United States Patent [19]

Sachs

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[45] **Jan. 1, 1974**

[54] **WALL FORMING BLOCKS**

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[22] Filed: **May 19, 1972**

[21] Appl. No.: **254,953**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 21,981, March 23, 1970, and a continuation-in-part of Ser. No. 732,973, May 29, 1968, abandoned.

[52] **U.S. Cl.** **52/309,** 52/595

[51] **Int. Cl.** **E04c 1/10,** E04c 2/10

[58] **Field of Search** 52/309, 404, 615, 52/364, 367, 371, 372, 373, 374, 593, 594, 595

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Primary Examiner—John E. Murtagh
Attorney—Cullen, Settle et al.

[57] **ABSTRACT**

Wall forming blocks made of foamed plastic material, and having vertical openings and upwardly opening channels extending along their upper edges, are formed with pre-formed rigid sheets bonded to their opposite faces, with furring strips secured to the inner faces of the sheets and embedded within the plastic. The blocks are stacked in courses to form a wall, with their vertical openings aligned with and their channels covered by the blocks next above them. Concrete slurry poured into such openings and channels forms a concrete supporting grid within the wall.

7 Claims, 12 Drawing Figures

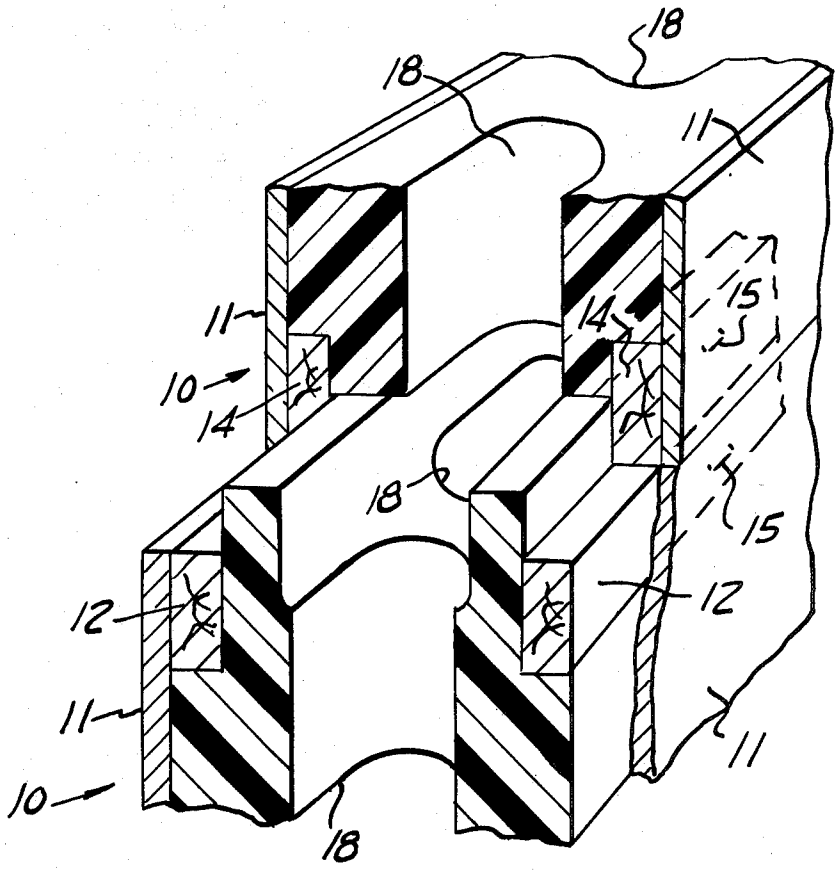


FIG. 1

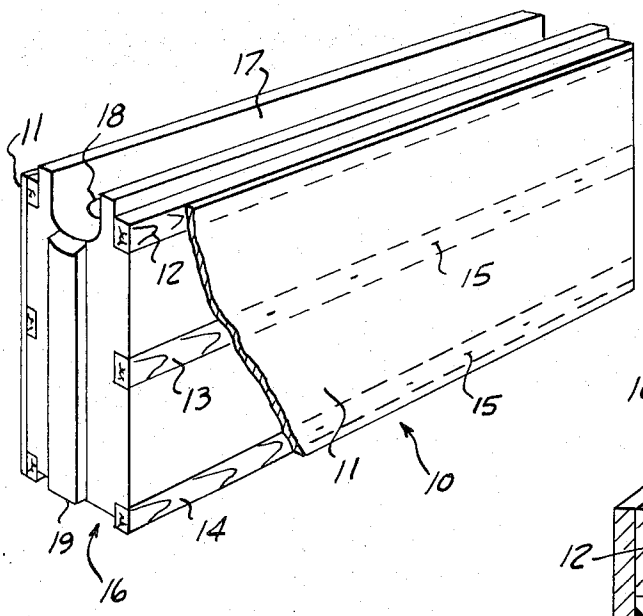


FIG. 2

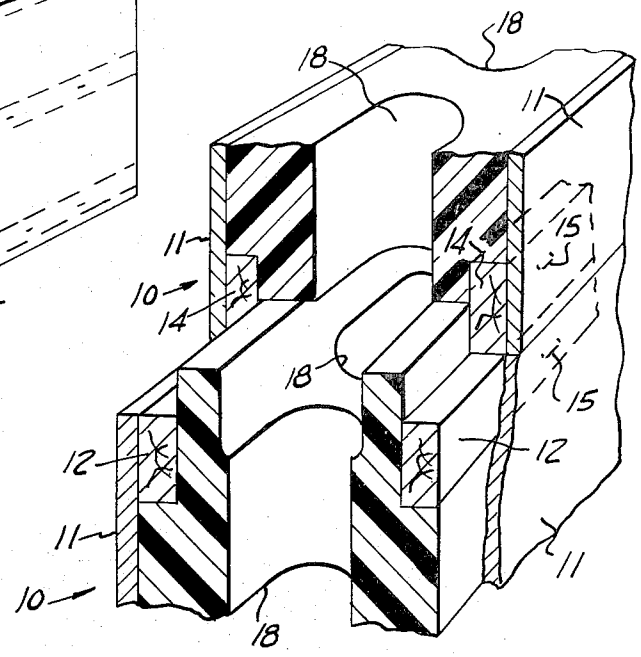
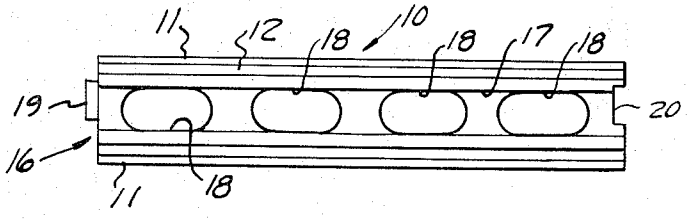


