A wall panel 12 comprises a cast concrete panel-skeleton 13 and a surface render 15 adhered to a front face of the panel-skeleton. The render is adapted to be formed into a stonework or brickwork façade. A lip 44 is formed around the panel-skeleton front face of between 5 and 15 mm width and is left uncovered with said surface layer. In use this protects the surface layer during handling and transportation. The panel may be used in a garage or shed structure wherein the joints between panels may covered with cover strips. A method of producing said panels is also claimed wherein the render may applied to the concrete panel with an L-shaped shuttering. There are further independent claims for the cover strip 60 which comprises a cast concrete skeleton 62 having front 61 and rear 63 surfaces, render 70 being applied to said front surface, and said rear surface incorporating a screw-receiving material core 66 which may extend the length of the strip.
Garage/Shed Structure

This invention relates to shed structures such as parking garages. Garages are frequently constructed from prefabricated concrete panels that are stood on end on a solid base and bolted edge to edge to form the walls of the garage. A similar approach can be taken with other buildings such as garden sheds, storage sheds and workshops.

BACKGROUND

Such buildings are unattractive in their basic form and it is common to pebble-dash the walls both to provide an attractive finish, per se, but also simply to hide the fact that the building is constructed from concrete panels by hiding the joints between them. It is also known to apply a layer of render in plastic form that is smoothed over the surface of the formed wall, covering the joints between the panels and which subsequently cures and is treated to give the appearance of brick or stonework. That is, the panel is provided with a stonework or brickwork façade.

Several different techniques are known. In the case of stonework, a mask may be formed that is pressed into the render surface before it has cured and so as to give the surface the contours of a stone wall. Once it has cured, the surface can then be painted to colour the “stones”. (Unless the context otherwise dictates, the use of inverted commas is to indicate the appearance of eg “stones” or “bricks”, rather than stones, or bricks, actually being intended.) In the case of brickwork, a thick layer of adhesive may be applied to the surface to which is subsequently applied a dust coating of an appropriate colour that is captured by the adhesive. Subsequently, a tool is applied to remove the colouring layer, in straight lines and exposing either the adhesive or the panel underneath to give the appearance of brick mortar. The removal continues outlining a brick-work pattern. By these means, the appearance of authentic brick- or stone-work can be achieved.

Such processes have been known for many years. However, it is now suggested that the problem of joints between adjacent panels can be solved by using a cover strip that also has the appearance of the stone or brick, but which is in the form of a dummy column. Although this create two joints where the column butts the wall (on either side of the joint between panels), these are less noticeable because each joint is in the angle
between the main wall and the column, rather than between two panels butted edge to edge and between which, in brick or stone wall terms, there should not be any joint at all.

The advantage of this arrangement is that the panels can then be pre-prepared in the factory under controlled conditions, rather than the having to treat an entire wall in situ and on-site. However, until the advent of more flexible cement compositions, such a process was still not always viable, but for an entirely different reason. That reason is simply the problem that many renders (that might otherwise be suitable) are too brittle to reliably survive the rigours of transportation and handling. When such renders are applied in the factory, by the time they have been transported to site and assembled, it is frequently the case that the render has cracked, despite the high rigidity of the concrete panels themselves. However, more flexible renders are now available that mitigate this problem substantially. Nevertheless, cracking and chipping of the edges during transportation and handling is still a problem.

The use of cover strips for the joints is well known. However, one known method of construction and attachment of the cover strip comprises a ply wood backing sheet on which the render has been applied. The render is subsequently treated in the same way as the panels, but so as to create a “column” of “bricks” or “stones”. The current method of fixing involves drilling several holes through the strip and through the joint between panels. A wall plug is then inserted between panel joints and a screw is inserted through the cover strip and into the wall plug to mechanically lock the cover strip in place. Generally, an adhesive grout is also applied to the ply wood sheet to provide a chemical fix against the panels, and to provide a seal that isolates the backing sheet. Finally, the screw is hidden by filling the aperture in which its head is received with the render material, and colouring it so that the screw is hidden. Accordingly, the cover strip cannot be removed without substantially destroying it, since it will be impossible to locate the screws. Moreover, the ply wood base will inevitably become a source of degradation over time.

