the present invention, there is provided an improvement in a method of forming a concrete wall, the improvement including the step of placing forms to define a cavity therebetween and subsequently

pouring concrete in the cavity between the forms, and placing the forms to define a wall having a plurality of recesses formed in at least one face of the wall, the recesses extending in a substantially vertical orientation.

In greater detail, the system of the present invention provides a concrete wall which has, on at least one face thereof, a plurality of vertically extending recesses formed therein. The arrangement of the recesses and the overall structure is such that a minimum amount of material (concrete) is used for a wall of a given strength. The recesses formed in the wall may have different configurations. A preferred configuration according to the present invention would be a semi-hexagonal configuration wherein each recess is defined by two inwardly angled walls and a third wall interconnecting the inwardly angled walls, the third wall being generally parallel to the longitudinal axis of the wall. Although this configuration is preferred for simplicity of construction; it will be understood that other recess configurations such as hemispherical, rectangular, triangular, etc. may be used. It is important that the lengths of the inwardly extending recesses be proportional to the straight sections to permit transfer of a compression movement on the straight section to a tension movement.

In a preferred embodiment, the recesses are formed in each of the opposing wall faces, with the recesses being offset with respect to each other. In other words, a

minimum wall thickness is defined by the inward most point of one of the recesses extending to the opposed wall surface.

There is also provided a concrete form system for the molding of a concrete wall according to the present invention. This system includes bottom and top elements adapted to receive the form which would define the wall. The form itself will preferably include a plurality of panels to define both the interior and exterior surfaces of the concrete wall. It will be understood that the use of the term "panels" can include either monothilic elements or a panel built up of smaller members.

It is within the scope of the present invention to use any suitable material for the panels including, for example, wood, metal, and plastics. A preferred material would be any of the known structural form materials.

For the sake of simplicity, reference has been made to a bottom element and a top element with a panel extending therebetween. In a practice, most walls would use a plurality of such elements in a vertical relationship to each other. In a practice, the height of each panel extending between two of the panel retaining elements could vary between 15 to 60 centimeters with the prime determination being the strength of the material forming the panels.

Having thus generally described the invention, reference will be made to the accompanying drawings

illustrating an embodiment thereof, in which:

Figure 1 is a perspective view partially cut away, of a concrete form system of the present invention and a poured concrete wall;

Figure 2 is a perspective view of a sidewall base element;

Figure 3 is a top plan view thereof;

Figure 4 is a side elevational view thereof as seen from the left hand side of Figure 3;

Figure 5 is a perspective view of a corner base element;

Figure 6 is a top plan view thereof;

Figure 7 is a side elevational view thereof;

Figure 8 is a perspective view of a corner panel form;

Figure 9 is a perspective view of a side wall panel form;

Figure 10 is a top plan view illustrating assembly of the panel forms according to the present invention;

Figure 11 is a top plan view, partially in a section, of the concrete form system of the present invention;

Figure 12 is a top plan view of a portion of a concrete wall resulting from the use of the form system of the present invention.

Referring to the drawings in greater detail and by reference characters thereto, reference will initially be

had to Figures 2, 3 and 4 which illustrate a sidewall base element generally designated by reference numeral 10.

Sidewall base element 10 includes a generally longitudinally extending portion having a base or bottom wall 12 with an exterior sidewall 14 extending along one marginal edge thereof. At either end of exterior sidewall 14 there are endwalls 16 and 18. Extending parallel to exterior sidewall 14 and inwardly from endwall 16 is a first interior wall portion 20. As may be best seen in Figures 2 and 3, interior wall portion 20 terminates in an arcuate wall section 22. A second interior wall section 24 extends inwardly from endwall 18 and is also parallel to exterior sidewall 14. It too terminates in an arcuate wall section 26.

