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Cornella et al.

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[54] **BUILDING CONSTRUCTION OF SPACED PANELS WITH WEATHER SEALS**

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[52] **U.S. Cl.** **52/270,** 52/395, 52/403, 52/573, 52/595

[51] **Int. Cl.** **E04b 1/68,** E04g 15/06

[58] **Field of Search** 52/270, 79, 573, 52/593, 595, 403, 393, 395, 404, 405

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[57] **ABSTRACT**

A compact, low cost building construction comprised of a poured concrete floor slab and foundation, a plurality of concrete corner columns extending upwardly from the floor with concrete walls extending between each corner column, and a row of insulated windows extending around the house between the top surfaces of the walls and a relatively flat roof structure to form a durable, long lasting housing structure. Each of the concrete corner columns has a pair of vertical channels or grooves, each of which receives a corresponding tongue portion of the abutting concrete side wall structure. Each side wall is poured after the corner columns have been completed with a steel spacer being inserted within each channel with a layer of tar paper, or similar material, wrapped around it; the spacer being removed after the concrete has set, thus providing an expansion type joint. The wall structures are provided with elongated insulation cells on the inside surface which are partially filled with fiber glass insulation and covered with a rigid panel or plasterboard to provide an attractive, yet durable and relatively inexpensive housing construction.

1 Claim, 10 Drawing Figures

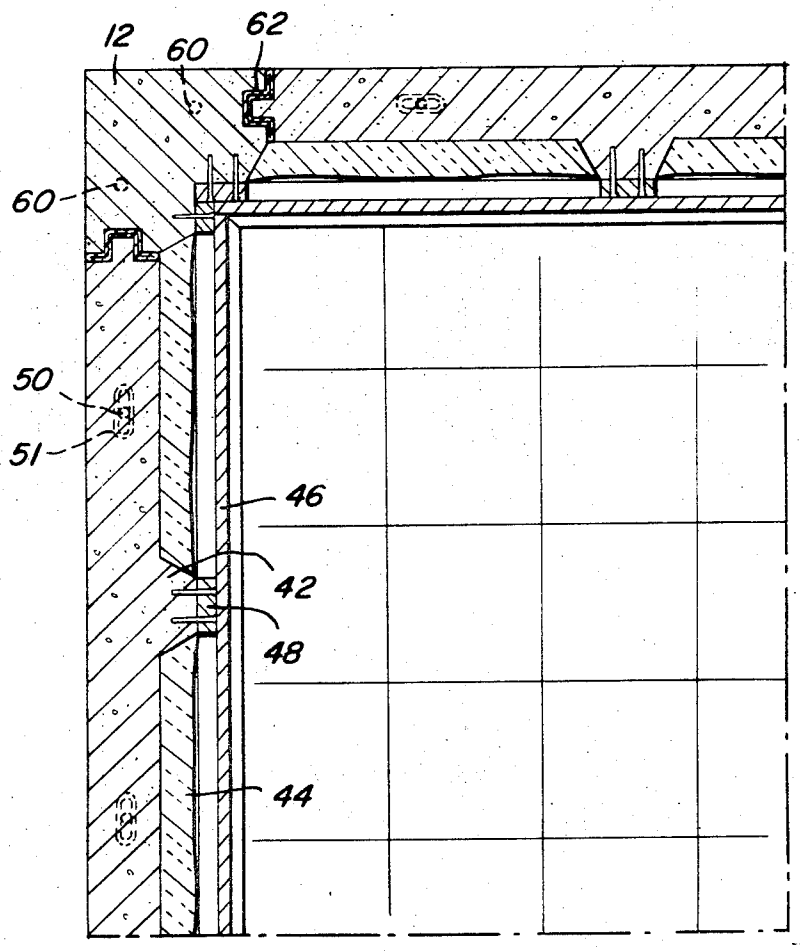
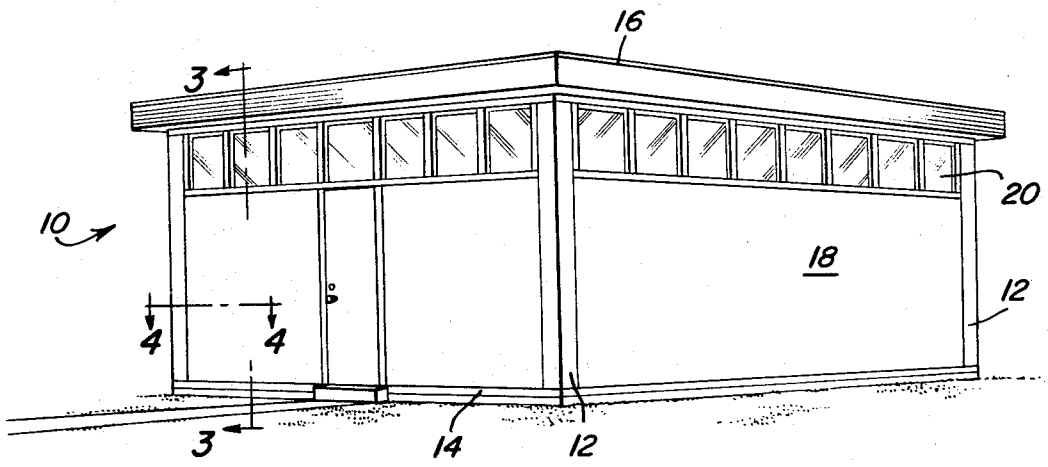


