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(54) **Title**: A TOWEL LADDER

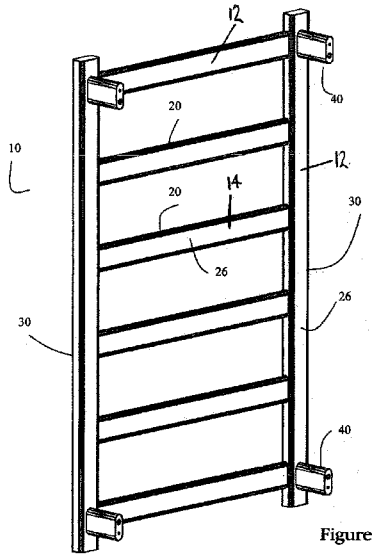


Figure 1

(57) **Abstract**: A towel ladder is described which includes at least one stringer and a plurality of rungs attached thereto, the at least one stringer or one of the plurality of rungs comprising a plurality of walls disposed substantially about a cavity, and at least one access panel associated with a stringer or a rung.

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A TOWEL LADDER

Technical Field

The present invention relates generally to towel ladders and in some embodiments particularly relates to heated towel ladders.

Background to the Invention

Towel ladders are a type of bathroom or kitchen fixture. They are typically attached to a wall of a bathroom or kitchen and include a number of horizontal rungs over which one or more towels can be folded so that they are ready for use. Some towel ladders are heated and maintain the towels stored on the ladder in a warm and dry condition.

Heated towel ladders are typically formed from tubular members which form both the horizontal rungs and the vertical stringers (or stiles) of the ladder. There are two main types of heated towel ladders, liquid filled and dry element types. In the case of liquid filled ladders, holes are cut in the stringers to receive the rungs, and the joints between rungs and stringers are welded in a watertight manner. The weld is then ground smooth to leave a visually acceptable appearance. The assembled ladder is then filled with a fluid, and a heating element is mounted in contact with the fluid. However, it is very time consuming to effect welded joints in a heated towel ladder, which must be both fluid-tight, and be finished in a visually appealing way.

In the case of dry element types, these utilise a single length of insulated wire as a heating element that is somewhat similar to an underfloor heating element. To assemble the towel ladder, the rungs and stringers are laid out and the heating element is threaded in a zig-zag fashion up the ladder through the rungs and stringers to leave two ends of the heating element trailing out of the end of one of the stringers. The rungs and stringers are then welded together. However, should the heating element fail in use, then it is impossible to replace the heating element, as it is no longer possible to remove and replace the element after welding. Thus, the heated towel ladder must be replaced. Furthermore, tubular

components can occupy a significant amount of storage space at the manufacturing stage.

The present invention seeks to provide a new towel ladder.

Summary of the Invention

According to one form of the present invention there is provided a towel ladder including:

at least one stringer and a plurality of rungs attached thereto, the at least one stringer or each one of the plurality of rungs comprising a plurality of walls disposed substantially about a cavity, and

at least one access panel disposed in one of the walls for providing access to the cavity of the at least one stringer or rung.

Preferably the access panel is flush with its respective wall. Preferably the access panel extends a full length of one of the walls.

Preferably the access panel is detachably mounted to one of the walls. Preferably the detachably mounted access panel is slidably mounted on the wall.

Preferably the access panel is slidably mounted on at least one stringer. Preferably the access panel is slidably mounted on at least one rung. Preferably the access panel includes a recess in at least one edge so as to receive and engage with cooperating and opposing wall edges.

Preferably the at least one stringer or at least one of the plurality of rungs includes one or more flat perimeter walls. Preferably the at least one stringer or at least one rungis formed from sheet metal. Preferably the sheet metal is formed into a channel comprising opposing returns to partially form one wall which receives the access panel.

Preferably the towel ladder can be heated. Preferably the towel ladder includes heating elements. Preferably the heating elements are disposed within one or more of the plurality of rungs such that substantially only the rungs are heated. An advantage of heating substantially only the rungs is that less energy is used in heating towels placed on the ladder. In this arrangement, electrical connection is

made to each rung element with a wire or loom extending along a stringer, but the electrical connection is made without heating the stringer.

According to another form of the present invention there is provided a towel ladder including

a plurality of stringers;

one or more rungs comprising rung ends,

wherein the stringers include one or more apertures for receiving one or more respective rung ends therethrough.

Preferably the rung end is held fast in the aperture by fasteners. Other suitable methods of fastening the rung end to the stringer include interference fits, bolts and adhesive.

Preferably a stringer insert is provided in the stringer for receiving and facilitating positioning of the rung end. The stringer insert facilitates strengthening of the stringer walls and receives a fastener for fastening the rung end to the stringer.

Preferably the fastener extends through a wall of the stringer and into or against the rung. Preferably the fastener extends through the access panel.

According to still another form of the invention there is provided a towel ladder including a plurality of stringers; a plurality of rungs; a plurality of mounting legs, respective ones of the mounting legs being fastened to respective stringers.

Preferably the mounting leg includes a mounting leg insert which is fastened to a respective stringer. Preferably the mounting leg includes a hollow tube which extends over the mounting leg insert in an interference fit relationship in order to affix to the insert.

Preferably the mounting leg insert is fastened to the access panel. Preferably the fastener is a screw which extends through the access panel and into the fastener.

