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(54) **Device for securing an insulation board within a cavity wall**

(57) The present invention concerns a device for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated, said device comprising: wall anchor means (5) for securing the inner wall to the outer wall; retaining means (7,7') for fixating an insulation board in the cavity; said retaining means including projections (7) gripping an end portion of the insulation board; wherein the retaining means include a mounting element (6) adapted to be fastened to the inner wall; the anchor means comprises an elongated member (5) with holding means (13), which cooperate with corresponding receiving means (16) on the mounting element for securing the anchor member to the mounting element; and the projections (7) are formed in the mounting element. Hereby, a better insulation quality may be achieved as the insulation boards may be positioned against a smooth inner wall without any wall ties pre-mounted, on which the insulation panels otherwise could be damaged. The insulation mounting procedure becomes much simpler and easier by a device according to the present invention, saving a considerable amount of time and consequently labour costs.

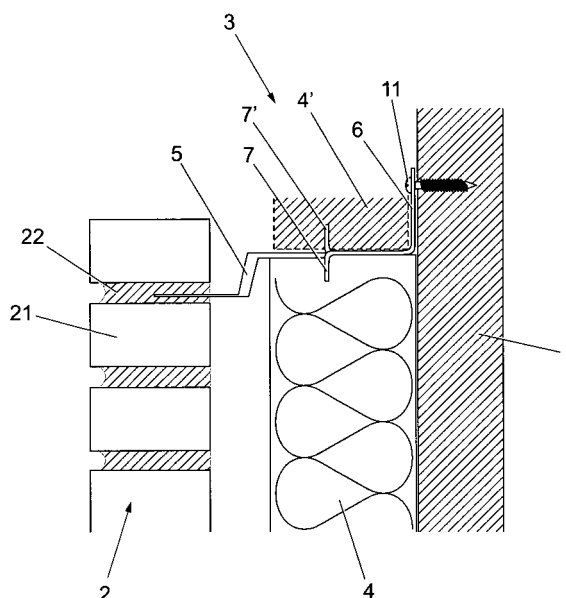


Fig. 1

Description

[0001] The present invention relates to a device for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated, said device comprising wall anchor means for securing the inner wall to the outer wall, and retaining means for fixating an insulation board in the cavity; said retaining means including projections gripping an end portion of the insulation board.

[0002] In a cavity wall with an inner wall and an outer brick wall, wall ties are used to connect the inner and outer wall in order to stabilise the housing wall. Wall anchors are made of metal, plastic or a combination thereof and they may have different shapes, e.g. rod-like or flat plates. In the cavity, insulation boards are provided. These boards are supported by the wall ties in the cavity. The wall ties consists of transverse pins, e.g. wire pieces, which are fixed to the inner wall during its construction. The insulation boards are then positioned between these protruding wires or mounted by penetrating the wires through the insulation board. Either way, this has the disadvantage that the boards are not accurately mounted, and may be dislocated when the wall ties are bend to fit between the brick layers of the outer wall. Furthermore, when mounting the insulation over the ties, the insulation may break off or holes may be punched out.

[0003] From GB-A-2 111 095 a modified wall tie is known, where projections are provided, so that the end of an insulation board may be easily mounted and held in place by this wall tie. When laying the outer wall, this modified wall tie must also be bend to fit into the mortar layer between two brick layers. This could cause the insulation boards to be bend or dislocated.

[0004] However, it is realised that a major disadvantage of these protruding wall ties, it that construction workers risk getting hurt when working on a site where cavity walls are under construction. The wall ties often are quite numerous, typically 4-6 pieces per square meter, in order to provide the required strength in the construction to withstand the wind load. By bending the wall ties in order to make them fit with the outer wall construction, the strength of these wall ties is somewhat reduced and there is a risk of some wall ties breaking off.

[0005] Other types of wall anchors or connectors for cavity walls are known from e.g. US 4,373,314, US 4,827,684 or US 5,816,008. However, common for these types are that they comprise many parts, that are relatively expensive to manufacture and that they are complicated in use.

[0006] On this background, it is the object of the present invention to provide a wall tie device which is inexpensive in manufacture and simple in use during mounting of both the wall tie and the insulation and which holds the insulation boards firmly in place. Moreover, it is an object to provide a wall connector which

involves a significantly reduced risk for the construction workers. Another object is to provide a wall connector which is not reduced in strength when working with it. Additionally, it is the object to reduce the necessary amount of anchors per wall area (anchors per sq. meter, and to achieve easier and better fixing properties of the wall ties and a more effective and efficient installation of insulation.

[0007] These objects are achieved by a device of the initially mentioned kind, wherein said device further comprises a mounting element adapted to be fastened to the inner wall, the anchor means comprises an elongated member with holding means, which cooperate with corresponding receiving means on a mounting element for securing the anchor member to the mounting element; and the projections are formed in the mounting element.

[0008] By the present invention, a wall tie is provided which is a combined insulation fastener and wall anchor. By a device according to the invention, the device may be mounted from the brick side on the inner wall, i.e. the side facing towards the cavity and the insulation board. The insulation board is positioned on the inner wall, whereafter the device is mounted on the top of the insulation board, gripping the insulation board and fastening the mounting element to the inner wall by e.g. screws or nails. The anchor means may be pre-mounted on the mounting element or may be attached to the mounting element after this element is mounted on the inner wall. Hereby, a better insulation quality may be achieved as the insulation boards may be positioned against a smooth inner wall without any wall ties pre-mounted, on which the insulation panels otherwise could be damaged. The insulation mounting procedure becomes much simpler and easier by a device according to the present invention, saving a considerable amount of time and consequently labour costs and avoiding open slits between the insulation boards.

[0009] Moreover, as the device may be made up by two pieces, these pieces may be made in different materials, preferably the mounting element being of a sheet metal and the anchor means being made of plastic, a thermal bridge between the inner and outer walls may be avoided.

