

Accessories for Modular Wall Construction and Method for constructing a modular wall

Background and Field of the Invention

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The invention relates to accessories for modular wall construction, and method for constructing a modular wall.

Known are methods for forming structural walls from modular wall panels. In a
10 typical method, two or more primary modular wall panels are aligned to form a first face of the structural wall and the primary modular wall panels are then fastened together. Secondary modular wall panels are then aligned opposite of the first face and coupled to the primary modular wall panels to form a secondary face of the structural wall. However, the way the primary wall panels
15 are fastened together and how the secondary modular wall panels are coupled to the primary modular wall panels is complex.

It is an object of the present invention to provide a modular wall fastener, modular wall bracket and method for constructing a modular wall which
20 alleviates at least one of the disadvantages of the prior art and/or to provide the public with a useful choice.

Summary of the Invention

In accordance with a first aspect of the present invention, there is provided a modular wall fastener for fastening adjacent first and second modular wall panels together to form at least part of a wall, each of the first and second
5 modular wall panels including an outer face portion and a first and a second side portion, the fastener comprising a rod-like body having:

a pin portion insertable into and through respective aligned apertures of the second side portion of the first modular wall panel and the first side portion of
10 the second modular wall panel;

a main portion connected to the pin portion;

a clip portion connected to the main portion and configured to fasten the second and first side portions of the first and second modular wall panels together to align the respective outer face portions to form the at least part of the wall.

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An advantage of the described embodiment is that the "insert and lock/fasten" feature of the fastener makes it very easy to install modular wall panels. Also, it is easy to disassemble the wall panels since the fastener may be unclipped by releasing the clip portion from the first and second modular wall panels.

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Preferably, the pin portion comprises a threaded portion, which may receive a nut and spacer to tighten the second side portion of the first modular wall panel and the first side portion of the second modular wall panel to the modular wall fastener. The modular wall fastener may further comprise a stopper plate
25 disposed along the pin portion and configured to abut against the first side

portion of the second modular wall panel. Preferably, the stopper plate is fixedly mounted to the pin portion.

The main body portion may form an angle of about 139° with the pin portion.

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The clip portion may cooperate with the main body portion to form an engagement point for engagement against the first side portion of the second modular wall panel. In this way, this improves the engagement of the modular wall fastener to the first side portion of the second modular wall panel and the
10 second side portion of the first modular wall panel.

The clip portion may be generally U-shape. The clip portion may include a first elongate element connected to the main body portion, a second elongate element connected to the first elongate member at substantially 90° and
15 extends in a direction as the pin portion and a third elongate element connected to the second elongate member at substantially 90° and extends in a direction substantially parallel to the first elongate member. The modular wall fastener may also comprise an abutment portion connected to the third elongate member of the clip portion, the abutment portion extending at an angle of
20 between 45° and 50° with a longitudinal axis of the third elongate member.

In a second aspect of the invention, there is provided a bracket for supporting modular wall panels, the bracket comprising
a support structure having a first edge and a second edge;

first slot means which extends from the first edge and which is configured to receive a first engagement device for releasably mounting the bracket to a first modular panel which forms at least part of a primary face of the wall;

second slot means which extends from the second edge and which is
5 configured to receive a second engagement device of a second modular wall panel to support the second modular wall panel which forms at least part of a secondary face of the wall.

An advantage of the described embodiment is that by configuring the slot
10 means to extend from different edges, it makes the bracket versatile to be mounted to a modular wall panel and to support the second modular wall panel. Disassembly is also easy since the second modular wall need only be removed from the second slot means and likewise, the bracket may be easily removed.

15 The support structure may include a support frame configured to support a plurality of support members, the first slot means and the second slot means being disposed on respective ones of the plurality of support members.

Advantageously, the bracket may further comprise four support members projecting from the support frame, wherein the first slot means may be disposed
20 on the first and fourth support members, and the second slot means may be disposed on the second and third support members located between the first and fourth support members.

Each of the four support members may include the first edge and the second
25 edge and the first slot means of the first and second support members may be

configured to extend from the first edge; and the second slot means of the second and third support members may be configured to extend from the second edge.

- 5 As a variation, each of the support members may have a first short edge and a second short edge and the support frame may include a first frame portion which connects the first short edges of the first and second support member; a second frame portion which connects the second short edges of the second and third support member, and a third frame portion which connects the first short
10 edges of the third and fourth support member.

