

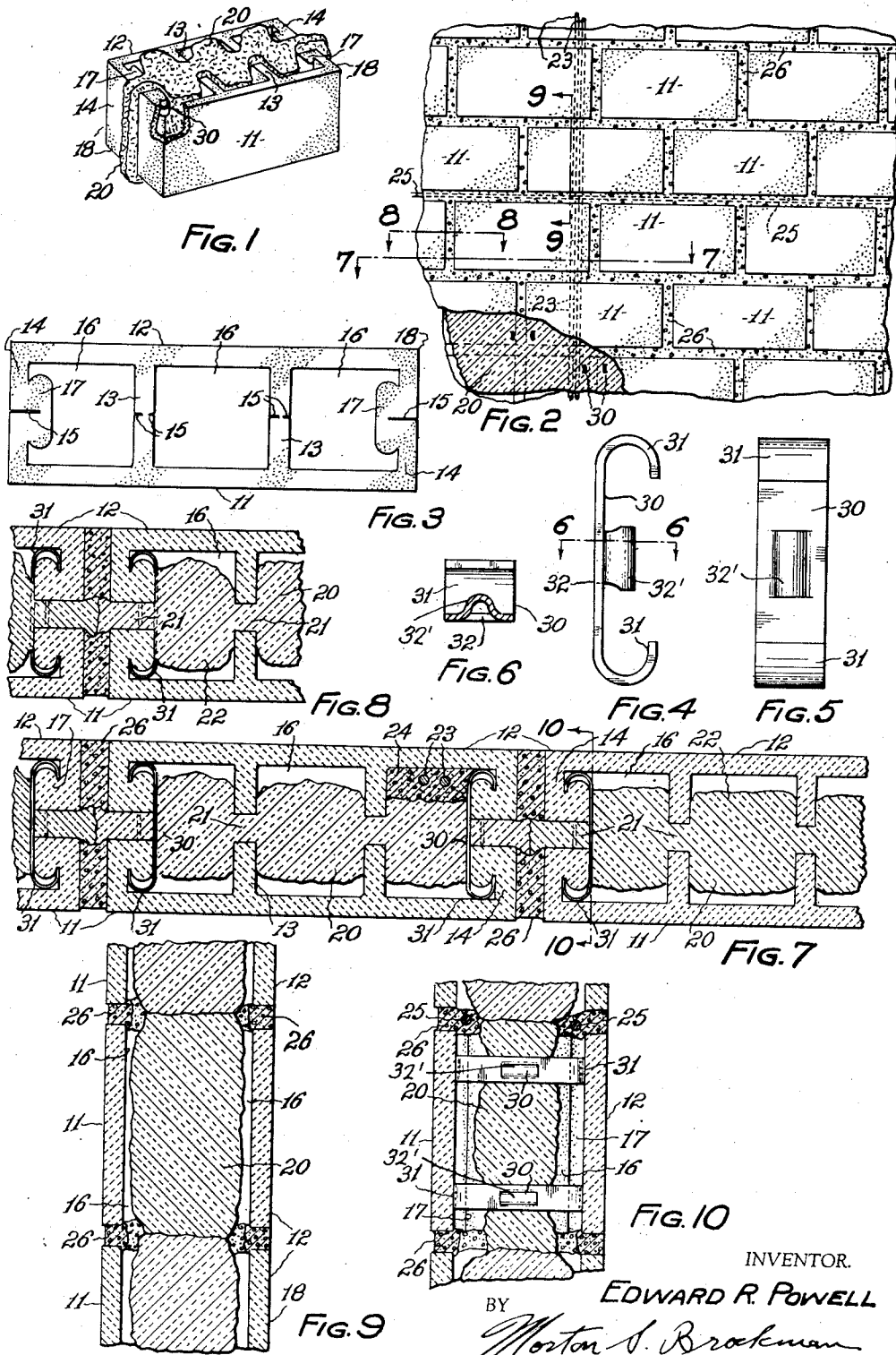
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E. R. POWELL

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COMPOSITE TILE STRUCTURE

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COMPOSITE TILE STRUCTURE

Edward R. Powell, Cleveland Heights, Ohio

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9 Claims. (Cl. 72-44)

This invention relates to composite blocks and particularly to preassembled building tile and wall structures made therefrom.

The primary object of the invention is to provide a building tile which has greater heat, moisture and sound insulating characteristics than similar units of the prior art.

Another object is to form such insulating tiles and wall structures easily and economically out of conventional materials and by processes familiar to the art.

