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- (71) Applicant: **ARKISTRUCT LTD.** [AU/AU]; 7 Light Street, Fortitude Valley, Brisbane, Queensland 4006 (AU).
- (72) Inventor: **LEE, Walter**; 7 Light Street, Fortitude Valley, Brisbane, Queensland 4006 (AU).
- (74) Agent: **PEGASUS IP**; PO Box 160, Toowong, Brisbane, Queensland 4066 (AU).
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(54) Title: A PREFABRICATED PANEL BUILDING SYSTEM

(57) Abstract: A prefabricated panel building system, including a plurality of wall panels adapted to be joined together; a structural frame defining the shape and configuration of a building; the frame having horizontal tracks wherein the panels are adapted to be slid against each other; each panel including specially adapted interlocking edge members having complementary profiles configured to interlock to form integrated stud or cross members, wherein the arrangement confers substantial rigidity and integrity. A method of building using the panels of the system.

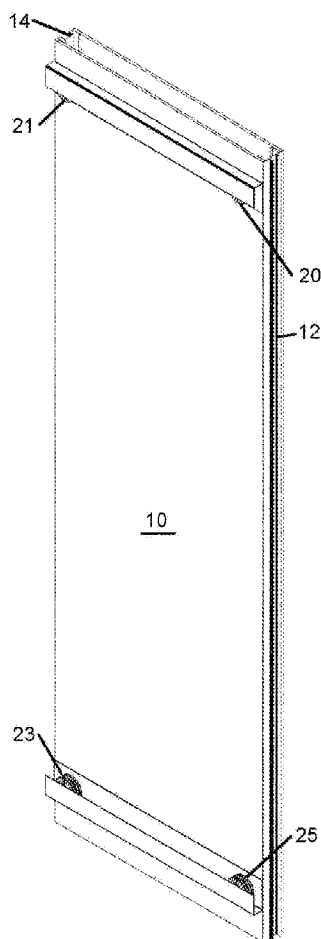


FIG. 1.



TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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PCT SPECIFICATION

A PREFABRICATED PANEL BUILDING SYSTEM

FIELD OF THE INVENTION

The present invention relates in particular but not exclusively to a versatile
10 prefabricated panel building system incorporating wall panels having a roller track
sliding means and an integrated stud assembly which confers substantial rigidity
and integrity and which significantly reduces construction time by dispensing with
traditional and prior art stud framing. The lightweight construction of the panels
are such that they can also be prefabricated or manufactured on site in a portable
15 or re-locatable factory or plant from raw and component materials thereby further
reducing or eliminating time and transport costs.

BACKGROUND OF THE INVENTION

20 The main disadvantage of prior art prefabricated wall building systems is that they
require labor and time in which to erect traditional stud framing, to affix wall
cladding panels, insert insulation material and then render, sand and paint the
finished product. Furthermore, prior art composition boardroom wallboard panels
are not designed for convenient water and electricity installation. Water pipes and
25 electric cables are usually installed on the outside surface of prior art panels.
While it is possible to install water pipes and electric conduits under the panel
surface, this requires cutting into the surface and then having to restore and
redecorate the panel post installation. If this is not skilfully undertaken, the repair
work will not only be unsightly, but may result in permanent damage to the
30 structural integrity of the panel thereby degrading overall performance. Most prior
art wallboard panels have poor weight bearing capacity. Upright walls constructed
from these panels inevitably have poor wind shear load resistance.
Existing composition panels must also be able to withstand diagonal torsion or
twisting forces according to various relevant municipal building regulations and

5 requirements. This results in prior art wallboard panels having to be of a substantial construction which are not conducive to being prefabricated on site which is not only costly but is often also aesthetically less pleasing in appearance.

In view of the above-mentioned limitations, it is an object of the present invention
10 to overcome the disadvantages of the prior art by providing a novel prefabricated wall panel building system which confers substantial rigidity and integrity and which is also characterized by relatively speedy installation and construction, high fire resistance, high weight bearing capacity, good sound insulation and most importantly, is cost effective relative to performance when compared to existing
15 and traditional building systems.

