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[Continued on next page]

(54) Title: AUTOMATED SELF-COLLAPSIBLE ISO CONTAINER

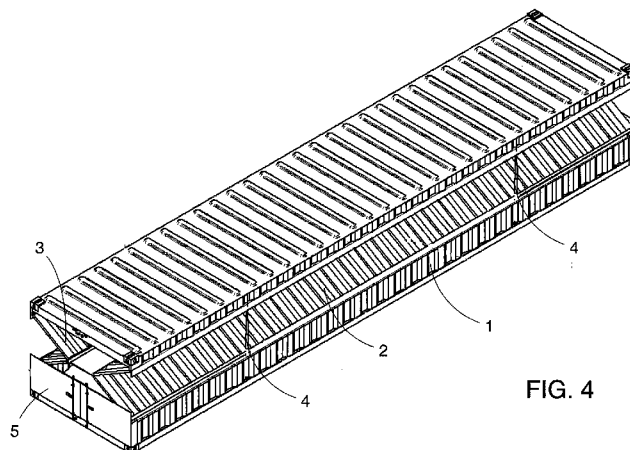


FIG. 4

(57) Abstract: AKDC (Automated self-collapsible container or Automated knock-down container, or Automated self-collapsible maritime container) embodies an innovation destined to revolutionise shipping and transport of goods around the world. Over sixty years have passed since the ISO CONTAINER made its first appearance becoming the most widely used system in the world for the movement of goods. Though chiefly used for transport by sea, over time the container has been adapted for carrying goods by road and rail as well; thousands of intermodal centres and port terminals have arisen to cope with the quantity of containers that are moved every day. But stocking space at the ports, though greatly increased may well be insufficient for the future. AKDC can therefore fulfil an important role from this point of view. The shipping companies are certainly those who will gain the greatest economic benefits from using the AKDC by cutting their storage and handling charges at ports and intermodal centres and, even more important, their costs for returning empties to various ports in the world, with reductions of up to one sixth of present levels (price per TEU), especially in areas where trading imbalance is a constant factor. Use of the AKDC also means a lower environmental and social impact in that less stocking surface is needed, allied to a reduction in the transport of empty units; last but not least the possibility of reducing accidents and pollution due to there being fewer vehicles on the roads. It follows that the AKDC will shortly be able to replace the obsolete DV container and open a brighter future with new models.



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### **Automated self-collapsible ISO container**

#### Known-art

PCT WO 2008/073202 June 2008; USA patent 3570698 March 1971; USA patent 5190179 March 1993; USA patent 4858779 August 1989; USA patent 3684122 August 1972; USA patent 4177907 December 1979; USA patent 3765556 October 1973; USA patent 5611449 March 1997; USA patent 4924783 May 1990; USA patent 4577772 March 1986; USA patent 4388995 June 1983; USA patent 3796342 March 1974.

For various important reasons the above known art did not arouse the interest of shipping companies, for two in particular:

1. A number of versions of these containers had to be disassembled literally by hand or by lifting or other equipment, employing several workers for several hours resulting in prohibitively high costs for disassembly and assembly.
2. Container disassembly and assembly would have involved risks of damage to single parts as well as the risk of losing some of them.

This precluded the concept of reducing running costs that, as will be seen, AKDC (Automated self-collapsible container or Automated knock-down container, or Automated self-collapsible maritime container) can guarantee by its system of automatic self-collapse and by the AKDC container having no removable parts.

#### Description

The most important feature of the AKDC (see drawing 1 showing the container erect) is that it can be automatically collapsed to reduce its bulk for purposes of transport, handling when empty or storage. Once collapsed (or bent up), its size and bulk amount to only one third of the space occupied when standing upright (see drawing 2).

Three 40' and six 20' units can in fact be loaded and carried on a single means of transport whether road truck or rail wagon. By using special trucks or low-loader wagons more than 3/40' or 6/20' containers can be transported at any one time. This also reduces the environmental and social impact made by the AKDC in that it requires less storage space and fewer trucks on the roads, when transported empty, with a consequent reduction in road accidents and pollution. The AKDC will possess all the characteristics needed to satisfy ISO and CSC standards in order to obtain approval for transport by sea, road and rail. These AKDC units can be handled by spreader-type or grapple-type cranes not only singly but also in 'packages' of three (drawing 3) held together by twist locks at the corners of each unit. The AKDC will be fitted with side 'pockets' so that a fork truck can move it. In this way the AKDC will be able to replace all the containers produced today in the sizes of 10', 15', 20', 40', 45' and 53' long by 8'6" or 9'6" high (those most commonly used in world shipping measure 20', 40', 45' and 53' long by 8'6" or 9'6" high), since the collapsible design can be used for all existing sizes. The two side walls, the upper door and upper wall that bend inwards to allow the container to collapse, the high level of economy and practicality characterizing the whole system, added to the extremely small amount of maintenance needed, constitute features of primary importance making the AKDC an innovative and unique container compared with those produced and used today for carrying goods all over the world. Compared with the present DV containers, the AKDC when collapsed is less liable to damage (to walls and doors) by faulty handling during transport and handling, resulting in lower costs for shipping companies running the container fleet as well as for hiring and insurance. The container is collapsed by knocking down the upper section of the door at the front end (part 7, drawing 5) and the upper rear wall (part 10, drawing 5) that, moved by a

