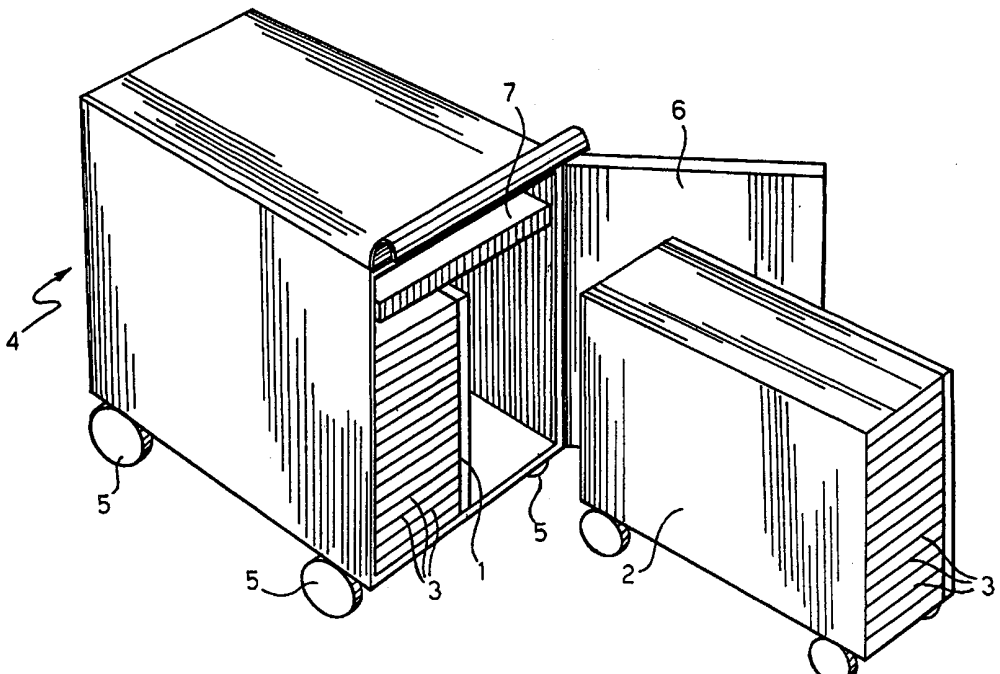


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : A47B 31/02, B64D 11/04, F25D 3/12</p>	A1	<p>(11) International Publication Number: WO 99/47023</p> <p>(43) International Publication Date: 23 September 1999 (23.09.99)</p>		
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>(21) International Application Number: PCT/EP99/01538</p> <p>(22) International Filing Date: 10 March 1999 (10.03.99)</p> <p>(30) Priority Data: TO98A000230 17 March 1998 (17.03.98) IT</p> <p>(71) Applicant (for all designated States except US): MONETTI S.P.A. [IT/IT]; Corso Principe di Piemonte, 61, I-12035 Racconigi (IT).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): MONETTI, Giovanni [IT/IT]; Via Valcrosa, 11, I-12030 Manta di Saluzzo (IT).</p> <p>(74) Agents: BUZZI, Franco et al.; Buzzi, Notaro & Antonielli d'Oulx S.r.l., Corso Fiume, 6, I-10133 Torino (IT).</p> </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> </td> </tr> </table>			<p>(21) International Application Number: PCT/EP99/01538</p> <p>(22) International Filing Date: 10 March 1999 (10.03.99)</p> <p>(30) Priority Data: TO98A000230 17 March 1998 (17.03.98) IT</p> <p>(71) Applicant (for all designated States except US): MONETTI S.P.A. [IT/IT]; Corso Principe di Piemonte, 61, I-12035 Racconigi (IT).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): MONETTI, Giovanni [IT/IT]; Via Valcrosa, 11, I-12030 Manta di Saluzzo (IT).</p> <p>(74) Agents: BUZZI, Franco et al.; Buzzi, Notaro & Antonielli d'Oulx S.r.l., Corso Fiume, 6, I-10133 Torino (IT).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
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<p>(54) Title: METHOD AND SYSTEM FOR AIRCRAFT CATERING</p> <div style="text-align: center; margin: 20px 0;">  </div>				
<p>(57) Abstract</p> <p>A system for aircraft catering wherein trolleys (1, 2) housing therein meals packaged on trays (3) are stocked and then transferred to aircraft boarding within wheeled (5) isothermal containers (4) provided with respective receptacles (7) of a solid refrigerant consisting of carbon snow.</p>				

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"Method and system for aircraft catering"

The present invention is related to aircraft catering handling.

Traditionally the airport catering systems contemplate providing the passengers' meals within trays grouped and fitted into respective trolleys which are then transferred from the production and packaging plant to boarding onto the aircrafts.

Meal handling in the field of aircraft catering has been subjected in recent years to a remarkable development under the purely numerical aspect. Each air-line provides on board of its own aircrafts food services which may comprise either fast snacks or complete meals, depending upon the length of the flight or the passenger class level.

Resorting to aircrafts as transportation means has been more and more growing and the suppliers of food services, bound to the requirement of the air-lines, have been facing huge investments for equipment and personnel to cope with the increasing market demands. To comply seasonably and professionally with these needs it is necessary to provide efficient and perfectly optimised under the logistics point of view production works.

The fundamental problem in managing the above services resides in maintaining the cold chain. As it is known, under this designation it is to be intended a thermal process line of the foodstuffs to be handled, which following cooking are quickly cooled down to a temperature of + 3°C and then kept at this temperature until thermal reconditioning thereof at the time the foods are eaten.

The present plants producing meals for aircraft catering provide a number of methods intended to comply with the above simple requirement: however, within the frame of the production cycle, several temporal steps are included which can be defined as "risky". Actually, the cycle traditionally comprises the following steps:

- 1 - storing the cooked and cooled down to + 3°C foodstuffs within cold-storage rooms provided at the production plant;
- 2- food portioning onto the trays;
- 3- fitting the trays into the transportation trolleys;
- 4- storing the trolleys within suitable refrigerating rooms also provided at the production plant;
- 5- loading the trolleys onto transportation vehicles;
- 6- boarding the trolleys fitted with trays on the aircrafts and unloading the empty trolleys;
- 7- returning of the trolleys to the production plant for washing.

The risky steps are those listed in the above under items 2-3-4-6, in consideration of the following.

Food portioning (step 2) is carried out within environments at an average temperature of 15-18°C wherein evidently, however fast may the tray preparation be, the foodstuffs are subjected to a first temperature raising.

The prepared trays are then fitted into the transportation trolleys (step 3) which are not isothermal and, even if pre-conditioned within refrigerating rooms, consist of containers in which the foodstuffs are necessarily subjected to a further thermal degradation.

At this stage the prepared trolleys should be housed within cold-storage rooms (step 4) while awaiting shipment to the aircrafts: it is evident that, in order to enable

inlet-outlet trolley flow, these cold-storage rooms cannot continuously provide the necessary refrigeration level for lowering down the temperature and maintaining the foodstuffs at the pre-set temperature values, owing to their frequent opening and closing.

The subsequent loading onto the transfer vehicles and shipping to the aircrafts (steps 5 and 6) can only make the food thermal situation worse owing to the following reasons:

- non-insulated vehicles;
- long travel times;
- variable environmental temperatures upon the season;
- flight delays and unforeseen stops.

The two main risks linked to any interruption of the cold chain are (i) possible starting of bacterial proliferation, which may degenerate into an uncontrolled development of polluting agents possibly leading to alimentary poisoning, and (ii) organoleptic degradation of the foodstuffs, with the consequent worsening in terms of taste which would in part jeopardise the service level which each air-line would intend to ensure.

The traditional aircraft catering methods and systems are unable to provide warranties against the above risks, not just as far as the employed preparation procedures are concerned, but instead in connection with the equipment which do not ensure the necessary qualitative standards.

In fact the item primarily charged with these deficiencies is the trolley for transporting the trays bearing the meals which, as normally designed, does not provide (or provides only to a limited extent) isothermal characteristics, i.e. the capability to prevent as far as possible any thermal exchanges with the outer environment.

To give a solution to this problem it has been proposed, in European Patent Application EP-A-0745816, to provide modified tray-bearing trolleys, having a structure made by thermally insulating walls and containing a compartment for a solid refrigerant, namely carbon snow. Such trolleys, which are intended to replace the existing ones should actually reduce at least in part the above-referenced risks. However their practical use is made almost impossible firstly because replacement of the huge number of traditional existing trolleys would involve excessive costs for the air-lines. Secondly the size of the these trolleys, which must fit into corresponding precise space onboard of the aircrafts, are made standard: a dimension increase deriving from the thermally insulating structure of the trolley walls would therefore be unfeasible. Lastly the necessarily reduced size of the solid refrigerant compartment and the limited air circulation inside the trolley would restrict the efficiency of lowering and maintaining the tray temperature, and supplying the solid refrigerant to the compartment of each trolley would involve remarkable complications and consequent costs.

Additional negative aspects of the present aircraft catering systems can be summarised in the following:

- need of providing large cold-storage rooms at the production plants of the meals in order to stock the loaded trolleys while waiting for being shipped to the aircrafts;
- excessive cost for conditioning the cold-storage rooms;
- poor results provided by these cold-storage rooms as compared to their management costs;
- unavoidable complications in terms of logistics.

The object of the present invention is to overcome the above drawbacks in a simple, practical, functional and relatively cheap way.

In order to achieve the above object, the invention is directed to a method for aircraft catering of the above-referenced type which is mainly characterised in that it consists of providing wheeled or pallet handled isothermal containers having, in a way known per se, respective receptacles for solid refrigerant constituted by carbon snow, fitting a respective limited number of said trolleys into each of said isothermal containers, and keeping said trolleys within said isothermal containers at least until boarding thereof onto the aircraft.

By virtue of this idea of solution it is possible to safely warrant the capability of lowering down the temperature and then store the portioned foodstuff in the trays at the correct temperature for a long time (for instance 20-25 hours), independently of where the trolleys housed within the isothermal containers are stored prior to boarding thereof onto the aircrafts. The solid refrigerant isothermal containers ensure the highest insensibility to the outer climatic conditions (for instance to relevant temperature differences between the inside and the outside), without requiring any outer power source: as a consequence the trolleys bearing the trays can be temporarily parked, waiting for boarding, at any available area even in the open air.

According to a preferred embodiment of the invention said isothermal containers are designed to normally house therein two trolleys in a side-by-side condition, whereby their size is so reduced that the containers and trolleys therein can even be stowed into the aircraft luggage compartment. This allows in practice boarding the meals

both for the outward and for the return flight of the aircraft at the departure airport.

The invention is also directed to a catering system based on the above principles.

The main advantages achieved by the invention can be summarised as follows:

- complete temperature lowering of the foodstuffs portioned in the trays down to the correct temperature of about + 3°C within 60-90 minutes from fitting thereof into the carbon snow isothermal containers;
- cooling of the whole trolleys carrying the trays so as to provide a cold store up effect,
- preservation at +3°C for a pre-set time, depending upon the amount of carbon snow introduced into the receptacles of the isothermal containers,
- absolute respect of the sanitary requirements in connection with correct foodstuff preservation without any risks of interrupting the cold chain,
- recovery of rooms and environments previously employed for installation of the cold-storage room,
- drastic reduction of cold-storage rooms and consequent power and space savings,
- possibility for the personnel to operate in compliance with the statutory requirements, avoiding continuous exposure to changes of temperatures due to repeated inlet-outlet relative to refrigerated environments,
- reduction of the general equipment costs,
- optimisation of the logistics,
- menu characterisation so as to conform with the food habits of the country to which the air-line belongs, by virtue of the possibility to board the meals of both the outward and return flights,

- turnover doubling for the catering companies due to the possibility of providing both the outward and the return flight meals.

The invention will now be disclosed in detail with reference to the accompanying drawings, purely provided by way of non limiting example, in which:

- Figure 1 is an exploded perspective view exemplarily showing the aircraft catering system according to the invention, and

- Figure 2 is a vertically sectioned view of figure 1.

In the drawings reference numerals 1,2 diagrammatically designate two trolleys of the type commonly employed for transferring groups of mutually superimposed trays 3 containing the meals of the passengers on board of an aircraft.

Reference numeral 4 generally designate an isothermal container having a substantially parallelepipedal shape, provided with a thermally insulating structure for instance formed by inner and outer walls made of plastic material, conveniently but not necessarily manufactured in one single block by a rotomoulding technique, and between which a layer of insulating foamed material is interposed.

The container 4 is provided inferiorly with castor wheels 5, to which a braking system - not shown since conventional - may be associated, and is equipped at the front with a door 6 which can normally be opened over 270°. In alternative the container 4 may be provided inferiorly with pallet feet for handling by a fork-lift vehicle or the like.

The size of the interior of the container 4 is such to enable housing therein the two trolleys 1,2 in a side-by-side condition, such as depicted in figure 2.

It is to be pointed out that the dimensions of the container 4 may be different than those of the shown example, and for instance such to enable housing therein a

greater number of tray-bearing trolleys, even in a superimposed condition.

A receptacle formed as a drawer 7 is arranged in the upper part of the container 4 and is intended to be partially or fully charged with a solid refrigerant, and more particularly with carbon snow.

The general arrangement of the drawer 7 and the mode for introducing carbon snow thereinto are generally known per se, and shall not be disclosed in detail for the sake of brevity. Namely, the drawer 7 can be of the type disclosed and illustrated in European Patent application n. 98830085.1 in the name of the same Applicant, not published at the priority date of the present application.

In use, following portioning of the meals onto the trays 3 and fitting thereof within the trolleys 1,2, these trolley 1,2 are immediately stowed into the isothermal container 4.

The isothermal container 4 is then transferred to the supply station of the carbon snow into the drawer 7 which, by virtue of its flexibility, shall enable the operators to charge the amount of CO₂ necessary either for a one way or for a return flight service.

The isothermal container 4 containing the trolleys 1,2 can thus be parked at any available area, even outdoor, without any need of providing extensive and cumbersome cold-storage rooms, while waiting for being shipped to the aircraft.

The following operation shall consist of grouping together the containers 4 directed to the same flight and transporting them to the boarding area onto the related aircraft. Transporting may be performed by means of standard vehicles without any particular requirements and, above all, not necessarily equipped with a refrigerant apparatus.

Alternatively the containers 4 may be transferred to the aircraft directly travelling on their own wheels 5.

The trolleys 1,2 shall then be taken out from the isothermal containers 4 and transferred into the respective housings provided on board of the aircraft, where they will be thermally protected until meal distribution.

In case the meals for the return flight have also to be boarded on the aircraft at the departure airport, the trolleys containing the trays with the meals for the back flight shall be kept within the related isothermal containers 4 and the latter will thus be stowed within the luggage compartment of the aircraft. Prior to take off for the return flight, the trolleys shall then be removed from the stowed container 4, which shall thus be employed to receive the trolleys of the already taken meals.

Naturally the details of construction and the embodiments may be widely varied with respect to what has been disclosed and illustrated, without thereby departing from the scope of the present invention, such as defined in the appended claims.

CLAIMS

1. A method for aircraft catering, wherein meals within groups of trays (3) fitted within respective trolleys (1,2) are transferred from a production and packaging plant to aircraft boarding, characterised in that it consists of providing wheeled (5) or pallet-handled isothermal containers (4) having, in a way known per se, respective receptacles (7) for a solid refrigerant constituted by carbon snow, fitting a respective limited number of said trolleys (1,2) into each of said isothermal containers (4), and keeping said trolleys (1,2) within said isothermal containers (4) at least until boarding thereof onto the aircraft.

2. Catering method according to claim 1, characterised in that said isothermal containers (4) are designed to normally house therein two said trolleys (1,2) in a side-by-side condition.

3. Catering method according to claim 1 or claim 2, characterised in that said trolleys (1,2) are at least in part boarded onto the aircraft while being housed within the related isothermal containers (4).

4. A system for aircraft catering, comprising trolleys (1,2) within which meals packaged into trays (3) are fitted, refrigerated stocking means of said trolleys (1,2), and transferring means of said trolleys to aircraft boarding, characterised in that said refrigerated stocking means and said transferring means consist of wheeled (5) or pallet-handled isothermal containers (4) provided, in a way known per se, with respective receptacles (7) of solid refrigerant consisting of carbon snow.

5. System according to claim 4, characterised in that said isothermal containers (4) are designed to

normally house therein two said trolleys (1,2) in a side-by-side condition.

Fig. 1

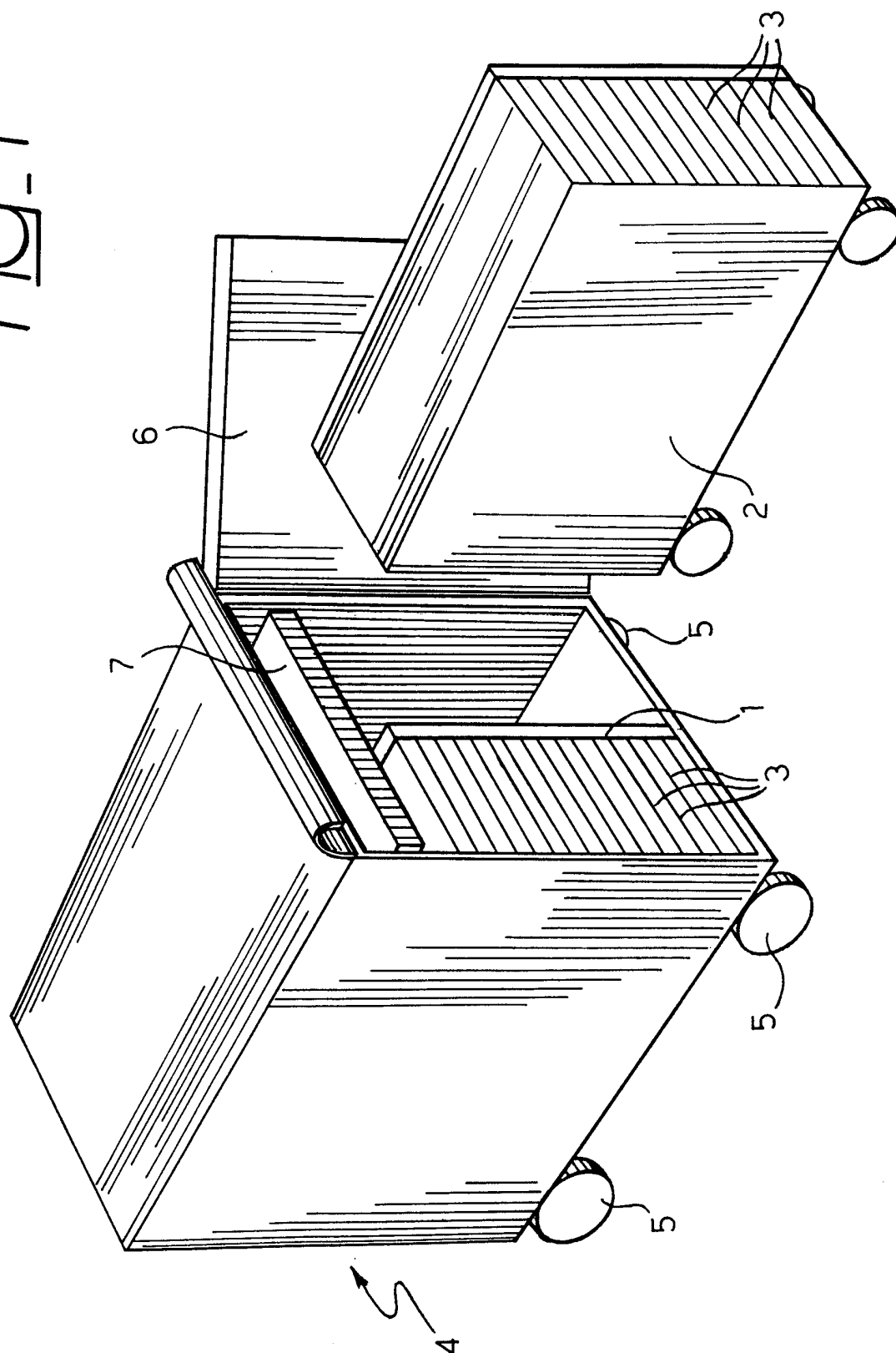
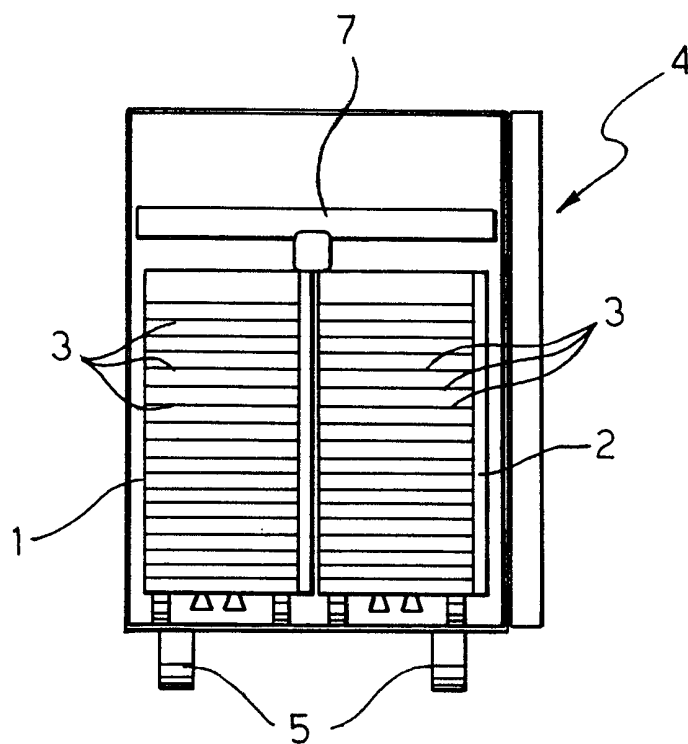


Fig. 2



INTERNATIONAL SEARCH REPORT

International Application No. PCT/EP 99/01538

A. CLASSIFICATION OF SUBJECT MATTER

A 47 B 31/02, B 64 D 11/04, F 25 D 3/12

According to International Patent Classification (IPC) or to both national classification and IPC 6

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A 47 B, B 64 D, F 25 D

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 4005549 A (ATELIERS REUNIS CADDIE) 13 September 1990 (13.09.90), fig. 4, pos. 34. --	1-5
Y	DE 3731523 A (SOCIETE INDUSTRIELLE DE L'ANHYDRIDE CARBONIQUE S.I.A.C.) 05 May 1988 (05.05.88), Fig. 1. --	1-5
A	GB 2281775 A (MG GAS PRODUCTS LIMITED) 15 March 1995 (15.03.95), Fig. 5. --	1-5
A	EP 0242587 A1 (MESSER GRIESHEIM)	1-5

☒ Further documents are listed in the continuation of box C.

☐ Patent family members are listed in annex.

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Date of the actual completion of the international search

26 May 1999

Date of mailing of the international search report

16. 07 1999

Name and mailing address of the ISA

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-2-

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>28 October 1987 (28.10.87), Fig.</p> <p>--</p> <p>US 4248060 A (FRANKLIN) 03 February 1981 (03.02.81), Fig. 1,2.</p> <p>----</p>	1

ANHANG

zum internationalen Recherchen-
bericht über die internationale
Patentanmeldung Nr.

ANNEX

to the International Search
Report to the International Patent
Application No.

ANNEXE

au rapport de recherche inter-
national relatif à la demande de brevet
international n°

PCT/EP 99/01538 SAE 228018

In diesem Anhang sind die Mitglieder
der Patentfamilien der im obenge-
nannten internationalen Recherchenbericht
angeführten Patentdokumente angegeben.
Diese Angaben dienen nur zur Unter-
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This Annex lists the patent family
members relating to the patent documents
cited in the above-mentioned inter-
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La présente annexe indique les
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Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
DE A1 4005549	13-09-1990	DE U1 9002113 DE C2 4005549 FR A1 2643601	21-06-1990 09-01-1992 31-08-1990
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US A 4248060	03-02-1981	keine - none - rien	