SUMMARY OF THE INVENTION

In a preferred aspect, the invention resides in a prefabricated panel building system including:

- 20 a plurality of wall panels adapted to be joined together;
- a structural frame defining the shape and configuration of a building;
- the frame having horizontal tracks adapted to receive the panels;
- the panels are slid along the tracks to abut against each other;
- 25 each panel including specially adapted interlocking edge members;
- the interlocking edge members having complementary profiles wherein opposite edge members of abutting panels are joined to form integrated studs and/or cross members of the frame and wherein the arrangement confers substantial rigidity and integrity to a building constructed using the system.

30 Preferably, the panels are of a rectangular configuration and the edge members are on opposite longitudinal sides of each panel.

Preferably, there are edge members on all sides of the panel.

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In a more preferred example, the top and bottom portions of the panel or edge members include integrated rollers whereby the panels are able to be slid in the tracks into position against and on top of each other.

- 10 In the alternative to rollers, skids or buttons of an anti-friction material such as Teflon may be used.

Preferably there are panels which include window frames or door frames as in built structural components of the panels or wherein windows and doors are
15 pre-fitted in the panels.

In a preferred example, the panel comprises:

- an inner wall decoration layer,
- a fiber calcium silicate board,
- 20 a thermal-protective layer and
- an external cladding,
- and wherein there is an air gap between the external cladding and the fiber calcium silicate board.

- 25 In a preferred example, the panel has an external cladding of prefinished metal coil skin.

In another example, the panel has a cladding material which includes magnesium oxide.

- 30 Preferably, the thermal-protective layer is provided with a hole.

Preferably, the light construction of the panels are such that they can be fabricated or manufactured on site in a moveable or re-locatable factory or plant from raw and component materials.

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Preferably, the panels or edge members include one or more slots into which a barbed bracket or mount is inserted to support accessories, including lights, ornaments, removable cladding or decorative panels.

- 10 Preferably, there are passages along the lengths of the edge members or which are created on interlocking together edge members of adjacent panels, and wherein the passages are adapted to accommodate the installation of supply services including electric cables or water pipes.

- 15 Suitably, the panels have holes for any article required to pass through the panels.

Preferably, the interlocked edge members are permanently joined together by rivets or screws.

- 20 In the alternative, the interlocked edge members can be permanently joined together with adhesive.

Preferably, decorative cover strips are used to cover any exposed interlocked edge members.

25

In a preferred version, the edge members are channels with a recessed connecting groove wherein panels are joined by a connecting piece inserted into the space created by the opposite grooves

- 30 More preferably, the edge members comprising an integrated stud are aluminum extrusions incorporating a tongue profile and a groove profile wherein the tongues and grooves are serrated to lock the panels when pushed and clipped together.

In an alternative version, the edge members are channels provided with a

5 connecting convex flange.

In a further alternative version, the edge members are channels provided with a connecting groove and a flange

10 The external cladding preferably comprises a base plate and an external composite plate fixed to the base plate.

The system is used to construct a wall of a room or building by interlocking the top and bottom edge members of panels stacked on top of each other.

15

The system is used to construct a floor, ceiling or roof by joining together edge members on all sides of the panels.

20 Preferably, the panels include integrated electrical conduit to accommodate electric cable or wires where power outlets are required.

Preferably, the complementary profiles of the edge members when interlocked together provide a water tight seal.

25 In another preferred example, there are thermal break fillet strips which span across the intersections of interlocking edge members of abutting panels to confer requisite acoustic, thermal and fire ratings.

30 In another aspect, the invention resides in a method of building using panels of the system according to any one of the above claims including the steps of:

- (a) assembling the structural frame;
- (b) sliding a first panel in a track to its predetermined position;
- (c) sliding a next panel in the track to abut against the first panel;
- (d) pushing the panels against each other to join together their respective

5 complementary edge members;
 (c) repeating steps (b) and (c) and (d) to join together further panels as
 required.

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It is submitted that the invention has the following beneficial effects: Both right
and left sides of upright panels are provided with recessed channels that are
interlocked with the channel of an adjacent panel to create the integrated stud
thereby eliminating the need for traditional stud framing. Similarly, reinforced
15 edge members are installed at the top and bottom of the panel wherein a weight
bearing joint is affected between one panel and another panel stacked on top of it.
To substantially reduce onsite assembly time, the top and bottom edge members
can include integrated roller track means whereby adjacent panels are able to be
slid into position against and on top of each other. Furthermore, passages of edge
20 members in alignment facilitate convenient and rapid installation of both water
pipes and electric conduits in both horizontal and vertical directions. For this and
other reasons, the edge members are also preferably in the order of being one to
two times stronger than the edges of ordinary laminated board in terms of vertical
load bearing, and horizontal wind shear resistance. It is submitted that a building
25 of the subject system gives nothing away to a permanently and traditionally built
house.