FIG. 3



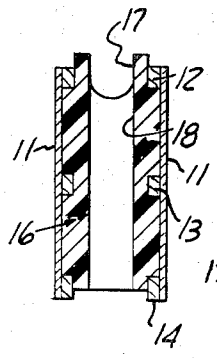


FIG. 5

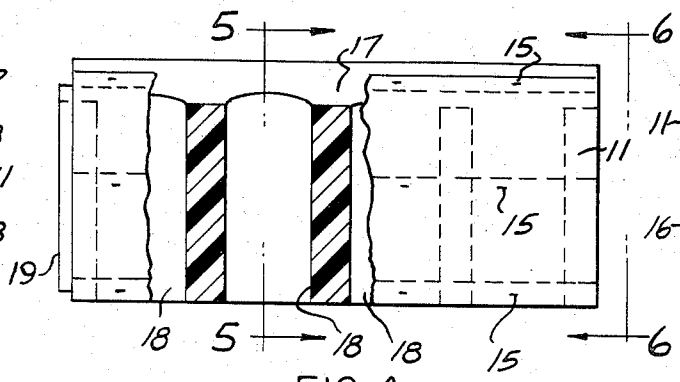


FIG. 4

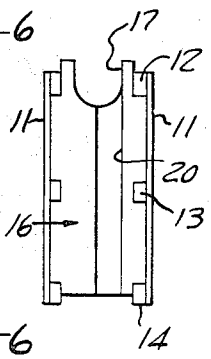


FIG. 6

FIG. 7

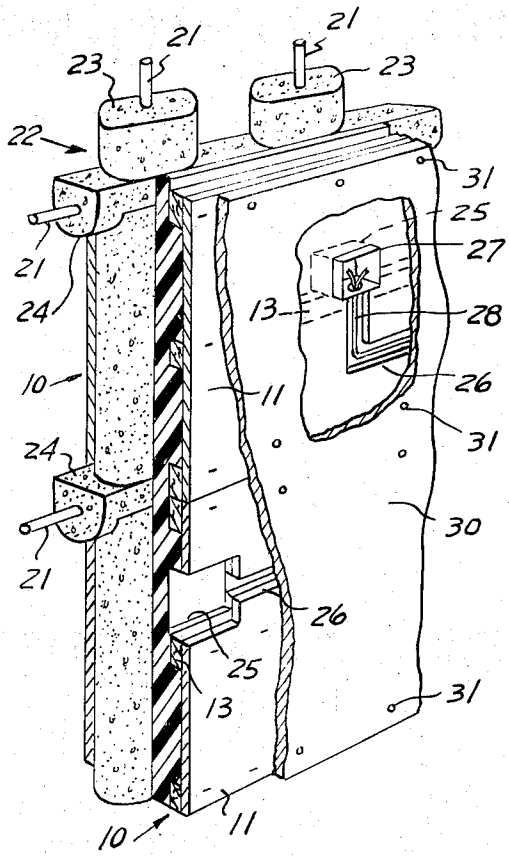
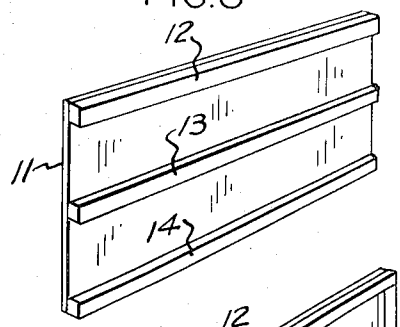


