

[54] INSULATING AND WATERPROOFING
APPARATUS

2,791,117 5/1957 Bailey 52/410
3,426,494 12/1969 Hala..... 5/410

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[21] Appl. No.: 231,206

[52] U.S. Cl. 52/303, 52/407, 52/410,
52/379

[51] Int. Cl. E04b 1/70, H04b 2/28, E04f 17/00

[58] Field of Search 52/411,
52/407, 303, 302, 403, 410, 404, 406, 409,
379, 592, 593, 412, 413, 503, 97, 562, 565

[56] References Cited

UNITED STATES PATENTS

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[57] ABSTRACT

A combined insulating and waterproofing apparatus, system and method comprising substantially rectangular shaped blocks of expanded polymeric plastic materials having insulative characteristics which blocks are disposed in predetermined adjacent proximate relationship with one another and positioned between the inner and outer wythes of a wall construction with the horizontal edges of the blocks being angularly inclined in a downward direction as viewed from the inner wythe with respect to the outer wythe.

60 Claims, 25 Drawing Figures

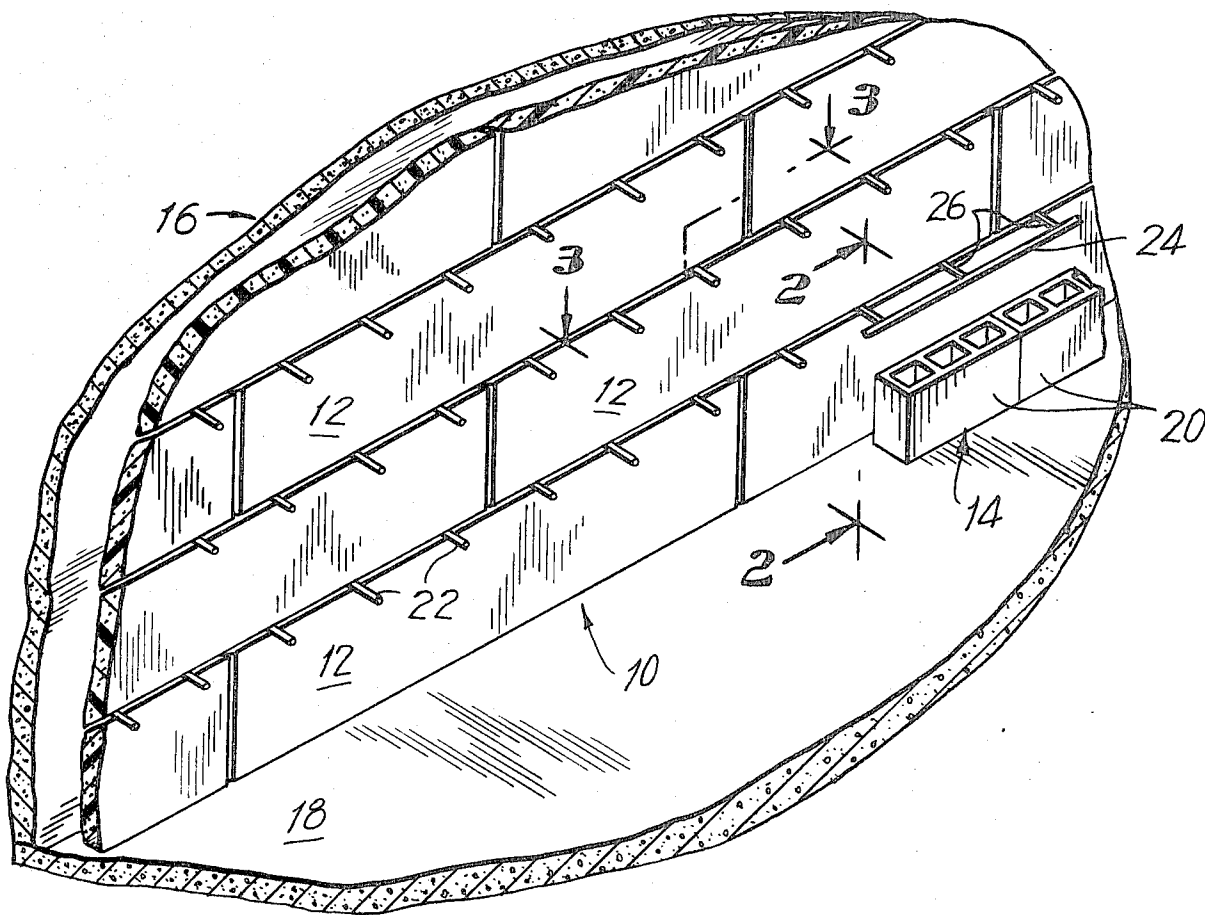


FIG. 1

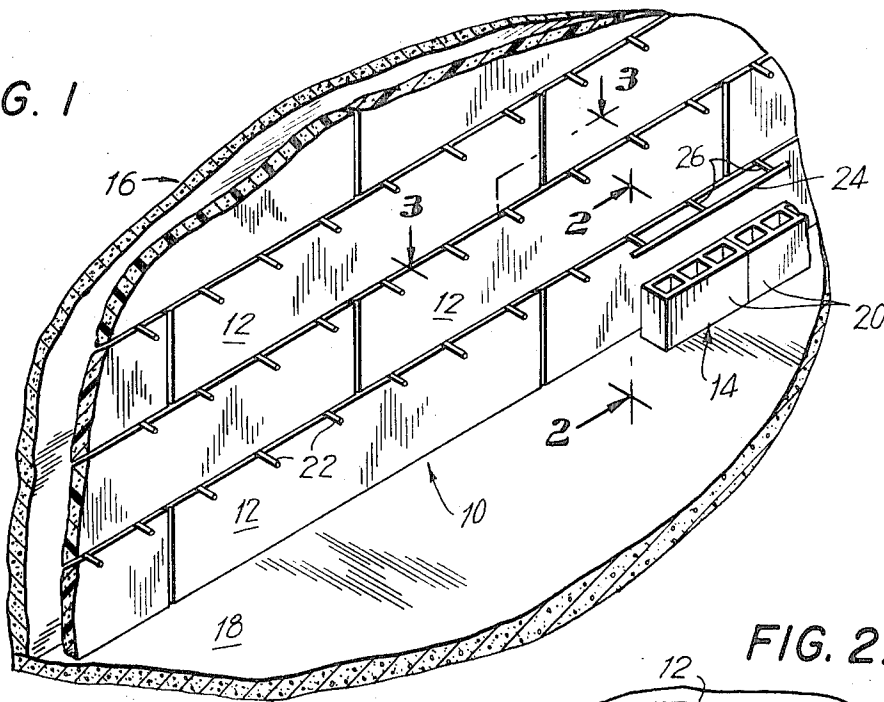


FIG. 2A

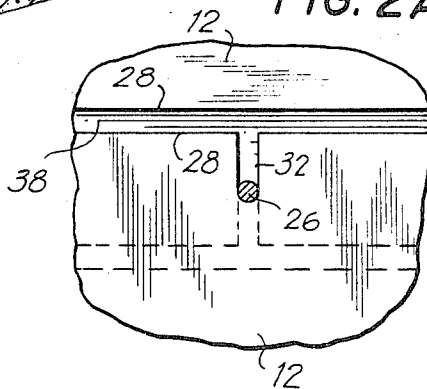


FIG. 2

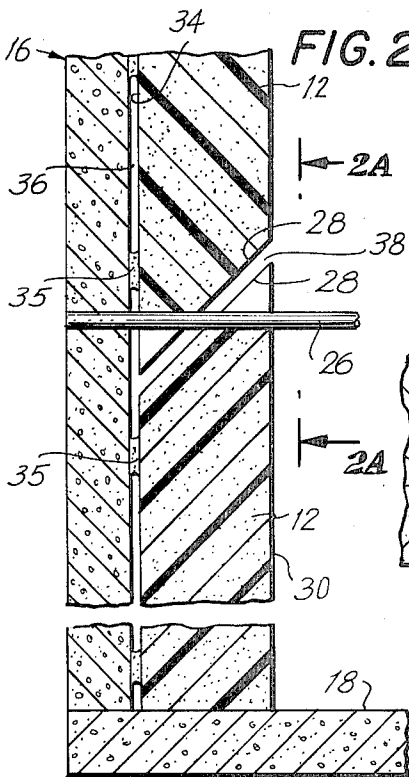


FIG. 3

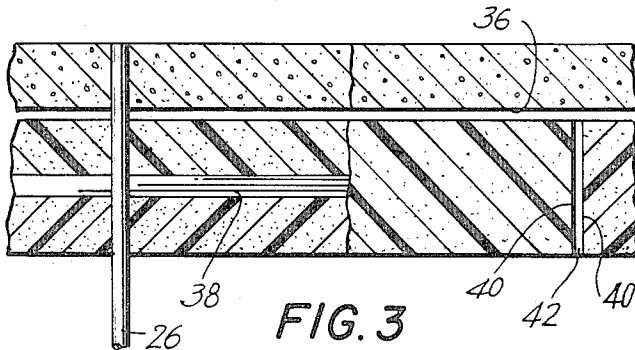


FIG. 4

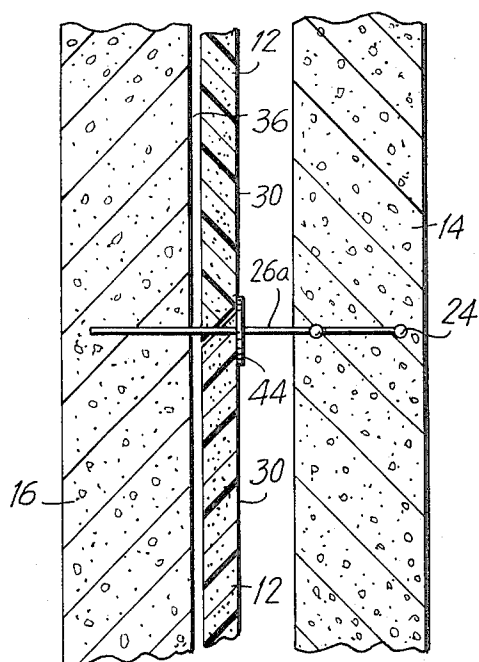


FIG. 5

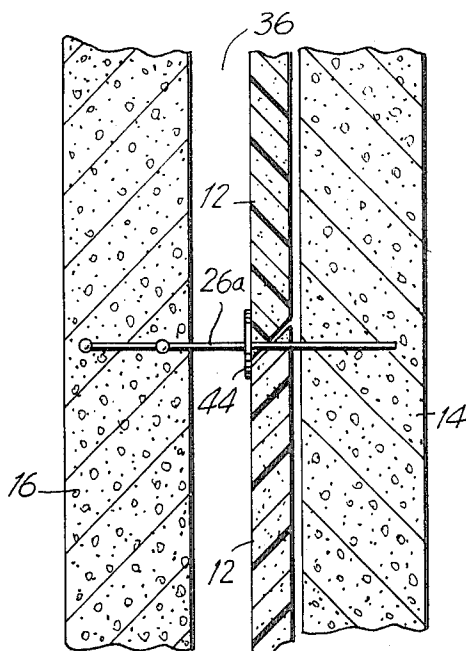


FIG. 6

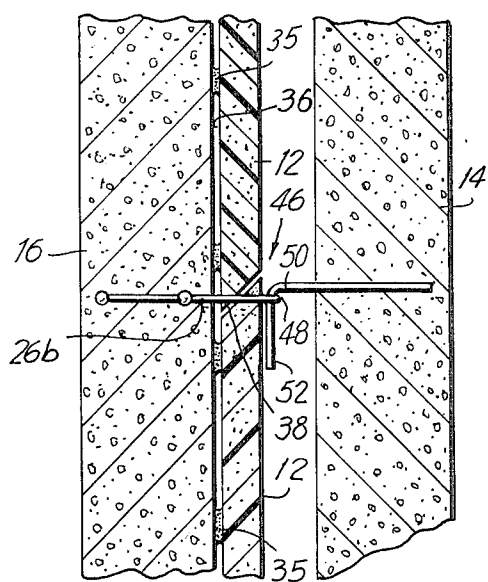


FIG. 7

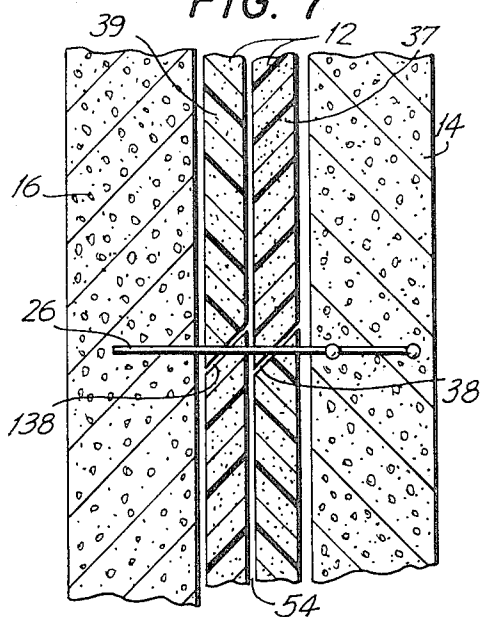


FIG. 8