The present system and method solves shortcomings of constructing prior art
composition board rooms and container houses by providing a novel and inventive
30 method of splicing together panels. It provides a prefabricated structure having
good thermal insulation properties with characteristics of fast installation and
greatly improved architectural aesthetic appearance.

It is submitted that compared with existing stud separated wall systems, the

5 invention is significantly advanced in its provision of rapidly and conveniently constructed buildings of equivalent structural integrity and most importantly, a low cost to performance advantage.

10 BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention is better understood and able to be put into practice, reference is made to the accompanying drawings wherein:

15 FIG. 1 is a preferred prefabricated panel used in the building system of the invention.

FIG. 2 shows detail of the top portions of adjacent panels of FIG. 1.

FIG. 3 shows detail of a pair of complementary serrated longitudinal edge members.

20 FIG. 4 shows a panel which includes a window frame and a door frame as structural components of the panel.

FIG. 5 shows detail of a preferred thermal break fillet strip according to the invention.

FIG. 6 shows detail of buttons of an anti-friction material whereby the panels are
25 able to be slid.

DETAILED DESCRIPTION OF EMBODIMENTS

As shown in the following drawings, the invention aims to provide a novel and versatile prefabricated panel building system characterized by fast installation,
30 rapid construction, high fire resistance, high weight capacity, high cost performance and good sound insulation when compared to the prior art. The present invention comprises a plurality of wallboard panels joined together. Each panel 10 as typically shown in Figure 1 includes specially adapted interlocking edge members 12,14 having complementary profiles configured to be interlocked

5 with the edge members of adjoining panels (not shown) to form integrated stud or cross members. The resulting integrated arrangement conferring substantial rigidity and integrity to the erected structure.

The preferred panel includes an inner wall decoration layer, a fiber calcium silicate board, a thermal-protective layer and an external wallboard cladding, which are preferably arranged in this sequence. A gap is preferably provided between the external wallboard cladding and the thermal-protective layer. In a preferred example, the thermal-protective layer is made up of PU or EPS foaming as a thermal insulation layer. The fiber calcium silicate board which is in contact with the thermal-protective layer is located between the thermal-protective layer and the external wallboard cladding. The external wallboard cladding is comprised of a base plate of fiber calcium silicate board and an external aluminum composite plate glued to the base plate. The edge members can have passages (not shown) extending their length wherein water and electric pipe and lines can be installed. Both top and bottom ends of the panels are provided with integrated rollers 20,21 and 23, 25 which engage tracks of the building's frame (not shown) whereby adjacent panels are able to be slid into position against each other.

Figure 2 shows partial detail of adjacent panels 16, 18 about to be joined by clipping together their respective complementary serrated longitudinal edge members 12, 14.

Both top and bottom (not shown) ends of the panels are provided with integrated rollers 20,22 which engage tracks of the building's frame (not shown) whereby adjacent panels are able to be slid into position against and on top of each other thereby substantially reducing onsite assembly time. In the alternative to rollers, skids or buttons of an anti-friction material such as Teflon may be used.

Figure 3 shows detail of a pair of complementary serrated longitudinal edge members 24, 26. The edge members which when clipped together comprise an

5 integrated stud are aluminum extrusions incorporating a tongue profile 24a and a groove profile 26a wherein the grooves are serrated to lock the panels (not shown in this view) when pushed together. There are also one or more slots 28,30 adapted to receive a barbed bracket or mounting member for the mounting of accessories, including lights, ornaments, removable cladding and decorative panels. Other
10 accessories can also include a bookshelf, a desk, a wash stand and the like. When in use, a barb is installed at the back of the article to be mounted, and then the barb is located in the slot, thereby providing a convenient and simple mounting system. In addition, the slot system can be used with lights, PVC ornaments, trunkings or other ornaments. Their use to attach removable wall cladding panels also makes
15 the panel system more versatile.

