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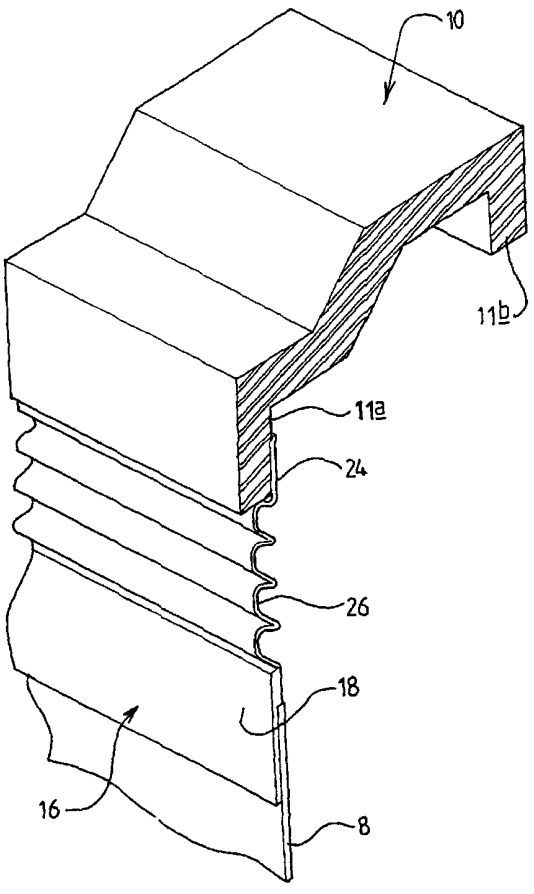
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[Continued on next page]

(54) Title: FREEZERS



(57) Abstract: In conventional manner a freezer comprises four outer walls (6) of insulating material, and four inner walls (8) of thermally conductive material, specifically thin aluminium sheet, extending upwardly from a base. At the upper part of the freezer, around the open top, is a frame assembly (10), defining the open top of the freezer, being moulded from plastics material, and comprising inner and outer vertical flanges (11a, 11b). In conventional manner the outer surface of the outer wall (6) extends behind the inner surface of the flange (11b), the space between the inner and outer walls being filled with packing material. In accordance with the invention the inner wall (8) terminates a short distance below the inner flange (11a), and an insulating member (12) extends between the inner flange (11a) and the inner wall (8) on each of the four sides, reducing the conduction of heat from the frame assembly to the inner wall (8), improving the efficiency of the freezer.

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Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Title: Freezers

Description of Invention

This invention is concerned with improvements relating to freezers, and will be described hereunder in the context of chest freezers.

A conventional chest freezer has an upwardly-open cabinet and a closure for the cabinet, conventionally afforded by a lid which may be slidable, or hingedly mounted for pivotal movement about a horizontal axis. The freezer cabinet conventionally comprises a generally rectangular base, comprising an inner wall of conducting material, typically aluminium sheet, and an outer wall of insulating material, conventionally of plastics material, and four side walls extending upwardly from the base to define an upwardly-open top. Each of said side walls similarly comprises an inner wall of thermally conducting material, conventionally of thin aluminium sheeting, and an outer wall conventionally of thermally insulating plastics material, with insulated packing therebetween. Conventionally, on the top, surrounding the opening, an upper frame assembly of moulded plastics material is mounted, conveniently having inner and outer flanges engaging the inside face of the inner wall and the outside face of the outer wall, respectively, and providing a seating surface for the lid. If desired the upper frame assembly may provide the pivotal mounting for the lid. Such a freezer is hereinafter referred to as being of the kind specified.

It is one of the various objects of this invention to increase the efficiency of a chest freezer of the kind specified.

According to this invention there is provided a freezer of the kind specified, comprising an insulating member between an upper part of the inner wall and the upper frame assembly.

Preferably the inner wall is located behind a lower margin of the insulating member, conveniently extending into a slot or recess provided in said

lower margin, and preferably an upper margin of the insulating member extends adjacent to the outer side of the inner flange of the frame assembly.

In this manner the insulating material is retained at the upper region of the freezer between the outer wall and the insulating member.

