

[54] **UNITIZED METAL-STUD CONCRETE FORM STRUCTURE**

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[51] Int. Cl.**E04g 9/00**

[58] Field of Search.....249/40, 44-47, 249/189-192, 196, 213, 219 W; 52/426, 563

[56] **References Cited**

UNITED STATES PATENTS

1,036,468 8/1912 Dyhrkopp.....249/40 X
1,588,229 6/1926 Hotchkiss.....249/189 X

2,358,975 9/1944 Hillberg.....249/190 X

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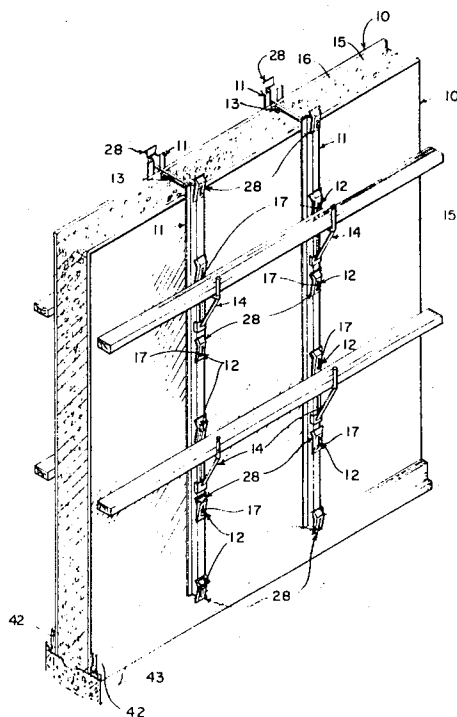
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[57] **ABSTRACT**

A unitized, reuseable form for generally vertical planar concrete surfaces of some areal extent including plural form panels and metallic supporting studs having particular associated fastening devices. The particularly configured studs are provided with spaced holes to accept ordinary headed snap ties of commerce which are releasably maintained by fastening wedges communicating between snap tie and stud. A particular spreader structure for the form top provides a snap tie with depending U-shaped body to provide great rigidity in the assembled form. Particular waler brackets are supported in the stud holes.

