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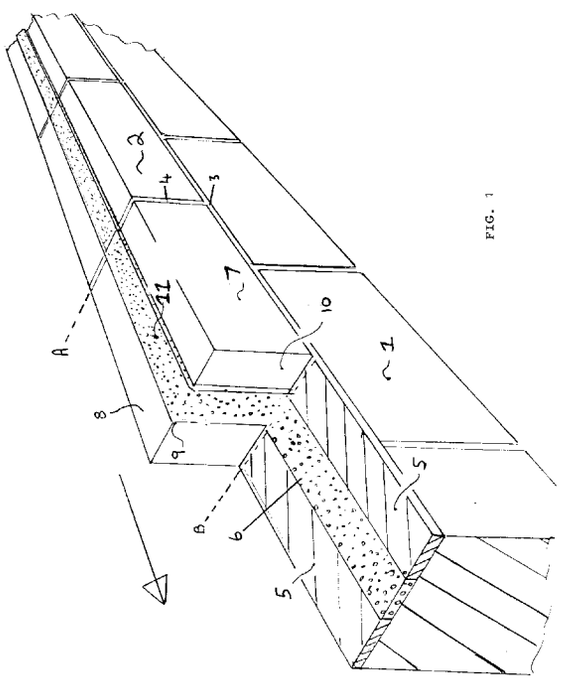
(54) Insulating strip and method.

(57) A method of construction of a masonry wall in which insulating strips (6) comprising insulating material are incorporated into the vertical (4) and horizontal (5) mortar joints to improve the thermal performance of the masonry wall. Also provided are insulating strips suitable for use in the method of construction and walls comprising a plurality of bricks or blocks each having an insulating strip associated with it.



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This invention relates to insulating strips to improve the performance, in the aspects of thermal insulation and inhibition of moisture penetration, of the mortar joints in masonry walls and to a method of building masonry walls which includes use of the insulating strips. More especially the invention relates to insulating strips and building methods for improving the performance of both horizontal and vertical mortar joints.

With the increasing cost of energy and the increasing awareness of the need to control emission levels to atmosphere from local and centralised heating plants (including those from power stations), many countries, including the U.K., are requiring buildings when newly built and/or extended to be constructed of fabric which improves on the thermal insulation of those in current use. There is therefore a need generally in the building industry to produce new materials having better insulating properties and to develop new building methods which lead to better insulated buildings.

Many countries, including the U.K., have a strong tradition of using masonry walls made of blocks and/or bricks with both horizontal and vertical mortar joints. Since 1975 there have been increasing calls upon the building materials industry in the U.K., to supply masonry units, generally blocks, to lighter density and to higher insulation values. The thermal performance of the mortar joints has, however, been generally overlooked. As the thermal performance of the constituent block element improves the heat leakage through the mortar joints becomes more significant. For example, typical concrete blocks used in masonry walls may have a thermal conductivity as low as 0.19 $Wm^{-1}K^{-1}$ (with a block density of 600 kg/m^3) while the typical thermal conductivity of mortar is 0.8 $Wm^{-1}K^{-1}$. The loss of heat is known as "cold bridging" and there is still a need to reduce the cold bridging across the mortar joints of traditional mortar construction.

A further problem with traditional masonry walls is the capillary action of moisture which occurs in any solid mortar bed and leads to an increased presence of moisture at the interior face of the blockwork adjacent to the mortar. This phenomenon is known as "pattern staining" and frequently occurs on the face of rendered and plastered walls particularly where blocks of low density (which tend to have the lowest thermal conductivity) have been used. This visual delineation of mortar joints is regarded as deleterious in most render finished walling.

As insulation values of buildings are required to be improved both cold bridging and pattern staining will become more significant and the invention described is a practical means of avoiding both, to the point of virtual elimination.

Methods which have been proposed to improve the thermal performances of masonry walls are described below.

U.S. Patent No. 4,833,852 describes an insulating unit for insertion into the cavities of special building blocks. The inserts are the same depth as the blocks and have a capping flange which extends longitudinally along the top of the block. The insert units and integral capping flanges are of sufficient length and thickness to produce a vertically and horizontally continuous insulating barrier within the multiple layer masonry block wall section. This system may only be used with blocks having suitable cavities.

