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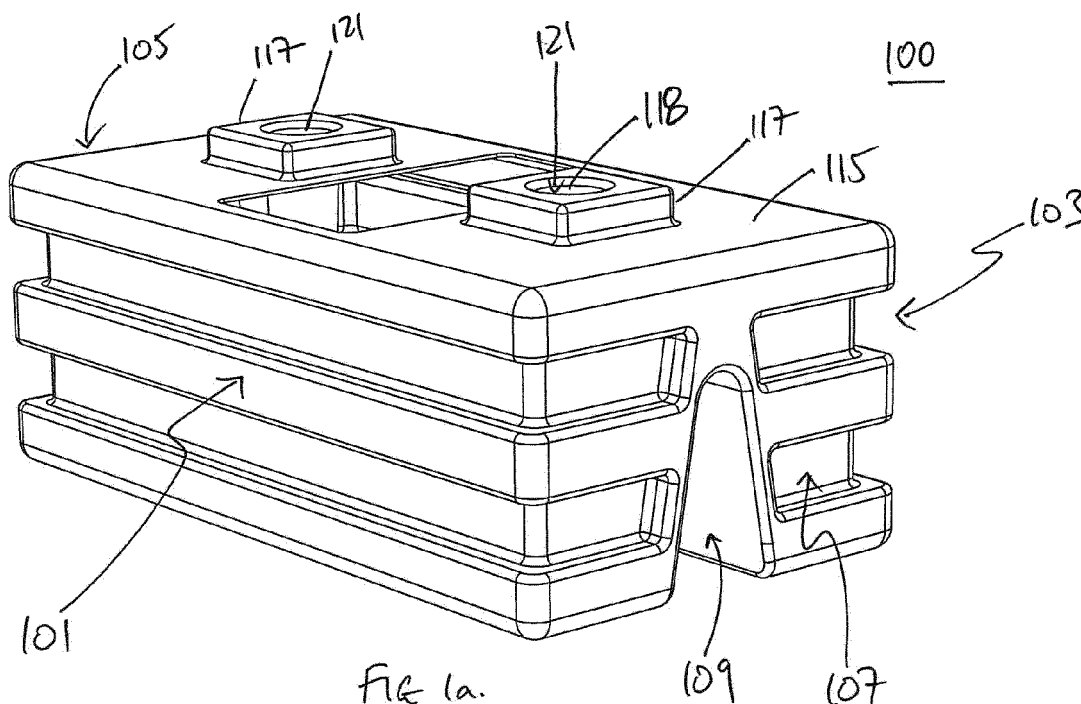
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(54) **Modular block system, apparatus and method**

(57) A modular block, comprises a front surface, a rear surface and two sides each side extending between an edge of the front surface and an edge of the rear surface of the block, a channel extending through the block

between the two sides and open at a bottom surface of the block, and a through-bore extending between a top surface of the block and into the channel to receive an arm of a lifting or support member.



Description

[0001] The invention relates generally to modular blocks and more particularly to a system of modular blocks which can be moved and connected in various ways.

[0002] Blocks for the construction of walls and structures are known. Typically, these blocks are formed from cast cementitious material. They typically have a front face, a rear face, and two sides with each side extending between an edge of the front face and an edge of the rear face of the blocks. They can be laid in courses 'dry' or with mortar. In either case, transportation and rapid deployment are issues, as is the disadvantage that such blocks can typically only be used a very limited number of times, with re-use requiring a significant investment of time and energy for reclamation.

[0003] Systems of interlocking construction blocks, such as reusable blocks, are also known in which blocks can be connected together to form a wall or structure. Normally, such blocks are cumbersome and heavy, which makes transportation and deployment difficult and time consuming. In addition, deployed blocks cannot typically be interlocked in a way that prevents them from being tampered with, which can be an issue where such blocks are used to form protective or defensive barriers for example.

[0004] According to an example, there is provided a modular block, comprising a front surface, a rear surface and two sides each side extending between an edge of the front surface and an edge of the rear surface of the block, a channel extending through the block between the two sides and open at a bottom surface of the block, and a through-bore extending between a top surface of the block and into the channel to receive an arm of a lifting or support member. The top surface can include a projecting portion extending outwardly from the top surface around the area defining the entrance of the through-bore. The bottom surface can include respective recessed portions on either side of the opening defined by the channel on the bottom surface that are complementary to and arranged to engage with a projecting portion of a complementary block. Multiple edges of the block can be tapered, chamfered or otherwise beveled. In an example, the channel can run parallel to a long axis of the block, or parallel to any of the front, rear, top or bottom surfaces. The side walls of the channel can diverge outwardly towards the bottom surface. The top of the channel can be curved, or can be flat.

[0005] In an example, the through-bore can extend from the top surface to form an opening at the top of the channel. The opening to the through-bore on the top surface of the block can be positioned centrally between the front and rear surfaces. The block can include a second or more through-bore positioned centrally between the front and rear surfaces, the said through-bore and the said second or more through-bore positioned in spaced relation on the top surface. At least one of the front, rear

and side surfaces can define alternating grooves and lands for a block. In an example, the block is solid and formed from concrete. Alternatively, the block can be formed from a plastics material, and includes an inlet whereby to fill a void within the block with any of cement, concrete, water or other liquids, sand or other aggregate.

