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(54) Brickwork support system.

(57) A brickwork support system for use in building construction comprising an elongate hanger rail (23 ; 61 ; 62) for attachment to a supporting structure (20) and a plurality of hanger elements (28 ; 51 ; 63 ; 83) depending from said rail and free to move longitudinally of the hanger rail during assembly of the brickwork (30 ; 81), each of said hanger elements having a lower end portion arranged so as in use to enter a recess in a face of a block shaped building element and to interlock with the block and/or the mortar or other bonding material in such recess.

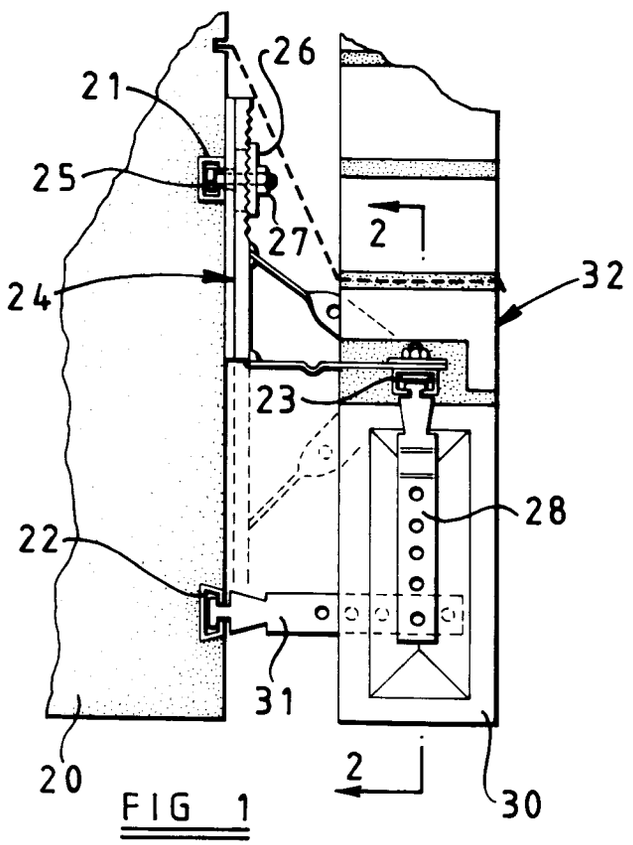


FIG 1

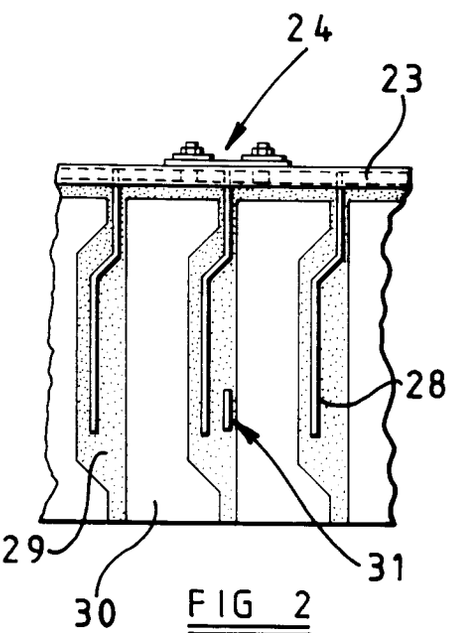


FIG 2

EP 0 473 460 A1

This invention relates to a brickwork support system for use in building construction. The term "brickwork" used herein is intended to include assemblages of block shaped building elements including, but not exclusively limited to, fired bricks.

More specifically the invention is concerned with a system for supporting brickwork on a structure as external cladding and deals with the problem of providing reliable support for suspended building elements such as, for example, those forming a so-called soldier course or a soffit.

A support system in accordance with the invention comprises an elongate hanger rail for attachment to a supporting structure and a plurality of hanger elements depending from said rail and free to move longitudinally of the hanger rail during assembly of the brickwork, each of said hanger elements having a lower end portion arranged so as in use to enter a recess in a face of a block shaped building element and to interlock with the block and/or the mortar or other bonding material in such recess.

Preferably there is provided adjustable means for attaching said hanger rail to said structure said means providing adjustment of the position of the hanger rail relative to the structure at least vertically and horizontally in use.

Desirably said adjustable means includes bracket means to which said hanger rail is secured and anchor means secured to the structure and to which said bracket means is adjustably connected.