According to a yet further aspect of the present invention there is provided a towel ladder including: a plurality of rungs and a plurality of heating elements, each heating element disposed within a respective rung, wherein the heating elements are electrically connected to one another in parallel.

Brief Description of the drawings

To enable a clearer understanding, the invention will now be further explained and illustrated by reference to the accompanying drawings in which:

Figure 1 is an isometric view of a towel ladder in accordance with a preferred embodiment of the present invention;

Figure 2 is an exploded view of various parts of the towel ladder shown in Figure 1;

Figure 3 is a rear elevation view of the towel ladder of Figure 1, showing the heating arrangement in hidden detail;

Figures 4 – 6 show the steps for forming a rung of the ladder shown in Figure 1;

Figure 7 – 11 show the steps for forming a stringer of the ladder shown in Figure 1; and

Figure 12 is a plan view of a sheet metal blank which is formed into a stringer shown in Figure 1.

Detailed Description of the Preferred Embodiment

Referring to the drawings there is shown a towel ladder generally indicated at 10, the towel ladder including a plurality of structural elements 12 which are in the form of rungs 20, stringers 30 and mounting legs 40. Each of the structural elements 12 are substantially hollow. Each stringer and rail comprises four walls 70, 71, 72, 73 generally disposed about a perimeter of a cavity.

One of the walls 73 of each of the plurality of rungs 20 or one of the walls of each of the stringers 30 in the embodiment shown is in the form of a removable wall member 18, the removable wall member 18 being in the form of an access panel 19. The access panel 19 when installed is disposed flush with one of the walls, and extends a full length of the wall with which it is associated.

The access panel 19 includes a recess 75 in each of its longitudinal edges so as to receive and engage with cooperating and opposing wall edges 76, 77. The recess

75 is formed such that the panel is flush with walls 71, 72.

The stringers 30 and the rungs 20 are formed from flat blanks of sheet metal material 78. The sheet metal is formed by the process described below and shown in the drawings into a C-shaped channel comprising three walls 70, 71 and 72. Walls 71 and 72 include edges 76 and 77 which oppose one another when the channel has been formed.

The towel ladder 10 includes a heating function, and includes heating elements 28 to achieve that purpose. The heating elements are disposed within one or more of the rungs 14 and are mounted inside the ladder such that firstly, a length of heating element material in the form of a loop 28 of Teflon coated heating element wire is associated with each rung 20 by inserting from one end of the rung 20. The length of wire forming the loop is selected such that the loop 28 extends for the entire length of rung 20. The resistance of the wire is selected such that in use, the rung reaches a temperature sufficient to heat towels, but should not reach a temperature that could scold or burn a normal adult person touching the rung 20. A loom 38 is inserted into the open channel which runs along the length of stringer 30. The heating element loops 28 are connected to the loom 38 by way of heat- and electricity-insulating ceramic connector blocks with connectors inside which electrically connect the heating element loops 28 together in parallel.

In this arrangement, electrical connection is made to each rung element with a wire or loom running along the stringer, but the electrical connection is made without heating the stringer.

The rungs 20 and stringers 30 of the towel ladder 10 are formed by deforming flat blanks of material. The towel ladder 10 further includes wall mounting legs 40 which are used to mount the towel ladder to a wall of a bathroom.

Referring to Figures 4, 5 and 6, the process steps for forming a rung 20 are illustrated. At Figure 4, a blank 22 of mirror finish 304 grade sheet stainless steel of approximately 1mm or preferably 0.8mm thickness is shown in end view. The blank is rectangular in shape.

The blank 22 is deformed on a bending machine such as the RAS Flexibend produced by RAS Reinhardt Maschinenbau GmbH of Sindelfingen, Germany. A die 50 is prepared beforehand for use with the bending machine. The die includes a bending formation 52. Referring to Figure 5, a first edge of the blank is shown having been bent around bending formation 52 of die 50. Then, referring to Figure 6, the blank is turned around and the other edge bent in the same manner so that both edges of the blank have now been bent to form a rung 20.

Referring to Figures 7 to 11, the process steps for forming a stringer are shown commencing with blank 32 shown at Figure 7. Blank 32 is shown in and end view, and is formed of the same material as blank 22. At figure 8, one edge of blank 32 is shown having been bent by 90 degrees about bending formation 52 of die 50. At figure 9, a second bend of 90 degrees has been put into the first edge. At figures 10 and 11, the blank has been turned around, and the same bends as shown in figures 8 and 9 are put into the second edge of the blank to form stringer 30.

Referring to Figure 12, blank 32 is shown in plan view. The blank includes a number of apertures 34 that are formed by laser cutting. The apertures are sized to accommodate insertion of rungs 20. The surface of the blank 32 that becomes the outer surface of the stringer 30 is protected by a plastic film that is intended to be peeled off following installation of the finished product. Other steel components of the towel ladder are also covered in this protective plastic film.

Referring to Figure 2, to assemble, the peripheral wall of the rung is completed by closing off the rung 20. This is done by inserting a panel 19, in the form of a length of anodised aluminium extrusion 26 into each rung 20.

The panel 19 or extrusion 26 is cut to the same length as rung 20. The extrusion 26 includes recess or groove 75 and the extrusion is fitted to the rung by sliding the extrusion along the edges of the rung so that the free edges 76, 77 of the rung are received in grooves 75.