Fig. 1



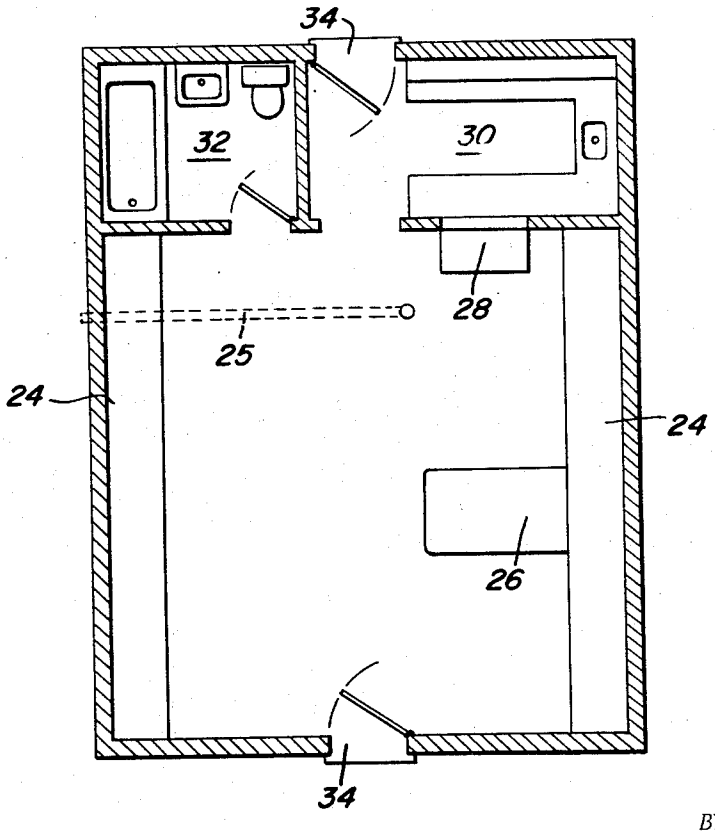


Fig. 2

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Fig. 3

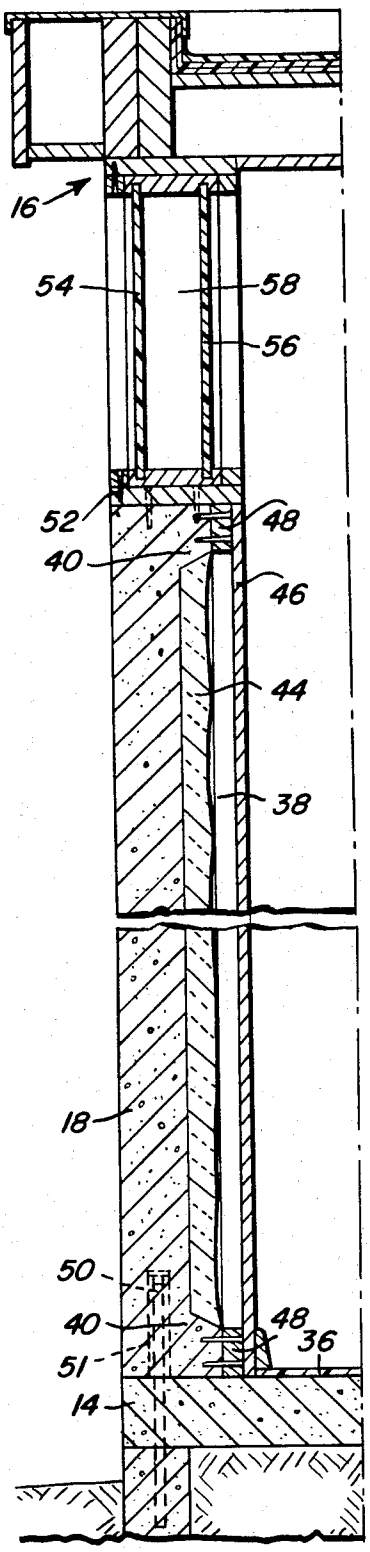


