July 9, 1968 D. D. DOWNING 3,391,507

BUILDING BLOCK FOR WALL CONSTRUCTION

Filed Dec. 3, 1963 4 Sheets-Sheet 1

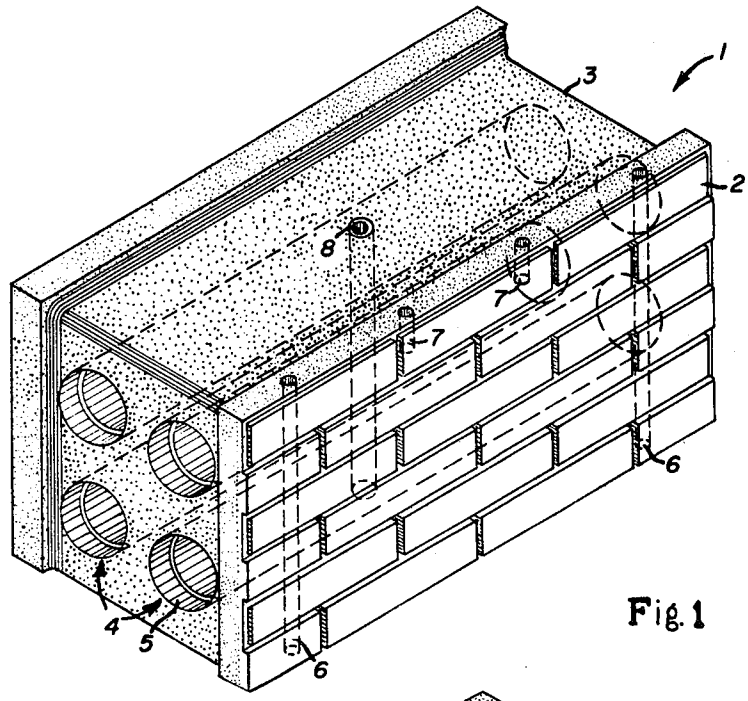


Fig. 1

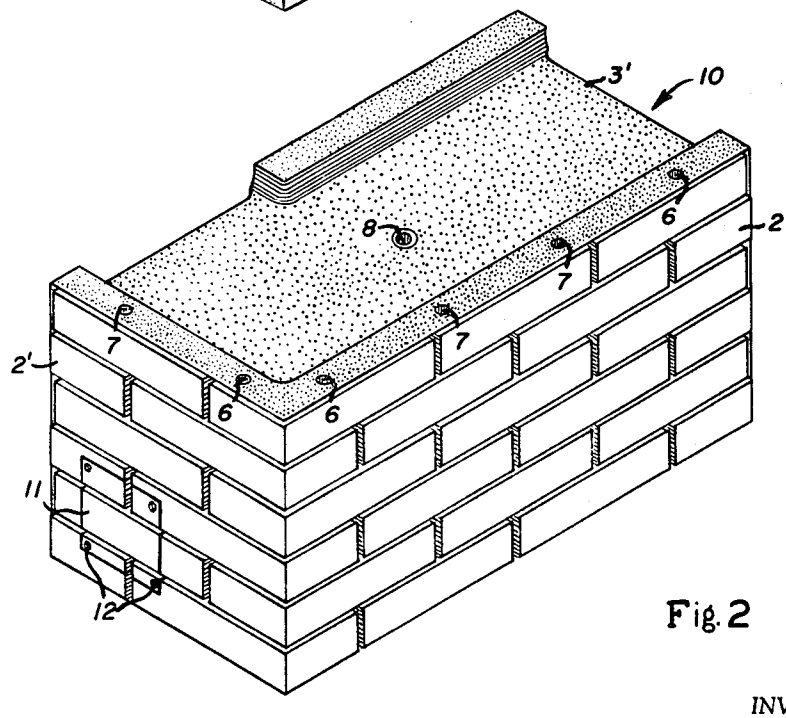


Fig. 2

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BUILDING BLOCK FOR WALL CONSTRUCTION