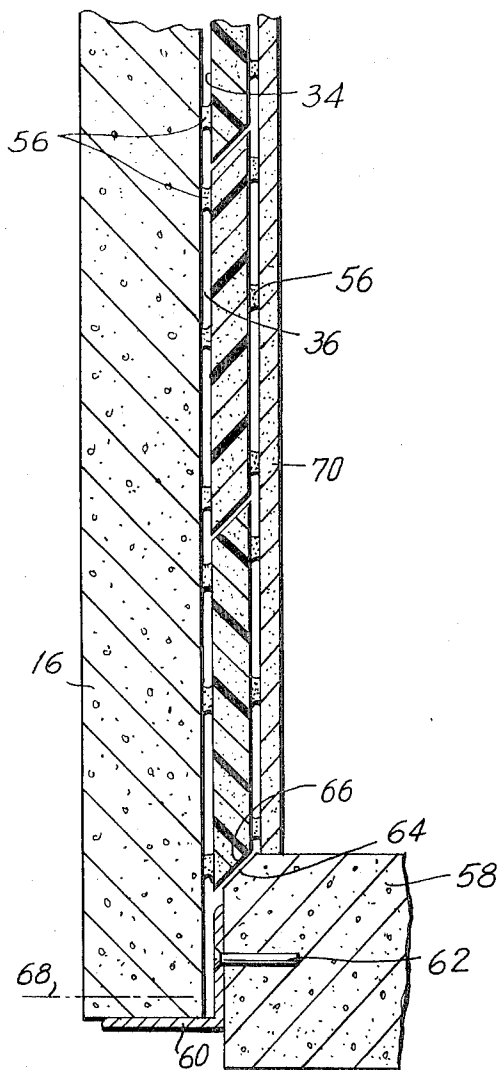


FIG. 9

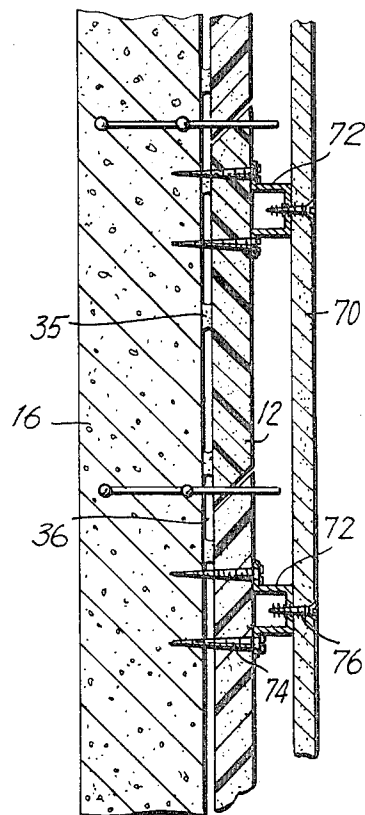


FIG. 10

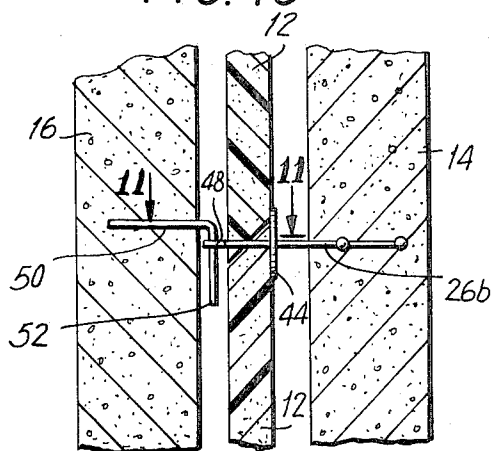


FIG. 11

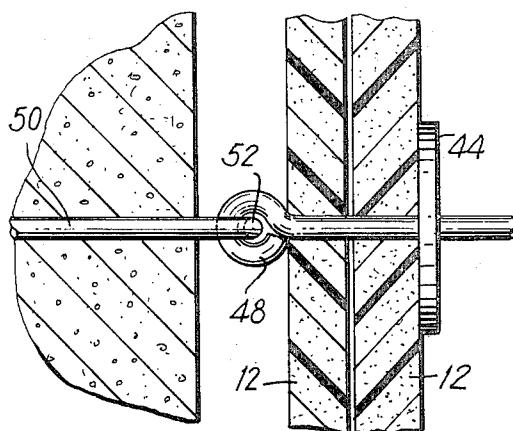


FIG. 12

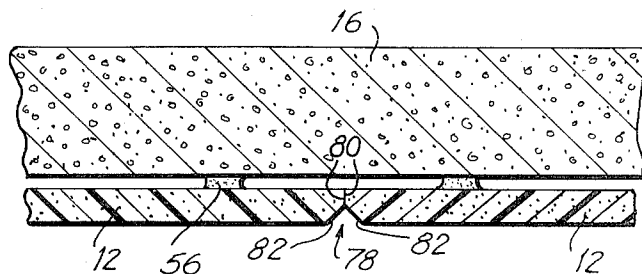


FIG. 13A

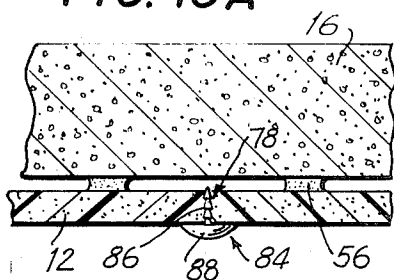


FIG. 13

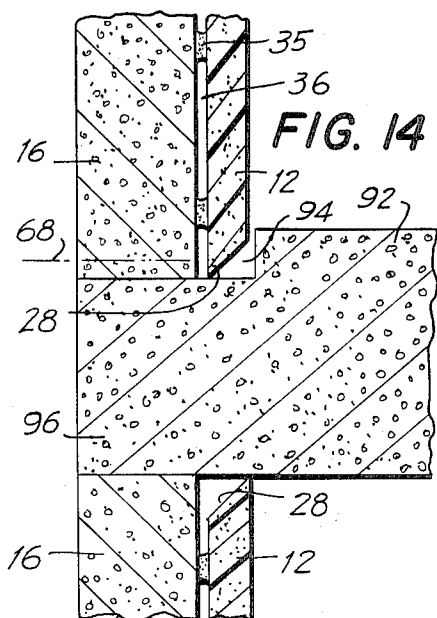
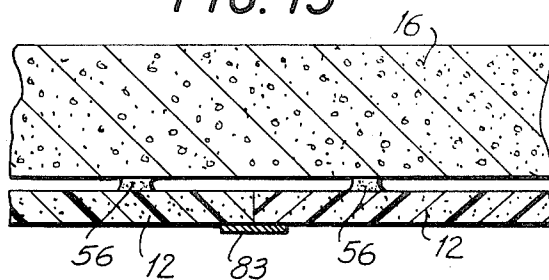


FIG. 15

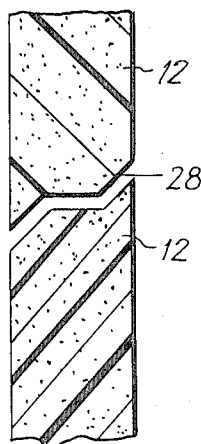


FIG. 16

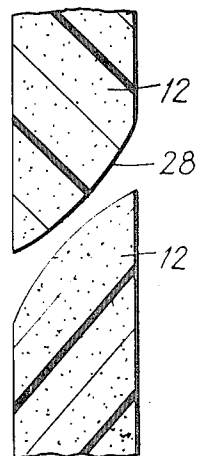
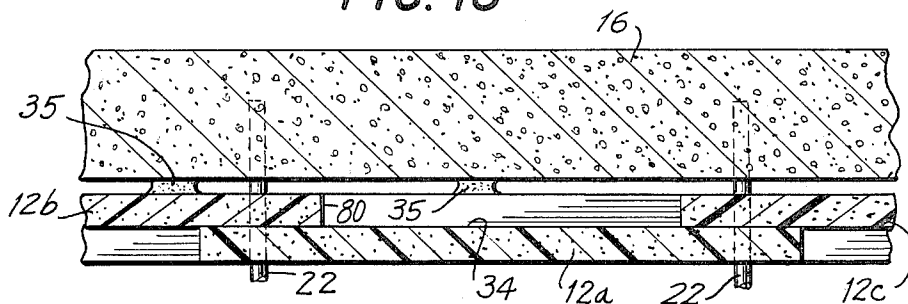
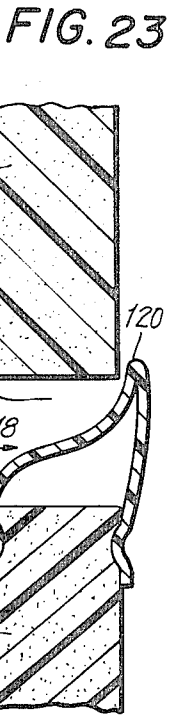
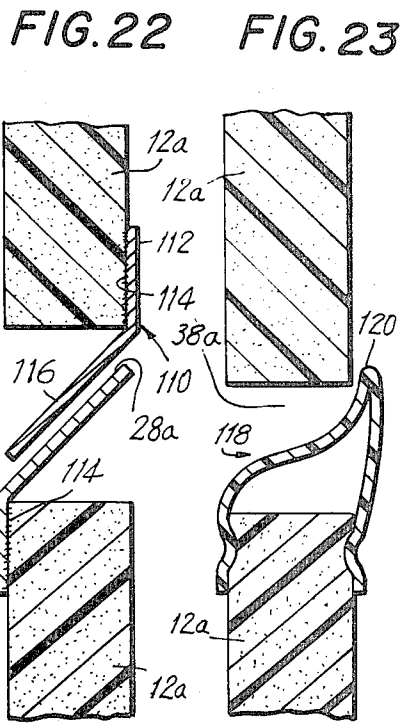
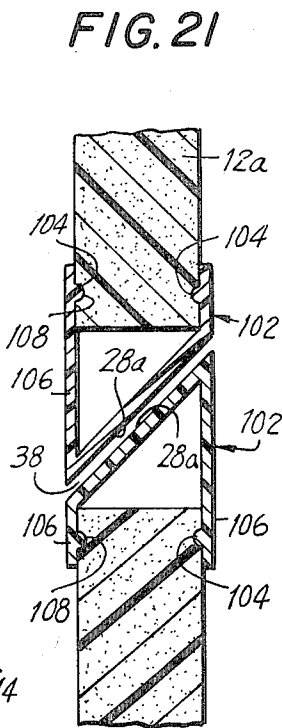
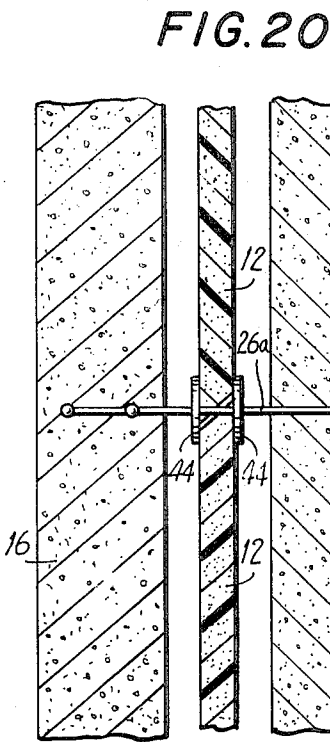
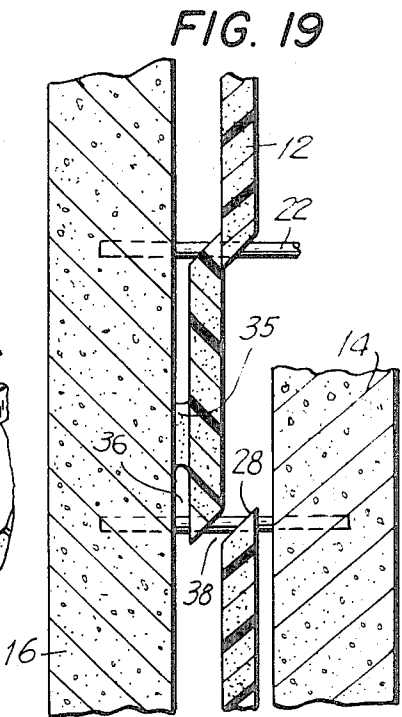
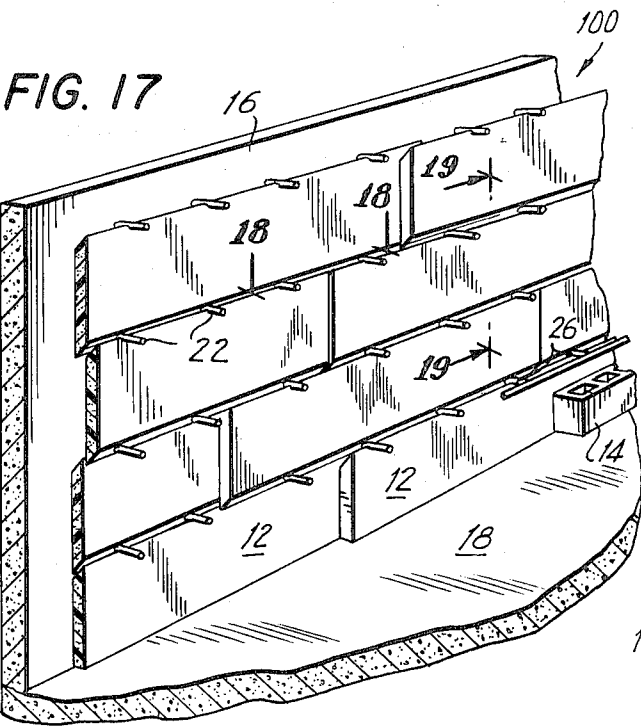