Fig. 4

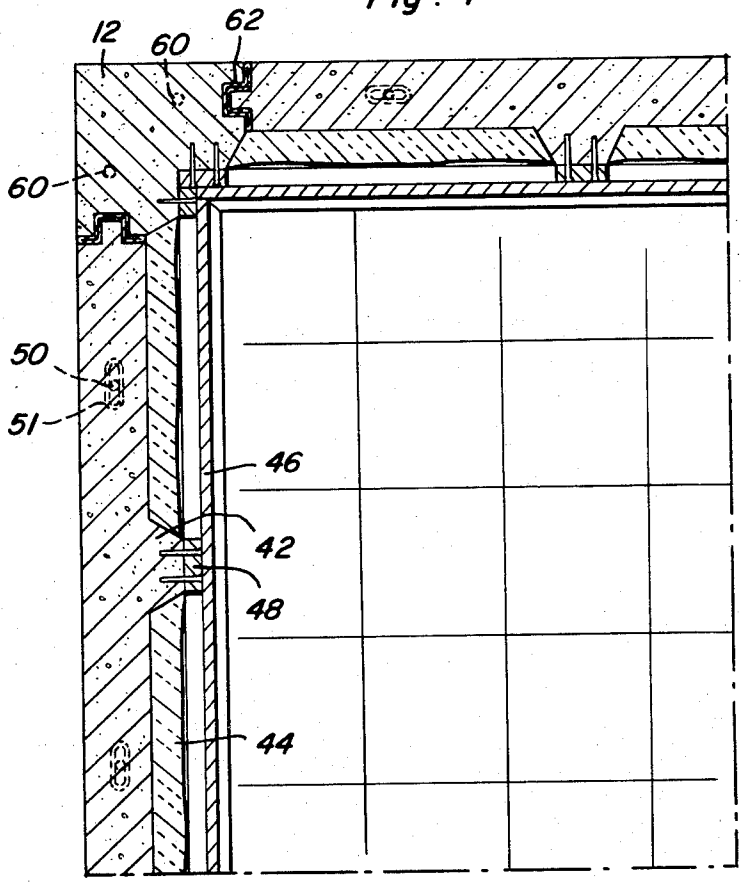


Fig. 5

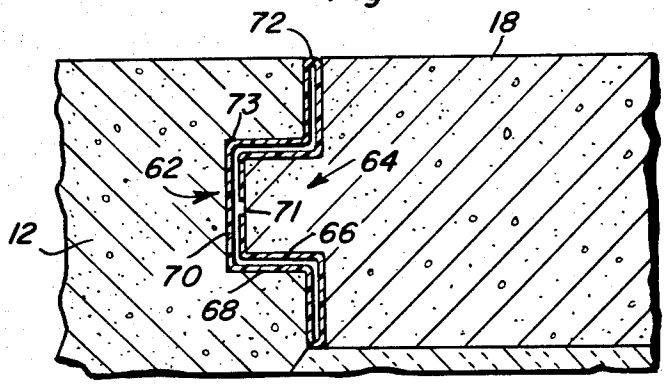
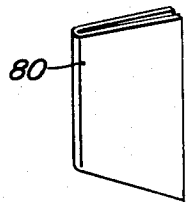