Sidewall base element 10 also includes an inset section generally designated by reference numeral 28. Inset section 28 is defined by a first inwardly extending wall 30, a second inwardly extending wall 32, and a horizontally extending wall 34 interconnecting inwardly extending walls 30 and 32. A base or bottom wall 36 is provided at walls 36, 32 and 34.

As seen in Figure 3, a pair of arcuate wall sections 38 and 40 extend upwardly from bottom portion 36 opposite horizontally extending wall 34.

Preferably, walls 30, 32 are from between one half to twice the length of wall 34. Walls 20 and 24 are likewise one half to four times the length of wall 34.

A reinforcing wall section 42 extends between inwardly extending walls 30 and 32 and which reinforcing wall 42 is parallel to exterior side wall 14.

As may be seen in Figure 3, bottom portion or wall 12 has a plurality of generally oblong apertures 44 formed therein.

There are also provided a plurality of relatively small apertures 48 at various locations in element 10 for purposes which will become apparent here and below.

Figures 5, 6 and 7 illustrate a corner base element which is generally designated by reference numeral 50 and reference will now be had thereto. Corner base element 50 includes a pair of mutually perpendicular exterior side walls 52 and 54 and a pair of endwalls 56 and 58. Mutually perpendicular interior side walls 60 and 62 are parallel to exterior walls 52 and 54 respectively. A bottom wall or base 64 has a plurality of relatively large apertures 66 formed therein as well as a plurality of relatively small apertures 68 located adjacent the side walls.

The form system of the present invention includes a panel assembly for the sidewall and corners. Thus, as may be seen in Figures 8 to 11, a side wall panel 70 includes a first wall section 72, a second wall section 74, and a third wall section 75. First wall sections 72 and 75 are parallel with respect to each other and second wall section 74 extends between first wall section 72 and third wall section

75 to form an angle of generally between 15° and 25°. As may be seen, first wall section 72 has a flange 76 extending outwardly therefrom and third wall section 75 has a corresponding flange 78 extending outwardly therefrom.

A corner panel shown in Figures 8 and 10 is generally designated by reference numeral 82 and includes a first wall section 84 and a second wall section 86 which are mutually perpendicular. Wall sections 86 and 84 have flanges 90 and 88 associated therewith.

In use, and as may be best seen in Figure 11, a plurality of sidewall base elements 10 are placed in an opposing relationship to define a sidewall which will have a semi hexagonal insert. Sidewall base elements 10 are secured together by means of connecting wires 94 which extend through apertures 48 in elements 10 and apertures 68 in corner elements 50. As will be noted, the connecting together by connectors in 94 is such that the sidewall base elements 10 and corner elements 50 are held in a state of tension.

Subsequent to the placement of elements 10 and 50, sidewall panel forms 70 and corner panel forms 82 are placed within the elements and corresponding elements 10 and 12 are secured on the upper portion thereof. There is thus provided a form system which is light weight and easy to use.

In practice, one would construct the forms using a plurality of intermediate elements between the top and

bottom elements. These elements would include the same feature, being adapted to receive a panel form in either side thereof.

Subsequent to the pouring of the concrete, the wall will have a sectional configuration as shown in Figure 12 wherein semi hexagonal recesses are provided in the wall. This permits the use of less concrete while the corrugated configuration assures that there is no loss of strength.

It will be understood that the above described embodiment is for purposes of illustration only and that changes and modifications may be made thereto without departing from the spirit and scope of the invention.

CLAIMS:

1. In a concrete wall having a horizontal length and a vertical height and a pair of generally parallel faces, the improvement wherein said wall has a plurality of recesses formed in at least one of said faces, each of said recesses extending in a substantially vertical direction.

2. The improvement of Claim 1 wherein said wall has a plurality of recesses formed in each of said faces, said recesses being arranged so as to be offset with respect to each other and to provide said wall with an overall corrugated configuration.

3. The improvement of Claim 2 wherein each of said recesses has a semi hexagonal configuration defined by first and second inwardly extending wall segments and a third wall segment interconnecting said two inwardly extending wall segments.