FIG.8



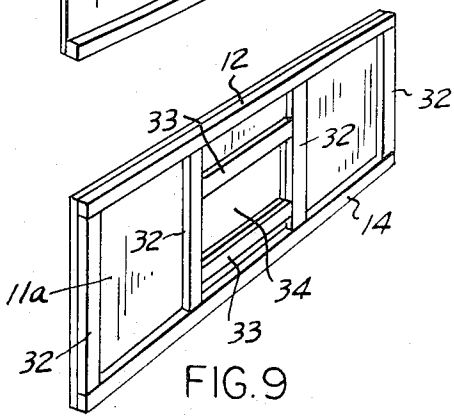


FIG.9

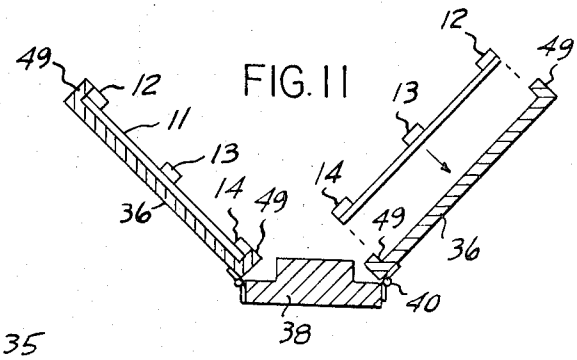


FIG.11

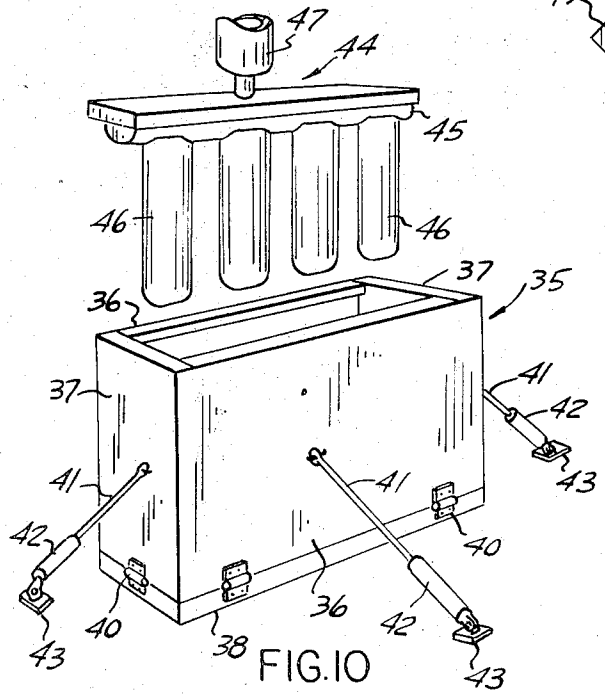


FIG.10

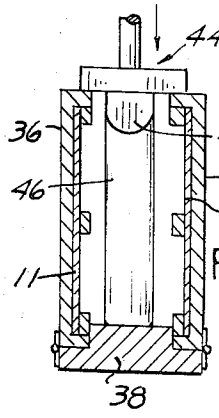


FIG.12

WALL FORMING BLOCKS

PRIOR APPLICATIONS

This application is a continuation-in-part of application Ser. No. 21,981, filed Mar. 23, 1970 and abandoned application Ser. No. 732,973, filed May 29, 1968.

BACKGROUND OF INVENTION

The invention herein relates to improvements in foamed plastic building blocks of the type shown, for example, in the patent to Moog, U.S. Pat. No. 3,410,044 of Nov. 12, 1968. Such type building blocks are laid in courses in a manner similarly to laying up a wall of concrete blocks, thus providing both a wall and a form into which concrete is poured for strengthening the wall. The form function is performed by the openings extruding through the blocks.

Such prior foamed plastic blocks are relatively difficult and expensive to manufacture, are fragile and easily broken during handling and assembly operations, and the wall surface formed thereby is generally incapable of supporting wall attachments, such as covering sheets, i.e., dry wall sheets, and the like, or electrical outlet boxes, i.e., dry wall sheets, and the like, or electrical outlet boxes, medicine cabinets, cupboards, window frames, etc., due to the fact that mechanical fasteners, such as nails or screws, will not anchor into the foam plastic.

SUMMARY OF INVENTION

The invention herein relates to foamed plastic blocks made of a pair of pre-formed stiff, rigid sheets between which foamed plastic is molded to bond to the sheets, thereby forming a composite block. The sheets are provided with furring strips secured to their inner faces so that these strips embed into and are bonded to the plastic. The plastic body of each block is formed with a channel along its upper edge and vertical openings extending completely through the block so that upon assembly of a wall from such blocks, the channels in one block are closed by the lower edge of the block above it or by a suitable cover plate in the case of the uppermost blocks, and concrete slurry poured into the channels and holes will solidify to form a cross-hatch type concrete grid within the wall.

The stiff, rigid sheets position and hold the furring strips in predetermined locations during the plastic molding, while simultaneously, the strips reinforce and stiffen the sheets both during molding as well as during pouring of the concrete into the wall. More significantly, the furring strips provide anchor points and load distribution means for supporting additional items to be fastened to the wall, such as dry wall finishing panels, electrical boxes, cupboards, etc.

Since the rigid sheets function as mold walls within which the plastic core or body of the block is molded, with the sheets then becoming integrated into the block as part of the composite lamination, the block molding process is considerably simplified, thus reducing costs. Since the finished block is lightweight, strong and not easily damageable, it may be made in large sizes, as for example, six feet by three feet in face dimension, thereby reducing time and labor in laying up a complete wall.

These and other objects and advantages of this invention will become apparent upon reading the following description, of which the attached drawings form a part.

DESCRIPTION OF DRAWINGS

FIG. **1** is a perspective view of a block, with a portion of one of its face sheets cut away for illustrative purposes.

FIG. **2** is an enlarged, fragmentary, cross-sectional perspective view showing a joint between two blocks.

FIG. **3** is a plan view of a block, and

FIG. **4** is an elevational view, partially in cross-section, of the block.