FIG. 18





INSULATING AND WATERPROOFING APPARATUS

BACKGROUND OF THE INVENTION

The present invention pertains to a new and novel combined insulating and waterproofing system and method of fabricating the same employing a new type of block member having both insulating and waterproofing characteristics.

Present edifices and structures are known to employ insulative sheets in the wall systems thereof; i.e., between the inner and outer wythe constructions, to provide insulation for the interior thereof. However, there does not presently exist an effective simple system or method of construction which will provide the more important aspect of being waterproof and which will also serve to insulate the interior of the resultant structure.

Although I have provided an effective waterproofing system, as described in my U.S. Pat. No. 3,426,494, the same does not provide the insulative qualities which are both necessary and desirable. Thus, there presently exists the need for a simple combination waterproofing and insulating system.

SUMMARY OF THE INVENTION

Accordingly, it is the primary object of the present invention to provide a new and novel combination waterproofing and insulative apparatus and method of fabricating the same to result in a new system to be employed in the construction of wall assemblies.

It is another object of the present invention to provide a system of the aforementioned type which is relatively simple to install and which does not require unusual skill in the installation thereof.

It is a further object of the present invention to provide a new and novel block construction when connected as a system in conjunction with a wall assembly is effective to waterproof said wall assembly.

It is yet another object of the present invention to provide a block construction of the aforementioned type which is fabricated from an insulative material so as to provide a combined insulating and waterproofing system.

It is yet a further object of the present invention to provide a system of the aforementioned type employed in conjunction with existent wall-tie structures.

It is still another object of the present invention to provide a system of the aforementioned object wherein the block construction of the wall system is secured simply and efficiently by means of adhesive securement.

The invention encompasses a combined insulating and waterproofing system employing expanded polymer plastic blocks having angularly inclined upper and lower edges disposed in juxtaposed relationship and positioned between the inner and outer wythes of a wall structure. The individual blocks are secured by use of wall ties in the wall structure or by adhesive securement means.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features and advantages of the present invention will become more apparent from the detailed description hereinafter considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of a combined insulating and waterproofing system employing the new combined insulating and waterproofing block and constructed pursuant to the principles of the present invention which is illustrative of a first embodiment thereof;

FIG. 2 is a sectioned elevational view taken on the line 2—2 of FIG. 1;

FIG. 2A is a sectional view taken on the line 2A—2A of FIG. 2;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1;

FIG. 4 is a sectional view depicting a combination insulating and waterproofing system representative of a second embodiment of the present invention with the inner wythe of the wall structure being built first;

FIG. 5 is a sectional view similar to FIG. 4 depicting a third embodiment of the present invention wherein the outer wythe of wall structure is built first;

FIG. 6 is a sectional view similar to FIG. 4 depicting a fourth embodiment of the present invention;

FIG. 7 is a sectional view similar to FIG. 4 depicting another embodiment of the present invention employing double layers or blocks of insulation for additional insulation and waterproofing when the vertical joints are in laterally offset relationship;

FIG. 8 is a section elevational view depicting another embodiment of the present invention employed in conjunction with a structural base member and using gypsum board as the inner wythe;

FIG. 9 is a sectional view illustrating a further embodiment of the present invention;

FIG. 10 is a sectional view depicting another embodiment of the present invention wherein the combined insulating and waterproofing system is employed in conjunction with an adjustable wall-tie construction;

FIG. 11 is a top view taken on the line 11—11 of FIG. 10;

FIG. 12 is a top sectional view depicting another embodiment of the new insulating and waterproofing block construction which is therein adhesively secured to the outer wythe of a wall construction;

FIG. 13 is a sectional view similar to FIG. 12 illustrating another manner in which to waterproof the vertical joints of the block construction;

FIG. 13A is a sectional view similar to FIG. 13 illustrating another embodiment of the invention;

FIG. 14 is an elevational section depicting another embodiment of the invention which illustrates the application of the system in conjunction with the structural floors of an edifice;

FIG. 15 is an elevational sectional view depicting another embodiment of the angular inclination of the longitudinal edges of the block construction of the present invention;

FIG. 16 is a view similar to FIG. 15 depicting a third embodiment of the angular inclination of the longitudinal edges of the block construction;

FIG. 17 is a perspective view similar to FIG. 1 depicting another embodiment of a combined insulating and waterproofing system;

FIG. 18 is a sectional view taken on the line 18—18 of FIG. 17;

FIG. 19 is a sectional view taken on the line 19—19 of FIG. 17;

FIG. 20 is a section elevation view depicting another embodiment of the present invention;

FIG. 21 is a sectional view illustrating end cap members employed to provide the angular inclination of the longitudinal edges of the block construction;

FIG. 22 is a sectional view similar to FIG. 21 illustrating another embodiment of end caps; and

FIG. 23 is a sectional view similar to FIG. 21 illustrating a further embodiment of end cap members employed to achieve the desired angular inclination.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a combination insulating and waterproofing system 10 constructed pursuant to the principles of the present invention. The system comprises blocks 12 preferably fabricated from an expanded polymer plastic material, such as polystyrene or polyurethane. However, foam glass and fibreglas material may also be employed. The blocks are preferably of rigid construction but capable of deformation or tearing upon the application of a predetermined amount of pressure, as will be discussed more fully hereinafter. The insulating blocks 12 are disposed between the inner wythe 14 and the outer wythe 16 of a wall structure. As shown in FIG. 1, the wall structure is constructed on a masonry foundation indicated by the reference numeral 18; however, the foundation may be fabricated from steel or any other suitable material. The inner wythe 14 is constructed from concrete blocks 20, but may be constructed from brick or other suitable masonry or building material. Similarly, the outer wythe 16 can also be constructed of any suitable masonry or building material, such as brick, concrete block, cement asbestos, steel, wood, etc. The wall structure itself may employ rows of wall-ties 22 built-in with the outer wythe 16 or built-in reinforcing rod assemblies 24 having tie members 26.