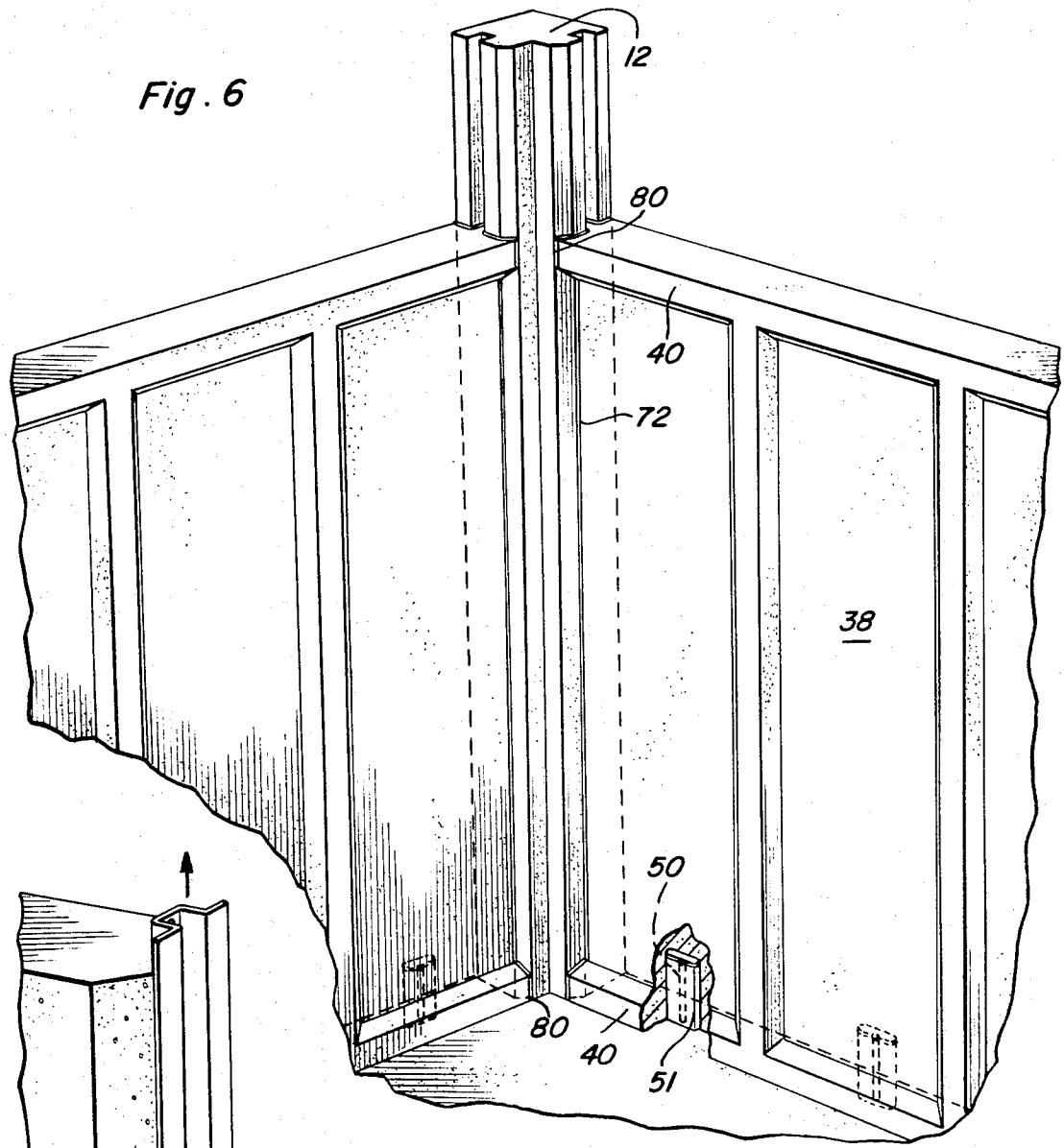
Fig. 8



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Fig. 6



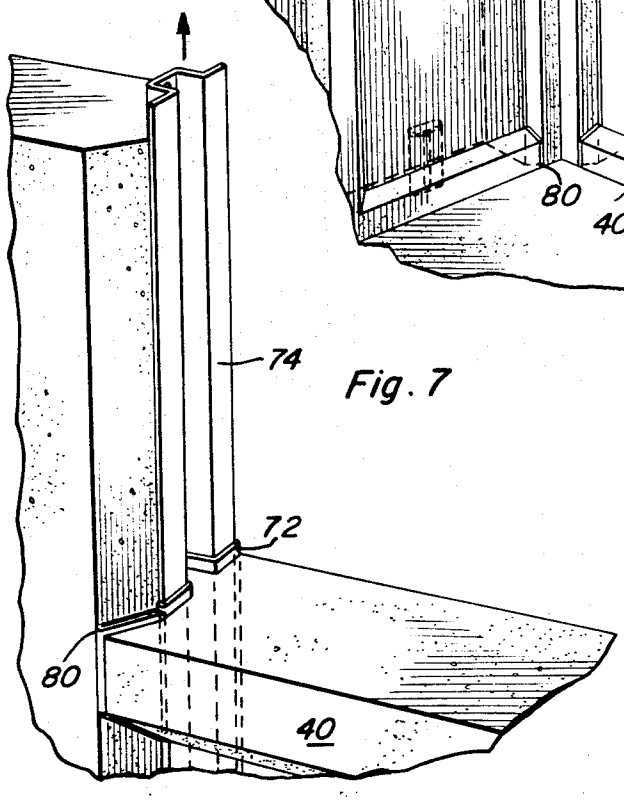