cylinder (part 9, drawing 4), is laid on the lateral supports so that later the side walls (part 2, drawing 4) can be collapsed and laid over the front upper door and the upper rear wall. By means of cylinders placed externally on the side walls between the container ribs, the roof can be lowered till it joins the fixed lower section of the side walls (part 1, drawing 4), the fixed lower section of the front door (part 6, drawing 4) and the fixed lower section of the rear wall. These operations carried out in the reverse order restore the container to its upright position.

On the inside the AKDC is fitted with anchoring points to prevent the load from moving during transport or handling. The door-closing system will be similar to that of the present DV, approved by regulations in force at many world ports for security (against terrorism), and which permit application of the latest types of safety and customs-sealing devices like those on the containers already in use.

Lateral walls and uprights will be fitted with watertight washers and hinges to avoid entry of rain, or sea water when at sea, both in the upright and in the collapsed positions and to permit the AKDC to bend inward and collapse.

A "package" of three units can be stowed away and roped on board a ship carrying full containers ('cellular' ships) as if it were a single DV/ISO container, but if necessary each unit can be roped singly. Collapsing is done by a system of cylinders at the lateral walls, front doors and rear wall, suitably spaced to ensure protection from shocks by means of hollow spaces to allow both for collapse of the walls and for their being returned to the upright position. The time needed to collapse and reposition the container is about two minutes for each operation. When completely collapsed the height of the unit is about one third (drawing 2) of its height when upright (drawing 1).

The AKDC will have a safety arrangement for preventing the walls from accidentally bending when upright and when, during loading, there are people inside, also preventing, when loading is completed, any bending that might damage the load. A similar locking system will come into effect to prevent the collapsed walls of an AKDC unit from extending when a crane is hooked onto the upper corner fittings to move it, singly or in packages of three. The

collapsing system will be stowed away to avoid damage during loading, handling, etc.

Another most important point is that the AKDC will not have any loose parts that could be detached, damaged or lost. It will also have a mechanical system of ventilation operable by hand. This is another important advantage particularly when the load has to be fumigated and then ventilated, or if its nature makes continuous ventilation necessary during transport. Present regulations on fumigation in fact require that, once a container has been fumigated with the toxic/poisonous substances needed to eliminate insects and parasites contained in the wood, it must be ventilated for at least twenty-four hours with its door open before anyone is allowed inside. If fumigation is necessary to eliminate parasites or other insects from the wood, keeping the doors open for twenty-four hour to ventilate the container may mean that other insects can enter thus destroying the effect of fumigation. AKDC, however, offers a ventilation system that can be mechanically opened or closed so that the container can be closed to gain the maximum effect during fumigation but afterwards the ventilation system can be turned on to allow the toxic substances to escape while keeping the doors closed to prevent the entry of other parasites.

AKDC can therefore rightly claim to represent the foundation stone of a new generation of containers for the coming years.

### Claims

1. System for complete automatic self-collapse of the upper sections of doors, upper section of the rear wall and the middle and upper sections of the side walls, all these parts being bent towards the inside of the container by cylinders placed inside close to the side walls, rear wall and front doors, and outside between the container ribs of the side walls to allow the roof to be lowered.

2. System for automatic self-collapse as in claim 1 and for self-elevation, the same as the collapsing system but operating in reverse, worked by a hydraulic and/or pneumatic and/or electrical system or a combination of these systems, with a blocking system to keep the side walls, the upper section of the doors, the upper section of the rear wall securely in an upright position; blocking system to keep the upper section of the doors, the upper section of the rear wall and the side walls collapsed during handling operations when the container is collapsed; unblocking system to allow the upper section of the door, the upper section of the rear wall, the side walls and the middle and upper sections of the side walls to be flattened and collapse the unit; unblocking system to allow repositioning of the upper section of the door, the upper section of the rear wall and the middle and upper sections of the side walls, to return the container to its upright position.