A further object is to provide a preassembled hollow type building block which is used and assembled in much the same manner as the conventional tile blocks are used.

Still another object is to form a reinforced wall structure of heat, moisture and sound insulated ceramic blocks.

These and other objects and features of the invention will become apparent from a study of the following description and claims together with the accompanying drawing in which like parts are designated by like reference characters and wherein:

Figure 1 is a perspective view of a preassembled block with parts broken away to show certain interior structures;

Figure 2 is an elevation of a part of a wall made up of many preassembled blocks of this invention;

Figure 3 is an enlarged top view of a tile block before splitting and reassembling;

Figure 4 is an enlarged plan view of the preferred form of metal clip used with the block;

Figure 5 is a front view of the metal clip shown in the Figure 4;

Figure 6 is a sectional view of the same clip taken along the line 6-6 of Figure 4;

Figure 7 is an enlarged view of a section of the assembled wall taken along the horizontal line 7-7 of the Figure 2;

Figure 8 is an enlarged view of a horizontal section of the same wall taken along the line 8-8 of the Figure 2;

Figure 9 is an enlarged vertical sectional view of the same wall taken along the line 9-9 of the Figure 2; and

Figure 10 is a cross-section of the wall as taken along the line and in the direction of the arrow 10-10 of Figure 7.

The composite building block of this invention consists of three essential elements, each of which will be described in detail hereinafter.

The hollow tile or cellular ceramic block intended for use with this invention is made

economically by the conventional stiff-mud process. Satisfactory sizes of original blocks, that is, the sizes before they are split, are about 12" x 12" x 4" thick; 15" x 18" x 6" thick. Other sizes may be easily made and used but, for convenience and for the purpose of illustration only, the hereinafter specification will refer to a more elongated three-cell block of the conventional hollow tile type. Also it should be understood at the outset that while the one type of block is shown, modification as to size, curvature and similar physical characteristics may be made in order to fit window and door openings, square or rounded corners, foundations and other structural building elements.

In the Figure 3 there is shown a ceramic tile having a front or first wall 11, a rear or second wall 12 which are parallel to each other and connected by the two perpendicular wall portions 13 and the two end wall portions 14, which form the interconnected cells 16. The characters 15 indicate small grooves which are cut into the wall portions 13 and 14 to facilitate severance of the block at these points. The two inner surfaces of the two end wall portions 14 are provided with rounded extensions which are referred to as lugs and which are designated by the characters 17.

As a preferred method of making the shape illustrated, the co-active lugs 17 as well as the rest of the tile members are formed in the die from which the plastic ceramics are extruded. The grooves 15 are cut into the intermediate wall portions 13 and end wall portions 14 while the block is still in its plastic state by stationary knives immediately after or just as the extruding column of material leaves the matrix and as it is about to be cut into separate units. The cell walls 13 are necessary for the larger tiles in the firing process in order to keep the outer walls 11 and 12 in parallel position and to prevent them from warping when heat is applied. The use of the intermediate cell walls greatly increases the size to which units can be satisfactorily made.

Since the general control requirements for this type of unit are not severe, a suitable tile block may be fired in a common down-draft kiln, although kilns of a more refined type may contribute to the strength and uniformity of the product. After firing, the tile shown in the Figure 3 is split or severed into the first, front or outer wall member 11 and the second, rear or inner wall member 12. This severing may be done with a negligible percentage of improper breakage by gently tapping the wall portions 13

and 14 with a one-half inch cold chisel and a light hammer of less than one and one-half pounds in weight. After splitting, the two tile members 11 and 12 are reassembled and the wall portions are properly matched for the purposes herein mentioned.

The bat of fibrous insulating material is of the matted or felted type. One type of material which has been found to possess exceptional merit for the blocks mentioned, is mineral wool stiffened slightly and rendered water-repellent by the admixture therewith of certain gums and oils. Such bats may be made with sufficient resiliency to keep a fairly constant tension on the clamp members 30 and yet be yielding enough to permit the cell walls 13 and 14 to compress it or become imbedded therein without injury to the tile members.

In the drawing the fibrous bat is indicated by the characters 20. The parts that are compressed between the aligned, matched and severed wall portions 13 and 14 are indicated by the characters 21 and the looser or distended parts in the interconnected cells 16 are indicated by the characters 22.

