

AN EXTRUDED SECTION and STRUCTURES MADE USING the EXTRUDED SECTION

Technical Field

5 This invention relates to an extruded section and structures made using the extruded section and more particularly, though not exclusively, to an extruded section of a metal such as, for example, aluminium (including aluminum) and its alloys, and structures made using the extruded metal section.

Background

10 Many temporary or semi-permanent structures are made for events such as, for example, exhibitions, sporting events, conferences, seminars, symposiums, construction projects, disaster relief centres, and so forth. Structures include: accommodation, offices, storage and warehousing facilities, display stands, exhibition spaces, greenhouses, reception rooms, temporary flooring, cafes, restaurants, bistros, and so forth. They may be required
15 for a few days, several months or even years. They are often specially constructed using relatively normal construction techniques. This is time consuming, and can be expensive. Also, often the materials used cannot be re-used or recycled. They may be difficult to construct and dismantle.

20 Summary

According to an exemplary aspect there is provided an extruded section comprising four mutually perpendicular sides that are identical to each other and that form a hollow core; each side comprising:

25 a first retaining channel and a second retaining channel, the first and second retaining channels being identical, spaced apart, parallel, a mirror image of each other, and adjacent a corner of the extruded section; and
a central mounting channel equidistant from the two retaining channels.

30 The first and second retaining channels may each comprise two parallel, spaced apart and undercut side edges that provide retaining beads and engaging edges. The central mounting channel may extend along a central, longitudinal axis of each side. The side may project over the central mounting channel to form an opening and two opposed retaining lips. Each central mounting channel may have a base that has a surface. Each surface may define a base plane. The four base planes may define a hollow square.



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According to another exemplary aspect there is provided a construction system comprising the extruded section as described above and a first retaining member for use with the extruded section. The first retaining member may comprise:

- 5 a front face with a longitudinally-extending recess and a longitudinally-extending lower retainer extending generally perpendicularly-outwardly from the front face; and
- a rear face integral with the front face and comprising a lower hook at a lower edge and extending generally opposite to the lower retainer;
- 10 the upper portion of the rear face being curved to enable the rear face to be flexible relative to the front face in the manner of a spring.

- The recess may accommodate a resilient strip of material projecting beyond the front face. The resilient strip may be compressible to allow for insertion of the retaining member after a panel is in place. The retaining member may further comprise an offset portion. The
- 15 construction system may further comprise a cover panel comprising a curved body with opposed retainers each end thereof offset inwardly and downwardly relative to the curved body and terminating in a hook. The construction system may further comprise a corner block comprising a hollow cube having six identical faces. Each face may comprise a peripheral bead and a central, square recess. There may also be a threaded, central hole
 - 20 through each face at a centre of each recess. The construction system may further comprise a hollow securing section of a square cross-section and having four identical sides each with a plurality of spaced-apart bolt holes, an open outer end and a closed inner end with a bolt-hole therethrough. The securing section may have outer dimensions matched to dimensions of the recess and dimensions of the hollow square. The
 - 25 construction system may further comprise a C-section attachable to the extruded section by a T-shaped member able to be engaged in the central mounting channel. The T-shaped member may be securely attachable to an end piece of the C-section. The end piece may comprise projections to engage in the first and second channels.

- 30 According to a further exemplary aspect there is provided a corner block for use in a construction system, the corner block comprising a hollow cube having six identical faces; each face comprising a peripheral bead and a central, square recess; there also being a threaded, central hole through each face at a centre of each recess.

- 35 According to yet another exemplary aspect there is provided a mobile theatre erected using the construction system described above, the mobile theatre comprising a projector

housing, the projector housing having a light transmittable portion for projecting a picture show.

- 5 The mobile theatre may further comprise a screen housing, the screen housing having a screen for screening a picture show. The projector housing may includes access for transactions. The screen may be removable for visual access to a stage located in the screen housing.

