United States Patent [19]

Matuschek et al.

[11] **3,877,194**

[45] **Apr. 15, 1975**

[54] **STRUCTURAL CORNER POST**

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[73] Assignee: **Univiron Corporation,** Southfield, Mich.

[22] Filed: **June 6, 1973**

[21] Appl. No.: **367,370**

Related U.S. Application Data

[62] Division of Ser. No. 254,031, May 17, 1972, Pat. No. 3,774,362.

[52] **U.S. Cl.** **52/730;** 52/301; 52/494; 52/732

[51] **Int. Cl.** **E04c 3/36**

[58] **Field of Search** 52/280, 497, 586, 593, 52/595, 592, 494, 720, 721, 730, 732, 739, 284, 285, 286, 301, 282, 233

[56] **References Cited**

UNITED STATES PATENTS

1,236,635	8/1917	Wells	52/280 X
2,065,433	12/1936	Dercum et al.	52/281 X
2,363,862	11/1944	Hancock	52/497 X
2,521,381	9/1950	Linch	52/280 X
2,836,861	6/1958	Rethmeier	52/732 X
3,206,903	9/1965	Johnson	52/494 X
3,226,906	1/1966	Koerner	52/732
3,305,986	2/1967	Mathews	52/730 X
3,462,897	8/1969	Weinrott	52/285 X
3,466,821	9/1969	O'Shaughnessy et al.	52/593 X
3,665,662	5/1972	Timbrook et al.	52/281 X

FOREIGN PATENTS OR APPLICATIONS

1,194,551	6/1965	Germany	52/497
1,484,122	1/1969	Germany	52/592

Primary Examiner—Frank L. Abbott
Assistant Examiner—Leslie A. Braun
Attorney, Agent, or Firm—Cullen, Settle, Sloman & Cantor

[57] **ABSTRACT**

The building structure utilizes prefabricated frame components of equal heights in forming the external and internal framing systems. The basic frame components include a structural post, blank wall frames, window frames, door frames and end caps. Each of the frame components is elongated and is provided with a laterally extending elongated male connector along one vertical edge and a pair of horizontally extending structural members at the top and bottom of the frame component forming a female receptacle on the other vertical edge whereby the male connector on each of the frame components fits into the female receptacle on an adjacent frame component and is secured thereto. Each frame component has load bearing capabilities and may be used interchangeably as members of interior or exterior walls. Each frame component utilizes manufactured elements which are commercially available and which require a minimum amount of work thereon, if any, in order to utilize same in the frame components. Identical manufactured parts are utilized in assembling the frame components and there is a regular rhythm of spacing the vertical studs or members of the frame components to insure "on center" dimensions when compared with present panel constructions.

In erecting the frame components, there is a constant repetition of identical components with the male connector of one component mating with a female receptacle on adjacent components and thereafter the components are tied mechanically together. Outer sheathing and inner wall boards are secured to the external and internal frame structures. Ceiling boards are secured to the roof trusses provided on the framing system.