4 Claims, 8 Drawing Figures



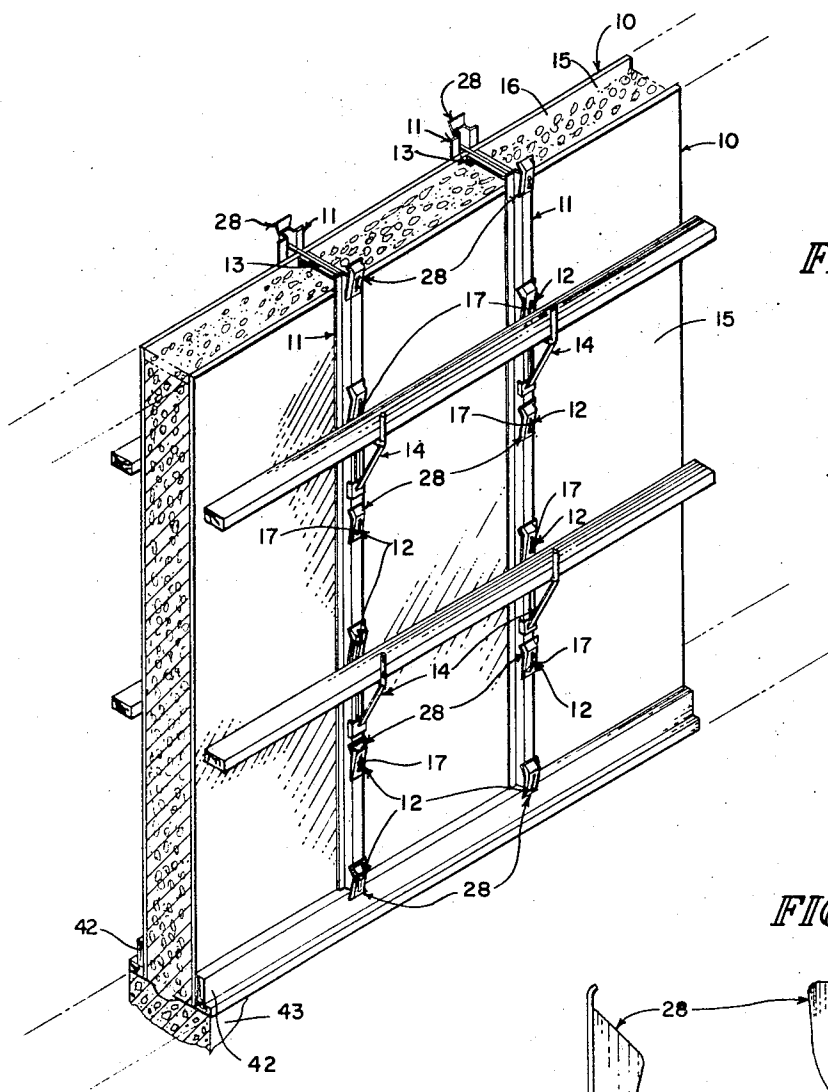


FIGURE 1

FIGURE 2

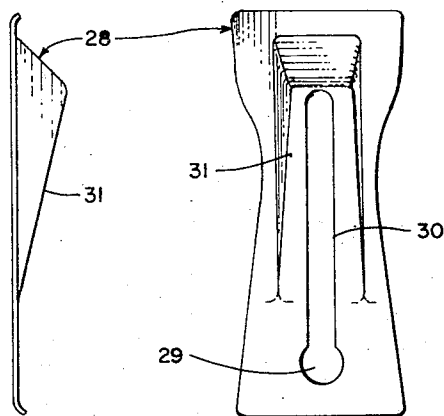


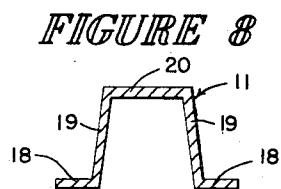
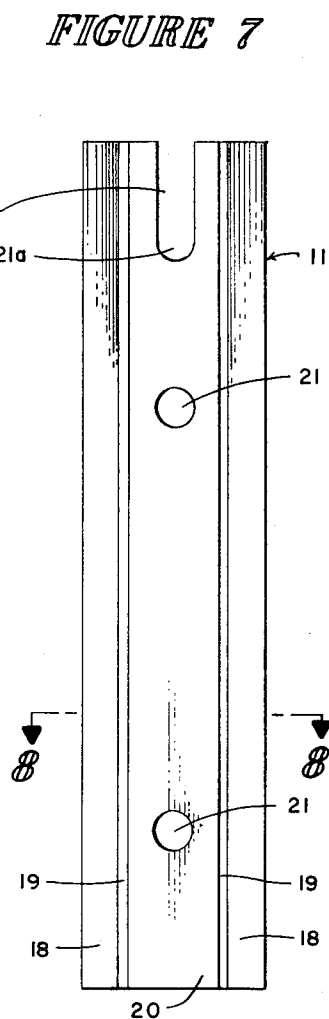
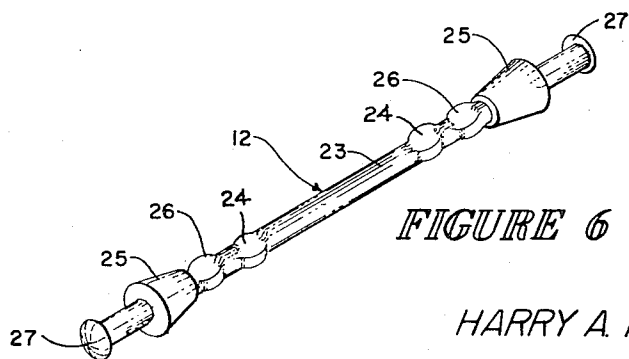
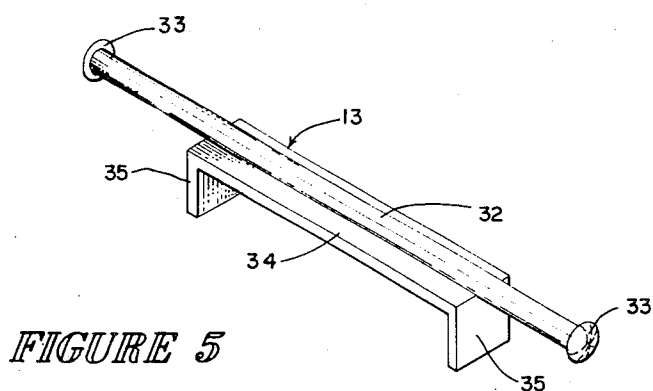
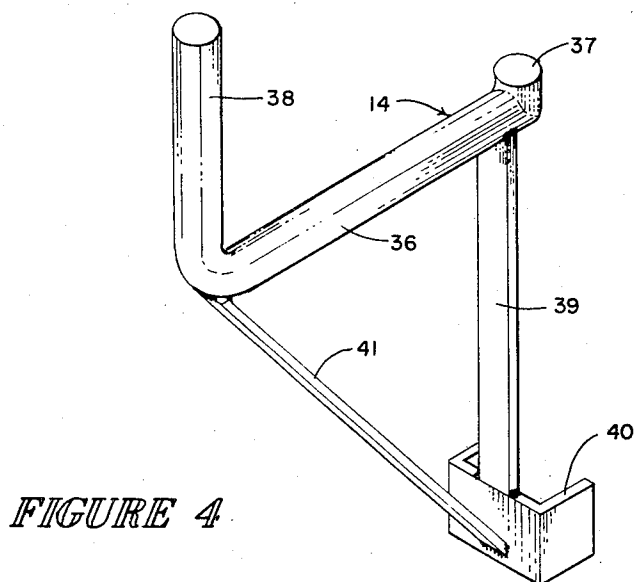
FIGURE 3

HARRY A. PRICHARD JR. INVENTOR.

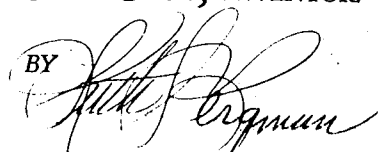
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UNITIZED METAL-STUD CONCRETE FORM STRUCTURE

BACKGROUND OF INVENTION

1. Field of Invention

This invention relates generally to modular-type concrete form structures and more particularly to such a structure having metal supporting studs that accept ordinary snap ties and particular ancillary spreader structure and waler supports.

2. Description of Prior Art

Modular reuseable type forming structures for concrete, and especially those for use with vertical planar areas of some areal extent, have been found desirable in the concrete arts and in response many forms of such structures have become known. Initially such forms were constructed with wooden elements, at first with wooden studs and boards, then wooden studs and plywood, and more recently with some or all metallic elements, especially for the form supporting structures but in some instances also for the forming surfaces themselves. The wooden elements have advantage over metal in that they are less expensive and easily workable but on the other hand they are not nearly so durable as the metal elements and generally do not provide the same strength for equal mass. Many combinations of such elements have become known in the concrete forming arts to gain particular advantages.

With the advent of multiple, thin layered, hardwood plywood at reasonable cost and the more extensive use of aluminum extrusions for supports, it was found that these two elements might be fortuitously combined into a forming system. My invention seeks to do this. I provide plywood panels for the actual forming elements supported by particularly configured aluminum studs, all of which may mechanically communicate by means of the ordinary snap ties of commerce releasably extending between opposed, positioned, elements. The novelty of my invention resides principally in the simple form of the aluminum supporting stud, its acceptance of normal snap ties of commerce, and the particular auxillary spreader and waler support structures, adapted to function with this particular form and configuration of stud. The elements combine to provide a total form structure that fulfills all the functions of the known structures but provides greater rigidity, durability, reusability, and simplicity.