4. The improvement of Claim 2 wherein said inwardly extending recesses have a generally arcuate configuration.

5. A form system for a concrete wall comprising a lower panel retaining member and an upper panel retaining member, a plurality of panels, each of said members having retaining means to receive and retain a marginal edge of a panel, said retaining means being designed to be arranged such that said panels extend in a generally overall corrugated configuration.

6. The system of Claim 5 further comprising a plurality of intermediate panel retaining members, said intermediate panel retaining members having retaining means on both sides thereof to receive and retain a marginal edge of a panel.

7. In a method of forming a concrete wall including the step of placing forms to define a cavity therebetween and subsequently pouring concrete in said cavity between said forms, the improvement comprising the step of placing said forms to define a wall having a plurality of recesses formed in at least one face of the wall, said recesses extending in a substantially vertical direction.

8. The improvement of Claim 7 including the step of placing said forms to define a wall having a plurality of recesses formed in both faces of the wall.

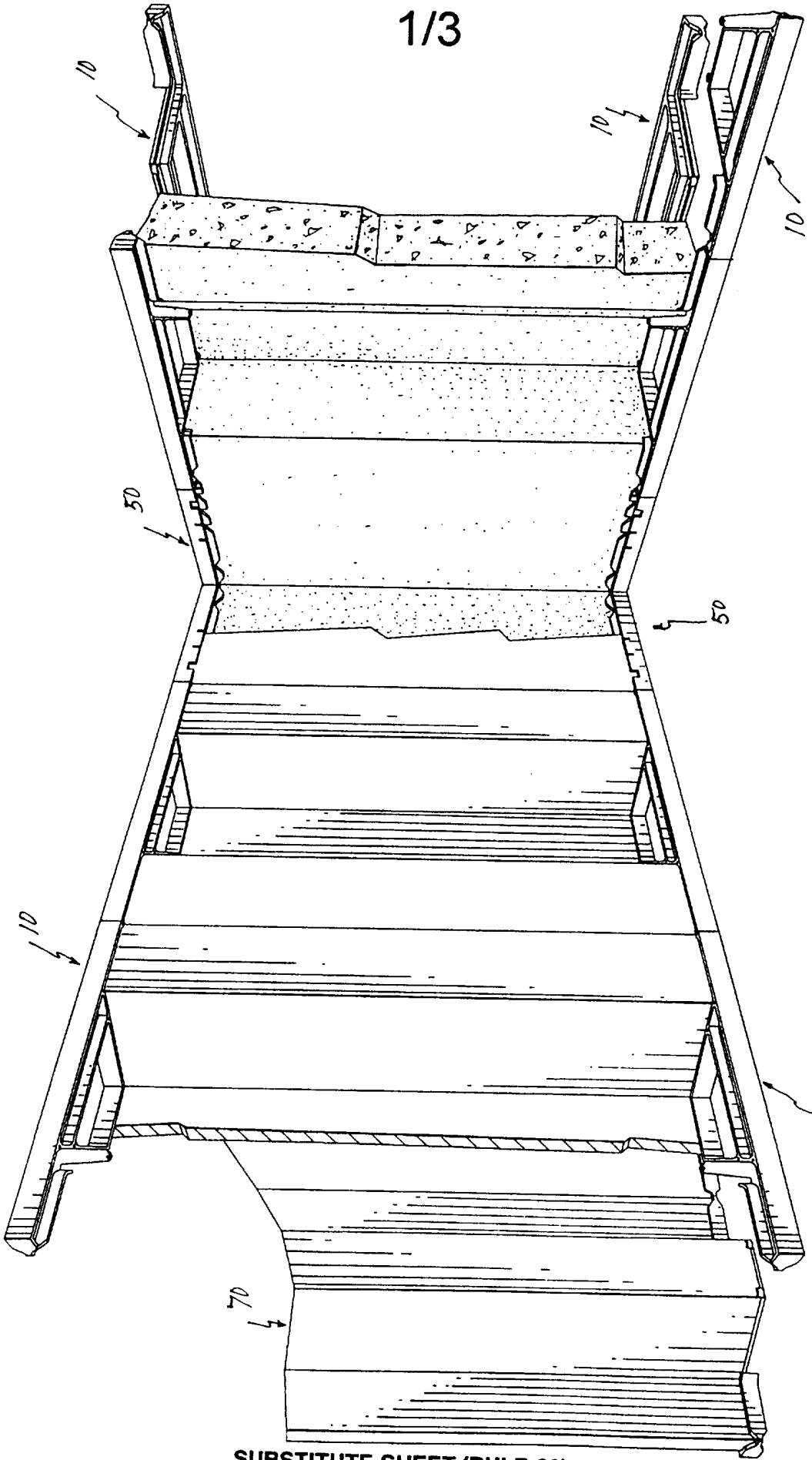

Fig- 1

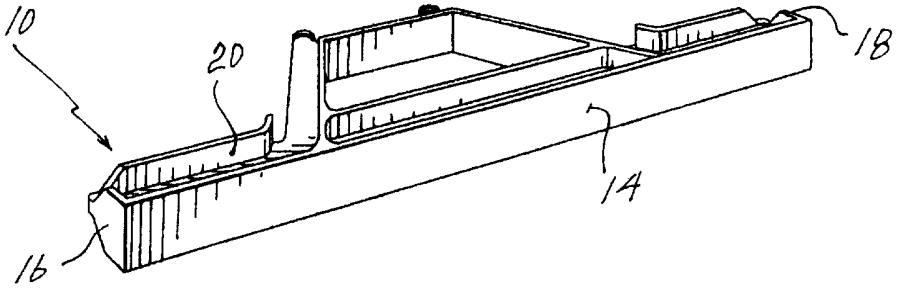

Fig- 2

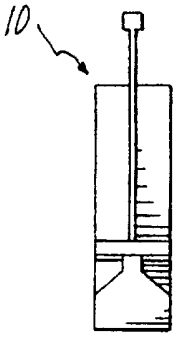

Fig- 4

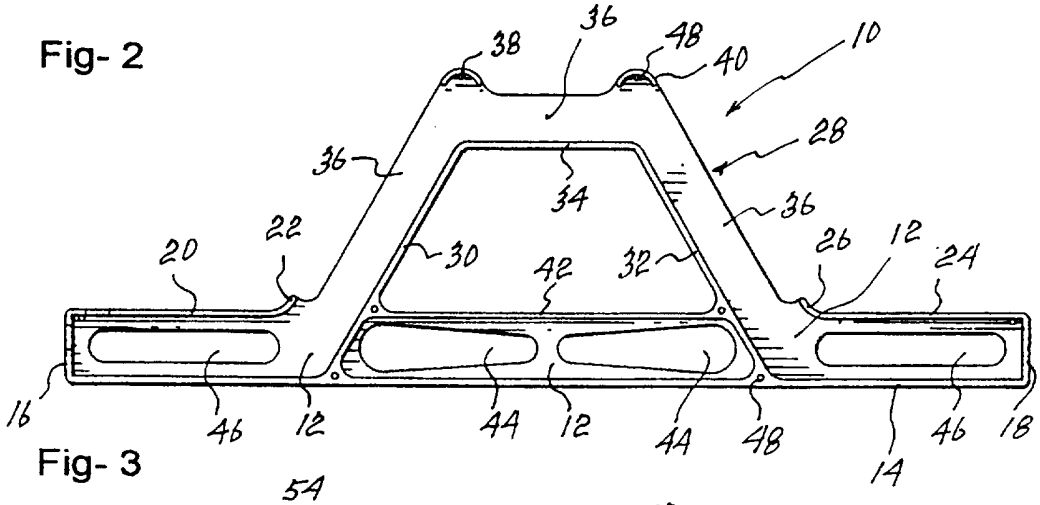

