

Glass Concrete Composite Panel

Field of the Invention

This invention relates to a construction system and method for glass or other
5 block panels, components thereof and a glass or other block panel formed
thereby, which has particular utility in the construction industry. The invention has
particular, although not exclusive, application for the construction of pre-fabricated
glass or other block panels that may be used as flooring, ceilings or wall panels in
building construction either in situ or remote of the construction site, especially
10 those that are required to meet a prescribed fire rating standard.

Throughout the specification, unless the context requires otherwise, the word
"comprise" or variations such as "comprises" or "comprising", will be understood to
imply the inclusion of a stated integer or group of integers but not the exclusion of
any other integer or group of integers.

15 **Background Art**

The construction of pre-fabricated glass or other block panels is known and is
relatively straightforward. The construction of glass or other block panels,
however, that are required to meet a prescribed fire rating standard is a little more
complex, where a mean thickness of the panel needs to be achieved with a
20 magnitude that is marginally greater than the thickness of a standard size glass or
other block.

The methods and systems of known construction for glass or other block panels
of the latter type generally involve the building of removable formwork to create a
planar substrate on which mouldings of substantially commensurate size and
25 shape to the blocks forming the panel are fixedly attached. The mouldings
typically comprise blocks made from wood, nylon or other suitable material and

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are arranged in a matrix corresponding to the intended arrangement of the blocks forming the panel, suitably spaced apart from each other to define interstices corresponding to the intended spacing between the blocks.

5 Blocks are then individually disposed in juxtaposition with the outer planar surface of each moulding so that the outer face of one side of a block confronts the outer planar surface of a corresponding moulding and the outer edge of the block is contiguous with the upstanding edge of a moulding defining the circumscribing interstice around the moulding. In this manner the interstices around the mouldings are carried through to define spaces between adjacent blocks for filling
10 with a binder whilst the mouldings hold the blocks in a matrix that becomes the panel.

Once the blocks are in position, a binding mixture such as concrete is poured into the interstices between the mouldings and the blocks in layers and reinforcing rods are laid within the spaces at discrete intervals and levels to be embedded
15 within the mixture until the interstices are completely filled with the binder. The binder may be agitated by a vibrator or other means to ensure that all of the spaces forming the interstices are filled with the binding mixture to complete the construction of the panel composite.

The panel composite is then left for the binding mixture to set or cure, which in the
20 case of concrete may be some 18 hours. Following setting or curing, the formwork and mouldings are dismantled and released from the block panel composite leaving an integral and self-supporting glass block panel structure that has grid-like protrusions formed by the binder projecting outwardly and contiguously from the spaces between the blocks on the side of the panel where
25 the moulding and formwork were previously disposed.

The resultant block panel can be used as a building element in the formation of walls, floors or ceilings within a building structure, which in the case of glass blocks is also translucent.

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A problem with this known form of construction is that the mouldings have to be positioned precisely upon the formwork surface to ensure proper location and formation of the interstices and the outer planar surfaces of the mouldings for correct location of the blocks. This can be very time consuming and laborious and thus adds significantly to the construction costs involved with manufacturing a block panel in this manner.

Another problem is that due to imperfections in the block side faces and the mouldings themselves, the junction between the confronting side faces of the blocks and the outer planar surface of the mouldings provides a gap in some places where the binding mixture can penetrate, particularly during vibration of the binder. This migration of the binder onto the surface of the blocks can deface the blocks after the formwork and mouldings are removed and can be difficult and costly to remove. This causes additional cleaning requirements in places that are difficult to access in the finished panel, given that these incursions onto the block surface occur adjacent a binder protrusion. Accordingly, the defaced region of the block surface is oftentimes simply left, resulting in an appearance of the panel that is unattractive and which, in the case of glass block panels detracts from the primary purpose of the panel which is to allow light to pass through.

Disclosure of the Invention

It is an object of the present invention to overcome some if not all of the problems described above with the construction of glass or other block panels, or to at least mitigate some if not all of these problems.