The bracket may also comprise first and second engagement devices, each engagement device includes an insert for inserting to an aperture of the first or second modular wall panel, and a screw which cooperates with the insert for
15 engagement with either the first slot means or the second slot means.

In a third aspect of the invention, the modular wall fastener as explained above may be packaged as a kit or combined with the bracket explained above.

- 20 A fourth aspect of the invention relates to a method of fastening adjacent first and second modular wall panels together to form at least part of a wall using a modular wall fastener as described above with each of the first and second modular wall panels including an outer face portion and a first and a second side portion, and the method comprises

inserting the pin portion into and through respective aligned apertures of the second side portion of the first modular wall module and the first side portion of the second modular wall panel; the pin portion arranged to cooperate with the aligned apertures to provide a pivoting point which enables the fastener to be
5 rotated about the pivoting point;

rotating the fastener about the pivoting point so as urge the clip portion to fasten the second and first side portions of the first and second modular wall panels together to align the respective outer face portions to form the at least part of the wall.

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If the pin portion includes a threaded portion, then the may further comprise inserting a spacer through the threaded portion, and fixing a nut which mates with the threaded portion so that the spacer engages with the second side portion of the first modular wall panel.

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In a fifth aspect of the invention, there is provided a method of constructing a modular wall using a plurality of brackets, each bracket according to features as described above, the modular wall being constructed from a first, second and third modular wall panels, each modular wall panels including an outer face
20 portion and a first and a second side portion, and the method comprises:

attaching an engagement device to respective apertures of the first, the second and the third modular wall panels;

mounting a first one of the plurality of brackets by slotting the respective engagement devices of the first modular wall panel into the first slot means of

25 the first one of the plurality of brackets;

mounting a second one of the plurality of brackets by slotting the respective engagement devices of the second modular wall panel into the first slot means of the second one of the plurality of brackets; the first and second modular wall panels being arranged side by side so that the respective outer face portions are aligned;

arranging the third modular wall panel opposite and offset from the first and second modular wall panels so that the outer face portion of the third one faces outside;

lifting the third modular wall panel to enable the respective engagement devices mounted of the third modular wall panel to be received in respective second slot means of the first one and second one of the plurality of brackets which is mounted to the first and second modular wall panels respectively.

The engagement device may include an insert for inserting into one of the apertures, and a screw which cooperates with the insert for engagement with either the first slot means or the second slot means.

Brief Description of the Drawings

An example of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a modular wall fastener according to a preferred embodiment of the present invention;

Figure 2 is a front view of the modular wall fastener of Figure 1;

Figure 3 is a side view of the modular wall fastener of Figure 1;

Figure 4 is a perspective view of a modular wall bracket according to the preferred embodiment of the present invention;

Figure 5 is a plan view of the modular wall bracket of Figure 4;

5 Figure 6 is a view of the modular wall bracket of Figure 5 in the direction AA;

Figure 7 is a view of the modular wall bracket of Figure 5 in the direction BB;

10 Figure 8 is a view of three modular wall panels placed side by side to form at least part of a primary face of a wall;

Figure 9 is a slightly enlarged cross sectional view of two of the modular wall panels (shown in broken lines) of Figure 8 in the direction CC;

Figure 10 is a side view from the direction DD of Figure 9;

Figure 11 is a front view from the direction EE of Figure 9;

15 Figure 12 shows the use of the fasteners of Figure 1 to lock the modular wall panels of Figure 8 together;

Figure 13 shows the construction of at least part of a secondary face of the wall of 8;

20 Figure 14 is an enlarged view of an engagement device for mounting the bracket of Figure 4 to one of the modular wall panels;

Figure 15 is a top view of the modular wall panels for the primary face and the modular wall panels the secondary face of the wall;

25 Figure 16 is a view of the bracket of Figure 4 which is used in Figure 13 and engagement devices for mounting the bracket to one of the modular wall panels;

Figure 17 is a top plan view of the primary face and the secondary face of the wall of Figure 13 made up respectively of three modular wall panels and 2 modular wall panels; and

Figure 18 is a variation of the bracket of Figure 4.

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Detailed Description of Preferred Embodiment

A first accessory for constructing modular walls is shown in Figure 1 and this is a perspective view of a modular wall fastener 100 according to a preferred
10 embodiment of the present invention. The modular wall fastener 100 has a rod-like body 102 and has a general J-shape structure. In this embodiment, the rod-like body 102 is made from a single length of steel rod. The rod-like body 102 has a generally cylindrical cross-section and is configured with a pin portion 104, a main body portion 106 connected to the pin portion 104, and a clip
15 portion 108 connected to the main body portion 106.