Figure 4 shows panels 32, 34 which includes a window 36 and a door 38 as structural components of panels 32, 34 which are pre-fitted. As previously
20 mentioned, the light construction of the panels are such that they can be fabricated or manufactured on site in a moveable or re-locatable factory or plant from raw and component materials. Openings can therefore be cut into the panels and prefabricated windows and doorways from suppliers installed on site thereby eliminating the need for separate window frame and door joinery.

25 Figure 5 shows detail of preferred thermal break fillet strips 40, 42 which span across the intersection of interlocking edge members 44, 46 of abutting panels 48, 50 to confer requisite acoustic, thermal and fire ratings. The fillet strips are preferably of a magnesium oxide and fiber glass construction which is affixed by
30 mastic based adhesive over the intersecting edge members.

Figure. 6 shows detail of buttons 62, 64 of an anti-friction material such as Teflon whereby panel 60 is able to be slid in the tracks (not shown) into position against and on top of other panels.

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It will be apparent to the skilled addressee that, in addition to the embodiments mentioned above, other equivalent technical solutions are also within the scope of
10 the invention.

5

CLAIMS

1. A prefabricated panel building system including:
a plurality of wall panels adapted to be joined together;
a structural frame defining the shape and configuration of
10 a building;
the frame having horizontal tracks adapted to receive the panels;
the panels are slid along the tracks to abut against each other;
each panel including specially adapted interlocking edge members;
the interlocking edge members having complementary profiles wherein
15 opposite edge members of abutting panels are joined to form integrated studs
and/or cross members of the frame.
2. The system of claim 1 wherein the top and bottom portions of the panel or edge
members include integrated rollers whereby the panels are able to be slid in the
20 tracks into position against and on top of each other.
3. The system of claim 1 wherein the top and bottom portions of the panel or edge
members include skids or buttons of an anti-friction material whereby the panels
are able to be slid in the tracks into position against and on top of each other.
25
4. The system of claim 1 wherein there are edge members on all sides of the
panel.
5. The system of claim 1, wherein the panel is of a rectangular configuration.
30
6. The system of claim 1, wherein one or more panels include window frames or
door frames as in built structural components of the panels or wherein windows
and doors are pre-fitted in the panels.

- 5 7. The system of claim 1, wherein the panel includes:
an inner wall decoration layer,
a fiber calcium silicate board,
a thermal-protective layer and
an external cladding,
10 and wherein there is a gap between the external cladding and the fiber calcium
silicate board.
8. The system of claim 1, wherein the panel has an external cladding of
prefinished metal coil skin.
- 15 9. The system of claim 1, wherein the panel has a cladding material which includes
magnesium oxide.
10. The system of claim 1, wherein the panels are fabricated or manufactured on
20 site in a moveable or re-locatable factory or plant from raw and component
materials.
11. The system of claim 1, wherein the panels or edge members include one or
more slots into which a barbed bracket or mounting is inserted to support
25 accessories, including lights, ornaments, removable cladding or decorative panels.
12. The system of claim 1, wherein there are passages along the lengths of the
edge members or which are created on interlocking together edge members of
adjacent panels wherein the passages are adapted to accommodate the installation
30 of supply services including electric cables or water pipes.
13. The system of claim 1, wherein the panels have holes for any article required
to pass through the panels.

5 14. The system of claim 1, wherein the interlocked edge members are permanently joined together by rivets or screws.

15 The system of claim 1, wherein the interlocked edge members are permanently joined together by adhesive.

10

16. The system of claim 1, wherein decorative cover strips are used to cover the interlocked edge members.

17. The system of claim 1, wherein the edge members are channels with a recessed
15 connecting groove wherein panels are joined by a connecting piece inserted into the space created by the opposite grooves.

18. The system of claim 1, wherein the edge members comprising an integrated stud are aluminum extrusions incorporating a tongue profile and a groove profile
20 wherein the tongues and grooves are serrated to lock the panels when pushed and clipped together.

19. The system of claim 1, wherein the edge members are channels provided with a connecting convex flange.

25

20. The system of claim 1, wherein the edge members are channels provided with a connecting groove and a flange

21. The system of claim 1, wherein a thermal-protective layer is provided with a
30 hole.

22. The system of claim 1, wherein the external cladding comprises a base plate and an external composite plate fixed to the base plate.

