

BUILDING ELEMENT

This invention relates to crack-inducing building elements.

5 A crack-inducing building element is an elongate element that is immersed in fluid concrete to predetermine where the hardened concrete will crack and to ensure that the crack which occurs can be sealed against the penetration of water.

It is impossible to avoid cracking in large slabs of concrete which are formed in situ
10 by pouring fluid concrete into moulds - as the concrete dries and hardens, cracks form. The best way to avoid cracks is to pour a series of relatively small slabs with sealing elements between them - the smaller the slab, the smaller the danger of cracking. However, it is often desirable for reasons of speed and economy to pour a large slab. To counter the fact that such a slab will inevitably crack on drying, crack-inducing building
15 elements are inserted into the fluid concrete at appropriate intervals. These are elongate, essentially planar boards or profiles whose width is ideally at least one-half of the thickness of the slab and which extend completely across the width of the slab. These will determine where cracks will occur. To prevent penetration of water into the slab via the resulting crack, the crack-inducing elements are provided with sealing elements such as
20 elastomeric sealing strips and waterproofing resin injection tubing.

Many different varieties of crack-inducing elements are known and have been successfully used in industry. However, there remains a major problem in the art, namely, that it is difficult to combine two or more of these art-recognised elements to give a
25 composite element with the necessary integrity. For example, should the width of the slab be greater than the length of the strip, it has not been possible up to now satisfactorily to join these elements together. Various joining components have been tried, typical examples being double-sided elastomeric end caps shaped to conform to the cross-section of the element. It has been found that the connection made is often not sufficiently rigid.
30 Similarly, should the slab be thick, such that the thickness is more than twice the width of the element, it has hitherto proved difficult to join securely two such boards edge to edge

in order that they exceed the minimum desired width of at least 50% of the slab thickness. Moreover, such an arrangement is difficult to keep waterproof.

It has now been found that a particular structure of crack-inducing element
5 substantially or completely avoids these problems. The invention therefore provides a crack-inducing element which has the form of an elongate, essentially planar board having two faces and four edges, there being formed adjacent to each edge at least one pair of depressions, one of each pair being located on each face in substantially opposing positions, and adapted to receive one end of a fastener which is capable of fastening
10 together two elements, each face additionally being adapted to receive waterproofing means.

The crack-inducing element according to the invention comprises an elongate, essentially planar board. For the purposes of this invention, "essentially planar" includes
15 the possibility of each face being slightly concave or convex, such that a transverse cross-section of the element has the form of a concave or convex lens. However, for simplicity of manufacture, it is preferred that the board be completely planar. The board may be constructed from any suitable material, a plastics material being particularly suitable. The element may be solid or hollow, a hollow element having the advantage of being able to
20 absorb a degree of concrete expansion, whereas the solid element has the advantages of simplicity and cheapness of manufacture.

Adjacent to each edge of the element are pairs of depressions, at least one pair per edge. One of each pair is located on each face in substantially opposing positions. These
25 depressions are adapted to receive one end of a fastener, the other end of the fastener being able to be connected to a corresponding depression pair on another element, thus joining the two elements together.

Preferably there should be adjacent to each edge more than one depression pair.
30 More preferably, the depressions at each edge have the form of a continuous groove extending the entire length or width, or both of the entire length and width, of the element. This is not only simpler to manufacture but it also allows the use of as many (or

as few) fasteners as desired. That part of the element between the outermost boundary of each groove and the corresponding edge is preferably less thick than the general thickness of the element and the edges of the element are preferably tapered or bevelled, so that the fasteners can more easily be placed.

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Provided that the fasteners are capable of being located into the depression pairs of adjacent elements which are to be joined, their nature is not narrowly critical and the skilled person will readily be able to perceive what is required in any given circumstance. While relatively complex variants (such as spring-loaded or screw-tightened clips) can be used, the preferred fasteners are one-piece, double-ended clips of resilient material. These have the advantages of simplicity and cheapness. A typical example is a clip having the form of an "H", the inner ends of the arms of the "H" bearing projections designed to fit into the depression pairs on the faces of the elements to be joined.

15 The element is adapted to receive waterproofing means. The waterproofing means may be any such means known to the art, for example, a resilient strip of any suitable material, such as rubber or plastic. It may also be a length of injection tubing. This is tubing which is perforated with transverse holes along its length, these holes being covered by resilient strips that act as valves. Thus, a sealing resin may be injected through the tube but concrete cannot flow into and block the holes. An example of a well-known commercial injection tubing is MASTERFLEX® 900 tubing ex Master Builders Technologies.