It is an object of the present invention to solve the above mentioned problems, or at least to mitigate their effects.

BRIEF SUMMARY OF THE DISCLOSURE
In accordance with a first aspect of the present invention there is provided a wall panel comprising a cast concrete panel-skeleton and a surface render adhered to a front face of the panel-skeleton, said render being adapted to be formed into a stonework or brickwork façade, wherein a lip around the panel-skeleton front face of between 5 and 15 mm width is left uncovered with said surface layer.

Preferably, said rim is between 7 and 12 mm in width. Preferably the rim extends all the way around the panel.

In accordance with a second aspect of the present invention there is provided a garage or shed structure comprising panels as claimed in any preceding claim joined side-edge to side-edge to form walls of the structure, wherein the joint between side-edges of adjacent panels is hidden by cover strips, and a top edge of the panels is hidden by a roof of the structure.

Thus only the bottom edge is potentially visible after construction of the building, but this does not provide an eyesore but rather appears simply as the bottom edge of the brick or stonework.

In accordance with a third aspect of the present invention there is provided a method of construction of a wall panel as defined above, said method comprising the steps of:

- casting a panel-skeleton;
- forming a shuttering frame around the edges of the pane-skeleton, whereby said rim is covered;
- applying render over said front face to a depth equal to the thickness of the shuttering;
- treating the render to provide the panel with a stonework or brickwork façade; and removing said shuttering.

Preferably, said shuttering is L-shaped in section, one arm of the L lying against said face covering said rim, the other arm of the L lying against the edge of the panel-skeleton.

In accordance with a fourth aspect of the present invention there is provided a cover strip comprising a casting of cementitious material having front, rear and edge surfaces, and said rear surface incorporating a screw-receiving material core, and at least said
front surface comprising render treated to provide the strip with a stonework or brickwork façade.

Preferably, said core extends the full length of the strip. Preferably, the strip includes at least one metal reinforcement bar. Preferably, the strip is rectangular in section, and has two of said reinforcement bars, each being between said front and rear surfaces and substantially the same distance from a respective edge of the strip. Said core may also be rectangular in section and of a width between 25% and 75% the width of the strip and thickness between 25% and 75% the thickness of the strip.

Preferably, said core is of plastics material, preferably uPVC foam. If the material of the core does not bond to the concrete of the skeleton, it is undercut, whereby it is mechanically retained in the strip.

Optionally, the strip may have a cast concrete skeleton, wherein said render is applied to the skeleton after casting thereof.

In accordance with a fifth aspect of the present invention there is provided a garage or shed structure comprising panels joined side-edge to side-edge to form walls of the structure, wherein the joint between side-edges of adjacent panels is hidden by a cover strip as defined above and wherein a screw is driven between the panels from one side into the core of the cover strip on the other side and to secure the cover strip against the other side of the wall.

In accordance with a sixth aspect of the present invention there is provided a method of construction of a cover strip as defined above, comprising the steps of:

- disposing at least one reinforcing bar in a mould so that the bar is spaced from a floor and sides of the mould;
- disposing a screw-receiving material core on the floor of the mould, spaced from its sides;
- casting and curing cementitious render in the mould to capture the material core; and
- treating the render to provide the strip with a stonework or brickwork façade.

Preferably, render is also applied to the edges of the cast product. Preferably, said treating step comprises securing a plurality of rendered cast product side edge to side
edge in a jig and removing render in lines across the cast products. Preferably, lines of render are removed on site from the edge of the strips after they have been applied to a joint between panels, whereby a closer match with corresponding lines of the panels may be achieved.