4 Claims, 16 Drawing Figures

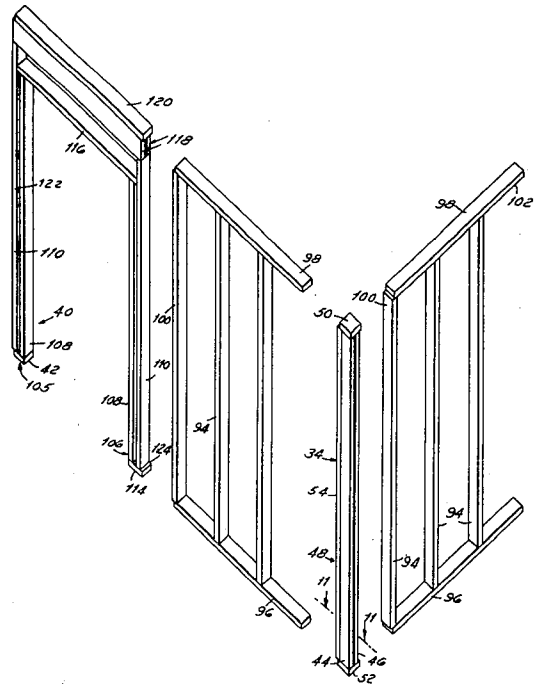


FIG. 1

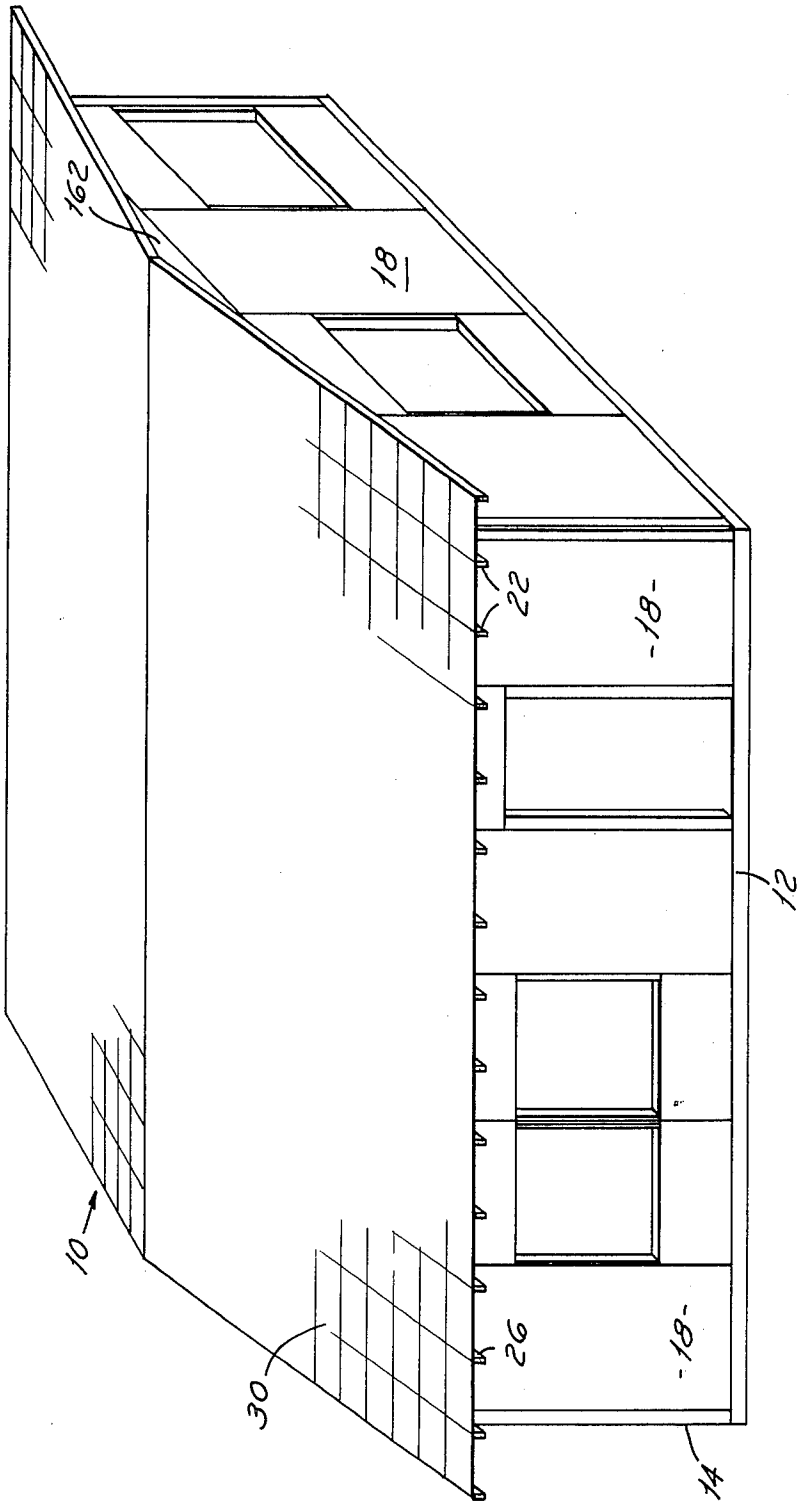


FIG. 2

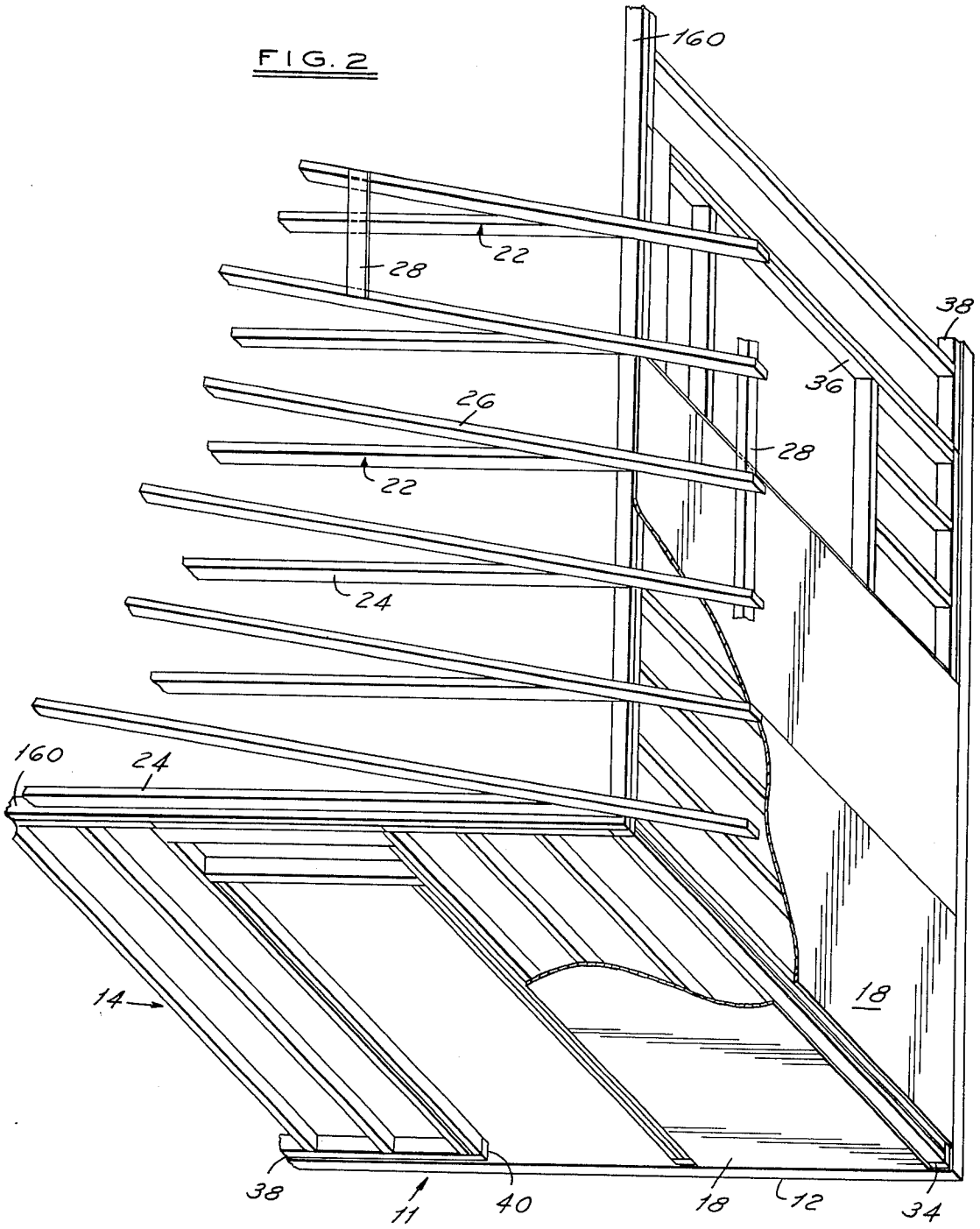


FIG. 3

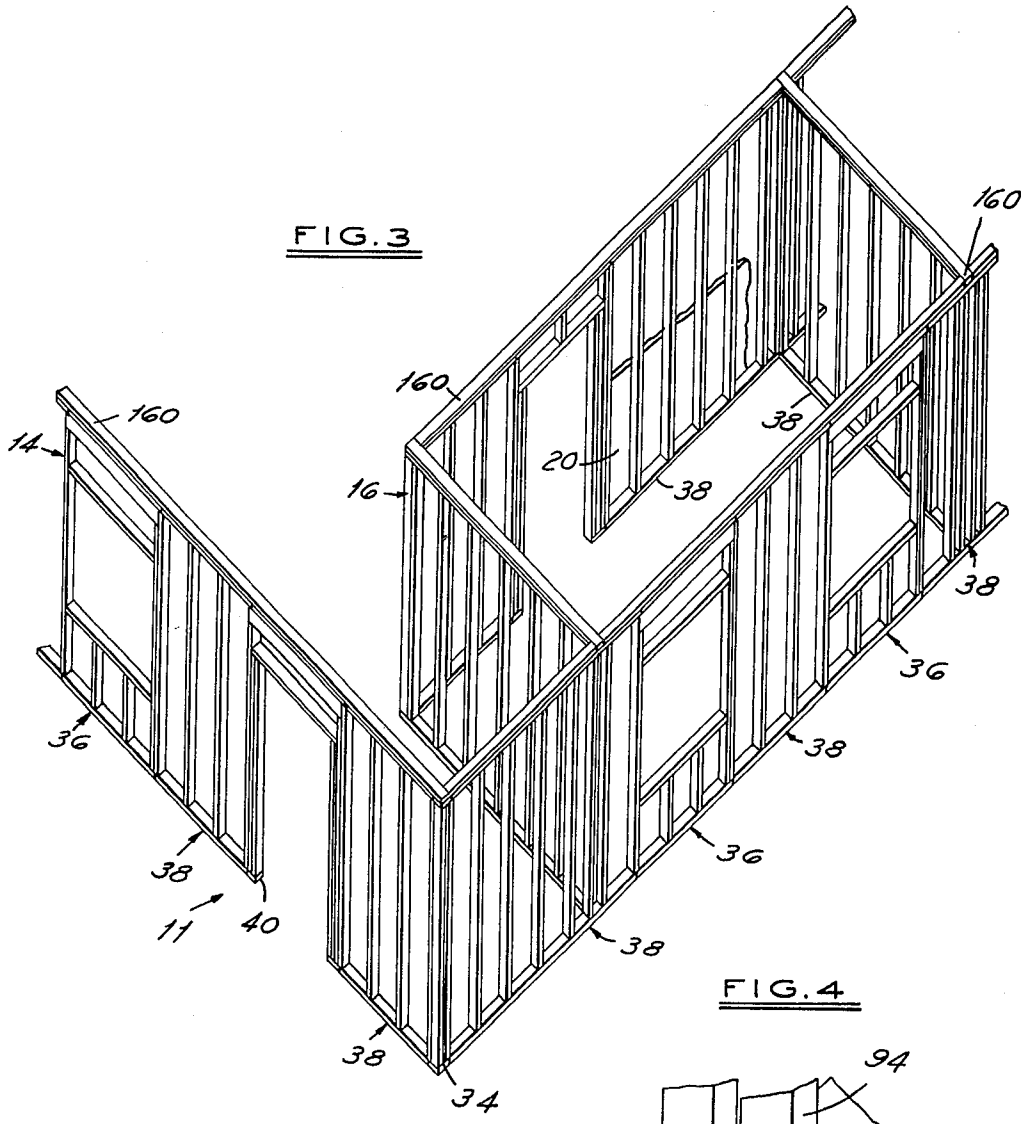

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FIG. 4

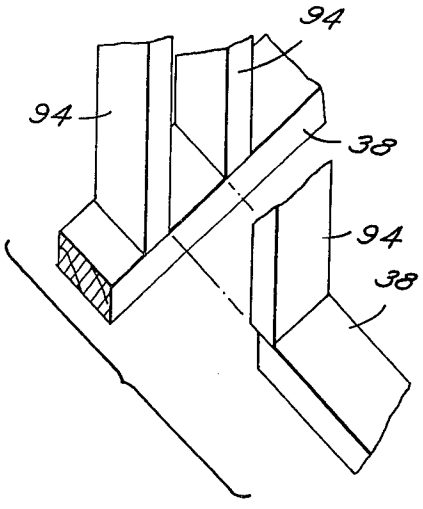

94
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38
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38