Brief Description of the Drawings

- 10 In order that the invention may be fully understood and readily put into practical effect there shall now be described by way of non-limitative example only preferred embodiments of the present invention, the description being with reference to the accompanying illustrative drawings.
- 15 In the drawings:
 Figure 1 is an end view of an exemplary embodiment of the extruded section;
 Figure 2 is an end view of an exemplary embodiment of a first extruded retaining member for use with the exemplary embodiment of Figure 1;
 Figure 3 is an end view of an exemplary embodiment of a second extruded retaining
 20 member for use with the exemplary embodiment of Figure 1;
 Figure 4 is an end view of an exemplary embodiment of an extruded cover member for use with the exemplary embodiment of Figure 1;
 Figure 5 is an end view of a combination of the exemplary embodiments of Figures 1, 2 and 4;
 25 Figure 6 is an end view of an exemplary wall panel formed using the exemplary embodiments of Figures 1 and 2;
 Figure 7 is an exploded front perspective view of the exemplary embodiment of Figure 5 prior to assembly with a corner block;
 Figure 8 is an exploded rear perspective view of the exemplary embodiment of Figure 5
 30 prior to assembly with a corner block;

Figure 9 is an exploded front perspective view of the exemplary embodiment of Figure 5 prior to assembly with a corner block at an intermediate level;

Figure 10 is a top perspective view of an exemplary embodiment of a wall panel;

Figure 11 is a side perspective view of the exemplary wall panel of Figure 10;

5 Figure 12 is a front perspective view of an exemplary embodiment of a roof panel;

Figure 13 is a front perspective view of a fitted support member for a floor panel;

Figure 14 is a top perspective view of a reception room formed using the exemplary embodiments illustrated above;

Figure 15 is two top perspective views of structures formed using the exemplary
10 embodiments illustrated above;

Figure 16 is a schematic representation of a perspective view of an exemplary embodiment of a mobile theatre projector housing;

Figure 17 is a schematic representation of a perspective view of an exemplary embodiment of a mobile theatre screen housing;

15 Figure 18 is a schematic representation of another perspective view of the exemplary embodiment of Figure 17; and

Figure 19 is a schematic representation of another perspective view of the exemplary embodiment of Figure 16.

20 **Detailed Description of Exemplary Embodiments**

To first refer to Figure 1, there is shown an extruded section 101 of any suitable material such as, for example, a metal. The metal may be, for example, aluminium. The extrusion has four mutually perpendicular sides 102 that are identical to each other and that form a hollow core 103. Each side 102 has a first retaining channel 104 and a second retaining
25 channel 105. The two retaining channels 104, 105 are identical, spaced apart, parallel, a mirror image of each other, and adjacent the corner 106. Each channel 104, 105 has two parallel, spaced apart and undercut side edges 107 that provide retaining beads 108 and engaging edges 109.

30 Extending along the central, longitudinal axis of each side 102 is a central mounting channel 110. The central mounting channel 110 is equidistant from the two retaining channels 104, 105. The side wall 102 projects over the mounting channel 110 with an opening 111, thereby forming two opposed retaining lips 112.

Each channel 110 has a base 113 that has a surface 114. Each surface 114 defines a base plane 115. The four base planes define a hollow square 116.

5 Figure 2 illustrates a first extruded retaining member 201 for use with the section 101. The member 201 has a front face 202 with a longitudinally-extending recess 203 and a longitudinally-extending lower retainer 204 extending generally perpendicularly-outwardly from the front face 202. Integral with the front face 202 is a rear face 205 that has a lower hook 206 at its lower edge extending generally opposite to the retainer 204. The upper
10 portion of the rear face 205 is curved to enable the rear face 205 to be flexible relative to the front face 202 in the manner of a spring.

The first retaining member 201 is adapted to engage in the first and second channels 104, 105 by first locating the retainer 204 under bead 108 and then compressing the rear face
15 205 so it moves closer to the front face 201. Hook 206 can then engage edge 109, and the pressure released so that rear face 205 can move away from the front face 202 thereby providing a secure attachment of the first retaining member 201 with the extruded section 101. Another retaining member 201 can be placed in the other of the first and second channels 104, 105 in an opposed manner to enable a panel to be placed therebetween. By
20 having the retaining members 201 inserted into place in a clip-like manner rather than a sliding manner, long lengths may be used without difficulty – sliding engagements normally used can cause jamming during engagement, or may require great strength due to the frictional forces involved.

25 The recess 203 may be used to accommodate a resilient strip of material 207 such as, for example, rubber, that can be secured in place by a suitable adhesive. It is preferred that the resilient strip project beyond the front face 202 so that it can assist in tightly retaining the panel and to reduce movement and vibration.

