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(54) **A refrigerated merchandising unit**

(57) A refrigerated merchandising unit (10) of the chest type is provided with heating elements (35,36) around a frame (20) forming an open mouth for access

to merchandise, a thermal barrier (31) being incorporated in the frame. The heating element (35,36) prevents ice build up and condensation on the unit.

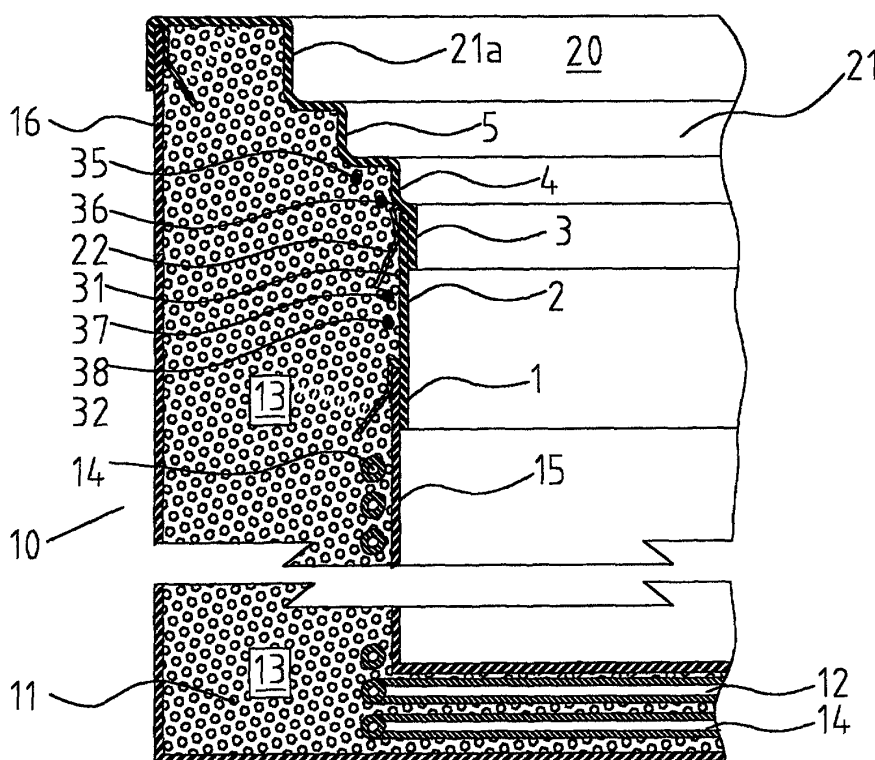


Fig. 2

Description**Introduction**

5 **[0001]** The present invention relates to a refrigerated merchandising unit of the chest type comprising: insulated base and side walls terminating in an open mouth and having inner panels of heat conducting material; evaporator tubes forming part of a refrigeration unit, housed in the insulated walls and base; a frame of low heat conducting material forming the open mouth; and a closure lid mounted in the frame.

10 **[0002]** These refrigerated merchandising units are used extensively in supermarkets and retail outlets generally for the storage and display of foodstuffs. Usually the lid of the unit is either a tilting hinged lid or a sliding lid formed of more than one sliding panel, usually two which meet in the centre of the chest intermediate the ends. For safety reasons, it is generally specified that the product within the unit must be held at a temperature of the order of -18°C . The refrigerated merchandising unit, while it has a certain amount of freezing capacity, has as its main purpose the ability to retain products that are placed in the unit at the desired temperature of below -18°C , such that they will not exceed 15 this temperature. All such units are marked with a load limit line above which products must not be placed.

15 **[0003]** Two problems arise. The first problem arises with the build up of ice in the unit above the load limit line and particularly on the frame surrounding the open mouth of the unit. There are two problems with the build up of such ice. The first problem is that it is aesthetically unpleasing and the second problem is that it can cause difficulties with the closure lid. When the closure lid is a hinged lid, this is often not a great problem because hinged lids tend to have a 20 better sealing capacity than sliding lids, however, in many countries a sliding lid is the preferred merchandising option. Sliding lids by their very construction tend to be less easy to seal against the ingress of air than pivoting lids. This ingress of air, and thus moisture to allow the formation of ice, particularly occurs at the corners of the open mouth of the frame since the open mouth is generally of rectangular shape and also where the sliding lids meet on closing the unit. Thus, if there are two sliding lids there are six locations on the frame where build up of ice occurs. In both types 25 of closure the build up of ice can cause distortion of the lids and thus further ingress of moisture laden ambient air, which is obviously detrimental.

[0004] The second problem is one of condensation. In the areas of the frame surrounding the open mouth that are more influenced by ambient temperature, the ingress of moist air will result in condensation being formed. This moisture is both aesthetically unpleasing and unhygienic. It can occur on both the sliding and the hinged lids.

30 **[0005]** The present invention is directed to overcoming these problems.

Statements of Invention

35 **[0006]** According to the invention there is provided a refrigerated merchandising unit of the chest type comprising: insulated base and side walls terminating in an open mouth and having inner panels of heat conducting material; evaporator tubes forming part of a refrigeration unit, housed in the insulated walls and base; a frame of low heat conducting material forming the open mouth; and a closure lid mounted in the frame; characterised in that a heating element is mounted around the frame.

