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(71) Applicant: **Candy S.p.A.
20052 Monza (MI) (IT)**

(72) Inventor: **Fumagalli, Silvano
20052 Monza (MI) (IT)**

(74) Representative: **Mittler, Enrico
Mittler & C. s.r.l.,
Viale Lombardia, 20
20131 Milano (IT)**

(54) Modular refrigerator apparatus

(57) A modular refrigeration apparatus is described comprising a refrigeration device provided with a refrigerating circuit of frost-free type (100) and at least one thermally insulated external container (200), separated from said refrigeration device (100, 300) and capable of containing food to be refrigerated. The container (200) comprises a first (3) and a second (4) port and the refrigeration device comprises at least one opening (102) for the emission of cold air into the inside of the container through said first port (3) and at least one other opening (103) for the aspiration of air from the container through the second port (4). The apparatus includes connecting means (150) between the openings in said refrigeration device and the ports on at least one container.

eration device comprises at least one opening (102) for the emission of cold air into the inside of the container through said first port (3) and at least one other opening (103) for the aspiration of air from the container through the second port (4). The apparatus includes connecting means (150) between the openings in said refrigeration device and the ports on at least one container.

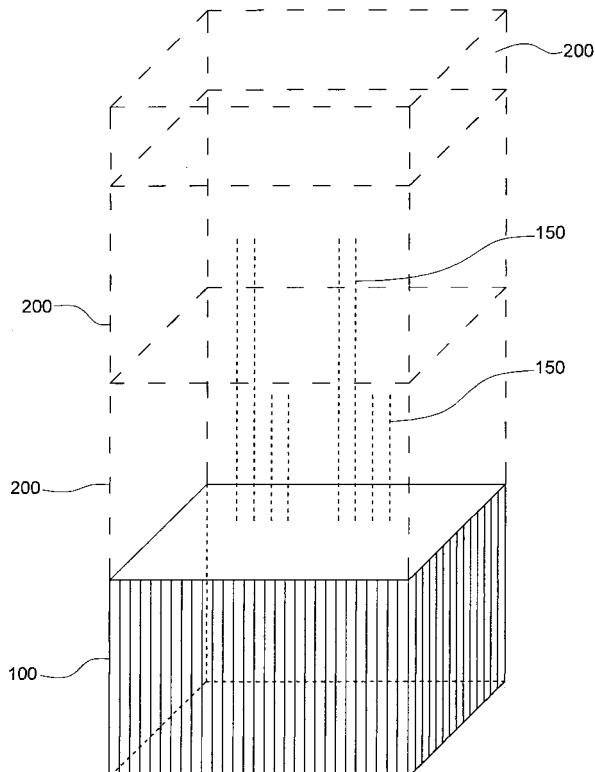


Fig. 1

Description

[0001] The present invention refers to a modular refrigeration apparatus.

[0002] Current refrigerators for domestic use normally comprise at least two compartments at different temperatures, one at a higher temperature (typically between +3°C and +6°C) for fresh food and the other at a lower temperature (typically -18°C) for frozen and deep-frozen food. Each of the two compartments is equipped with a respective evaporator, or with a respective portion of the same evaporator, which forms part of a normal refrigeration circuit with compressor and condenser.

[0003] These refrigerators are generally "frost-free", i.e. equipped with means capable of preventing the formation of frost on the wall of the evaporator. For this reason a so-called "ventilated" evaporator, i.e. one which is subjected to forced air circulation, is provided in the lower-temperature compartment.

[0004] It is possible in particular circumstances for domestic refrigerators not to have the capacity necessary for containing all the food to be refrigerated, for example when a greater number of people is present than normal. In other circumstances it is possible for the same refrigerator to have a larger capacity than that required and therefore higher consumption than necessary.

[0005] In view of the state of the art described, the object of the present invention is to provide a refrigeration apparatus which is always appropriate to the needs of the user.

[0006] In accordance with the present invention, this object is achieved by means of a modular refrigeration apparatus comprising a refrigeration device provided with a refrigerating circuit of frost-free type, characterised by the fact of comprising at least one thermally insulated external container, separated from said refrigeration device and capable of containing food to be refrigerated, said container comprising a first and a second port and said refrigeration device comprising at least one opening for the emission of cold air into the inside of the container through said first port and at least one other opening for the intake of air from the container through said second port, said apparatus comprising connection means between the openings in said refrigeration device and the ports on at least one said container.

[0007] The characteristics and advantages of the present invention will become evident from the following detailed description of its practical embodiments, which are illustrated by way of non-limiting examples in the attached drawings, in which:

figure 1 is a schematic perspective view of a modular refrigeration apparatus in accordance with a first embodiment of the present invention;

figure 2 is a schematic view on plan of the refrigeration device only of the apparatus shown in figure 1;

figure 3 is a schematic view in section of the refrigeration device only of the apparatus shown in figure

1;

figure 4 is a schematic view in section of a modular refrigeration apparatus in accordance with a second embodiment of the present invention;

figure 5 is a schematic frontal view of the refrigeration device shown in figure 4;

figure 6 is a schematic view on plan of a container usable in the modular refrigeration apparatus shown in figures 1 or 4;

figure 7 is a schematic lateral view of the container shown in figure 6;

figure 8 is a schematic view in vertical section along line VIII-VIII of the container shown in figure 6;

figure 9 is a schematic view in transverse section along line VIV-VIV of the container shown in figure 6;

figure 10 is a schematic lateral view of another container usable in the modular refrigeration apparatus shown in figures 1 or 4;

figure 11 is again a schematic lateral view of the container shown in figure 10;

figure 12 is a schematic view in section along line XII-XII of the container shown in figure 10;

figure 13 is a schematic view in transverse section of the container shown in figure 10;

figures 14-17 show schematically a kitchen including a modular refrigeration apparatus as shown in figures 1-13;

figures 18-19 show schematically a refrigeration device in accordance with a variant of the apparatus in the previous embodiments.

[0008] With reference to figure 1, a modular refrigeration apparatus is shown in accordance with a first embodiment of the present invention. The modular apparatus comprises a refrigeration device 100 comprising a refrigerating circuit 110 (figures 2 and 3) of frost-free type and one or more containers 200 for preserving and freezing foodstuffs, located above device 100.

[0009] Refrigerating circuit 110 of refrigeration device 100 includes in known manner an evaporator, a compressor, a filter, a condenser and flow laminators. A fan 101, activated cyclically by a suitable electric motor, allows the circulation of air inside the containers 200 relating to the refrigerator. Said fan is capable of aspirating the air which passes through the evaporator and is capable of directing the chilled air to the inside of the containers 200.

[0010] Refrigeration device 100 comprises one or more ports 102 for the output of cold air and one or more ports 103 for air intake.