It has found that, by providing a thermal break between the inner, thermally conductive wall and the upper frame assembly, significant thermal losses may be reduced, and an efficiency improvement of 10% can be gained with minimum reduction in the effective capacity of the freezer.

Preferably means is provided to reduce surface contact between the insulating member and the inner wall and/or the inner flange of the upper frame.

Preferably the insulating member comprises a convoluted or serpentine section between the lower margin and the upper margin, providing an extended thermal path between the inner (conducting) wall and the frame assembly.

According to this invention there is also provided a method of increasing the efficiency of a freezer in which an upper region of the inner wall of the freezer is provided by insulating means to reduce transfer of heat from the upper frame assembly to the inner wall.

There will now be given a detailed description, to be read with reference to the accompanying drawings, of two freezers which are preferred embodiments of this invention, having been selected for the purposes of illustrating the invention by way of example.

In the accompanying drawings:

Figure 1 is a perspective view illustrating an upper part of the freezer which is the first embodiment of this invention;

Figure 2 is a perspective view of an insulating member which is utilised in the freezer which is the first embodiment of this invention;

Figure 3 is an enlarged view of one part of the freezer cabinet showing the insulating member in position thereon;

Figure 4 is an enlarged view of one part of the freezer cabinet which is the second embodiment of this invention, showing an alternative insulating member in position thereon;

Figure 5 is a schematic sectional view based on Figure 4;

Figure 6 is an enlarged view of part of Figure 4; and

Figure 7 is a view from the opposite side of part of the insulating member shown in Figure 6.

The freezer which is the first embodiment of this invention is a chest freezer shown generally in Figure 1 having an open top which may be closed by a lid (not shown). In conventional manner the freezer comprises four outer walls 6 of insulating material, conventionally of plastics material, and four inner walls 8 of thermally conductive material, specifically thin aluminium sheet, extending upwardly from a base 4. The base forms no part of the present invention and will not hereinafter be described.

At the upper part of the freezer, and extending around the open top, is an upper frame assembly 10, defining the open top of the freezer, being moulded from plastics material, and comprising inner and outer vertical flanges 11a, 11b respectively. In conventional manner, the upper margin of the inner wall 8 would extend behind the outer surface of the flange 11a, i.e. that face of the flange 11a facing the flange 11b, whilst the outer surface of the outer wall 6 would extend behind the inner surface of the flange 11b, the space 14 between the inner and outer walls being filled with insulated packing material 15, such as polyurethane foam.

In accordance with this invention the inner wall 8 terminates a short distance below the inner flange 11a, and an insulating member 12 extends between the inner wall to the flange 11a, and the inner wall 8 on each of the four sides.

Specifically the insulating member 12 is moulded from plastics material, specifically having a low index of thermal conductivity, and conveniently being

of relatively small cross-sectional dimensions, comprising an upper wall 13 which in use is engaged behind the inner wall of the inner flange 11a of the upper frame assembly 10. At the lower part the insulating member 12 is bifurcated, having parallel walls 14a and 14b which define a slot 15 which may be located over the upper margin of the inner wall 8, as shown in Figure 3.

In this manner the amount of heat which is transferred from the upper region of the freezer, particularly in the vicinity of the upper frame assembly 10, to the inner wall 8 is significantly reduced, without any commensurate reduction in the utility of the freezer.

The freezer which is the second embodiment differs from the first embodiment only in the construction of thermal insulating member. Specifically in the second embodiment, the insulating member 16, similarly conveniently moulded in one piece from plastics material, comprises a lower margin 18 provided with a recess 19, on which spacing means in the form of narrow ribs 20 are provided, said ribs 20 being engaged by the upper margin of the inner wall 8.

An upper margin 24 of the insulating member 16 is in the form of a narrow flange, preferably similarly provided with spacing means afforded by ribs 25 on a rear face, which in use is engaged behind the inner face of the flange 11a (see Figure 6).

In that the spacing means provides an insulating air gap between the engaging faces, it functions further to reduce heat transfer between the upper part of the freezer and the inner walls, further increasing the efficiency of the freezer.