SUMMARY OF INVENTION

My invention provides plural form panels supported by plural vertical metal studs adapted to receive snap-type form ties, spreaders, and waler supports, in cooperation with other form elements, to provide a completed structure to form opposed concrete surfaces.

The panels are sheet-like elements variously dimensioned to form a predetermined area. The studs are extruded U-shaped elements having plural spaced holes extending in a medial line along their length, the holes in all studs being similarly spaced so that holes in various studs may cooperate in the structure to allow passage of snap ties therebetween. The uppermost hole in the stud has a slot communicating through the stud end to allow placement of spreaders.

Ordinary snap ties of commerce extend through panels and between paired opposed studs to maintain

the elements in appropriate forming position. The snap ties pass through the holes in the opposed studs and are releasably held by ordinary fastening wedges of commerce.

My top spreader provides an elongate headed tie-like element structurally carrying a medially positioned depending U-shaped spreader, the legs of which space the inner opposed surfaces of the form elements. The spreader is releasably maintained between opposed studs by fastening wedges.

My waler bracket provides an elongate fastening element having an inward, angularly projecting fastener adapted to pass into a stud hole and be releasably carried thereby with a U-shaped bracket at the other end to maintain the element on the bracket once placed. An L-shaped, braced, waler arm extends outwardly to carry a waler between its angled outwardmost projection and the outer surface of the stud carrying the waler bracket.

In providing such form structure, it is:

A principal object of my invention to create an improved form for vertical concrete surfaces that is more rigid, and of greater durability than similar forms now existent.

A further object of my invention to provide such a structure that accepts ordinary headed form ties of existing commerce.

A further object of my invention to provide such a form structure that has modular, particularly configured metal supporting studs of high durability, great strength and simple maintenance.

A still further object of my invention to provide a novel spreader structure that may be removably fastened as ties to create a form of great rigidity.

A still further object of my invention to provide a waler support of particular configuration that is releasably fastenable within any stud hole to maintain a waler in a nice fit against the outer surface of form studs to aid form rigidity and provide safe waler support.

A still further object of my invention to provide a form structure of the nature aforesaid that is of simple and economic manufacture, of rugged and durable nature, of new and novel design and otherwise well adapted to the uses and purposes for which it is intended.

Other and further objects of my invention will appear from the following specification and accompanying drawings which form a part hereof. In carrying out the objects of my invention, however, it is to be understood that its essential features are susceptible of change in design and structural arrangement with only one preferred and practical embodiment being illustrated in the accompanying drawings as required.

BRIEF DESCRIPTION OF DRAWINGS

In the accompanying drawings which form a part of this specification and wherein like numbers of reference refer to similar parts throughout:

FIG. 1 is an isometric view of a partial section of concrete wall with my forms in place thereon to show the relationship of parts and the general configuration of the elements of my invention.

FIG. 2 is an orthographic side view of a tie fastening wedge of commerce.

FIG. 3 is an orthographic front view of the wedge illustrated in FIG. 2.

FIG. 4 is an isometric view of the waler bracket of my invention showing its various elements, their configuration and relationship.

FIG. 5 is an isometric view of the spreader of my invention showing its details.

FIG. 6 is an isometric view of a typical snap tie of commerce.

FIG. 7 is an orthographic front view of the metal stud of my invention.

FIG. 8 is a horizontal cross sectional view of the stud of FIG. 7, taken on the line 8—8 thereon in the direction indicated by the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in more detail and particularly to that of FIG. 1, it will there be seen that my invention comprises generally form panels 10 supported by vertical studs 11 mechanically joined by snap ties 12 and supporting spacers 13 and waler supports 14.

