

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 227 359
A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 86309489.2

(51) Int. Cl.⁴: E04C 3/02 , E04C 3/22

(22) Date of filing: 05.12.86

(30) Priority: 05.12.85 GB 8530018

(43) Date of publication of application:
01.07.87 Bulletin 87/27(84) Designated Contracting States:
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(54) Architectural arch.

(57) A system for forming a straight or curved architectural arch from bricks (11) interconnected by ties (41). The bricks are formed with bores (21,22) one above the other into which pins (44,45) forming part of the ties extend. The ties have rearwardly extending anchors (43) for connection to a structure. Each brick (11) has a central rebate (18,19) in each face which is open at the top. Two adjacent rebates form a recess into which grout can be poured.

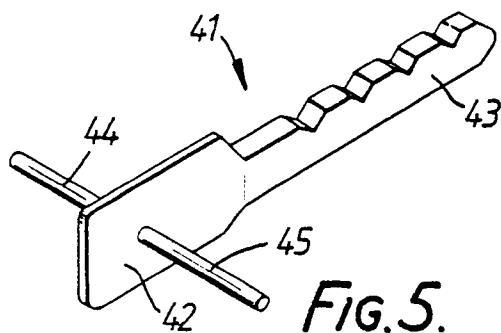


FIG. 5.

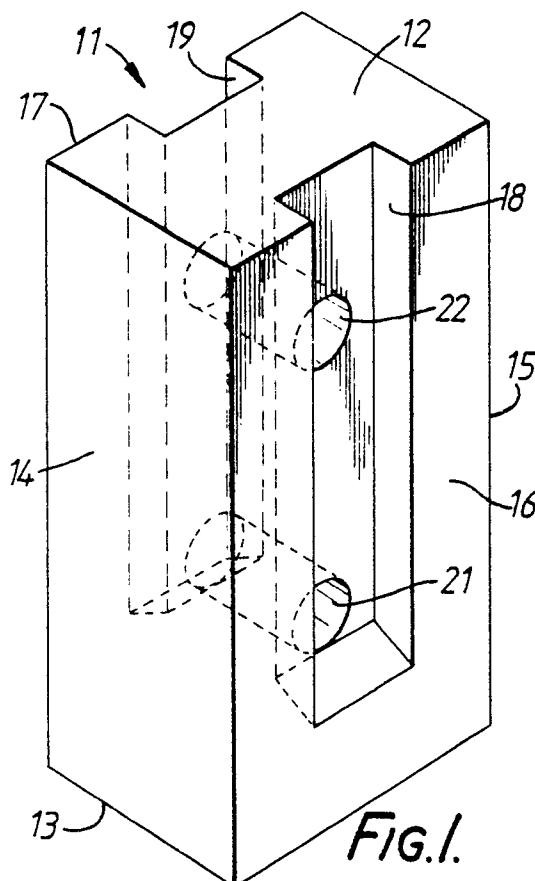


FIG. 1.

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ARCHITECTURAL ARCH

The present invention relates to arches for use in buildings, in particular, brickwork arches. Such arches may be suitable for location over architectural features such as windows, doors panels etc., and may have various shapes from flat to semi-circular, gothic and many other decorative forms.

In the past, arches have been made by various methods. In perhaps their simplest form, arches have comprised a series of upright or "soldier" bricks arranged side-by-side over the feature. In such an arrangement, the arch has no load-bearing properties and must therefore be supported either by a lintel beneath or by a rod passing through the bricks from one end of the arch to the other or by some other means. This would constitute a flat arch. This basic design might be varied by using suitably tapered bricks to arrive at a trapezium-shaped arch having a flat top and bottom.

Other forms of arch are curved, for example, semi-circular arches. These use tapered bricks arranged in a semi-circle above the feature. Semi-circular arches in the past have relied on their massive bulk for their load bearing properties and are therefore only a practical solution when used in double thicknesses. They are not a practical proposition as a single layer, since they cannot use a rod passing down the centre of the bricks for support nor a semi-circular lintel.

