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Publication number: **0 473 460 B1**

**EUROPEAN PATENT SPECIFICATION**

- (49) Date of publication of patent specification: **10.05.95** (51) Int. Cl.<sup>8</sup>: **E04F 13/08, E04B 1/41**  
(21) Application number: **91308000.8**  
(22) Date of filing: **30.08.91**

(54) **Brickwork support system.**

(30) Priority: **30.08.90 GB 9018874**

(43) Date of publication of application:  
**04.03.92 Bulletin 92/10**

(45) Publication of the grant of the patent:  
**10.05.95 Bulletin 95/19**

(84) Designated Contracting States:  
**GB**

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**EP 0 473 460 B1**

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## Description

This invention relates to a soffit 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 number of brickwork support systems are known. For example, GB-A-2183688 discloses a system for supporting a brickwork arch using a plurality of rigidly fixed ties, each tie including a pair of pins for insertion into recesses in adjacent bricks of the arch, and a tooth for embedding in a support structure. DE-A-3743701 and DE-A-3521724 similarly disclose systems comprising a plurality of supports, in the form of brackets, each support being secured to a support structure and arranged to extend beneath and support a brick or other building block.

According to the present invention there is provided a soffit support system for supporting a brickwork soffit comprising a suspended course of block shaped building elements for use in building construction, the soffit support system comprising a plurality of hanger elements each including, at one end, a head region, and being arranged at its opposite end to enter a recess in a face of a block shaped building element so as to interlock with the block and/or mortar or other bonding material in the recess in use, and characterized by an elongate hanger rail for attachment to a supporting structure, the hanger rail being of re-entrant cross-section to be arranged, in use, with its opening presented downwardly, the head region of each hanger element being received within the channel section of the rail, each hanger element including a neck portion narrower than the head region and extending, in use, downwardly through the channel opening whereby each hanger element is supported by said rail, dependent therefrom and is slidable longitudinally of the hanger rail during assembly of the soffit.

Preferably there is provided adjustable means for attaching said hanger rail of 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 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<sup>a</sup> 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<sup>b</sup>. 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 mortar.

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 intumed 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 soffit support system for supporting a brickwork soffit (30; 81) comprising a suspended

course of block shaped building elements for use in building construction, the soffit support system comprising a plurality of hanger elements (28; 51; 63; 83) each including, at one end, a head region (28a), and being arranged at its opposite end to enter a recess in a face of a block shaped building element so as to interlock with the block and/or mortar or other bonding material in the recess in use, and characterized by an elongate hanger rail (23; 61; 62) for attachment to a supporting structure (20), the hanger rail (23; 61; 62) being of re-entrant cross-section to be arranged, in use, with its opening presented downwardly, the head region (28a) of each hanger element (28; 51; 63; 83) being received within the channel section of the rail (23; 61; 62), each hanger element (28; 51; 63; 83) including a neck portion narrower than the head region (28a) and extending, in use, downwardly through the channel opening whereby each hanger element (28; 51; 63; 83) is supported by said rail (23; 61; 62), dependent therefrom and is slidable longitudinally of the hanger rail (23; 61; 62) during assembly of the soffit (30; 81).

2. A soffit 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 soffit 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 soffit support system as claimed in any one of Claims 1 to 3, characterized in that said hanger elements are shaped to co-act with the frog of frogged bricks.
5. A soffit support system as claimed in any one of Claims 1 to 3, characterized in that said hanger elements (83) each include one or more pins (84) for engagement in respective bores (85) of perforated bricks (82).
6. A soffit support system as claimed in any one of Claims 1 to 5, 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.