[0010] The mounting element comprises a substantially vertical mounting portion with holes for wall fastening and a substantially horizontal insulation retaining portion, which is provided with the projections at the end. Thus, the device is provided with a shape which can slide along the inner wall and onto the top of the insulation board so that the projections can grip the top portion of the board and fits the edge created by the top surface of the insulation board and the inner wall. Moreover, once installed, the device also provides a close fitting for receiving a bottom portion of the subsequent insulation board which goes on top of the first board.

[0011] In a first embodiment, the projections are triangularly formed for facilitating penetration into the in-

sulation board. Hereby, the insulation board is gripped by penetrating the teeth-like projections into the end section of the board to retain the insulation board in place.

[0012] In the preferred embodiment of the invention, the mounting element is made of a metal sheet, which is folded for forming the mounting portion, the insulation retaining portion and the projections. By making the mounting element in a single part, which consists of a blank cut out in a metal sheet and then folded at substantially right angles to its final form, a simple design which is cheap to manufacture is achieved. The projections are folded to a substantially vertical position with at least one projection pointing upwards and at least one pointing downwards. Hereby, an insulation board may be gripped at its lowermost portion by the at least one projection of an already present mounting element, which other at least one projection is retaining an insulation board below.

[0013] In a preferred embodiment of the invention, the anchor means is rotatably mounted on the mounting portion of the mounting element. In particular, the anchor means is rotatably mounted for rotation in substantially the same plane as the insulation retaining portion. Hereby, the anchor means, which is preferably made in a S or Z-like shape, may be rotated into the required position rather than being bend. This means less risk of reducing the tensional strength of the anchor means.

[0014] The elongated member of the anchor means preferably comprises a first elongated anchor portion with holding means for securing the anchor member to the mounting element so that it is positioned substantially in the same plane as the insulation portion of the mounting means, said first portion having a length exceeding the width of the insulation board; a second elongated anchor portion for securing the anchor member to the outer wall; and an intermediate portion spacing said first and second anchor portions apart, preferably so that the elongated portions are substantially parallel, said intermediate portion being flattened.

[0015] By spacing apart the two anchoring portions, the rotation of the anchor member in the mounting element results in a vertical relocation of the second anchoring portion, so as to position this second portion at the correct level in the outer wall. By forming a flattened intermediate portion, the anchoring means becomes less flexible counteracting the flexibility that would otherwise be introduced by this S- or Z-like shape.

[0016] In a preferred embodiment of the anchor member, the intermediate portion spaces the first and second anchor portions apart with a distance substantially equal to the height of a brick. Hereby it may be ensured that the second anchoring portion may always be positioned at a lower level than the first anchoring portion. This is advantageous as this means that water condensing in the cavity is led away into the cavity space next to the outer wall rather than into the insulation and the inner wall, whereby the insulation is prevented from being

soaked in water condensate. This results in a better preservation and performance of the insulation.

[0017] In a first embodiment of the invention, the mounting element is provided with two insulation sheet portions between which the elongated anchor member is protruding. This design of the mounting element may provide a firm grip by penetrating the projections into the insulation at a distance. The mounting element according to this embodiment may consist of a relative low amount of material making it light and thereby easy to work with and to manufacture, and also thereby contributing to a reduction in the thermal conductivity between the inner and outer walls through the insulation, as the arms preferably in this embodiment do not extend beyond approx. half of the thickness of the insulation board.

[0018] In a preferred embodiment of the invention, the receiving means of the mounting element comprises a protrusion and an aperture, so that the anchor member may be fixed to the mounting element through said aperture. Hereby, the rotation of the anchor means in the mounting element may be achieved in a simple manner, which is inexpensive to produce. Alternatively, the elongated member may be an elongated protruding portion that is integrally formed with the mounting element.

[0019] The anchor means as well as the mounting piece could be made of metal, preferably galvanised steel or similar corrosion resistant metal or metal alloy or alternatively made of plastic or in a combination of plastic and metal. By using plastic thermal bridges between the inner and outer walls may be avoided.

[0020] In an embodiment of the invention, the second elongated anchor portion for securing the anchor member to the outer wall is provided with retention means, such as small teeth, a spiral or arrow shape or similar surface protrusions resisting relative movement between the second anchor portion and the outer wall once the second anchor portion is mounted therein. Hereby, the elongated anchor portion may be fixedly fastened in the mortar layer in the outer wall.

[0021] The invention also relates to a method of constructing an insulated cavity wall comprising the steps of: providing an inner wall, positioning an insulation board against the inner wall and gripping said insulation board by a mounting element of a device having a mounting element and an anchor means, fastening said mounting element to the inner wall, manipulating the anchor means protruding from the mounting element of the device to fit between two brick layers of an outer wall during the construction of said outer wall, and securing the anchor means to an outer wall for anchoring the outer wall to the inner wall.

[0022] According to a preferred embodiment of this method, the insulation board is positioned on an already mounted mounting element and is gripped by being penetrated by at least one upwardly protruding projection on said already mounted mounting element and thereafter is being gripped on its top portion by at least one

downwardly protruding projection on the mounting element to be mounted. The anchor means are preferably manipulated by rotating the anchor means. Hereby, a method is provided that ensures a firm retention of the insulation boards within a cavity wall and a strong wall tie between the inner and outer walls of the cavity wall with only a limited or even without introducing any thermal bridging between these walls. Moreover, an inexpensive method of constructing a cavity wall is achieved, which is easy and relatively quick in use reducing the costs involved.

[0023] The invention is described in more detail with reference to the accompanying drawings, in which:

- Fig. 1 is a cross-sectional schematic view of a cavity wall with a insulation-securing device according to the invention;
- Fig. 2 is a perspective view of a device for securing an insulation board within a cavity wall according to a first embodiment of the invention;
- Fig. 3 and 4 show side views of an embodiment of anchoring in a device according to the invention;
- Fig. 5 and 6 show another embodiment of the anchoring in a device according to the invention;
- Figs. 7 and 8 show blanks for producing a device according to the invention;
- Figs. 9 and 10 show a second embodiment of a device according to the invention;
- Fig. 11 shows a third embodiment of a device according to the invention; and
- Fig. 12 shows a fourth embodiment of a device according to the invention.