30 Figure 3 illustrates a second extruded retaining member 301 for use with the section 101. The member 301 has a front face 302 with a longitudinally-extending recess 303 and a longitudinally-extending lower retainer 304 extending generally perpendicularly-outwardly from the front face 302. Integral with the front face 302 is a rear face 305 that has a lower hook 306 at its lower edge extending generally opposite to the retainer 304. The upper
35 portion of the rear face 305 is curved to enable the rear face 305 to be flexible relative to the front face 302 in the manner of a spring.

The first retaining member 301 is adapted to engage in the first and second channels 104, 105 by first locating the retainer 304 under bead 108 and then compressing the rear face 305 so it moves closer to the front face 301. Hook 306 can then engage edge 109, and the pressure released so that rear face 305 can move away from the front face 302 thereby providing a secure attachment of the second retaining member 301 with the extruded section 101. Another retaining member 301 or a first retaining member 201 can be placed in the other of the first and second channels 104, 105 in an opposed manner to enable a panel to be placed therebetween. By having the retaining members 301 inserted into place in a clip-like manner rather than a sliding manner, long lengths may be used without difficulty – sliding engagements normally used can cause jamming during engagement, or may require great strength due to the frictional forces involved.

The recess 303 may be used to accommodate a resilient strip of material 307 such as, for example, rubber, that can be secured in place by a suitable adhesive. It is preferred that the resilient strip project beyond the front face 302 so that it can assist in tightly retaining the panel and to reduce movement and vibration. The resilient strip 207, 307 will also be compressible to allow for insertion of a retaining member 201, 301 after a panel is in place.

The principal difference over the first retaining member 201 is the offset portion 318 so that the front face 302 is closer to the rear face 305. In this way two first retaining members 201 can be used for a panel of a certain thickness. Using one panel 201 and a panel 301 allows a thicker panel to be used. Using two retainers 301 allows an even thicker panel to be used.

Figure 4 illustrates a cover panel 401 that comprises a curved body 402 having opposed retainers 403 at each end thereof offset inwardly and downwardly relative to the body 402 and terminating in a hook 406. The hooks 406 are adapted to engage the edges 109 of the channels 104, 105 to enable the cover 401 to be releasably retained relative to the side wall 102, and thus the extruded section. By the retainers 403 being offset, the edges 405 will locate adjacent the corners 106 so that the body 402 substantially completely covers the wall 102, and thus covers the channels 104, 105 and 110. If covers 401 are provided on adjacent sides 102 the edges 405 of the two covers 401 will touch, or almost touch, to provide a visually-pleasing appearance. In this way the cover 401 is a decorative cover. As such it may be made of any suitable material, and may be decoratively treated (as by being coloured). For example, the cover 401 may be powder coated aluminium, anodized

aluminium, or of a plastics material. The cover 401 may also be made by an extrusion process.

5 Figure 5 shows an assembly of an extruded section 101 with two opposed retaining members 201 and two covers 401. The engagement of the hooks 206 and 406 with the edges 109 can be seen, as can the engagement of the retainers 204 with the lips 108.

10 Figure 6 shows an assembly of two extruded sections 101(a) and 101(b) with each having two opposed retaining members 201. The assembly is with a wall panel 620. As can be seen the resilient strips 207 grip the sides of the wall panel 620 with the resiliency of the strips 207 allowing or compensating for any thermal expansion and contraction, and minimizing vibrations, rattles and the like.

15 The extruded section 101 is configured to be used with corner blocks 740 and hollow securing sections 760, as is shown in Figures 7 to 9. Each corner block 740 is a cube having six identical faces 741. Each face 741 has a peripheral bead 742 and a central, square recess 743. There is a threaded, central hole 744 through each face 741 at the centre of each recess 743. The threaded hole is able to receive a correspondingly-threaded shaft of a bolt (not shown).

20 The securing sections 760 are of a square cross-section having four identical sides 761 each with two bolt holes 762. The bolt holes 762 may be threaded, if desired or required. Each securing section 760 is of a predetermined length and has an open outer end 763 and a closed inner end 764. The closed inner end 764 has a bolt hole therethrough to
25 enable a bolt to be passed through the open end 763, down the hollow interior, through the bolt hole in closed end 764, end to engage in the threaded bolt hole 744. In this way the securing section 760 can be securely yet releasably attached to the corner block 740. To facilitate this, the outer dimensions of the securing section 760 are preferably matched to the dimensions of the recess 743 so that the securing section can be accurately located
30 relative to the corner block 740 prior to the bolt being tightened.