FIG. **5** is a cross-sectional view taken in the direction of arrows **5—5** of FIG. **4.**

FIG. **6** is an end view taken in the direction of arrows **6—6** of FIG. **4.**

FIG. **7** is a fragmentary, perspective view of a portion of a wall.

FIG. **8** is a perspective view of a preformed sheet.

FIG. **9** is a view similar to FIG. **8** but showing a modified form of sheet.

FIG. **10** is a perspective view of a mold within which a block is formed.

FIG. **11** is a cross-sectional end view of the lower portion of the mold when opened.

FIG. **12** is a cross-sectional view of the closed mold.

DETAILED DESCRIPTION

FIG. **1** illustrates the relatively large size wall forming block **10,** which may be, for example, **6** feet long by 3 feet high and about 10 inches thick or deep. The size and shape may vary considerably, but the construction described below, lends itself to the manufacture of blocks of a considerably greater size than conventional building blocks.

The block **10** is formed of a pair of preformed rigid sheets **11** made, for example, of stiff or rigid cardboard, either of single thickness or laminated double-faced corrugated cardboard, particle board, composition board, socalled "Masonite," plywood, aggregate covered board formed of stiff substrate coated with aggregate or stone and a binder, etc. These sheets may be relatively thick, such as on the order of one-eighth to one-quarter inch in thickness, more or less, so that they are stiff, self-sustaining and relatively rigid.

After the sheets are cut to size, a number of wood furring strips are secured to their inner faces, the strips being formed of conventional wood furring strip materials. Preferably, at least three strips are provided for each sheet, namely, an upper strip **12,** a middle strip **13** and a lower strip **14,** with the strips all being parallel, running horizontally and with the upper and lower strips preferably at the upper and lower edges of the sheet. For various specific purposes, the strips may be otherwise arranged upon the sheet and may be formed of different materials. These strips may be fastened to the sheets by mechanical fasteners, such as staples **15.**

The block body portion **16** is formed of a foamed plastic material, such as a low density urethane or polystyrene or the like, molded in place between the two sheets **11** to form the composite block structure.

The upper edge of the plastic block body **16** is provided with a horizontally extending channel or groove whose upwardly open top will later be covered by the lower edge of the block next above it after the blocks are laid up into a wall. In addition, enlarged vertical

openings 18 extend completely through the block body.

A tongue 19 and a groove 20 are formed on the two opposite vertical ends of the block for interlocking with corresponding portions on adjacent blocks.

To form a building wall, the blocks are laid in courses, interlocked end to end and stacked one above the other. As illustrated in FIG. 2, the lower furring strips 14 of one block rests upon the upper furring strips 12 of the block beneath it so that these strips cooperate to form hardened, load bearing and load transmission rails or block body corners, in addition to functioning as furring strips.

After the blocks have been laid into the wall formation, conventional metal reinforcing rods 21 may be positioned through the aligned vertical openings of the blocks and also through the block upper edge grooves and thereafter concrete slurry may be poured into the openings to fill the openings and grooves.

The solidified concrete forms an internal grid 22 formed of vertical columns 23 and horizontal connectors 24, within the wall for supporting loads applied to the wall. Thus, the blocks function as forms for the pouring of the concrete. The plastic block material surrounding the poured concrete sections tends to keep the moisture in so that the concrete cures towards its maximum strength far more rapidly than is the case in conventional pouring of concrete.

Upon completion, the wall becomes a load bearing wall capable of supporting substantial loads, at the same time also giving the appearance and structure of a conventional wall, but with substantially increased insulation qualities.

Recesses or openings 25 may be cut into the sheets 11 and adjacent plastic body portions to receive various wall attachments, such as electrical outlet boxes, cabinets and cupboards and the like. Likewise, grooves 26 may be cut into the block surface for electrical wiring, etc. By way of example, FIG. 7 illustrates an electrical outlet box or junction box 27 mounted within a recess 25 cut in the wall surface, with electrical wiring 28 laid in a groove 26 so that the wiring is below the plane of the wall surface. The box may rest upon or be secured, as by nails, to the adjacent furring strip for permanent connection to the wall.