The insulating blocks 12 are fabricated having angularly inclined horizontal edges 28 with the upper and lower horizontal edges being disposed in substantially parallel relationship, whereby the vertical cross-section of the blocks is in the form of an irregular parallelogram. As seen in FIG. 2, it is possible to form the block with only a singular angularly inclined horizontal edge for use as bottom or top members.

In the application of the insulating blocks or sheets 12 with respect to the wall-tie embedded outer wythe 16, which is constructed first, the block 12 is placed flush upon the base 18 and the upper horizontal edge is then forced upon the wall-ties 22 by applying pressure upon the front face or surface 30 of the block 12. This force causes the deformation of the horizontal edge 28 and forms a vertical tear or slit 32 (FIG. 2A); however, the block is easily placed in position with respect to the outer wythe 16. In this regard, it is to be noted that although the rear surface 34 of block 12 is in substantially flush or abutting relationship with the inner surface of outer wythe 16, it is actually spaced therefrom due to mortar 35 or other debris which adheres to the wythe 16 during construction thereof. Thus, there is formed a vertical channel or space 36 between the wythe 16 and the blocks 12.

The blocks 12 are forced upon the wall-ties 22 or tie members 26 in horizontal rows or courses, usually starting from the bottom up. However, the courses may be commenced from the top or from an intermediate

position without adversely affecting the completed system.

Referring now to FIGS. 1 thru 3, it will be seen that the application of two courses of the blocks 12 results in the upper horizontal inclined edge 28 of the lower block and the lower horizontal edge of the upper block being disposed in juxtaposed position and forming a small horizontal angular channel or joint 38 which is directed downwardly from the inner wythe 14 to the outer wythe 16. The channel 38 is formed due to the fact that in the application of progressive courses of blocks 12 it is virtually impossible to place the angular edges of adjacent blocks in abutting fluid-tight relationship, even though the edges are parallel.

The vertical edges 40 of horizontal blocks 12 in the same course are also disposed in slightly spaced relationship even when attempting to place them in side-by-side abutting relationship and thus form a vertical joint 42. However, the system is constructed in a manner such that the vertical joints 42 in one course are preferably laterally offset with respect to the vertical joints in the next vertically adjacent course; the importance of which will be discussed hereinafter.

The blocks or sheets 12 of insulating material are preferably fabricated having heights of 16 inches and lengths of from four to nine feet. The length is much more a matter of design than the height since it is common practice in masonry construction to place the wall-ties 22 in the outer wythe with a vertical spacing of 16 inches. However, if the vertical wall-tie spacing is more or less than 16 inches the height of the blocks 12 can be varied accordingly.

After the system 10 has been installed, as hereinabove described, the outer and inner wythes of the wall structure completed, the structure in both waterproof and insulated. The structure is insulated by virtue of the insulating material and waterproof by virtue of the construction in the following manner. If any water should permeate between the inner and outer wythes 14 and 16, respectively, it will tend to flow downwardly. If the water flows down upon the rear surface 34 of the blocks 12, it will flow down through channel 36 and be prohibited from permeating the blocks 12 and also the inner wythe 14. If water flows downwardly upon the inner surface 30 of a block 12, it will then flow into a horizontal downwardly inclined joint 38 from whence it will flow into channel 36 and be prevented from reaching and permeating the inner wythe 14. Since the vertical joints of adjacent courses of blocks 12 are laterally offset with respect to one another, water flowing within a vertical joint 42 will reach a horizontal joint 38 and be directed downwardly into vertical channel 36 and also be prevented from reaching and permeating the inner wythe 14.

It will thus be apparent that any water or vapor which subsequently moisturized will always be directed away from the inner wythe by virtue of the present invention due to the new and novel construction of the insulating blocks 12. It will also be readily apparent to those skilled in the art that the method of installing the system is simplicity itself in that no tools of any kind are required since the system is assembled merely by the pressure applied to the blocks 12 by a workman.

It is to be noted that although the insulating blocks or sheets 12 have herein been described as having an irregular parallelogram cross-section, the term angular inclination is meant to include a configuration wherein

the angular inclination extends from the front upper horizontal edge rearwardly towards the rear lower horizontal edge.

Referring now to FIG. 4, wherein similar parts are denoted by similar reference numerals, there is shown a second embodiment of the present invention wherein the inner wythe 14 is constructed prior to the construction of the outer wythe 16. The inner wythe has reinforcing rod assemblies 24 built in therewith. The assemblies include tie members 26a of the type described in my U.S. Pat. No. 3,426,494 and includes a plastic disc 44 slidably mounted on the members 26a in tight frictional engagement. The discs are normally uniformly spaced on the tie members 26a wherefore the blocks 12 are pressed upon the tie members 26a with the front surface 30 of the blocks 12, as viewed from the inner wythe 14, in abutting engagement with the discs 44. The outer wythe 16 is then constructed and there is provided the vertical channel 36.

FIG. 5 illustrates another embodiment wherein similar parts are denoted by similar reference numerals. In this embodiment the outer wythe 16 is constructed first and the blocks 12 are pressed upon the tie members 26a until they abut the discs 44. Thereafter, the wall structure is completed by building the inner wythe 14. It is to be noted that there is herein provided a larger vertical channel 36 whereby the blocks 12 are spaced in closer adjacent relationship to the inner wythe 14.

In FIG. 6 there is illustrated another embodiment wherein the blocks 12 are positionally secured between the inner and outer wythes 14 and 16, respectively, by means of an adjustable wall-tie member 46. The member includes a tie portion 26b having an eye 48 and an arm portion 50 having a hook 52. The outer wythe 16 is constructed first and the blocks 12 press fitted upon the tie portion 26b between the eye 48 and the inner surface of the outer wythe 16. As discussed previously, the mortar 35 actually prevents the blocks 12 from resting flush against the outer wythe 16 and contributes to the formation of the vertical channel 36 necessary for the downward flow of water away from the inner wythe 14.

After the blocks 12 have been inserted in place, the hooks 52 which also serve to position the blocks within the wall structure, are placed in the eyes 48 and arm portions 50 are built-in with the inner wythe 14 to complete the wall structure. Thus, any water flow will pass either through joints 38 into channel 36 or directly into channel 36 and then outwardly from the wall structure, as will be discussed hereinafter.

Referring now to FIG. 7, there is shown another embodiment of the present invention wherein similar parts are denoted by similar reference numerals. In this embodiment, the inner wythe 14 is constructed first and two layers or thicknesses of blocks 12 herein denoted 37 and 39 are mounted between adjacent rows of vertical tie members 26. This construction results in the formation of a secondary vertical channel 54 which is disposed between the two layers of insulating blocks 37 and 39. After the two layers are press fitted upon tie members 26, the outer wythe 16 is constructed to complete the wall structure. Thus, any water flowing downwardly upon the inner face of the blocks 12 of layer 37 will flow through joint 38 and then downwardly in channel 54. If the water should flow over upon the face of the blocks 12 of layer 39, it will flow downwardly

through the secondary joint 138 into vertical channel 36.