[0011] With reference to figures 4 and 5, a modular refrigeration apparatus is shown in accordance with a second embodiment of the present invention. The modular apparatus of said second embodiment differs from that of the first embodiment in that the refrigeration device 300, comprising the refrigerating circuit 110 and openings 102 and 103, is of vertical type and the containers 200 for preserving and freezing foodstuffs are located in

proximity to device 300. In both embodiments the containers 200 may also be located at a distance and linked by special connections and remote controls.

[0012] Both the refrigeration device 100 and the refrigeration device 300 may be equipped with a handle 105 for transport into suitable environments.

[0013] With reference to figures 6-10, a container 200 is shown for the modular apparatus shown in figures 1 and 4. The container comprises a compartment 1 capable of housing food to be refrigerated and another compartment 2 into which flows cold air coming from a refrigerating apparatus through a port 3; the cold air flows out through another port 4. Ports 3 and 4 consist of insulated tubular elements preferably made of plastic. Compartment 1 is separated from compartment 2 by means of a plurality of eutectic plates 5 arranged in the manner of a separating wall; the plates 5 are arranged on a plurality of elements 6 connected to the lower wall 7 of the container. The elements 6 are arranged in such a way as to force the cold air coming from opening 3 along a particular path 8 inside the container. Path 8 is preferably of serpentine type and consequently the elements 6 are arranged substantially parallel to each other and parallel to the lateral walls 9 of the container; the serpentine path means a longer stay for the cold air inside the container and therefore faster cooling of the eutectic plates 5. The container is provided with a removable cover 10.

[0014] The container is thermally insulated so as to maintain a constant temperature for a determinate period of time; the eutectic plates 5 contribute to maintaining said temperature constant for a longer period of time. In this way the container is capable of preserving food for a determinate period of time.

[0015] The container is also fitted with closing stoppers 11 for ports 3 and 4, preferably in polyethylene, to avoid possible falls in temperature through contact between the interior of the container and the external environment after the container has been refrigerated.

[0016] In figures 11-13 another container 200 is shown. The container in figures 11-13 differs from the container in figures 6-10 in that compartment 1 has a removable tent-like cover 20. The cover 20 is supported by a frame 21 of adjustable height so as to utilise the minimum volume in relation to the quantity of food to be kept. Cover 20 has a sealing rim 22 capable of engaging with a suitable rim on the container for sealing container 1. The container has an overall size variable between a minimum shown in figure 11 and a maximum shown in figure 12.

[0017] Figures 14-17 show a kitchen including a modular refrigeration apparatus as shown in figures 1-13. The kitchen includes a refrigeration device 100 normally located under a work surface 500 while the container 200 is normally located above the work surface, preferably set up as a wall unit or inside a wall unit.

[0018] The refrigeration device 100 may be made up of a domestic refrigerator with external openings 102 and 103 for the delivery of cold air and the intake of recircu-

lated air.

[0019] The modular refrigeration apparatus comprises connection means 150 for the flow of cold air from the ports 102 to the ports 2 on container 200 and for the outflow of air from the ports 3 on container 200 to the ports 103 on device 100. Said connection means are preferably tubular pipes, thermally insulated.

[0020] Figures 18 and 19 show a refrigeration device 100 made up of a domestic refrigerator with external openings 102 and 103 for the delivery of cold air and the intake of recirculated air.

Claims

- Modular refrigeration apparatus comprising a refrigeration device provided with a refrigerating circuit of frost-free type (100) **characterised by** the fact of comprising at least one thermally insulated external container (200), separated from said refrigeration device (100, 300) and capable of containing food to be refrigerated, said container (200) comprising a first (3) and a second (4) port and said device comprising at least one opening (102) for the emission of cold air into the inside of the container through said first port (3) and at least one other opening (103) for the intake of air from the container through said second port (4), said apparatus comprising connection means (150) between the openings in said refrigeration device and the ports on at least one said container.
- Apparatus according to claim 1, **characterised in that** said container comprises at least one eutectic plate (5) for maintaining a constant temperature inside said container.
- Apparatus according to claim 2, **characterised in that** said container comprises a compartment (1) capable of containing foodstuffs and a further compartment (2), separated from the first by at least one eutectic plate (5) arranged in the manner of a dividing wall, said further compartment (2) comprising said first (3) and second (4) ports.
- Apparatus according to claim 3, **characterised in that** said container comprises a grille of elements (6) integral with the bottom wall (7) of the container and capable of imposing a serpentine path (8) on the flow of air inside the container.
- Apparatus according to claim 4, **characterised in that** said container comprises at least two eutectic plates (5) located on the elements (6) of said grille.
- Apparatus according to claim 4, **characterised in that** said compartment (1) comprises a removable cover (10).

7. Apparatus according to claim 4, **characterised in**
that said compartment (1) comprises a tent-like re-
movable cover (20).
8. Apparatus according to claim 2, **characterised in** 5
that said first port (3) and said second port (4) are
thermally insulated tubular elements.
9. Apparatus according to claim 1, **characterised in**
that said container comprises closing stoppers for 10
said ports.
10. Apparatus according to claim 1, **characterised in**
that said refrigeration device is a domestic refriger-
ator. 15
11. Kitchen comprising a modular refrigeration appa-
ratus as defined in claims 1 to 10.
12. Kitchen according to claim 11, **characterised by** the 20
fact of comprising a work surface (500), said refrig-
eration device being located below the work surface
and said container being located above the work sur-
face.