FIG. 6

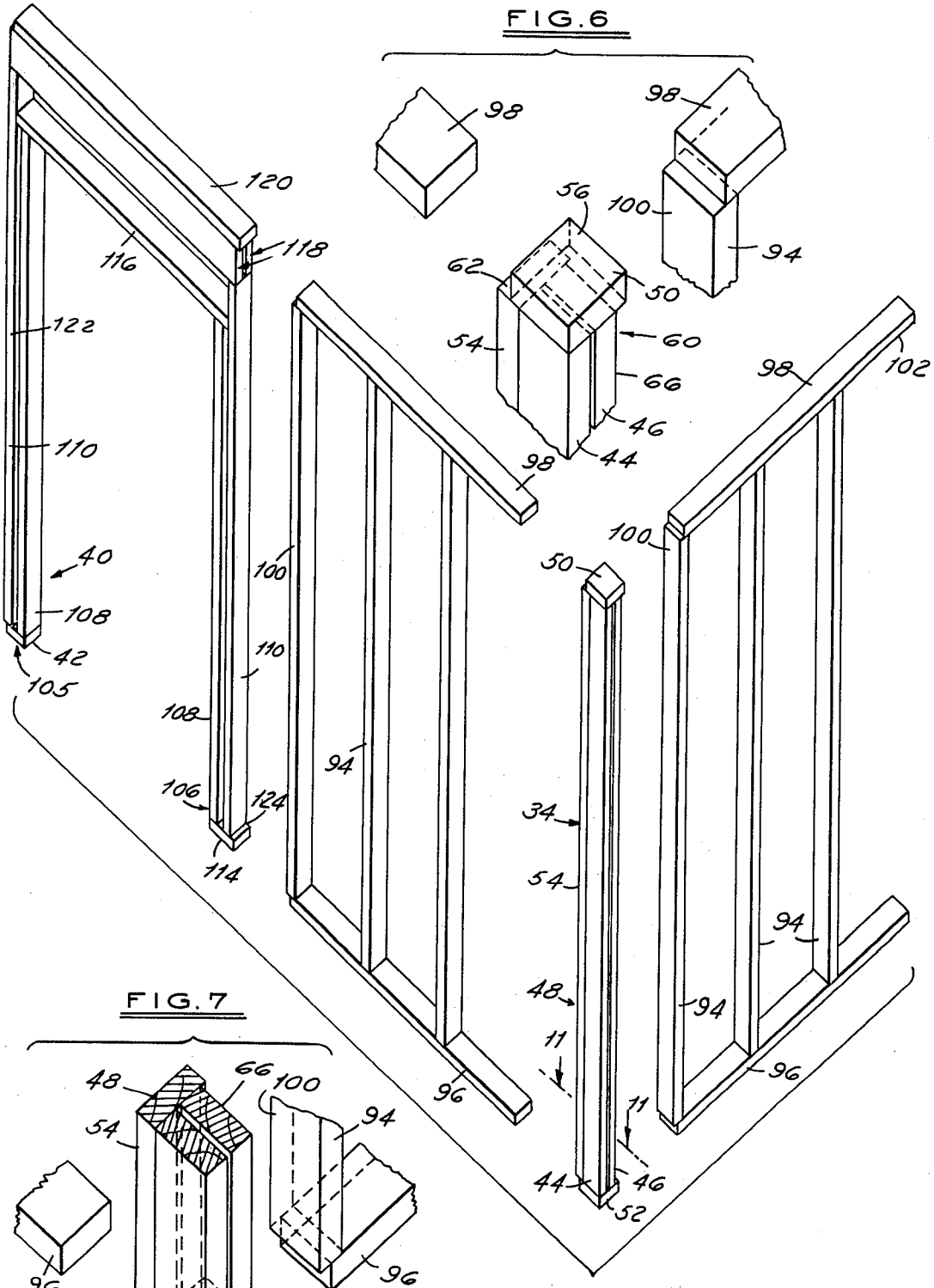


FIG. 7

FIG. 5

FIG. 8

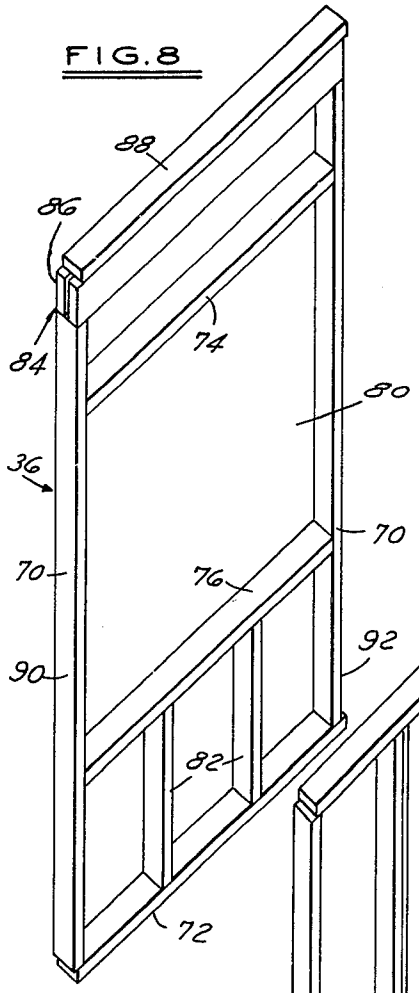


FIG. 9

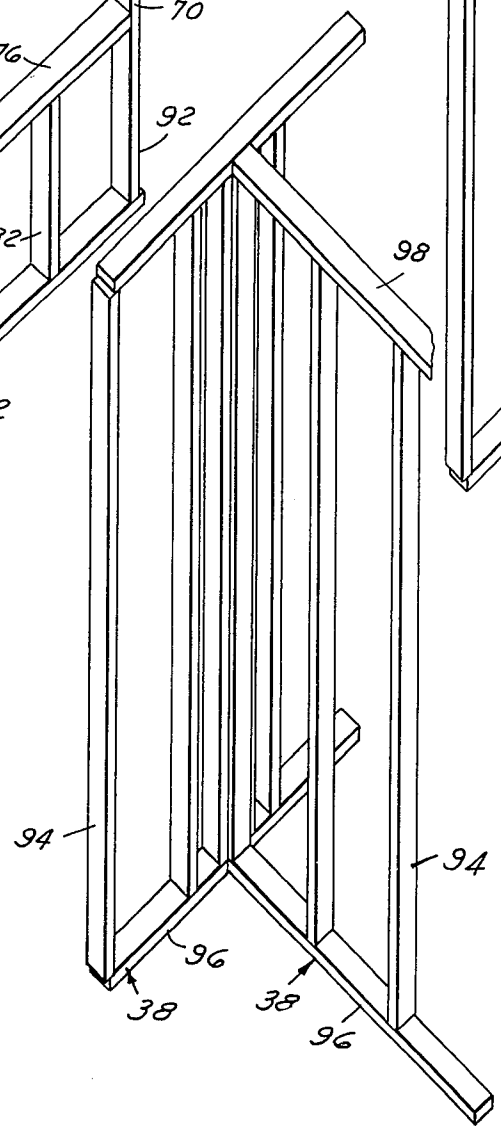


FIG. 10

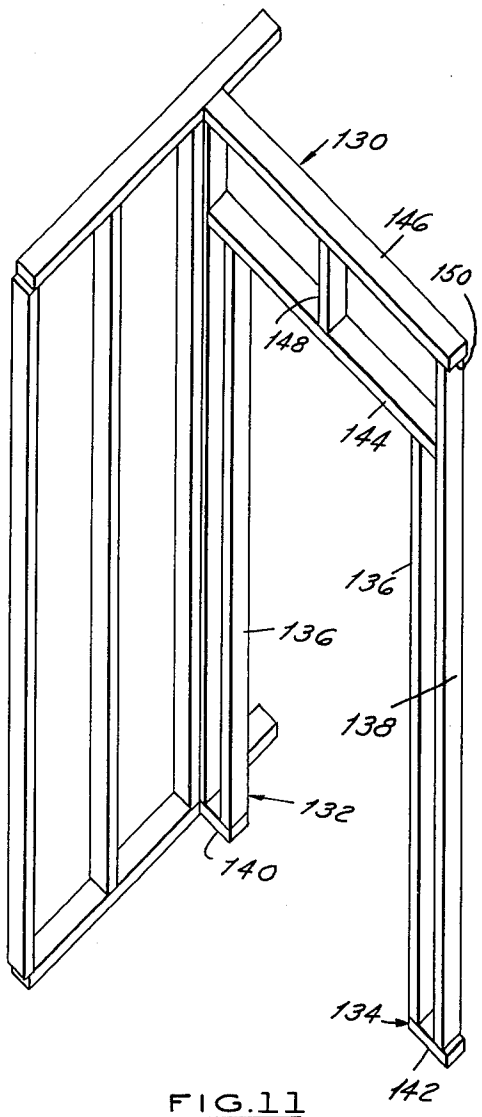


FIG. 11

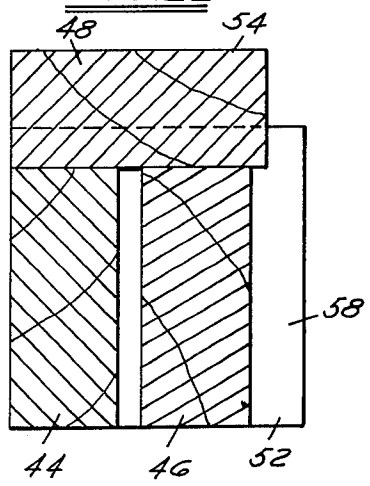


FIG. 13

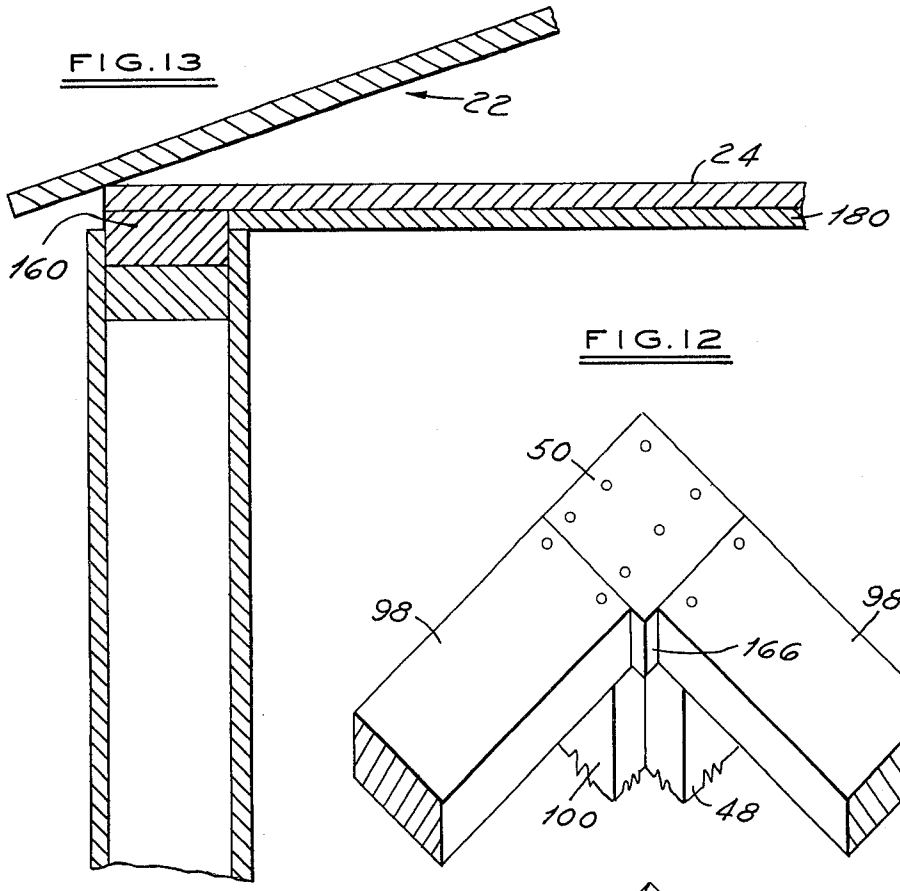

22
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FIG. 12

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FIG. 15

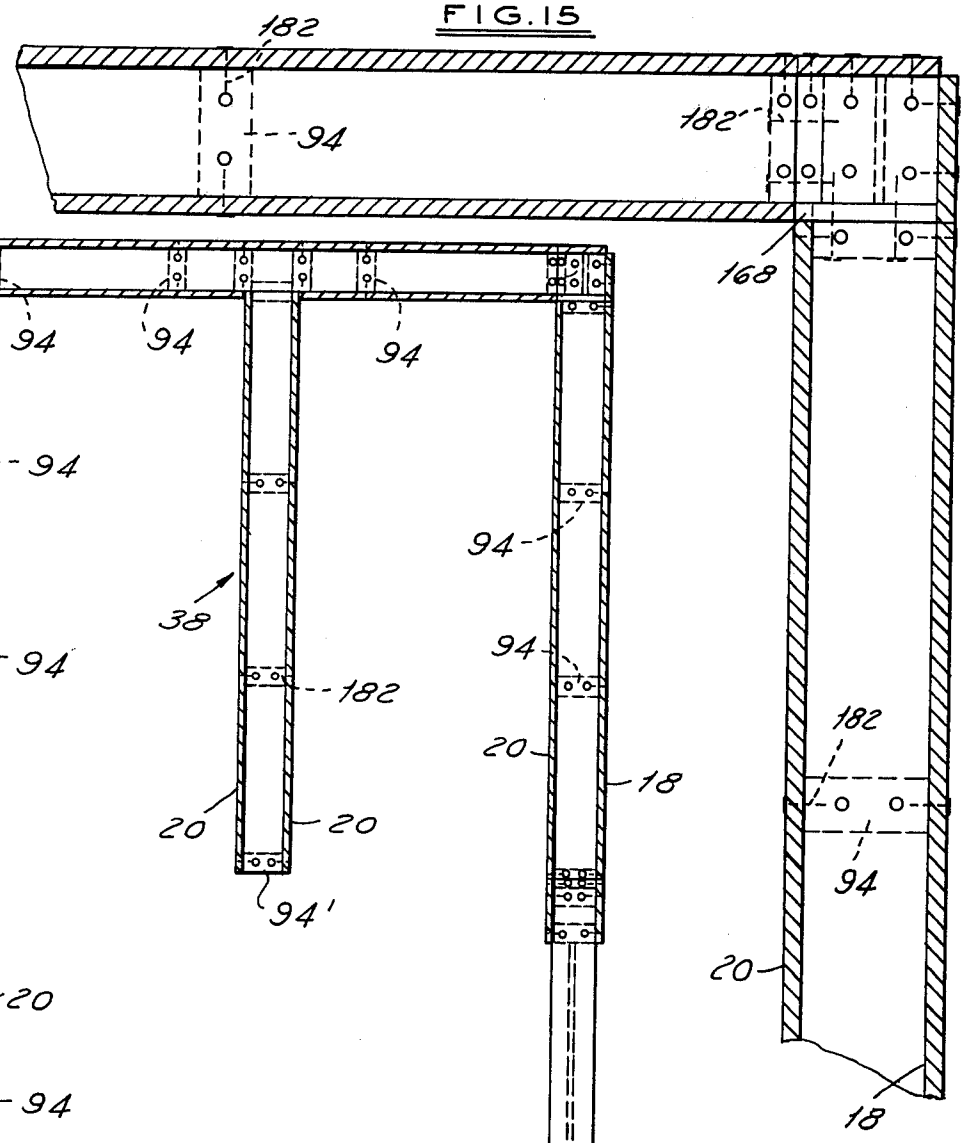

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FIG. 14

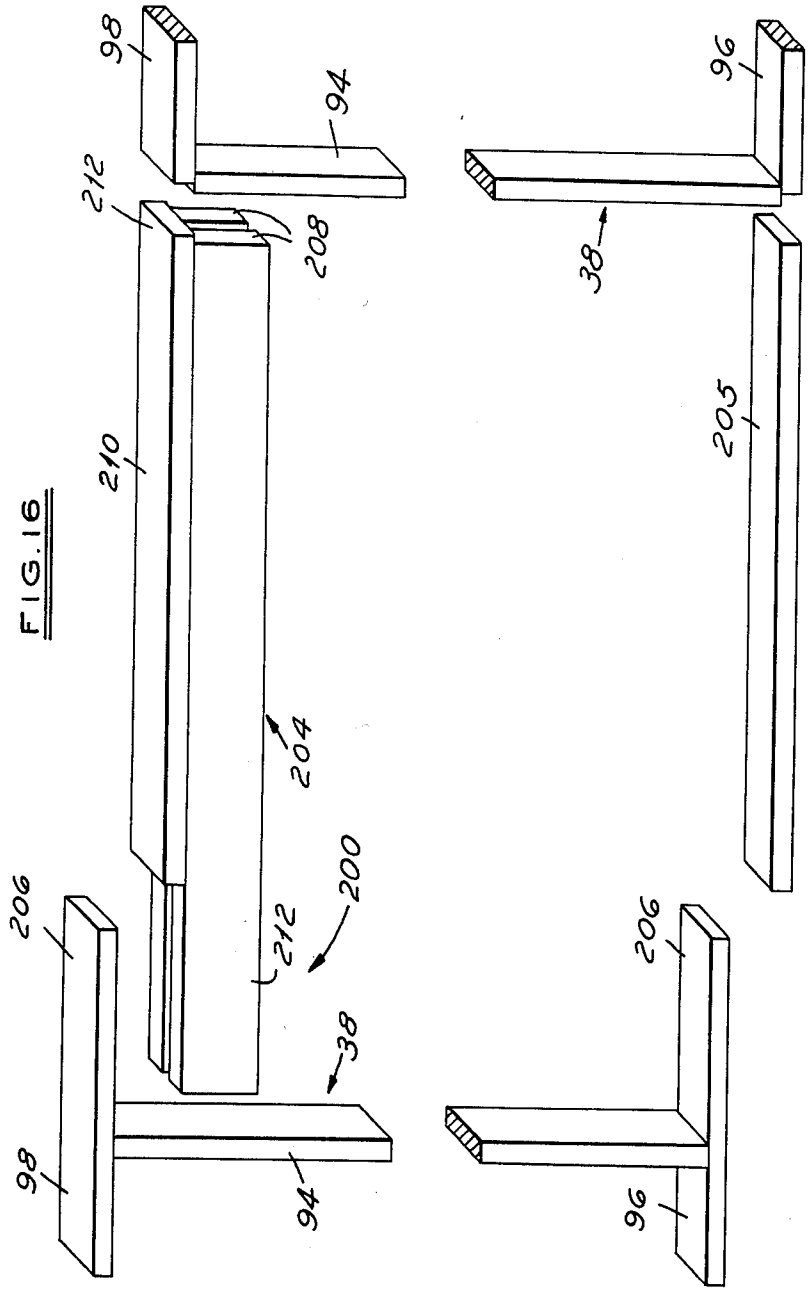


FIG. 16

STRUCTURAL CORNER POST

This is a division of application Ser. No. 254,031, filed May 17, 1972 now U.S. Pat. No. 3,774,362.

BACKGROUND OF THE INVENTION

During the past decade there have been programs designed for lowering the cost of constructing buildings. The emphasis of such programs is placed primarily on buildings designed for residential use. Individual entrepreneurs as well as large industrial and commercial firms have attempted to find solutions to the problem of constructing economical buildings and houses. The avowed objective of each program is to produce a better house for less cost.

The term "manufactured housing" has been used during the last several years. The basic assumption is that only by building houses in factories can solutions be found to rising costs. Such an assumption indicates a misunderstanding of the term manufactured housing as well as its meaning. It is submitted that houses cannot be "manufactured" any more than an automobile or a toaster is manufactured. Automobiles and toasters are assembled from parts that are manufactured. Thus buildings and houses are assembled and not manufactured.

Only parts can be manufactured — i.e. made by machine. Only a high volume of identical parts makes manufacturing economical. Manual operations are rarely replaced by a machine operation until the market for such parts made by man reach a potential volume that will not only provide a return on the investment in the machine but in addition will yield a profit.

The basic problem with housing is not that there is too little manufacturing; but, too much. Every single component that a house requires is already being manufactured in factories. Too frequently these products are simply manufacturing blanks in the hands of the builder and the subcontractors who practice their craft by re-manufacturing with their ancient hand tools what machines produced. Some products are used in a house precisely as they were manufactured or factory-assembled, products such as nails, switch plate covers, toilets, appliances and doorknobs. But the products that are