25 The element may be adapted to receive such waterproofing means by any convenient means, for example, clips, holes or grooves, attached to or formed therein. An especially convenient method of providing an element according to the invention with waterproofing means is a recess extending along the longitudinal axis of the element. Each element has two such recesses, one on each face. The form of the recess is not critical. A particularly useful form is a concave groove.

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The waterproofing means may be secured to the element by any suitable means, for example, adhesive, clips or fasteners, or by friction of tightly-fitting components. In one

preferred embodiment of the invention, a recess as hereinabove defined has a series of holes along its entire length and preferably to one side of its axis. These holes pass completely through the element to form a similar series of holes in the equivalent recess on the other face. This allows waterproofing strips or injection tubing to be mounted
5 using, for example, plastics fasteners which wrap around the tubing and go through the element via the holes, being secured therein by, for example, expanding anchor heads on the fasteners.

The number of waterproofing means per element will depend on the nature of the
10 means. For example, if the waterproofing means is a strip of a material such as rubber, it is generally necessary to have such a strip on either side of the element. If the means is a resin injection tubing, a single tube on one side can often suffice, because, if the tubing is fixed in place by fasteners passing through holes in the element, as hereinabove described, the liquid sealing resin can flow around and through the element to seal both
15 sides. The skilled person can readily ascertain what is needed in each individual case.

The great advantage of the elements of this invention is versatility. Elements can be clipped end to end, side to side or end to side, allowing a large variety of combinations. The elements are held tightly and firmly together and are easily assembled and placed.
20 The cracks that inevitably occur when the concrete hardens can be made highly resistant to the entry of water, thus ensuring longer life of the concrete. The invention therefore also provides a method of introducing a waterproofed crack into a poured concrete slab at a predetermined place by introducing into the concrete when it is still fluid at least one crack-inducing element which is selected from an individual element as hereinabove
25 defined and a composite of at least two such joined elements, such that the element is at least half the thickness of the slab, said element being provided with waterproofing means.

The invention is further described with reference to the drawings, which depict
30 schematically a preferred embodiment.

Figure 1 is a plan view of a preferred embodiment of an element according to the invention.

Figure 2 is a transverse section of two elements of the type shown in Figure 1,
5 clipped together at their longitudinal edges.

An element, generally indicated by 1 has edge portions 2 on all four edges which are less thick than the element and which edges have bevels 3 for easier clipping together. Equidistantly located adjacent to each edge and running parallel to the edge is a groove of
10 rectangular cross-section 4, four on each face, and each corresponding to a groove located on the same place on the opposite face. Centrally located on and running down the longitudinal axis of each face is a concave recess 5. Lined down one side of this recess is a row of cylindrical holes 6, the holes going completely through the element and emerging in a similar position in the corresponding concave recess on the opposite face.
15 These holes allow an injection tube to be clipped to the element. In addition, the element has at each end a cutout 7, adapted to receive injection tubing, should the element be used to form a vertical slab.

A clip 8 depicted in Figure 2 holds two elements together. It has the form of an H
20 with inwardly-pointing projections 9 at the ends of the H adapted to fit tightly into the grooves 4. The clip is made of any suitable resilient material, such as nylon. Elements can be joined by simply snapping the clips over portion 3 or sliding them along the groove.

Claims:

1. A crack-inducing element which has the form of an elongate, essentially planar board having two faces and four edges, there being formed adjacent to each edge at least one pair of depressions, one of each pair being located on each face in substantially opposing positions and adapted to receive one end of a fastener that is capable of fastening together two elements, each face additionally being adapted to receive waterproofing means.
2. A crack-inducing element according to claim 1, in which there are at least two pairs of depressions per edge.
3. A crack-inducing element according to claim 1, in which each depression consists of a continuous groove close to and parallel to each edge.
4. A crack-inducing element according to any one of claims 1-3, in which the element is adapted to receive waterproofing means by the provision therein on each face of a longitudinal, axial recess into which waterproofing means can be securely fitted.
5. A crack-inducing element according to claim 4, in which secure fitting is by means of a series of holes lying within the recess, and preferably to one side of its axis, and spaced along its entire length, the holes passing completely through the element to form a similar series of holes in the corresponding recess on the opposite face.
6. A crack-inducing element according to any one of claims 1-4, in which the waterproofing means is injection tubing fixed to the element.

7. A method of introducing a waterproofed crack into a poured concrete slab at a predetermined place by introducing into the concrete when it is still fluid at least one crack-inducing element that is selected from an individual element according to claim 1 and a composite of at least two such jointed elements, such that the element or composite is at least half the thickness of the slab and extends completely across the slab, said element or composite being provided with waterproofing means.