[0006] In an example, the channel is adapted to receive a wire, rod, bar or other such means whereby to pass through an aperture of the arm of the said lifting or support member when placed in the through-bore, thereby to releasably secure the lifting or support member to the block. The channel can be adapted to receive a wire, rod, bar or other such means whereby to pass through respective apertures of arms of a lifting or support member when placed in the through-bore, thereby to releasably secure the lifting or support member to the block. In an example, a modular block is adapted to engage with a complementary modular block in courses, the upper most course to receive the said support member.

[0007] According to an example, there is provided a modular block apparatus, comprising a modular block as claimed in any preceding claim, a lifting or support member, including an arm with an aperture, and a wire, rod, bar or other such means. The lifting member can be used to lift the block when the member is fixed to the block using the wire, rod, bar or other such means. The support member can support a fencing panel fixed to the block using the wire, rod, bar or other such means for example. The lifting or support member can be used to secure multiple blocks together using the wire, rod, bar or other such means.

[0008] According to an example, there is provided a method, comprising providing a modular block as hereinafter described, providing a lifting or support member with an arm including an aperture, securing the lifting or support member to the block using a wire, rod, bar or other such means by passing the same through the aperture of the arm when the arm is placed in a through-bore of the block. The method can further comprise securing a further block to the said block using a further arm of the said lifting or support member by passing the wire, rod, bar or other such means through an aperture of the further arm when the said further arm is placed in a through-bore of the said further block. The method can further comprising using the lifting member to lift the block.

[0009] According to an example, there is provided a fencing panel for use with a modular block apparatus as herein described. According to an example, there is provided a lifting member for use with a modular block apparatus as herein described. According to an example, there is provided a support member for use with a modular block apparatus as herein described.

[0010] An embodiment of the present invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:

Figure 1a is a schematic perspective view of a mod-

ular block according to an example;

Figure 1b is a schematic bottom perspective view of a modular block according to an example;

Figure 2a is a schematic top perspective view of a modular block according to an example;

Figure 2b is a schematic bottom perspective view of a modular block according to an example;

Figure 3a is a schematic perspective view of a modular block and lifting member according to an example;

Figure 3b is a schematic perspective view of a modular block and lifting member according to an example;

Figure 4a is a schematic perspective view of a modular block and lifting member according to an example;

Figure 4b is a schematic perspective view of a modular block and lifting member according to an example;

Figure 5a is a schematic perspective view of modular blocks and fencing according to an example;

Figure 5b is a schematic perspective view of modular blocks and fencing according to an example; and

Figure 6 is a schematic exploded perspective view of modular blocks and fencing according to an example.

[0011] Figure 1a is a schematic perspective view of a modular block according to an example. The modular block 100, comprises a front surface 101, a rear surface 103 and two sides 105, 107 each side extending between an edge of the front surface 101 and an edge of the rear surface 103 of the block 100. A channel 109 extends through the block 100 between the two sides and is open at a bottom surface 111 of the block. A through-bore, hole or channel 121 extends between a top surface 115 of the block 100 and into the channel 109. The through-bore 121 can receive an arm of a lifting or support member as will be described below, and is profiled and oriented in the block to accommodate such an arm.

[0012] The top surface 115 can include a projecting portion 117 extending outwardly from the top surface 115 around the area defining an entrance 118 of the through-bore 121. The projecting portion 117 can be square, rectangular or any other desired shape, and can project by any desired amount from the top surface of the block.

[0013] Figure 1b is a schematic bottom perspective view of a modular block according to an example. The

bottom surface 111 includes respective recessed portions 123, 125 on either side of the opening defined by the channel 109 on the bottom surface 111. In an example, the portions 123, 125 are complementary to and arranged to engage with a projecting portion 117 of a complementary modular block according to an example.

[0014] With reference to figures 1a and 1b, it can therefore be seen that a column or course of modular blocks according to an example can be stably built by aligning projections 117 with the complementary portions 123, 125 so that when blocks are seated atop one another a projection of a lowermost block sits within the recess defined by the portions of the block seated thereon. Typically, a modular block will be an elongate block with multiple such projections and recesses as shown in figures 1a and 1b. Accordingly, stability can be increased by staggering courses of blocks so that a projection of one block sits in a recess defined by the portions of a block to be placed on top thereof such that another projection of the lowermost block sits in a recess defined by the portions of a different block to be placed on top thereof and juxtaposed with the other upper block (such as can be seen in figures 5a and 5b for example).

[0015] In an example, a modular block 100 can have multiple edges which are tapered or otherwise profiled so as to round or chamfer the edges. In particular, projections 117 and recesses portions 123, 125 can include tapered, chamfered or beveled edges thereby by reduce accuracy of alignment required when deploying blocks. That is, such tapered or beveled edges provide a degree of latitude which is beneficial when blocks are lined up and engaged since any deviation from perfect alignment can be accommodated and projections and so on will naturally seat themselves into recesses. Of course, it will be appreciated that the edges of block need not necessarily be profiled as described above.