[0024] Figure 1 shows a cavity wall having an inner wall 1 and an outer wall 2 with a cavity 3 there between. In the cavity 3, a layer of insulation comprising a number of insulation boards 4, 4' is positioned against the inner wall 1. Each insulation board 4 is held in place by an insulation-securing device comprising a mounting element 6 and wall anchor means 5, which are jointed together. This device is positioned on top of the insulation board 4. The device is provided with projections 7, 7', which penetrate into the end section of the insulation board 4 underneath, whereafter the mounting element 6 is fastened to the inner wall by a screw 11 or other suitable fastening means. When the next insulation board 4' is positioned on top of the already secured board 4, the lower end section of this next board 4' is penetrated by the upward-facing projection 7' of the device. Thereafter, this board 4 is secured to the inner wall 1 by another device.

[0025] The anchor means 5 is preferably an elongated member which is secured to the mounting element 6 in a first end pointing towards the inner wall 1 and extending through the cavity 3 along the top surface of the

insulation board 4 and into the outer wall 2. The elongated member 5 further comprises a second end which is manipulated into fitting in between two layer of bricks 21 in the outer wall 2 as the outer wall is being built, so that the anchor member 5 is secured in the mortar layer 22 between the bricks 21. The bricks 21 may be "normal" type bricks used for wall-building purposes, but by the term is to be understood any kind of building elements suitable for constructions of a cavity wall, i.e. the inner and/or the outer wall.

[0026] Figure 2 shows a device according to a first embodiment of the invention. As shown in fig. 2, the mounting element 6 comprises a generally vertically oriented mounting portion 8 and a generally horizontally oriented insulation-retaining portion 9, including one or more arms with projections 7 protruding out the retaining portion plane. Substantially in this plane, holding means 10 are provided in the mounting element 6 for securing the anchor means 5 to the mounting element 6. In the mounting portion 8, one or more fastening holes 11 for receiving the fastening means for fastening the device to the inner wall (see fig. 1) are provided.

[0027] Side views of the anchor means 5 and the mounting element 6 are shown in the figures 3 and 4. In a first embodiment, the elongated anchor member 5 is s-shaped having a first and second elongated portion 51, 52 with a distance portion 53 in between. The first elongated portion 51 is provided with holding means 10 at its distal end pointing towards the mounting element and the inner wall, and the second elongated portion 52 is extending into the outer wall 2 and has a distal end portion to be embedded in a mortar layer 22 therein. In this embodiment, the elongated member 5 is rotatably mounted in the mounting element 6. The distance portion 53 separates the two elongated portions 51, 52 by a distance h, which in a preferred embodiment preferably is substantially equal to the height of a brick, which is approx. 5-6 cm. The anchor member may then be rotated in the mounting element 6 for positioning the second elongated portion 52 for embedding in the mortar layer 22 with the distance portion pointing downwards, so that the second elongated portion 52 is lower in position than the first elongated portion 51 whereby water is led away from the insulation and towards the outer wall. In fig. 3, the distance portion 53 is shown as a flat, wide, plate-like portion; however, depending on the material used and its natural stiffness, it could be made thick and wide as the anchor means 51, 52 itself, i.e. rod-like.

[0028] The mounting element 6 is preferably made up by a sheet which is bend into the desired shape. The insulation-retaining portion 9 is provided with projections 7 at its distal end and the mounting portion 8 is formed at the other end. The length 1 of the insulation-retaining portion 9 is in a first embodiment less than the thickness of the insulation board 4, and more preferably about half the thickness of the insulation. Hereby, a mounting element which is relatively small, thereby re-

ducing cold bridging, may be provided which nevertheless offers a firm grip of the insulation board.

[0029] The anchor member 5 is provided with holding means 10 for rotatably securing it to the mounting element 6. The anchor must be able to withstand a certain amount of tensional force when installed in the wall to meet up with formal requirements like wind load and contractual strength of the cavity wall. In the first embodiment thereof, shown in fig. 4, the plate section of the mounting portion 8 receiving the anchor member 5 is provided with a protrusion 12 with a hole 14 through which the first elongated portion 52 of the anchor extends and which on the back side thereof is provided with a termination head 13 for retaining the anchor 5 in the mounting element 6. The hole may also be made as a slit combining the embodiments shown in figs. 4 and 6. It would then be necessary to have a portion 53 being fit through the mounting piece. When the portion 53 is also rod-like, only one hole is needed.

[0030] Another embodiment of the connection between the anchor member 5 and the mounting element 6, the mounting portion 8 is provided with a portion 15 which is cut free and bend out of plane with the rest of the mounting portion 8. This flange portion 15 is provided with a groove 16 into which the distal end of the anchor member 5 may be inserted with the termination head 13 on the back side of this flange portion 15 so that the anchor will be retained therein whilst still being able to rotate.

[0031] In fig. 7 and 8 are shown some examples of blanks for stamping or otherwise cutting a mounting element from a sheet metal and then bending it along the folding lines (the dotted lines). The embodiment shown in fig. 7 shows a blank for a mounting element with receiving means 12, 14 for the anchor means. In fig. 8 another embodiment is shown, where the elongated anchor member 5 is integrally formed in the blank for the mounting element.

[0032] In fig. 9 and 10, a second embodiment of a device according to the invention is shown. According to this embodiment, the mounting element 6 is provided with a step-like shaped insulation-retaining portion 9, where the projection 7 is a flange gripping around an insulation board having a profiled edge. This flange is correspondingly shaped so it fits around this profiled edge. This makes the invention suitable for insulation boards 4 where a penetrating of projections is not possible, such as foam insulation.