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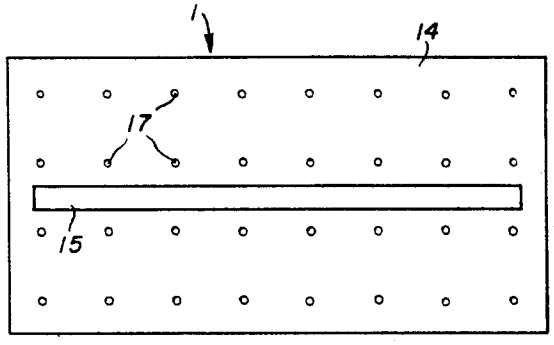


Fig. 3.

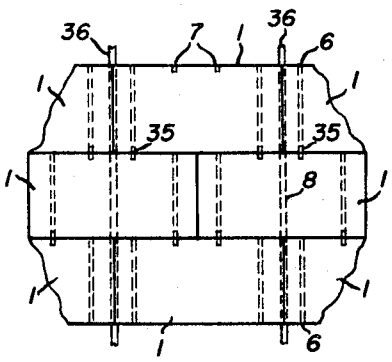


Fig. 12

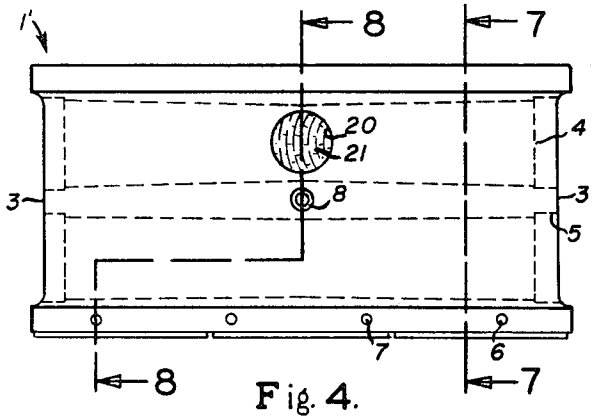


Fig. 4.

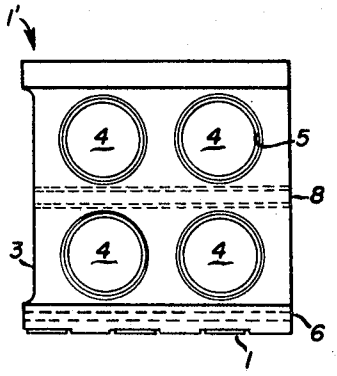


Fig. 5.

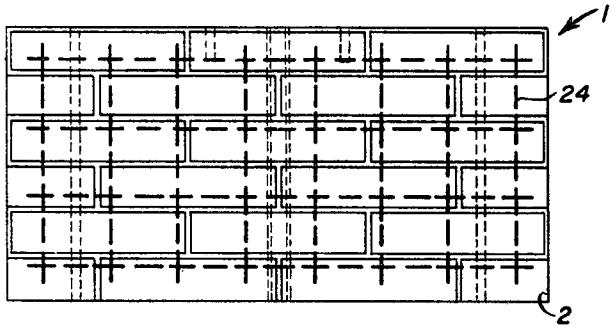


Fig. 6.

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BUILDING BLOCK FOR WALL CONSTRUCTION

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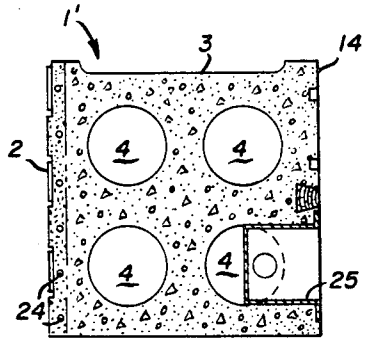