Conveniently said hanger rail is of channel construction and said hanger elements are slidable lengthwise thereof.

Conveniently said hanger elements are shaped to co-act with the frog of frogged bricks.

Alternatively said hanger elements each include one or more pins for engagement in respective bores of perforated bricks.

Preferably there is provided horizontal restraining means for restraining in a horizontal direction brickwork which is supported vertically by said hanger elements.

In the accompanying drawings:

Figure 1 is a sectional view of a first example of a system in accordance with the invention used in a soldier course construction;

Figure 2 is a section on line 2-2 in Figure 1;

Figure 3 is a perspective view of a hanger element used in the system shown in Figure 1;

Figure 4 is a section like Figure 1, but showing a second example;

Figure 5 is a section like Figure 1, but showing a third example;

Figure 6 is a view like Figure 2 showing a modification which is applicable to all three of the first to third examples;

Figure 7 is a perspective view of a hanger element used in the modification shown in Figure 6,

Figure 8 is a sectional view of a fourth example of the invention used in a soffit construction;

Figure 9 is a section on line 9-9 in Figure 8;

Figure 10 is a perspective view of a hanger element used in the system shown in Figure 8;

Figure 11 is a perspective view of an alternative form of hanger element;

Figure 12 is a section like Figure 9, but showing two possible modifications,

Figure 13 is a sectional view of a fifth example used in a soffit construction.

Figure 14 is a view like Figure 2 of a further example of the invention used in a soldier course of a soffit construction,

Figure 15 is a perspective view of a hanger element used in the example of Figure 14, and

Figure 16 is a view like Figure 15 of a modification.

Dealing firstly with the example shown in Figures 1 to 3, the supporting structure includes a concrete beam, wall or floor 20 which has two elongate horizontal support channels 21, 22 cast into it at vertically spaced positions. Each channel 21, 22 (as well as a channel 23 yet to be described) has inturned flanges along its free edges so as to be capable of interlockingly receiving bolt heads or T-shaped ends of hanger or other elements

The upper one of the channels, 21, is used to mount brickwork support brackets 24 at intervals along its length. These are secured in position by means of bolts 25 which have their heads located in the channel 21. Each bracket has a vertically extending slot through which the bolts 25 pass and is clamped in place by a washer 26 and nut 27. The bracket and washer preferably have interengaged serrated faces for positive grip. The bracket position can be adjusted horizontally along the channel 21, vertically by virtue of the slot and horizontally perpendicularly to the channel 21 by means of shims inserted between the concrete and the bracket.

The brackets 24 support brickwork above and below as shown in Figure 1. For the support of a soldier course beneath the brackets, a hanger rail in the form of an elongate channel 23 is bolted to the brackets with its open mouth facing downwardly. A plurality of the hanger elements 28 shown in Figure 3 are hung from the hanger rail 23 by means of T-shaped end portions 28^{a} provided thereon. The hanger elements 28 are movable along the rail 23 during construction and, as shown in Figure 2 extend into the mortar 29 between the bricks 30 of the soldier course.

In the example shown in Figures 1 to 3 frogged bricks are employed for the soldier course and, so as to provide a good interlock between the hanger elements and the mortar (and therefore with the bricks), each hanger element has a bent lower end portion, in this case a cranked end portion 28^{b}. To improve the interlock further and to maintain the integrity of the

mortar, the hanger element is formed with a series of punched holes.

The lower channel 22 is used for horizontal restraining elements 31. These are in the form of flat metal strips with T-shaped ends like those of the hanger elements. Holes are punched in these strips to provide a bond with the motor.

In assembling the construction shown in Figures 1 to 3 the brackets 24 are mounted in the required positions and the hanger rails 23 are then bolted on. The soldier course is laid onto a temporary support and after each brick is laid, one of the hanger elements is positioned with its lower end disposed in the frog of the brick to which mortar has already been applied and then the next brick is mortared and laid. A restraining element 31 is inserted after every three, four (or other number) bricks. To conceal to rail 23, the course of bricks laid on top of the soldier course, is formed of bricks 32 of L-shaped section as shown in Figure 1.

Turning now to Figure 4, the construction shown therein differs from that shown in Figure 1 in that an elongated L-section strip 34 is used instead of the separate brackets 24. This strip has mounting brackets 35 welded to it at intervals and the rail 23 is welded directly to the strip 34, the brackets 35 being mounted to the upper channel 21 as described above in relation to the brackets 24.