used in framing the house and covering the frame are typically measured, marked, and cut. Until then the 2 × 4 inches lumber, gypsum board, insulation batt and exterior siding may never have been handled by man. Even such a mundane item as a pine 2 × 4 inches is a product of a capital-intensive, highly sophisticated processing industry — and it comes to the carpenter in a far more finished, dimensionally true state than its hand-hewn predecessor did not too many years ago. However, by the time the carpenter is finished measuring, marking, sawing, drilling, notching, routing, shimming and otherwise remaking the lumber, much of the manufacturing economies inherent in that piece of lumber are lost. A person rarely finds a high enough quantity of such parts in a house that are precisely identical to attract somebody to manufacture the parts in final form.

It is on individual parts that the present invention focuses. If housing is to be "revolutionized", the emphasis must be placed on every single component that goes into the production of the building. Only by offering industry high volume of identical parts can housing attract the investment required for even more sophisticated machines than are presently available; lure technologies that exist but are not being applied to housing; and unleash the research and development expenditures that must be forthcoming if housing is to catch up with at least the machine, if not the space age.

Most manufactured housing firms concentrate almost exclusively on trying to achieve substantial labor savings vis-a-vis conventional, on-site construction. The techniques used, however, are usually limited to hiring "non-skilled" workmen so that lower-than-field wages can be paid. The materials being used and the methods of fabrication are customarily the same as one finds on a conventional building site. There are several fallacies in this approach. Among them, as discussed hereinafter, is the assumption that reducing labor costs alone will more than offset the investment and cost penalties that builders incur when they elect to build houses in factories. These cost or investment penalties — versus conventional construction firms — come in the form of land and building for the plant; tooling; administrative and production overhead; special freight problems and costs; and, the unique — unique for the construction industry — problem of having to self-finance their entire inventory. Perhaps the most serious but least acknowledged penalty comes in the form of restrictions on design. The manufactured house is frequently so unattractive aesthetically that it borders on being non-competitive at any price.