The pin portion 104 is substantially longitudinal, has a predetermined length t which will be further explained below, and has a threaded male end section 110 near a first free end 112 of the rod-like body 102. The modular wall fastener 100
20 includes a spacer 114 and a nut 116 with a corresponding threaded female section (not shown) to mate with the threaded male end section 110.

The modular wall fastener 100 also includes a stopper plate 118 fixedly mounted to the pin portion 104 at a position closer to the main body portion 116.
25 The distance between the stopper plate 118 and the first free end 112 of the

rod-like body 102 is predetermined according to size and shape of modular wall panels which is to be held together by the modular wall fastener 100. Figure 1 shows the spacer 114 and the nut 116 separate from the rod-like body 102 and Figure 2 shows the spacer 114 inserted into the threaded male end section 110 and the nut 116 mated with the threaded male end section 100.

The main body portion 106 is also substantially straight and is connected to the pin portion 104 at an acute angle 120 and in this embodiment, the acute angle is about 70° to 80°.

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The main body portion 106 is connected to the clip portion 108 which is generally U-shaped. The clip portion 108 includes a first elongate element 122 which is connected to the main body portion 106, a second elongate element 124 connected to the first elongate element 122 at substantially 90° and extends generally in a same direction as the pin portion 104, and a third elongate element 126 connected to the second elongate element 124 at substantially 90° and extends substantially parallel to the first elongate element 122 and towards the pin portion 104. In this way, the configuration of the pin portion 104, the main body portion 106 and the clip portion 108 forms the generally J-shape structure as discussed above.

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The first elongate element 122 of the clip portion 108 is connected to the main body portion 106 at an obtuse angle 128 to create an engagement point 130. In this embodiment, the obtuse angle 128 is about 139° (see Figure 3) and it is

envisaged that the obtuse angle 128 may be between about 135° and about 145°.

The clip portion 108 also includes an abutment portion 132 which extends from
 5 the third elongate element 126 at an angle offset from a longitudinal axis of the
 third elongate element 126. The angle is about 48° as shown in Figure 1.

A second accessory for constructing modular walls is shown in Figure 4 and this
 shows a modular wall bracket 200 according to the preferred embodiment of
 10 this invention.

The modular wall bracket 200 includes a support structure 202 made of steel
 plate which has a thickness of about 3mm. The support structure 202 is
 configured with a support frame 204 and a number of spaced apart support
 15 members 206,208,210,212 projecting from the support frame 204. Each of the
 support members 206,208,210,212 are substantially rectangular and have two
 long edges 206a,206b,208a,208b,210a,210b,212a,212b and two short edges
 206c,206d,208c,208d,210c,210d,212c,212d with one of the short edges
 206c,208c,210c,212c being connected to the support frame 204.

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Each of the support members 206,208,210,212 projects from the support frame
 204 in a same general direction and includes first and second slot means
 214,216,218,220. The first slot means 214,216 of the first and fourth support
 members 204,208 includes a slot 214a,216a which extends from one of the
 25 long edges 206b,208b. The second slot means 218,220 includes a slot

218a,220a which, on the other hand, extends from the other long edges 210a,212a respectively. In other words, the first and second slot means in this embodiment are disposed on different support members 206,208,210,212.

5 As shown in Figure 5, which is a plan view of the bracket 200 of Figure 4, the support frame 204 is profiled to match an inner surface of a modular wall panel to which the bracket 200 is to be mounted and in this embodiment, the bracket has a central portion 204a which is straight and end portions 204b which are slightly beveled so that the end portions 204b forms an inner angle of about
10 105° with the respective first and fourth support members 206,208. In this way, the bracket is able to conform to the profile of the inner surface of the modular wall panel.

The second and third support members 210,212 are connected to the central
15 portion 204a of the support frame 204 and each of the second and third support member 210,212 forms an angle of about 92° with respect to a longitudinal axis of the central portion 204a when measured between the second and third support members 210,212. The angle of about 92° is intended to conform to the profile of the modular wall panel and thus, other angles are envisaged
20 depending on the profile of the modular wall panel. It should be appreciated that the second and third support members 210,212 are longer than the first and fourth support members 206,208.

Figure 6 shows a view of the bracket 200 of Figure 4 in the direction AA to show
25 the fourth support member 208 more clearly. It should be appreciated that the

slot 216a has sides 216c which extends from the long edge 208b and tapers inwardly and to meet with a semi-circular end segment 216d. The slot 216a of the fourth support member 208 has a similar configuration as the slot 214a of the first support member 206.