If the gum or wax treatment of the fibrous bat is about 2 to 4 per cent by weight and if the gum or wax is properly applied, the bats will permit mortar to be laid against them and will not absorb water from the mortar to an extent which will impair the setting or hardening of the mortar. Such bats are practically incombustible and are strong enough to have a material structural value. The pore structure of the bat is considerably coarser than that of the tile. This feature and the treatment of the bats combine to resist transmission of water. I have found that one wall of a tile may stay wet indefinitely without wetting the opposite wall of the same tile.

The metal clamp members are clearly illustrated in the Figures 4, 5 and 6. A clamp is simply a blanked piece of longitudinal springy metal which has a back section 32 and two hook-like members or curved ends 31. The two curved sections 31 have ends which face each other and which close or open under tension. The curved end sections 31 engage the ceramic lugs 17. As shown in Figs. 4, 5, and 6, the back section 32 includes a raised lug 32' formed by shearing and stretching the metal. The lug 15 serves to keep the tile properly spaced. The curved sections 31 have enough spring tension to retain the inner and outer wall members in assembled relation with the resilient fibrous insulating material therebetween. Other forms of clamps may be used in place of the simple form shown.

It is desirable also in order to longer preserve the metal clamps, that they be dipped in asphalt before assembly. It has been found also that dipping them in asphalt prevents the metal clamps from slipping off the co-active lugs 17 if the tension of the compressed fibrous bat is not sufficient to hold them in place.

In assembly the interconnected cells 16 of the blocks should be so nearly filled with distended bat material that a practically complete surface is formed so that mortar may be spread on the tile and partly on the fibrous bat just as if the preassembled block were a solid unit. For more complete insulation, especially as against sound, the bats should be a little larger than the tile so as to contact adjacent bats of other tiles in order to complete the insulation.

The Figure 1 of the drawing more clearly shows

how the excessive length and width of the fibrous bat extends outwardly, above and below the edges 18 of the wall members 11 and 12. The Figures 7, 8, 9 and 10 illustrate how the individual bats touch and interlock at their top, bottom and side edges so that there is no solid rigid element connecting the front and back walls.

A wall of this sort is usually erected on a footing of concrete or other firm material. The blocks are laid just as in laying brick or common hollow tile. The mortar 26 is spread on the base and on some of the tile itself. Other tile are laid successively adjacent thereto in this conventional manner. I have found that an especially good wall may be formed by bonding the units as shown in the Figures 2, 7, 8, 19 and 10 by inserting horizontal rods 25 in the horizontal mortar joints which may be thick enough for the purpose. Additional reinforcement is obtained by having reinforcing vertical rods 23 inserted through certain vertically aligned cells 16 and rigidly retaining the vertical rods therein with hardened grout 24 which is poured into the cells as illustrated in the Figure 7. A sort of integral stud is thus formed by the hardened grout 24 which is carried through from one tile cell to another. This grout 24 also firmly bonds the horizontal rods 25. The mortar 26 for erection work of this sort should be of the hard mortar class. That is, it should contain at least one part of Portland cement to two parts of lime as the bond with six to nine parts of sand. A larger proportion of Portland cement than was just mentioned has also been used successfully.

The principal advantage of this invention is the manufacture of clay tile in the shapes which are readily formed in tile mills of existing types and then converting the tile into composite insulated tile. Another feature is the use of mineral wool bats of available type for the insulating medium. This tile and bat co-act both in the erection and in the finished structure to produce economically desirable buildings.

It is well known that good sound-proof, moisture-proof and high thermal resistance walls can be erected by using double wall construction with the insulating media interposed between the two walls, but this procedure requires the expenditure of large amounts on special and skilled labor on the job with attendant high erection costs. This invention is directed to the manufacture of units which are already so assembled that the sound resistance, moisture resistance and thermal resistance are imparted thereto before erection when the assembly costs are relatively much lower.

As added advantages of the particular preferred form which I have selected, the units are practically indestructible in normal service, being mechanically strong and resistant to shock; incombustible, containing only small amounts of organic matter; vermin-proof, containing almost no food for rodents or insects; weather resistant, requiring no painting or painting for decoration only; and not being subject to decay. Furthermore, the units are assembled for the most part of the combination of conventionally made products which are time-tested in the building industry and which are not likely to disturb one's confidence in the structures erected therefrom.

It will now be clear that there is provided by this invention a composite tile structure and method of making same which accomplishes the objects heretofore mentioned. While the invention has been described and illustrated in a specific

form, it is to be understood that the embodiment of the invention as shown is suggestive only and is not to be considered in a limiting sense. It is to be further understood that there may be other forms or adaptations of this invention which will suggest themselves to persons familiar with the art and those modifications are all considered to be within the broad scope of the invention as no limitations upon it are intended other than those imposed thereon by the breadth of the appended claims.