Fig. 7

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Fig . 9

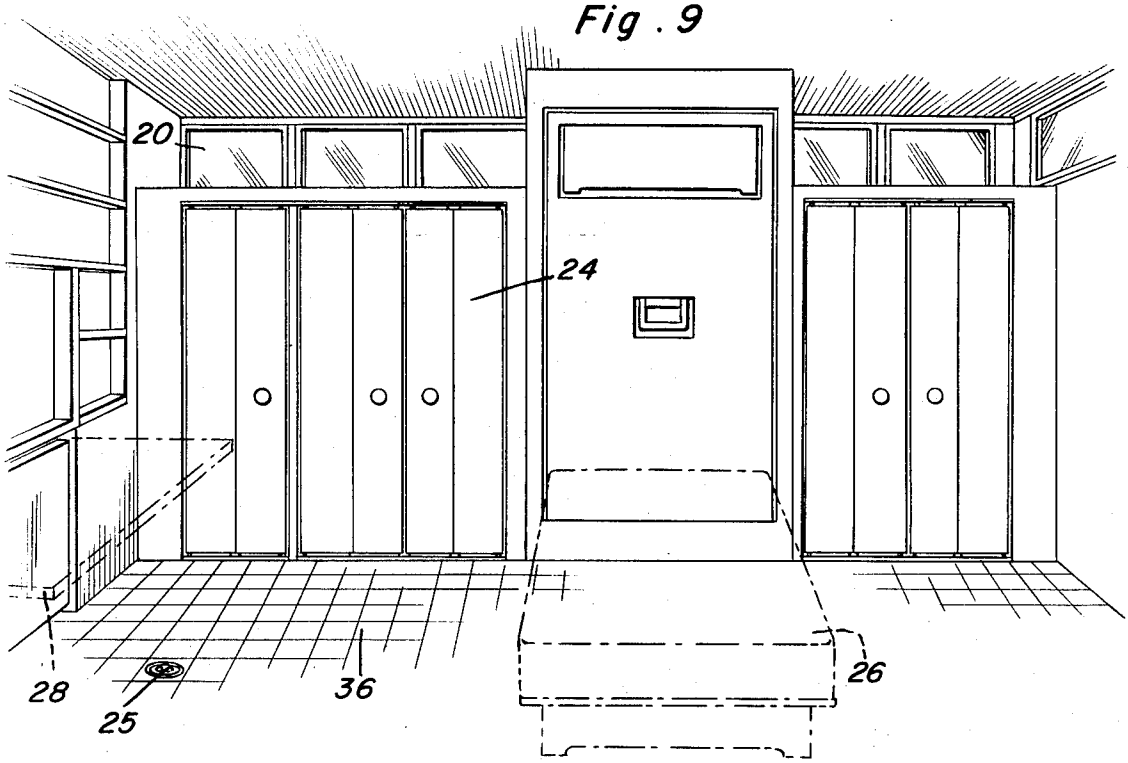
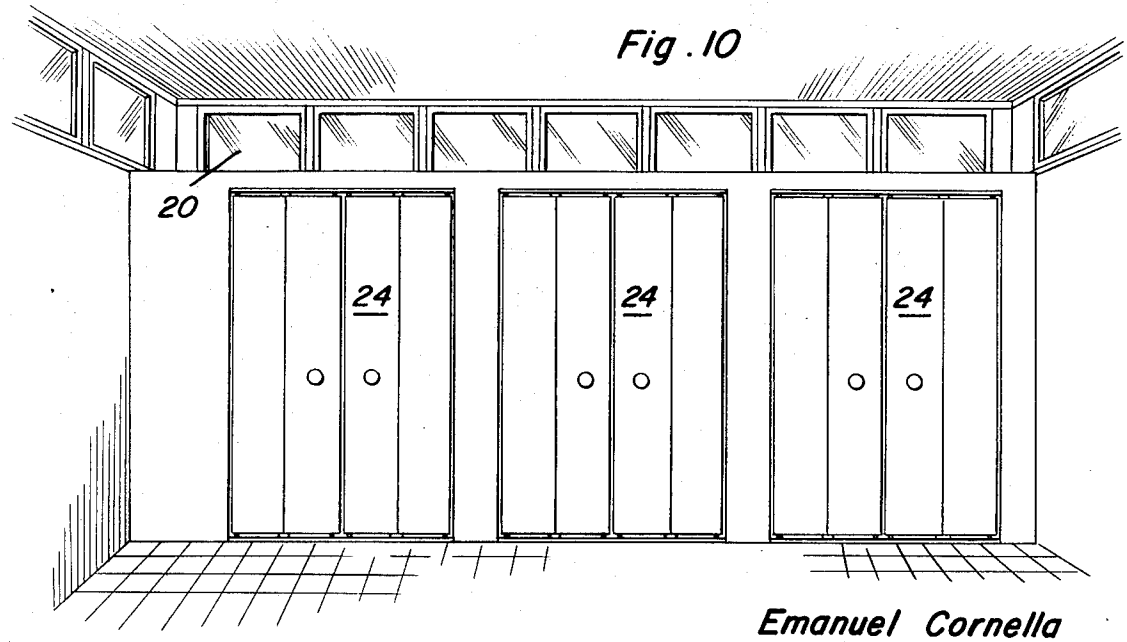