In the example shown in Figure 5 an elongated L-section strip is again used and this is attached to the concrete 20 by bolts 45 with their heads engaged in short lengths of vertically extending channel 46 cast into the concrete (horizontal slots being provided in the strip 44 for horizontal alignment). The channel 23 is again welded directly to the strip 44.

In the modification shown in Figures 6 and 7, bricks 50 with a recess or rebate are used instead of frogged bricks. The hanger element 51 has its lower end bent at right angles to the length of the hanger element to enter the recess or rebate of the brick instead of being cranked.

The soffit construction shown in Figure 8, 9 and 10 has a soldier course the same as that shown in Figures 1 to 3, except for the arrangement for horizontal movement restraint. To support the soffit brickwork 60, a pair of channels 61, 62, like channels 21 to 23, are cast into the underside of the concrete 20. These are horizontal and parallel and each supports a plurality of hanger elements 63. As shown in Figure 10 each such hanger element is of inverted T shape in front elevation and is bent to a cranked configuration in side elevation so that the horizontal portions of the inverted T lie within the frogs of the soffit bricks.

Horizontal restraint of the soffit brickwork is provided by restraint elements 64 bolted at intervals to a further horizontally opening channel 65 cast into the concrete 20 and fastened to the hanger elements 63 at positions intermediate the ends of the latter by means of bolts. Restraint of the soldier course is provided by restraint strips 66 extending at one end into the mortar between the final row of soffit bricks and at the other end into the mortar between the bricks of the soldier course. If some relative movement between the soffit brickwork and the soldier course needs to be provided for a soft sealant 67 is used instead of mortar between the soffit bricks and the soldier course bricks and one end of each restraint strip 66 is enclosed within a plastic sleeve 68.

As in the examples of Figures 1 to 5 recessed or rebated bricks may be used instead of frogged bricks. The necessary modifications are shown in Figures 11 and 12.

In Figure 13, an alternative horizontal restraint arrangement for the soffit brickwork is shown. In this case, each restraint element 74 is welded to a bracket 75 which is secured to a channel 76 cast into the same face of the concrete as that which supports the soldier course brackets.

Figure 14 illustrates a soldier course 81 formed from perforated bricks 82. Such bricks are well known and include one or more through bores 85 extending between the mating faces of the bricks. Bore configurations using a row of three bores or an array of seven bores are well known but it should be recognised that many other bore configurations are possible. Each hanger element 83 has one or more pins 84 extending transverse to the element for engagement in the bore or bores of associated bricks. In Figure 15 a single pin 84 is shown and such a hanger is usable with a variety of perforated bricks since there is no necessity for there to be a pin engaging in each bore of each brick. Figure 16 shows a hanger having three pins and such a hanger is likely to be suitable only for use with a corresponding three bore brick, although naturally there may be multi bore bricks with which the three pin hanger could cooperate.

The pins 84 extend from both faces of their respective hangers and thus each interlocks with the two bricks on opposite sides thereof. The pins 84 will usually be of much smaller diameter than the bores 85 in the bricks but naturally any space in a bore 85 around a pin 84 will be occupied with mortar which will have set before the temporary support for the bricks has been removed. The hangers 84 may have apertures through which the mortar extends.

There can be provided hangers with a pin or pins projecting from one face only for use at the end of a soldier course if appropriate.

The manner in which the hangers 83 are supported is as described above, Figure 14 showing a hanger rail channel 23 supported as described above, with which T-shaped ends of the elements 83 interlock as described above.

During construction of the soldier course the hanger elements 83 will be interposed between adjacent mortared bricks as the bricks are laid and the

hanger elements will be slid along the channel 80 as necessary to engage the pin or pins in the bore or bores of the adjacent brick. The next brick will then be positioned so that the outwardly projecting parts of the pin or pins 84 are received in its bore or bores. The pin or pins 84 enter the bores of the associated bricks through the mortar layer applied to the bricks and so push mortar into the bores.

Whilst all of the embodiments described above utilise hanger rails in the form of channels having inturned flanges, it is to be understood that many other hanger rail configurations are possible, for example, a channel with side walls which converge towards the open mouth thereof. Corresponding formations are provided on the hanger elements to provide the required dependent, axially moveable relationship with the hanger rails.