In accordance with one aspect of the present invention, there is provided an improvement in a method for constructing a glass or other block panel comprising laying blocks on a corresponding moulding having a series of coplanar outer surfaces for supporting the blocks in a matrix with interstices between the adjacent outer edges of the blocks and filling the interstices with a binder, the improvement comprising:

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disposing a gasket formed of resilient material fixedly around the periphery of the planar outer surfaces of the moulding so that the gasket projects marginally proud of the outer surface;

5 and positioning the blocks so that periphery of the side face confronting the outer surface of the moulding is brought into sealing relationship with the gasket to prevent binder from penetrating through the junction between the gasket and the confronting side face of the block.

10 In accordance with another aspect of the present invention, there is provided an improvement in the construction system of a block panel comprising a moulding having a series of coplanar outer surfaces for supporting the blocks in a matrix with interstices between the adjacent outer edges of the blocks to be filled with a binder, the improvement comprising a gasket formed of resilient material fixedly attached to the periphery of each planar outer surface of the moulding and having a portion extending marginally proud of the surface for supporting the face of a
15 block thereon in sealing engagement therewith.

In accordance with a further aspect of the invention, there is provided a gasket formed of resilient material for fixed attachment to a moulding having a planar outer surface formed with a groove, the gasket including: an inner shank portion for positive and retained location within the groove and an outer projecting portion
20 obliquely oppositely disposed relative to the inner shank portion, the distal end of the outer projecting portion forming a planar locus disposed proudly of the planar outer surface of the moulding when fixedly attached thereto to sealing engage a planar surface of block disposed thereon.

25 In accordance with another aspect of the invention, there is provided a modular moulding for constructing a block panel, the moulding comprising:

a circumferential wall, a planar outer surface surmounting the wall, and a radial flange projecting outwardly of the wall, oppositely disposed of the planar outer surface in generally parallel, spaced relationship therewith,

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the radial flange being uniformly disposed around the wall of constant radial extent and being provided with a stepped edge to enable overlapping engagement with an adjacent moulding to form a regular matrix with interstices defined by the wall and flanges of adjoining mouldings disposed between a series
5 of coplanar outer surfaces on which glass blocks may be disposed.

In accordance with a still further aspect of the invention, there is provided an improvement in a method for constructing a glass or other block panel comprising laying blocks on a series of coplanar outer surfaces for supporting the blocks in a matrix with interstices between the adjacent outer edges of the blocks and filling
10 the interstices between the outer surfaces with a binder, the improvement comprising:

fixedly locating a series of discrete modular mouldings of the type described in the preceding aspect of the invention to a substrate in adjacent and overlapping relationship to each other to form a matrix of planar outer surfaces having
15 uniformly spaced interstices disposed therebetween; and

laying the blocks upon the surfaces in corresponding relationship therewith to continue and maintain the interstices between the blocks before filling the interstices with binder.

In accordance with another aspect of the invention, there is provided a
20 construction system for a glass or other block panel formed of a matrix of blocks bound together by a binder, comprising:

a plurality of mouldings of the type defined in the penultimate preceding aspect of the invention fixedly disposed to a substrate in adjacent and overlapping relationship with each other to form a matrix with regularly spaced interstices
25 therebetween and a series of coplanar outer surfaces on which the blocks may be disposed prior to filling the interstices with a binder.

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In accordance with a further aspect of the invention, there is provided a glass or other block panel formed in accordance with any one of the preceding aspects of the method or system defined therein.

Brief Description of the Drawings

- 5 The invention will be better understood in the light of the following description of one specific embodiment. The description is made with reference to the following drawings, wherein:

Figure 1a is a perspective view of the topside of a moulding;

Figure 1b is a perspective view of the underside of the moulding in Figure 1a;

- 10 Figure 1c is a side elevation of the moulding in Figures 1a and 1b;

Figure 2a is a perspective view of a gasket;

Figure 2b is a fragmentary perspective view through a cross section of the gasket in Figure 2a;

- 15 Figure 3 is cross-sectional view taken through the junction between the circumferential wall and outer surface of the moulding;

Figure 4 is a cross sectional view showing the overlapping relationship between adjacently disposed mouldings;

Figure 5 is a cross-sectional view of a composite glass block panel construction system with the moulding and formwork in place;

- 20 Figure 6a is a fragmentary cross-sectional view of the junction between the circumferential wall and the outer surface of a moulding with the gasket in position, showing its relative position within Figure 5;

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Figure 6b is a corresponding fragmentary view of Figure 4, showing its relative position within Figure 5

Figure 7 is a plan view of a completed glass block panel;

Figure 8 is a cross-sectional view of the panel of Figure 7 taken through section
5 C-C; and

Figure 9 is a cross-sectional view of the panel of Figure 7 taken through section D-D.