Fig . 10



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BUILDING CONSTRUCTION OF SPACED PANELS WITH WEATHER SEALS

In the past, many building constructions have been proposed to provide relatively inexpensive housing. Many of these constructions were of lightweight materials which were of poor insulation quality and which were susceptible to rapid deterioration. While the initial cost of such constructions was relatively low, the maintenance, heating, and general upkeep expenses were unusually high, far offsetting the initial savings realized in the purchase price.

It is an object of the present invention to provide a versatile building construction which is durable, long lasting, and well insulated, yet relatively inexpensive to produce and maintain over a period of years.

Another object of the present invention is to provide a novel poured concrete building construction having side walls with tongue portions each of which engages a corresponding groove in a corner column in such a manner that the expansion and contraction of the walls does not result in cracking, thereby increasing the life expectancy of the structure.

It is a further object of the present invention to provide a unique modular house construction comprised of a plurality of poured concrete side walls with insulation cells therein defined by horizontal and vertical webs which support firrings for the interior wall panels of wood, plasterboard or the like, thus providing an attractive, yet rugged and relatively inexpensive housing construction.

Still another object of the present invention is to provide a compact housing structure which encompasses a multipurpose room having compact closets and folding furniture mounted along the walls, such that the room may be quickly and easily converted from a living room to a dining area or bedroom.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a perspective view of a typical house of the building construction of the present invention;

FIG. 2 is a layout view of the building construction shown in FIG. 1;

FIG. 3 is a cross-sectional view along plane 3—3, shown in FIG. 1;

FIG. 4 is a sectional view taken along section 4—4 of FIG. 1;

FIG. 5 is an enlarged sectional view of the joint between a side wall and corner column;

FIG. 6 is a partial perspective view of the inside corner of the building construction without the windows or roof structure;

FIG. 7 is a partial perspective view of the joint between a wall and corner column with the channel insert extending therein;

FIG. 8 is a perpsective view of a spacer which may be used between the horizontal support web and corner column during pouring;

FIG. 9 is a perspective view of one side of the room of the building construction shown in FIG. 1; and

FIG. 10 is a perspective view of another side of the room of the building construction shown in FIG. 1.