[0016] In an example, the channel 109 runs parallel to a long axis of the block 100, or parallel to any of the front 101, rear 103, top 115 or bottom surfaces 111 for example. That is, the channel 109 is arranged to pass along the length of the block 100 in alignment with a long axis thereof. The channel 109 is positioned centrally within the block 100 in an example, but can be offset from centre if desired. In an example, the side walls 130 of the channel 109 diverge outwardly towards the bottom surface 111. The channel therefore forms a u-shape with the top of the channel 131 being curved. Other alternatives are possible. For example, the channel 109 can have side walls 130 that run parallel to surfaces 101, 103. The top portion 131 can be flat, and define a surface that runs parallel to surface 115.

[0017] According to an example, a through-bore 121 extends from the top surface 115 to form an opening at the top of the channel 109. That is, a hole is formed that extends from the top surface, through the block, out to the channel 109. Typically, the through-bore 121 is circular, but it will be appreciated that it may have any cross-sectional shape, which can be constant along the length

thereof, or vary as desired, such by narrowing, widening, or changing in shape.

[0018] In an example, the opening of the through-bore 121 on the top surface 115 of the block 100 is positioned centrally between the front 101 and rear 103 surfaces. That is, the through-bore lies at position that is substantially equidistant from the edges of the front and rear surfaces with the top surface. Other alternatives are possible, and in one example, one or multiple through-bores can be positioned anywhere and at any orientation for a modular block. Typically however, a through-bore will be positioned centrally on a top surface of a block.

[0019] As shown in figures 1a and 1b, block 100 includes a second through-bore that is also positioned centrally between the front 101 and rear 103 surfaces, and which is positioned in spaced relation on the top surface 115 from the other through-bore. In an example, an elongate modular block, such as depicted in figures 1a and 1b, amongst others, includes at least two through-bores that are respectively positioned at equal distances from the side surfaces 105, 107. Positioning through-bores symmetrically in the block 100 enables there to be an equal distribution of weight of the block 100 when the block is lifted as will be described below. An irregular or eccentric positioning of through-bores, there being one or more, leads to a weight imbalance that could cause the block to swing, skew and so on and lead to unwanted strain on the block and on other parts of an apparatus according to an example. In some circumstances, an irregular or eccentric disposition of through-bores can be desired however, such as in the case of an irregularly shaped block, and the present invention is not intended to be limited to instances of symmetric placement of through-bores.

[0020] In an example, at least one of the front, rear and side surfaces of a block can define alternating grooves and lands. These can be for aesthetic purposes, to reduce the weight of the block, or for purposes relating to engagement of complementary blocks. For example, a protruding portion of one block can be arranged to fit within a groove of another block, thereby increasing the stability and security of the pairing.

[0021] Figures 2a and 2b are schematic perspective views of a modular block according to an example. The same elements are present in the block of figures 2a and 2b as those noted with reference to figures 1 and 1b. However, in this case, the block is square in shape (cuboidal) with corresponding changes to the positioning of the through-bore for example. That is, the through-bore of these figures is centrally placed in the block and there is only one. Whilst more than one is possible, the size of the block in this example dictates that one is sufficient or desirable.

[0022] In an example, a modular block is solid and typically devoid of any cavities or voids therein. For example, a block can be formed from concrete or other such suitable hardwearing, and resilient material that can be introduced into a suitable mold to form such blocks. A suit-

able mold can be a pre-formed steel mold for example. The walls of a molded block can be flat or can include lands or grooves.

[0023] In another example, a block can be formed from a plastics material. For example, a plastics material can be injection molded to form a block that includes an inside region defined by the walls of the block. The inside cavity can be sealed from the outside, and can include an inlet 150 whereby to fill the void within the block with any suitable material. For example, a plastic block can be filled, fully or partially, with cement, concrete, water or other liquids, sand or other aggregate for example. Typically, a block will be filled to a level and with a material that ensures that the block is stable and secure once deployed. Accordingly, a minimum weight may be specified depending on the material with which the block is to be filled.

[0024] Figures 3a and 3b are schematic perspective views of a modular block and lifting member according to an example. The apparatus 300 of figures 3a and 3b comprises a block 301, such as described with reference to figures 1a-b and 2a-b above, a lifting member 303 and a securing member 305. In an example, securing member 305 is a wire, rod, bar or other such resilient elongate means.

[0025] A lifting member 303 according to an example comprises one or more arms 307 connected to a cross beam 309 that can include a lifting hook, or similar, 311. An arm 307 includes an aperture 313 therethrough. In the example of figures 3a and 3b, the arms 307 are spaced so that they can be introduced into the through-bores of the block 301. In use, arms 307 of the member 303 are introduced or fed into the through-bores of a block until a point where the cross beam 309 contacts the block or otherwise until a point where the arms are sufficiently introduced into the block. Typically this will be at the point where the bottom of the arms extend into the channel 309 of the block. Apertures 313 are arranged towards the bottom of the arms 307 as shown, and therefore, in use, extend into the channel 309 when the arms are introduced fully into the through-bores.