## Patentansprüche

1. Soffittentragsystem für das Tragen einer Ziegelsoffitte (30; 81), die eine frei tragende Lage von blockförmigen Bauelementen für einen Einsatz bei Baukonstruktionen aufweist, wobei das Soffittentragsystem eine Vielzahl von Hängeelementen (28; 51; 63; 83) aufweist, die jeweils an einem Ende einen Kopfbereich (28a) umfassen, und deren entgegengesetztes Ende so angeordnet wird, daß es in eine Aussparung in einer Außenseite eines blockförmigen Bauelementes gelangt, damit es beim Einsatz zu einem Ineinandergreifen mit dem Block und/oder dem Mörtel oder einem anderen Bindemittel in der Aussparung kommt; und gekennzeichnet durch eine längliche Hängeschiene (23; 61; 62) für eine Anbringung an einer Tragkonstruktion (20), wobei die Hängeschiene (23; 61; 62) einen einspringenden Querschnitt aufweist, damit beim Einsatz die Anordnung so erfolgen kann, daß ihre Öffnung nach unten zeigt, wobei der Kopfabschnitt (28a) eines jeden Hängeelementes (28; 51; 63; 83) innerhalb des Kanalabschnittes der Schiene (23; 61; 62) aufgenommen wird, und wobei jedes Hängeelement (28; 51; 63; 83) eine Einengung umfaßt, die schmaler ist als der Kopfbereich (28a), und die sich beim Einsatz durch die Kanalöffnung nach unten erstreckt, wodurch jedes Hängeelement (28; 51; 63; 83) durch die Schiene (23; 61; 62) herabhängend aus dieser getragen wird und in der Längsrichtung der Hängeschiene (23; 61; 62) während des Zusammenbauens der Soffitte (30; 81) verschiebbar ist.
2. Soffittentragsystem nach Anspruch 1, gekennzeichnet durch eine regulierbare Einrichtung für die Befestigung der Hängeschiene (23) an der Konstruktion (20), wobei die Einrichtung die Regulierung der Position der Hängeschiene relativ zur Konstruktion (20) mindestens vertikal und horizontal beim Einsatz bewirkt.
3. Soffittentragsystem nach Anspruch 2, dadurch gekennzeichnet, daß die regulierbare Einrichtung umfaßt: eine Halterung, (24; 34, 35; 44, 45) an der die Hängeschiene gesichert wird und eine Verankerungseinrichtung (21), die an der Konstruktion (20) gesichert ist, und mit der die Halterung regulierbar verbunden ist.
4. Soffittentragsystem nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Hängeelemente so geformt sind, daß sie mit den Vertiefungen der Ziegel zusammenwirken, die Vertiefungen aufweisen.

5. Soffittentragsystem nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Hängeelemente (83) jeweils einen oder mehrere Bolzen (84) für ein Eingreifen in die entsprechenden Bohrungen (85) der Lochziegel (82) umfassen.
6. Soffittentragsystem nach einem der Ansprüche 1 bis 5, gekennzeichnet durch die horizontale Begrenzungseinrichtung (22, 31; 64, 65, 66; 74, 75, 76) für das Begrenzen des Ziegelmauerwerks, das vertikal durch die Hängeelemente getragen wird, in horizontaler Richtung.

## Revendications

1. Système de support de maçonnerie destiné à supporter un élément de maçonnerie (30, 81), comprenant une rangée suspendue d'éléments de construction en forme de bloc à utiliser pour la construction d'un bâtiment, le système de support de maçonnerie comprenant plusieurs éléments de suspension (28; 51; 63; 83) comprenant chacun, à une extrémité, une région de tête (28a) et étant disposés à leur extrémité opposée de manière à pénétrer dans un creux dans une face de l'élément de construction en forme de bloc afin de s'accrocher au bloc et/ou au mortier ou à un autre matériau d'assemblage dans le creux utilisé, et caractérisé par un rail de suspension allongé (23; 61; 62) pour la fixation à une structure de support (20), le rail de suspension (23; 61; 62) présentant une section transversale à redan disposée de manière à être placée en service avec son ouverture tournée vers le bas, la région de tête (28a) de chaque élément de suspension (28; 51; 63; 83) étant disposée dans la section creuse du rail (23; 61; 62), chaque élément de suspension (28; 51; 63; 83) comprenant une partie de col plus étroite que la région de tête (28a) et s'étendant en service vers le bas à travers l'ouverture du creux, tandis que chaque élément de suspension (28; 51; 63; 83) est supporté par ledit rail (23; 61; 62) dépendant de ce rail et peut coulisser longitudinalement sur le rail de suspension (23; 61; 62) pendant l'assemblage de la maçonnerie (30; 81).
2. Système de support de maçonnerie selon la revendication 1, caractérisé par des moyens réglables pour fixer ledit rail de suspension (23) à ladite structure (20), ledit moyen assurant le réglage de la position du rail de suspension par rapport à la structure (20), au moins dans le sens vertical et le sens horizontal pendant l'utilisation .

3. Système de support de maçonnerie selon la revendication 2, caractérisé en ce que ledit moyen réglable comprend des moyens de console (24; 34, 35; 44, 45) auxquels ledit rail de suspension est fixé et des moyens d'ancrage (21) fixés à la structure (20), et à laquelle ledit moyen de console est assemblé avec possibilité de réglage. 5
4. Système de support de maçonnerie selon l'une quelconque des revendications 1 à 3, caractérisé en ce que lesdits éléments de suspension ont une forme qui leur permet de coopérer avec le bourrelet de briques à bourrelets. 10  
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5. Système de support de maçonnerie selon l'une quelconque des revendications 1 à 3, caractérisé en ce que lesdits éléments de suspension (83) comprennent chacun une ou plusieurs broche(s) (84) destinée(s) à s'engager dans les trous correspondants (85) des briques perforées (82). 20
6. Système de support de maçonnerie selon l'une quelconque des revendications 1 à 5, caractérisé par des moyens de maintien horizontaux (22, 31; 64, 65, 66; 74, 75, 76) destinés à maintenir en direction horizontale la maçonnerie qui est supportée verticalement par lesdits éléments de suspension. 25  
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