The outer dimensions of the securing section 760 are also matched to the dimensions of the hollow square 116 so that the securing section 760 is a close but slideable fit inside the extruded section 101 and is located, and held in place, by the surfaces 114. The extruded
35 section preferably has holes in each face 102 that align with bolt holes 762 to enable the extruded section 101 can be releasably attached to the securing section 760. In this way

the corner block 740 can be used to securely yet releasably attach up to six extruded sections 101 by use of the securing sections 760.

5 Figures 7 and 8 show this being done as three securing sections 760 are being used for a corner.

In Figure 9 four securing sections are being used for a corner of an intermediate floor of a structure.

10 Figures 10 and 11 shows an exemplary wall panel 1080 made up of three interlinking panels 1081 held in place relative to two extruded sections 101 each with an end block 740, and three covers 401. The panels 1080 may be solid (as shown) or may comprise or include doors, windows, archways, and so forth. The panels 1080 may be of any suitable size or material.

15 In Figure 12 a roof panel 1280 is shown. Here the panels 1281 rest on the faces 102 of the extruded section 101 and a held by a single retaining member 201 on each of the extruded sections 101.

20 Figure 13 illustrates a C-section 1390 attached to the extruded section 101 by a T-shaped member 1391 engaging in central channel 110. The C-section 1391 is used to hold an edge of a floor panel (not shown) or other load-bearing panel. The T-shaped member 1391 is securely attached to an end piece 1392 of the C-section 1390. if required or desired, the end piece 1392 may also have projections 1393 to engage in first and second channels
25 104, 105. As the C-section 1390 is of limited depth, it may be located relative to the extruded section 101 by a sliding fit, rather than as a clip.

Figures 14 and 15 show three forms of temporary or semi-permanent structures that may be assembled using a construction system using several of the above components and
30 techniques. These structures may be single storey (as illustrated) or may be multiple storey structures.

According to one aspect, there is provided an exemplary embodiment of a mobile theatre constructed using the above construction system. Referring to Figure 16, the mobile theatre
35 comprises a projector housing 10 for housing for a projector 12. Preferably, the projector housing 10 is made from a standard shipping container or something that replicates a

standard shipping container. It is preferably readily mounted and dismounted from a trailer or a truck for easy transportation. The housing further comprises a front 14 having an internal wall 16 comprising a light transmittable portion 18 through which the projector 12 can project a picture show such as a cinematic film, a newsreel, a documentary and the like. Alternatively, the projector 12 may be replaced by one or more spotlights, or the like. In that case, there may be more than one light transmittable portion 18 for more than one spotlight.

In the embodiment of Figure 16, the light transmittable portion 18 is an opening in the internal wall 16 of the projector housing 10. The projector 12 is located in the projector housing 10 behind the internal wall 16. The light transmittable portion 18 may be enclosed for protection when not in use or during transportation. Any suitable means may be used, such as, for example, doors 17 that are integral with the front 14 of the housing 10. When open, the doors 17 may serve to define a viewing space 19 for accommodating patrons.

In use, light from the projector 12 is transmitted through the opening 14 onto a suitable screen. As shown in Figure 17, the screen 22 is located on a front 21 of a mobile theatre screen housing 20. The screen 22 is preferably integral with the screen housing 20. Additionally, the screen 22 may be removable by means such as rollers or slides to provide visual access to a stage in the screen housing 20. This transforms the mobile theatre from screening projected shows into a live performance theatre, where live events may be held or performed on the stage.

Preferably, the screen housing 20 is made from a standard shipping container or something that replicates a standard shipping container. It is preferably readily mounted and dismounted from a trailer or a truck for easy transportation. Sound reproduction apparatus 24 such as speakers may be located on the front 21 of the screen housing 20, around the screen 22. The screen 22 and the speakers 24 may be enclosed for protection when not in use or during transportation. Any suitable means may be provided, such as, for example, doors 27 that are integral with the front 21 of the screen housing 20. When open, the doors 27 may serve to define a viewing space 29 for accommodating patrons.

The screen housing 20 is preferably located at an appropriate distance from the projector housing 10, with the front 21 of the screen housing 20 facing the front 14 of the projector housing 10, so that the doors 17 and 27 together define a combined space 19 and 29 for accommodating patrons and creating a sound shell. Additional sound reproduction

equipment 32 may be stored in the screen housing 20 as shown in Figure 18, together with other equipment such as an electrical generator 34.