Claims

1. A brickwork support system for use in building construction comprising an elongate hanger rail (23; 61; 62) for attachment to a supporting structure (20) and a plurality of hanger elements (28; 51; 63; 83) depending from said rail and free to move longitudinally of the hanger rail during assembly of the brickwork (30; 81), each of said hanger elements having a lower end portion arranged so as in use to enter a recess in a face of a block shaped building element and to interlock with the block and/or the mortar or other bonding material in such recess.

2. A brickwork support system as claimed in Claim 1 characterized by adjustable means for attaching said hanger rail (23) to said structure (20) said means providing adjustment of the position of the hanger rail relative to the structure (20) at least vertically and horizontally in use.

3. A brickwork support system as claimed in Claim 2 characterized in that said adjustable means includes bracket means (24; 34, 35; 44, 45) to which said hanger rail is secured and anchor means (21) secured to the structure (20) and to which said bracket means is adjustably connected.

4. A brickwork support system as claimed in any one of Claims 1 to 3 characterized in that said hanger rail is of channel construction and said hanger elements are slidable lengthwise thereof.

5. A brickwork support system as claimed in any one of Claims 1 to 4 characterized in that said hanger elements are shaped to co-act with the frog of frogged bricks.

6. A brickwork support system as claimed in any one of Claims 1 to 4 characterized in that said hanger elements (83) each include one or more pins (84) for engagement in respective bores (85) of perforated bricks (82).

7. A brickwork support system as claimed in any one of Claims 1 to 6 characterized by horizontal restraining means (22, 31; 64, 65, 66; 74, 75, 76) for restraining in a horizontal direction brickwork which is supported vertically by said hanger elements.