GB-A-2,045,830 describes an insulated double skinned masonry structure. Each skin is constructed from a mixture of apertured bricks and unapertured bricks and the cavity formed is staggered from course to course. The bricks in each course are so arranged that insulating material placed in the cavity between the skins penetrates through the coursing joint between the courses and abuts an insulating material within at least one aperture of a brick in the course below, thereby providing insulation both vertically and horizontally.

GB 1,564,714 is one of a number of patents which disclose methods of building insulated walls which require the use of specially shaped bricks. The bricks used have a deep groove running longitudinally along their top and bottom faces. When made up into a wall the grooves in adjacent courses are aligned and rigid insulating strips fill the resulting cavities. The grooves are deeper than half the depth of the bricks and are staggered so that the insulating strips overlap vertically thereby forming an efficient barrier to the passage of heat. The insulating strips improve the thermal performance of both the bricks and the mortar joints.

GB 1,499,242 discloses a method of building which gives improved thermal performance of perforated brick walls. The horizontal mortar joints between adjacent courses comprise two bands of mortar which extend in the longitudinal direction of the wall and between those two bands is provided a strip of insulating material. Materials suggested for the insulating strip include glass wool or rock wool or other flexible insulating filaments in the form of a roll or a plait enclosed in a sealed plastics sheath.

The vertical ends of the bricks are shaped and when placed together the shaped ends form cavities in which mortar may be placed to form vertical joints. It is suggested that some of the cavities may be used to hold a polyurethane foam or other insulating material.

The present invention provides a method of construction of a masonry wall in which insulating strips comprising insulating material are incorporated into the vertical and horizontal mortar joints, the mortar joints comprising two substantially parallel bands of mortar spaced apart across the width of the joint with part of an insulating strip between them, each insu-

lating strip being of the correct length to extend completely along the length of one horizontal surface of a brick or block, used in the wall, substantially parallel to the edges of the brick or block, to pass over one edge and to extend completely along one adjacent vertical end of the brick or block, substantially parallel to the edges of the brick or block, each strip being of such material or of such a structure as to allow it to pass smoothly over the edge, each strip being incorporated in both a horizontal and vertical mortar joint; the horizontal surface and the vertical end of the brick or block being defined by the normal placement of the brick or block in the wall and the length of the horizontal surface being the length which would run in the longitudinal direction of the wall as the brick or block is placed in the wall.

The method is preferably one in which the bricks or blocks used to build the wall have an insulating strip placed on them, the insulating strip being positioned so that it extends along the length of one horizontal surface, smoothly over an edge and down a vertical end the mortar then being applied as usual.

The present invention further provides an insulating strip for use in the mortar joints of a masonry wall comprising bricks or blocks, the strip being comprised of an insulating material and of the correct length to extend completely along the length of one horizontal surface of a brick or block substantially parallel to the edges of the brick or block, to pass smoothly over one edge and to extend completely along one adjacent vertical end of the brick or block, substantially parallel to the edges of the brick or block, the insulating strip being narrower than the width of the horizontal surface of the brick or block and being such that it bends smoothly over the edge; the horizontal surface and the vertical end being defined by the normal placement of the brick or block in the wall and the length of the horizontal surface being defined as the length which would run in the longitudinal direction of the wall as the brick or block is normally placed in the wall; each strip thereby being capable of providing continuous insulation in and between both a horizontal and a vertical mortar joint.

The insulating strips of the present invention when used in the construction of a masonry wall may provide insulation in both the horizontal and vertical mortar joints. They are simple to use and cheap to produce.

The present invention also provides a masonry wall comprising a plurality of bricks or blocks, each brick or block having an insulating strip, comprising insulating material, associated with it, the strip being in contact with and extending completely along one horizontal and one vertical mortared surface, substantially parallel to the edges of the surfaces, the insulating strip being narrower than the width of the horizontal surface of the brick or block.

Further provided by the present invention is the use of a plurality of insulating strips in a masonry wall, each insulating strip comprising insulating material and being of the correct length to extend completely along one horizontal and one vertical mortared surface, extending substantially parallel to the edges of the surfaces, of a block or brick in the wall, the width of the insulating strip being less than the width of the horizontal surface of the brick or block.