Referring now, to FIGS. 1 and 2, a typical housing unit of the building construction of the present invention can be seen, and is generally indicated by the numeral 10. The construction includes four concrete corner columns 12 which extend upwardly from a concrete floor and foundation section 14 and are joined to a roof structure 16, which is relatively flat, with sufficient slope to adequately handle the drainage of rainwater and the like. A plurality of wall sections 18 are provided, each of which extends between the corner columns and is joined by a section of windows 20, which extend between the wall sections and the roof structure.

It is seen from the general layout of the floor plan illustrated in FIG. 2 that such a housing unit may be provided with a multi-purpose room, which serves as a living room, dining area, and bedroom. The room may be provided with compact closet space 24 running along the side walls, as well as folding furniture, such as a folding bed assembly 26 and folding table 28. The closets and cabinets 24 against the walls are used for storage of clothes, shoes, and all outside wearing apparel, as well as spare bedding linens and the like. Cooking, of course, is done in the kitchen area 30 provided with a stove, refrigerator, and similar kitchen appliances, and being conveniently communicated with the multipurpose room by way of an opening adjacent to table 28. A bathroom 32 may be provided having a shower, toilet and sink located therein. Preferably, the housing unit is provided with a pair of entrance doors 34 at the front and back sides thereof.

Referring to FIGS. 9 and 10, it is appreciated that the multipurpose room may be provided with a tile floor 36 of durable, long lasting materials such as vinyl. A vacuum outlet 25 may be provided in the floor for the purpose of vacuum cleaning without the need of motorized equipment within the confines of the housing unit, the vacuum unit being located remote from the interior of the housing unit and not shown in the drawings. Also, the desirability of folding furniture such as bed 26 and table 28 can be appreciated, it being evident that a great amount of floor space can be utilized when the furniture is in the folded position. The lighting conditions within the multipurpose room are enhanced by the continuous row of windows 20 which surround the upper walls of the room to provide lighting from the outside from not just one, but several angles.

FIGS. 3 and 4 illustrate the construction of the side wall sections extending between the corner columns. It can be seen that each of the side wall sections 18 is provided with a plurality of elongated insulation cells 38 which are defined by several horizontal and vertical support webs 40 and 42, respectively. Each cavity is, preferably, at least partially filled with fiber glass 44, or similar materials, to provide adequate insulation for the housing unit. Each of the cells and insulation is covered by an interior panel 46, of plasterboard or the like which extends around the interior of the wall sections to provide an attractive outward appearance. These panels may be attached to the wall sections by way of firring strips 48 which are anchored to the horizontal and vertical support webs. Each wall section is fastened in position by way of anchoring bolts or reinforcing rods 50 which each extend from the floor and foundation into an oblong-shaped cap 51 which is positioned in the wall to permit longitudinal expansion, but prevent transverse movement. Each of the window assem-

blies is fastened to the wall section by way of a horizontal mounting board 52, or the like, anchored to the top of the wall section. Preferably, each window assembly is comprised of a pair of windows 54 and 56, with an air space 58 therebetween for insulation. Each corner column is fastened to the foundation by a plurality of anchor bolts or reinforcing rods 60, similar to anchor bolts 50 of the side wall sections. It can be seen that each corner column is provided with a pair of channel-shaped grooves 62, which extend vertically along the entire length of each corner column.

Referring, now, to FIG. 5, the construction of the joint between each corner column and side wall can be seen in more detail. Each side wall 18 is provided with a tongue portion 64 which extends into the corresponding slot or groove 62 of the abutting corner column. The side surfaces 66 of each tongue portion are parallel to the corresponding side surfaces 68 of each groove 62 and perpendicular to the end surfaces 70 and 71, such that each side wall section is free to move longitudinally relative to the abutting corner column. The importance of this arrangement cannot be over emphasized. This geometrical relationship together with expansion space 73 permits expansion and contraction of the side wall sections which is totally independent of the abutting corner columns. This prevents cracking of the side wall sections and corner columns, such being common with conventional constructions, and such greatly reducing the overall life expectancy of the structure.

Each side wall section is separated from the corresponding corner column by way of an insert 72 of folded tar paper, plastic or similar material. After installation of the corner columns has been completed, and the concrete has had sufficient time to dry, the forms for each wall section are fastened into position. Prior to pouring the concrete for the wall sections, a channel-shaped form 74 is inserted into each groove in the corner columns, with the tar paper or plastic material 72 folded therearound. Each insert 74 is made of steel, or similar relatively rigid material, such that it will not deform in shape under the influence of the folded tar paper or the weight of the freshly poured side walls.