The most serious error that "housing manufacturers" typically make is exaggerating labor's share of the total cost of construction. Analyses by the Kaiser Commission outline construction costs of single-family residences as: labor 18 percent; material 38 percent; development 30 percent; overhead and profit 14 percent; for a total 100 percent.

By extrapolation, the analysis suggests that 8 percent of the 18 percent labor input is associated directly with development, e.g. excavating and building foundations, back-filling, hooking up utilities. The balance of labor costs — only 10 percent of total costs — is associated directly with the structure; only this portion can be moved into a plant. Even if in-plant operatons could yield a 50 percent reduction in labor costs, the net impact on total costs would be only 5 percent. The effect on total "monthly occupancy costs" is even less impressive. A 50 percent reduction in house-related labor would lower a homeowner's monthly costs by less than 3 percent. In search of such savings, however, it is common to make a substantial investment in plant, tooling and equipment. These costs, plus the other cost penalties referred to earlier, are severe handicaps for the housing manufacturer because they are all in excess of what his competitor — the traditional builder — has invested. Just amortizing the investment and paying for the high overhead (again, relative to his competition) will more than offset any labor savings, and it is not clear whether he is even achieving the latter.

Because of inadequate analysis of the trade-offs between the immense investment in plant and (theoretical) labor savings, large losses have been experienced by otherwise capably managed companies who have ventured into manufactured housing. Many have ceased to do business in the housing field because of serious financial losses.

There are two principal categories of firms which are attempting to build houses in factories: (a) those which assemble the entire house in the factory, usually in two

sections, truck it to a site, set it on its foundation, and make final connections; and (b) those classified as "component manufacturers"; the latter customarily take one of two forms, or perform both types of operations:

1. Component manufacturers fabricate whole walls, complete with insulation and wiring, windows and doors, and exterior and interior wall sheathing installed in the factory. Usually cranes are required for final assembly of the wall "components" on site; and
2. Other component manufacturers fabricate smaller sections of the wall, usually referred to as "panel manufacturers", with sheathing, insulation, wiring and exterior siding left for installation on site.