5 23. The system of claim 1, used to construct a wall of a room or building by interlocking the top and bottom edge members of panels stacked on top of each other.

24. The system of claim 1, used to construct a floor, ceiling or roof by joining
10 together edge members on all sides of the panels.

25. The system of claim 1, wherein the panels include integrated electrical conduit to accommodate electric cable or wires where power outlets are required.

15 26. The system of claim 1, wherein the complementary profiles of the edge members when interlocked together provide a water tight seal.

27. The system of claim 1, wherein there is a thermal break fillet strip which spans across the intersection of interlocking edge members of abutting panels to confer
20 requisite acoustic, thermal and fire ratings.

28. A method of building using panels of the system according to any one of the above claims including the steps of:

- (a) assembling the structural frame;
- 25 (b) sliding a first panel in a track to its predetermined position;
- (c) sliding a next panel in the track to abut against the first panel;
- (d) pushing the panels against each other to join together their respective complementary edge members;
- (e) repeating steps (b) and (c) and (d) to join together further panels as required.

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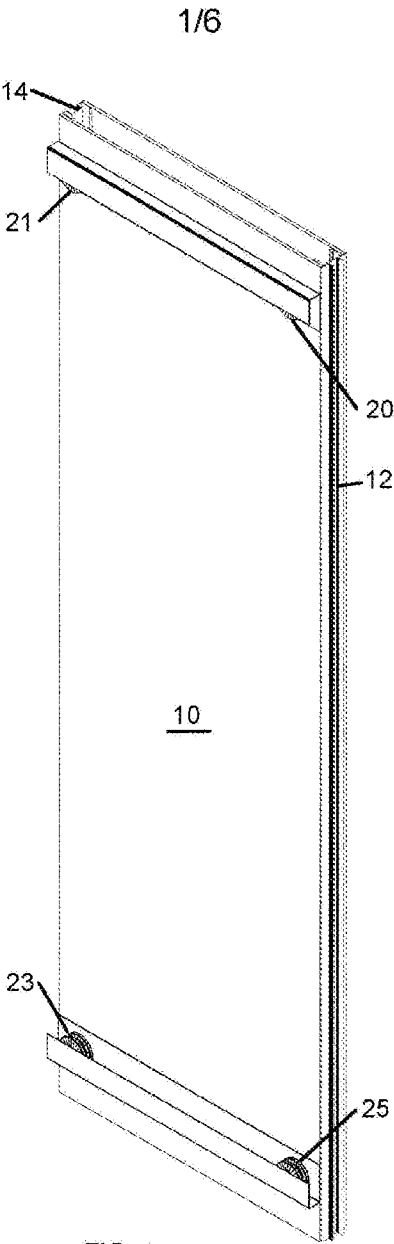


FIG. 1.

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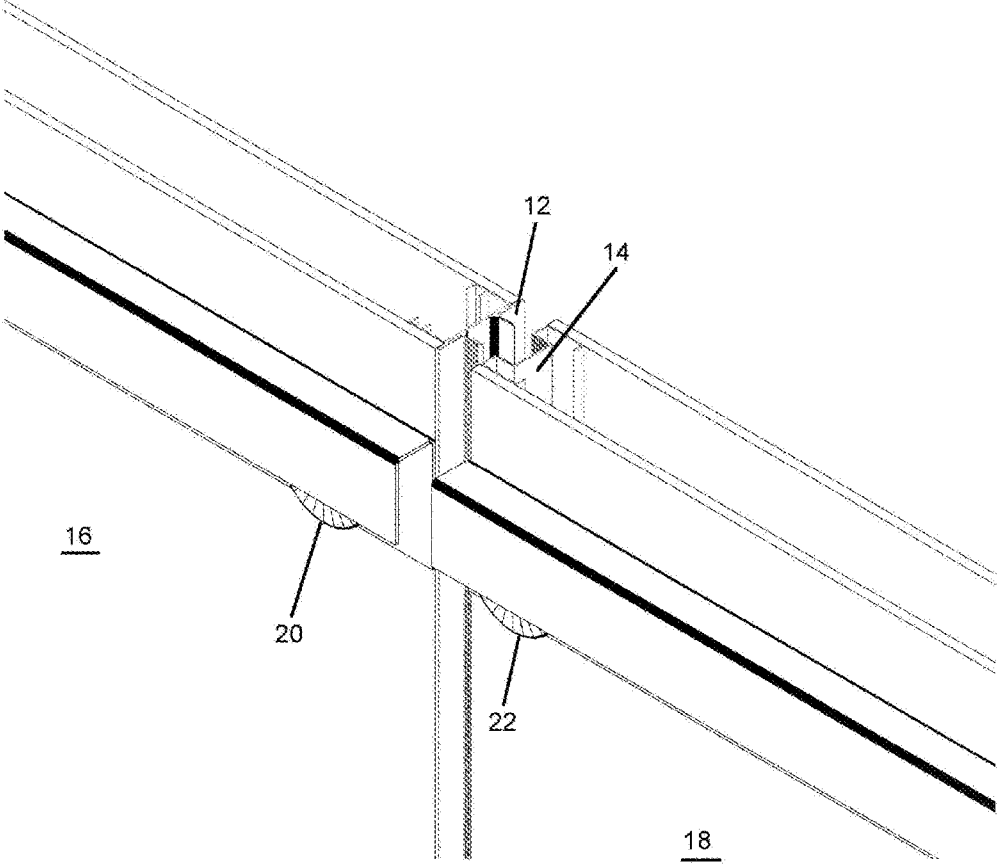


FIG. 2.

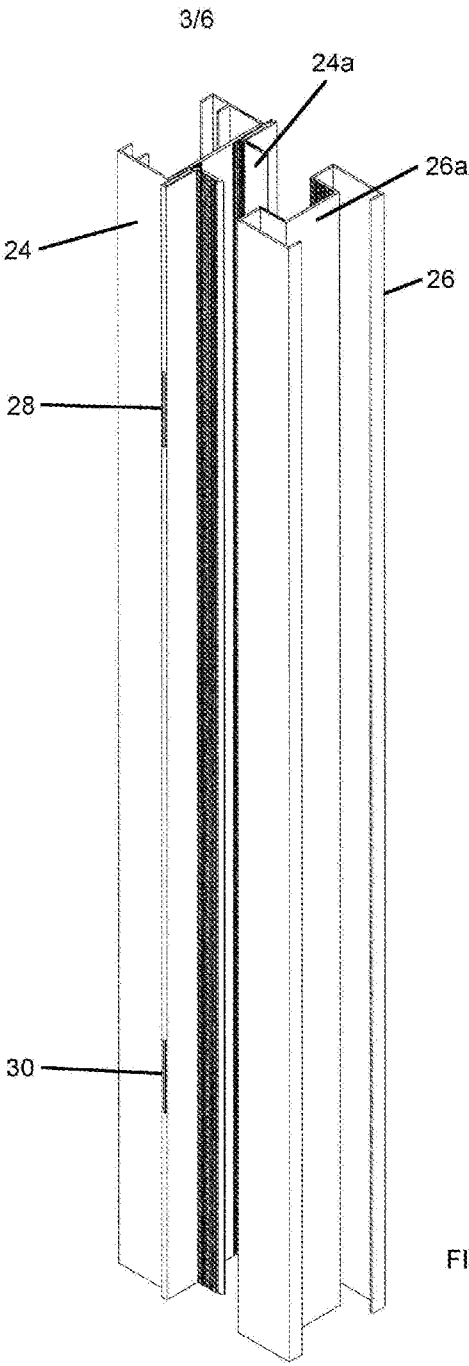


FIG. 3.