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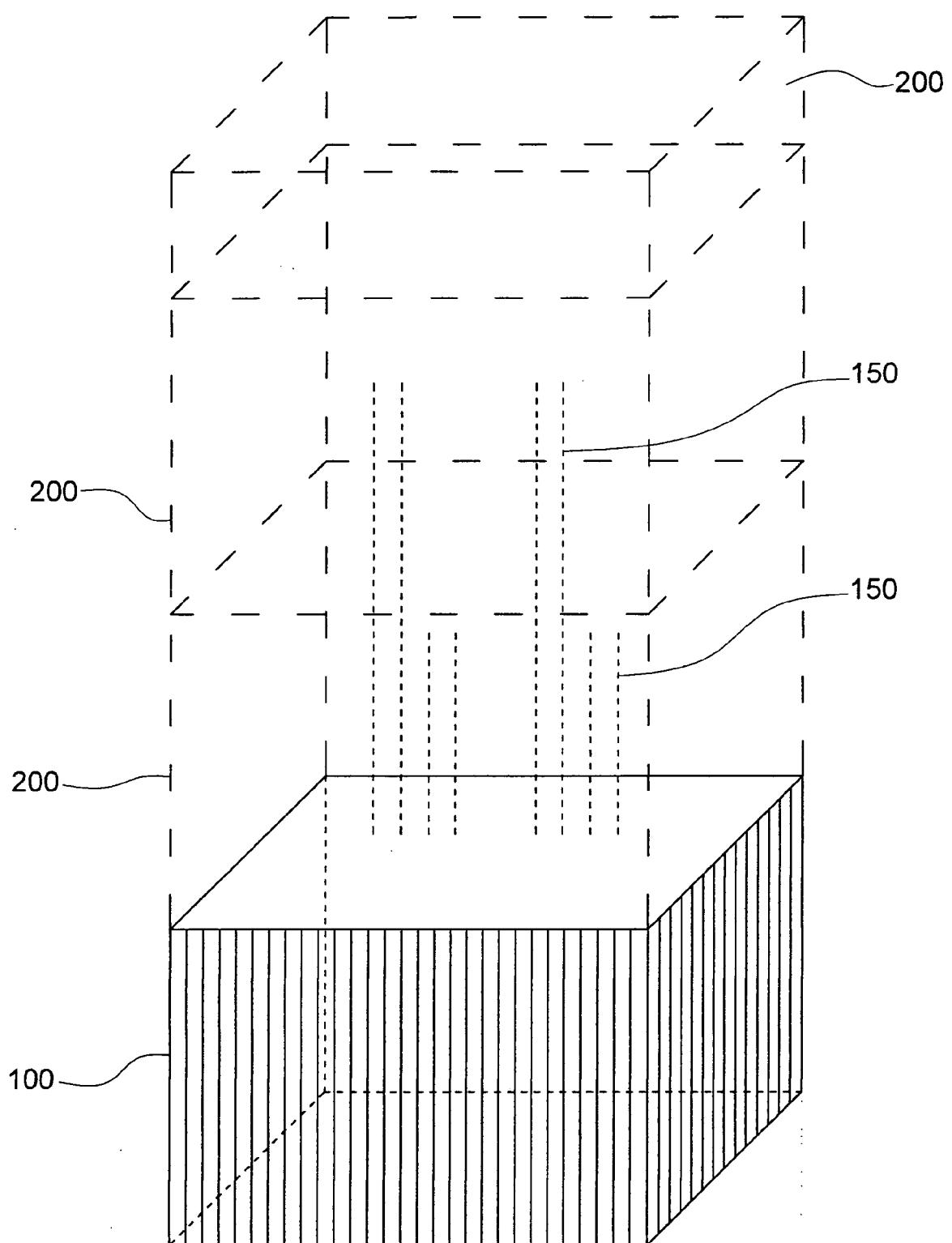