The latter type of operation is most akin to the subject invention in the sense that the product of such a component manufacturer typically follows a modular scale. The panels usually are offered in lengths such as 2 foot, 4 foot, and 8 foot. Such panels are, however, usually closed at both ends. As a result, there are material cost penalties since there is a doubling up of end studs where two panels abut. Also, this type of joint and internal assembly complicates their assembly and the engineering of assembly tools and processes. The main reason is that a regular rhythm of spacing between studs is not maintained; i.e. on center dimensions are not constant. This kind of a butt joint also requires in some applications special efforts to insulate the butt seam. Of course, manufacturing and assembly economies are reduced to their lowest level by those panel fabricators who build any size panel that a customer may choose to specify.

SUMMARY OF THE INVENTION

This invention relates to the use of prefabricated frame components used in the erection of the internal and external framing systems of houses, low-rise apartments, office buildings, light industrial buildings and schools.

The basic framing components include a structural column or corner post, blank wall assemblies or wall frames, window frames and door frames and end caps. The framing structure or system utilizes top and bottom horizontal framing parts ("plates") that are of the same dimension. Vertical support members or studs are located on center and vary in length only when used to support sills in windows or door frames. Each of these components has load-bearing capabilities and may be used as members of interior or exterior walls, interchangeably.

Corner support and structural integrity are provided by the column or corner post designed to receive the "male" end of the framing component from one side and, at a 90° angle to the male, a "female" end of another framing member or component. The corner post may be reversed, i.e., turned upside down, and used for a reverse configuration of wall members. This permits the same column or corner post to be used for "inside" or "outside" corners without modifications required for the column or the sub-assemblies that abut it. The same corner post without modifications is also used in certain applications for joining intersecting members of interior walls. Any one of the framing members or components may be connected at right angles to any other by simply inserting the male end or connector anywhere next to or between the vertical members along the horizontal plane of the member or component which it is joining or by abutting the female end to the member or component anywhere along the horizontal plane. The end cap is used to close the female end or female receptacle of a wall member or frame component as may be required in some applications. It is identical in length to the vertical supports or studs used in the frame components.

The various frame components are joined together via a C-type butt joint on the horizontal plane that overlaps a vertical support member or stud both at the top and bottom. Various frame components are connected together with the conventional top plate, each section of which would butt approximately 12 inches or more from any butt joint formed by the wall members or frame components.

The framing system requires as few as eight different parts from which all components can be assembled, namely the post, blank wall members, window frames, door frames, and the end caps. The system includes a constant repetition of identical parts which are manufactured in volume. Use of identical parts is the absolute prerequisite for economical manufacturing. Production capability is increased since eight machines, very simple in design, could be used to make the eight parts. Tooling costs would be minimized since each machine performs only one operation, which typifies the least expensive and most efficient machine of all.

In the framing system there is a regular rhythm of spacing between full length, vertical wall members or components which makes assembly particularly easy. Sheathing may be applied to the framing system with virtually no modification required in most instances. This permits manufactured materials such as the typical 4 × 8 foot gypsum and insulation-type wall boards to be used as finished products on the framing system without alterations.

Another feature of the present invention is that the framing members may be produced economically either in a plant, where the advantage may be production and inventory control, or on the building site. In addition the system is equally adaptable to a conventional "stick" building, as well as the typical in-plant type of operation. Depending on the size of the structure, a building could be enclosed on the site within one day thus permitting some flattening of the building cycle that results from climatic conditions and tend, therefore, to increase the overall productivity of the housing industry.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a house or building structure;

FIG. 2 is a fragmentary perspective view of a corner of another house or building structure, with certain parts removed or broken away to illustrate the external framing structure;

FIG. 3 is a fragmentary perspective view of another house or building structure, with certain parts removed illustrating the internal and external framing structures;

FIG. 4 is an exploded fragmentary view illustrating the manner in which a pair of framing units located at 90° are joined together by a C-type butt joint or male-female connection;

FIG. 5 is an exploded perspective view illustrating a corner post and a plurality of framing components or

units of the framing structure prior to being joined together;

FIG. 6 is a fragmentary perspective view of the upper portion of the corner post illustrating the method of connecting two adjacent frame components to the corner post.

FIG. 7 is a fragmentary perspective view of the lower portion of the corner post illustrating the manner in which the two adjacent frame components are connected to the corner post;

FIG. 8 is a perspective view of the window frame;

FIG. 9 is a perspective view illustrating the manner in which a pair of angularly related frame components, one internal and one external, are connected;

FIG. 10 is a perspective view illustrating the manner in which an internal door frame is joined to an internal or external wall frame;

FIG 11 is a sectional view through the corner post taken on the line 11—11 of FIG. 5;

FIG. 12 is an enlarged fragmentary view of a corner construction, with intermediate parts of the corner post and horizontal framing members broken away, showing the upper and lower horizontal framing members attached to the corner post;

FIG., 13 is a vertical sectional view through a wall frame illustrating the manner in which the outer sheathings, inner wall board and ceiling panel are mounted in the framing system;

FIG. 14 is a plan view of another house or building structure illustrating the manner in which the outer sheathing and inner wall boards are attached to the framing components; and

FIG. 15 is an enlarged fragmentary plan view of one corner of the house or building structure illustrated in FIG. 14; and

FIG. 16 is a fragmentary front elevational view of a modified frame construction for a large window opening or for a sliding door and including upper and lower horizontal bridge or spanner elements.

DESCRIPTION OF A PREFERRED EMBODIMENT

The house or building structure illustrated in FIG. 1 is designated by the numeral 10 and the house or building structure illustrated in FIGS. 2 and 3 is designated by the numeral 11. The fabricated structural frame components including columns and panels, described in detail below, utilized in the building structures 10 and 11 are interchangeable and can be arranged to provide building structures of various configurations and sizes.

The building structure 10, 11 is erected or assembled on a generally flat and hard surface such as a concrete slab 12. The building structure 10, 11 includes a continuous or endless external framing structure 14 and also may include an internal framing structure 16, as an example, of the type illustrated in FIG. 3. The external framing structure 14 is provided with suitable sheathing 18 on the outside surface of the framing structure 14 as will be subsequently described. In addition, suitable wall panels 20 are provided on the inside of the external framing structure 14 and on both sides of the internal framing structure 16.

Mounted on the external framing structure 14 of each building structure 10, 11 are roof trusses 22 spaced, as an example, on 24 inch centers. Each roof truss 22 comprises a horizontal stringer 24 and a pair of inclined structural members 26 suitably connected at the center apex at the inner ends thereof and to opposite end portions of the stringer 24 at the outer ends thereof to provide a gable type roof structure or truss 22. Roof boards 28 are mounted on the roof trusses 22 to which is applied a suitable roofing material 30 (FIG. 1) such as asbestos shingles. It should be appreciated that the roof structure may take various shapes and be made from various materials well known in the art.

Referring now to FIGS. 1, 2, 3 and 5 the external framing structure 14 consists of a plurality of standardized frames and components hereinafter referred to as the column or corner post 34, window frame 36, wall frame 38 and door frame 40. The aforementioned corner post 34, window frame 36 and wall frame 38 are also used in forming the internal framing structure 16. The only difference between the internal and external framing structure 14 and 16 is in the design of the door frame and in the use of end caps as will subsequently appear.

FIGS. 5–11 inclusive illustrate five standardized frame components utilized in the internal and external framing structures 14 and 16. The column corner post 34 as illustrated in FIGS. 5–7, 11 and 12 consists of three elongated vertical studs 44, 46 and 48, of equal length, with two of the studs 44, 46 arranged parallel and spaced slightly apart a distance of one-fourth inch. The other stud 48 abuts the two parallel studs 44, 46 as shown in FIG. 7. The column 34 further includes an upper end cap or plate 50 and a lower end cap or plate 52 which are secured to the top and bottom surfaces of the column 34 respectively. One longitudinal and vertical edge portion of the column 34 forms a male connector 54 while another edge portion of the column 34, defined by the overhanging portions 56, 58 of the end caps 50, 52 respectively, forms a female receptacle 60 located at 90° from the male connector 54. The male connector 54 has an upper flat surface 62 and a lower flat surface 64. The male connector 54 has a length equal to the length of stud 48. The female receptacle 60 has a height equal to the length of stud 46 which has a surface 66 which defines the back wall of the receptacle 60.