The length of the insulating strip will depend on the dimensions of the brick or block it is to be used with; several sizes of insulating strip may be produced so that there will be a strip available which is suitable for use with the bricks and blocks most commonly used by the building industry.

Typically blocks used in masonry walls are 440 mm in length and 215 mm in height and bricks are 215 mm in length and 65 mm in height, these terms being used of the brick or block in normal orientation. Insulating strips according to the present invention for use with the blocks may therefore be supplied pre-formed in nominal 655 mm lengths and for use with the bricks pre-formed in nominal 280 mm lengths. Nominal lengths are given and mean lengths to a tolerance of +0 mm to -10 mm.

Although the strip may be of any width less than that of the brick or block on which it is to be placed, it is advantageous that it is no more than approximately one third of the width of the brick or block. If the strip or a plurality of strips, if used as described below, is greater than a third of the width of the brick or block in width then the structural transfer of loads through the mortar beds may be adversely affected.

For example, where the strip is used with a brick of width 100 mm, a 25 to 30 mm wide strip might be used and where a block of width 190 mm is used either a wider strip, for example, one 60 mm wide strip, or a plurality of narrower strips side by side, for example, two 30 mm wide strips, may be used. The use of a number of narrow strips laid adjacent and parallel to each other instead of one wide strip reduces the number of different widths of insulating strips to be produced.

The thickness of the strip is dictated by the depth of the mortar bed which is to be laid. Advantageously the depth of the strip is the same as the depth of the mortar and should only be greater if the strip is made from a compressible material so that in use it is compressed to the depth of the mortar bed. If the strip is too shallow then the thermal performance of mortar joints containing the strip may not be as good as when the strip is the full depth of the mortar. British Codes of Practice specify that the depth of a mortar bed should be 10 mm and it is therefore preferred that the strip has a finished depth of 10 mm, with the accompanying advantage that the strip assists the bricklayer in gauging the depth of mortar being trowelled on to the bed.

As indicated above, the strips bend easily and

smoothly over an edge of a brick or block. This may be achieved by the choice of suitable insulating material and by the use of a suitable thickness for the strip. Alternatively it may be achieved by the choice of structure of the strip, that is, the strip may comprise a means of facilitating bending over the edge of a brick or block. Advantageously, the bending function of all types of strips will be assisted by notching or a similar facilitating feature. Preferably the strip has a preformed indentation in the position where the strip will need to be bent, i.e., at a distance equal to the length of the horizontal surface from one end of the strip, to allow easy and clean bending of the strip. The provision of a means to aid bending, as described above, also has the advantage that it assists in the placement of the strip in the preferred position on the brick. Preformed indentations may be provided in two places on the strip, each at a distance equal to the length of the horizontal surface from an end of the strip. The provision of two preformed indentations will allow easy application of the strip no matter which way round it is when picked up by a bricklayer.

The continuous nature of the insulation over one edge, typically the leading edge as seen as laying proceeds, of the block helps to ensure substantially complete insulation across the mortar joints in which it is used.

The insulating strips of the present invention comprise an insulating material, preferably a semi-rigid material and most preferably a semi-rigid foam plastic. Insulating materials used for the strips of the present invention typically have a thermal conductivity of about 0.036 $Wm^{-1}K^{-1}$.

A semi-rigid material is for this purpose defined as one that maintains its shape and may be compressed by a superimposed block yet does not suffer permanent compression. Semi-rigid materials are preferred as they have the capacity to resist the action of the trowel used to lay the mortar.

Preferred materials are sufficiently flexible to allow a block to be bedded on the mortar in the normal way without impeding laying and are flexible enough to accept local deformation by conventional wall ties, for example, of the wire butterfly type.

It is preferred that the material is non-putrescible and, as was discussed above, the material and structure should be chosen to allow bending of the strip. Advantageously, the material chosen for the strip is compressible, such as, for example, a foam plastic, as that, together with an appropriate choice of strip thickness, will allow the masonry to be fully supported by and in full contact with the mortar material of any joint comprising the strip without interference from the strip. It is preferred that foamed plastics having a high proportion of closed cells are used as they better prevent the diffusion of water.