[0026] Securing member 305 can then be fed through the channel 309 and through the apertures 313 of arms 307 thereby securing the member 303 to the block as shown in figure 3b. At this point, with the member 305 tensioned if appropriate, the block 301 can be lifted, using hook 311 for example. The member 303 is releasably secured to the block since the member 305 can be removed from the arms 307 when the member 303 is not under load. In an example, member 305 can be a wire, rod, bar or other such means. For example, member 305 (or 503 and so on) can be any elongate, resilient member capable of securing apparatus to blocks and capable of being held under tension when such blocks are lifted for example. The profile of a member in this connection can vary as desired, and be circular, square and so on. Similarly, the thickness can vary depending on the material used for the member, and thus the strength etc, and the

shape of the apertures of the arms for example. At the end point of a course of blocks (or for a single block for example), member 305 can be terminated by connecting it to the outside of the final block in a course for example, or by anchoring it to the ground or some other suitable anchor point to enable the member to remain in position and to prevent tampering.

[0027] Similarly to the above, figure 4a and 4b are schematic perspective views of a modular block and lifting member according to an example. However, in this case a smaller block 400 is provided with only one through-bore. A suitable lifting member 401 with a single arm 403 and aperture 405 is therefore used to lift the block 400 in a similar fashion to that described above.

[0028] According to an example, modular blocks as described can engage with complementary modular blocks in courses. As described above, stability can be increased by staggering courses of the blocks so that a projection of one block sits in a recess defined by the portions of a block to be placed on top thereof such that another projection of the lowermost block sits in a recess defined by the portions of a different block to be placed on top thereof and juxtaposed with the other uppermost block. In this connection, figures 5a and 5b are schematic perspective views of modular blocks according to an example, which include support members for fencing for example.

[0029] Two courses of modular blocks according to an example are depicted, an uppermost course 501 and a lowermost course 500. As shown, the uppermost course 501 is composed of blocks that are staggered in position in relation to the lowermost course 500. As will be appreciated, a wall such as that depicted in figures 5a and 5b will be subject to stresses. Accordingly, it is common for the purposes of strengthening to ensure that joins between blocks do not vertically align in any two successive courses.

[0030] As can be seen in figure 5b, arms or support members for an apparatus to be supported, such as fencing for example, are introduced into the through-bores of blocks. Similarly to the provision of ensuring that joins between blocks do not vertically align in any two successive courses, respective arms for one apparatus can be introduced into different blocks as depicted. That is, one elongate modular block according to an example can accommodate arms from multiple such apparatus to be supported.

[0031] As shown in figure 5b, the member 503 is fed through channel 505 and through apertures in arms as described above in order to secure the arms and thus the apparatus to be supported (or the lifting member) to the blocks in question. In the example, shown the apparatus to be supported consists of fencing panels 507, each of which includes two arms. Thus, one panel 507 spans two blocks as shown, and is secured in place using member 503 so that the panel 507 is held securely in place and cannot be removed unless the member 503 is removed from its corresponding apertures 509. Natural-

ly, to do so would be a burden to anyone desiring to remove the fencing without permission. As a result of the weight, for example, of the blocks of the courses 500, 501, it will also be extremely difficult for individual blocks to be moved or tampered with. Clearly, more courses than that shown can be used. Also, it will be apparent that, in an example, arms as described herein are of a length that enables them to be used with a single course of blocks. That is, they are no more than the height of a modular block according to an example. Other alternatives are possible, and arms may be provided for lifting and/or support members that are longer than the height of one block and which can therefore be introduced via the through-bores of an upper course of blocks into through-bores of a course there-below, and which can therefore be secured in place via multiple channels for example.

[0032] As shown in figure 5a, an arm can include an upper portion 511 that is arranged to fit into a through-bore and that includes a stopper portion to prevent the arm from entering any further. The position of the stopper of portion 511 can be selected to alter the amount of an arm that is fed into the channel 505, and thus the position of the aperture of the arm for example.

[0033] Figure 6 is a schematic exploded perspective view of modular blocks and fencing according to an example. A fencing panel 507 is depicted, with an arm 515 including an aperture 517 and an upper portion 511. Upper and lower courses of blocks 501, 500 are shown in exploded form, and the member 503 is in an unengaged state - that is, before being fed through the channel and apertures.

Claims

1. A modular block, comprising:

- a front surface, a rear surface and two sides each side extending between an edge of the front surface and an edge of the rear surface of the block;
- a channel extending through the block between the two sides and open at a bottom surface of the block; and
- a through-bore extending between a top surface of the block and into the channel to receive an arm of a lifting or support member.

2. A modular block as claimed in claim 1, wherein the top surface includes a projecting portion extending outwardly from the top surface around the area defining the entrance of the through-bore.