Fig. 7

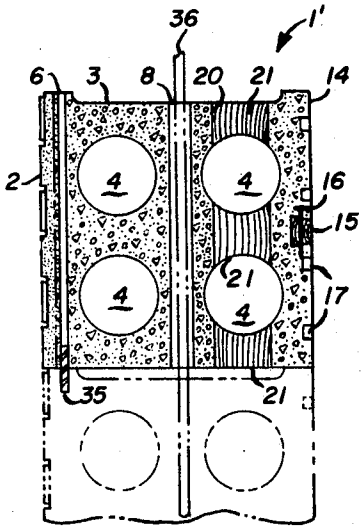


Fig. 8

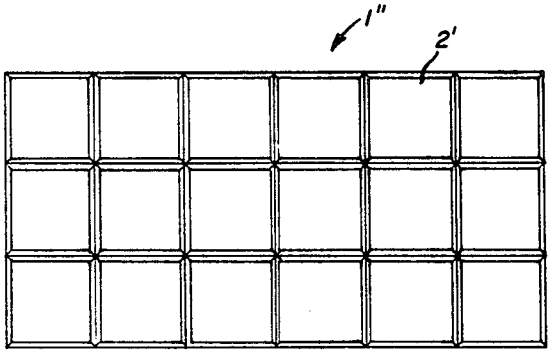


Fig. 9

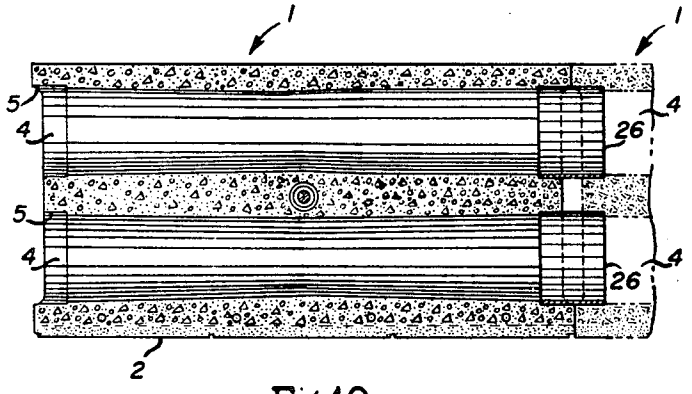


Fig. 10

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BUILDING BLOCK FOR WALL CONSTRUCTION

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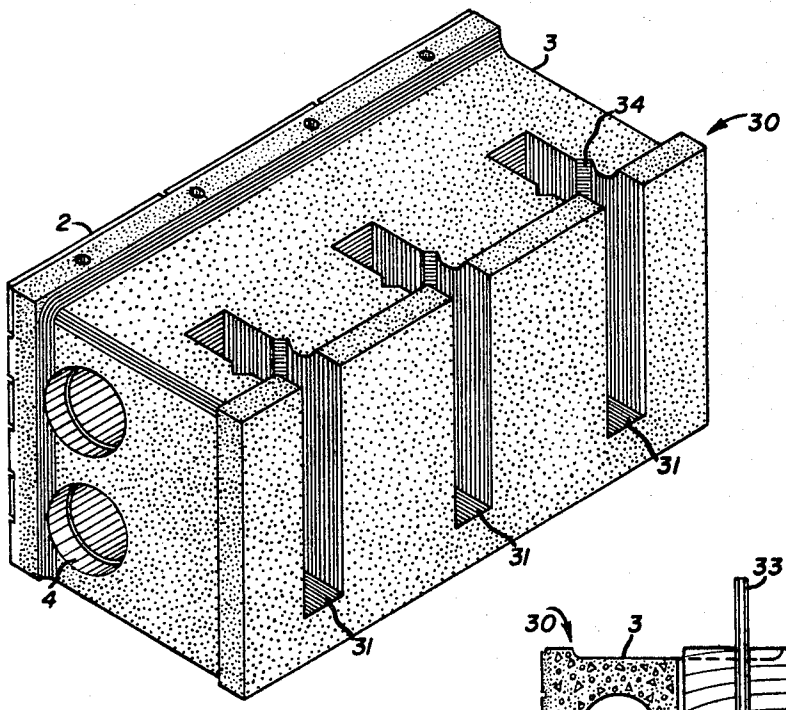