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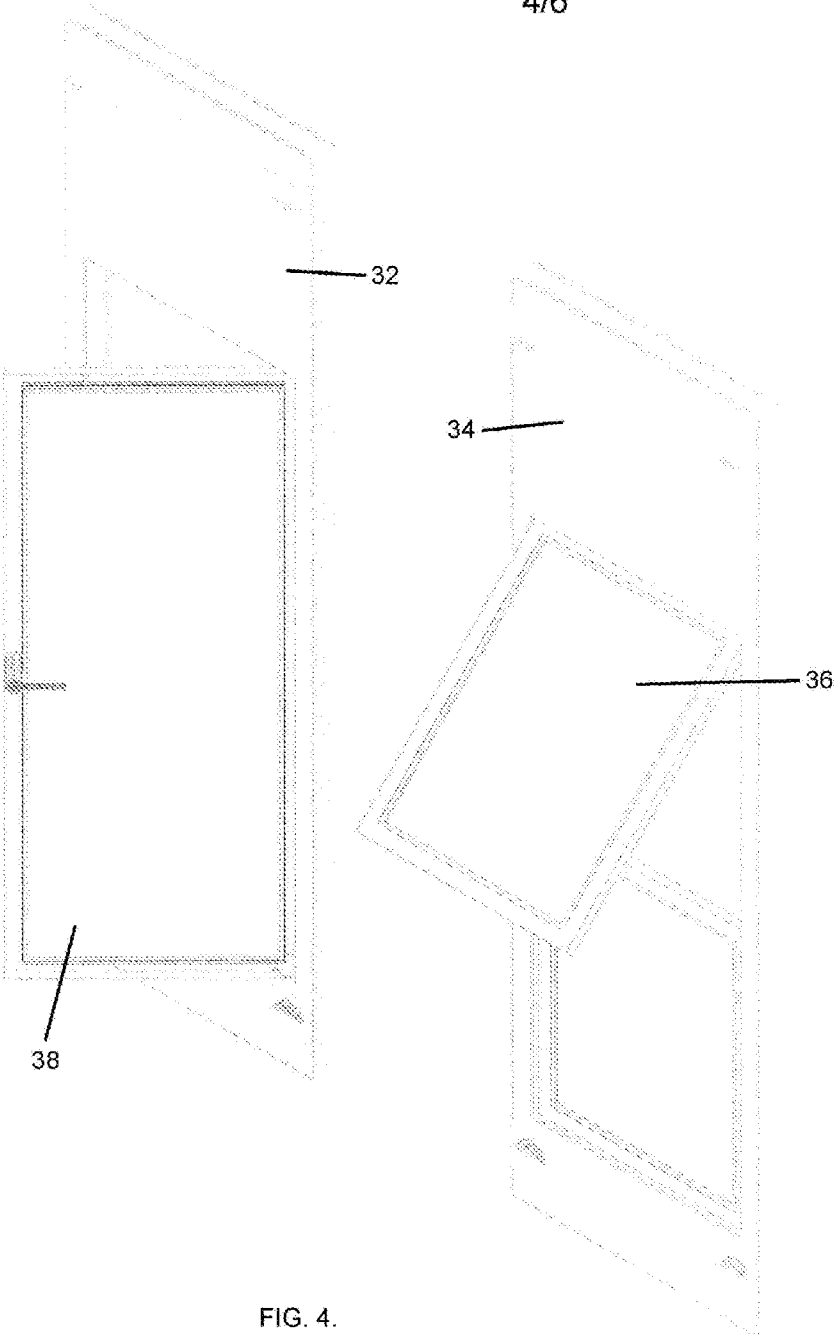


FIG. 4.

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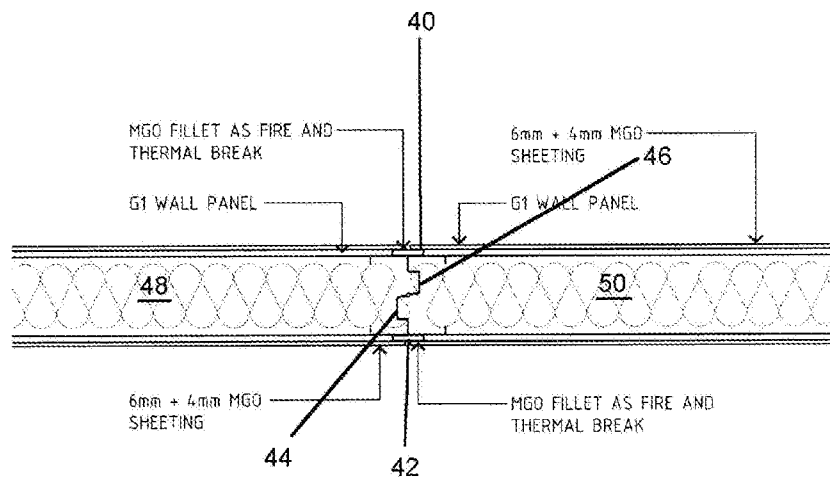


FIG. 5.