After the side walls have dried sufficiently the forms are removed together with each of the channel-shaped inserts 74, as can be seen in FIGS. 6 and 7. It can be seen, that in the preferred embodiment, each wall section is provided with upper and lower horizontal support webs 40. Since it is desired to maintain an expansion joint between each column and wall section, it is necessary to provide additional inserts 80 which are trapezoidal in shape, to separate each horizontal support web 40 from the abutting corner column. Each insert 80 is preferably formed from a single piece of folded sheet metal which assumes a trapezoidal shape when folded, and which provides adequate separation to compensate for expansion and contraction due to changes in temperature, and the like. If desired, the trapezoidal inserts may be removed after the concrete has set. However, if the spacing between each fold is sufficient to absorb the side wall expansion, the inserts may be left in place.

It should be noted, that the insert 72 functions not only as a resilient spacer between each column and side wall, but also serves as a weather seal between the inside and outside areas. The weather sealing ability of the insert is enhanced by the fact that the exposed portions of the insert are folded, such that the space 73 which normally exists between the adjacent folds is sealed against the entrance of water, moisture, ice, or the like, which might hamper the proper movement of the joint. Thus, it is appreciated that the construction of the joint between each side wall and corner column is relatively simple in nature, easy to install, yet highly functional and durable.

When desired, the side wall sections may be poured in a manner that they may be readily removed, should the homeowner desire to change locations. This may be done by providing a tar paper joint, similar to 72 at the base of each side wall section, such that is separates the side wall from the floor slab. Of course, if such a temporary construction were used, caps 51 over reinforcing rods or bolts 50 would permit easy removal of each wall section. With such an arrangement, each side wall section could be lifted with a crane, sliding them upward through the grooves or slots within each corner column.

While the initial costs of producing the above disclosed housing unit may exceed those of conventional low cost housing units, the benefits and advantages of such a construction cannot be over-emphasized. For example, the manner in which the side wall sections are joined to each corner column permits movement between these sections, yet prevents cracking due to expansion and contraction. Furthermore, the specially constructed joint 72 not only provides an expansion space, but also provides a suitable weather seal, insulating the interior of the housing unit from the elements of the weather. Also, the many advantages of the side wall construction should not be overlooked. For example, the insulation cells 38 serve not only as an area for insulation, but also serve to lighten the overall wall construction. Further, the vertical and horizontal web supports which define each insulation cell serve as a base for mounting the interior wall panels. While the overall construction is relatively simple, it is highly durable, requires a minimum amount of maintenance and furnishes adequate insulation to sufficiently reduce heating and air conditioning expenses. The unique wall construction combined with the features of the multipurpose living room with compact cabinets, closets and folding furniture provides a housing unit not previously available with conventional constructions. As such, the building construction of the present invention provides low cost housing for young married couples, retired senior citizens and low income families. It is apparent, that the housing unit of the present invention costs substantially less than conventional constructions, when the costs are measured over the lift expentancy of the home, such as a time period of 20 to 30 years.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A building construction comprising a pair of vertical columns, and a side wall disposed between each pair of said columns, and an expansion joint between each of said columns and the associated side wall, said expansion joint comprising: an elongated vertically ex-

tending groove aligned with a corresponding elongated tongue which extends partially into the elongated groove and is spaced therefrom such that said columns are unaffected by horizontal expansion and contraction of said side wall, said tongue having an end surface and a pair of opposite side surfaces, each of said elongated grooves and tongues being generally rectangular-shaped in cross-section, the cross-sectional area of each of said tongues being substantially less than that of the corresponding groove such that there is a space therebetween, and a weather seal member disposed in said space between each of said tongues and grooves to seal the space against the elements, said weather seal member comprising a single sheet of flexible material folded on itself and conforming in shape to said tongue portion and said groove, one portion of said seal member paralleling and engaging the surfaces of said column, and the other portion of said seal member paralleling and engaging the surfaces of said side wall, said one portion paralleling said other portion and horizontally separated therefrom by an expansion air space which permits horizontal expansion of said side walls without cracking said columns, said weather seal member including exposed edges each defined by a vertical fold of said sheet of material such that said expansion air space is sealed against the elements of the weather, said sheet of material including generally vertical terminal edges oppositely disposed of each other and within the confines of said groove and tongue end surface to substantially seal said expansion space.

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