[0033] A third embodiment is shown in fig. 11, where the arms of the insulation portion 9 extend along the entire width of the insulation board 4 and the projections 7 grip around the outer edge of the insulation board. This is more suitable for e.g. glass wool insulation panels, where a penetration of projections into the board material may damage the insulation board, as it will be peeled off due to the fibre orientation in the board. As shown in fig. 11, a projection 7 is provided on each arm 9 each projection being bend in different directions to grip the

insulation boards on each side of the mounting element. The anchor member may be integrally shaped in the mounting element, as shown in fig. 11, but could also be rotatably mounted according to one of the embodiments described above.

[0034] In fig. 12, a fourth embodiment is shown, showing a mounting element 6 which is similar to the mounting element shown in fig. 2, but with projections 7 in a rectangular shape rather than the teeth-like shape shown in fig. 2.

[0035] By the invention, it is realised that numerous variations of the shape may be provided without departing from the scope of the invention, as set for the in the accompanying claims.

Claims

1. A device for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated, said device comprising:

wall anchor means for securing the inner wall to the outer wall;

retaining means for fixating an insulation board in the cavity; said retaining means including projections gripping an end portion of the insulation board;

characterised in that

the retaining means include a mounting element adapted to be fastened to the inner wall; the anchor means comprises an elongated member with holding means, which cooperate with corresponding receiving means on the mounting element for securing the anchor member to the mounting element; and the projections are formed in the mounting element.

2. A device according to claim 1, wherein the mounting element comprises a substantially vertical mounting portion and a substantially horizontal insulation retaining portion, which is provided with the projections at the end.
3. A device according to claim 1 or 2, wherein the projections are triangularly formed for facilitating penetration into the insulation board.
4. A device according to any of the preceding claims, wherein the mounting element is made of a metal sheet, which is folded for forming the mounting portion, the insulation retaining portion and the projections.
5. A device according to claim 4, wherein the projec-

tions are folded to a substantially vertical position with at least one projection pointing upwards and at least one pointing downwards.

6. A device according to any of the preceding claims, wherein the anchor means is rotatably mounted on the mounting portion of the mounting element. 5
7. A device according to claim 6, wherein the anchor means is rotatably mounted for rotation in substantially the same plane as the insulation-retaining portion. 10
8. A device according to claim 6 or 7, wherein the elongated member of the anchor means comprises 15
 - a first elongated anchor portion with holding means for securing the anchor member to the mounting element so that it is positioned substantially in the same plane as the insulation portion of the mounting means, said first portion having a length exceeding the width of the insulation board, 20
 - a second elongated anchor portion for securing the anchor member to the outer wall, and
 - an intermediate portion spacing said first and second anchor portions apart, preferably so that the elongated portions are substantially parallel. 25
9. A device according to claim 8, wherein the intermediate portion spaces the first and second anchor portions apart with a distance substantially equal to the height of a brick. 30
10. A device according to any of the preceding claims, wherein the mounting element is provided with two insulation portion sheet portions between which the elongated anchor member is protruding. 35
11. A device according to any of the preceding claims, wherein the receiving means of the mounting element comprises a protrusion and an aperture, so that the anchor member may be fixed to the mounting element through said aperture. 40
12. A device according to any of claims 1 to 5, wherein the elongated member is an elongated protruding portion that is integrally formed with the mounting element. 45
13. A device according to any of the preceding claims, wherein the anchor means made of metal, preferably galvanised steel or similar corrosion resistant metal or metal alloy. 50
14. A device according to any of the preceding claims, wherein the anchor means are made of plastic or of a combination of plastic and a suitable metal material. 55

15. A device according to any of the preceding claims, wherein the second elongated anchor portion for securing the anchor member to the outer wall is provided with retention means, such as small teeth, a spiral or arrow shape or similar surface protrusions resisting relative movement between the second anchor portion and the outer wall once the second anchor portion is mounted therein.

16. A method of constructing an insulated cavity wall comprising the steps of:

providing an inner wall,
positioning an insulation board against the inner wall and gripping said insulation board by a mounting element of a device comprising a mounting element and an anchor means, fastening said mounting element to the inner wall;
manipulating the anchor means protruding from the mounting element of the device to fit between two brick layers of an outer wall during the construction of said outer wall; and
securing the anchor means to an outer wall for anchoring the outer wall to the inner wall.

17. A method according to claim 16, whereby the insulation board is positioned on an already mounted mounting element and is gripped by being penetrated by at least one upwardly protruding projection on said already mounted mounting element and thereafter is being gripped on its top portion by at least one downwardly protruding projection on the mounting element to be mounted.
18. A method according to claim 16 or 17, whereby the anchor means are manipulated by rotating the anchor means.