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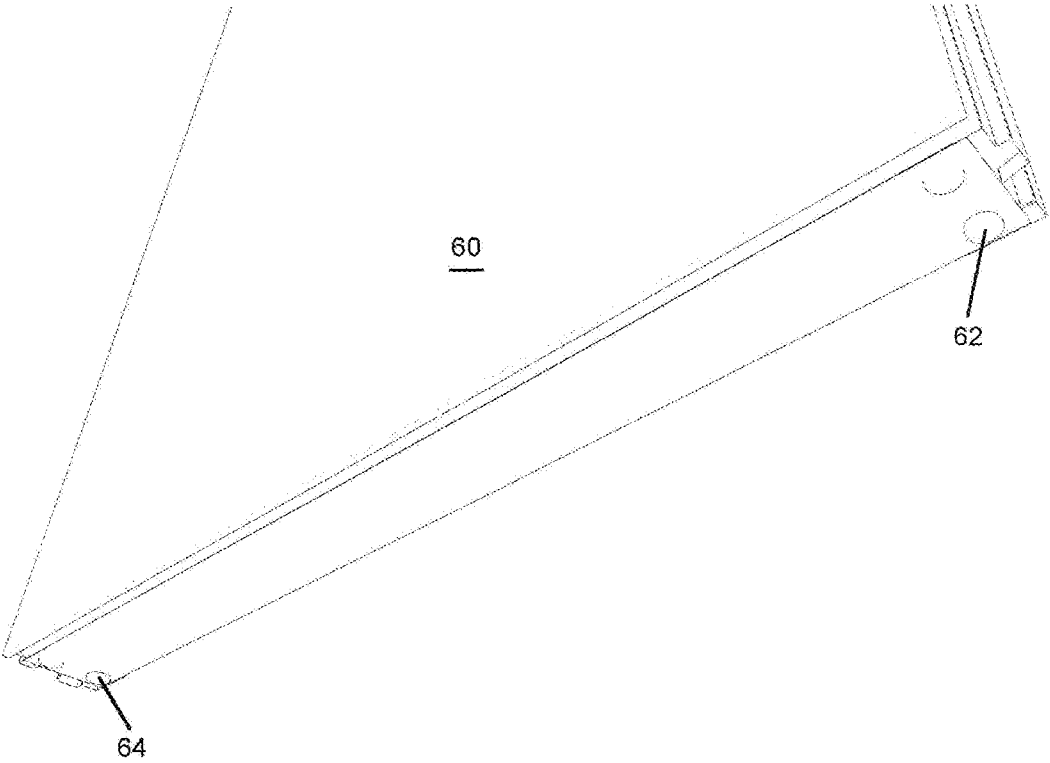


FIG. 6.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2014/000111

A. CLASSIFICATION OF SUBJECT MATTER

E04B 2/56 (2006.01) E04B 2/88 (2006.01) E04B 1/02 (2006.01) E04B 1/343 (2006.01) E04C 2/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DATABASES: WPI, EPODOC (CLUSTER: TXTE). **IPC/CPC:** E04B1/02, E04B1/38, E04B1/343, E04B2/02, E04B2/56, E04B2/88, E04B1/74, E04C2, E06B3. **KEYWORDS:** STRUCTURE, BUILDING, FRAME, PANEL, WALL, PARTITION, RAIL, TRACK, RUNNER, ROLLER, SLIDE, SHUTTLE, TRANSLATE, EDGE, END, SIDE, JOIN, INTERLOCK, ATTACH, TONGUE, COMPLEMENTARY, VERMICULITE, SILICATE, MAGNESIUM OXIDE and similar terms.

Google Patents: Building, panel, frame, partition, rail, track, runner, wheel, roller, slide, translate, glide, move, silicate, vermiculite, magnesium oxide, cladding, insulation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

☒ Further documents are listed in the continuation of Box C
 ☒ See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"J" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 7 March 2014	Date of mailing of the international search report 07 March 2014
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au Facsimile No.: +61 2 6283 7999	Authorised officer Joshua Hackworth AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832866

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Information on patent family members		PCT/AU2014/000111	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
Form PCT/ISA/210 (Family Annex)(July 2009)			

INTERNATIONAL SEARCH REPORT Information on patent family members		International application No. PCT/AU2014/000111	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. Form PCT/ISA/210 (Family Annex)(July 2009)			