Fig.11

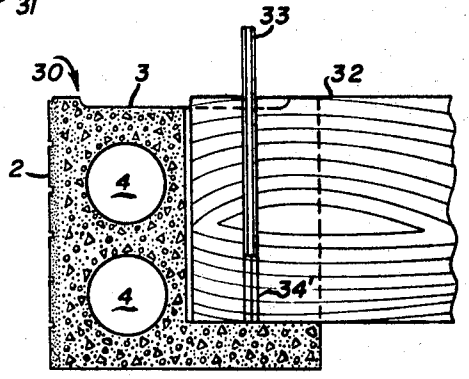


Fig.13

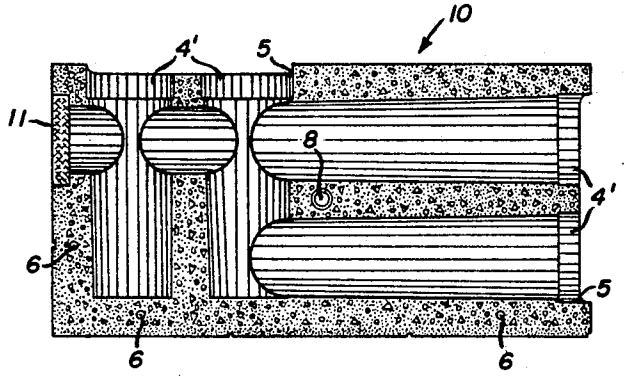


Fig.14

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3,391,507

BUILDING BLOCK FOR WALL CONSTRUCTION

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10 Claims. (Cl. 52—314)

This invention relates to the construction of walls and particularly to the design of an improved building block for wall construction.

The building industry is one of our oldest industries but the method of constructing masonry walls has not improved or even changed for many decades. It is believed that there exists at the present time a genuine need for an improved type of masonry wall construction.

Accordingly, it is an object of the present invention to provide an improved wall construction which can be easily and rapidly erected by unskilled labor.

Another object of the invention is to provide an improved building block which is basically a good thermal insulator and which also has a waterproof face. In addition, it is desired to provide a building block with a face surface having a permanent cast-in-color. An additional object is to provide a block which can be made to have a variety of surface designs, including a design simulating conventional brick construction. Further it is desired to provide a building block which will be many times the size of conventional blocks or bricks and still be easily handled by one man.

A further object of the invention is to provide a building block and a wall construction having built-in conduits for services such as wiring and pipes. In addition, it is desired to provide a means for joining the conduits from block to block in a manner which does not in any way obstruct the conduit so that wires and pipes can be easily threaded through the conduits and so that the conduits can serve to carry air for heating and cooling. A related object of the invention is to provide a joining arrangement which not only joins the conduits from block to block but also prevents mortar from running into the conduit joints formed between adjacent building blocks.

An additional object of the invention is to provide a building block having intersecting horizontal and vertical services conduits; and further to provide an arrangement wherein said vertical conduits are provided with cast-in knock-out plugs.

It is also an object of the invention to provide building blocks with service conduits having cast-in access plates and having cast-in boxes to receive electrical fittings such as junctions and switches.

A further object of the invention is to provide blocks with vertical guide bores so arranged that pins inserted in said bores serve to position the blocks one above the other quickly and accurately and serve to reinforce the block wall construction.

Another object of the invention is to provide a building block having a face surface design, such as a design simulating the appearance of several courses of bricks, and having a mortar groove arranged so that when several of said blocks are joined together, the continuous appearance of a standard brick wall is maintained.

A further object of the invention is to provide a building block which will automatically achieve the requisite vertical orientation of floor and ceiling joists and will provide the proper horizontal spacing between them. An additional related object is to obtain a stronger connection between walls and the floors and ceilings.

Another object of the invention is to provide a building block having cast-in recesses on its inner face for plastering and a cast-in nailing strip for attaching paneling.