It is possible to use pre-cast arches, however, these are expensive and very difficult to handle on-site. Furthermore, they either require a complicated metal reinforcement system or a load bearing feature above.

When an arch is required having a form which is neither flat nor semi-circular, problems may arise from a load-bearing point of view. For example, a shallow curved arch suffers all the drawbacks of a semi-circular arch but in addition, has very poor load-bearing characteristics, and so metal angle supports from above may be required, and these are very cumbersome.

It is therefore an object of the present invention to provide a system for an architectural arch which exhibits considerable load bearing characteristics and which can be used in single course brickwork.

It is a further object to provide such a system which can be used for any arch profile.

According to the present invention, a system for an architectural arch comprises a series of bricks laid side by side and a series of pins, each pair of adjacent bricks being interconnected by means of a pin. Preferably, each pin is of stainless steel and has a rearwardly extending anchor for connection to a structure. The pin and anchor may be considered to constitute together a tie.

The bricks may be of any suitable material and may be cuboidal, to provide a flat arch or may have any other suitable profile, e.g. trapezoidal to provide a curved or semi-circular arch.

Preferably, each brick is formed with an opening to receive the pin. The opening may be a bore extending laterally through the thickness of the brick in which case there are preferably two bores, one spaced above the other. In this way a pin can extend into one bore from one side of the brick while another pin can extend into the other bore from the other side of the brick, and so on. Thus, each pin supports effectively half of the two adjacent bricks into whose bores it extends.

Preferably, therefore, each tie comprises an anchor and a pin extending laterally in both directions.

It will thus be understood that an arch can be built up from a series of such bricks with adjacent bricks interconnected by staggered pins, preferably leaving a series of rearwardly extending anchors for attachment to a structure.

Preferably, each brick has in each side face, a central rebate which is open at the top. Thus, when two bricks are placed together, with a layer of mortar between them, and a tie in position with the pins extending into the corresponding bores, the two rebates form a recess into which a grout can be poured. Preferably, the bores in the bricks are appreciably larger than the size of the pins so that the grout can fill the bores, surrounding the pins. The grout therefore serves to bond the two adjacent bricks together. This allows the mortar layer between the bricks to be quite thin which is frequently preferred for aesthetic reasons.

The bricks may be manufactured quite simply. First they are formed as cuboids, preferably by extrusion. The rebates may then be formed and bores drilled through. They may then either be used directly to build a flat arch or subsequently formed with inclined faces if a curved or semi-circular arch is to be built. Naturally, any radius of arch curvature can be produced by adjusting the inclination of the faces.

The pins and anchors are preferably made of stainless steel. The grout is preferably a run-grout which may incorporate styrene-butadiene rubber.

In practice, a curved arch may be constructed as follows. A former is placed in position. A brick with the required profile is placed on the former and a layer of mortar is placed on the side surface of the brick. A tie is located with its pin level with one of the brick bores and the position of the anchor is marked on the structure behind the arch, which structure might be concrete downstand

beam or part of a floor structure. A hole is then drilled in the structure at the marked position and the tie is located with the pin in the brick bore and the anchor in the newly drilled hole. The anchor is grouted in position.

A second brick is then mortared and placed in position adjacent the first with the remainder of the pin of the tie extending into the corresponding bore in the second brick. The recess formed by the two rebates is filled with grouting and the whole process is repeated, with the next tie being located relative to the other bore in the second brick. In this way, a load-bearing arch can be constructed with adjacent bricks being interconnected by staggered pins. It will be appreciated that a considerable span can be achieved.

However, the present invention allows an arch to be constructed in an even simpler fashion. The precise position of the ties relative to the bricks resulting from the location of the pins in the brick bores means that the position of the anchors relative to the structure as a whole can be predetermined. Thus, the holes necessary for location of the anchors can be drilled into the supporting structure in advance. The bricks and ties can then simply be mortared and grouted in position one after the other. Sufficient on-site tolerance is provided by the size of the pins relative to the brick bores.