Preferably, said treatment includes application of colour to said render. Preferably, said lines are removed using a router and guide therefore.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention are further described hereinafter, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of a wall constructed using panels and cover strips according to the present invention;

Figure 2 is a section on the lines A-A and partly on the line A-B-B-A in Figure 1;

Figure 3 is a plan view of a panel shown in Figure 1 during its rendering process;

Figure 4 is a section on the line D-D in Figure 3;

Figure 5 is a section through a cover strip on the line C-C in Figure 1; and

Figure 6 is a detail of the cover strip viewed in the direction of the Arrow X in Figure 5.

DETAILED DESCRIPTION

In Figure 1, a wall part 10 comprises to wall panels 12a,b butted edge to edge. Figure 2 shows a third wall panel 12c, and each panel comprises a cast concrete skeleton 13 and a render layer 15 applied to planar front face 14 of the skeleton and forming a brickwork or stonework façade. The panel 12 has a ribbed rear side 16, with ribs 18a,b,c providing strength and reinforcement. Indeed, the ribs 18a,c are at side edges 20a,b of the panels and the preferably extend around the entire periphery of the panel forming floor and ceiling ribs 18d.

The panel skeletons 13 are formed by casting concrete in suitably shaped moulds. The ribs 18 are preferably reinforced with bars 22. Periodically, the side ribs 18a,c are provided with through holes 24 so that, when two panels 12 are butted side to side, and appropriate wedge spacers 26 are inserted between them, they can be bolted together with nuts and bolts 30a,b and appropriately shaped washers 32. The shaped washers
32 and spacer 26 are required because the ribs 18 are tapered to facilitate removal of the mould product from the mould (not shown) that forms its skeleton 13.

When formed in, and removed from, the mould, a special frame 40 is mitred around the panel edges 20. In section, the frame is L-shaped, with the long part L₁ resting end-on to ground 50 and side-on against the side 20 of the panel skeleton 13. The short leg L₂ overlaps front face 14 of the skeleton by about 10 mm. Moreover the depth of the leg L₂ is about 12 mm so that when render 15 is spread into the shallow mould formed by front face 14 and frame 40, a smooth, even and constant depth facing is provided. Once set to a reasonable extent, the frame 40 is removed leaving a lip 44 of the skeleton 13 around its entire periphery uncovered by render 15. However, the render 15 is further treated by applying a face coat of coloured powder or paint as desired and depending on the texture required and then lines 46 are routed away exposing the render underneath that is arranged to have the colour of brick mortar. Finally, cross lines 48 are added so as to give the facing 15 a brick-wall-like appearance.

The panel 12 is now ready for transportation and handling. Because the render 15 is set back about one centimetre from the edge of the panel, it is not so susceptible to chip and crack damage as it would if it extended right to the edge. This is particularly important at the ground edge 44a, since the panels are frequently handled by sliding on the ground. Nevertheless, the sides are also susceptible and indeed may sometimes crack and chip so much that the crack appears beyond the edge of the cover strip to be described further below. Thus having the rib 44 going up the sides is useful. Indeed, only along the top edge does the rib not perform a particularly useful function, but even here, the frames 40 forming it may have assisted in maintaining the right depth of the render 15.

When bolted edge to edge as shown in Figures 1 and 2, the joint between adjacent panels is very obvious, particularly because of the ribs 40, but the joint would be evident in any event. It is impossible to disguise. Consequently, cover strips 60 are provided which, in fact, give the appearance of reinforcing columns.

As can be seen in Figures 2 and 5, a strip 60 comprises a rectangular casting 62 of cementitious render material, with front and rear faces 80,63 and reinforcing bars 64 adjacent each corner. On the floor of the mould (not shown) in which the strip 62 is cast there is disposed a screw-receiving material core 66 such as of wood or, preferably,
uPVC foam (such material does not deteriorate in time, of course). Thus the rear face 63 includes an exposed face of the core 66. If the material of the core does not adhere well to concrete, then it might require surface features that provide a mechanical key with the concrete. For example, it could be frusto-conical in section, whereas it is rectangular in Figure 2.