Other and further objects and features of advantage will be apparent from the following detailed description where-

in reference is made to the accompanying drawings in which:

FIG. 1 is a perspective view of a building block according to the invention;

FIG. 2 is a perspective view of a corner block according to the invention;

FIG. 3 is a view of the inside face of the block shown in FIG. 1, showing a nailing strip and plastering recesses;

FIG. 4 is a top view of a building block similar to the block of FIG. 1 but including a vertical conduit and a knock-out block;

FIG. 5 is a right end view of FIG. 4;

FIG. 6 is a front view of a block according to the invention and showing the location of a reinforcing screen;

FIG. 7 is a cross section view taken on the line 7—7 of FIG. 4 and showing a cast-in box to receive an electric fitting;

FIG. 8 is a cross section view taken on the line 8—8 of FIG. 4 and showing the vertical conduit. FIG. 8 also shows an adjacent lower block in dot-dash outline;

FIG. 9 is a back view of a block having tiles cast on its interior surfaces;

FIG. 10 is a cross section view on a plane through the two lower conduits of the block in FIG. 1 and showing the conduit connecting sleeves and a portion of the adjacent block;

FIG. 11 is a perspective view of a block at the floor or ceiling joist level and showing the joist receiving and positioning slots;

FIG. 12 is a front view of a representative section of a wall showing the vertical interconnection between blocks. The faces of the blocks in FIG. 12 are shown plain to avoid confusing the showing of the interior interconnecting means.

FIG. 13 is a section view through a joist-receiving slot of FIG. 11 and showing a joist in position, with a locking pin partly inserted; and

FIG. 14 is a horizontal section through the two lower conduits of the end block in FIG. 2 and showing a cast-in access plate.

Referring in more detail to the drawings, FIG. 1 shows a building block 1 having a face portion 2 on the main or body portion of the block. The body portion is preferably made of concrete with light weight aggregates, and the face portion is a more dense cast-on layer having the desired design in an enduring cast-in color. The face is also preferably given a waterproofing treatment.

Block 1 has a mortar groove 3 extending continuously around three edges; namely, the top and two end edges. The main purpose of groove 3 is to place the mortar joint out of view from the front of a wall constructed in accordance with the invention. More specifically, additional blocks 1 can be aligned in abutment with the ends of the block in FIG. 1 and on top thereof and in every case the edge of the face surface 2 of each block will be in direct contact with the adjacent edge of the face of the abutting blocks. The mortar to bond the blocks together is positioned in groove 3 in each block and thus hidden from view. In this way the desired pattern on the front of each block (such as the brick pattern on FIG. 1) can be continued onto the adjacent blocks without the break caused by the usual mortar line.

Block 1 has four horizontal passages built-in conduits 4 to receive services such as electric lines and plumbing pipes. In addition conduits 4 can serve, per se, to carry air from heating or cooling. The service conduits also serves to lighten the block and to add to its thermal insulation properties. As will be described in detail in connection with FIG. 10, conduits 4 are provided with an enlarged diameter mouth 5 at each end.

In order that even unskilled labor can easily position blocks on top of each other in perfect vertical alignment

and perfect lateral offset, the blocks are provided with four bores, spaced apart equally along the block. The two end bores **6** are throughbores, and the two center bores **7** open to the top of the block but stop part way down. The center of the block has a through-bore **8** which is available for use in geographic locations in which building codes require vertical reinforcing rods extending the entire height of the wall and spaced along the wall, for example on four foot centers.

Each of the bores **6–8** is preferably formed by a piece of tubing cast-in place.

FIG. 2 shows a block **10** which is a corner block designed to match block **1**. Parts of block **10** which are identical to parts of block **1** are given the same reference numbers, and parts which are similar are given primed reference numbers. FIG. 14 shows a horizontal cross section through the lower conduits **4'** in block **10**. One feature of the invention is to provide a cast-in access plate **11** at the end of one of the conduits **4'** which can be removed to open the service conduit for installation or repair of service lines. Access plate **11** can be made of metal, wood or plastic, and is held in place by four screws **12**.