Between the upper and lower regions the insulating member is provided with a convoluted or serpentine region 26, providing an extended thermal path between the upper margin of the inner wall 8 and the lower margin of the frame assembly 10.

In this manner the insulated packing material 15 is retained within the space at the upper region of the freezer between the outer wall, the upper frame assembly, and the insulated member 16. In this manner the amount of heat transferred from the upper frame assembly to the interior of the freezer is significantly reduced, significantly increasing the efficiency of the freezer, albeit with a small increase in temperature in the immediate vicinity of the lower surface of the lid.

Whilst in the preferred embodiments above described the insulating member is produced by moulding, conveniently extrusion, of plastics material, it may of course be produced by other means, and if desired may be prefabricated from one or more parts secured together, conveniently by a process such as welding. Additionally the insulating member may be produced in an aesthetically pleasing colour to enhance the appearance of the interior of the freezer.

It is to be appreciated that the terms "inner" and "outer" are used herein in relation to directions which are inwardly of, or outwardly of, the interior of the freezer cabinet.

It is to be appreciated that whilst the invention has been described hereinabove in relation to a chest freezer having an opening which lies conventionally in a horizontal plane, with the lid being slidable or pivotal about a horizontal axis, the invention may be utilised with an upright freezer, in which the opening lies in a vertical plane, having a door mounted for movement about a vertical axis.

In the present specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any

combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A freezer cabinet comprising an inner wall (8) of thermally conducting material, an outer wall (6) of thermally insulating material, with insulating material (9) therebetween, and a frame assembly (10) surrounding an opening of the freezer cabinet, the frame assembly (10) comprising an inner flange (11a) and an outer flange (11b) engaging the outer face of the outer wall (6), said frame assembly providing a seating surface for a closure member of the freezer cabinet,

characterised by the provision of an insulating member (12, 16) between the upper part of the inner wall (8) and the inner flange (11a) of the frame assembly.

2. A freezer according to Claim 1 wherein the inner wall (8) is located behind a lower margin of the insulating member (12).

3. A freezer according to any one of Claims 1 and 2 wherein the inner wall (8) extends into a slot or recess (15) provided in the lower margin of the insulating member (12).

4. A freezer according to any one of the preceding claims wherein an upper margin of the insulating member extends adjacent to the outer side of the inner flange (11a) of the frame assembly.

5. A freezer cabinet according to any one of the preceding claims wherein the insulating member comprises spacing means (19) to reduce surface contact between the insulating member and the inner wall.

6. A freezer cabinet according to any one of the preceding claims wherein the insulating member is provided with spacer means (25) to reduce surface contact between the insulating member and the inner flange of the frame assembly.

7. A freezer cabinet according to one of Claims 5 and 6 wherein the insulating member is provided with surface formations (20, 25), which engage with the inner wall and/or the inner flange of the upper frame, creating an air gap therebetween.

8. A freezer cabinet according to any one of the preceding claims wherein between upper and lower regions the insulating member is provided with a convoluted or serpentine region (26), providing an extended thermal path between said upper and lower margins (24, 18).

9. A method of increasing the efficiency of a freezer in which an upper region of the inner wall of the freezer is provided by insulating means (12, 16) to reduce transfer of heat from the upper frame assembly (10) to the inner wall (8) of the freezer.