3. A modular block as claimed in claim 2, wherein the bottom surface includes respective recessed portions on either side of the opening defined by the channel on the bottom surface that are complemen-

tary to and arranged to engage with a projecting portion of a complementary block.

4. A modular block as claimed in any preceding claim, wherein the channel runs parallel to a long axis of the block, or parallel to any of the front, rear, top or bottom surfaces. 5
5. A modular block as claimed in any preceding claim, wherein side walls of the channel diverge outwardly towards the bottom surface. 10
6. A modular block as claimed in any preceding claim, wherein the through-bore extends from the top surface to form an opening at the top of the channel. 15
7. A modular block as claimed in any preceding claim, wherein the opening to the through-bore on the top surface of the block is positioned centrally between the front and rear surfaces. 20
8. A modular block as claimed in any preceding claim, the block including a second through-bore positioned centrally between the front and rear surfaces, the said through-bore and the said second through-bore positioned in spaced relation on the top surface. 25
9. A modular block as claimed in any preceding claim, wherein at least one of the front, rear and side surfaces define alternating grooves and lands. 30
10. A modular block as claimed in any preceding claim, wherein the channel is adapted to receive a wire, rod, bar or other such means whereby to pass through an aperture of the arm of the said lifting or support member when placed in the through-bore, thereby to releasably secure the lifting or support member to the block. 35
11. A modular block apparatus, comprising: 40
 - a modular block as claimed in any preceding claim;
 - a lifting or support member, including an arm with an aperture to lift the block when the member is fixed to the block using a wire, rod, bar or other such means. 45
12. A modular block apparatus as claimed in claim 11, wherein the lifting or support member is used to secure multiple blocks together using the wire, rod, bar or other such means. 50
13. A method, comprising: 55
 - providing a modular block as claimed in any of claims 1 to 10;
 - providing a lifting or support member with an arm

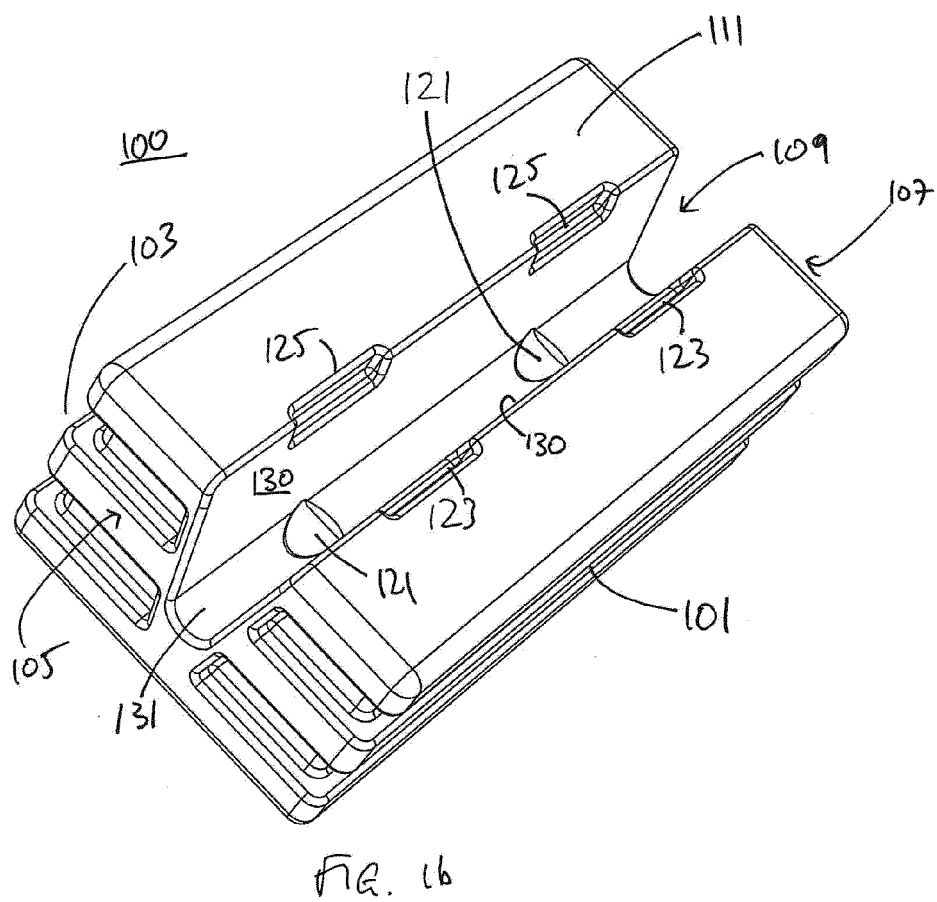
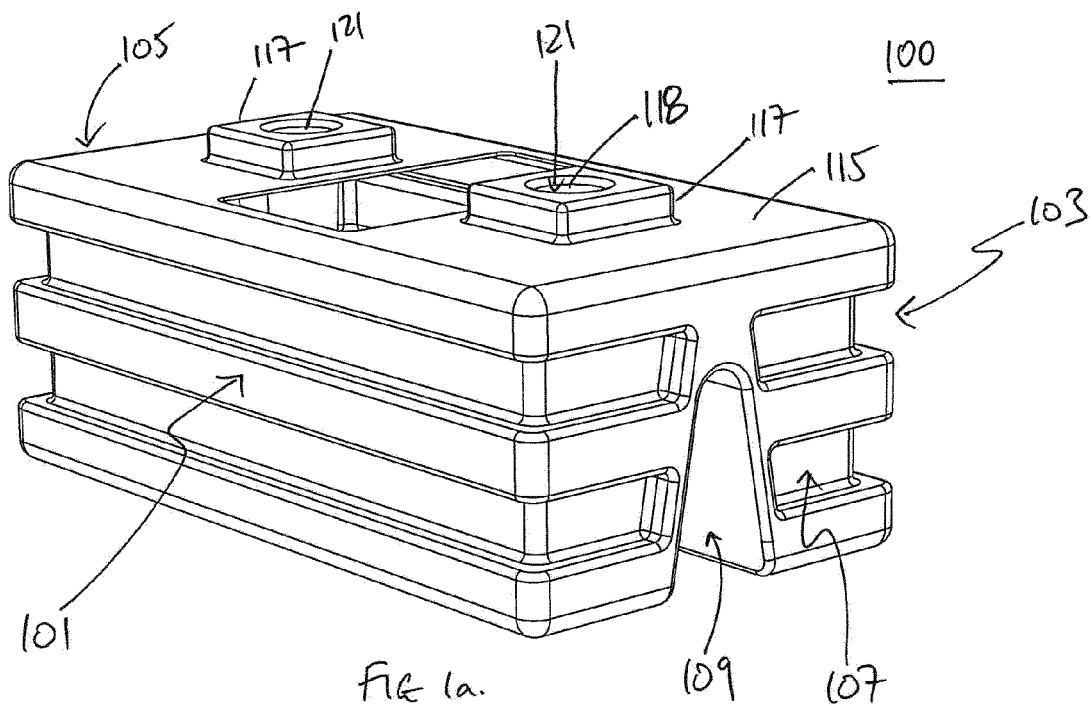
including an aperture;