The strip 60 is rectangular in section. It has two of said reinforcement bars, each being between said front and rear surfaces and substantially the same distance from a respective edge 72 of the strip. The core is also rectangular in section and of a width about 50% of the width of the strip. The thickness of the core is about 40% the thickness of the strip.

Once cast, front and side surfaces of the render are preferably coloured, as appropriate, by application of dust or paint. Preferably, a number of strips 60 are then placed edge to edge, side by side in a jig (not shown) so that cuts 70 can be formed in an efficient manner in the front face 80 of the strips, using a router, for example, and appropriate guide. The lines or cuts 70 are arranged of course to correspond with the cuts 46 in the panels 12. However, it may be preferred to leave cuts in the sides 72 until the strips have been secured in place, since it may be desirable to match precisely the cuts 76 with the cuts 46. Such short transverse cuts (not visible) could thereby be slightly inclined if needed to ensure continuity.

The strips 60 are connected by screws 90 (see Figure 2) which are driven from the rear side 16 of the panels 12 through the gap between adjacent sides 20 and into the core 66. The point of the screw may penetrate into the concrete 62. When sufficient screws have been employed to fix the strip in place, the joint gap is filled with mastic 92 which serves to disguise the screws 90. However, should it be desired to dismantle the strips, or indeed, the entire garage or other structure formed by the panels 12, this can be achieved without damaging the panels or strips. A screw driver is simply thrust into the mastic 92 and drawn down the gap until a screw 90 is struck and located. The mastic can then be dug out from there and the screw undone. Then the bolts 30a,b can be undone if further dismantling is required.

The strips 60 hide and mask the vertical joints between panels. However, the lower lip 44a is visible in the finished article. However, there is nothing odd about this
appearance and simply provides a neat lower edge of the apparent “brickwork”. The top edge 44b is hidden by the roof and cutter overlaps (not shown).

Figure 6 shows a plan view of a strip, in the direction of the Arrow X in Figure 5, in which the lines 70, cut through the top, coloured surface of the fibre cement render, are visible. The lines are cut using a router with a TCT cutting tool and a steel template. The nature of the cementitious render, the colouring, the router and cutting tool and methods required to obtain straight lines are all within the skill of the person skilled in the art and require no further elucidation herein.

Throughout the description and claims of this specification, the words “comprise” and “contain” and variations of the words, for example “comprising” and “comprises”, means “including but not limited to”, and is not intended to (and does not) exclude other moieties, additives, components, integers or steps.

Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

Features, integers, characteristics, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.

The reader’s attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.
Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of any foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.
CLAIMS

1. A wall panel comprising a cast concrete panel-skeleton and a surface render adhered to a front face of the panel-skeleton, said render being adapted to be formed into a stonework or brickwork façade, wherein a lip around the panel-skeleton front face of between 5 and 15 mm width is left uncovered with said surface layer.

2. A wall panel as claimed in claim 1, in which said lip is between 7 and 12 mm in width.

3. A wall panel as claimed in claim 1, in which said rim extends all the way around the panel.

4. A garage or shed structure comprising panels as claimed in any preceding claim joined side-edge to side-edge to form walls of the structure, wherein the joint between side-edges of adjacent panels is hidden by cover strips, and a top edge of the panels is hidden by a roof of the structure.

5. A structure as claimed in claim 4, in which the bottom edge is visible after construction of the structure.

6. A method of construction of a wall panel as claimed in claim 1, 2 or 3, said method comprising the steps of:
   casting a panel-skeleton;
   forming a shuttering frame around the edges of the pane-skeleton, whereby said rim is covered;
   applying render over said front face to a depth equal to the thickness of the shuttering;
   treating the render to provide the panel with a stonework or brickwork façade; and
   removing said shuttering.