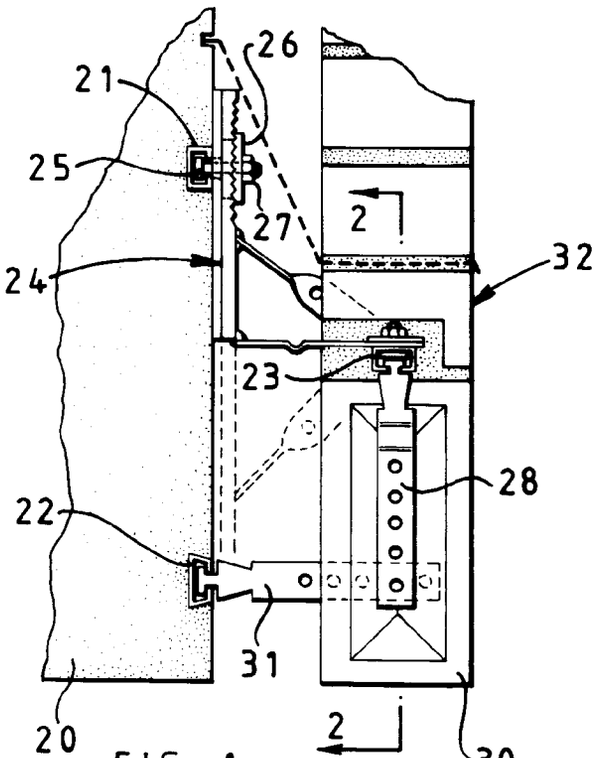


FIG 1

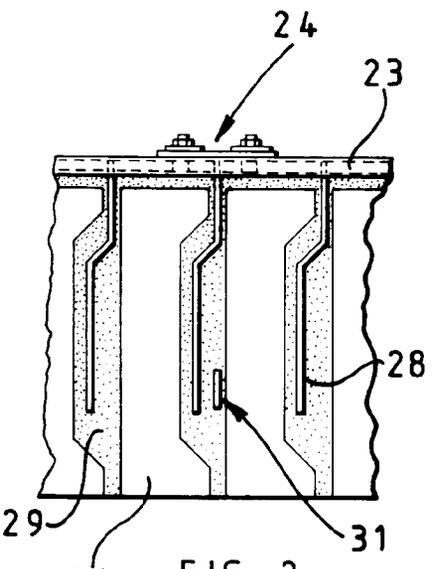


FIG 2

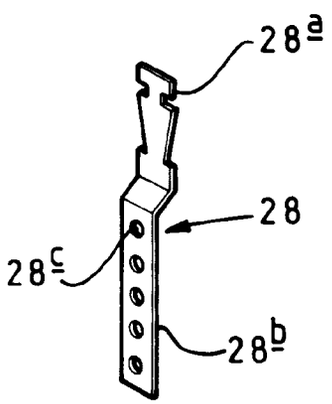


FIG 3

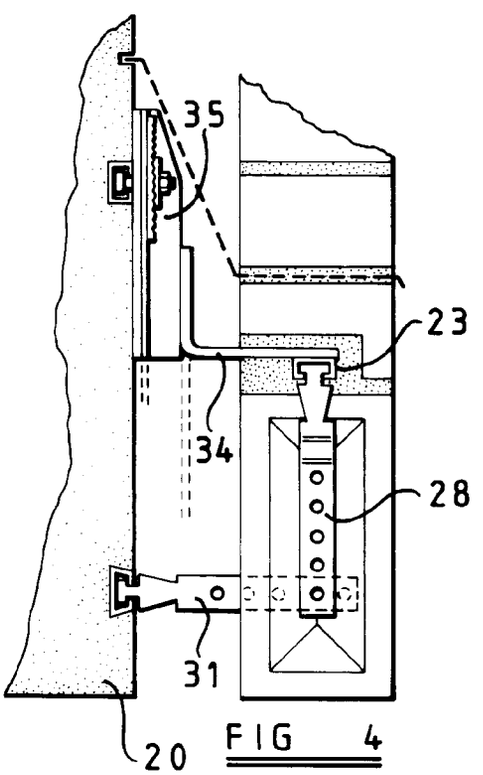


FIG 4

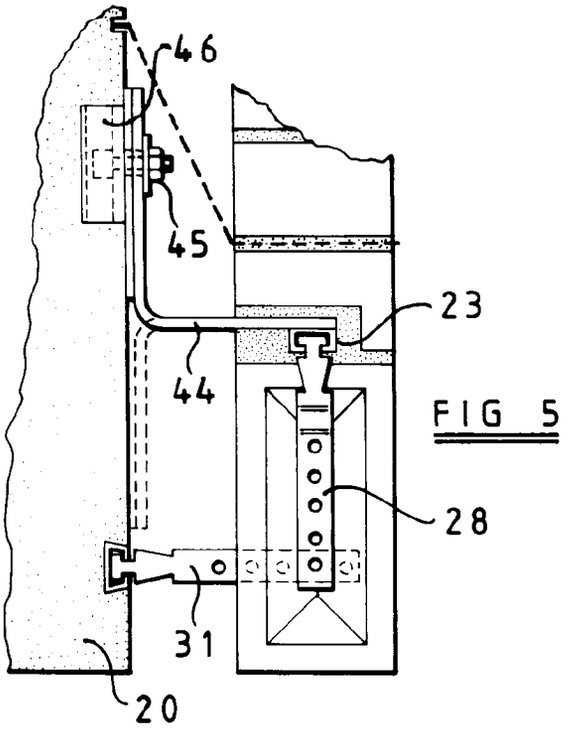


FIG 5

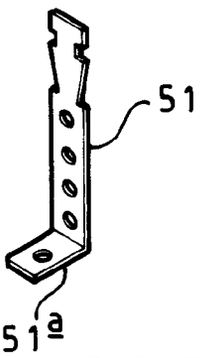