3. Application of the self-collapsing and re-elevation system as in claims 1 or 2 applicable to all types of ISO and non-ISO containers, cases mobile for transporting goods or for any other use such as in the shipbuilding or other industries, in military and/or industrial applications, in all the existing sizes, the most popular being of 10', 20', 25', 30, 35', 40', 45', 53' in length and 8'6" and 9'6" high, and/or others still.

4. Container fitted with:

- a) front door in two sections, a fixed lower, non-collapsible section (part 5, drawing 1) and an upper collapsible section (part 6, drawing 1) each with two doors, left and right;

- b) rear wall in two sections, a fixed lower section (part 11, drawing 5 and part 1, drawing 6) and a collapsible upper section (part 10, drawing 5 and part 2, drawing 6);
- c) internal points of support at the side walls (part 12, drawing 5) for the two panels of the upper section of the front door and for the upper section of the rear wall;
- d) two side walls each consisting of three sections hinged together, the lower section of which is fixed – non collapsible – (drawing 1, parts 2, 3) and the two upper sections collapsible inside the container joined by watertight hinges, to allow said two sections to be bent towards the inside of the container (drawing 4); when collapsed, the middle and upper sections of the two lateral walls lie over the already-collapsed upper section of the front door and over the already-collapsed upper section of the rear wall;
- e) cylinders placed outside the side walls between the ribs of the container, to allow the roof to be lowered till it joins the upper edge of the fixed lower section of the side walls (part 1, drawing 1), the upper edge of the fixed section of the door and the upper edge of the fixed section of the rear wall, superimposing the middle section over the upper section of the side walls, the upper section of the door and the upper section of the rear wall completing the collapsing process (drawing 2).

5. Total absence of detached and removable parts reduces risks of loss or damage to zero.

6. Mechanical system for ventilating the container with doors closed.



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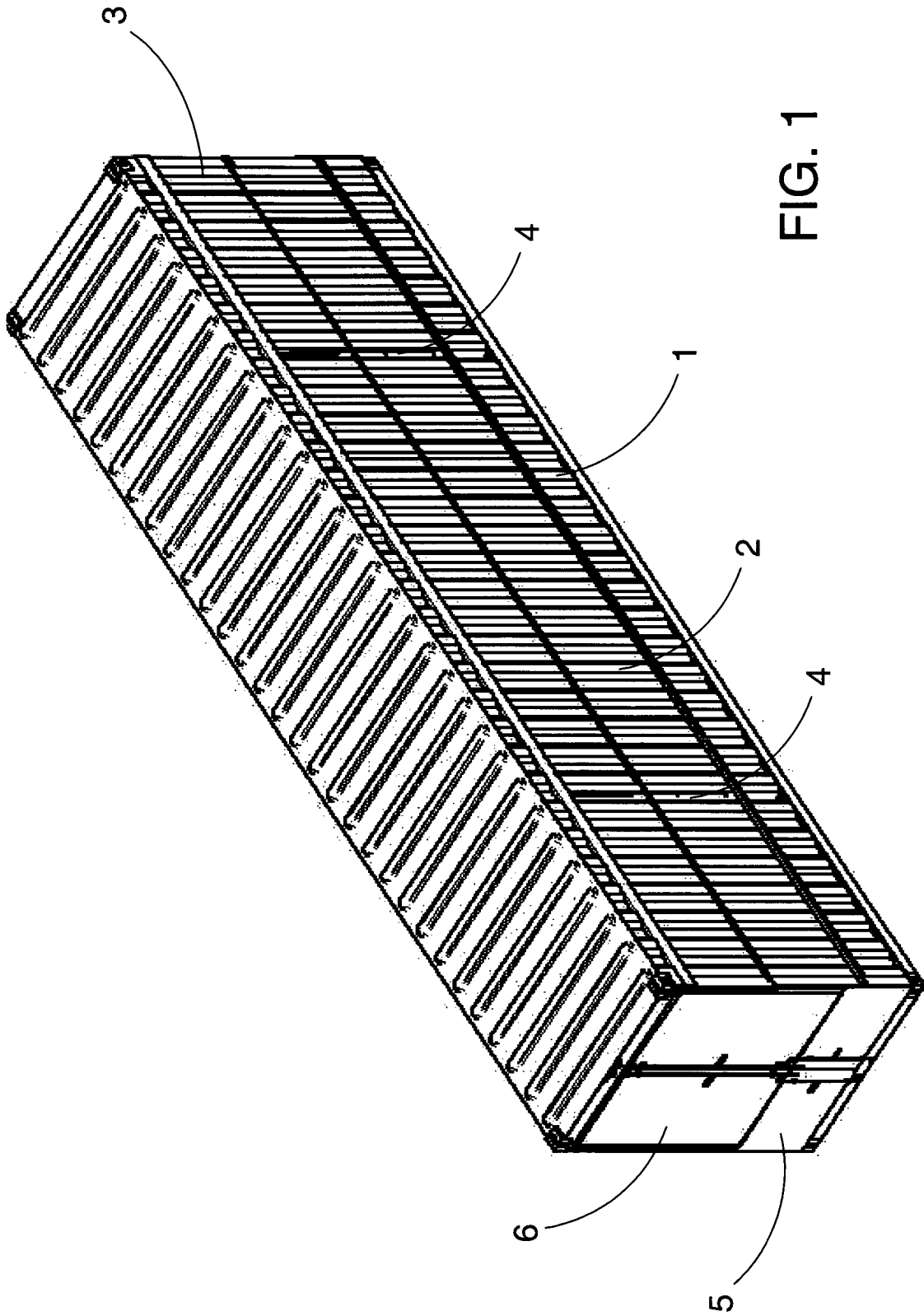