It is to be noted that the spacing between the adjacent layers of blocks 12 to form vertical channel 54 is dependent to some extent upon the workman's installation and the environmental cleanliness. However, whether there is any spacing between the adjacent layers of blocks 12 is unimportant. Moreover, the present embodiment is constructed in a manner wherein the vertical joints in layer 37 are laterally offset with respect to the vertical joints in layer 39. Thus, any water permeation through the vertical joints in layer 39 will flow downwardly in the secondary vertical channel 54 until it reaches the horizontal joint 138 adjacent the outer wythe 16. Thereafter, the water flows downwardly within the horizontal joint 138, from where it is directed into vertical joint 36.

This system may be employed where additional insulating qualities of the finished wall structure are required.

With reference now to FIG. 8, there is shown another embodiment of the present invention wherein the outer wythe 16 is constructed first and the insulating blocks 12 are secured to the outer wythe by means of glue or any other suitable adhesive 56 placed on the inner surface of the outer wythe or on rear surface 34 of blocks 12. The blocks 12 are then placed upon the inner surface of the outer wythe 16 in courses, as discussed previously, and securely connected by means of the adhesive. The adhesive 56 may be of the epoxy type which dries rather quickly and which renders a firm bond. The adhesive 56 is applied on outer wythe in a random pattern whereby there is provided the vertical flow channel 36.

The present embodiment includes a structural base member 58 fabricated of concrete, steel or other suitable material to which is secured a lintel 60 by means of an anchor bolt 62. The outer wythe 16 rests upon the lintel 60. The base 58 has the upper corner thereof chamfered as at 64 so that the angular inclination there is complementary with the lower horizontal edge 28 of the lower most ones of the insulating blocks 12 which together form an angularly downward inclined channel 66 similar to the channel 38 formed by the complementary horizontal edges of vertically adjacent blocks 12. The bottom portion of the outer wythe 16 is provided with weep holes as indicated by the dash line 68.

Secured to the front surface of the blocks 12 by means of adhesive 56 is a gypsum board inner wall, which for the purposes of the present invention is deemed to be the inner wythe identified by the reference numeral 70. It is to be understood that although an inner wythe is normally construed to be one which is fabricated of masonry material, no such limitation is intended by the use of this terminology in the present application. It is herein to be noted that the present wall system due to the chamfered edge 64, resulting channel 66 and weep holes 68 results in a system which is self flashing, i.e., one wherein the water is directed outwardly of the structure without the provision of additional structural features to accomplish the same.

Referring now to FIG. 9, there is illustrated another embodiment of the present invention wherein the outer wythe 16 is constructed first with ties 26 embedded therein, as described previously. The insulating blocks 12 are then pressed upon ties 26 with the mortar 35 in-

terposed between the blocks 12 and the outer wythe 16 so as to form the vertical channel 36. Thereafter longitudinal horizontal channel framing members or brackets 72 are secured to the blocks 12. The channel members 72 may be secured by means of vertical support members (not shown), by adhesive securement to blocks 12 or secured through the insulating blocks 12 into the brick outer wythe 16 by means of fasteners 74, as shown. The gypsum board inner wythe 70 is then secured to the channel members 72 by means of fasteners 76. The channel members 72 may also be disposed vertically and may be free standing; i.e., secured only at the top and bottom portions thereof.

FIGS. 10 and 11 illustrate another embodiment of the invention wherein the inner wythe 14 is constructed first having tie members 26b embedded therein and upon which are mounted discs 44. The blocks 12 are pressed upon tie members 26b in abutting engagement with discs 44. The arm portions 50 are then secured to the tie members by inserting the hooks 52 into the eyes 48. The inner wythe 16 is then constructed with the arms 50 embedded therein.

It is herein to be noted that although in several embodiments of the invention one wythe is deemed to be built prior to the other, it is possible to have the heights of both the inner and outer wythes built substantially simultaneously and have the insulating blocks inserted therebetween course by course. Similarly, the order of construction of the wythes may also be varied.

While the present embodiment has been described as utilizing the discs 44 to space the blocks 12 from inner wythe 14 to prevent water seepage through said inner wythe, it is possible, but not preferable, to omit discs 44 and have the blocks substantially flush with the inner wythe 14. In this instance, almost all water would be directed outwardly of the wall system but the vertical joints between horizontally adjacent blocks could present a somewhat limited problem, which subsequent embodiments of the invention obviate.

An embodiment of the present invention which obviates the problems created at the vertical joints of the combined waterproofing and insulating system of the invention is depicted in FIG. 12. The vertical joints 78 which are formed by the joinder of the vertical edges 80 of the blocks 12 are chamfered as at 82 to provide a V-shape indentation or joint whereby any water flowing down at the rear face 34 of the blocks 12 and through the vertical joints 78 will flow inwardly along the inner portion of the V-shaped joint 78 away from the inner wythe. Since the vertical joints are laterally offset with respect to one another from course to course, the water running downwardly along a particular indented joint 78 will thereafter be directed outwardly by horizontal joints 38 into the rear vertical channel 36. Therefore, the water will be prevented from seeping into the inner wythe.

Another embodiment of the invention to solve the problems created at the vertical joints is shown in FIG. 13, wherein a pressure sensitive and waterproof tape 83 is secured along the entire vertical joint 78 upon the inner surface of adjacent blocks 12.

In FIG. 13A is depicted another embodiment for solving the water seepage problem which might occur at the vertical joint 78. In this embodiment, the lateral ends of the blocks 12 are effectively sealed by molding strip 84 which has a T-section configuration. The strip 84 may be fabricated of metal or preferably plastic and

extends along the entire height of the blocks 12 in an integral configuration. The strip 84 includes a serrated shank portion 86 and an arcuate or beaded head portion 88. The shank portion 86 is force fitted into the joint 78 and grippingly engages the edges of adjacent blocks 12 to effectively seal the vertical joint 78 from the inner wythe. In this regard, any possible water permeation, such as that which might occur from a heavy rainstorm, through the outer wythe 16 and into the rear of joint 78 would be prevented from passing through the joint by head 88 and thus, would be prevented from seeping into the inner wythe. Any water passing into joint 78 would be directed downwardly therein until it reached the horizontal joint 38 and from there would be diverted outwardly of the inner wythe, as discussed in detail hereinbefore.

Referring now to FIG. 14, there is depicted a further embodiment of the invention for use in conjunction with edifices having structural floor members such as the concrete floor slab 92. The slab 92 has a cutout portion 94 which may be rectangular as illustrated or of any other suitable configuration. The reduced slab portion 96 is secured with respect to the outer wythe 16 in a well known manner. The lowermost block 12 of the wall above slab 92 is positioned within cutout 94 with the lower rear horizontal edge 28 of the block 12 being positioned substantially upon or in slight spaced relationship to the upper surface of the slab portion 96. The upper front horizontal edge 28 of the block immediately below slab 92 is disposed in substantially abutting engagement with the underside of slab 92. The outer wythe 16 is provided with weep holes, as indicated by the dashed line 68, at spaced locations disposed horizontally adjacent cutout portion 94. Thus, any water flow within the wall system would flow downwardly in channel 36 and any water flowing on the front face of the lowermost block 12 would flow into cutout portion 94 and thence outwardly from the wall structure via weep hole 68. Thus, the present embodiment comprises a self flashing system.

With reference now to FIGS. 15 and 16, there is therein illustrated alternate embodiments of the angular inclining horizontal edges 28 of the block 12. The edge 28 of FIG. 15 is of substantially sawtooth configuration while that of FIG. 16 is of an arcuate configuration.

It is herein to be understood that the terms "angular inclination" and "angularly inclined" are deemed to mean any configuration wherein the edge on one face of the block is at a different elevation with respect to the edge of the other face of the block when the block is placed in its normal vertical orientation; in the present embodiments when the faces of the block are disposed in parallel relationship with the vertical plane.

Referring to FIG. 17, there is illustrated an alternate embodiment of the present invention, wherein the problems of water seepage from both the horizontal and vertical joints are solved simultaneously by the novel system to be discussed hereinafter. FIG. 17 is similar to FIG. 1 and similar parts are denoted by similar reference numerals.