Inserts in the form of injection moulded polythene blocks 60 are used to reinforce the joints between rungs 20 and stringers 30. Blocks 60 are inserted from one end of stringer 30 and aligned so that the aperture 62 in each block lines up with

aperture 34 of stringer 30. One end of rung 20 is then inserted through aperture 34 and is received with an interference fit in aperture 62 of block 60. This operation is repeated for each rung 20 down the length of stringer 30.

In the embodiment illustrated, there are six rungs 20 in the ladder. The same process is then carried out for the other ends of the rungs 20. That is, they are inserted into a second stringer.

Referring again to Figure 2, the rear faces of stringers 30 are then closed off with lengths of extrusion 36 in the same manner as previously described for the rungs 20.

At the time of installing the towel ladder in a bathroom, a low voltage power supply, for example, 12 or 24VDC, is connected to loom 38 through one of wall mounting legs 40. The connection may be made at either the top or the bottom of the ladder. Further, because the ladder is symmetrical top to bottom, the ladder can be installed either way up. So, the loom 38 can extend from either the left hand or right hand side of an installed towel ladder 10. This advantageously provides flexibility for connecting a power supply to the loom, as it can be effectively attached at any of the four comers of the ladder 10.

The ladder 10 is mounted to a wall by way of mountings 40 which are comprised of a block of polythene 42 which is surrounded by a chrome plated sleeve 44 to give a pleasing outer appearance.

To install, a template or the like is used to mark out the positions of the four wall mountings 40 on the wall. Each of mounting blocks is secured by way of a screw through one of holes 48. The other of holes 48 is used to thread the power supply wire, and is only used at one of the mounting blocks. Then, the panel 19 or extrusion 36 is slid part-way out of the top of stringer 30 (as seen in figure 11). Screws are inserted through holes 37 and secured to mounting block 44 by way of holes 46. This is carried out for the top two mountings, and then the ladder is slid upwards to expose the lower end of the extrusions 36.

The same screw fixing procedure is carried out for the lower mounting blocks. At the mounting 40 which carried the power supply wire, the power supply wire is threaded through hole 39 and attached to loom 38 with heat resistant ceramic

connecting blocks. Ladder 10 is then slid down to its final position, with extrusions 36 inside either end of the stringers.

Grub screws (not shown) are inserted from the rear side of the ladder 10 through threaded holes 31 adjacent each mounting 40. The grub screws are tightened with an Allen key and bite into respective polythene blocks 60 at each mounting point. The grub screws prevent the ladder from sliding downwards. Finally, end caps 64 are inserted at each comer to close off the ends of stringers 30. The installed result has the appearance of the heated towel ladder (from the back) as shown in Figure 1.

Following installation, or sometimes before or during, at some stage the protective plastic is peeled from stainless steel surfaces to reveal a mirror finish. This could be done after further installation works are carried out which protects the mirror finish of the towel ladder.

The towel ladder described above is a heated towel ladder and included a heating arrangement. Other embodiments may not be heated and do not include any heating arrangement.

In the embodiment described above, the flat blanks were produced by laser cutting. In other embodiments that may be formed by plasma or water jet cutting. In the embodiment described above the towel ladder included two stringers and six rungs. However, the invention also has application in towel ladders having any number of rungs and stringers, and including a second row of rungs extending adjacent the first row.

It can be seen that embodiments of the invention have at least one of the following advantages:

- Low voltage heating arrangement reduces injury potential to users.
- Power connection can be made at any of the four wall fixing points.
- Power connection is made inside the towel ladder, and not in the wall.
- Improves ease of installation as no in-wall preparation or installation kits are required to be installed at time of wall construction.

• High quality mirror finish cannot be achieved with traditional hand polishing of tubular parts.

• High accuracy (0.1 mm) which cannot be achieved with traditional welded tubular parts.

• Heating elements are accessible for replacement

• Parallel connection means that if a heating element in one rung fails, the others continue to work.

• Flat blanks take up less storage space than tubular parts which reduces inventory space at manufacturing stage.

• Legs are attached by installer - so the volume of the final packaged product is that of a traditional welded heated towel ladder with welded legs.

• The plastic coating allows for the heated towel ladder to be installed during the construction phase of the bathroom. The plastic protects the heated towel ladder from scratches due to construction.

• This method of manufacture provides for flexibility of creating new designs to suit customers/projects that would like an exclusive design.

The word 'comprising' and forms of the word 'comprising' as used in this description do not limit the invention claimed to exclude any variants or additions.

Modifications and improvements to the invention will be readily apparent to those skilled in the art. Such modifications and improvements are intended to be within the scope of this invention.

The claims defining the invention are as follows:

1. A towel ladder including:
at least one stringer and a plurality of rungs attached thereto, the at least one stringer or each one of the plurality of rungs comprising a plurality of walls disposed substantially about a cavity, and
at least one access panel disposed in one of the walls for providing access to the cavity of the at least one stringer or rung.

2. The towel ladder in accordance with claim 1 wherein the access panel extends a full length of one of the walls.

3. The towel ladder in accordance with claim 2 wherein the access panel is detachably mounted to one of the walls.

4. The towel ladder in accordance with claim 3 wherein the access panel is slidably mounted on the wall.

5. The towel ladder in accordance with any one of claims 1 to 4 wherein the access panel includes a recess in at least one edge so as to receive and engage with cooperating and opposing wall edges.