FIG 7

FIG 6

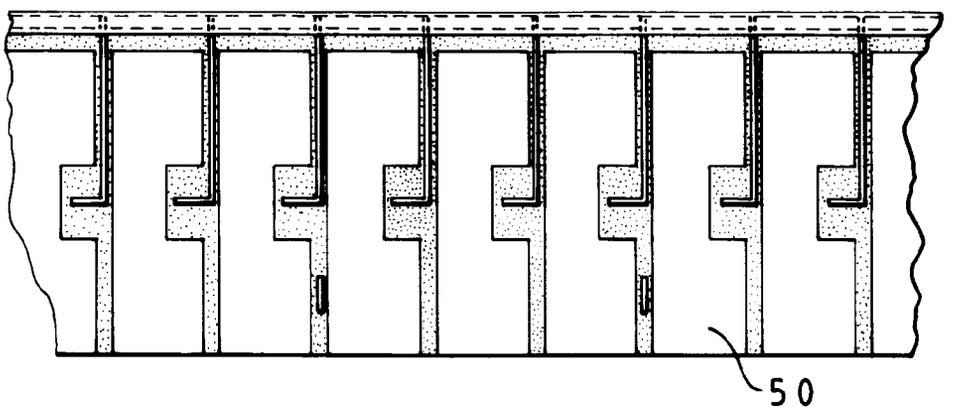
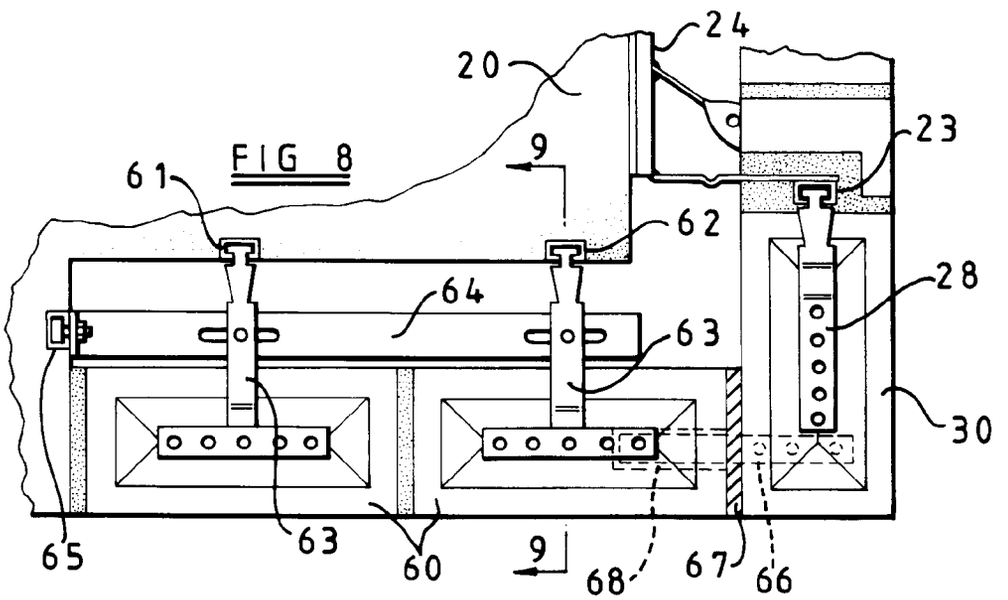


FIG 8



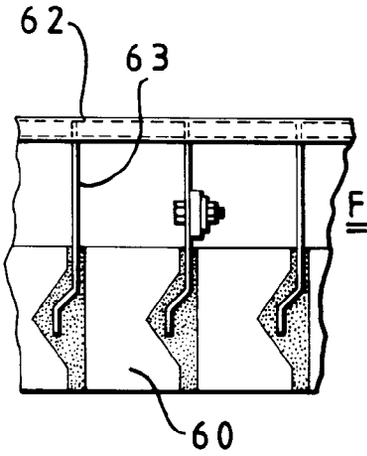


FIG 9

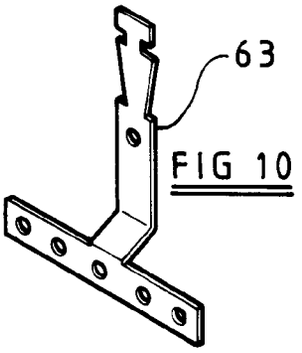


FIG 10

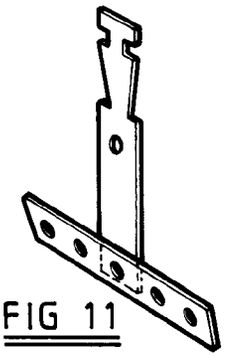
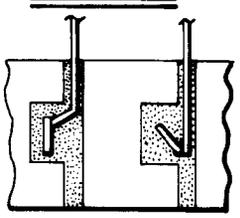