FIG. 3 is a view of the rear or inner face of the block in FIG. 1. It will be seen from FIG. 3, and also from FIGS. 7 and 8, that the inner face is provided with a cast-in nailing strip **15** made of wood or plastic. Strip **15** can be held firmly in place by having a dovetail fit as shown in FIGS. 7 and 8. Also, a nail **16** can be employed in combination with or in place of the dovetail fit to hold the strip **15** in place. As shown in FIGS. 3, 7 and 8 the inner face **14** is also provided with a plurality of cast-in recesses **17** for use in plastering when that is the desired inner finish.

FIG. 4 is a top view of a block **1'** which is exactly the same as block **1** except that it includes the added feature of a vertical service conduit **20**. One of the reasons for vertical conduits is to provide a means for extending wires, pipes or air flow up and down from one story to another. Another reason is that even with regard to a single floor it is necessary to run services vertically in some locations, for example to pass up and around windows and doors. As shown in FIG. 8, the vertical conduit **20** intersects the horizontal conduits **4** in order to be fully effective. Also, it will be seen that the vertical conduit is provided with cast-in wood or plastic knock-out plugs **21**. In this way the vertical conduits are used only when needed and do not form unnecessary openings in the horizontal conduits.

FIG. 6 is a front view of block **1** showing in dashed lines a reinforcing wire mesh **24**. The mesh is imbedded in the cast-on face layer **2** to support it during the pouring of the main body and to help bond the face to the body and prevent splitting of the block. As will be understood by those skilled in the art, the concept of a cast-on face layer makes it possible to provide a basic block construction on which can be cast any desired type of face design. For example, instead of the brick of FIG. 1, a block can be surfaced with cast-on title as shown by interior face **2'** on the block **1'** in FIG. 9.

As shown in FIG. 7, one of the features of the invention involves a cast-in box **25** of metal or plastic for receiving electrical fittings such as junctions and switches.

Another feature of the invention relates to the method of joining conduits from block to block so that mortar is prevented from reaching the conduits and that wires laid in the conduits find a continuous smooth inner wall. As shown in FIG. 10, both of these objectives are achieved by the use of metal or plastic sleeves **26**. An important aspect of this feature is that the inside diameter of sleeves **26** is the same as the inside diameter of the effective portion of conduits. In this way the conduit from block to block presents a smooth continuous inner wall surface. It will also be noted in FIG. 10 that the conduits **4** are preferably tapered to have thin smallest diameter at the middle. In this way each conduit can be formed by two tapered forming members which can be easily withdrawn from the ends of the conduits after the block is formed.

FIGS. 11 and 13 disclose the arrangement for locating floor and ceiling joists. More specifically, the figures show a block **30** which is used at the floor and ceiling joist level. Block **30** is substantially the same as block **1** except that two of the horizontal conduits are omitted and are replaced by slots **31** which receive joists **32**. The joist-receiving slots are cast-in with proper width to receive a standard joist and are spaced apart the distance required by standard codes. In order to secure the joists firmly in place in slots **31**, a pin **33** is preferably driven between the sides of the joists and slots. Preferably, shallow grooves **34** in the walls of slots **31** and matching grooves **34'** in the sides of joists **32** are provided to receive pins **33**.

As shown in FIG. 12 a wall constructed of blocks according to the invention is a very rigid structure. More specifically reinforcing and locating pins **35** extend through the end tubes **6** in each block and into the short tubes **7** in two other blocks. In this way each block is locked to two other blocks. In addition, a continuous reinforcing rod **36** can be inserted in tubes **8** periodically along the wall. The rods can be secured very firmly in the tubes by pouring a thin mortar in the tubes around the rods and then vibrating the rods.

Although preferred embodiments of the present invention are shown and described herein, it is to be understood that modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A building block comprising:
- a substantially rectangular body having a pair of parallel end faces, a top face, a bottom face, an outer face and inner face;
- at least one conduit extending through said body substantially perpendicular to said end faces;
- said conduit being tapered down from each end to a minimum diameter between the end faces, said conduit further having enlarged constant diameter portions adjacent each end face; and
- a plurality of bores extending perpendicularly through said top face, one-half of said bores extending completely through the body of said block and through said bottom face to form long bores and one-half of said bores extending only part way down to said bottom face to form short bores.