7. A method as claimed in claim 6, in which said shuttering is L-shaped in section, one arm of the L lying against said face covering said rim, the other arm of the L lying against the edge of the panel-skeleton.
8. A cover strip comprising a casting of cementitious material having front, rear and edge surfaces, and said rear surface incorporating a screw-receiving material core, and at least said front surface comprising render treated to provide the strip with a stonework or brickwork façade.

9. A cover strip as claimed in claim 8, in which said core extends the full length of the strip.

10. A cover strip as claimed in claim 8 or 9, in which the strip includes at least one metal reinforcement bar.

11. A cover strip as claimed in claim 10, in which the strip is rectangular in section, and has two of said reinforcement bars, each being between said front and rear surfaces and substantially the same distance from a respective edge of the strip.

12. A cover strip as claimed in claim 11, in which said core is rectangular in section and of a width between 25% and 75% the width of the strip and thickness between 25% and 75% the thickness of the strip.

13. A cover strip as claimed in claim 11 or 12, in which said core is of plastics material, preferably uPVC foam.

14. A cover strip as claimed in any of claims 8 to 13, which has a cast concrete skeleton, wherein said render is applied to the skeleton after casting thereof.

15. A garage or shed structure comprising panels joined side-edge to side-edge to form walls of the structure, wherein the joint between side-edges of adjacent panels is hidden by a cover strip as claimed in any of claims 8 to 14, wherein a screw is driven between the panels from one side into the core of the cover strip on the other side and to secure the cover strip against the other side of the wall.

16. A method of construction of a cover strip as claimed in any of claims 8 to 13, said method comprising the steps of:
   disposing at least one reinforcing bar in a mould so that the bar is spaced from a floor and sides of the mould;
disposing a screw-receiving material core on the floor of the mould, spaced from its sides;
casting and curing cementitious render in the mould to capture the material core; and
treating the render to provide the strip with a stonework or brickwork façade.

17. A method as claimed in claim 16, in which said treating step comprises securing a plurality of rendered cast product side edge to side edge in a jig and removing a surface layer of the render in lines across the cast products.

18. A method as claimed in claim 17, in which lines of said surface layer are removed on site from the edge of the strips after they have been applied to a joint between panels, whereby a closer match with corresponding lines of the panels may be achieved.

19. A method as claimed in claim 16, 17 or 18, in which said treatment includes application of colour to said surface layer render.

20. A method as claimed in any of claims 16 to 19, in which said lines across the cast products are removed using a router and guide therefor.

21. A wall panel and method of making the same substantially as hereinbefore described with reference to the accompanying drawings.

22. A cover strip for a wall panel and method of making the same substantially as hereinbefore described with reference to the accompanying drawings.
**Documents considered to be relevant:**

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<th>Category</th>
<th>Relevant to claims</th>
<th>Identity of document and passage or figure of particular relevance</th>
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<tr>
<td>Y</td>
<td>Y: 1-7</td>
<td>US 5735094 A (ZEMBER) See figures and concrete substrate 40 and a brick finish layer 46</td>
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<tr>
<td>Y</td>
<td>Y: 1-7</td>
<td>US 4590726 A (SALAZAR) See figures esp. concrete brick 10 and decorative facing 12</td>
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<tr>
<td>Y</td>
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<td>US 4644719 A (SALAZAR) See figures, esp. base layer 12 and decorative layer 14</td>
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<td>Y</td>
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<td>DE 4129636 A1 (KOCH) See figures and EPODOC, see esp. carrier plate 1 and separate coating with brick like appearance</td>
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<td>US 3004369 A (FINDLAY) See figures</td>
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**Categories:**

- X Document indicating lack of novelty or inventive step
- Y Document indicating lack of inventive step if combined with one or more other documents of same category.
- & Member of the same patent family
- A Document indicating technological background and/or state of the art.
- P Document published on or after the declared priority date but before the filing date of this invention.
- E Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC:

Worldwide search of patent documents classified in the following areas of the IPC:

- E04B; E04C; E04F; E04H

The following online and other databases have been used in the preparation of this search report:

- EPODOC & WPI
### International Classification:

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