Best Mode(s) for Carrying Out the Invention

The preferred embodiment of the best mode of the invention is directed towards a
10 construction system and method for a glass block panel that is able to meet a prescribed fire rating standard requiring the mean of the panel thickness to be greater than the individual thickness of each glass block forming the panel. The embodiment also describes a modular moulding and gasket used in the construction of the panel and the resultant panel so formed.

15 The construction system 11 is best shown in Figure 5 of the drawings, where timber formwork 13 forms a substrate on which plastic mouldings 15 are fixedly disposed by screw fasteners 17 to form a moulding composite. Gaskets 19 are affixed to the mouldings and glass blocks 23 are disposed thereon, defining interstices 25 therebetween. The interstices 25 are filled with a binder in the form
20 of concrete 27 and steel reinforcing rod 29 to complete the formation of a composite block panel construction system.

Describing each of the components of the system in more detail, the formwork 13 and glass blocks 23 are of standard design. The formwork is simply a sheet of timber, such as thick plywood. The glass blocks are rectangular and each
25 comprise a pair of parallel side faces 23a and a peripheral edge 23b.

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The concrete 27 is also of a standard binding mix to meet the requisite fire rating and structural strength requirements for binding the glass blocks together to form the panel. Similarly, the steel reinforcing rod 29 is of a prescribed gauge and sized to locate within the interstices.

- 5 The mouldings 15 are modular, the design of each being more particularly shown in Figures 1a to 1c. Each moulding is specially designed comprising an upstanding and outwardly flared circumferential wall 31, a planar outer surface 33 surmounting the wall, and a radial flange 35 projecting outwardly of the wall. The flange is oppositely disposed of the planar outer surface 33 and is in generally
10 parallel, spaced relationship therewith.

The radial flange 35 is divided into two symmetrical stepped edge configurations, one being complementary to the other, where one stepped edge configuration is formed along two adjacent terminal edges of the circumferential wall 31, and the other stepped edge configuration is formed along the two remaining terminal
15 edges of the circumferential wall. The one stepped edge configuration is arranged so that an upper recessed portion of the radial flange is provided to form a lower radial flange 37a and the other stepped edge configuration is arranged so that a lower recessed portion of the radial flange is provided to form an upper radial flange 37b. The lower radial flange 37a is provided with a medial slot 38a in each
20 adjacent terminal edge thereof, and the upper radial flange is provided with a medial tongue 38b to locate within a correspondingly aligned slot 38a of an adjoining moulding. The symmetrical and complimentary configuration of the stepped edges allows for overlapping and positive engagement with an adjacent moulding 15 as shown in Figures 4 and 6b of the drawings. In this manner a
25 regular matrix of coplanar outer surfaces 33 is formed with interstices 25 defined by the wall 31 and flanges 35 of adjoining mouldings.

The junction between the planar outer surface 33 and the circumferential wall 31 is formed with a continuous groove 39 for accommodating the gasket 19. The distal end of the outer side wall 39a of the groove 39 juxtaposed with the
30 circumferential wall 31 terminates short of the distal end of the inner side wall 39b of the groove juxtaposed with the planar outer surface 33.