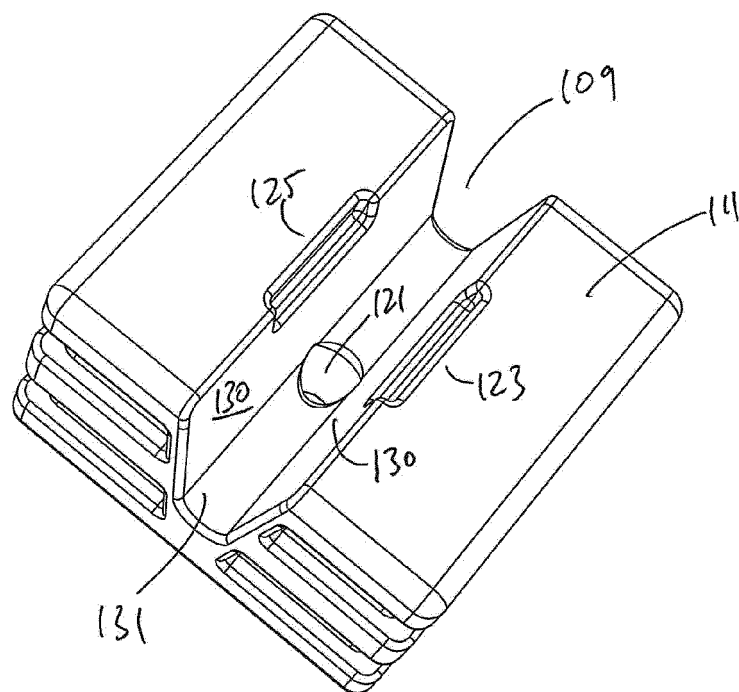
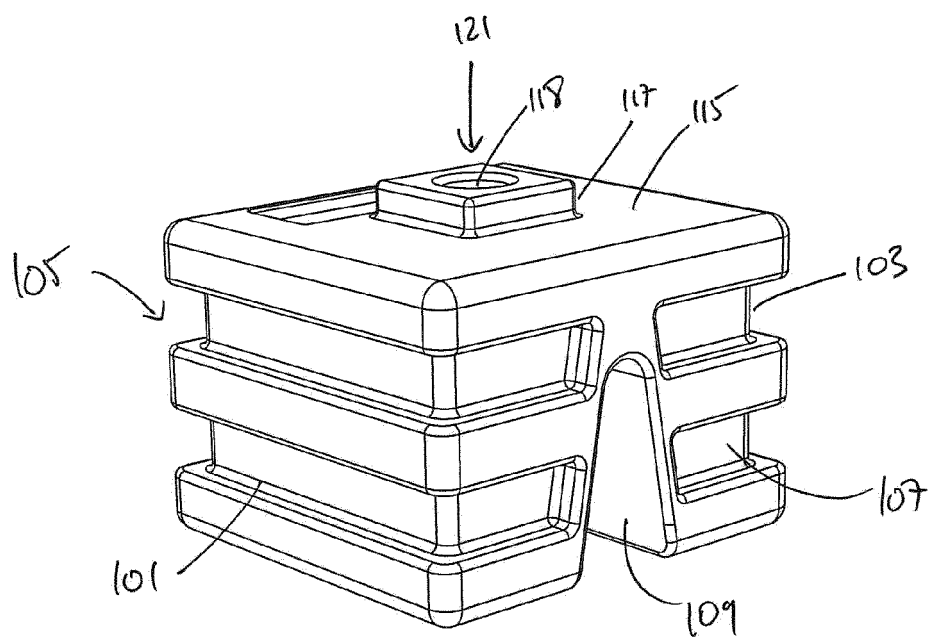
securing the lifting or support member to the block using a wire, rod, bar or other such means by passing the same through the aperture of the arm when the arm is placed in a through-bore of the block.