2. A building block comprising:
- a substantially rectangular body having a pair of parallel end faces, a top face, a bottom face, an outer face and inner face;
- at least one conduit extending through said body substantially perpendicular to said end faces;
- said conduit being tapered down from each end to a minimum diameter at the mid-point between the end faces, said conduit further having enlarged diameter portions adjacent each end face;
- a plurality of bores extending perpendicularly through said top face, one-half of said bores extending completely through the body of said block and through said bottom face to form long bores and one-half of said bores extending only part way down to said bottom face to form short bores; and
- a continuous mortar groove in said end faces and one of said top and bottom faces, the remaining top and bottom face being planar.

3. A building block comprising:
- a substantially rectangular body having a pair of parallel end faces, a top face, a bottom face, an outer face and inner face;
- at least one conduit extending through said body substantially perpendicular to said end faces;

said conduit being tapered down from each end to a minimum diameter at the mid-point between the end faces, said conduit further having enlarged diameter portions adjacent each end face;

a plurality of bores extending perpendicularly through said top face, one-half of said bores extending completely through the body of said block and through said bottom face to form long bores and one-half of said bores extending only part way down to said bottom face to form short bores, each of said long bores and said short bores being arranged symmetrically with respect to a first plane midway between and parallel to said end faces, and each short bore on one side of said first plane being arranged symmetrically with a long bore on the same side of said first plane with respect to a further plane midway between said first plane and end face on said same side; and

vertical recesses in said end faces and a horizontal recess in one, but not the other, of said top and bottom face.

4. A building block in accordance with claim 3 including a joist receiving slot part way across said top and said inner face and stopping short of said bottom face.

5. A building block in accordance with claim 4 in which one side wall of said joist receiving slot includes a pin receiving groove.

6. A building block in accordance with claim 3 in which said outer face is in the shape of a plurality of bricks and in which said inner face is in the shape of a plurality of tiles and in which a cast-in steel reinforcing mesh underlies said outer face.

7. A building block comprising top and bottom walls a plurality of pin-receiving bores in said top wall, said bores being arranged on vertical axes, some of said bores extending through to said bottom wall and some of said bores extending only part way to said bottom wall, a second building block comprising top and bottom walls, said second building block having a plurality of pin-receiving bores in the top wall of said second block and arranged on vertical axes, some of the bores in said second block extending through to the bottom wall of said second block and some of the bores in said second block extending only part-way to the bottom wall of said second block, said second block being positioned on top of the first said block, one of said through-bores in said second block being in alignment with one of said part-way bores in said first block, and a pin received in each of said aligned bores.

8. A building block comprising top and bottom walls and a plurality of pin-receiving bores in said top wall, said bores being arranged on vertical axes, some of said bores extending through to said bottom wall and some of said bores extending only part way to said bottom wall, a second and a third building block, said second and third

blocks having vertical through-bores and part-way bores therein arranged therein in the same position as they are arranged in the first said block, said first and second blocks being positioned end to end in a horizontal plane, said third block being positioned on top of said first and second blocks and centered along the combined length of said first and second blocks, one of said through-bores in said third block being in alignment with one of said part-way bores in said first block, another of said through-bores in said third block being in alignment with one of said part-way bores in said second block, and a pin received in each of said aligned bores.

9. A building block comprising top and bottom walls and a plurality of pin-receiving bores in said top wall, said bores being arranged on vertical axes, some of said bores extending through to said bottom wall and some of said bores extending only part way to said bottom wall, each of said through-bores and part-way bores being arranged symmetrically with respect to a first plane midway between and parallel to the ends of said block, and each part-way bore on one side of said first plane being arranged symmetrically with a through-bore on the same side of said first plane with respect to a further plane midway between said first plane and the end on said same side.

10. A building block as claimed in claim 3 in which said block comprises a relatively light body material and a relatively dense cast-on face layer having a pattern.

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