Alternatively, it is possible to fix the ties in position, with the anchors set into the structure prior to the construction of the arch, due to the predetermined positions of the ties. To construct the arch it will then simply be necessary to mortar the bricks, locate them with the pins in the appropriate bores, and grout them in position.

The invention may be carried into practice in various ways and some embodiments will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 is an isometric sketch of a brick for a flat arch in accordance with the invention;

Figure 2 is an isometric sketch of a brick for a curved arch;

Figure 3 is a side view of the brick of Figure 2;

Figure 4 is a front view of the brick of Figure 2;

Figure 5 is an isometric sketch of a tie;

Figure 6 is a vertical section through a structure with a brick and tie in position; and

Figure 7 is a schematic view of part of an arch in accordance with the invention.

The brick 11, shown in Figure 1 may be used to construct a flat arch in accordance with the invention.

The brick 11 has a top surface 12, a bottom surface 13, a front face 14, a rear face 15, and two side faces 16, 17. The side faces 16, 17 each have a recess 18, 19 which are open at the top surface 12 only. Two bores 21, 22 extend from one recess 18 to the other 19.

The brick 31 shown in Figures 2 to 4 may be used to construct a curved arch and is similar to the brick 11 except that the side faces 36, 37 are tapered. Thus, the brick 31 is wider from side to side at the top 12 than at the bottom 13. The degree of taper will be determined by the required radius of curvature of the arch to be constructed.

The tie 41 shown in Figures 5 and 6 is made of stainless steel and consists of a pin 44, 45, a flat perpendicularly extending shank 42, and an anchor portion 43. The anchor portion 43 is serrated.

The construction of an arch is shown in Figure 6 and 7. The bricks 31 are positioned on a former 51 and the ties 41 are located with one end 44 of the pin extending into one of the bores, in this case the upper bore 22. The serrated anchor portion 43 extends into a suitable hole 52 drilled into a concrete downstand beam 53.

A second brick 31 (not shown in Figure 6) is positioned with its side face 37 adjacent the side face 36 of the first brick 31 and with a thin layer of mortar 54 between them. The hole 52 is filled with grouting and the recess formed by the two adjacent rebates 18, 19 is also filled with grouting so that the shank 42 and the pins 44, 45 are encased, and the two bricks 31 are securely bonded. The next tie 41 is located with its pin in the lower bore 21 of the second brick 31 and so on, as shown in Figure 7. In this way, the arch form shown in Figure 7 is built up and the former can then be removed.

Claims

1. A system for forming an architectural arch comprising a series of bricks (11) laid side by side and a series of pins (44,45) interconnecting the bricks (11), characterised in that each pair of adjacent bricks (11) is interconnected by means of a separate pin (44,45).

2. A system as claimed in Claim 1 characterised in that each pin (44,45) has a rearwardly extending anchor (43) for connection to a structure (53).

3. A system as claimed in Claim 1 or Claim 2 characterised in that the bricks (11) have a trapezoidal profile (31).

4. A system as claimed in any preceding claim characterised in that each brick is formed with an opening (21,22) in the form of a bore extending laterally through the thickness of the brick in order to receive a pin.

5. A system as claimed in Claim 4 characterised in that each brick includes two bores, one spaced above the other.

6. A system as claimed in any of Claims 2 to 5 characterised in that an anchor (43) and its respective pin together form a tie (41), the pin (44,45) extending laterally in both directions. 5

7. A system as claimed in any preceding claim characterised in that pairs of adjacent bricks are interconnected by staggered pins. 10

8. A system as claimed in any preceding claim characterised in that each brick has in each side face, a central rebate (18,19) which is opened at the top whereby, when two bricks are placed together the two rebates form a recess. 15

9. A system as claimed in any of Claims 5 to 8 characterised in that the bores in the bricks are appreciably larger than the size of the pins whereby space is left for grout to fill the bores surrounding the pins. 20

10. A system as claimed in any preceding claim characterised in that the pins and anchors are made of stainless steel.

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