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Figure 7 shows a view from the direction BB of the bracket of Figure 4 to show a configuration of the third slot means 220 of the third support member 212 more clearly. The slot 220a of the third slot means 220 has a main axis 222 which forms an angle of about 59° to 60° with the long edge 212a of the third support member 212. The slot 220a has a first side 220b which extends from the long edge 210a at the same angle of 59° to 60° and a second side 220c. The second side 220c which has a first portion 220d which forms an angle of substantially 90 with the long edge 210a and a second portion 220e which extends from the first portion 220d and which is substantially parallel to the first side 220c. The slot 220a is closed by a semi-circular head portion 220f. The first portion 220d and the first side 220b thus create a bigger opening at the long edge 210a for easier location of an engagement device with the slot 220a.

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Use of the fastener 100 and the bracket 200 will now be described.

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Figure 8 shows a wall 300 having a primary face 302. The wall 300 is formed from three modular wall panels 400,410,420 placed side by side to form the primary face 302 of a wall 300. In this embodiment, each the modular wall panels 400,410,420 are identical, although this may not be necessarily so. Each wall panel 400,410,420 includes a front portion 402,412,422 which are aligned

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to form the primary face 302 and two side portions 404,406,414,416,424,426 to form a generally C-shape cross section. Each pair of side portions 404,406,414,416,424,426 includes engagement apertures 408,409,418,419,428,429 (engagement apertures 418,428 are hidden from view in Figure 8) formed at predetermined locations and in this embodiment, the engagement apertures 408,409,418,419,428,429 are spaced apart by 150mm from each other. Other distances are envisaged depending on the application, although a distance of 150mm to 200mm is preferred since this has been found to enable the modular wall panels 400,410,420 to be used for almost all applications. Also, the modular wall panels 400,410,420 are usually fabricated in heights of between 2.7m and 3m and if the modular wall panels 400,410,420 need to be cut to custom the modular wall panels to certain applications, the distance of 150mm to 200mm has been found to be able to accommodate to such applications. This is particular useful since the modular wall panels 400,410,420 may be fabricated or manufactured with a standard configuration and depending on application, cut to size.

Figure 9 is a slightly enlarged cross sectional view of the first and second modular wall panels 400,410 in the direction CC with the first and second modular wall panels 400,410 shown in broken lines. As it can be appreciated, the second side portion 406 of the first modular wall panel 400 has a thickness t_1 and the first side portion 414 of the second modular wall panel 410 has a thickness t_2 . It should be appreciated that both of this thickness t_1 and t_2 may be the same.

With the first and second modular wall panels 400,410 arranged in an end to end relationship i.e. with the second side portion 406 of the first modular wall panel 400 arranged next to the first side portion 414 of the second modular wall panel 410, and the engagement apertures 409,418 aligned, the pin portion 104 of the fastener 100 is inserted through one of the aligned apertures 409',418' as shown in Figure 9 so that at least part of the threaded male section 110 protrudes beyond a combined thickness (t_1+t_2) of the second side portion 406 and the first side portion 414 of the first modular wall panel 400 and the second modular wall 410 respectively. In other words, the length t of the pin portion 104 needs to be longer than the combined thickness (t_1+t_2) so that the threaded male section 110 protrudes beyond the first side portion 406.

The stopper plate 118 of the fastener 100 is arranged to abut against an inner surface 414a of the first side portion 414 of the second modular wall panel 410 and the pin portion 104 cooperates with the aligned apertures 409',418' to provide a fulcrum for the fastener 100 to rotate (see arrow C in Figure 10) in order for the clip portion 108 to fasten the second side portion 406 of the first modular wall panel 400 and the first side portion 414 of the second modular wall panel 410 together.

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The profile of the clip portion 108 is configured to match the profile of the second side portion 406 and the first side portion 414 and the length of the second elongate element 124 of the clip portion 108 is configured to match the combined thickness (t_1+t_2) of the second side portion 406 and the first side portion 414 of the first modular wall panel 400 and the second modular wall 410

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respectively so that the third elongate element 126 frictionally engages an inner surface 406b of the second side portion 406 (see Figure 11). A tool, such as a hammer, may be used to knock the abutment portion 132 in the direction C shown in Figure 10 so that the clip portion 108 fastens the two side portions 404,416 together between the first elongate element 122 and the third elongate element 126.