FIG. 1

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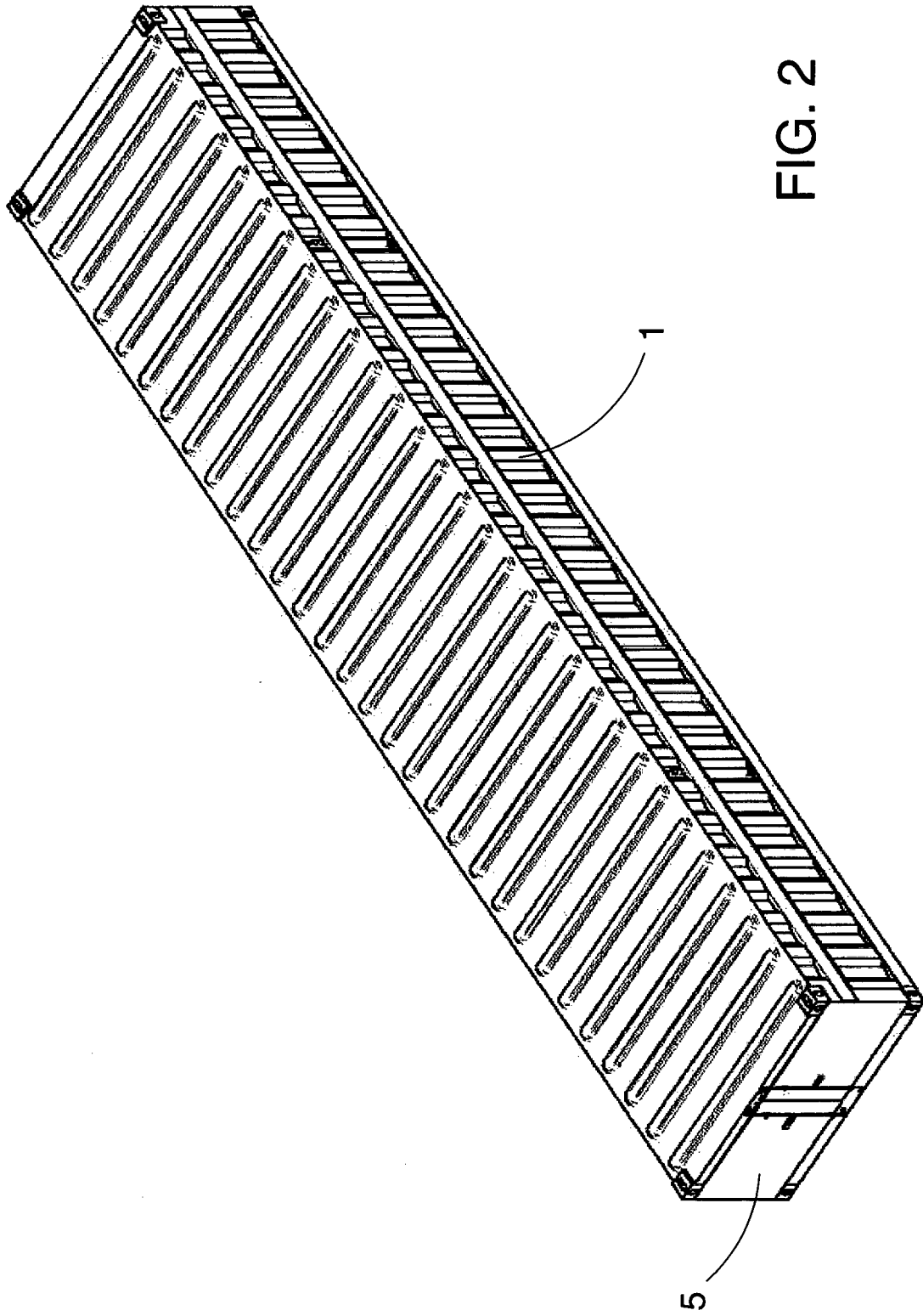


FIG. 2

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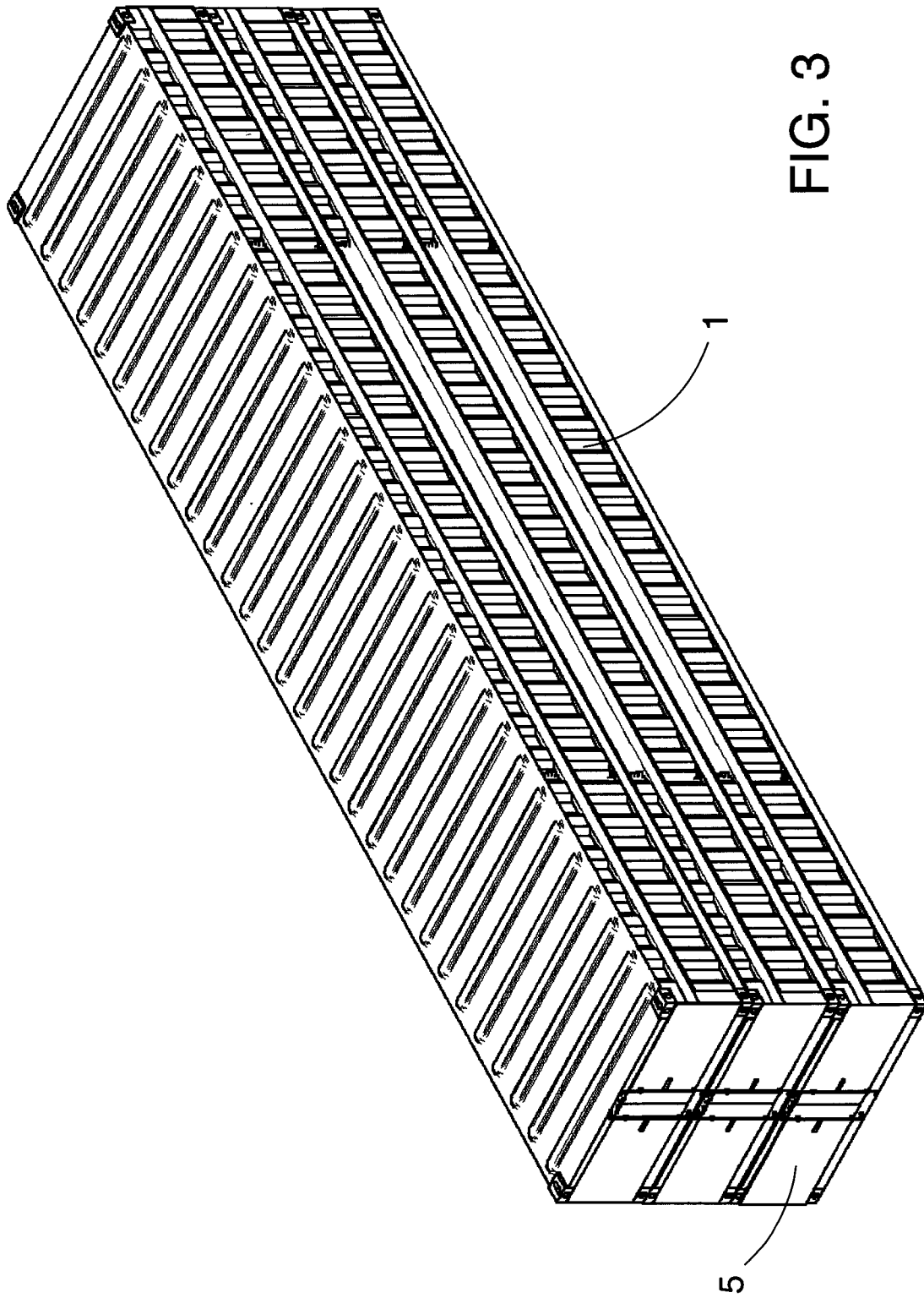


FIG. 3

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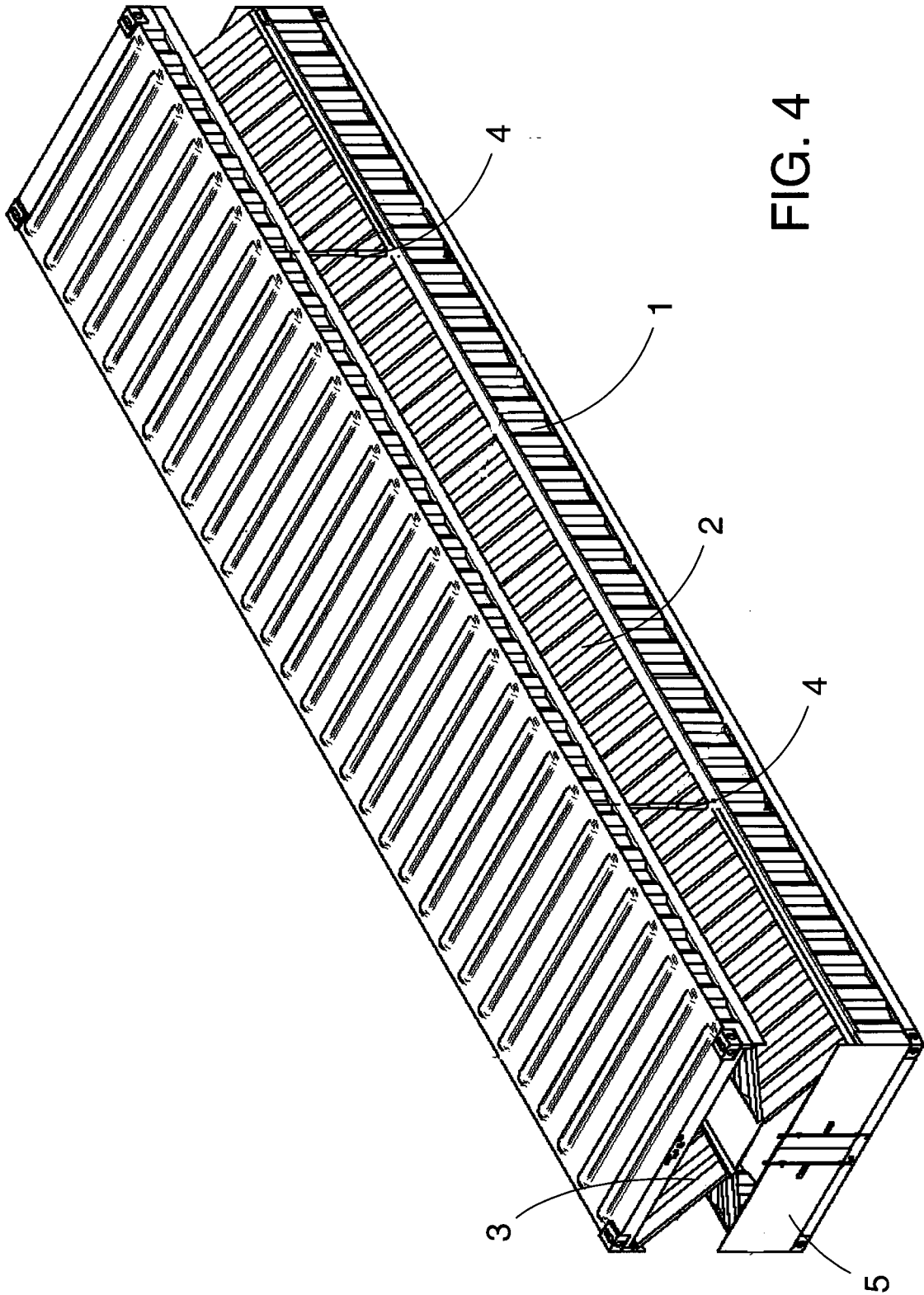


FIG. 4

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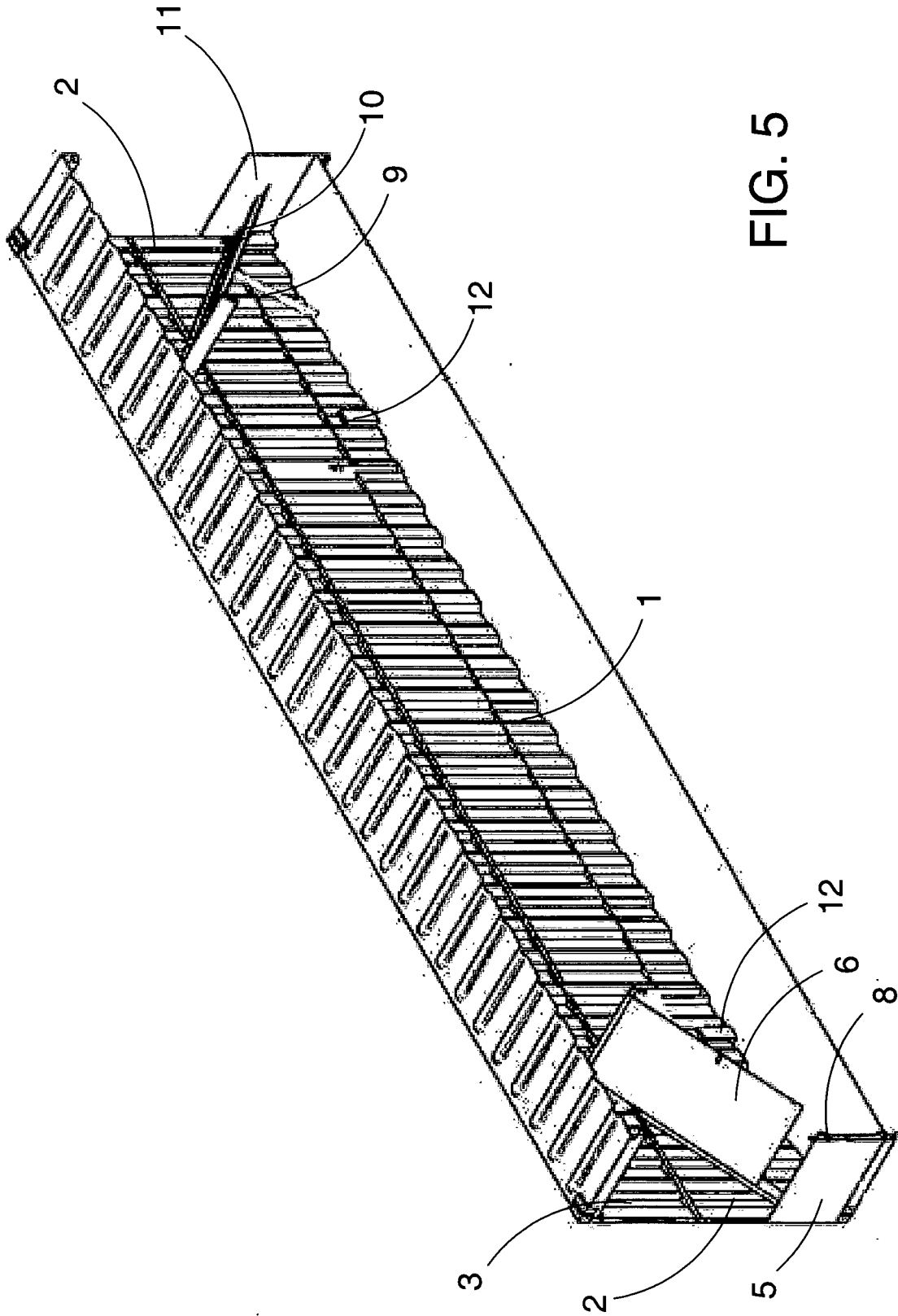


FIG. 5

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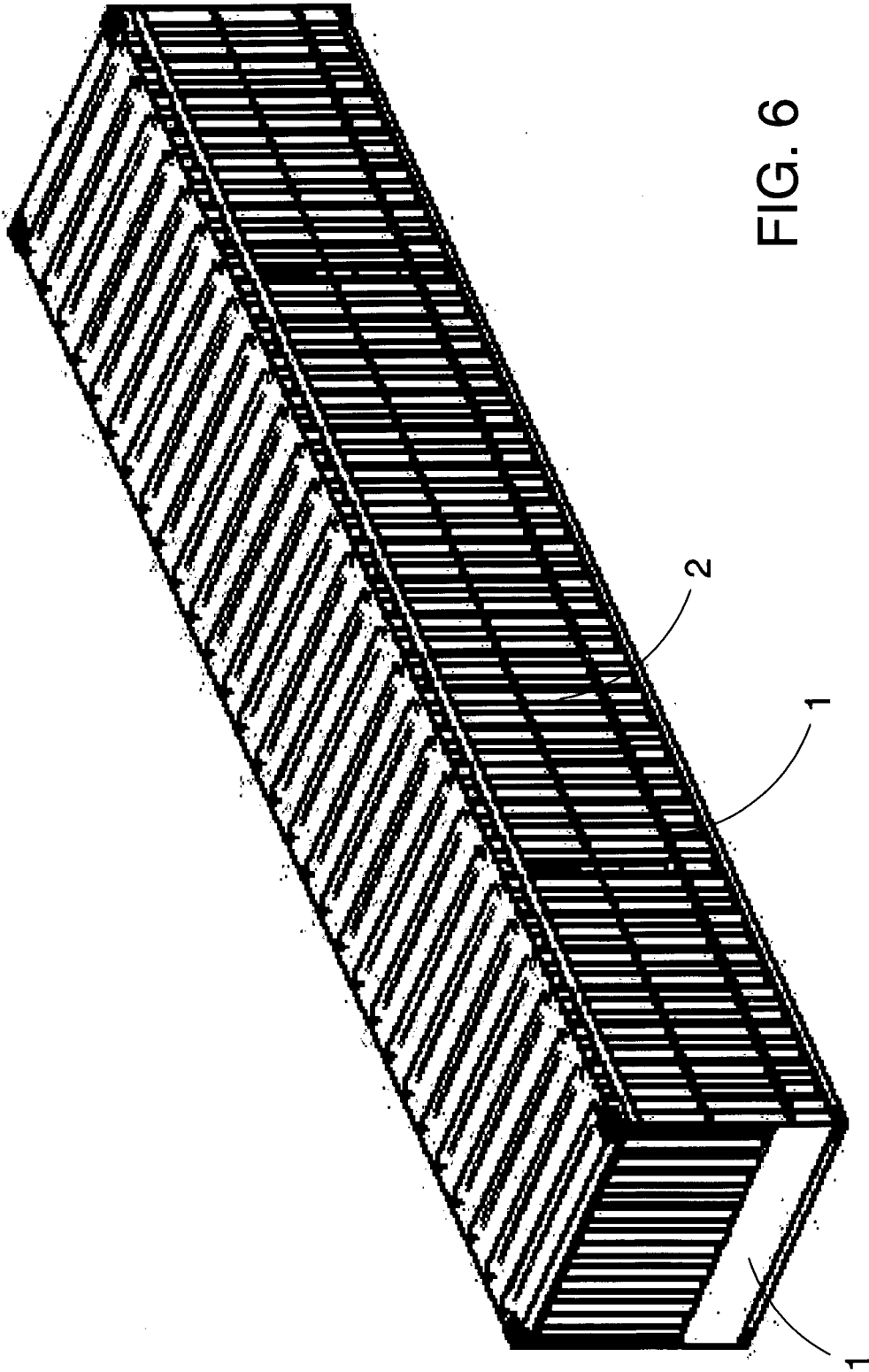


FIG. 6

**INTERNATIONAL SEARCH REPORT**

International application No  
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**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. B65D88/52 B65D90/00  
 ADD. B65D88/12

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)  
 B65D

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 practical, search terms used)  
 EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 102 19 709 A1 (MUELLER WERNER [DE]) 7 November 2002 (2002-11-07) paragraph [0047] - paragraph [0058]; claims 2,3; figures 1-4	1-5
X	US 2007/056967 A1 (DOBRINSKI BRIAN T [US] ET AL) 15 March 2007 (2007-03-15) paragraph [0048] - paragraph [0068]; figures 1-4	1-5
X	WO 2006/024104 A1 (CONTAINER TECHNOLOGY PTY LTD [AU]; FISK FRANK MICHAEL [AU]) 9 March 2006 (2006-03-09) page 10, line 8 - page 12, line 15; figures 1,2,8,9	1-5
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" 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</p> <p>"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</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search  22 August 2011	Date of mailing of the international search report  30/08/2011
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Lämme1, Gunnar
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/IT2011/000156

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/194192 A1 (ROSALES VIZUETA JOSE LUIS [EC]) 14 August 2008 (2008-08-14) paragraph [0005]; figure 1a -----	5,6
X	DE 299 14 390 U1 (HESS KARLFRIEDER [DE]) 18 January 2001 (2001-01-18) page 4, line 2 - page 9, line 27; figures 2,3,4 -----	1-3,5



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2011/000156

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 10219709	A1	07-11-2002	NONE
-----			
US 2007056967	A1	15-03-2007	WO 2008033668 A2 20-03-2008
-----			
WO 2006024104	A1	09-03-2006	AT 496850 T 15-02-2011 CN 101039853 A 19-09-2007 EP 1796990 A1 20-06-2007 US 2008029510 A1 07-02-2008
-----			
US 2008194192	A1	14-08-2008	CN 101293586 A 29-10-2008 EC SP088177 A 29-09-2008
-----			
DE 29914390	U1	18-01-2001	NONE
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