10. A freezer according to any one of the preceding claims, being a chest freezer.

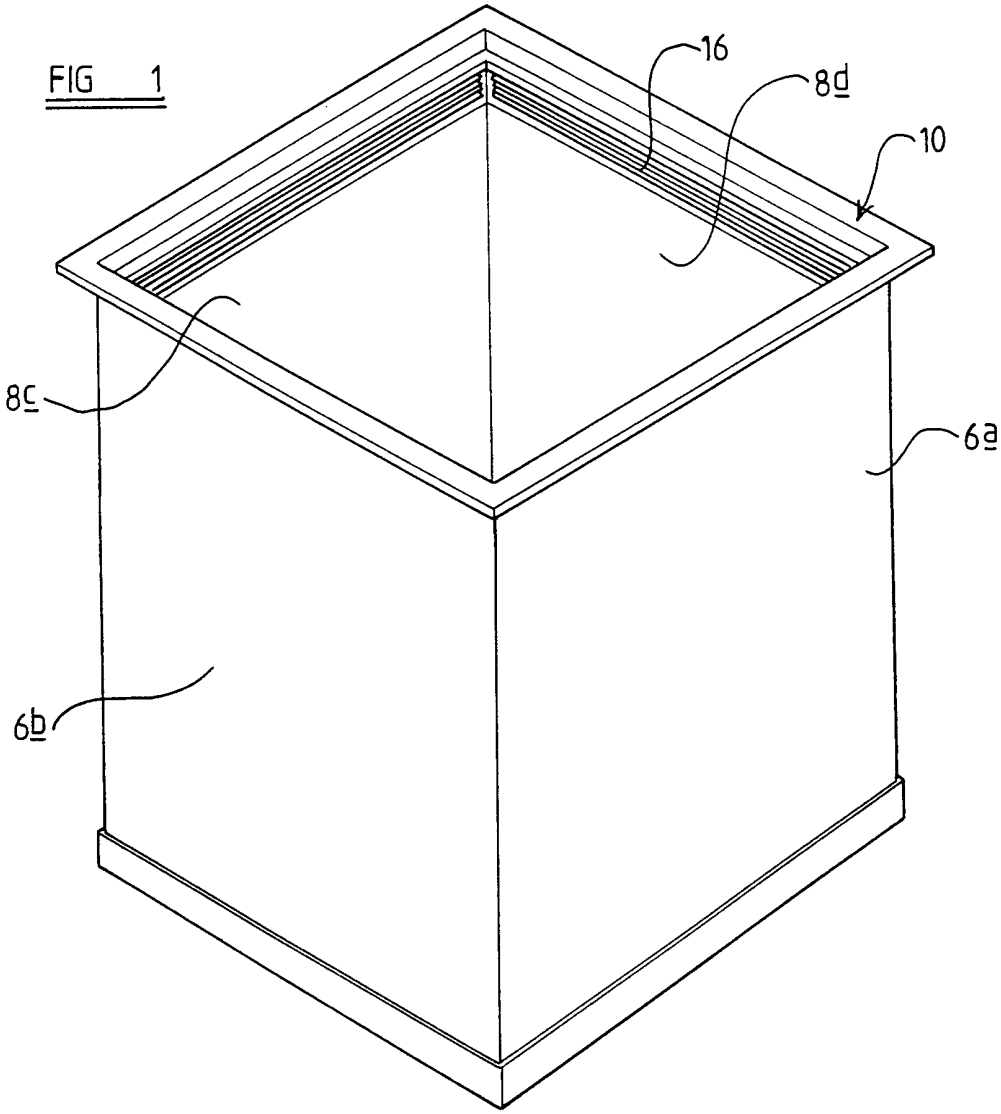
11. An insulating member for a freezer according to any one of the preceding claims.

12. A freezer cabinet constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.

13. An insulating member for a freezer cabinet, constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.

14. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.