6. The towel ladder in accordance with any one of claims 1 to 5 wherein the walls of the at least one stringer or any of the plurality of rungs comprise flat perimeter walls.

7. The towel ladder in accordance with any one of claims 1 to 6 wherein the at least one stringer or any one of the plurality of rungs are formed from sheet metal.

8. The towel ladder in accordance with claim 7 wherein the sheet metal is formed into a channel comprising opposing returns to partially form one wall which receives the access panel.

9. The towel ladder in accordance with any one of claims 1 - 8 further comprising a heating mechanism.

10. The towel ladder in accordance with claim 9 wherein the heating mechanism includes heating elements.

11. The towel ladder in accordance with claim 10 wherein the heating elements are disposed within one or more of the plurality of rungs.

12. The towel ladder in accordance with claim 11 wherein the heating elements are electrically connected to one another in parallel.

13. A towel ladder including a plurality of stringers and one or more rungs comprising rung ends, a stringer or a rung having an access panel, wherein the stringers including one or more apertures for receiving one or more respective rung ends therethrough.

14. The towel ladder in accordance with claim 13 wherein the rung end is held fast in the aperture by fasteners.

15. The towel ladder in accordance claim 13 or 14 wherein a stringer insert is provided in the stringer for receiving and facilitating positioning of the rung end.

16. The towel ladder in accordance with claim 15 wherein the stringer insert facilitates strengthening of the stringer walls and receives a fastener for fastening the rung end to the stringer.

17. A towel ladder including a plurality of stringers; a plurality of rungs; at least one access panel in a stringer or rung; and a plurality of mounting legs, respective ones of the mounting legs being fastened to respective stringers.

18. The towel ladder in accordance with claim 17 wherein the mounting leg includes a mounting leg insert which is fastened to a respective stringer.

19. The towel ladder in accordance with claim 17 or 18 wherein the mounting leg includes a hollow tube which extends over the mounting leg insert in an interference fit relationship in order to affix to the insert.

20. A towel ladder including: a plurality of stringers; a plurality of rungs; and one or more heating elements, at least one stringer or rung having an access panel and the or each heating element disposed within a respective rung, wherein the or each heating elements are electrically connected to one another in parallel.