In this embodiment, the outer wythe 16 is constructed first and rests upon the foundation 18. The wythe 16 has ties 22 and tie-members 26 disposed therein. The waterproofing system 100 is constructed by employing blocks 12 of the type discussed previously but the blocks are inserted upon the ties 22 in

overlapping relationship (FIG. 18). The blocks 12 are pressed upon ties 22 in a manner whereby the vertical edges 80 of two adjacent blocks are disposed in laterally offset relationship to one another. Similarly, the rear face 34 of a block 12a is disposed in abutting engagement with the front face of the two blocks 12b and 12c, respectively (FIG. 18).

From FIG. 19, it will be apparent that any water flowing between the inner and outer wythes 14 and 16, respectively, will always be directed outwardly toward the outer wythe via horizontal joint 38 into the vertical downward channel 36. Moreover, since this system encompasses placing the blocks 12 in overlapping relationship, effectively by just slapping the blocks on top of one another without requiring the fitting of one block next to another, the amount of skill required to effect this combined insulating and waterproofing system is minimal. In the present era where highly skilled labor is difficult to obtain, the present invention is a significant advancement in the field of building construction by providing a vastly superior system which is easily installed.

From FIG. 18, it will be readily apparent that the present embodiment obviates the problem of water seepage through vertical joints since this type of joint, per se, no longer exists. In this regard, the edge 80 of a block is never disposed next to nor is it coextensive with another similar edge of an adjacent block. Instead the edge 80 is positioned upon either the front face 30 or the rear face 34 of another block, whereby it is virtually impossible for any waterflow upon edges 80 to seep into the inner wythe 14.

It will also be apparent to those skilled in the art that it is within the purview and scope of the present invention to secure the blocks 12 with respect to the ties 22 in a lancing fashion, i.e., by press fitting a block upon a singular or plurality of ties 22 with the ties piercing or extending through the central portion of the blocks 12, as opposed to the edge portions of said blocks.

With reference to FIG. 20, there is depicted still a further embodiment of the present invention wherein the tie members 26a are provided with a pair of discs 44. The outer wythe 16 is constructed first and the blocks are interposed between the pairs of discs. Thus, blocks 12 are positionally secured between the outer wythe 16 and the inner wythe 14 with the discs 44 in abutment with the blocks 12 insuring that the positional disposition of the blocks will remain constant due to the frictional engagement of the discs 44 upon the tie member 26a.

Although the blocks 12 have herein been described as being integral members fabricated having the angularly inclined horizontal edge 28, the blocks may be fabricated of a substantially rectangular configuration having end cap members secured in relation to the horizontal edge to provide the necessary angular inclination. Embodiments of this portion of the invention are depicted in FIGS. 21 through 23. FIG. 21 depicts a block member 12a having angular end caps 102 which are preferably formed of a hardened inert plastic material but which may be formed of metal or any other suitable material. The end caps 102 include beads or ridges 104 which when the end caps are placed upon the blocks 12a, grippingly engage the blocks. The end caps may be placed upon blocks and the sides 106 of the end caps pressed together to cause the ridges 104 to seat themselves with respect to blocks 12a by form-

ing longitudinal grooves or slots 108 in which the ridges are seated. The angular inclined edges 28a of the end caps 102, then cooperate to form the horizontal joint 38.

FIG. 22 illustrates an end cap 110 which is of angular L-shaped configuration with the base portion 112 thereof being secured to one of the faces of blocks 12a respectively, such as by means of double backed adhesive strip 114; however, any suitable fastening means may be employed. The arm portion 116 comprises the angularly inclined edge 28a.

FIG. 23 illustrates an end cap member 118 secured to the upper horizontal edge of the blocks 12a. In this embodiment, the lower horizontal edge may be flush since the member 118 includes an upwardly extending edge portion 120 which protrudes above the lower horizontal edges of the blocks 12a to thereby produce a horizontal joint 38a which will direct all water flow downwardly and rearwardly of the inner wythe.

It will be apparent to those skilled in the art that the tear slits, horizontal joints and vertical channels provide a "breathing" system which will allow water vapor to pass through the wythes.

It is herein to be noted that the blocks have been described as formulated of expanded plastic material so as to be insulative; however, this cellular construction does not provide a highly wettable surface. If a highly wettable surface is desired for special constructions, then the blocks may be coated with a wetting agent on one or more surfaces thereof. The blocks may also be coated with a water absorbent layer for specialized construction requirements.

While I have shown and described the various preferred embodiments of my invention, it will be apparent to those skilled in the art that there are many modifications, changes and improvements which may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A waterproof wall assembly comprising an inner wythe and an outer wythe disposed in spaced apart relationship with respect to one another, a plurality of waterproof block members disposed in the space between said inner and outer wythes, means for positionally securing said block members with respect to at least one of said wythes, said block members having a front face, a rear face and horizontally disposed upper and lower edges, said front face being disposed in facing relation to said inner wythe and said rear face being disposed in facing relation to said outer wythe, and selected ones of said upper and lower horizontal edges of said block members being angularly inclined in a downward direction from the front face toward the rear face along at least a portion of said horizontal edges, whereby any water flow upon the front face of said block members is diverted away from said inner wythe by means of said angularly inclined edges.
2. A waterproof wall assembly in accordance with claim 1, wherein said block members have a substantially rectangular configuration.
3. A waterproof wall assembly in accordance with claim 2, wherein

the side edges of laterally adjacent ones of said block members are disposed in substantially abutting engagement.

4. A waterproof assembly in accordance with claim 2, wherein

the side edges of laterally adjacent ones of said block members are disposed in overlapping relationship.

5. A waterproof wall assembly in accordance with claim 2, wherein

said rectangular block members are oriented with the longitudinal axis thereof disposed in a horizontal plane.

6. A waterproof wall assembly in accordance with claim 5, wherein

said rectangular block members disposed between said inner and outer wythes are positioned in substantially horizontal rows,

said angularly inclined horizontal upper edges of selected ones of said block members being disposed in adjacent proximate relationship to the lower horizontal edges of selected ones of said block members, and

said adjacently disposed horizontal edges forming downward angularly inclined horizontal joints for diverting water flow away from said inner wythe toward said outer wythe.

7. A waterproof wall assembly, in accordance with claim 1, wherein

said rear faces of said block members and said outer wythe are spaced from one another to form a vertical channel for the downward flow of water.

8. A waterproof wall assembly in accordance with claim 6, wherein

said rear faces of said block members and said outer wythe are spaced from one another to form a vertical channel for the downward flow of water, and said vertical channel being in fluid flow communication with said horizontal joints.

9. A waterproof wall assembly in accordance with claim 1, wherein

said angularly inclined horizontal edges are formed integrally with said block members.

10. A waterproof wall assembly in accordance with claim 1, wherein

said angularly inclined horizontal edges comprise angular end caps secured to said block members along at least a portion of the horizontal edges of said block members.

11. A waterproof wall assembly in accordance with claim 10, wherein

said end caps extend along the entire length of said block member horizontal edges.

12. A waterproof wall assembly in accordance with claim 3, wherein

said side edges of selected ones of said block members are chamfered,

and adjacent abutting chamfered side edges of said block members forming vertical joints which are recessed with respect to said front faces of said block members.

13. A waterproof wall assembly in accordance with claim 3, wherein

said abutting side edges form vertical joints, means secured to said vertical joints upon the front face of said block members to prohibit the permeation of water through said vertical joints from the

rear faces towards the front faces of said block members.

14. A waterproof wall assembly in accordance with claim 13, wherein

said means secured to said vertical joints comprises a layer of waterproof tape.

15. A waterproof wall assembly in accordance with claim 14, wherein

said means secured to said vertical joints comprises a T-shaped strip, said strip including a shank portion and a head portion, and

said shank portion extending into said vertical joint and said head portion overlying said vertical joint in abutting engagement with the front faces of said adjacent block members.

16. A waterproof wall assembly in accordance with claim 1, wherein

said block members are fabricated of an insulative material, thereby forming a combined insulated and waterproof wall assembly.

17. A waterproof wall assembly in accordance with claim 16, wherein

said insulative material is an expanded polymer plastic material.

18. A waterproof wall assembly in accordance with claim 17, wherein

said expanded polymer plastic material is selected from the group consisting of polystyrene and polyurethane.