Panels 10 comprise planar sheets 15 of some rigid material of substantial durability in the environs of wet concrete. At least one side 16 of the panels is coated with appropriate agents known in the art to improve durability and cause release from a set concrete surface. Plural holes 17 in spaced array are provided through the sheets to allow passage of the heads and shanks of snap ties 12. The holes 17 may be established at the time of placement of the forms and after positioning the supporting studs or they may be established in appropriate array prior thereto. If the holes be established prior to panel placement, they normally will be arrayed in some uniformly spaced, rectilinear plan that will allow the panels to be used either horizontally or vertically with a similar spacing of holes in the supporting studs to allow matching. If predrilled holes are used, normally any surplus unused holes need not be plugged as sufficient concrete will not extrude to be of any consequence, but obviously if desired, some type of plug or surface blockage (not shown) may be used.

Sheets 15 may be formed of any rigid material but preferably they are formed of commercial sized sheets of plywood. The thin layer, multi-ply hardwood product of three-quarter or five-quarter thickness, though more expensive in the inception is much stronger and of greater strength and durability than the soft wood product so as to be of ultimate lower economic cost. The known rigid sheet form materials of wood, metal, plastic, or combinations of these elements may also serve the purposes of my invention, if not so well.

Vertical studs 11, as seen especially in FIGS. 7 and 8, comprise elongate prismatic beam-like elements of substantially uniform cross section formed with outer webbs 18 communicating with similar angularly disposed legs 19 structurally joined by medial body portion 20. Each of these elements is of appropriate thickness to provide the required rigidity for the element and its cross sectional shape is uniform with a configuration to allow formation by extrusion. The medial body portion defines plural spaced holes 21 generally arrayed along the center line of the beam.

The diameter of the holes is such as to allow the passage of the head of a snap tie to allow its fastening on the outer side of the beam. The spacing of holes 21 is preferably of the same module as that of the holes in the form panels, if holes be predrilled therein, to allow insertion of snap ties through the cooperating form panel holes and vertical stud holes. Uppermost hole 21a of each stud is provided with slot 22 communicating through the end of the stud to allow convenient placement of spreaders in the upper part of the form without endwise insertion through a hole.

Preferably studs are formed from one of the stronger aluminum alloys by traditional extrusion methods. The overall length of the stud may be such as desired, but its outward extension, that is the distance between the opposed faces of body 20 and webb 18, is preferably the same as the thickness of dimension lumber, normally 1½ inches, so that the dimension number may be incorporated in form structure if desired.

Snap ties 12, illustrated in FIG. 6, are of an ordinary form commonly used in the present day concrete arts. They provide in general elongate cylindrical body 23 having similar spaced holding ridges 24, similar spaced outward breakoff notches 25, similar opposed internal spacing elements 26 and opposed heads 27 in the outwardmost extensions. Holes 17, 21 in panels 10 and studs 11 are of such size as to allow the free passage of the heads 27 of the snap ties therethrough. In use, the ties are inserted from the inside of spaced opposed form panels with inner spacers 26 on the inside surface of each of these elements and the head structure projecting through both panels 10 and outward studs 11 so that the ties may be fastened on the exterior of the studs.

The fastening of the snap ties is accomplished by devices known in the concrete arts, such as the metal wedge shown in FIGS. 2 and 3. The head 27 of a particular snap tie projecting outwardly beyond a vertical stud is passed through hole 29 in wedge 28 and wedge moved so that the snap tie head moves along slot 30. As this occurs the head will come into engagement with wedge surface 31 and be tightened between the opposed wedges on the outside of an opposed stud through which the snap tie passes. These wedges may be easily applied or removed by impact such as from a hammer.

Both the snap tie and fastening wedge are presently well known in the concrete forming arts and neither constitute my invention per se, though they form a necessary part of the whole.