Figure 19 shows a perspective view of the back 41 of the projector housing 10. The back 41 preferably includes access 42 for transactions such as ticketing and food and beverage sales. The access 42 can range from a simple opening to the entire back 41 of the projector housing 10 as shown in Figure 19. The back 41 of the projector housing 10 may be adapted to open and allow transactions to occur over appropriately styled counters 44 in the projector housing 10.

When open, the back 41 may comprise two functional parts: an awning 46 for sheltering patrons from rain or sun, and a terrace 48 where patrons may form a queue. A collapsible railing 49 may be provided on the terrace 48 for additional comfort and safety.

Whilst there has been described in the foregoing description exemplary embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations in details of design, construction and/or operation may be made without departing from the present invention.

The Claims

1. An extruded section comprising four mutually perpendicular sides that are identical to each other and that form a hollow core; each side comprising:
 - a first retaining channel and a second retaining channel, the first and second retaining channels being identical, spaced apart, parallel, a mirror image of each other, and adjacent a corner of the extruded section; and
 - a central mounting channel equidistant from the two retaining channels.
2. An extruded section as claimed in claim 1, wherein the first and second retaining channels each comprise two parallel, spaced apart and undercut side edges that provide retaining beads and engaging edges.
3. An extruded section as claimed in claim 1 or claim 2, wherein the central mounting channel extends along a central, longitudinal axis of each side and the side projects over the central mounting channel to form an opening and two opposed retaining lips.
4. An extruded section as claimed in any one of claims 1 to 3, wherein each central mounting channel has a base that has a surface; each surface defining a base plane; the four base planes defining a hollow square.
5. A construction system comprising the extruded section as claimed in any one of claims 1 to 4 and a first retaining member for use with the extruded section; the first retaining member comprising:
 - a front face with a longitudinally-extending recess and a longitudinally-extending lower retainer extending generally perpendicularly-outwardly from the front face; and
 - a rear face integral with the front face and comprising a lower hook at a lower edge and extending generally opposite to the lower retainer;
 - the upper portion of the rear face being curved to enable the rear face to be flexible relative to the front face in the manner of a spring.
6. A construction system as claimed in claim 5, wherein the recess accommodates a resilient strip of material projecting beyond the front face.
7. A construction system as claimed in claim 5 or claim 6, wherein the resilient strip is compressible to allow for insertion of the retaining member after a panel is in place.
8. A construction system as claimed in any one of claims 5 to 7, wherein the retaining member further comprises an offset portion.
9. A construction system as claimed in any one of claims 5 to 8 further comprising a cover panel comprising a curved body with opposed retainers each end thereof offset inwardly and downwardly relative to the curved body and terminating in a hook.

10. A construction system as claimed in any one of claims 5 to 9 further comprising a corner block comprising a hollow cube having six identical faces; each face comprising a peripheral bead and a central, square recess; there also being a threaded, central hole through each face at a centre of each recess.
- 5 11. A construction system as claimed in any one of claims 5 to 10 further comprising a hollow securing section of a square cross-section, has four identical sides each with a plurality of spaced-apart two bolt holes, an open outer end and a closed inner end with a bolt hole therethrough.
12. A construction system as claimed in any one of claims 5 to 11, wherein the securing
10 section has outer dimensions matched to dimensions of the recess and dimensions of the hollow square.
13. A construction system as claimed in any one of claims 5 to 12 further comprising a C-section attachable to the extruded section by a T-shaped member able to be engaged in the central mounting channel; the T-shaped member being securely attachable to an end
15 piece of the C-section.
14. A construction system as claimed in claim 13, wherein the end piece comprises projections to engage in the first and second channels.
15. A corner block for use in a construction system, the corner block comprising a hollow cube having six identical faces; each face comprising a peripheral bead and a
20 central, square recess; there also being a threaded, central hole through each face at a centre of each recess.
16. A mobile theatre erected using the construction system of any one of claims 5 to 14, the mobile theatre comprising a projector housing, the projector housing having a light transmittable portion for projecting a picture show.
- 25 17. A mobile theatre as claimed in claim 16 further comprising a screen housing, the screen housing having a screen for screening a picture show.
18. The mobile theatre of claim 16 or claim 17, wherein the projector housing includes access for transactions.
19. The mobile theatre of any one of claims 16 to 18, wherein the screen is removable
30 for visual access to a stage located in the screen housing.