FIG 1



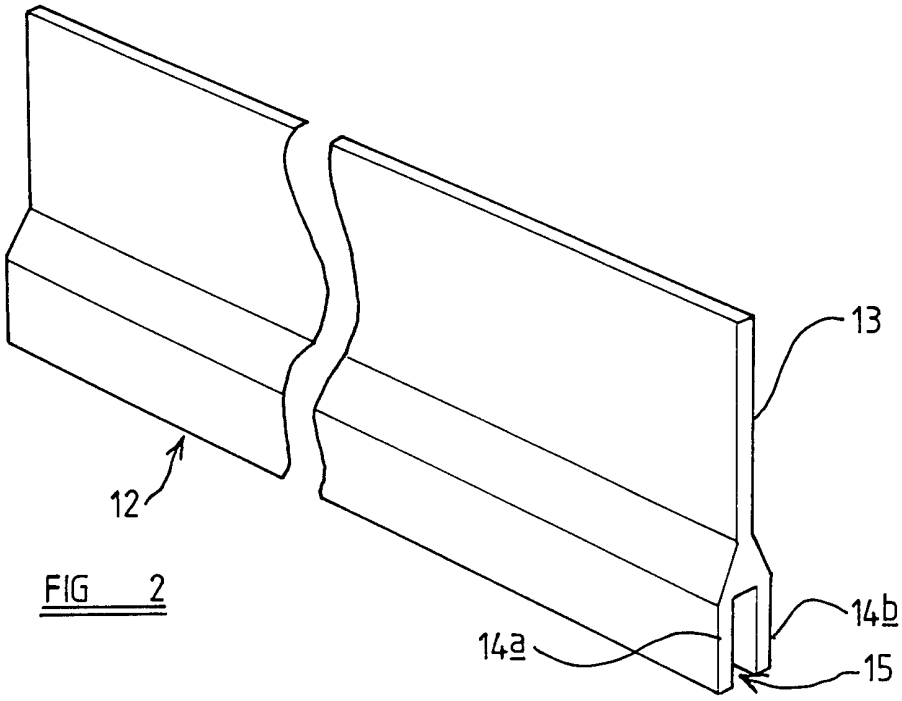


FIG 2

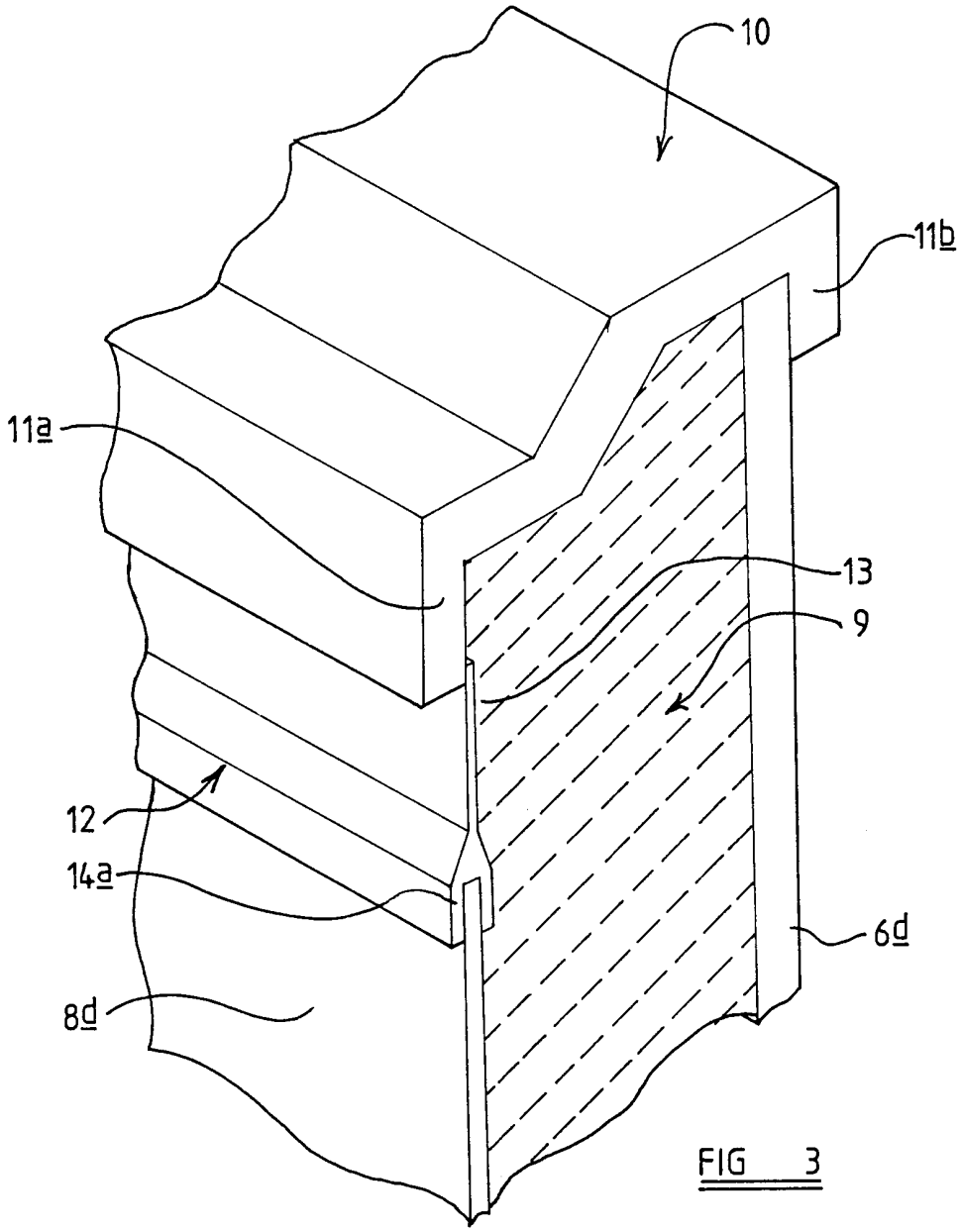


FIG 3

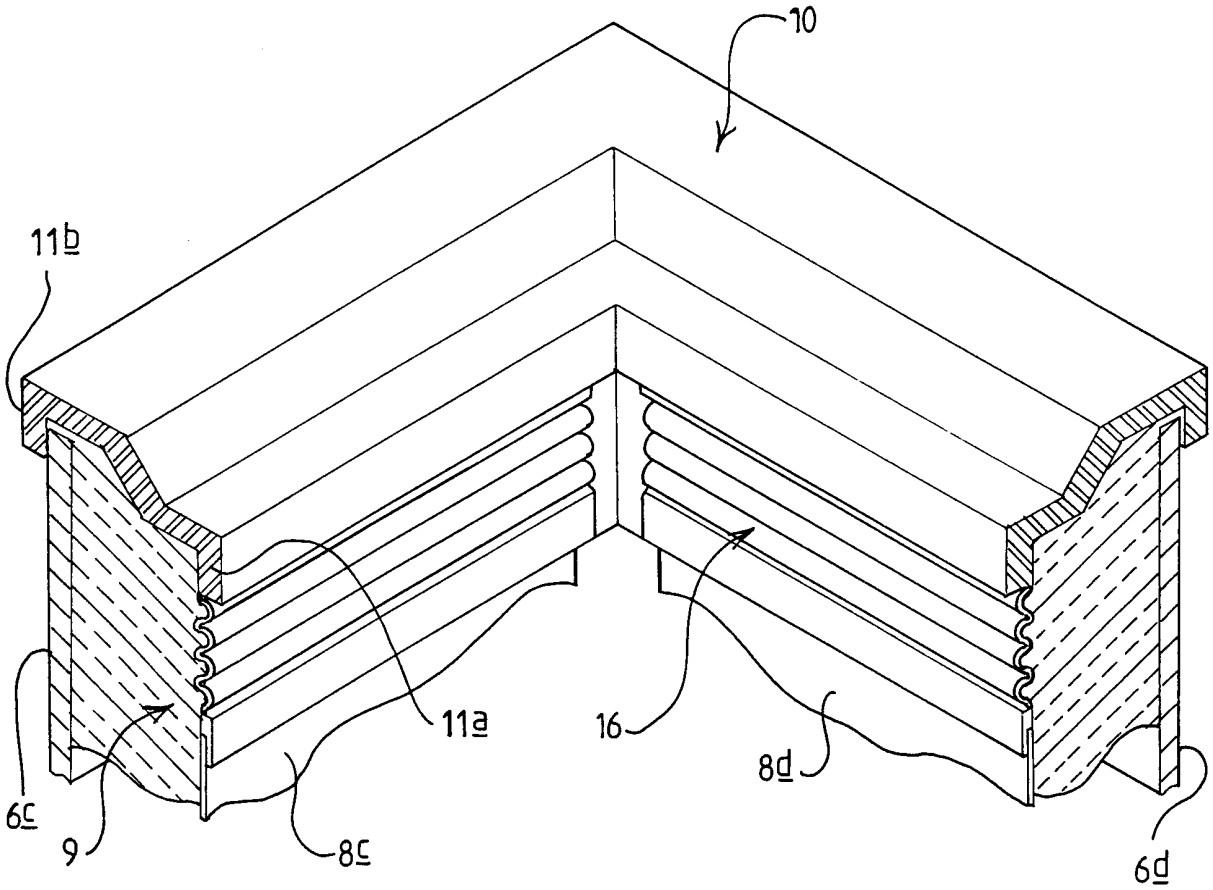


FIG 4

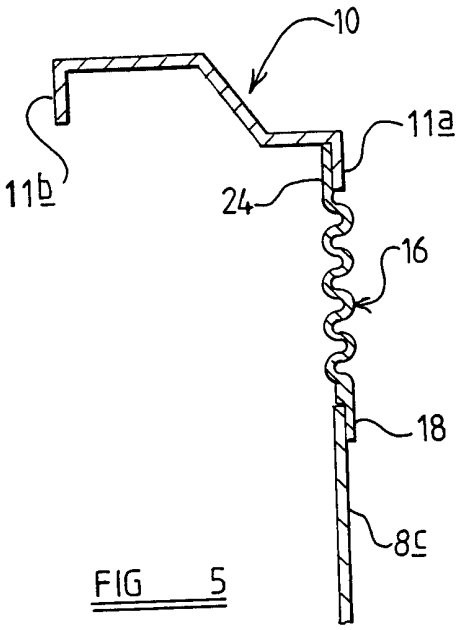


FIG 5

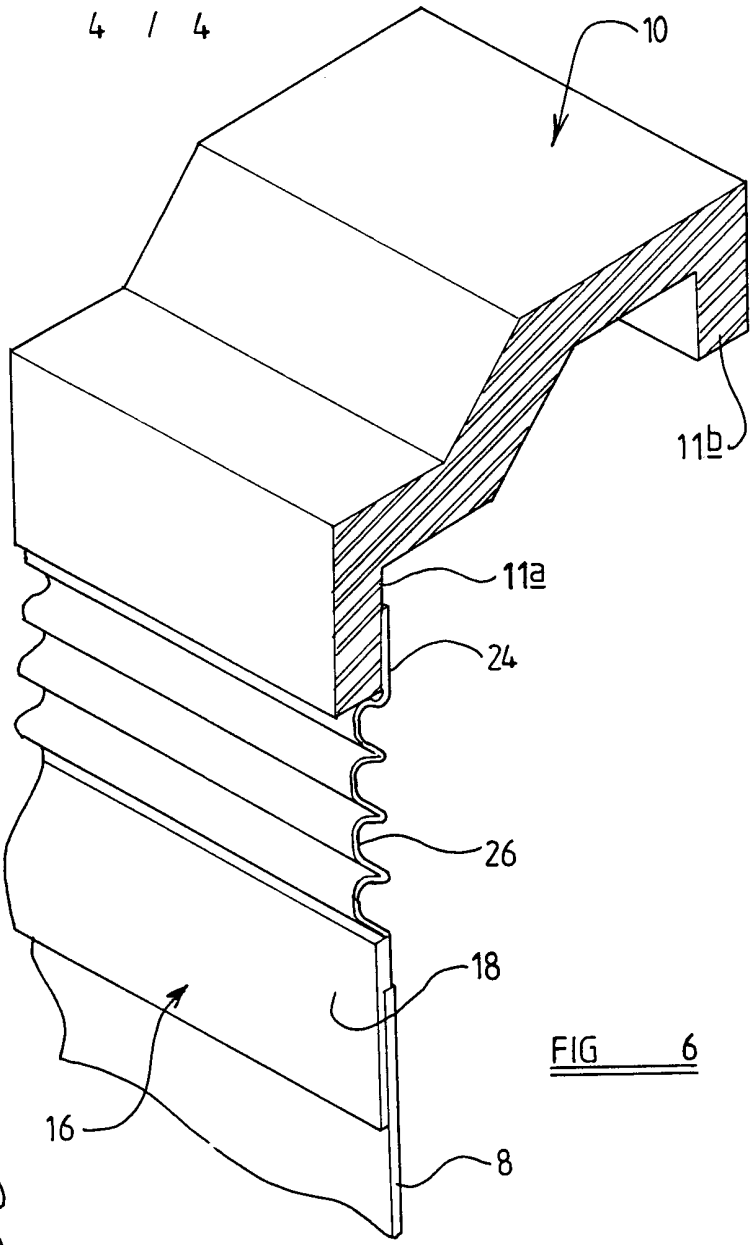


FIG 6

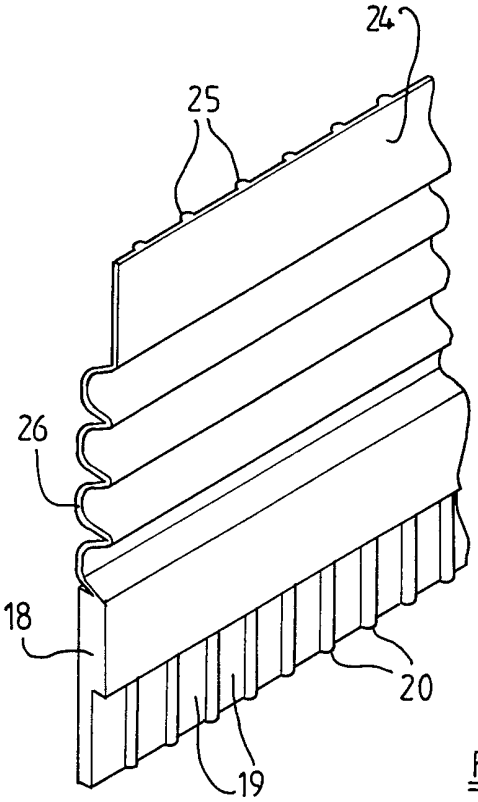


FIG 7

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/GB 00/03271

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F25D23/08

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)
IPC 7 F25D

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 37 42 693 A (LIEBHERR WERK LIENZ GMBH) 18 May 1989 (1989-05-18) column 1, line 20 -column 1, line 43 column 1, line 68 -column 2, line 41 column 3, line 60 -column 4, line 3 column 4, line 35 -column 4, line 47 claims 1-4 figures 1,2	1-4,9-11