Where a semi-rigid material is chosen then the strip acts as a good barrier, i.e., it occludes mortar from the centre of the joint, and it may also act as a striking off edge for the trowelled mortar.

Examples of materials which are suitable include preformed or moulded fibrous mats of mineral or vegetable origin. For example, mineral wools including glass fibre mats, e.g., Glass Fibre Quilt; cork, wool felt; fibreboard and copra fibre. Also suitable are foam plastics such as urea-formaldehyde, polyvinyl chloride, polyethylene, polyesters, phenol resins, polyurethanes, polystyrenes and expanded forms thereof. Expanded polystyrene materials are especially preferred.

To assist in the use of and ease of positioning of the strips it is preferred that the face of the insulating strip, which is to be placed in contact with the brick or block, is provided with an adhesive so that the strip is self-adhesive. The strip may advantageously be pre-coated with an adhesive and then provided with a cover tape which may be easily removed when the strip is to be used.

Suitable adhesives only need to hold the strip in place until it is surrounded by mortar and preferably until the next course is in place. There is no need for the adhesive to be permanent.

The self-adhesive faced strip is especially preferred for use in exposed situations and/or windy conditions such as for use by bricklayers who are working on scaffolding.

Typically the insulating strips may be provided in packets of 50 or so which may be placed in a scabbard type belt worn by the bricklayer. The strips are then removed one at a time and a cover tape removed to expose an adhesive face. The packs in which the strips may be held are advantageously lightweight, easily refilled and arranged so that only one strip may be removed at a time.

The present invention also provides masonry walls comprising the insulating strips of the invention or made by the methods of the present invention.

Kits comprising bricks or blocks and corresponding insulating strips of the appropriate size and as claimed in the present invention are also provided.

The present invention further provides the use of an insulating strip in the mortar joints of a masonry wall so that each strip provides insulation in a vertical and horizontal mortar joint.

One use of the strip of the present invention which is also a specific embodiment of the building method of the present invention will now be described in greater detail by way of example only with reference to the accompanying drawing, in which the sole figure is a diagrammatic representation of a partially constructed masonry wall.

Referring to the drawing, the wall comprises a first or lower course of blocks 1 and a second or upper course of blocks 2 which is under construction. The work is progressing in the direction of the arrow. Between the upper 2 and lower 1 courses is a horizontal

mortar joint 3 and between the blocks within each course are vertical mortar joints 4.

The horizontal mortar bed 5 which forms the horizontal mortar joints 3 is trowelled on in the normal way and the insulating strip 6 takes up some of the volume normally occupied by the mortar. The mortar is then struck off level with the top surface of the strip 6 ready to receive the next course.

The next block in the advancing upper course 2 is then laid in the normal way. It then receives its preformed insulating strip which is preferably held in place by a self-adhesive surface. This is shown on the block 7. The insulating strip 11 is placed on the upper surface of the block 8, bent smoothly over the leading top edge of the block 9 and then run down the front end of the block 10.

As shown in the figure the correct position of the insulating strip is such that it extends from the back upper edge of the block (line A), to the bottom of the front vertical end of the block (line B).

The mortar for the vertical mortar joint is then applied to the end 10 of the block 7 in the normal way. The part of the strip in contact with the end 10 of the block takes up some of the space usually occupied by the mortar. The mortar is then struck off level with the surface of the strip ready for the next block to be laid.

As may be seen from the diagram, the parts of the insulating strips 11, which sit on the top surface of each block form, in effect, one long continuous insulating membrane along the top of the upper course of the blocks 2 ready for the next mortar bed to be laid so that the next course of blocks may be added.