As shown in FIG. 8, each window frame 36 consists of a pair of vertical studs 70; a bottom horizontal plate 72; a pair of intermediate horizontally extending elements or sills 74, 76, which define along with intermediate portions of said vertical studs 70 a window opening 80; a pair of vertical bracing elements or studs 82 interposed between the lower intermediate horizontal element 76 and the bottom horizontal plate 72; a header 84 consisting of two elements 86 laid on their edges and spaced apart and mounted on top of the vertical studs 70; and a top horizontal plate 88 mounted on the header 84. As illustrated in FIG. 8 the left-hand vertical edge of the window frame 36 forms an elongated male connector 90. The overhanging portions of the plates 72 and 88 at the right-hand vertical edge portion of the window frame 36 and the outer surface of the right stud 70 and the right end surface of header 84 forms a female receptacle 92 which is adapted to receive the male connector on a column or corner post 34 or the male connector on an adjacent frame whether a window frame 36, wall frame 38, or door frame 40. The bracing studs 82 are located on 16 inch centers with respect to the studs 70. The size of the window opening 80 may vary.

As shown in FIG. 5, each wall frame 38 comprises three vertically extending studs 94 spaced on 16 inch centers; a bottom horizontally extending plate 96; and a top horizontally extending plate 98. The top and bottom plates 96, 98 are of equal length and are connected to the three vertically extending studs 94 as shown in FIGS. 5, 9 and 10. The left-hand longitudinal edge of the wall frame 38 as shown in FIG. 5 forms a male connector 100. The overhanging end portions of plates 96, 98 at the right-hand edge portion of the frame 38 forms a female receptacle 102 which is adapted to receive the male connector on a column or corner post 34 or the male connector on an adjacent frame whether a window frame 36, wall frame 38, or door frame 40. The wall frame 38 may be used in both the internal and external framing systems.

As shown in FIG. 5, the external door frame 40 consists of a pair of vertical stiles 105, 106, each stile 105, 106 consisting of an inner vertical stud 108 and an outer vertical stud 110. The inner vertical stud 108 is shorter than the outer vertical stud 110. The vertical studs 108, 110 of each stile are spaced apart 1½ inches. The vertical studs 108, 110 of the left stile 105 are mounted on an end cap or plate 112 while the vertical studs of the right stile 106 are mounted on a larger end cap or plate 114. An intermediate horizontal element 116 spans the space between and abuts the inner surfaces of the outer vertical studs 110 and is secured to the top surfaces of the inner vertical studs 108. A header 118 consisting of two horizontally extending elements or parts 119 are spaced apart one-half inch and are mounted on their edges across the top surfaces of the outer vertical studs 110 of the two stiles 105, 106. A top horizontal plate 120 is supported by the header 118. The left-hand edge of the door frame 40 forms a male connector 122. The overhanging end portions of end plate 114 and top plate 120 and the outer surface of stud 110 of the stile 106 at the right-hand edge of the door frame 40 (FIG. 5) forms a female receptacle 124 which is adapted to receive the male connector on a column or corner post 34 of the male connector on an adjacent frame whether a window frame 36, wall frame 38 or door frame 40.

As shown in FIGS. 3 and 10, the internal door frame 130 consists of a pair of vertical stiles 132, 134, each stile 132, 134 consisting of an inner vertical stud 136 and an outer vertical stud 138. The inner vertical stud 136 is shorter than the outer vertical stud 138. The vertical studs 136, 138 of each stile are spaced apart. The vertical studs 136, 138 of the left stile 132 are mounted on an end cap 140 while the vertical studs of the right stile 134 are mounted on a larger end cap 142. An intermediate horizontal element or plate 144 spans the space between the outer vertical studs 138 and is secured to the top surfaces of the inner vertical studs 136. A top horizontal plate 146 is mounted on the outer vertical studs 138. A bracing stud 148 is centrally located between studs 138 between the horizontal plates 144, 146. The left-hand edge of the internal door frame 130 forms a male connector, not shown. The overhanging end portions of plate 146 and end cap 142 and the outer surface of stud 138 of stile 134 at the right-hand edge of door frame 130 forms a female receptacle 150 which is adapted to receive the male connector on a column or corner post 34 or the male connector on an adjacent frame.

The various frame components as stated previously are erected and assembled on slab 12, with the door frames, window frames, wall frames and corner posts of the internal and external framing systems located according to the floor plan. After the various components are erected on the slab 12 horizontal top plates 160 are placed on top of the several frame components of the internal and external framing systems 14, 16. As shown in FIGS. 2 and 3, the top of plates 160 are superimposed on the top horizontal structural members of the frame components including structural members 120, 98, 88, 130, etc. Thereafter the conventional top plates 160 are secured to the frame components including the corner posts to tie the frame components together. The roof trusses 22 are mounted on the framing system and spaced on 24 inch centers as stated previously. Each gable type building structure includes various wall boards and sheathing at the ends of the building structure between the top plates 160 and the roof structure as represented generally by the numeral 162 in FIG. 1.

FIG. 3 illustrates the male-female connections or C-type butt joints provided between adjacent wall components, with the conventional top plates 160 spanning the exterior framing structure 14 as well as the interior framing structure 16. Each top plate 160 has a cross section of 1½ × 3½ inches and can vary in length. Each wall component has a height of 7 feet 11 inches. The overall height from the slab 12 to the top surface of plate 160 is 8 feet ½ inches.

As stated previously, the present invention utilizes certain parts manufactured in volume from commercially available lumber. Several component parts having a predetermined length and cross section are used for economy purposes. The component parts of each frame component are tied together by nails. Abutting frame components also are tied together by nails which are driven through the C-type butt connection as appears in FIG. 12. The top plates 160 are tied to the frame components by nails properly placed.

The dimensional configuration of the several parts used in the manufacture of the frame components are as follows:

	No.	Section	Length
Column 34			7'11"
vertical studs	44, 46, 48	1-½ × 3-½"	7'8"
top end cap	50	4" × 4"	1-½" thick
bottom end cap	52	4" × 4"	1-½" thick
Window Frame 36		(4'¾" wide)	7'11"
vertical studs	70	1-½" × 3-½"	7'2-½"
bottom plate	72	do.	4'0"
top plate	88	do.	4'0"
intermediate plates	74, 76	do.	3'9"
vertical bracing	82	do.	2'5"(Can vary in length)
header members	86	1-½" × 5-½"	4'0"
Wall Frame 38		(4-¾" wide)	7'11"

—Continued

	No.	Section	Length
vertical studs	94	1-½" × 3-½"	7'8"
bottom plate	96	do.	4'0"
top plate	98	do.	4'0"
External Door Frame 40		(4'¾" wide)	7'11"
outer vertical studs	110	1-½" × 3-½"	7'2-½"
inner vertical studs	108	do.	6'10-¾"
intermediate plate	116	do.	3'9"
top plate	120	do.	4'0"
header members 1	118	1-½" × 5-½"	4'0"
left bottom end cap	112	3-½" × 3-¾"	1-½" thick
right bottom end cap	114	3-½" × 5-¼"	1-½" thick
Internal Door Frame 130		(4'¾" wide)	7'11"
outer vertical studs	138	1-½" × 3-½"	7'8"
inner vertical studs	136	do.	6'10-¾"
intermediate plate	144	do.	3'9"
top plate	146	do.	4'0"
center brace	148	do.	7'¾"
left bottom end cap	140	3-½ × 5-¼"	1-½"thick
right bottom end cap	142	3-½" × 6-¾"	1-½"thick
Vertical End Cap	94'	1-½" × 3-½"	7'8"

FIGS. 13–15 inclusive illustrate the structure for assembling the outer sheathing **18** and the inner wall boards **20** to the frame components of the internal and external framing systems **14, 16.** The outer sheathing **18** is commercially available in sheets of a size 4 × 8 foot × ½ inch. The sheathing **18** is erected or applied to the framing system **14** with virtually no modification required in most cases except to fit around door and window openings. The wall boards **20,** as an example, gypsum and insulation-type wall boards, are commercially available in 4 × 8 foot × ½ inch sheets. The wall boards **20** are used as purchased with the exception when applied to door frames and window frames. In such instances the boards must be cut to required size.