Y		1,8
A		5-7

Y	GB 725 546 A (GENERAL ELECTRIC COMPANY) 2 March 1955 (1955-03-02) page 3, line 87 -page 4, line 27 claims 1,2 figures 2,3	1,8

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 November 2000	05. 12. 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	CORREIA DOS REIS, I

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter. ›nal Application No
PCT/GB 00/03271

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 411 657 A (GOBEILLE WILLIAM P) 19 November 1968 (1968-11-19) column 1, line 69 -column 2, line 64 figures 2,3	1,5-7
A	US 5 671 991 A (GRANT ALEXANDER) 30 September 1997 (1997-09-30) column 1, line 3 -column 1, line 23 column 5, line 5 -column 5, line 8 figure 2	1
A	US 2 276 635 A (WEBER KARL A) 17 March 1942 (1942-03-17) column 1, line 1 -column 1, line 7 column 1, line 43 -column 2, line 50 claims 1-6 figures 2,3	1
A	FR 1 425 665 A (GENERAL MOTORS CORPORATION) 7 April 1966 (1966-04-07) page 2, line 41 -page 2, line 66 page 2, line 104 -page 3, line 21 figures 4-8	1
A	GB 516 449 A (ELECTROLUX LIMITED) 2 January 1940 (1940-01-02) page 2, line 17 -page 2, line 65 claim 1 figures 1-4	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 00/03271

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 12-14
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 12-14

Claim 12 is directed to "A freezer cabinet constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings" and contains no features as such.

Claim 13 is directed to "An insulating member for a freezer cabinet, constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings" and contains no features as such.

Claim 14 is directed to "Any novel feature or novel combination of features described herein and/or in the accompanying drawings" and contains no features as such.

According to PCT Rule 6.2(a), the features of the invention should be expressed solely in the claims without reference to the description. Hence, claims 12, 13 and 14 are so unclear that they cannot be examined.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. onal Application No
PCT/GB 00/03271

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