Claims

1. A method of construction of a masonry wall in which insulating strips comprising insulating material are incorporated into the vertical and horizontal mortar joints, the mortar joints comprising two substantially parallel bands of mortar spaced apart across the width of the joint with part of an insulating strip between them, each insulating strip being of the correct length to extend completely along the length of one horizontal surface of a brick or block, used in the wall, substantially parallel to the edges of the brick or block, to pass over one edge and to extend completely along one adjacent vertical end of the brick or block, substantially parallel to the edges of the brick or block, each strip being of such a material or of such a structure as to allow it to pass smoothly over the edge and each strip being incorporated in both a horizontal and vertical mortar joint; the horizontal surface and the vertical end of the brick or block being defined by the normal placement of the brick or block in the wall and the length of the horizontal surface being the length which would run in the longitudinal direction of the wall as the brick or block is placed in the wall.

2. A method for the construction of a masonry wall as claimed in claim 1, in which the bricks or blocks used to build the wall have an insulating strip placed on them, the insulating strip being positioned so that it extends along the length of one horizontal surface, smoothly over an edge and down a vertical end the mortar then being applied as usual.

3. An insulating strip for use in the mortar joints of a masonry wall comprising bricks or blocks, the strip being comprised of an insulating material and being of the correct length to extend completely along the length of one horizontal surface of a brick or block substantially parallel to the edges of the brick or block, to pass smoothly over one edge and to extend completely along one adjacent vertical end of the brick or block, substantially parallel to the edges of the brick or block, the insulating strip being narrower than the width of the horizontal surface of the brick or block and being such that it bends smoothly over the edge; the horizontal surface and the vertical end being defined by the normal placement of the brick or block in the wall and the length of the horizontal surface being defined as the length which would run in the longitudinal direction of the wall as the brick or block is normally placed in the wall; each strip thereby being capable of providing insulation in both a horizontal and a vertical mortar joint.

4. A masonry wall comprising a plurality of bricks or blocks, each brick or block having an insulating strip, comprising insulating material, associated with it, the strip being in contact with and extending completely along one horizontal and one vertical mortared surface, substantially parallel to the edges of the surfaces, the insulating strip being narrower than the width of the horizontal surface of the brick or block.

5. The use of a plurality of insulating strips in a masonry wall, each insulating strip comprising insulating material and being of the correct length to extend completely along one horizontal and one vertical mortared surface, extending substantially parallel to the edges of the surfaces, of a block or brick in the wall, the width of the insulating strip being less than the width of the horizontal surface of the brick or block.

6. The invention as claimed in any one of claims 1 to 5, wherein the strip is of a width of approximately one third of the width of the horizontal sur-

face of the block or brick.

7. The invention as claimed in any one of claims 1 to 6, wherein the depth of the strip is approximately the same as the depth of the mortar joint in which it is to be incorporated.

8. The invention as claimed in any one of claims 1 to 7, wherein the strip comprises a means to facilitate bending over the edge of a brick or block, advantageously, the means comprises one or two indentations preformed in the strip in positions where the strip might need to be bent over an edge.

9. The invention as claimed in any one of claims 1 to 8, wherein the strip comprises a semi-rigid material.

10. The invention as claimed in any one of claims 1 to 9, wherein the strip comprises a foam plastic, advantageously, a urea-formaldehyde, polyvinyl chloride, polyethylene, polyester, phenol resin, polyurethane, or a polystyrene.

11. The invention as claimed in any one of claims 1 to 9, wherein the strip comprises a preformed or moulded fibrous mat of mineral or vegetable origin.

12. The invention as claimed in any one of claims 1 to 11, wherein the strip comprises a material which is non-putrescible.

13. The invention as claimed in any one of claims 1 to 12, wherein the face of the strip which is to be in contact with the brick or block is provided precoated with an adhesive.

14. A kit for the construction of a wall comprising bricks or blocks and corresponding insulating strips as claimed in any one of claims 3 and 6 to 13 of the correct size to be used with the bricks or blocks.

15. The use of an insulating strip, as claimed in any one of claims 3 and 6 to 13, in the mortar joints of a masonry wall so that the strip provides insulation in a vertical and horizontal mortar joint.