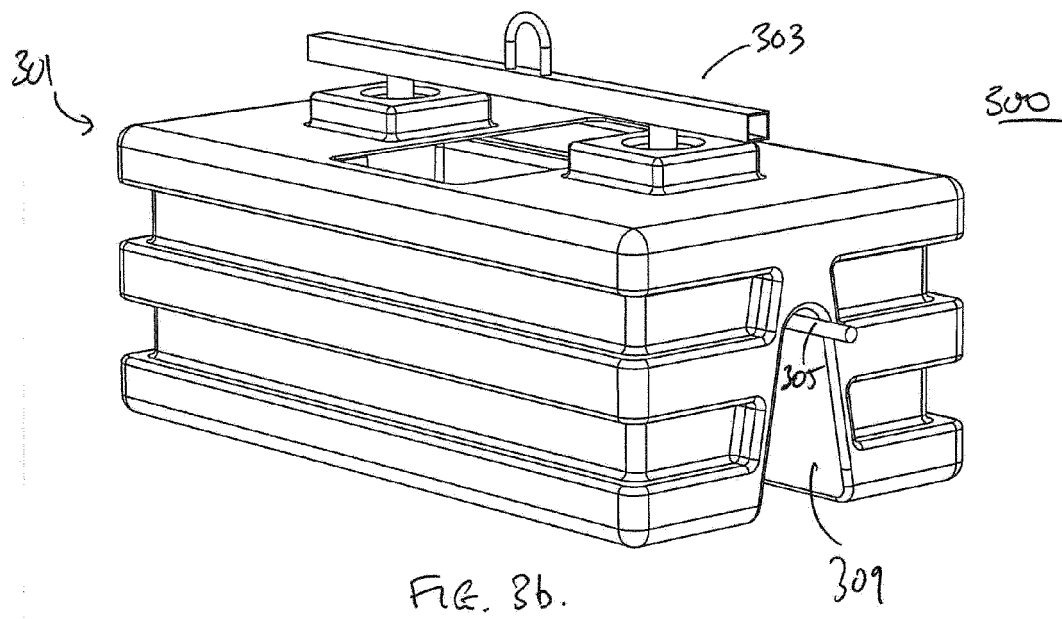
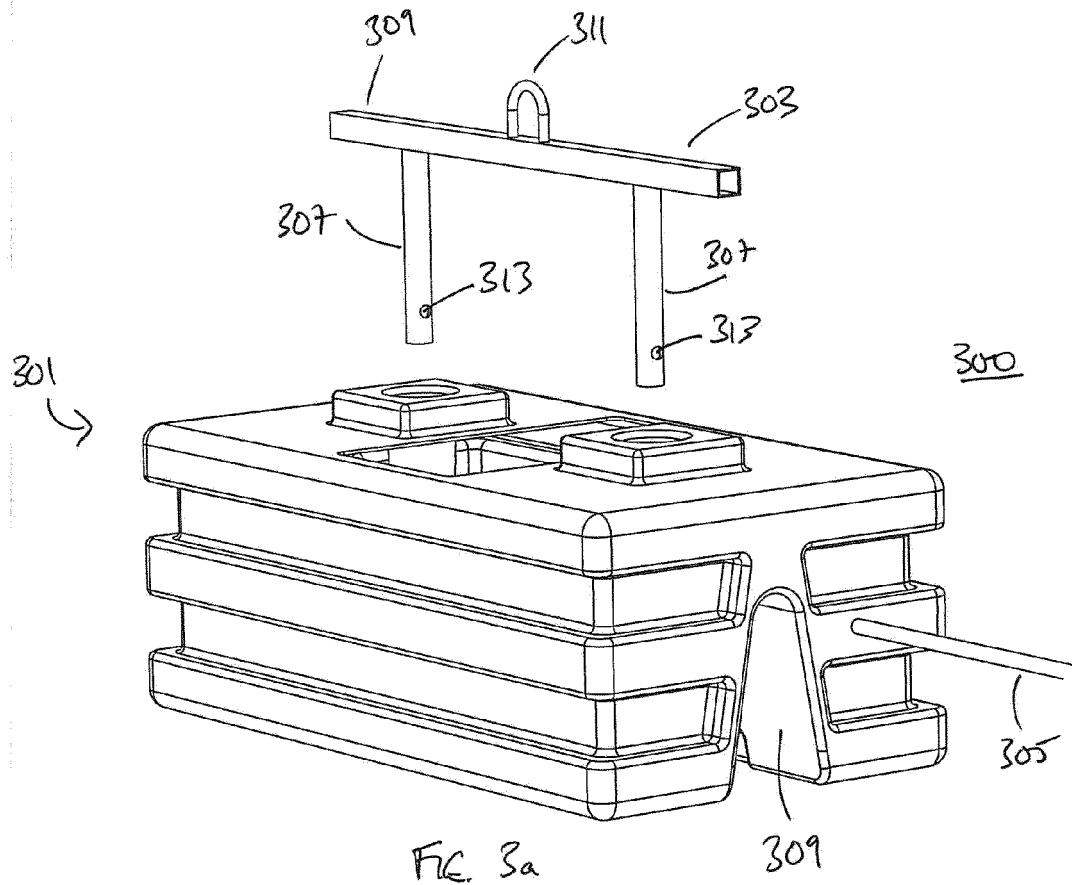
14. A method as claimed in claim 13, further comprising:

securing a further block to the said block using a further arm of the said lifting or support member by passing the wire, rod, bar or other such means through an aperture of the further arm when the said further arm is placed in a through-bore of the said further block.

15. A fencing panel for use with a modular block apparatus as claimed in claims 11 or 12 or a modular block as claimed in any of claims 1 to 10.







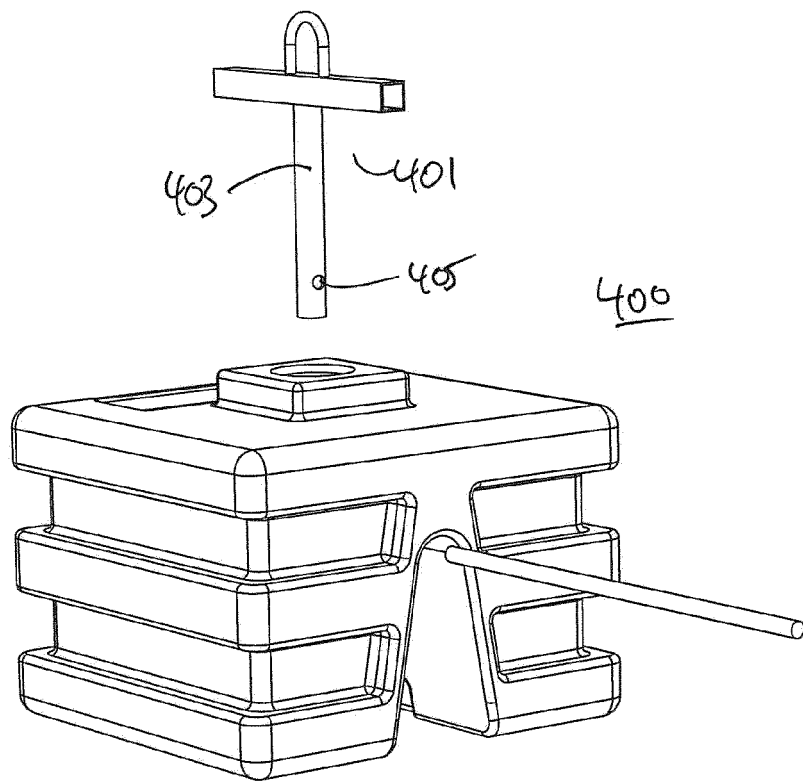


FIG. 4a

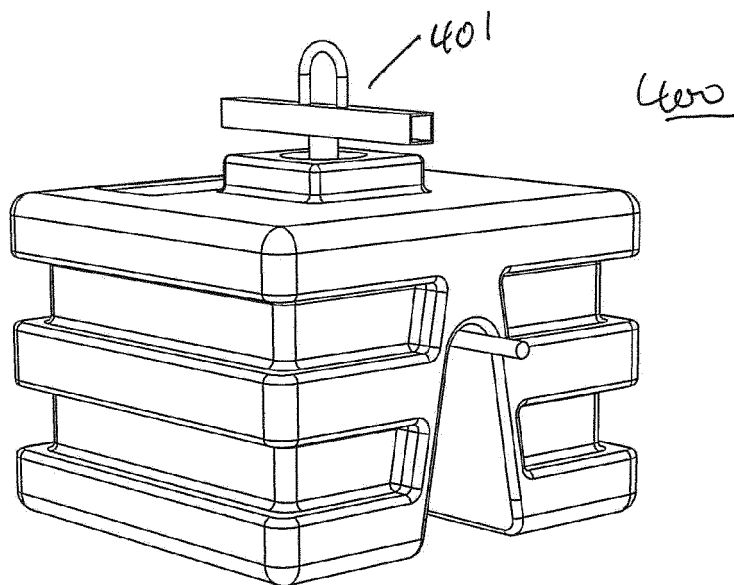


FIG. 4b