Spreader 13 of my invention is illustrated in FIG. 5 where it is seen to comprise elongate, cylindrical body 32 having heads 33 at each end similarly to a snap tie. This structure may, in fact, be one of the form ties illustrated in FIG. 6 with inner spacers 26 removed. Structurally communicating with the medial portion of body 32 is the rigid U-shaped spacer with back 34 welded to body 32 and structurally communicating spacer legs 35 perpendicularly projecting therefrom. The distance between opposed outer surfaces of spacer legs 35 determines the space between form panels 10 and may vary in individual instances. Separate spreaders must be provided for each different spacing. The projection of body 32 beyond each end of spacer legs 35 is such as to allow the body to extend through opposed form

panels 10, through opposed studs 11, and provide sufficient projection there beyond to allow fastening by means of fastening wedges 28 positioned as before stated between opposed heads 33 of the spreader and the lateral surfaces of opposed supporting studs 11.

Normally paired opposed form panels 10 have been spaced by means of plural snap ties illustrated in FIG. 6, but spacing by means of such ties does not provide a very rigid form structure. I have found it necessary in using my invention to provide a more rigid spreader structure, especially for the top portion of form elements and I, therefore, use spreader 13 at least in the upper parts of the form structure to maintain appropriate rigidity of the whole. In this regard it is to be noted that spreader body 32 may be placed in uppermost hole 21a of a stud by moving it through slot 22 and without inserting the head perpendicularly through the hole. If desired the spreader might be used as an expendable element and placed elsewhere in the form structure.

Waler support 14 is illustrated particularly in the isometric view of FIG. 4. It comprises the U-shaped support arm having horizontal body element 36 communicating with shorter upturned inner fastening arm 37 and opposed longer upturned outer support arm 38. The support arm is of cylindrical cross section and such size as to fit within holes 21 in vertical studs 11. The length of the inner fastening arm must be so regulated that the structure may be placed within a stud hole by appropriate manual manipulation, but yet allow the upward projection to catch the inner stud surface about the hole to maintain the support on the stud, once placed. The length of support arm 38 is not critical but in general it should be somewhat greater than twice the thickness of walers to be used to assure that the walers will not slip from the support. Bracket arm 39 communicates with the under surface of body 36 in a position such that the opposed facing surfaces of fastening arm 37 and bracket arm 39 are spaced by the thickness of a stud body. The bracket arm depends to structurally communicate with bracket 40 adapted to fit snugly against body 20 and about legs 19 of a vertical stud. Angle support 41 communicates from the bracket to the outer portion of body 36 to provide additional rigidity. The length of body 36 is such that when the bracket is in position on a stud the distance between the opposed surfaces of stud body 20 and support arm 38 is substantially equal to the width of the waler to be supported so as to provide more rigidity to the ultimately assembled form structure and a safe waler support.

Having thusly described the structure of my invention its use may be more readily understood.

Firstly a plurality of the various elements of my invention are constructed according to the foregoing specification. They are then assembled substantially as illustrated in the partial view of FIG. 1.

Some supporting surface 42 is established such as a footing upon which the concrete structure, in this instance a wall, is to be placed. Panels 10 are placed in opposed fashion with adjoining panels having their side edges substantially abutting. They are maintained in this position by some form of temporary support as known in the construction arts. The lower edges of the forms are then properly aligned and maintained in ap-

propriate position by structural elements 43, again according to well known practice now prevailing in the concrete arts. Normally bottom structural element 43 comprises dimension lumber nailed or otherwise fastened to the green concrete footing beneath the wall to be formed. Plural vertical studs 11 then are placed in opposed pairs on the outer surfaces of panels 10 and maintained in this position by snap ties 12. The studs preferably are of a length so that top holes 21a are substantially at the upper level of panels 10 and the studs are placed so that holes 21 therein align with preformed holes 17 in the panels. If there be no preformed holes, they now are established in appropriate position. Snap ties are then inserted from between opposed panels 10 with their ends projecting outwardly through the panels and through the cooperating holes in studs 11. With ties in this position, fastening wedges 28 are placed to tighten the whole structure and maintain it in appropriate position. As the fastening wedges are tightened upon the snap tie head, the outward surfaces of spacers 26 will be tightened against the inner surface of opposed panels 10. Nextly spreaders 13 are positioned in the upper part of each opposed pair of vertical studs by inserting the body portions in the upper holes 21 with spacer legs 35 immediately adjacent the opposed inner surfaces of panels 10. Fastening wedges 28 are then placed between the heads 33 and adjacent studs 11 to tighten the elements.