It will be noted in FIG. **12** that after a pair of angularly related structural members **98** of adjacent wall frames **38** are tied to the corner post **34,** the inner corner **166** of the upper end plate **50** and the inner corner **168** of the lower end cap **52** of corner post **34** are exposed and each provides a pair of vertical surfaces **170,** 172 located at 90°. Such surfaces **170, 172** each has a height of 1½ inches and a width of one-half inch and forms a stop surface for the inner wall boards **20** as illustrated in FIGS. **14** and **15.**

The vertical surfaces **170, 172** on the corner posts **34** and the vertical studs of the several frame components provide nailing surfaces in order to connect the outer sheathing or sheets **18** and the inner wall boards **20** to the frame components. The sheathing and wall boards are manufactured in 4 × 8 foot × ½ inch sheets. The boards may be arranged vertically as illustrated in FIG. **13** or horizontally. In FIGS. **13** the outer sheathing **18** extends from the ground or slab **12** to a point one-half inch below the top surface of the conventional top plate **160.** The wall board **20** also extends from the slab **12** to one-half inch below the top surface of the top plate **160.** The outer sheathings **18** are connected to the vertical studs of the frame components which are located on 16 inch centers. The wall boards **20** abut the vertical surfaces **170, 172** of the corner posts **34** and are connected to the vertical studs of the frame components. Since the vertical studs of the internal and external framing systems **14, 16** are accurately located on 16 inch centers, the workman needs only to measure from the corner posts along each wall after the sheathings **18** and wall boards **20** are put in place in order to locate the vertical nailing surfaces provided on the vertical studs. The ceiling board **180** illustrated in FIG. **13** is in the form of a 4 × 8 foot × ½ inch sheet. The ceiling boards **180** abut the horizontal stringers **24** provided on the trusses **22.** The edges of the ceiling boards **180** abut the top edges of the wall boards **20,** with the outer surfaces of the ceiling boards **180** being flush with the outer surface of the top plates **160.** The ceiling boards **180** may be secured to the horizontal stringers **24,** located on 24 inches centers, by nails.

Vertical end caps **94'** are utilized to close the female ends of the wall frames **38** as illustrated in FIG. **14.** In addition, end caps **94'** are provided in certain applications where the female ends of two or more interior or exterior wall frames **38** come together and where the female end of a wall frame **38** connects to the exterior framing system. FIGS. **14** and **15** illustrate the manner of using nails **182** to attach the outer sheathings **18** and wall boards **20** to the vertical studs of the interior and external framing systems **14, 16.**

The blank wall frame **38** may be modified and designed to meet a local building code which permits stud-wall construction on 24 inch centers rather than 16 inch centers as described previously. The configuration of the other frame components, i.e. wall, door, corner post and end caps would remain the same. The only difference would be that the vertical studs of the frame components would be increased in length or extended 1½ inches. With such a construction the conventional top plates **160** are eliminated in both the internal and external framing systems. To compensate for the removal of the 1½ inch top plate **160** and still maintain a rough "wall height" of 8 feet ½ inch (to accommodate conventional manufactured wall covering materials which commonly come in increments of 4 foot widths, 8 foot lengths and one-half inch thickness), the vertical studs of each frame component would be lengthened by 1½ inches.

The 24 inch on-center pattern is gaining acceptance in the United States as members of the building trades seek effective ways of lowering construction costs without sacrificing structural integrity. With floor joists, wall studs and roof trusses all on 24 inch centers a rhythmic band of structural members rings the entire building. The present system is readily adaptable to this trend. A material cost reduction would result since the top plates **160** are eliminated in addition to one stud per each 4 foot "blank" wall frame. The roof trusses, located on 24 inch centers, would rest directly on the frame components.

When properly fabricated and erected the system would permit framing-in an entire structure of approximately 1500–2000 square feet within 1 day. Most importantly framing the walls, both interior and exterior,

could be accomplished with little more than a hammer. When precisely made, components of the system square and plumb each other at time of connecting together. The entire wall structure can be erected without a measuring tool or marking device, a saw, a drill, or a square; thereby several of the most labor-intensive activities associated with building construction are eliminated. Theoretically, even a level may be unnecessary except as a quality control gauge.

The use of the framing system is not dependent upon the availability of any particular building material. As a result, the framing system could be constructed from any material that has load-bearing characteristics that may be found locally. The framing system need not be assembled by "skilled" tradesmen since it is particularly useful for self-help building projects or for building in areas where there is a short supply of building tradesmen.

Dimensionally, the framing system is sized to accept conventional wall covering materials such as gypsum board and exterior sheathing with a minimum of modification to such products; also, to accept conventional plumbing and electrical components; and at the same time, the engineering principles incorporated make the framing system adaptable to change that may subsequently occur in any one of the frame components which require the frame for support. The vertical supports or studs can be moved closer or further apart, the plate can be lengthened or shortened or altered in oher ways, as can the vertical members, in width or any other dimension, without departing from the basic concept of the invention.

The framing system incorporates a high degree of dimensional standardization, and thus lends itself readily to the design and building of simple tools for fabricating its members and for assembling its parts.

The costs of both material and labor for framing in a house or other type of building structure should be equal to or less than for conventional constructions. The framing system due in part to using manufactured parts and by locating the studs on center provides a better structure in terms of strength and the structure is adapted to be expanded without costly probing of the walls to determine stud locations. In addition the framing system permits the exchange of any one of its framing members for another (or simply interchanging existing members).

The variety of local and state building codes in the United States is considered to be a major obstacle in aggregating a national housing market from which could be derived the maximum economies available from manufacturing. With the present framing system the most stringent structural building codes in the United States as well as in neighboring countries would be met. Thus the system is universally applicable, without alienating local building departments, zoning boards, or trade unions. Due to its "open" type construction, the framing system accommodates state and local electrical or mechanical construction codes.

The frame construction **200** illustrated in FIG. **16** may be used in the building structure where a large picture type window opening or a sliding door construction is required. The frame construction **200** includes portions of a pair of wall frames **38** which are separated by an upper bridge or spanner device **204** and by a lower spanner element **205.** The end portions **206** of the top and bottom plates **96, 98** of the left wall frame **38** overhang a distance of 15¼ feet from vertical stud **94.** The vertical stud **94** of the right wall frame **38** extends or overhangs a distance of three-fourths inches.

The bridge or spanner **204** includes a pair of elongated header members **208** which are spaced apart. Each member **208** is constructed from 2 × 6 wood lumber and has an actual size of 1½ × 5½ × 5 feet 2½ inches. A top plate **210** is mounted on the header members **208,** with the right end portion **212** overhanging a distance of three-fourths inches whereby the end portion **212** is adapted to rest upon the top surface of stud **94** of the right wall frame **38.** The top plate **210** is made of 2 × 4 wood lumber, having an actual size of 1½ × 3½ inches × 4 feet. The left end portions **212** of header members **208** are not covered by the top plate **210** and are adapted to fit under the overhanging portion **206** of top plate **98** of the left wall frame **28** and to be secured thereto.

The lower spanner device **205** is made from 2 × 4 lumber and has an actual size of 1½ × 3½ inches × 4 feet. The right end portion of the lower spanner device **205** abuts the lower surface of the vertical stud **94** of the right wall frame **38.** The end portion **206** of the lower plate **96** of the left wall frame **38** is adapted to abut the end surface of the lower spanner **205** and is secured or connected thereto by various types of fastening or connecting devices or braces, not shown.

What we claim as our invention is:

1. A load supporting corner post adapted for use in the framing system of a building structure comprising a vertically extending elongated column, the top and bottom surfaces of said column being flat and parallel, each of said top and bottom surfaces being divided into first and second zones, and upper and lower generally flat end caps overlying and secured to the first zones of said top and bottom surfaces respectively in parallel relation and extending in the same direction, and end caps including vertically aligned overhanging edge portions which form a female receptacle with an adjacent and intermediate vertical surface on said column, said female receptacle being adapted to receive therebetween a vertical structural member, the second zones of said top and bottom surfaces overlying a laterally extending vertical edge portion of said column which form a male connector which is adapted for engagement with the end portions of upper and lower horizontally extending structural members, said vertical edge portion and said intermediate vertical surface being located 90° apart, said column comprising a pair of longitudinally extending structural elements arranged in parallel relation having the opposing longitudinal surfaces spaced slightly apart and a third longitudinally extending structural element abutting and arranged perpendicular to said pair of structural elements, said pair and said third structural elements being of substantially equal length, said third structural element forming said laterally extending vertical edge portion.

2. The load supporting corner post defined in claim **1** wherein said upper and lower generally flat end caps each has a horizontal cross section of rectangular configuration.

3. The load supporting corner post defined in claim **1** wherein said structural elements and said end caps are made from wood.

4. The load supporting corner post defined in claim **3** wherein the end caps are secured to the column by nails driven through the end caps and first zones into the column.

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