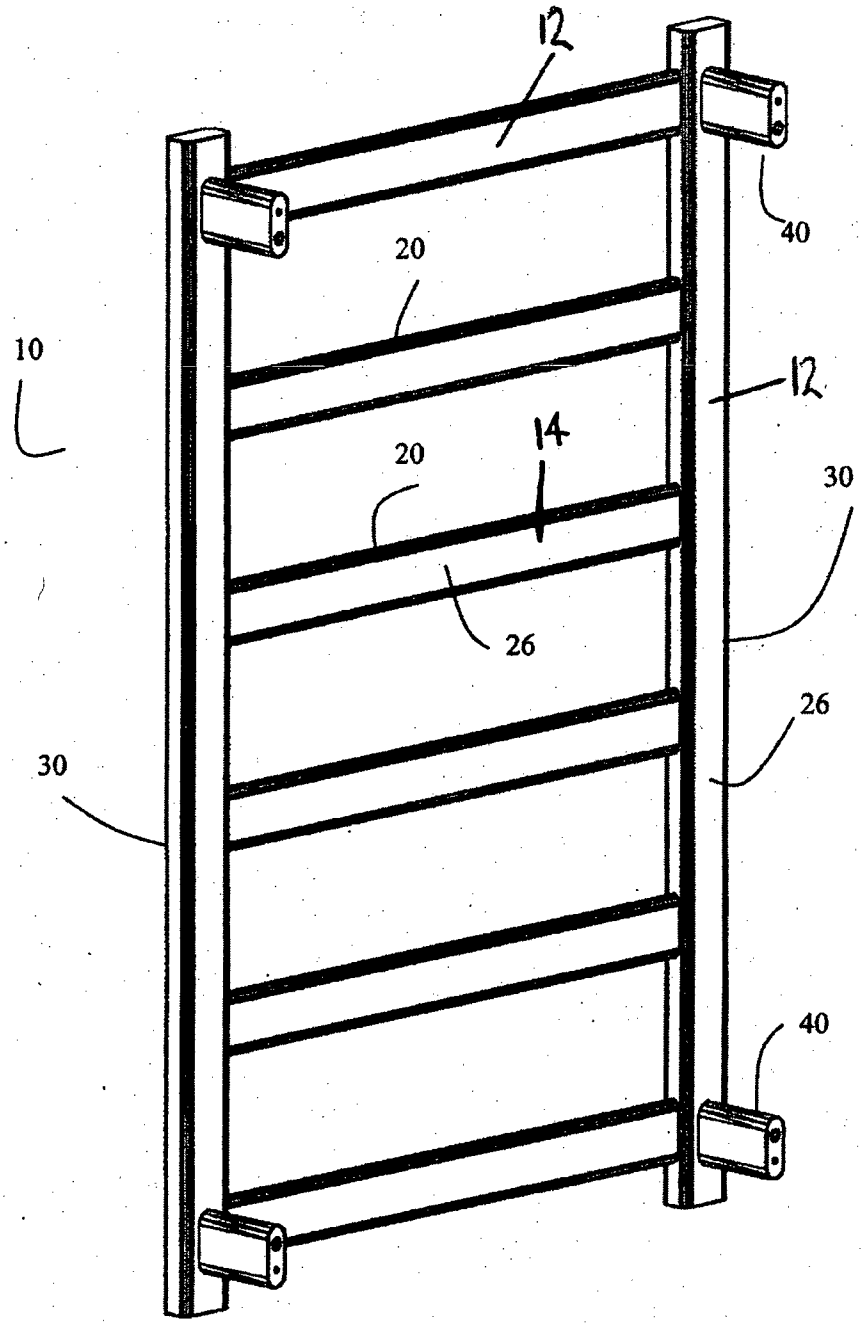


Figure 1

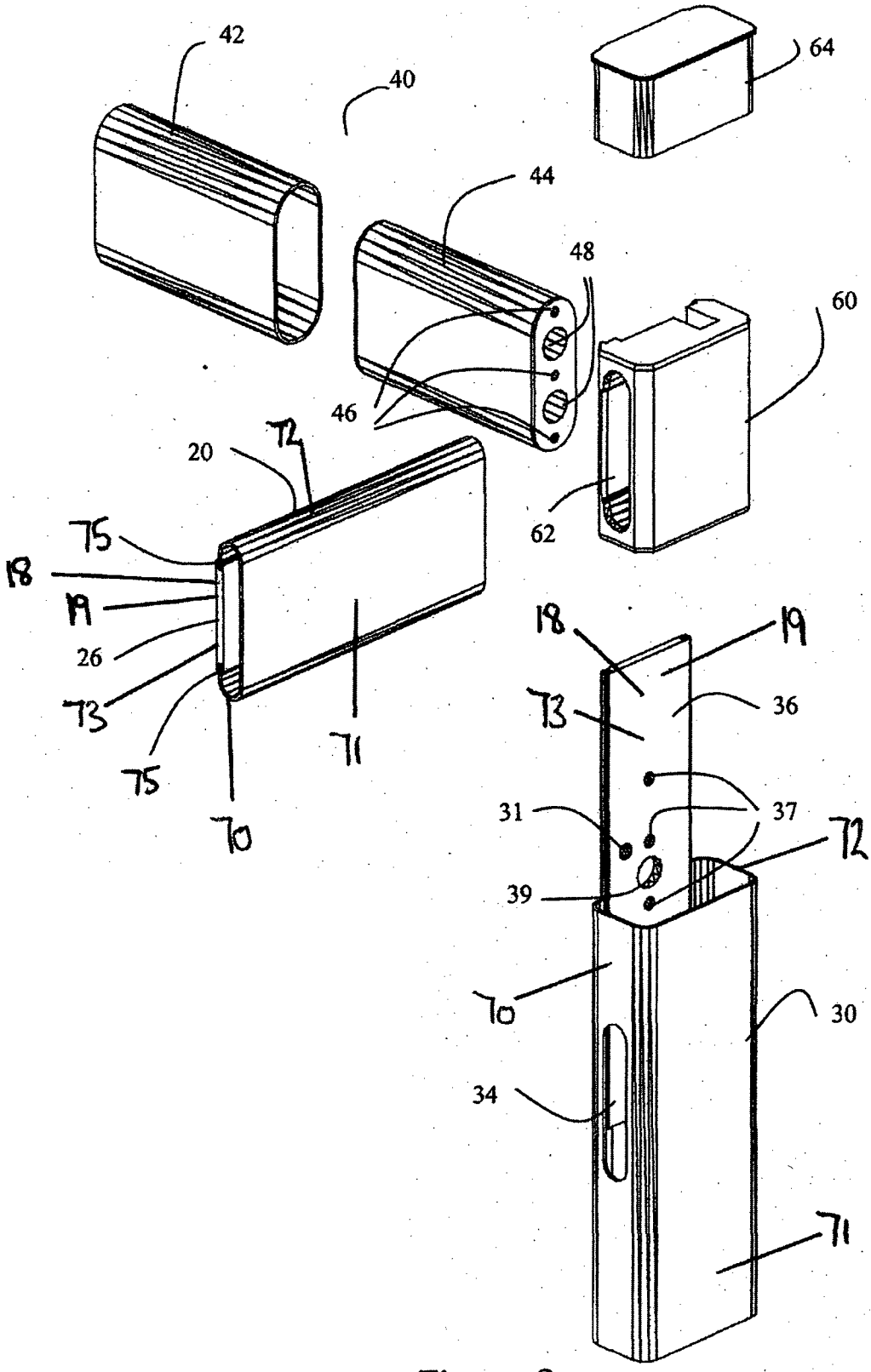

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Figure 2

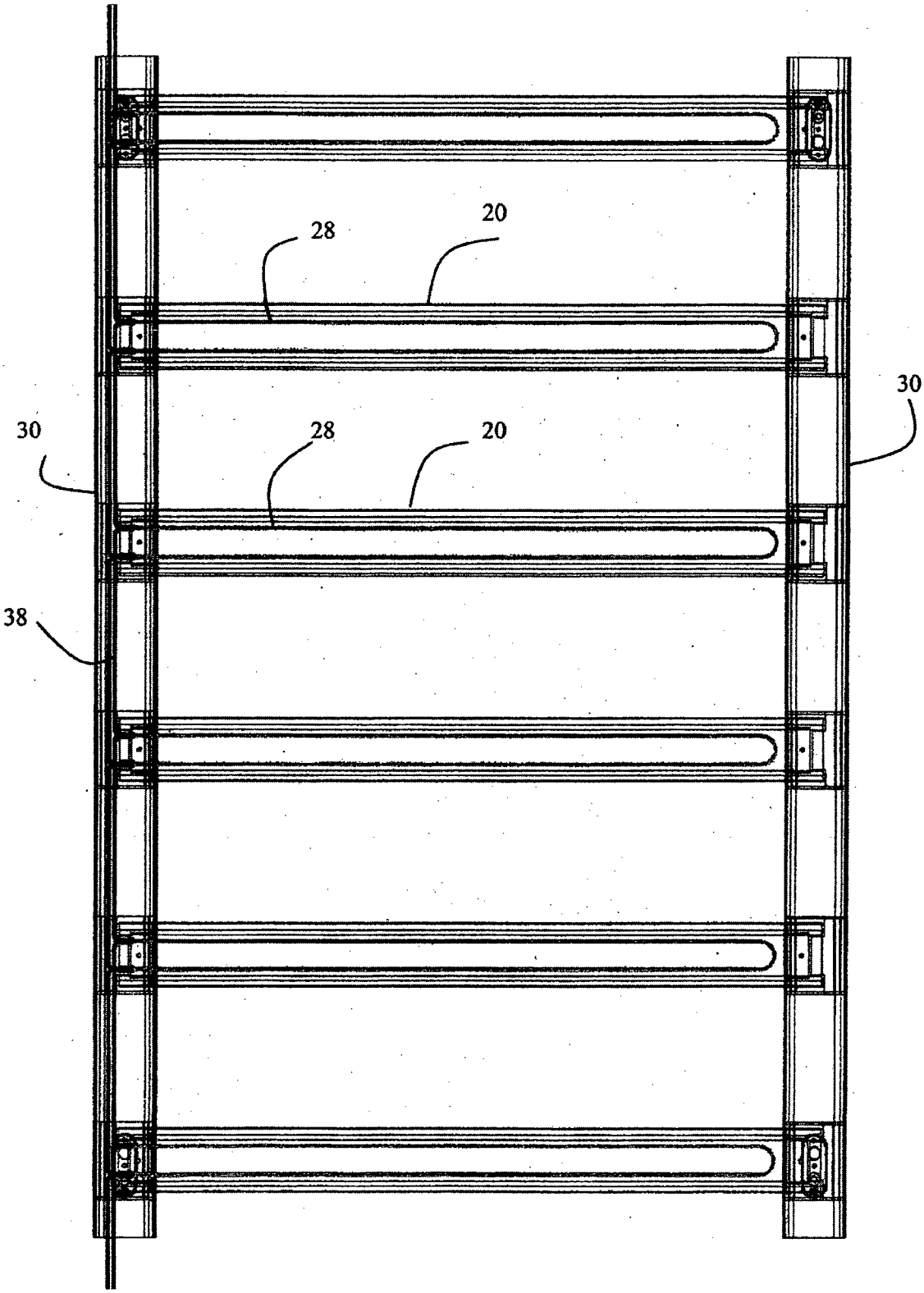


Figure 3

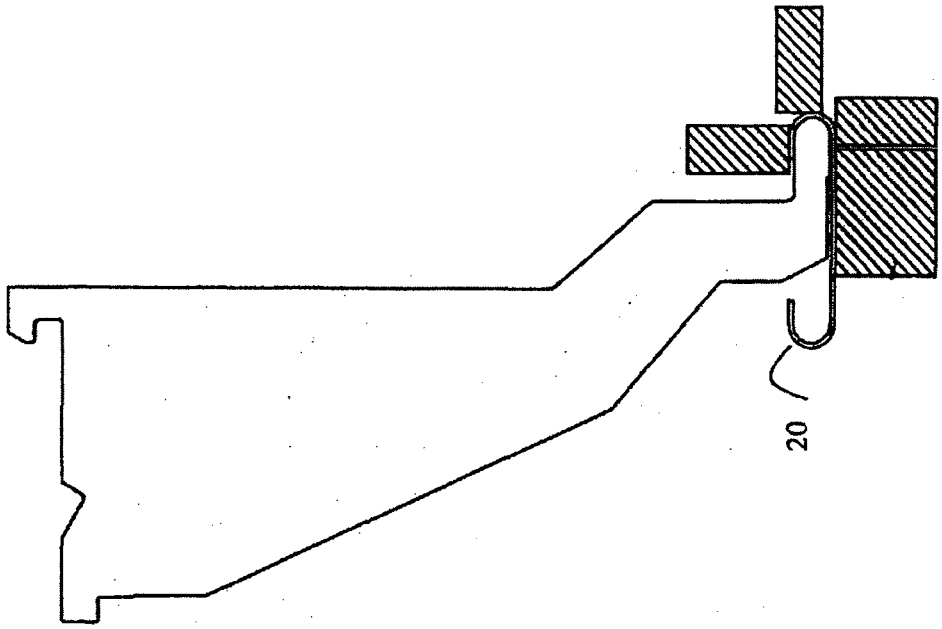


Figure 6

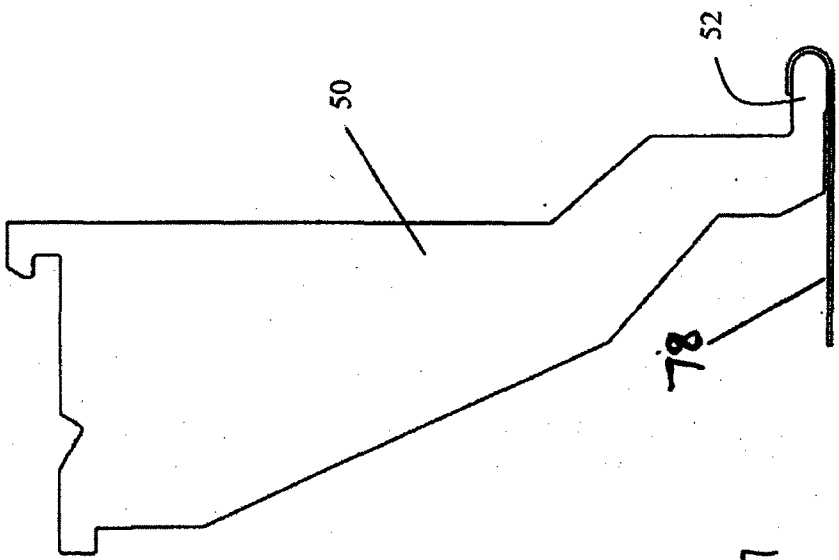


Figure 5

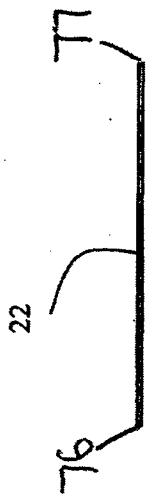


Figure 4

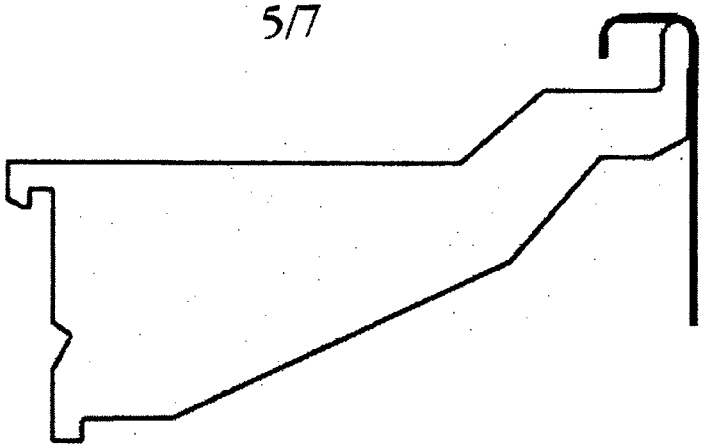


Figure 9

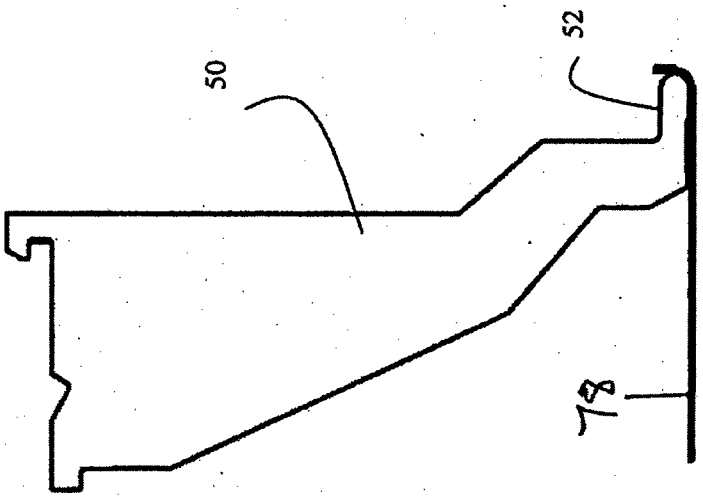


Figure 8

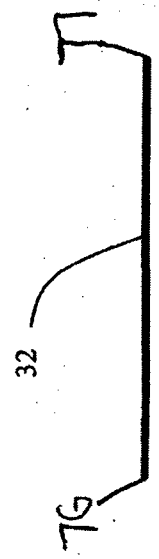