Fig.1

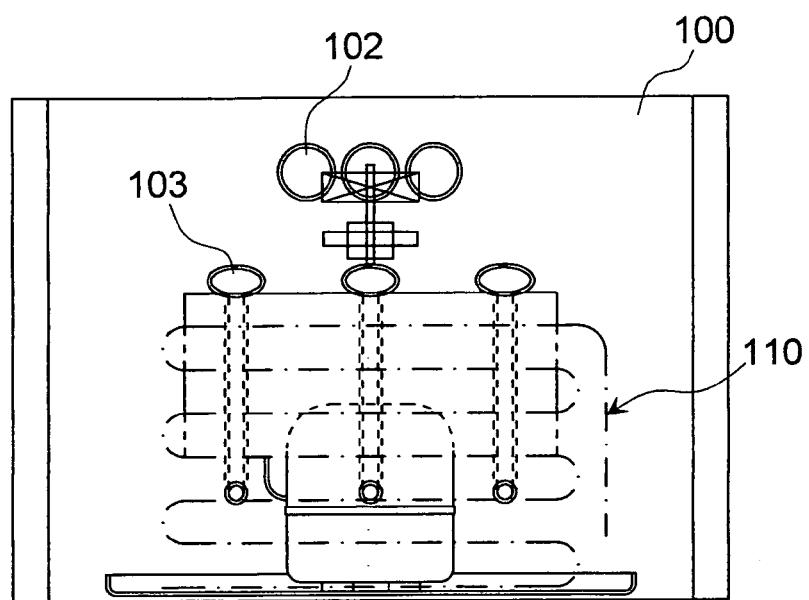


Fig.2

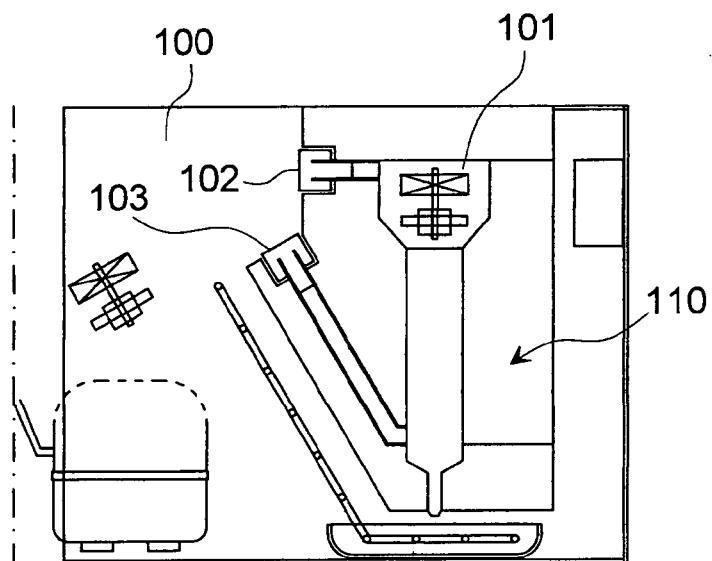


Fig.3

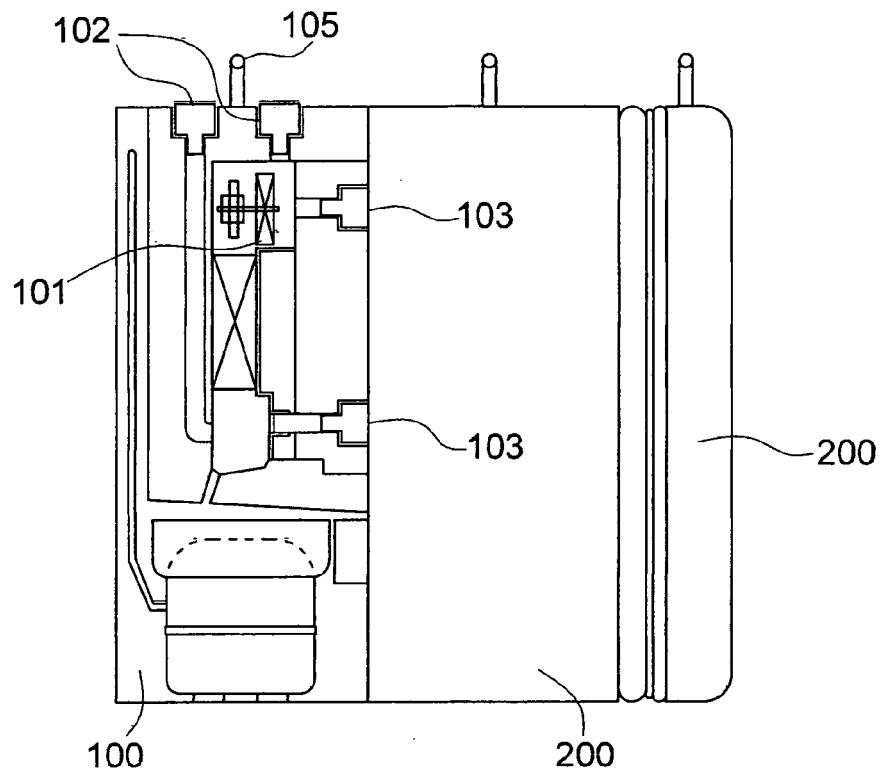


Fig.4

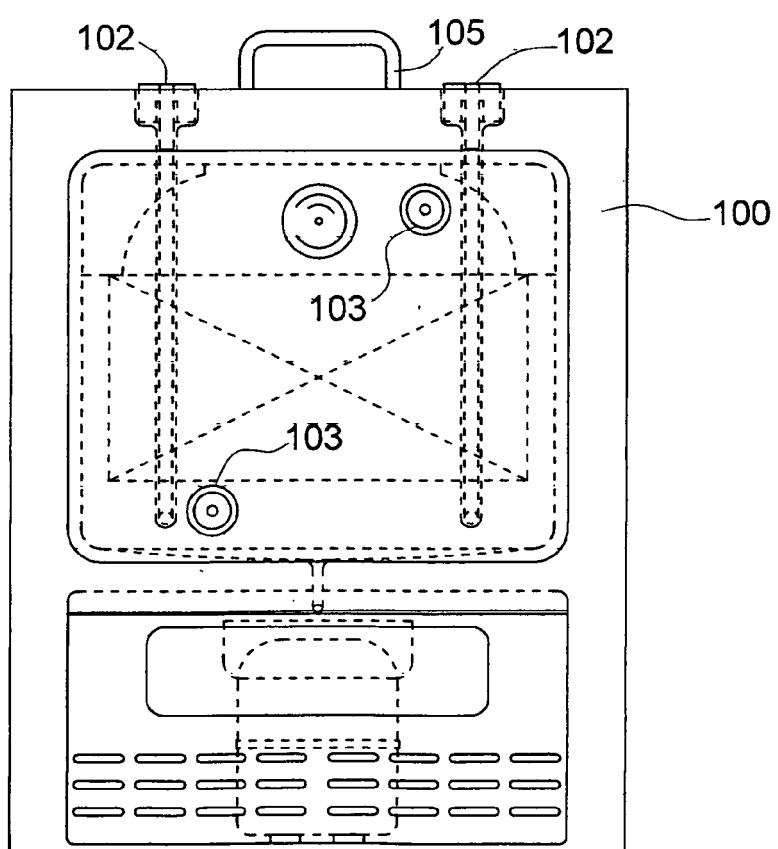


Fig.5

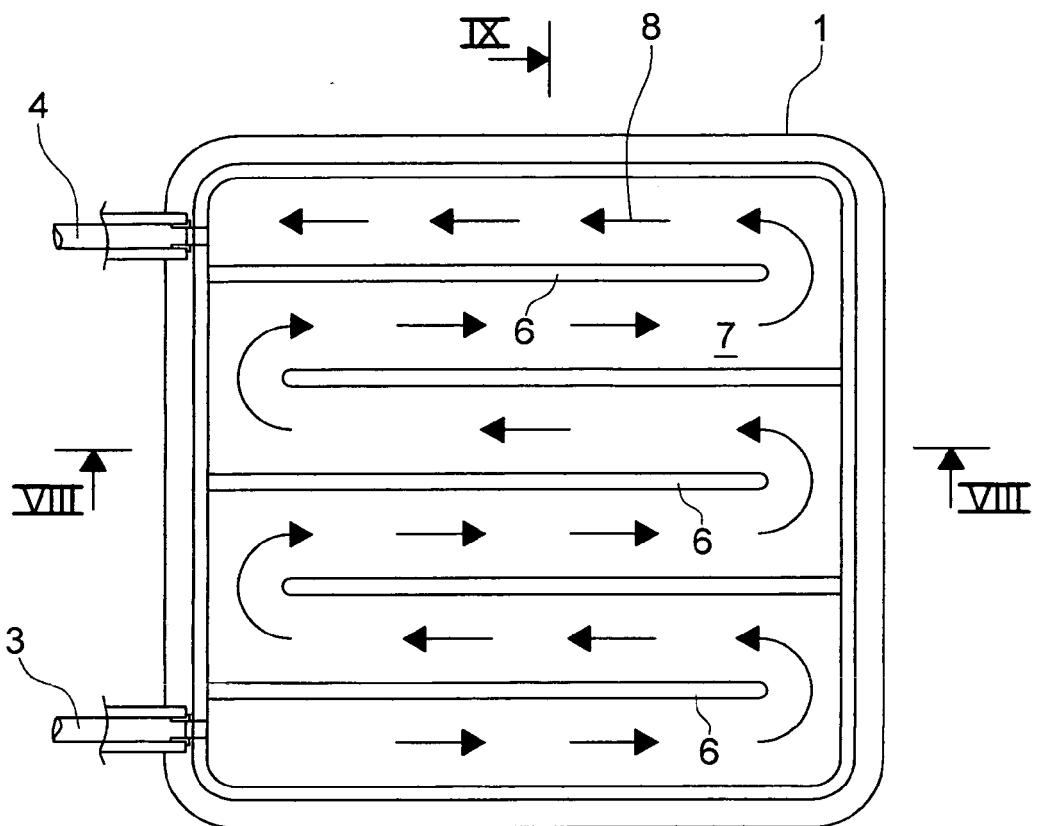


Fig.6

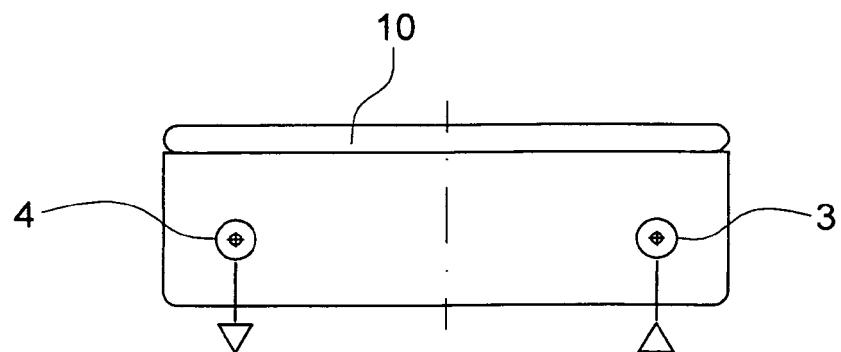
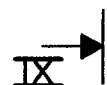


Fig.7

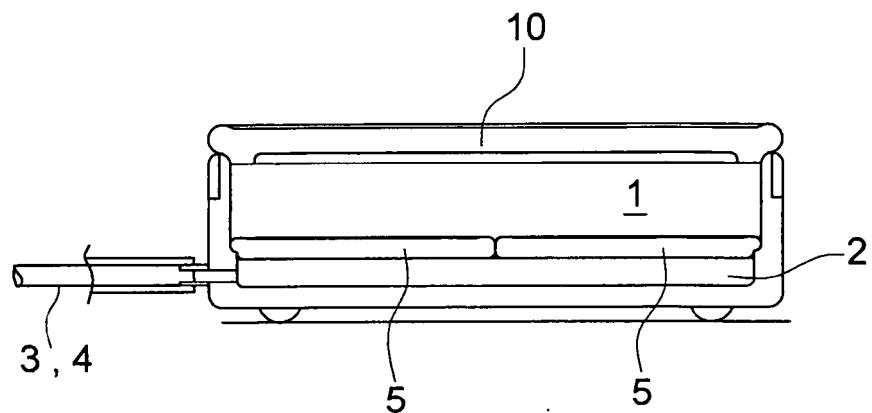


Fig.8

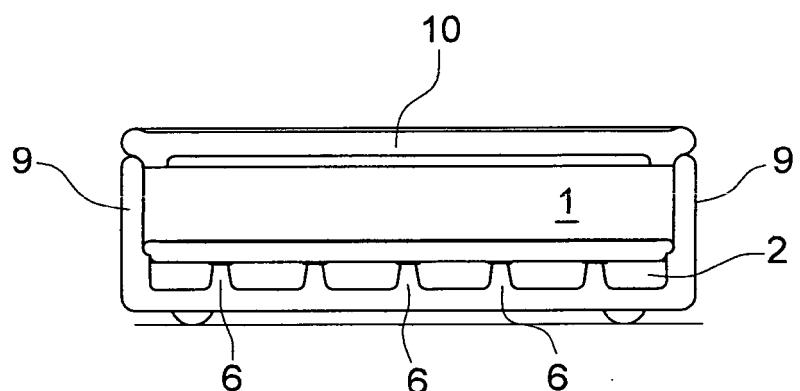


Fig.9

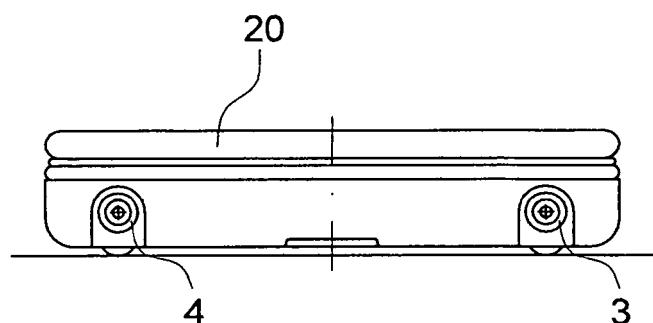


Fig.10

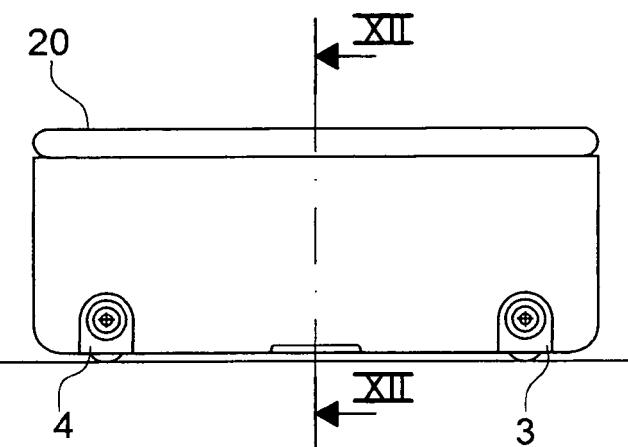


Fig. 11

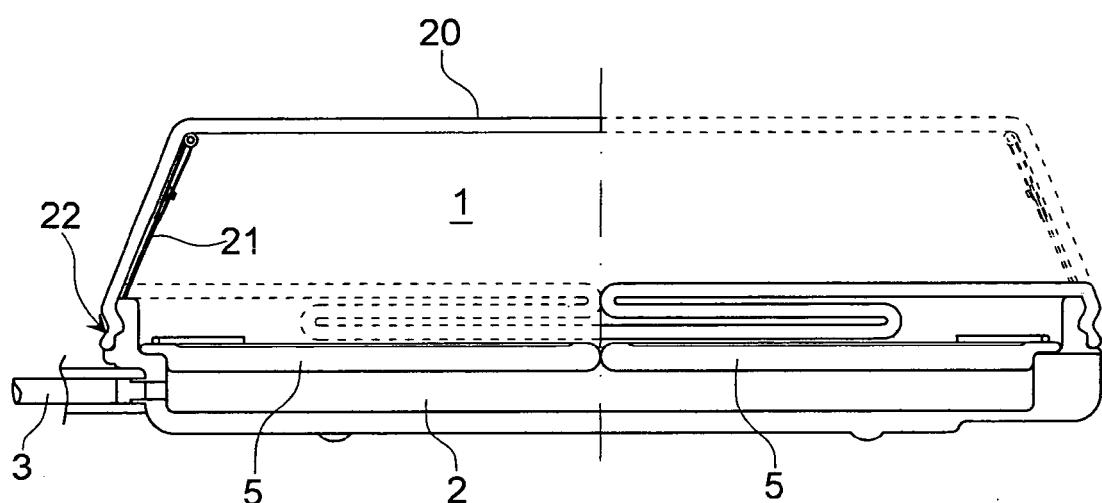


Fig. 12

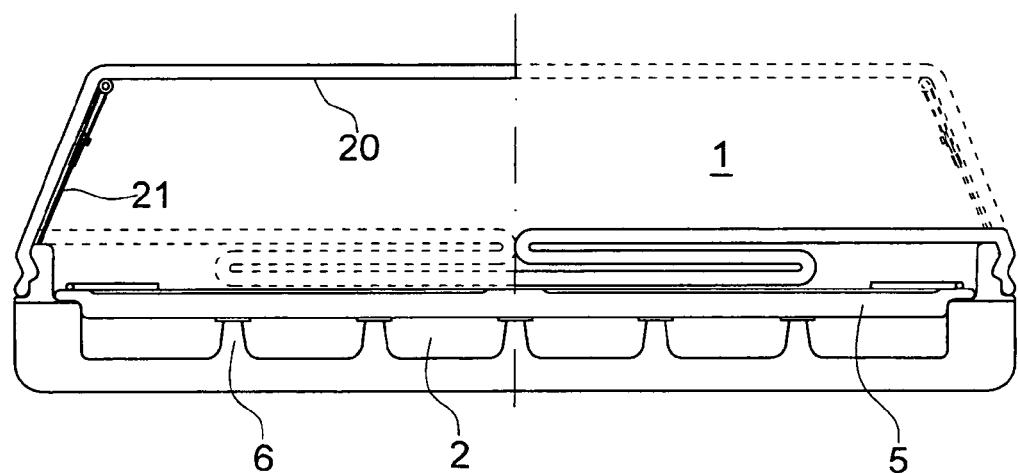


Fig. 13

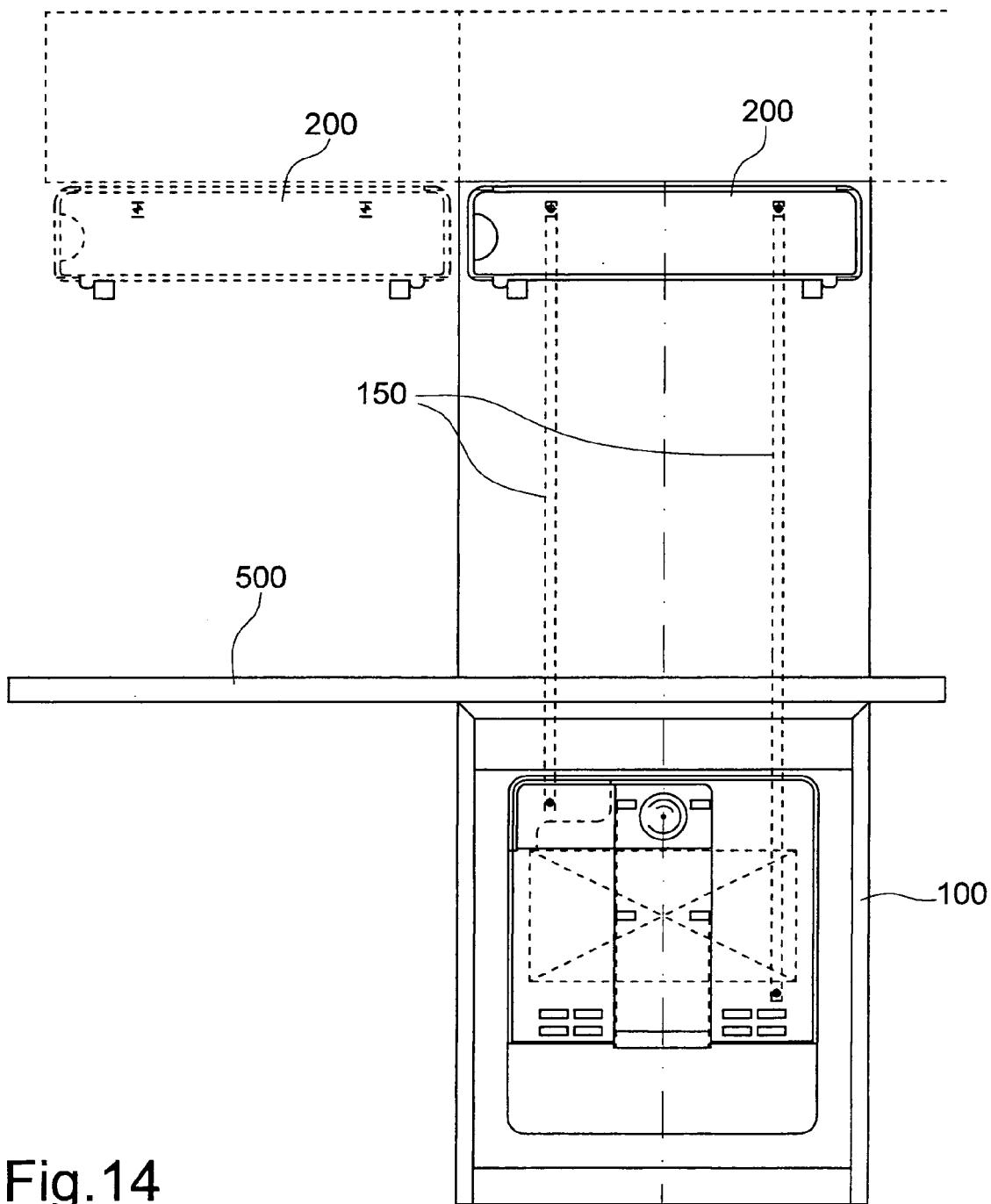


Fig.14

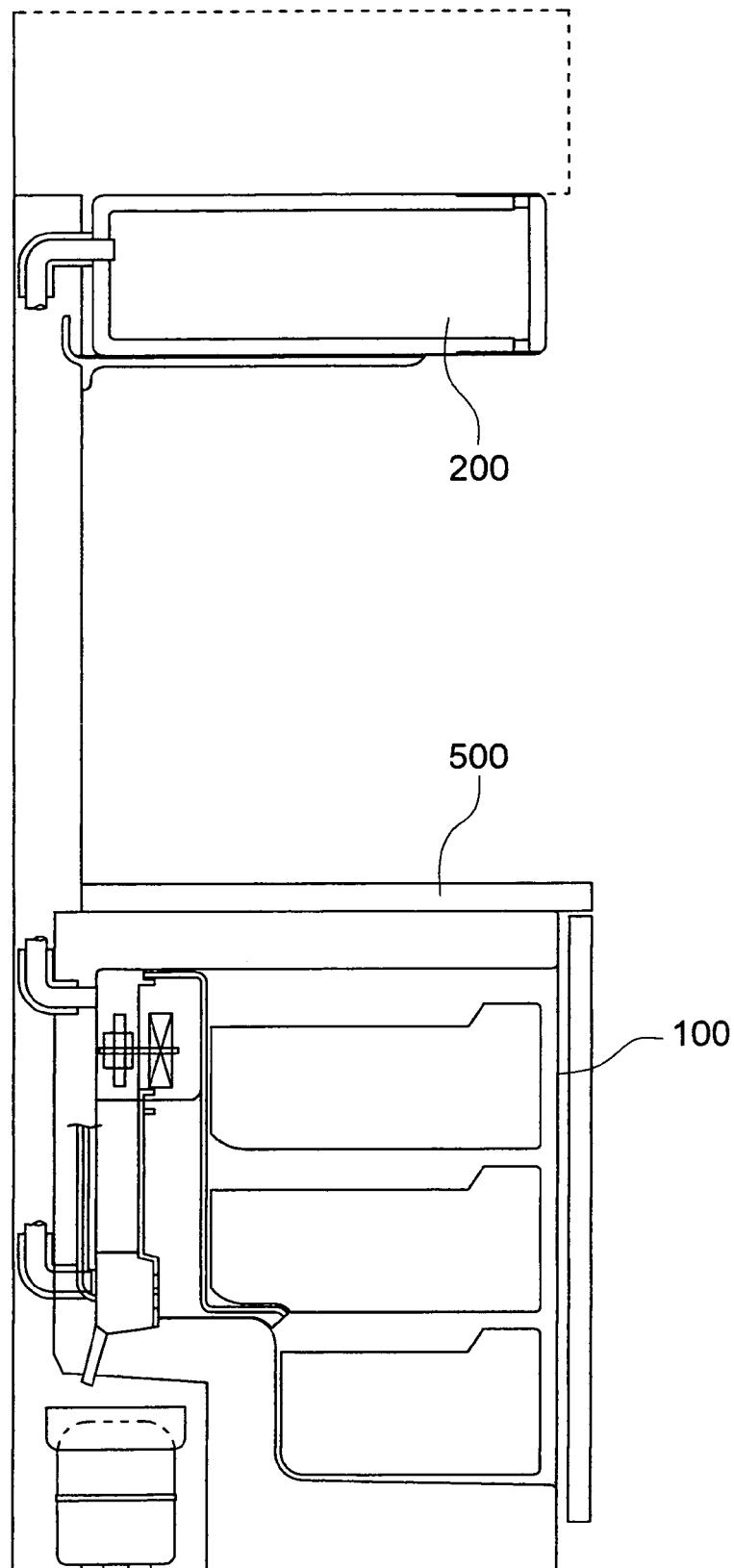


Fig.15

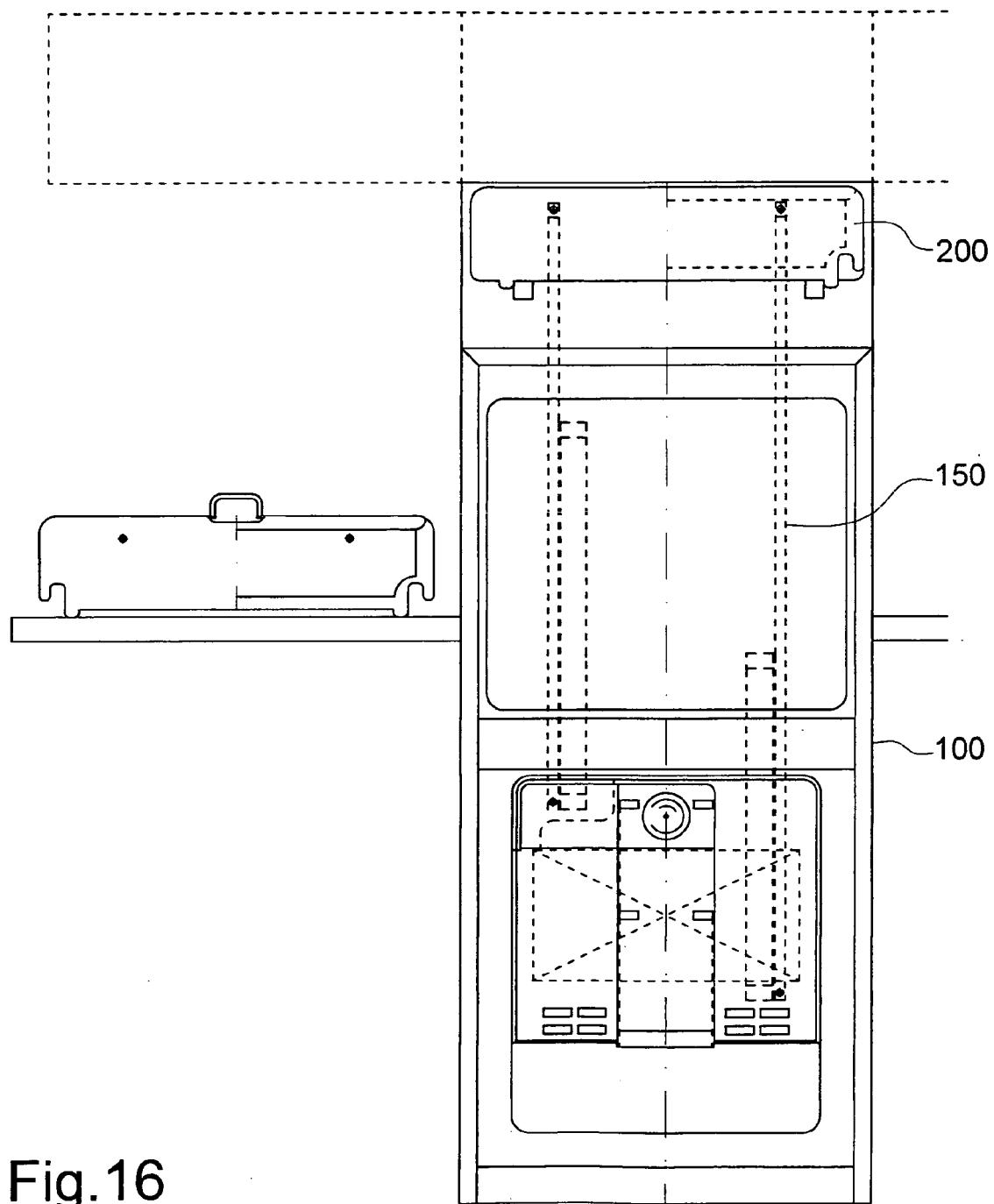


Fig.16

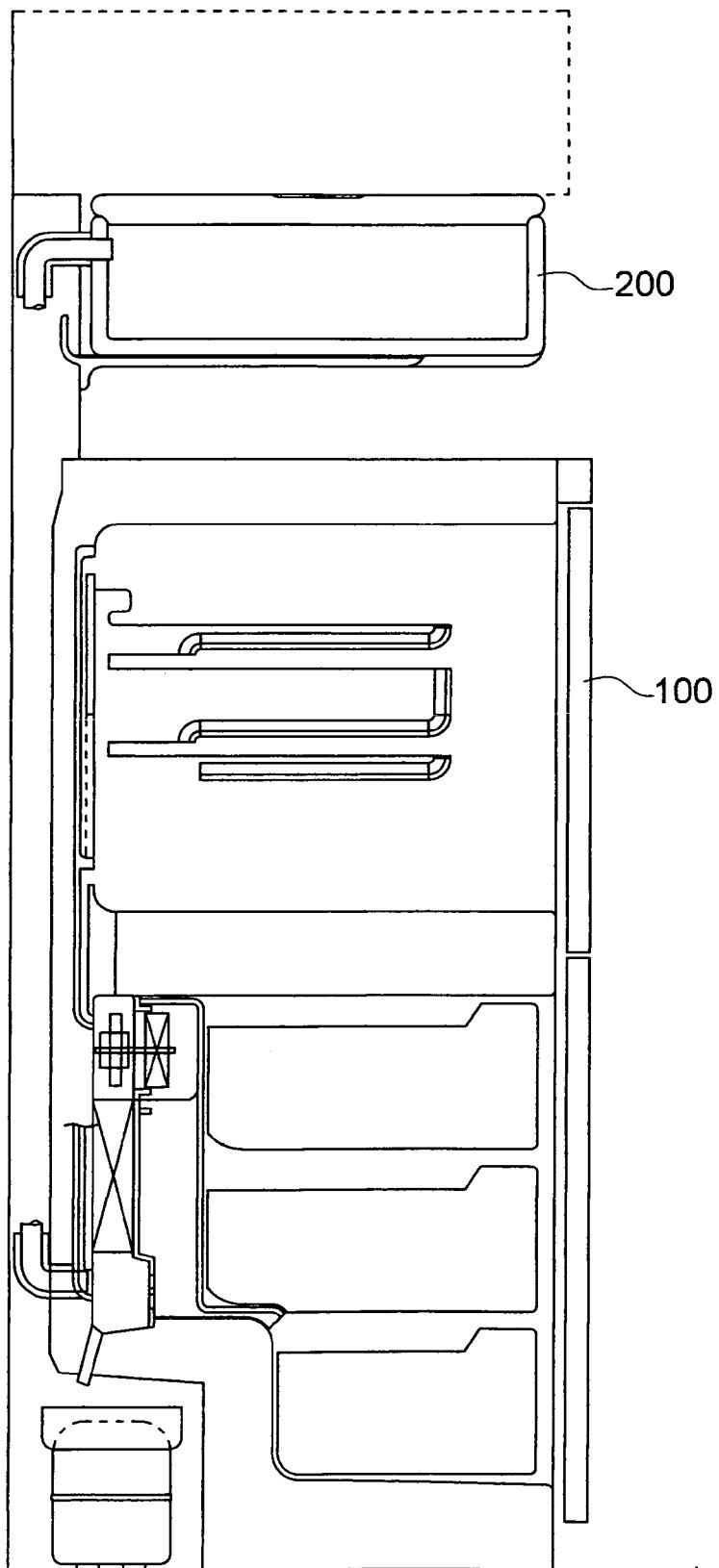


Fig.17

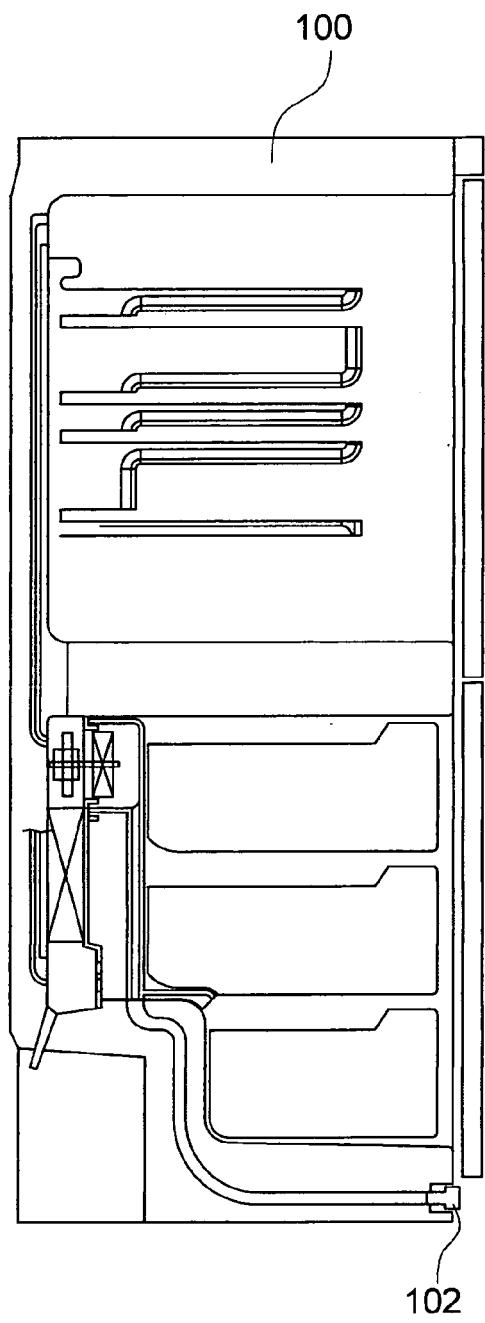
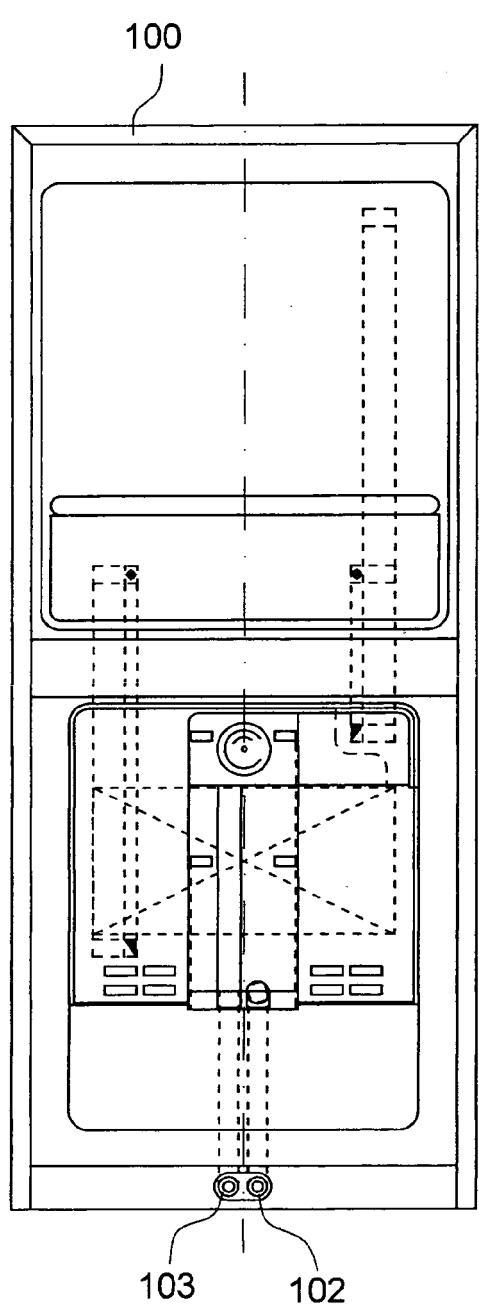


Fig.19

Fig.18



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
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Y	* figures 1-3 * * page 6, line 23 - page 10, line 8 *	2-8	F25D15/00 F25D17/06
Y	EP 0 223 743 A (MERLONI ELETTRODOMESTICI SPA [IT]) 27 May 1987 (1987-05-27)	2-8	ADD. F25D23/10
A	* abstract; figures 1,2 * * page 4, line 7 - page 5, line 2 *	1	
Y	EP 0 290 992 A (NALLINGER JORG D [DE]; EPPEL HARTMUT [DE]) 17 November 1988 (1988-11-17)	4-7	
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The present search report has been drawn up for all claims			
4	Place of search	Date of completion of the search	Examiner
	The Hague	27 June 2007	Yousufi, Stefanie
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT
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