Thereafter, the spacer 114 and the nut 116 is inserted into the threaded male section 110 so that the nut 116 mates with the threaded male section 110 to lock the fastener 100 in place. In this way, the two side portions 404,416 and thus, the two modular wall panels 400,410 are held together and constrained to move together.

Depending on the height of the modular wall panels 400,410,420, more than one fastener 100 may be used to lock the modular wall panels 400,410,420 together. As shown in Figure 12, three fasteners 100 are used to lock the first and second modular wall panels 400,410 together and likewise, three more fasteners 100 are used to lock the second modular wall panel 410 to the third modular wall panel 420.

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The fastener 100 is easy to use since a user need only insert the pin portion 104 into one of the aligned apertures 409,418 and then rotate the fastener 100 to lock or fasten the two side portions 404,416 together using the clip portion 108. The "insert and lock" action thus makes it very easier to hold two modular wall panels 400,410 together.

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With the modular wall panels 400,410,420 held together with the fasteners 100, the modular wall panels 400,410,420 are then connected to a top support (for example, a roof) and/or a bottom support (for example, a floor) by conventional means.

If it is necessary to construct a second face 304 for the wall 300, a further of fourth modular wall panel 430 is used as shown in Figure 13. For the sake of simplicity only the first and second modular wall panels 400,410 are shown in Figure 13. The fourth modular wall panel 430 is similar to the first three modular wall panels 400,410,420 and also has a front portion 432 and two side portions 434,436 to form a generally C-shape structure. The fourth modular wall panel 430 also includes engagement apertures 438,439 (apertures 439 hidden from view) formed at predetermined locations along the height of the fourth modular wall panel 430 as discussed earlier for the other three modular wall panels 400,410,420.

To mount the bracket 200 to an inner surface 401,411 of the first and second modular wall panels 400,410, an engagement device 500 is used and this is shown in Figure 14. The engagement device 500 includes a screw 502 with a head 504 at a distal end and a male threaded body 506 terminating at a proximal end with an Allen-key end portion 508. It should be appreciated that the head 504 also includes an Allen-key end portion for engagement by a suitable Allen-key although this is not shown in the drawings.

The engagement device 500 further includes an insert 510 having a circular head 512 and a cylindrical hollow body 514. The cylindrical hollow body 514 is substantially smooth and includes an inner female threaded portion 516 which extends throughout the hollow body 514 and to the circular head 512. The inner
5 female threaded portion 516 is configured to mate with the male threaded body 506 of the screw 502.

The user first selects the location to mount the bracket 200 to the first modular wall panel 400 and in this case, the row corresponding to the second pair of
10 engagement apertures 408,409 from the top is selected and these engagement apertures are referenced by 408",409". Likewise, the corresponding row of engagement apertures 418,419 in the second modular wall panel 410 is also selected and these engagement apertures are referenced by 418",419". To help the user decide which apertures 408,409 to use so that the fourth modular wall
15 panel 430 is suitably supported, in this embodiment, the engagement apertures 408,409 which are designated to support the brackets 200 are formed with an enlarged aperture head (not shown) so that the head 512 of the insert 510 is received in the enlarged aperture head so that the insert 510 is flushed with the surface of the side portions 404,406 of the first modular wall panel 400 as an
20 example. In this embodiment, the selected engagement apertures 408",409" are configured in this way and so are the engagement apertures 418",419" of the second modular wall panel 410. It should be appreciated that it is not necessary for the inserts 510 to be flushed and if this is the case, then all the engagement apertures 408,409 may be configured in the same way, and the user has the
25 flexibility to choose the locations of mounting the brackets 200.

As it can be seen from Figure 15, which is a top view of Figure 13 and with certain details omitted, two of the brackets 200 are mounted to each of the modular wall panels 400,410 and for the sake of explanation, the bracket 200 for the first modular wall panel 400 is designated as the first bracket 1200 with the additional of 1000 for like parts as the bracket 200. The bracket for the second modular wall panel 410 is designated as the second bracket 2200 with the additional of 2000 for like parts as the bracket 200. Four engagement devices 500 are used to mount the first and second brackets 1200,2200 to respective inner surfaces 401,411 of the first and second modular wall panels 400,410. Like parts of the engagement devices use like references with the additional of 1000 for the first engagement device, 2000 for the second engagement device, 3000 for the third engagement device and 4000 for the fourth engagement device.