The wall surfaces may then be finished by applying wet plaster or stucco or the like. More typically, it may be finished by applying wall board or dry wall panels 30 fastened by nails 31 driven into the furring strips. The furring strips may be easily located behind the sheets 11 by observing the staples 15.

FIG. 9 illustrates a modified form of sheet 11*a* which is similar to the sheet 11 illustrated in FIG. 8, except that vertical furring strips 32 are provided. In addition, central frame strips 33 are secured to the sheet, with the sheet material between the strips 33 cut out at 34 to provide an opening which may be made of a size to accommodate a window frame, a medicine cabinet or the like. This illustrates that the furring strips and other similar strips may be attached to the panel 11 in various patterns for specific purposes. Also, metal furring strips (e.g., channel or angle shaped steel strips) may be used, instead of wood strips.

METHOD OF FORMING BLOCKS

FIGS. 10–12 illustrate a mold suitable for making the above described blocks. The method in summary, is first preforming the sheets by cutting them to size and then applying the furring strips as described above. Thereafter, a pair of sheets are arranged parallel and spaced apart and the foam plastic material is molded between the sheets to join them together and to bond the sheets and plastic integrally.

During the molding process, the sheets preposition the furring strips in their predetermined locations and simultaneously, the furring strips stiffen or further rigidify the sheets and by embedding in the plastic, further lock the plastic and sheets together.

The mold 35, is formed in a box-like shape, with side walls 36, end walls 37, a base 38 and hinges 40 connecting the walls to the base. The walls may be swung open by suitable means, as for example, by connecting piston rods 41 to them, with the rods moved and arranged within conventional hydraulically operated cylinders 42 which are connected by brackets 43 to a floor support.

The mold cover 44 includes a channel forming portion 45 and depending forms 46 for molding the vertical openings within the plastic. The mold cover may be raised and lowered by a suitable hydraulic piston rod and cylinder mechanism 47.

As illustrated in FIG. 11, the mold side walls 36 are provided with upper and lower lips 49 so that preformed sheets 11 may be arranged against the inside surfaces of the walls 36, between the lips 49. Thereafter, the mold is closed by swinging the walls into the box forming position. After the cover of the mold is lowered, as illustrated in FIG. 12, the foamable plastic material may be inserted into the cavity and permitted to foam and cure into the shape of the block body portion.

Having fully described an operative embodiment of this invention, I now claim:

1. A wall formed of blocks laid in stacked courses, comprising:

each blocking being formed of a pair of vertically arranged, parallel, horizontally spaced apart, preformed rigid sheets such as of thick, rigid cardboard, plywood and the like sheet materials, with the body of the block formed of a foamed plastic material arranged between and bonded to the inner faces of the sheets;

and each block having horizontally arranged corner furring strips fastened to and in face to face contact with and extending along the length of the inner surface of at least one of the block forming sheets, at the upper and lower edges respectively of such sheet so that these corner furring strips are arranged at and form the upper and lower horizontal corners of the plastic body at at least one vertical face thereof;

with the upper corner furring strip of each block having an exposed upper edge surface extending along its length and the lower corner furring strip having an exposed lower edge surface extending along its lower edge, and the strip edges adjacent the plastic body being bonded thereto;

with the lower corner furring strip of each block engaging in face to face contact with and resting directly upon the upper corner furring strip of the block in the course next below it;

and a number of vertically arranged openings extending through the plastic body of each block, with the openings of the stacked blocks arranged in align-

ment and with said openings being filled with concrete which thus forms a concrete support embedded within the wall, and with said furring strips forming load bearing and transferring and rigidifying means for the sheets to which they are attached, as well as bearing edges for the adjacent blocks.

2. A wall as defined in claim 1, and wherein each of said blocks has one of its corner furring strips extended outwardly in a vertical plane relative to its adjacent horizontal plastic body edge to form a horizontal tongue portion, covered by its adjacent sheet edge, extending the horizontal length of said block, and the other of said corner furring strips of each block is arranged a short distance inwardly in the vertical plane of its adjacent horizontal plastic body edge to form an upwardly and outwardly opening groove for receiving and engaging along its length with the horizontal tongue forming portion of the furring strip of the block in the next adjacent course for thereby interlocking the courses of blocks.