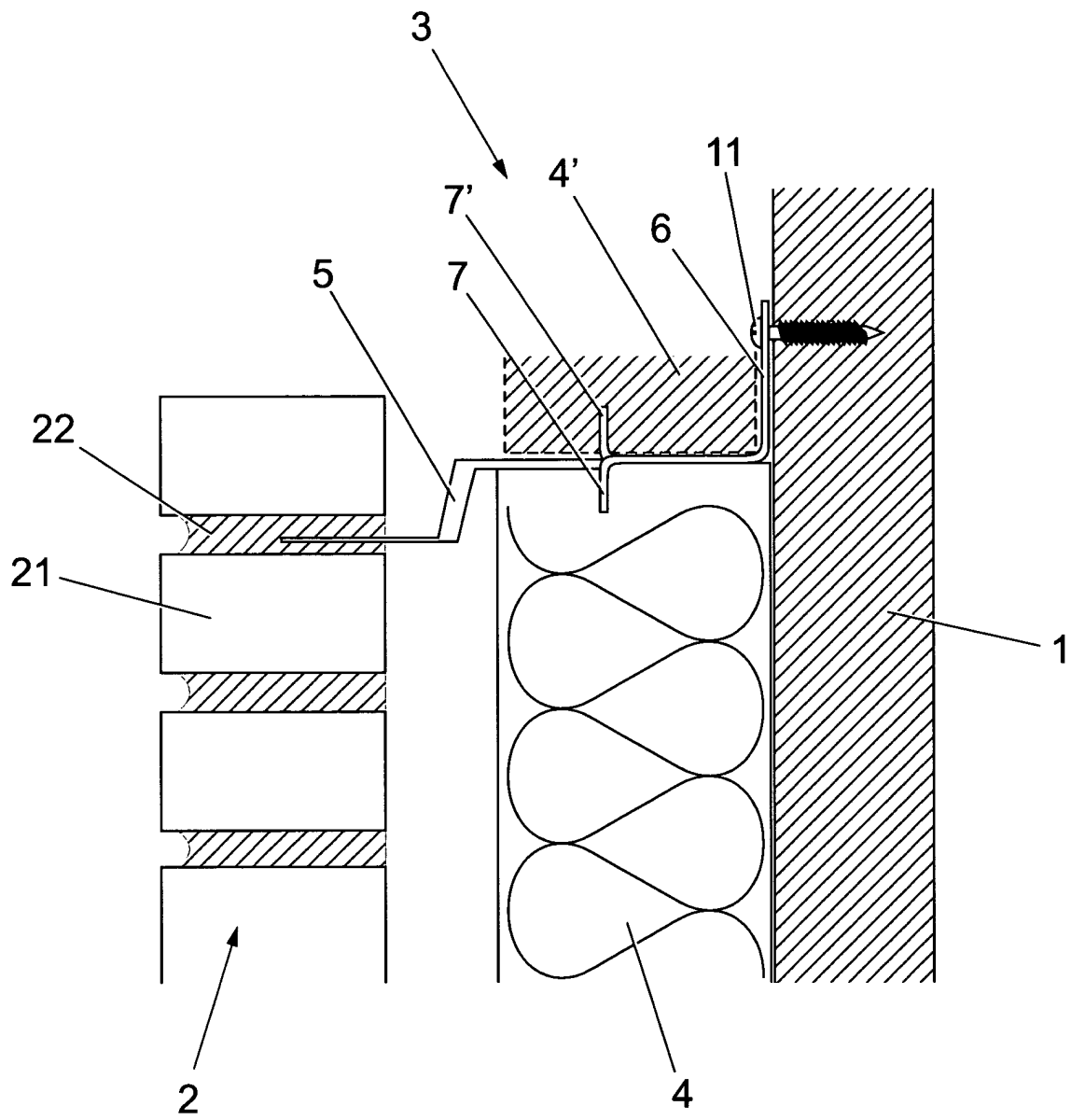


Fig. 1

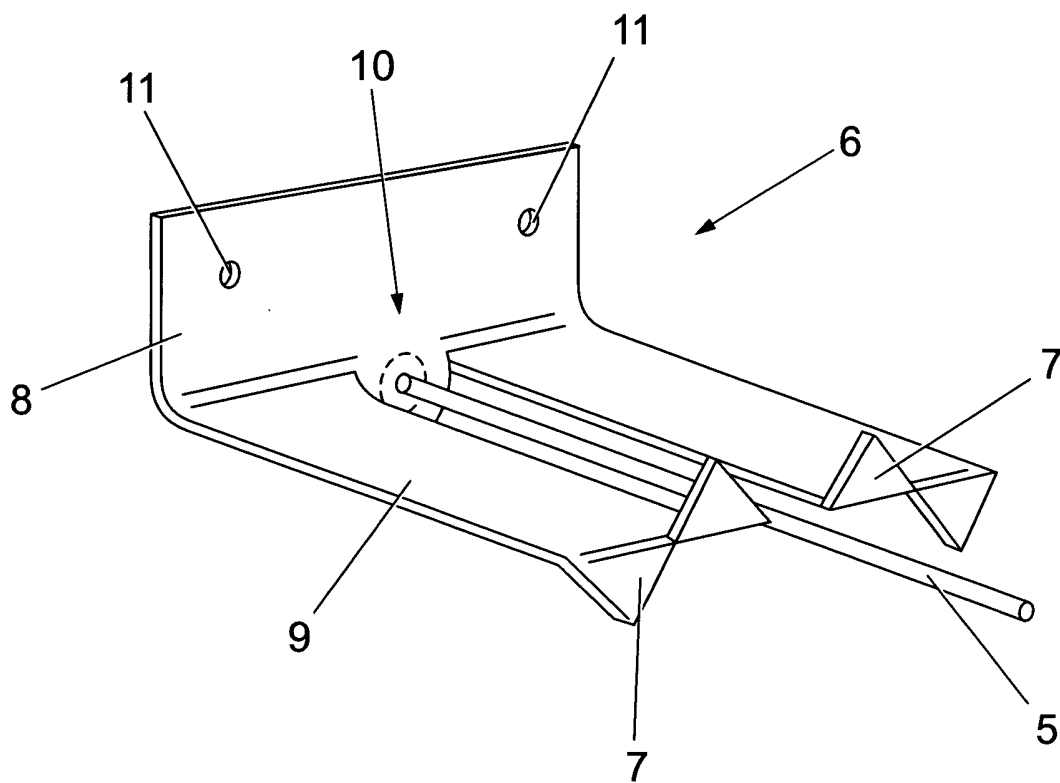


Fig. 2

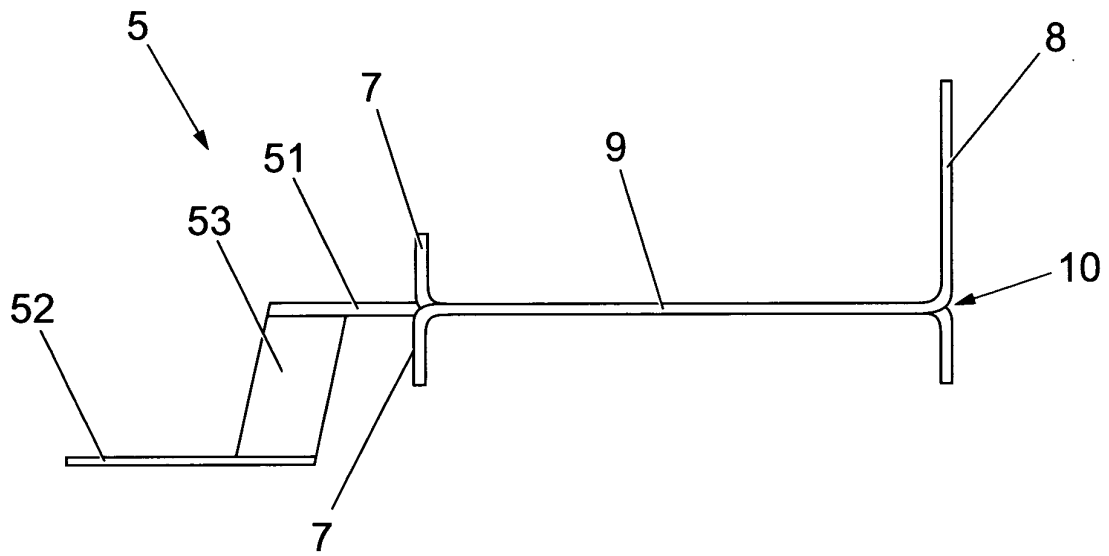


Fig. 3

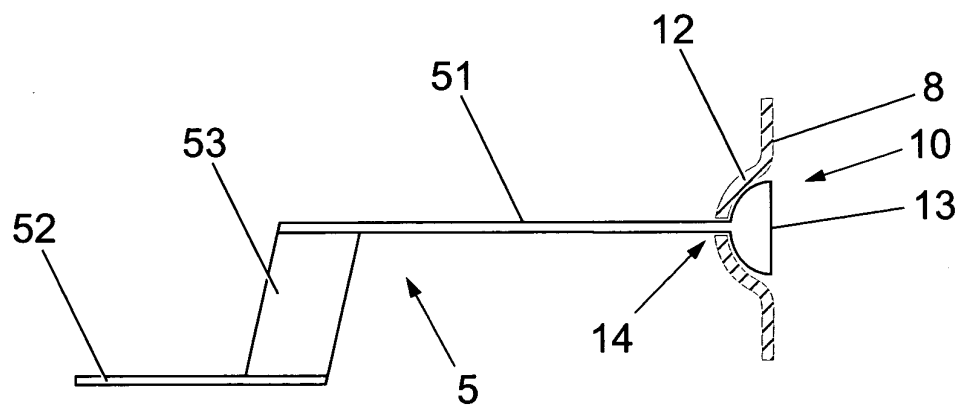


Fig. 4

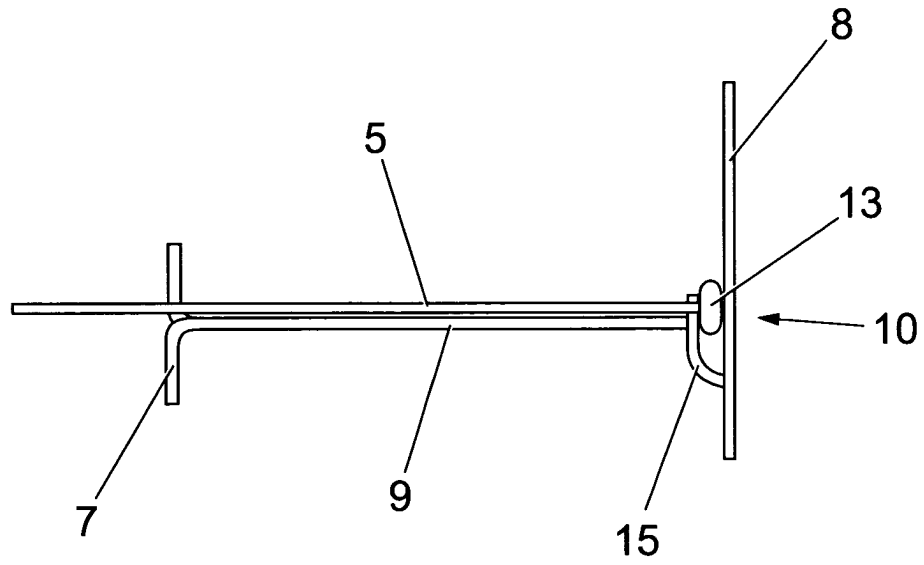


Fig. 5

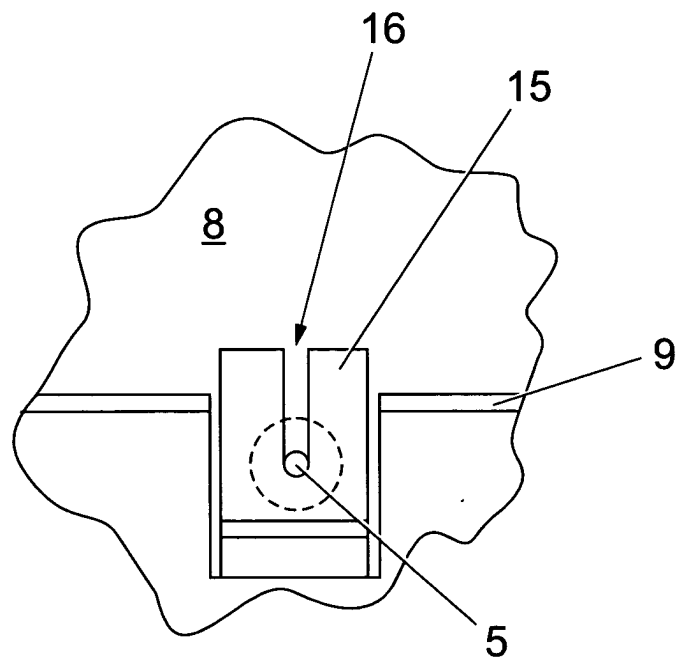


Fig. 6

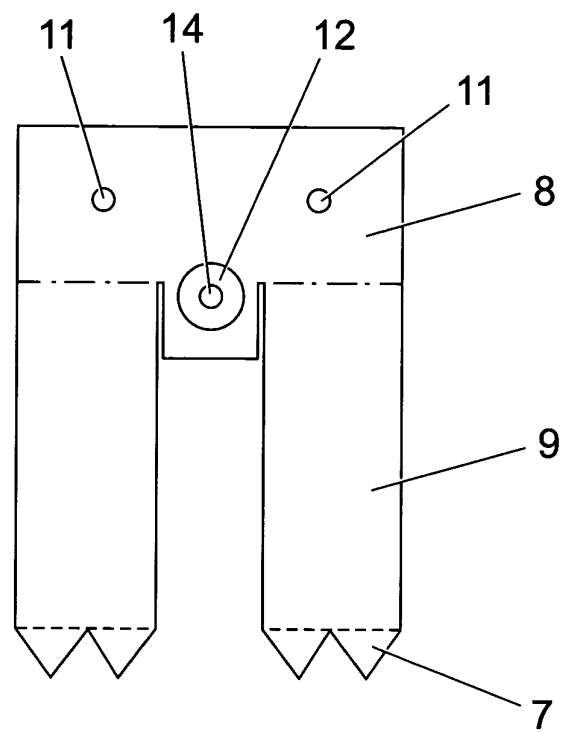


Fig. 7