FIG 11

FIG 12



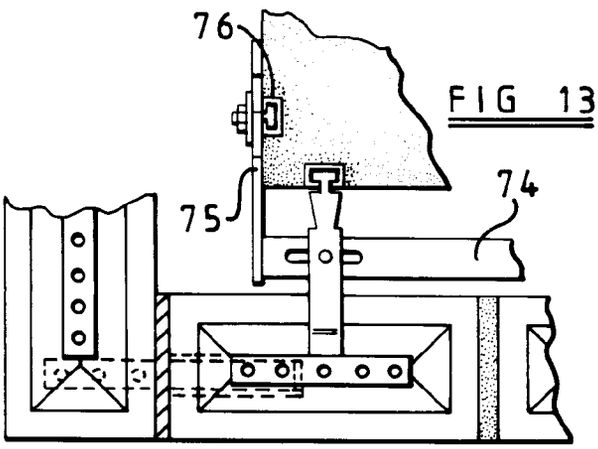


FIG 13

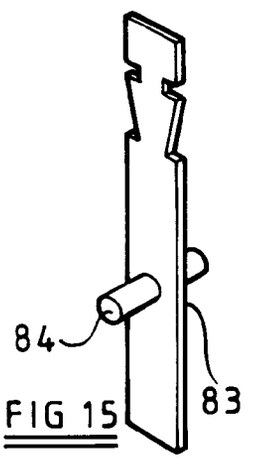


FIG 15

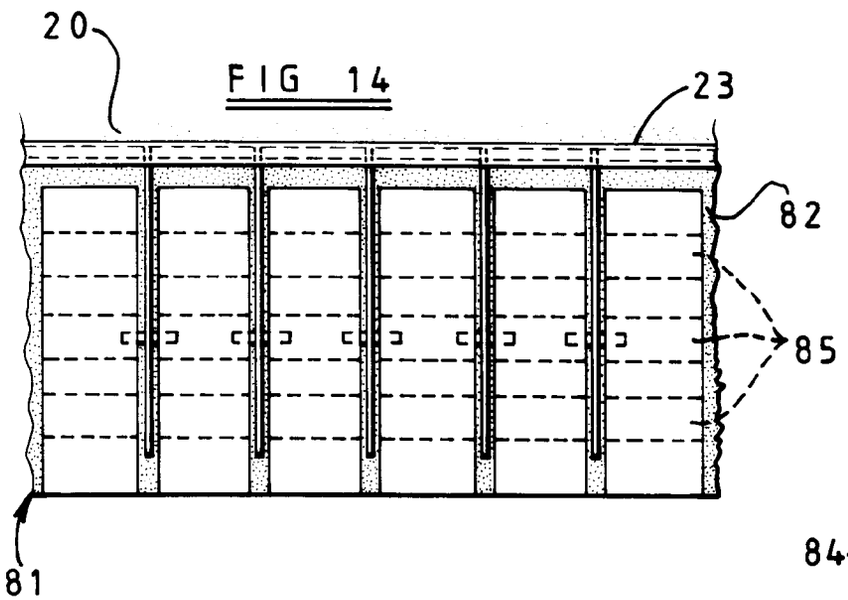


FIG 14

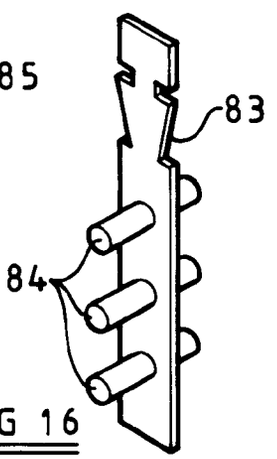


FIG 16

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 8000

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)
Y	DE-A-3 521 724 (WILHELM MODERSOHN GMBH & CO KG) * page 5, line 21 - page 7, line 24; figures 2,7 * ---	1,4-6	E04F13/08 E04B1/41
Y	GB-A-2 183 688 (KNOX) * page 2, line 34 - line 71; figures 1-7 * ---	1,4-6	
Y	FR-A-2 542 347 (SOCIETE GENERALE D'ENTERPRISES-CONSTRUCTION SGE-CONSTRUCTION) * page 4, line 19 - page 8, line 8; figures 1-5 * ---	1,4,5	
Y	FR-A-992 777 (SIMPLIFIED BRICK CONSTRUCTIONS LTD ET AL.) * page 2, left column, line 34 - page 3, left column, line 15; figures 1-13 * ---	1,4,5	
A	FR-A-438 702 (SOCIETE DES PROCEDES BROUSSE ET NOUVEAUX MATERIAUX DE CONSTRUCTION) * page 1, line 25 - page 2, line 11; figures 1-3 * ---	1,4	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-A-3 743 701 (DEUTSCHE KAHNEISEN GESELLSCHAFT WEST GMBH) * column 2, line 27 - column 3, line 50; figures 1-5 * ---	1-4	E04F E04B E04C F16B
A	DE-A-3 043 731 (WILHELM MODERSOHN GMBH & CO KG) * page 4, line 12 - page 5, line 32; figures 1-3 * -----	1,7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 DECEMBER 1991	AYITER J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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& : member of the same patent family, corresponding document

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