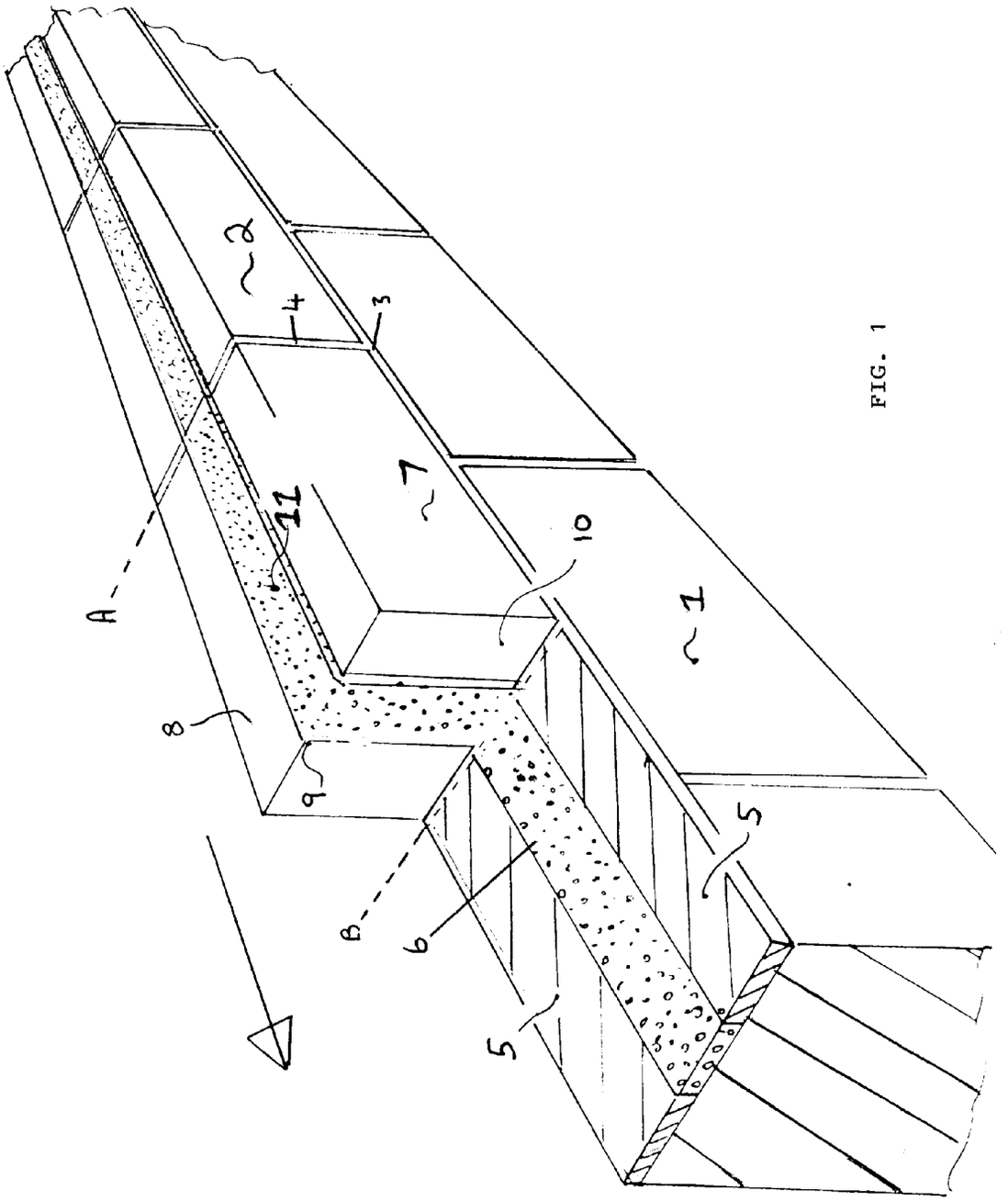

FIG. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 3559

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
D,A	GB-A-1 499 242 (STURM) * page 1, line 57 - line 94; figures 3-5 *	1,3-5, 11,14,15	E04C1/40 E04B2/00
A	FR-A-2 372 940 (BOUYGUES) * page 2, line 9 - page 4, line 6; figures 1,2 *	1-7,10, 14,15	
A	FR-A-2 577 255 (MANENT ET AL.) * page 1, line 17 - line 20; figure 5 *	1-5	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

E04C
E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 August 1994	Mysliwetz, W

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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