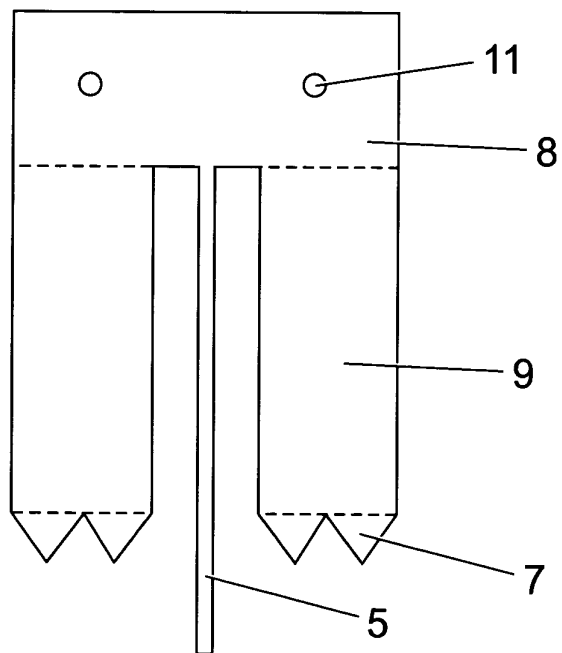


Fig. 8

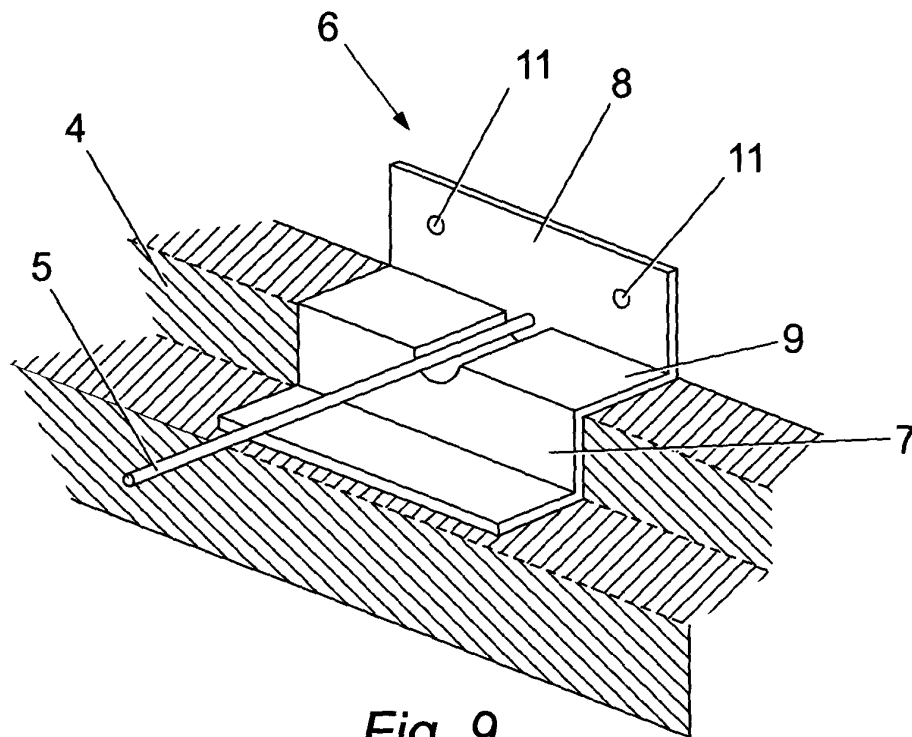


Fig. 9

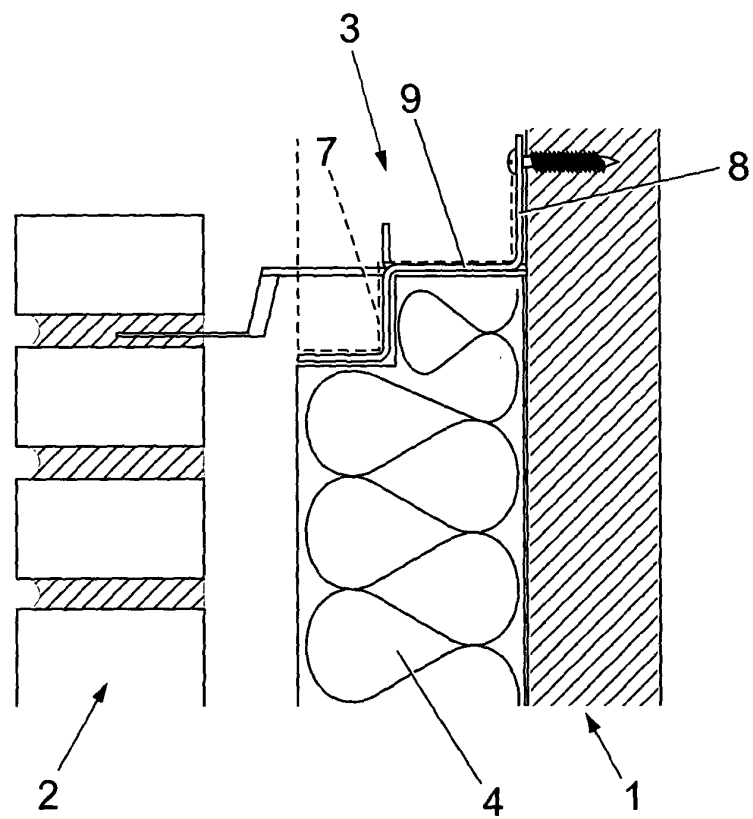


Fig. 10

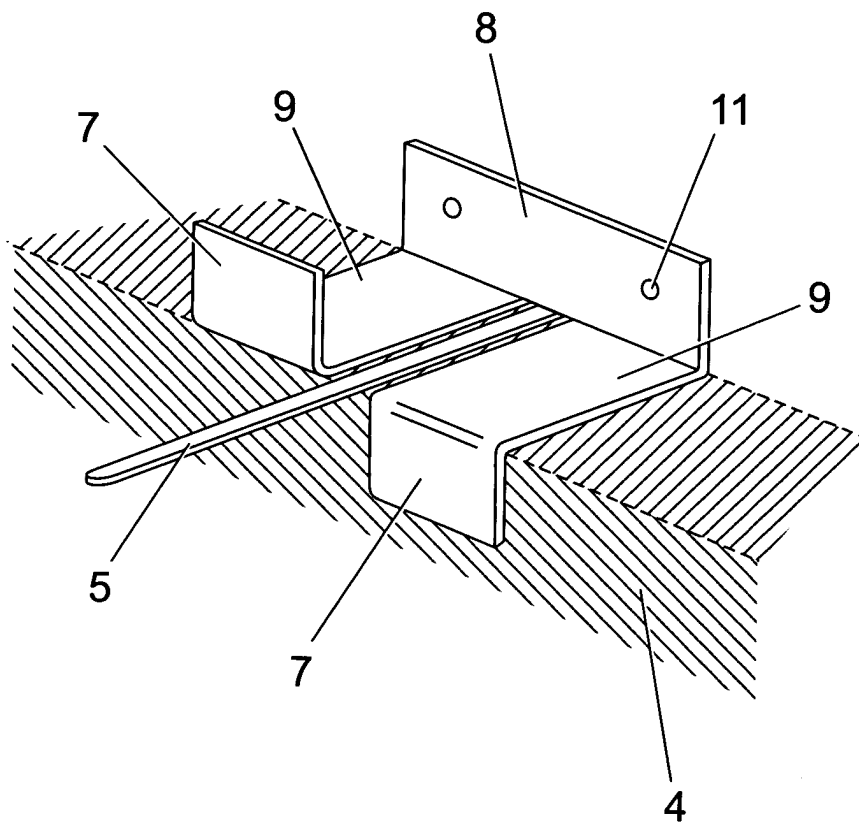


Fig. 11

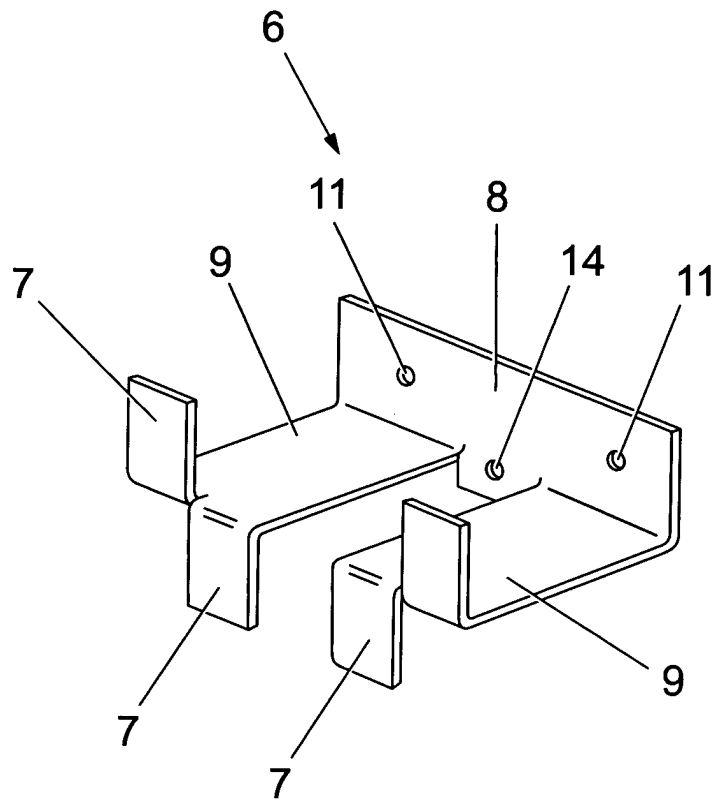


Fig. 12



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 7723

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.7)
X	US 5 671 578 A (HOHMANN RONALD PETER) 30 September 1997 (1997-09-30) * column 5, line 15-30; claim 1; figures 1,2,6 *	16,18	E04B1/41 E04B1/76
X	GB 2 291 080 A (ANCON CLARK LTD) 17 January 1996 (1996-01-17) * page 1, paragraph 1; figure 6 *	16	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E04B E04F
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 4 December 2003	Examiner Rosborough, J
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 07 7723

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-12-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5671578	A	30-09-1997	NONE	

GB 2291080	A	17-01-1996	NONE	

GB 2111095	A	29-06-1983	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82