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The cylindrical hollow body 1514 of the insert 1510 of the first engagement device 1500 is first inserted into or cast into the engagement aperture 408" of the first side portion with the head 1512 flushed within the engagement aperture 408" and its enlarged aperture head. With the insert 1510 inserted into or cast- in the engagement aperture 408", the screw 1502 is then inserted into the cylindrical hollow body 1514 of the insert so that the male threaded body 1506 mates with the inner female threaded portion 1516 of the cylindrical hollow body 1514. However, the screw 1502 is not tightened fully against the insert 1510 and there is a gap 1520 between the head 1504 of the screw 1502 and the head 1512 of the insert 1510.

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The second engagement device 2500 is similarly mounted to the engagement aperture 409" and likewise, there is a gap 2520 between the head 2504 of the screw and the head 2512 of the insert of the second engagement device 2500.

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When the first and second engagement devices 1500, 2500 are mounted to the first modular wall panel 400, the first bracket 1200 is then releasably mounted to the first and second engagement devices 1500,2500. This is performed by engaging the slots 1214a,1216a of the first and fourth support members 1206,1208 with the first and second engagement devices 1500,2500 respectively. Figure 16 shows the engagement more clearly without showing the first modular wall panel 400 and the inserts 1510. Thus, the gaps 1520,2520 are adapted to allow the slots 1214a,1216a to engage with the respective screws 1502,2502.

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The second bracket 2200 is similarly mounted to the second modular wall panel 410 using the third and fourth engagement devices 3500,4500 (see Figure 15). When the brackets 1200,2200 are mounted in place, the brackets 1200,2200 are ready to support the fourth modular wall panel 430.

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Next, additional engagement devices 5500,5600 similar in configuration as the bracket 200 are similarly inserted into the second row of the engagement apertures 438",439" of the fourth modular wall panel 430 in the same manner as described above and gaps 5520,5620 in the respective engagement devices 5500,5600 are created to accommodate the third support member 1212 of the

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first bracket 1200 and the second support member 2210 of the second bracket 2200.

With the additional engagement devices 5500,5600 mounted to the fourth modular wall panel 430 as explained above, the fourth modular wall 430 is placed in an opposing relationship with the modular wall panels 400,410,420 of the first primary face 302 of the wall 300 so that side portions 434,436 face inner surfaces 401,411 of the respective first and second modular wall panels 400,410. In other words, the fourth modular wall panel 430 is offset with respect to the modular wall panels 400,410,420 which form the primary face 302 of the wall.

The fourth modular wall 430 is then lifted up slightly so that the gaps 5520,5620 are received in respective slots 1220a of the third support member 212 of the first bracket 200 and the slot 2218a of the second support member 2210 of the second bracket 2200. In this way, the slots 1220a,2218a of the respective first and second brackets 1200,2200 support the opposing fourth modular wall panel 430.

It should be appreciated that due to the offset, the third support member 1212 of the first bracket 1200 and the second support member 2210 of the second bracket 2200 support the fourth modular wall panel 430. This means that the second support member 1210 of the first bracket 1200 is configured to support an opposing end modular wall panel 450 and likewise the third support member 2212 of the second bracket 2200 is configured to support a further modular wall

panel 440 as shown in Figure 17. The end modular wall panel 450 is similar to the fourth modular wall panel 430 except that the end modular wall panel 450 is about half the width of the fourth modular wall panel 430 and with one side portion 452. As it may be appreciated from Figure 17, the end modular wall panel 450 is supported by attaching an engagement device 5700, similar to the engagement device 500, to an aperture on the side portion 452 so that the end modular wall panel 450 is supported by the second support member 1210 of the first bracket 1200, in a similar manner as the fourth modular wall panel 430. A further end modular wall 460, similar to the modular wall panel 450 although configured in a different orientation, is used to complete the second face 304 of the wall as shown in Figure 17.

Depending on the height of the modular wall panels 400,410,420,430, more brackets 200 may be used. For example, in Figure 13, each modular wall panel 400,410 has three brackets 200 mounted along its height, and as explained earlier the user may be guided by where to mount the brackets 200 based on the location of the apertures with enlarged aperture heads

With the above, the primary face 302 and the primary face 304 of the wall 300 is formed with ease. As it can be appreciated, the modular wall panels 400,410,420,430,440 may be the same and this result in higher productivity in manufacturing and installation works.