- The gasket 19, as shown in Figures 2 and 6a of the drawings, is formed of resilient material, such as rubber, and comprises an inner shank portion 19a for positive and retained location within the groove 39 and an outer projecting portion 19b obliquely oppositely disposed relative to the inner shank portion at an incidental angle of approximately 135° . The gasket forms a ring so that the distal end 41 of the outer projecting portion 19b defines a planar locus disposed proudly of the planar outer surface 33 of the moulding 15 when fixedly attached thereto within the groove to sealing engage a planar surface of a block disposed thereon. The angular orientation of the outer projecting portion 19b is biased outwardly from the transverse axis of the planar locus formed thereby and the junction as shown in Figure 6a of the drawings to provide for the best sealing engagement of the side face 23b of a glass block and impede the incursion of concrete into the junction between the outer face 33 of the moulding and the confronting side face of the block 23.
- 15 The moulding 15 is also provided with a pair of cylindrical bosses 43 projecting transversely of the planar outer surface, inwardly of the moulding and having central apertures 45 that open to the surface to facilitate the location of the screw fasteners 17. The apertures are countersunk at the surface to accommodate the heads of the fasteners.
- 20 The resiliency of the gaskets 19 facilitates fixing the glass blocks 23 in position when locating them on the mouldings in a planar array, as shown in Figures 5 and 7 of the drawings, and helps in retaining the blocks in position.
- Once the formwork 13 and the mouldings 15 are precisely positioned with the gaskets 19 in place, the glass blocks are carefully laid in position and the interstices 25 filled with concrete. The space defining the interstices between the mouldings is filled initially with concrete before a first layer of reinforcing rods is disposed upon the concrete to create a mesh. Once the reinforcing rods are in position, concrete is poured into the remaining space of the interstices between the glass blocks until approximately the two-thirds level of the blocks. A second layer of reinforcing rods is then positioned to create a second mesh layer and the

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remainder of the concrete is poured to level off at the outer side face of the glass blocks, embedding the reinforcing rods therein.

The composite panel structure is then left to set or cure, which in the case of concrete can take up to 18 hours.

- 5 After the curing process is complete, the formwork and the mouldings can be dismantled and released from the composite, leaving an integral and self-supporting glass block panel 51 as shown in Figures 7 to 9, having outwardly protruding concrete formations 53 contiguous with the spacing between the blocks 23. As can be seen, the circumferential wall 31 of the moulding is tapered
- 10 outwardly to facilitate releasing the moulding 15 from the composite.

It should be appreciated that the scope of the invention is not limited to the particular embodiment described herein and that the invention has utility with forming panels from other type of block material.

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The Claims Defining the Invention are as Follows

1. An improvement in a method for constructing a glass or other block panel comprising laying blocks on a corresponding moulding having a series of coplanar outer surfaces for supporting the blocks in a matrix with interstices between the adjacent outer edges of the blocks and filling the interstices with a binder, the improvement comprising:

disposing a gasket formed of resilient material fixedly on the periphery of the planar outer surfaces of the moulding so that the gasket projects marginally proud of the outer surface; and

positioning the blocks so that periphery of the side face confronting the outer surface of the moulding is brought into sealing relationship with the gasket to prevent binder from penetrating through the junction between the gasket and the confronting side face of the block.
2. An improvement as claimed in claim 1, wherein the projection of the gasket is also biased outwardly from the junction towards an adjacent interstice.
3. An improvement in the construction system of a block panel comprising a moulding composite having a series of coplanar outer surfaces for supporting the blocks in a matrix with interstices between the adjacent outer edges of the blocks to be filled with a binder, the improvement comprising a gasket formed of resilient material fixedly attached to the periphery of each planar outer surface of the moulding and having a portion extending marginally proud of the surface for supporting the face of a block thereon in sealing engagement therewith.
4. An improvement as claimed in claim 3, wherein said portion is also biased outwardly from the junction towards an adjacent interstice.
5. A gasket formed of resilient material for fixed attachment to a moulding for supporting a block, the moulding having a planar outer surface formed with a groove, the gasket including: an inner shank portion for positive and

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retained location within the groove and an outer projecting portion obliquely oppositely disposed relative to the inner shank portion, the distal end of the outer projecting portion forming a planar locus disposed proudly of the planar outer surface of the moulding when fixedly attached thereto to sealing engage a planar surface of a block disposed thereon.

6. A gasket as claimed in claim 5, wherein the oblique disposition of said outer projecting portion is biased outwardly from the transverse axis of the planar locus formed thereby.

7. A modular moulding for constructing a block panel, the moulding comprising:

a circumferential wall, a planar outer surface surmounting the wall, and a radial flange projecting outwardly of the wall, oppositely disposed of the planar outer surface in generally parallel, spaced relationship therewith,

the radial flange being uniformly disposed around the wall of constant radial extent and being provided with a stepped edge to enable overlapping engagement with an adjacent moulding to form a regular matrix with interstices defined by the wall and flanges of adjoining mouldings disposed between a series of coplanar outer surfaces on which glass blocks may be disposed.

8. A moulding as claimed in claim 7, wherein the radial flange is divided into two symmetrical stepped edge configurations, one being complementary to the other, one said stepped edge configuration being formed along two adjacent terminal edges of the circumferential wall, and the other stepped edge configuration being formed along two remaining terminal edges of the circumferential wall, the terminal edges forming a rectangle.
9. A moulding as claimed in claim 8, wherein said one stepped edge configuration is arranged so that an upper recessed portion of the radial flange is provided to form a lower radial flange, and the other stepped edge configuration is arranged so that a lower recessed portion of the radial flange is provided to form an upper radial flange.

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10. A moulding as claimed in claim 9, wherein said lower radial flange is provided with a medial slot in each adjacent terminal edge thereof, and said upper radial flange is provided with a medial tongue to locate within a correspondingly aligned slot of an adjoining moulding.
11. A moulding as claimed in any one of claims 7 to 10, wherein the junction between said planar outer surface and said circumferential wall is formed with a continuous groove for accommodating a gasket as claimed in any one of claims 5 and 6.
12. A moulding as claimed in claim 11, wherein the distal end of the outer side wall of the groove juxtaposed with said circumferential wall terminates short of the distal end of the inner side wall of the groove juxtaposed with said planar outer surface.
13. A moulding as claimed in any one of claims 7 to 12, including a plurality of cylindrical bosses projecting transversely of the planar outer surface, inwardly of the moulding, and having central apertures that open to the surface to facilitate the location of the screw fasteners.
14. A moulding as claimed in claim 13, wherein said apertures are countersunk at the surface to accommodate the heads of the fasteners.
15. An improvement in a method for constructing a glass or other block panel comprising laying blocks on a series of coplanar outer surfaces for supporting the blocks in a matrix with interstices between the adjacent outer edges of the blocks and filling the interstices between the outer surfaces with a binder, the improvement comprising:

fixedly locating a series of discrete modular mouldings as claimed in any one of claims 7 to 14 to a substrate in adjacent and overlapping relationship to each other to form a matrix of planar outer surfaces having uniformly spaced interstices disposed therebetween; and

laying the blocks upon the surfaces in corresponding relationship therewith to continue and maintain the interstices between the blocks before filling the interstices with binder.

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16. An improvement as claimed in claim 15, including affixing gaskets as claimed in any one of claims 5 and 6 into said grooves of the mouldings as claimed in any one of claims 11 and 14, after fixedly locating said moulding to said substrate and before laying the blocks thereon.
17. A construction system for a glass or other block panel formed of a matrix of blocks bound together by a binder, comprising:

a plurality of mouldings as claimed in any one of claims 7 to 14 fixedly disposed to a substrate in adjacent and overlapping relationship with each other to form a matrix with regularly spaced interstices therebetween and a series of coplanar outer surfaces on which the blocks may be disposed prior to filling the interstices with a binder.
18. A construction system as claimed in claim 17, including a plurality of gaskets as claimed in any one of claims 5 and 6 for affixing into the grooves of respective mouldings as claimed in any one of claims 11 and 12.
19. A glass or other block panel formed in accordance with any one of the preceding claims of the method or system defined therein.
20. A gasket substantially as described herein with reference to the accompanying drawings, as appropriate.
21. A moulding substantially as described herein with reference to the accompanying drawings, as appropriate.
22. A construction system substantially as described herein with reference to the accompanying drawings, as appropriate.
23. A glass or block panel substantially as described herein with reference to the accompanying drawings, as appropriate.
24. An improvement in a method for constructing a glass or other block panel substantially as described herein with reference to the accompanying drawings, as appropriate.

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25. An improvement in the construction system of a block panel substantially as described herein with reference to the accompanying drawings, as appropriate.