19. A waterproof wall assembly in accordance with claim 6, wherein

said block members are fabricated of an insulative material, thereby forming a combined insulated and waterproof wall assembly.

20. A waterproof wall assembly in accordance with claim 19, wherein

said rear faces of said block members and said outer wythe are spaced from one another to form a vertical channel for the downward flow of water, and said vertical channel being in fluid flow communication with said horizontal joints.

21. A waterproof wall assembly in accordance with claim 16, including

wall-tie members interconnected between said inner and outer wythes.

22. A waterproof wall assembly in accordance with claim 21, wherein

said means for positionally securing said block members with respect to said one of said wythes comprises said wall-tie members.

23. A waterproof wall assembly in accordance with claim 22, wherein

said wall-tie members are disposed in substantially horizontal rows,

said waterproof block members being disposed between adjacent rows of said wall-tie members, and said block members being positionally secured by the frictional engagement of said wall-tie members with said upper and lower horizontal edges of said block members.

24. A waterproof wall assembly in accordance with claim 16, wherein

said means for positionally securing said block members with respect to one of said wythes comprises an adhesive disposed between one of said faces of said block members and said one of said wythes.

25. A waterproof wall assembly in accordance with claim 24, wherein said adhesive is disposed between the rear faces of said block members and said outer wythe.
26. A waterproof wall assembly in accordance with claim 19, wherein said means for positionally securing said block members with respect to one of said wythes comprises an adhesive disposed between one of said faces of said block members and said one of said wythes.
27. A waterproof wall assembly in accordance with claim 26, wherein said adhesive is disposed between the rear faces of said block members and said outer wythe, and said adhesive serving to space said rear faces of said block members from said outer wythes to form a vertical channel for the downward flow of water.
28. A waterproof wall assembly in accordance with claim 27, wherein said vertical channel is in fluid flow communication with said horizontal joint.
29. A waterproof wall assembly in accordance with claim 28, wherein said inner wythe is secured with respect to said block members by means of an adhesive interposed between said inner wythe and said front faces of said block members.
30. A waterproof wall assembly in accordance with claim 29, wherein said inner wythe is fabricated of gypsum board.
31. A waterproof wall assembly in accordance with claim 20, including means for connecting said inner wythe with respect to said block members.
32. A waterproof wall assembly in accordance with claim 31, including means for connecting said block members to said outer wythe.
33. A waterproof wall assembly in accordance with claim 32, wherein said means for connecting said inner wythe with respect to said block members comprises channel members interposed between said block members and said inner wythe.
34. A waterproof wall assembly in accordance with claim 33, wherein said channel members are disposed in substantially vertical planes.
35. A waterproof wall assembly in accordance with claim 32, wherein said inner wythe is fabricated of gypsum board.
36. A waterproof wall assembly in accordance with claim 21, wherein said wall-tie members includes means operatively connected therewith to space said block members a predetermined distance from at least one of said wythes.
37. A waterproof wall assembly in accordance with claim 36, wherein said one of said wythes is said inner wythe.
38. A waterproof wall assembly in accordance with claim 36, wherein said one of said wythes is said outer wythe.
39. A waterproof wall assembly in accordance with claim 36, wherein

said last mentioned means is effective to space said block members a predetermined distance from said inner wythe and said outer wythe.

40. A waterproof wall assembly in accordance with claim 19, wherein

said block members are arranged to form first and second layers thereof between said inner and outer wythes.

41. A waterproof wall assembly in accordance with claim 40, wherein

said front faces of said first layer of block members is disposed in facing relation to said inner wythe, said rear faces of said second layer of block members is disposed in facing relation to said outer wythe, and

said rear faces of said first layer of block members and said front faces of said second layer of block members are disposed in juxtaposed relationship.

42. In a wall assembly including an inner wythe and an outer wythe in spaced apart relationship and a structural horizontal support member, the improvement comprising

at least one block member disposed in the space between said inner and outer wythe,

said block member having a lower angularly inclined edge extending downwardly from said inner wythe toward said outer wythe,

said support member having a horizontally extending recess formed in one of the side edges thereof, said recessed side edge of said support member being secured with respect to said outer wythe,

said angularly inclined lower edge of said block member being positioned within said recessed side edge portion of said support member,

said outer wythe having a plurality of weepholes disposed in adjacent relationship to said recessed side edge portion of said support member, and

said angularly inclined lower edge of said block member, said recessed side edge portion of said support member and said weepholes forming a self-flashing system.

43. A wall assembly in accordance with claim 42, wherein

said lower angularly inclined edge of said block member is disposed at an elevation lower than that of the upper horizontal surface of said support member.

44. A wall assembly in accordance with claim 42, including

a plurality of said block members disposed in side by side relationship,

said plurality of block members extending longitudinally a distance which is substantially equal to the longitudinal extension of said recessed side portion of said support member.

45. A wall assembly in accordance with claim 44, wherein

said block members are formulated of an insulative material, thereby providing an insulative barrier between said inner and outer wythes at the elevation of the wall assembly which is adjacent said horizontal support member.

46. A wall assembly in accordance with claim 44, wherein

said block members are of substantially rectangular configuration having the adjacent side edges

thereof disposed in substantially abutting engagement.

47. A wall assembly in accordance with claim 44, wherein

said block members are of substantially rectangular configuration having the adjacent side edges thereof disposed in overlapping relationship.

48. In a wall assembly including an inner wythe and an outer wythe disposed in spaced apart relationship and a structural horizontal support member, the improvement comprising

at least one block member disposed in the space between said inner and outer wythe,
said block member having an angularly inclined lower edge extending downwardly from said inner wythe toward said outer wythe,
said horizontal support member having a horizontally extending champhered upper edge portion,
means for securing said horizontal support member to said wall assembly at a predetermined elevation with the champhered upper edge portion thereof being disposed in the space between said inner and outer wythes,

said champhered upper edge portion having a downward angular inclination from said inner wythe toward said outer wythe,

said champhered upper edge portion being disposed in adjacent proximate relationship to said angularly inclined lower edge of said block member,

said outer wythe having a plurality of weepholes disposed in adjacent relationship to said angularly inclined edges, and

said angularly inclined lower edge of said block member, said champhered upper edge portion of said support member and said weepholes forming a self-flashing system.

49. A wall assembly in accordance with claim 48, wherein

said structural horizontal support member is secured with respect to said outer wythe.

50. A wall assembly in accordance with claim 49, wherein

said weepholes in said outer wythe are disposed at an elevation below that of said angularly inclined edges.

51. A wall assembly in accordance with claim 50, wherein

said horizontal support member is a structural base member.

52. A wall assembly in accordance with claim 51, wherein

said means for securing said structural base member to said outer wythe comprises a lintel.

53. A wall assembly in accordance with claim 50, including

a plurality of said block members disposed in side by side relationship, and

said block members being substantially horizontally coextensive with said champhered upper edge of said support member.

54. A wall assembly in accordance with claim 53, wherein

said block members are formulated of an insulative material, thereby providing an insulative barrier between said inner and outer wythes at the elevation of the wall assembly which is adjacent said horizontal support member.

55. A wall assembly in accordance with claim 53, wherein

said block members are of substantially rectangular configuration having the adjacent side edges thereof disposed in substantially abutting engagement.

56. A wall assembly in accordance with claim 53, wherein

said block members are of substantially rectangular configuration having the adjacent side edges thereof disposed in overlapping relationship.

57. A waterproof wall assembly in accordance with claim 1, wherein

selected ones of said block members have a wetting agent applied to at least one of the surfaces thereof.

58. A waterproof wall assembly in accordance with claim 1, wherein

selected ones of said block members have a water absorbent layer applied on at least one of the surfaces thereof.

59. A waterproof wall assembly in accordance with claim 1, wherein

said means for positionally securing said block members with respect to said one of said wythes comprises substantially horizontally extending members secured to said one of said wythes, and said block members being impaled upon said horizontally extending members.

60. A waterproof wall assembly in accordance with claim 59, wherein

said horizontally extending impaling members are secured to said one of said wythes by means of an adhesive.

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