By providing the slots 214a,216a on the bracket 200 to engage the modular wall panel for the primary face of the wall and the modular wall panel for the

secondary face of the wall, this leads to greater flexibility since the modular wall panels need only be fabricated with predetermined engagement apertures 408,409 and the user then mounts the engagement devices 500 to support the brackets 200. With the first and second slot means 214,216,218,220 formed on
5 opposing edges of support members 206,208,210,212, this creates more flexibility since the bracket 200 may also be releasably mounted to the modular wall panels 430,440 for the secondary face 304 of the wall and supporting the modular wall panels 400,410,420 of the primary face 302 of the wall.

10 With the fastener 100 as proposed, it is relatively quick to secure modular wall panels together and any adjustment is possible with the threaded end portion 110 and the nut 116.

With the proposed accessories 100,200 and method of assembling the modular
15 wall panels, it is possible to construct walls with lower cost, greater speed and of better quality. Further, this also promotes "green" technology since the wall panels, the fastener 100, and the bracket 200 may be re-used and recycled.

The described embodiment is not to be construed as limitative. For example,
20 the first, second and third elongate elements of the clip portion 108 need not be at 90° to each other. Instead other angles are envisaged, such as between 85° and 95° etc as long as the elongate elements are able to carrying out the fastening function. Also, the stopper plate 118, the spacer 114 and the nut 116 may not be necessary and the pin portion 104 may not have the threaded end

portion 110 since the locking or fastening action may be achieved by the clip portion 108.

Further, the abutment portion 132 may not be necessary but preferred since it provides a place for the user to forcefully knock the fastener 100 so that the clip portion 108 frictionally engages the two side portions of two modular wall panels together.

The angle which the pin portion 104 forms with the main body portion 106 and the angle which the main body portion 106 forms with the clip portion 108 are exemplary only and these angles may change depending on the configuration of modular wall panels. Also, the configuration (length and angles etc) of the first elongate element 122, the second elongate element 124 and the third elongate element 126 of the clip portion 108 may change depending on the configuration of the modular wall panels.

Further, the configuration of the bracket 200 may change. For example, it is envisaged that the bracket 200 may be formed from a single piece of metal plate. Such a variation 600 is shown schematically in Figure 18 which is a perspective view of the bracket 600. The bracket 600 includes a support structure 602 having a first support frame 603 having first and fourth support members 604,606 which also includes slots 604a,606a for engagement with respective engagement devices 500 of a modular wall panel for the primary face of the wall. The slots 604a,606a of the first and fourth support members 604,606 are similar to the slots 214a,216a of the bracket 200.

The support structure 602 further includes second and third support members 608,610 having a first edge which connects the first support frame 603 and a second edge which is supported by a second support frame 605. In this way, the opening between the second and third support members 608,610 opens up in a different direction as the opening between the first and second support members, and the opening between the third and fourth support members. The opening between the second and third support members are arranged to receive two side portions of opposing modular wall panels so that these side portions are received in slots 608a,610a provided on the second and third support members 608,610 in the same way as the second and third support members 210,212 of the bracket 200 of Figure 4.

Instead of steel or other types of metal, the bracket 200 may be formed from other composite materials such as high tensile strength plastic.

In the described embodiment, a number of brackets 200 are mounted to the modular wall panels 400,410,420 which form the primary face of the wall and the brackets 200 are then used to support opposing modular wall panels 430,440 which forms the secondary face of the wall.

Having now fully described the invention, it should be apparent to one of ordinary skill in the art that many modifications can be made hereto without departing from the scope as claimed.

CLAIMS

1. A modular wall fastener for fastening adjacent first and second modular wall panels together to form at least part of a wall, each of the first and second modular wall panels including an outer face portion and a first and a second side portion, the fastener comprising a rod-like body having:
 - a pin portion insertable into and through respective aligned apertures of the second side portion of the first modular wall panel and the first side portion of the second modular wall panel;
 - a main portion connected to the pin portion;
 - a clip portion connected to the main portion and configured to fasten the second and first side portions of the first and second modular wall panels together to align the respective outer face portions to form the at least part of the wall.
2. A modular wall fastener according to claim 1, wherein the pin portion comprises a threaded portion.
3. A modular wall fastener according to any preceding claim, further comprising a stopper plate disposed along the pin portion and configured to abut against the first side portion of the second modular wall panel.
4. A modular wall fastener according to claim 3, wherein the stopper plate is fixedly mounted to the pin portion.