I claim:

1. An insulated building block, comprising in combination, a first wall member, a second wall member parallel to and in spaced relation to the first wall member, a plurality of perpendicular matched wall portions including matched end wall portions integral with the said wall members and forming with said wall members a plurality of interconnected cells, pairs of co-active lugs on the matched end wall portions, a bat of loose fibrous insulating material between the said wall members filling the said cells and spacing the matched wall portions and the co-active lugs thereon, and a clamp means engaging the said lugs retaining the said spaced wall members and the bat of fibrous material in an assembled relation.

2. An insulated building block, comprising in combination, a first wall member, a second wall member parallel to and in spaced relation to the first wall member, a plurality of perpendicular matched wall portions including matched end wall portions integral with the said wall members and forming with said wall members a plurality of interconnected cells, a bat of loose fibrous insulating material supported between the wall members and having a distended part in the said interconnected cells and a compressed part between the said matched wall portions, and a clamp means retaining the spaced wall members and the bat of fibrous material in an assembled relation.

3. An insulated building block, comprising in combination, a first wall member having edges, a second wall member having edges and being parallel to and in spaced relation to the first wall member, a plurality of matched wall portions perpendicular to the said wall members and being integral therewith, the said wall members and wall portions forming a plurality of interconnected cells therebetween, a bat of loose fibrous insulating material supported between the wall members and having a distended part in the said interconnected cells and a compressed part between the said matched wall portions, the said bat of fibrous material extending beyond the edges of the wall members, and a clamp means engaging the matched wall portions retaining the said spaced wall members and the bat of fibrous material in an assembled relation.

4. An insulated building block, comprising in combination, a first wall member, a second wall member parallel to and in spaced relation to the first wall member, a plurality of matched wall portions including end wall portions perpendicular to the said wall members and being integral therewith, the said wall members and wall portions forming a plurality of interconnected cells therebetween, pairs of co-active lugs on the matched end wall portions, a bat of loose fibrous resilient insulating material supported between the wall members and having a distended part

in the said interconnected cells and a more compressed part between the said matched wall portions, and tensioned clamp means engaging the said co-active lugs retaining the spaced wall members and the bat of fibrous material in an assembled resilient relation.

5. An insulated building block, comprising in combination, a ceramic front wall member having edges, a ceramic rear wall member having edges and being parallel to and in a spaced relation to the front wall member, a plurality of matched wall portions including end wall portions perpendicular to the said wall members and being integral therewith, the said wall members and wall portions forming a plurality of interconnected cells therebetween, pairs of co-active lugs on the matched end wall portions, a bat of loose fibrous resilient insulating material supported between the wall members and having a distended part in the interconnected cells and a more compressed part between the said matched wall portions, the said bat of fibrous material extending beyond the edges of the wall members, and tensioned clamp means engaging the co-active lugs inside the cells retaining the spaced wall members and the bat of fibrous material in an assembled resilient relation.

6. A wall structure comprising a plurality of hollow juxtaposed building blocks including interrupted end and intermediate walls dividing said blocks into a plurality of shells, means holding said shells in assembled relationship, insulating material within said shells and extending through the interruptions of said end and intermediate walls, reinforcing rods projecting through vertically contiguous cells of superposed blocks, and hardened grout securing said rods to said blocks and said plurality of blocks in assembled relationship.

7. An insulating building block comprising complementary hollow shells, said shells including adjacent open sides in spaced relationship, fibrous insulating material within said shells and including compressed portions extending between the end walls of said shells and projecting therebeyond, and means securing said shells in assembled relationship.

8. An insulating building block comprising complementary hollow shells including side, end and intermediate walls defining cells, fibrous insulating material within said cells and including compressed portions extending between the end and intermediate walls of the complementary shells and projecting beyond said end walls, and clamping means securing said shells in assembled relationship.

9. A wall structure comprising a plurality of juxtaposed building blocks each including complementary hollow shells in spaced relationship, said shells having adjacent open sides, means securing said shells in assembled relationship, fibrous insulating material within said shells and including compressed portions extending between the adjacent walls of said spaced shells and projecting therebeyond into contact with like portions of the insulating material of adjacent units, said insulating material also extending above and below said shells into contact with the insulating material of adjacent blocks whereby said insulation is substantially continuous throughout said wall structure.

EDWARD R. POWELL.