Fig- 3

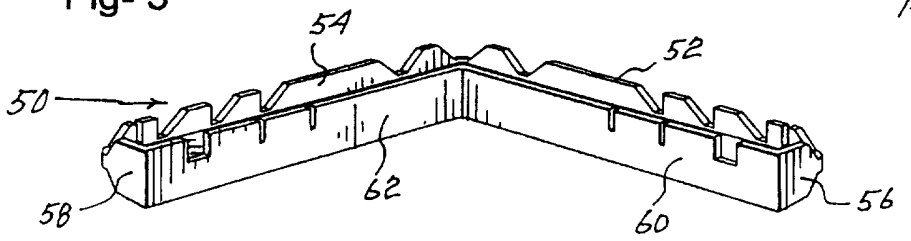

Fig- 5

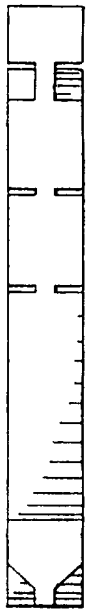

Fig- 7

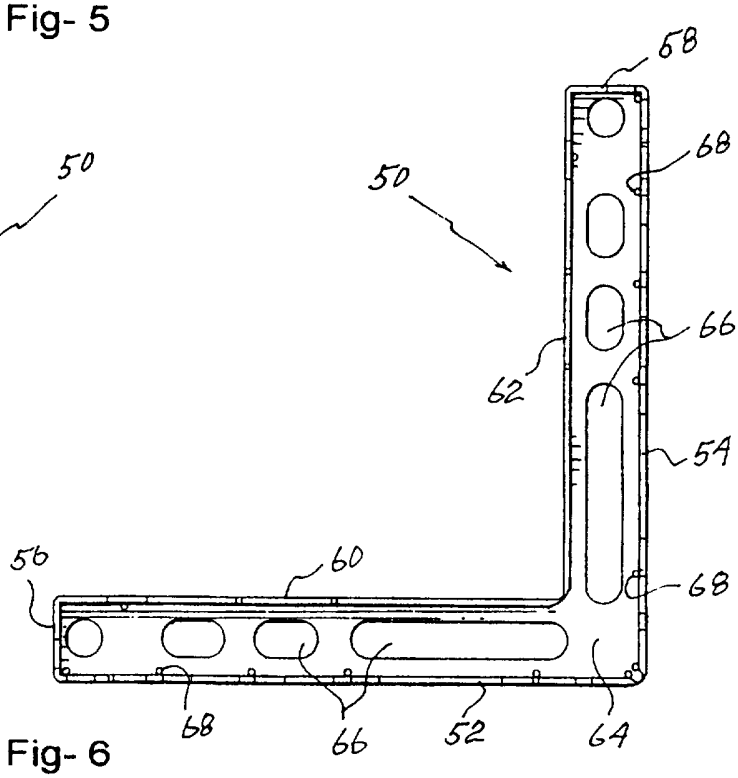

Fig- 6

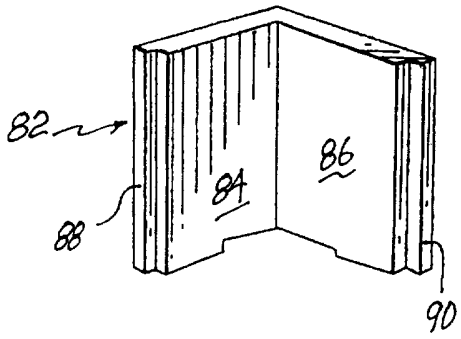

Fig- 8

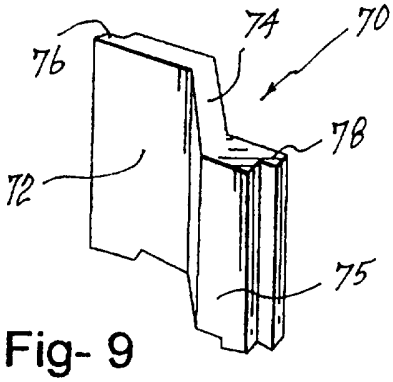

Fig- 9

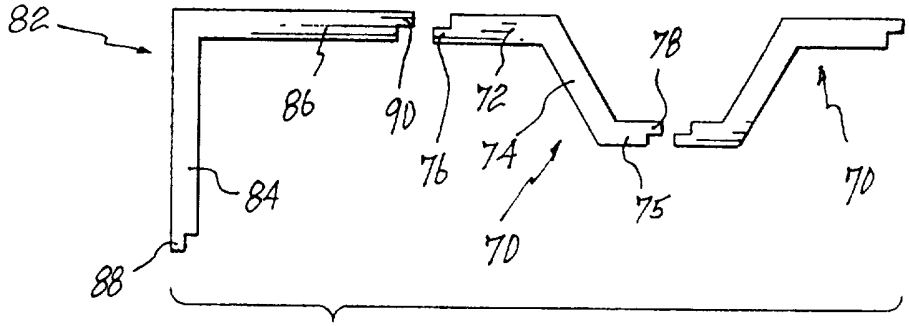

Fig- 10

Fig- 11

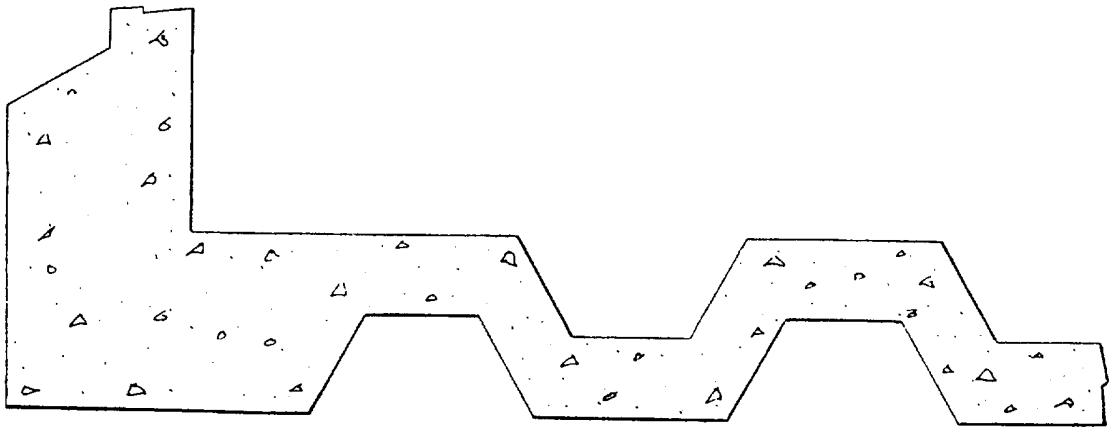

Fig- 12

INTERNATIONAL SEARCH REPORT

Inter nal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E04G9/10 E04G15/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2 272 659 A (DALEY) 10 February 1942 see page 1, column 1, line 48 - page 2, column 2, line 21; figures	1,3,7 5,6
X A	FR 2 161 407 A (USINES GEORGES LUCAS & CIE.) 6 July 1973 see page 3 - page 7; figures	1,4,7 5,6
X	US 1 373 523 A (NICHOLAS) 5 April 1921 see the whole document	1,7
A	GB 624 606 A (RUMBLE) 14 June 1949 see the whole document	5,6
A	FR 978 039 A (VOISIN) 9 April 1951	
A	DE 21 01 872 A (FLÖSSER) 20 July 1972	

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Date of the actual completion of the international search	Date of mailing of the international search report
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 1 721 643 A (SHULMAN) 23 July 1929	

1

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Information on patent family members

Inter nal Application No
PCT/CA 97/00322

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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