5. A modular wall fastener according to any preceding claim, wherein the main body portion forms an angle of about 139° with the pin portion.
- 5 6. A modular wall fastener according to any preceding claim, wherein clip portion cooperates with the main body portion to form an engagement point for engagement against the first side portion of the second modular wall panel.
- 10 7. A modular wall fastener according to any preceding claim, wherein the clip portion is generally U-shape.
8. A modular wall fastener according to claim 7, wherein the clip portion includes a first elongate element connected to the main body portion, a
15 second elongate element connected to the first elongate member at substantially 90° and extends in a direction as the pin portion and a third elongate element connected to the second elongate member at substantially 90° and extends in a direction substantially parallel to the first elongate member.
- 20 9. A modular wall fastener according to any preceding claim, further comprising an abutment portion connected to the third elongate member of the clip portion, the abutment portion extending at an angle of between 45° and 50° with a longitudinal axis of the third elongate member.

10. A bracket for supporting modular wall panels, the bracket comprising a support structure having a first edge and a second edge; first slot means which extends from the first edge and which is configured to receive a first engagement device for releasably mounting the bracket to a first modular panel which forms at least part of a primary face of the wall;
- second slot means which extends from the second edge and which is configured to receive a second engagement device of a second modular wall panel to support the second modular wall panel which forms at least part of a secondary face of the wall.
11. A bracket according to claim 10, wherein the support structure includes a support frame configured to support a plurality of support members, the first slot means and the second slot means being disposed on respective ones of the plurality of support members.
12. A bracket according to claim 11, further comprising four support members projecting from the support frame, wherein the first slot means are disposed on the first and fourth support members, and the second slot means are disposed on the second and third support members located between the first and fourth support members.
13. A bracket according to claim 12, wherein each of the four support members includes the first edge and the second edge, the first slot means of the first and second support members being configured to

extend from the first edge; and the second slot means of the second and third support members being configured to extend from the second edge.

14. A bracket according to claim 13, wherein each of the support members
5 has a first short edge and a second short edge, the support frame including a first frame portion which connects the first short edges of the first and second support member; a second frame portion which connects the second short edges of the second and third support member, and a third frame portion which connects the first short edges of
10 the third and fourth support member.
15. A bracket according to any of claims 10 to 14, further comprising first and second engagement devices, each engagement device includes an insert for inserting to an aperture of the first or second modular wall
15 panel, and a screw which cooperates with the insert for engagement with either the first slot means or the second slot means.
16. In combination, a modular wall fastener according to any of claims 1 to 9 and a bracket according to any of claims 10-15.
- 20
17. A method of fastening adjacent first and second modular wall panels together to form at least part of a wall using a modular wall fastener according to any of claims 1 to 9, each of the first and second modular wall panels including an outer face portion and a first and a second side
25 portion, the method comprising

inserting the pin portion into and through respective aligned apertures of the second side portion of the first modular wall module and the first side portion of the second modular wall panel; the pin portion arranged to cooperate with the aligned apertures to provide a pivoting point which enables the fastener to be rotated about the pivoting point; rotating the fastener about the pivoting point so as urge the clip portion to fasten the second and first side portions of the first and second modular wall panels together to align the respective outer face portions to form the at least part of the wall.

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18. A method according to claim 17, wherein the pin portion includes a threaded portion, and the method further comprises inserting a spacer through the threaded portion, and fixing a nut which mates with the threaded portion so that the spacer engages with the second side portion of the first modular wall panel.

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19. A method of constructing a modular wall using a plurality of brackets, each bracket according to any of claims 10 to 15, the modular wall being constructed from a first, second and third modular wall panels, each modular wall panels including an outer face portion and a first and a second side portion, the method comprising:
- attaching an engagement device to respective apertures of the first, the second and the third modular wall panels;

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mounting a first one of the plurality of brackets by slotting the respective engagement devices of the first modular wall panel into the first slot means of the first one of the plurality of brackets;

5 mounting a second one of the plurality of brackets by slotting the respective engagement devices of the second modular wall panel into the first slot means of the second one of the plurality of brackets; the first and second modular wall panels being arranged side by side so that the respective outer face portions are aligned;

10 arranging the third modular wall panel opposite and offset from the first and second modular wall panels so that the outer face portion of the third one faces outside;

lifting the third modular wall panel to enable the respective engagement devices mounted of the third modular wall panel to be received in respective second slot means of the first one and second one of the plurality of brackets which is mounted to the first and second modular wall panels respectively.

20. A method according to claim 19, wherein the engagement device includes an insert for inserting into a said aperture, and a screw which
20 cooperates with the insert for engagement with either the first slot means or the second slot means.