Waler supports 14 are then placed by manual manipulation on vertical studs 11 in a horizontal, lineally arrayed row and plural walers 44, normally of dimension lumber, are then positioned between a plurality of the lineally arrayed supports. The walers are inserted generally by placing the elements at an angle within the area enclosed between stud and support arm 38 of the waler support and then forcing the waler downwardly so that it rests nicely between body 36 of the support and the opposed stud surface. Normally at the end of one waler there is allowed an overlap against the next waler so that no formal fastening between walers is required.

Normally in construction of a form element of this type, a pair of opposed vertical studs 11 will be placed over the seam between two adjacent panels to provide a seal and appropriate rigidity for the panels at their end parts. This is not necessary, however, and joints between panels may occur between studs or if desired a structural member such as a common 2 x 4 may be fastened over the joint to assure its rigidity and keep more fluid concrete from exiting therefrom. It is to be noted in this regard that a normal structural element of nominal 2 inch thickness will fit between the exterior surface of the form panel and the interior surface of the waler supported thereby.

Normally a wall to be formed will have corners which usually maintain the form elements in appropriate position without external support. If a free standing wall be formed or if it otherwise be required to have external support, the forms of my invention may be supported by secondary supports (not shown) in the same fashion as is the common practice with other present day concrete forms.

The forms once established as aforesaid may be filled with concrete in the traditional fashion and the

concrete allowed to set. When appropriately set, the walers are removed, the studs then removed from panels and the panels stripped from the adjacent finished concrete surface. The projecting end parts of snap ties may then be broken and the wall finished in the traditional fashion.

From the foregoing it is to be particularly noted that my aluminum studs provide a structure of a beam-like nature that may be made to almost any desired strength specification by increase of element size, and particularly thickness. It is further to be noted that the aluminum from which the studs are constructed is quite impervious to concrete and its environs and may generally be readily cleaned either by mechanical or chemical means by reason of its smooth surface and chemical inertness.

It is further to be noted that all of the elements of my invention are preformed and not necessarily configured to a particular structure or job so that they might be quite reuseable. Similarly the elements are not deformed or otherwise deteriorated by use.

It is further to be noted that the waler bracket of my invention is positively placed on a supporting stud so that it may not fail to create a safety hazard. It is further to be noted that a waler may be nicely fit between bracket and adjacent stud to maintain the bracket in appropriate position to provide rigid elements between the various studs and thusly greater rigidity of the whole structure.

It is further to be noted that the spacer elements of my invention are rigidly positioned in the upper portion of the form between opposed panels to provide a rigid, mechanical linkage that, combined with the waler structure, provides an extremely rigid form.

The foregoing description of my invention is necessarily of a detailed nature so that a specific embodiment of it might be set forth as required, but it is to be understood that various changes of detail, rearrangement and multiplication of parts may be resorted to without departing from its spirit, essence or scope.

Having thusly described my invention, what I desire to protect by Letters Patent, and what I claim is:

1. A concrete form structure of the nature aforesaid comprising in combination:

- a plurality of rigid, sheet-like panels arrayed in adjacency to define the opposed surfaces of a potential concrete structure, the panels having plural spaced holes arrayed to cooperate with holes of an opposite panel to accept snap ties therebetween;
- a plurality of vertical metal studs comprising prismoidal structures of extrudable nature each with an elongate medial body with angularly disposed legs projecting outwardly therefrom to structurally communicate with coplanar lateral webbs, the body defining plural spaced holes having centers along the medial line of a stud, the end-most holes having slots communicating through the ends of the stud, the holes being of a size to allow passage of the head of a snap tie therethrough and the slots of a size to allow passage of the body of a snap tie;
- a plurality of snap ties adapted to extend through paired opposed, studs and panels therebetween with a plurality of releasable fastening devices to mechanically communicate between tie heads and