3. A wall as defined in claim 2, and wherein each of said blocks is provided with a similar corner furring strip along its upper and lower edges and secured to the opposite sheet in the same manner as the first mentioned corner furring strips, wherein one horizontal edge of the plastic body forms a horizontal tongue portions along the length of the plastic body and the opposite horizontal edge of the plastic body of each block forms a groove for receiving and interlocking with the corresponding portions of the next adjacent blocks of the next adjacent course, in addition to the tongue and groove form of engagement between adjacent corner strips of the blocks.

4. A wall as defined in claim 1, and said blocks each including an elongated, narrow, rigid furring strip, secured in face to face contact to one of said sheet inner faces at a distance between the upper and lower edges of the sheet, and extending along the length of such sheet, with the furring strips each being completely embedded within and bonded to the adjacent plastic material of its plastic body, except for the strip portions which are in face to face contact with their respective sheets;

whereby face covering panels and wall attachments may be applied upon the wall and mechanically fastened to said furring strips and said furring strips transfer and spread load to and from the rigid sheets to which they are fastened, as well as rigidifying the sheets further.

5. A plurality of building blocks stacked vertically to form a continuous vertical wall,

each block having a generally rectangular, thick foamed plastic body, a pair of vertically arranged, parallel preformed think rigid sheets having opposed interfaces enclosing said body and exposed outer faces, and a plurality of elongated, narrow relatively rigid furring strips disposed horizontally and secured between said body and said sheets, including a furring strip located at each of the four corners of said rectangular body having an outer vertical face secured to said interface of one of said sheets and an exposed horizontal face generally parallel to the vertical edge of said one of said sheets, the remaining faces of said strips embedded within and bonded to said plastic body,

and said blocks stacked vertically with said exposed horizontal faces of said furring strips in face-to-face and load bearing contact and said sheet outer faces forming a continuous vertical surface.

6. The vertical wall defined in claim 5, wherein the plastic body of each of said blocks includes a vertically projecting portion extending beyond said horizontal exposed faces of said furring strips at one horizontal end and a conforming channel at the opposed horizontal end, and said blocks stacked with one projecting body portion received within the channel of the next vertical block in interlocking relation.

7. A wall forming block comprising:

a pair of vertically arranged, parallel, spaced apart, pre-formed, thin rigid sheets each having exposed outer faces and facing inner faces;

an elongated, narrow, rigid furring strip horizontally disposed and secured in face to face contact to one of said sheet inner faces at a distance between the upper and lower edges of the sheet and extending along the length of the sheet;

a thick foamed plastic material block body arranged between the sheets and bonded to their inner faces, and with the furring strips completely embedded within and bonded to the plastic material, except for the strip portion which is in face to face contact with its sheet;

the block being formed for edge to edge alignment with and stacking with other such blocks into courses to form a wall; whereby face covering panels and wall attachments may be applied upon the wall and said furring strip transfers and spreads loads to and from the rigid sheet to which it is fastened and also the plastic block body within which it is embedded;

horizontally arranged corner furring strips, each fastened to and in face to face contact with and extending along the length of the inner surface of one of said sheets at the upper and lower edges respectively of such sheet so that these corner furring strips are arranged at and form the upper and lower horizontal corners of the plastic block body, with the upper corner furring strips having an exposed upper edge surface extending along its length and the lower corner furring strip having an exposed lower edge surface extending along its lower edge, and the strip edges adjacent the plastic body being bonded to the plastic material thereof; wherein the lower corner furring strip of one block rests directly upon the upper corner furring strip of the block next below it for providing load bearing engagements between the blocks in adjacent courses;

and wherein one of said corner furring strips is extended outwardly in the vertical plane relative to the adjacent horizontal plastic body edge to form a horizontal tongue portion, covered by its adjacent sheet edge, extending the horizontal length of the block and the other of said corner furring strips is arranged a short distance inwardly, in the vertical plane, of its adjacent horizontal plastic block edge to form an upwardly and outwardly opening groove for receiving and engaging along its length with the horizontal tongue portion formed by a block in the next adjacent course.

* * * * *