Figure 7

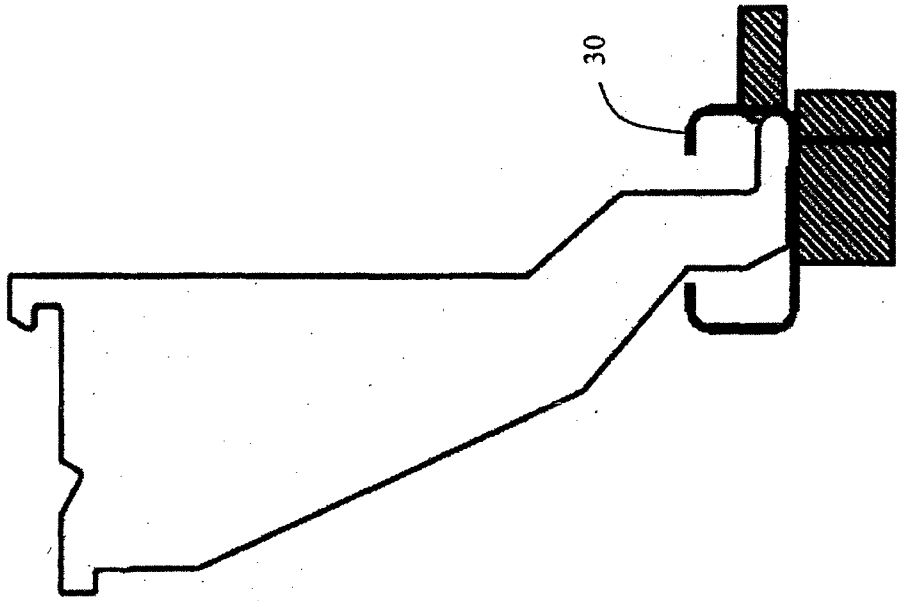


Figure 11

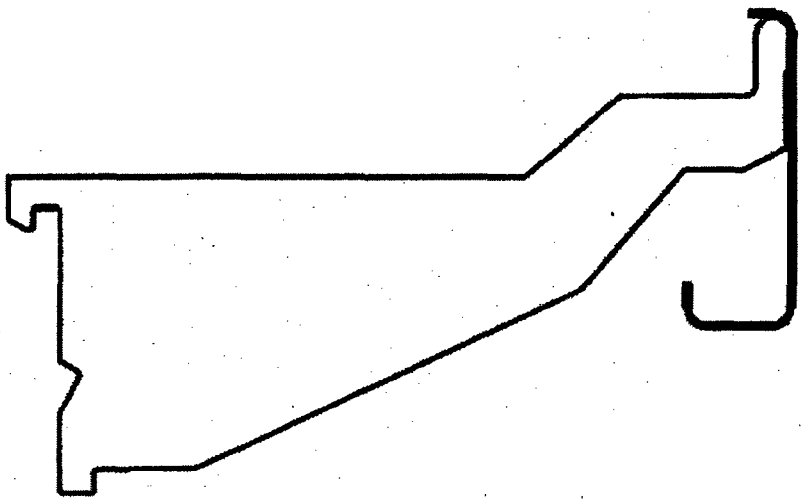


Figure 10

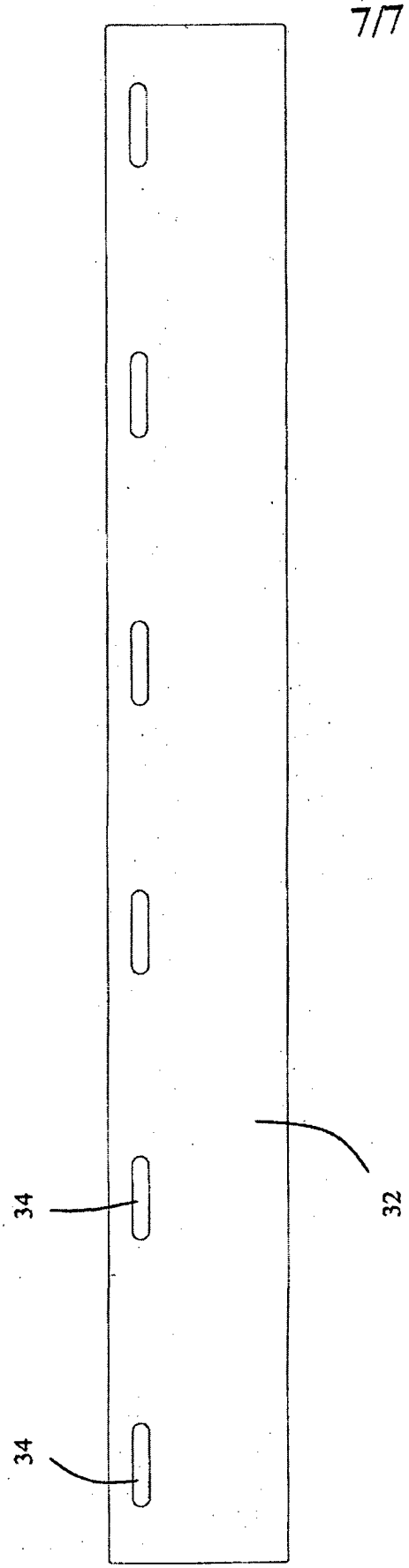


Figure 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2011/000449

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

A47K 10/04 (2006.01) ***D06F 58/16*** (2006.01) ***D06F 59/08*** (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)
EPODOC, WPI (Tube, Conduit, Cavity, Door Access Cover, Panel & Towel)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 2009/010541 A2 (BASIC HOLDINGS) 22 January 2009 (Fig1, 2, & 5, P1 Ln2 , Pg11 Ln21 and Pg13 Ln6)	1-6, 9-13 & 20 7-8 & 14-19
Y	US 2008/0138054 A1 (SHORT) 12 June 2008 (Fig 4, 5, 6 & 7 & Fig2 P.N.15)	8 & 14-19
Y	GB 638203 A (METCALF) 7 June 1950 (Pg1 Ln77)	7
A	WO 2006/013083 A1 (BASIC HOLDINGS) 9 February 2006	

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Date of the actual completion of the international search	Date of mailing of the international search report
08 June 2011	04 JUL 2011
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer **S. Ochsenbein** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 7999

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2011/000449

This Annex lists the known "A" publication level 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.

Patent Document Cited in Search Report		Patent Family Member			
WO	2009010541	EP	2229559	GB	2451109
US	2008138054	AU	2007237167	NZ	551614
GB	638203	NONE			
WO	2006013083	GB	2416686		

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX