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VOID FORMER**BACKGROUND OF THE INVENTION**

1) Field of the Invention

5 The present invention relates to a void former for use in casting concrete wall panels.

2) Description of the Prior Art

In the construction of buildings using precast concrete wall panels it is necessary to form a connection between adjacent panels which are erected in edge-to-edge relation to form a longer wall. The connection may be made by incorporating into the panel at the time of casting a connector mounting which is exposed to the surface of the wall panel adjacent to the edge thereof but slightly recessed from the surface. After erection, a metal connector plate is applied to the adjacent connection mountings of the two adjacent panels so as to span the two mountings. The connection mountings may take various forms, for example channels for providing an adjustable connection, internally threaded ferrules, or pads; the type of connection with the connector plate which spans the two panels will depend on the exact nature of the connection mounting. Figure 1 shows a connection system involving connection mountings in the form of channels 2 and a connector plate 4 spanning the two channels and connected thereto by bolts which are slidable within the channels (one of which is horizontal and the other vertical) to permit adjustment. The channels each open into a rectangular recess R formed in the face of the panel P. The connector plate 4 also lies within that recess. The recess R is of a size to permit some adjustment in the position of the connection plate while the connection between the two panels is being made.

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SUMMARY OF THE INVENTION

The present invention relates to a void former particularly designed for forming a recess such as that shown at R in the face of the panel at one edge thereof.

According to the present invention there is provided a void former for use in the casting of concrete wall panels to form a recess in a surface of the panel, the void former comprising a flexible shell of box-like form open at one side, an opposite side of the shell being closed

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and being adapted for co-operation with a connection mounting cast into the panel to be accessible via the recess in the panel, and a rigidifying insert locatable into the shell through the open side and being removable after casting to permit removal of the shell by flexing the shell from the recess thus formed.

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Further according to the invention, there is provided a method of casting a recess in the surface of a concrete wall panel to provide access to a connection mounting within the panel, said method comprising the steps of:

10 providing a void former comprising a flexible shell of box-like form open at one side and closed at an opposite side;

mounting within the interior of the shell a removable insert to rigidify the shell;

mounting the connection mounting to a projection externally at the closed side of the shell;

15 forming the panel by casting around the void former and connection mounting, with the open side of the shell opening onto a face of the panel so as to be substantially flush therewith;

removing the rigidifying insert from the shell through the open side thereof after setting of the concrete; and

flexing the shell to remove the shell from the recess thus formed.

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In one form, the shell is adapted for use with a connection mounting in the form of at least one, and preferably two, internally threaded ferrules. In another form the shell is adapted for co-operation with a connection mounting in the form of a channel. In yet another form, the shell is adapted for co-operation both with internally threaded ferrules and a channel.

25 The co-operation with the connection mounting is by means of plugs or other connections projecting externally of the shell from the closed side thereof whereby to engage and locate the connection mounting. The plug or other formation can be formed integrally with the shell or alternatively the closed side of the shell can be apertured to receive an insert which projects externally of the shell from the interior thereof for engagement with the
30 connection mounting.

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In the casting of concrete wall panels in a factory situation, the panels are typically cast onto a flat steel bed. Depending on the specific situation, the recess may need to be formed in the upper face of the panel during casting (known as the "near face") or the lower face of the panel in contact with the steel bed (known as the "far face"). The void former of the preferred embodiment of the invention is able to be used in either of these situations. Accordingly in the preferred embodiment of the invention the shell is a cuboid shape and the insert is of a corresponding shape. The insert has a closed face configured to close the open side of the shell for use in near face casting. The face opposite to the closed face is an open face and in far face casting the insert is orientated so that its open face lies within the open side of the shell and co-operates with means for locating the void former on the casting bed. When the casting bed is a flat steel bed, conveniently the void former can be located on the bed by magnetic attachment using a magnetic system within the insert. Such a magnetic system may comprise one or more magnetic blocks removably mounted within the insert to engage directly against the steel casting bed. However, it is to be understood that other systems, non-magnetic, may alternatively be used to locate the void former relative to the bed; for example the insert could be orientated with its closed face against the bed to be secured thereto by a double-sided adhesive tape.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 2 is an exploded view showing the principal components of a void former in accordance with the preferred embodiment of the invention;

Figure 3 is a schematic section view showing the void former of Figure 2 set up for near face casting in co-operation with a connection mounting consisting of two internally threaded ferrules;

Figure 4 is a section similar to Figure 3 showing the void former at the completion of casting of the panel;

Figure 5 is an exploded view showing the void former in a configuration set up for far face casting;

Figure 6 is a schematic section equivalent to Figure 5 and showing the void former

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set up against a steel casting bed;

Figure 7 shows an embodiment of the shell of the void former specifically adapted for use with a connection mounting in the form of a channel; and

Figure 8 is a schematic section showing a channel fitted to the void former of
5 Figure 7 in a far face casting situation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to Figure 2, the void former comprises an outer shell 6 moulded in a flexible hard-wearing plastic (for example a flexible polyurethane). The outer shell 6 is of
10 a cuboid shape open at one of its two larger faces (the upper face as shown in Figure 2). A relatively rigid one-piece insert 8 also of cuboid shape is designed to fit into the interior of the shell 6 in order to rigidify the shell. The insert 8 is of a relatively lightweight, thin-walled structure moulded in one piece in a suitable plastic such as nylon or polypropylene. The insert is also open to one of its larger faces (the upper face as shown in Figure 2) and
15 includes reinforcing webs 10 which define rows of cells 12 extending from the opposite closed face to the open face.

The operation of the void former will initially be described in relation to its possible use with a connection mounting consisting of two internally threaded ferrules. The closed face
20 of the shell is designed for cooperation with the outer end of the ferrules. For this purpose the closed face of the shell 6 has outwardly projecting plugs 14 which engage into the open ends of the ferrules.

In a near face casting situation (see Figures 3 and 4), that is one in which the recess is to be
25 formed in the upper face during casting, the shell 6 is orientated with its closed face lowermost. The ferrules 16 are supported from the casting bed at a suitable height in a known manner by ferrule chairs or supports shown schematically at 18. The plugs 14 at the underside of the shell 6 are engaged into the open ends of the ferrules 16 and the insert 8 is applied to the interior of the shell 6 in order to rigidify the shell, the closed face of the
30 insert 8 being uppermost in order to prevent entry of concrete into the shell during casting. After casting (see Figure 4), the upper face of the panel P is substantially flush with the

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upper edge of the void former as shown in Figure 4. The insert 8 is removed from the shell 6 and the flexibility of the shell 6 with the insert removed enables it to be manipulated to permit its easy removal from the rectangular recess thus formed whereby the outer ends of the ferrules 16 are then exposed to the main rectangular face of the recess.

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The void former is able to be used repeatedly in this way.

In a modification, instead of plugs 14 projecting from the closed face of the shell 6 to co-operate with the ferrules 16, the shell is formed with holes to receive bolts or plugs inserted
10 into the ends of the ferrules from inside the shell.

In a far face casting situation (Figures 5 and 6), that is one in which the recess is formed in the underface of the panel against the steel casting bed, blocks 20 of magnetic material are placed into at least some of the cells 12 of the insert 8 and the insert is applied with its
15 open face against the steel bed whereby the insert is located securely in position on the bed by the magnetic blocks 20 within its cells. The shell 6 is placed over the insert 8 with its closed face uppermost, and the open ends of the ferrules 16 are located over the upwardly projecting plugs 14 thereby locating the ferrules 16. After casting, when the panel is raised from the bed the magnetic blocks 20 will remain attached to the bed, and the insert 8 can
20 be removed from the shell 6, and the shell itself then removed from the void by manipulation of the shell as previously described. Instead of using the magnetic blocks 20 to locate the insert 8 on the bed, the insert can be applied with its closed face against the bed and secured thereto by adhesive or double-sided adhesive tape.

25 When the connection mounting is in the form of a channel, provided the mouth of the channel is an appropriate size, the two plugs 14 may also fit into the mouth of the channel so as to engage and locate the channel. However, in an alternative version shown in Figures 7 and 8, the outer side of the closed face of the shell 6 is formed with an elongate rib 22 of a width to provide a tight fit into the mouth of the channel 24.

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Although the void former particularly described is designed for use with connection

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mountings in the form of internally threaded ferrules or channels, it is to be understood that the void former, and particularly the shell of the void former, can be configured for use with other types of connection mountings by providing a suitable interface between the shell and the connection mounting. It is also to be understood that the shell can be of a
5 shape other than the cuboid shape illustrated and its shape will be governed by the shape of the recess to be formed.

The embodiments have been described by way of example only and modifications are possible within the scope of the invention.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A void former for use in the casting of concrete wall panels to form a recess in a surface of the panel, the void former comprising a flexible shell of box-like form open at one side, an opposite side of the shell being closed and being adapted for co-operation with a connection mounting cast into the panel to be accessible via the recess in the panel, and a rigidifying insert locatable into the shell through the open side and being removable after casting to permit removal of the shell by flexing the shell from the recess thus formed.
2. A void former according to claim 1, wherein co-operation with the connection mounting is provided by a projection extending externally from the closed side of the shell.
3. A void former according to claim 2, wherein the connection mounting is an internally threaded ferrule into which the projection engages.
4. A void former according to claim 2, wherein the connection mounting is a channel having an open side and the projection fits into the open side of the channel.
5. A void former according to any one of claims 1 to 4, wherein the projection is formed integrally with the shell.
6. A void former according to any one of claims 1 to 5, wherein the rigidifying insert is of box-like form open at one side with an opposite side being closed, and the insert is able to be mounted within the flexible shell selectively with its open side or its opposite closed side adjacent the open side of the flexible shell.
7. A void former according to claim 6, wherein the rigidifying insert includes internal reinforcing webs which define cells extending between the closed and open sides of the insert.

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8. A void former according to claim 7, further comprising magnetic blocks locatable within at least some of the cells to secure the void former to a steel casting bed.

9. A void former according to any one of claims 1 to 8, wherein the shell and insert
5 are of cuboid shape.

10. A method of casting a recess in the surface of a concrete wall panel to provide access to a connection mounting within the panel, said method comprising the steps of:
providing a void former comprising a flexible shell of box-like form open at one
10 side and closed at an opposite side;
mounting within the interior of the shell a removable insert to rigidify the shell;
mounting the connection mounting to a projection externally at the closed side of the shell;
forming the panel by casting around the void former and connection mounting,
15 with the open side of the shell opening onto a face of the panel so as to be substantially flush therewith;
removing the rigidifying insert from the shell through the open side thereof after setting of the concrete; and
flexing the shell to remove the shell from the recess thus formed.

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11. A method according to claim 10, wherein the connection mounting is an internally threaded ferrule into which the projection is engaged.

12. A method according to claim 11, wherein there are two such projections each of
25 which engages within a respective internally threaded ferrule.

13. A method according to claim 10, wherein the connection mounting is a channel having an open side into which the projection engages.

30 14. A method according to any one of claims 10 to 13, wherein to form the recess in the upper face of the panel, the shell is orientated with its closed side lowermost and

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spaced upwardly from a casting bed whereby the open upper side of the shell lies level with the upper face of the panel.

15. A method according to any one of claims 10 to 13, wherein to form the recess in
5 the lower face of the panel against a casting bed, the shell is orientated with its open side lying against the casting bed.

16. A method according to claim 15, wherein the casting bed is made of steel and the
rigidifying insert is of hollow interior structure defining a series of cells which open onto
10 one side of the insert, the insert is orientated within the shell with its open side against the casting bed, and at least some of the cells contain magnetic anchors which serve to anchor magnetically the void former to the casting bed.

17. A method according to claim 15, wherein the insert within the shell is releasably
15 adhered to the casting bed.

18. A method according to any one of claims 10 to 17, wherein the shell and insert are of cuboid shape.

20 19. A void former substantially as hereinbefore described with reference to the accompanying drawings.

20. A method of casting a recess in the surface of a concrete wall panel, substantially as hereinbefore described with reference to the accompanying drawings.