studs to releasably fasten the ties between opposed studs;

plural spreaders communicating between the upper portions of opposed cooperating studs with plural wedge-type fasteners releasably maintaining the spreaders in position, each spreader comprising an elongate cylindrical body element, having heads at each of its end parts, structurally carrying in its medial part the back of a U-shaped bracket having perpendicularly projecting planar legs of some areal extent to fit inwardly adjacent the opposed surfaces of mould panels to space them and,

plural waler supports releasably communicating with holes in the vertical studs in horizontal linear arrays to accept and support walers therebetween.

2. A concrete form structure of the nature aforesaid comprising in combination:

- a plurality of rigid, sheet-like panels arrayed in adjacency to define the opposed surfaces of a potential concrete structure, the panels having plural spaced holes arrayed to cooperate with holes of an opposite panel to accept snap ties therebetween;
- a plurality of vertical metal studs comprising prismoidal structures of extrudable nature each with an elongate medial body with angularly disposed legs projecting outwardly therefrom to structurally communicate with coplanar lateral webbs, the body defining plural spaced holes having centers along the medial line of a stud, the end-most holes having slots communicating through the ends of the stud, the holes being of a size to allow passage of the head of a snap tie therethrough and the slots of a size to allow passage of the body of a snap tie;
- a plurality of snap ties adapted to extend through paired opposed, studs and panels therebetween with a plurality of releasable fastening devices to mechanically communicate between tie heads and studs to releasably fasten the ties between opposed studs;

plural spreaders communicating between the upper portions of opposed cooperating studs with plural wedge-type fasteners releasably maintaining the spreaders in position and,

plural waler supports releasably communicating with holes in the vertical studs in horizontal linear arrays to accept and support walers therebetween, each waler support comprising an elongate U-shaped support arm having a shorter perpendicularly projecting fastener arm at one end and a longer perpendicularly projecting support arm at the other end with a bracket arm structurally depending from the body at a spaced distance inwardly adjacent the shorter fastening arm, the bracket arm carrying a U-shaped bracket in its lowermost portion to fit about the body of the supporting metal stud and a support arm communicating between the bracket and the outer part of the support body.

3. In a concrete form structure having a plurality of rigid panels arrayed in abutting adjacency to define the opposed surfaces of a structure to be formed with plural opposed cooperating holes to accept snap ties between opposed panels; a plurality of vertical supportive studs with plural spaced holes to accept snap ties;

a plurality of headed snap ties to extend between opposed panels and studs; and a plurality of mechanical devices to releasably fasten the stud heads against the adjacent stud surfaces, the invention comprising:

a spreader with an elongate cylindrical body element, having heads at each of its end parts, structurally carrying in its medial part the back of a U-shaped bracket having perpendicularly projecting planar legs of some areal extent to fit inwardly adjacent the opposed surfaces of mould panels to space them.

4. In a concrete form structure having a plurality of rigid panels arrayed in abutting adjacency to define the opposed surfaces of a structure to be formed with plural opposed cooperating holes to accept snap ties between opposed panels; a plurality of vertical supportive studs with plural spaced holes to accept snap ties;

a plurality of headed snap ties to extend between opposed panels and studs; and a plurality of mechanical devices to releasably fasten the stud heads against the adjacent stud surfaces, the invention comprising:

a waler support with an elongated U-shaped support arm having a shorter perpendicularly projecting fastener arm at one end and a longer perpendicularly projecting support arm at the other end with a bracket arm structurally depending from the body at a spaced distance inwardly adjacent the shorter fastening arm, the bracket arm carrying a U-shaped bracket in its lowermost portion to fit about the body of the supporting metal stud and a support arm communicating between the bracket and the outer part of the support body.

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