40 **[0007]** In one embodiment of the invention the frame is a two-part frame comprising an outer lid mounting part and an inner thermal barrier connecting the frame to the side walls.

[0008] In another embodiment of the invention a heating element is mounted adjacent to the thermal barrier.

[0009] In a further embodiment of the invention the heating element provides different heat outputs at different locations around the frame where the ingress of air is more likely to occur.

45 **[0010]** In another embodiment of the invention the open mouth is rectangular and the heating element provides the greatest heat output adjacent to the corners of the frame.

[0011] In a still further embodiment of the invention the open mouth is rectangular; the lid comprises a plurality of sliding lid sections; and the heating element provides the greatest heat output adjacent the corners of the frame and where the lid sections meet when the unit is closed.

50 **[0012]** In another embodiment of the invention the frame houses a temperature sensor, connected to a controller in turn connected to a power source for operating the heating element.

[0013] In a further embodiment of the invention the heating element is connected to a timer.

[0014] In a still further embodiment of the invention the heating element is removably mounted on the inwardly facing surface of the frame.

55 **[0015]** In one embodiment of the invention the frame comprises: a resilient plastics material; an inwardly facing re-entrant slot around its periphery for reception of heating element and a closure for the slot.

[0016] In another embodiment of the invention the heating element is a strip heater comprising a heating wire housed within an elongate flexible strap-like body.

[0017] In one other embodiment of the invention the evaporator tubes extend up the side walls to adjacent the frame.

Detailed Description of the Invention

[0018] The invention will be more clearly understood from the following description of an embodiment thereof given by way of example only with reference to the accompanying drawings in which:

Fig. 1 is a sectional view of portion of a prior art merchandising unit used for test purposes,

Fig. 2 is a sectional view similar to Fig. 1 of a merchandising unit according to the invention,

Fig. 3 is a sectional view of a detail of a frame of another merchandising unit according to the invention,

Fig. 4 is a view similar to Fig. 3 of a still further detail of another frame of a merchandising unit according to the invention.

[0019] Referring to the drawings, and initially to Fig. 1, there is shown a prior art refrigerated merchandising unit indicated generally by the reference numeral 1, comprising upstanding rectangular insulated side walls 11 and a insulated base wall 12 housing insulation material 13 and evaporator tubes 14 forming part of a refrigeration unit not shown. Essentially the insulated side walls 11 and an insulated base wall 12 are formed by an outer cabinet body housing an inner liner cabinet which is formed of panels 15 of a high heat conducting material. The outer skin, as it were, of the side walls 11 and base walls 12 is formed from further panels 16.

[0020] The merchandising unit 1 has an open mouth 20 for reception of a closure lid (not shown). The open mouth 20 is surrounded by a frame 21 having depending open resilient slots 22 and 23 for reception of the panels 15 and 16 respectively. Fine temperature probes, which were used for tests as will be described below, were temporarily placed in the merchandising unit and are identified by the circled numerals 3, 4 and 5 in Fig. 1.

[0021] Referring to Fig. 2, there is illustrated a refrigerated merchandising unit according to the invention, indicated generally by the reference numeral 10. Parts similar to those described with reference to the previous drawing are used to identify the same parts. In this embodiment the frame member is again identified by the reference numeral 21 and is a two part. However, that portion which is identical to the frame member namely an outer frame is identified by the reference numeral 21a and the frame member 21 additionally comprises an inner thermal barrier 31 of a low heat conducting material which engages within the depending slot 22 and itself has a depending slot 32 for engagement with the panels 15. Effectively the thermal barrier turns the frame into a two part frame. Heating elements 35, 36, 37 and 38 are mounted behind the frame 21 and thermal barrier 31. The heating elements 35 and 36 are connected to suitable sources of supply and/or to a control unit.

[0022] In operation, some or all of the heating elements 35, 36, 37 and 38 are used to ensure that there is a sharp rise in temperature between the top of the panels 15 and open mouth 20.

[0023] In tests carried out in the refrigerated merchandising units 1 and 10, a total heating of 36 watts was supplied to each of the heating elements 35 and 37 and the temperature measured at the locations identified by the circled numerals 1 to 5. The air temperature was also measured at the front of the cabinet, at the middle of the cabinet and at the back of the cabinet at the load limit line. As was the ambient air. The ambient air was relatively high as the tests were carried out to ensure that the refrigerator merchandising unit 10 would operate satisfactorily. The tables below give the results of two tests carried out.

TEST NO. 1

[0024] *Date of test July 4, 2001*

[0025] *Heating elements*

35 @ 36W

37 @ 36W

Temperature	Prior art (Fig. 1) °C	Invention (Fig. 2) °C
Position 1	-	-25
Position 2	-	-3.0
Position 3	-20.0	+5.3

(continued)

Temperature	Prior art (Fig. 1) °C	Invention (Fig. 2) °C
Position 4	-0.9	+17.0
Position 5	+13.4	+24.4
Air @ Front	-24.6	-24.4
Air @ Middle	-22.8	-22.2
Air @ Back	-21.0	-19.7
Ambient	+25.8	+25.8

[0026] Further tests were carried out using one or more of the heating elements at different power inputs. The results are given below.

TEST NO. 2

[0027] *Date of test July 6, 2001*

[0028] *Heating elements*

35 @ 18W

36 @ 18W

37 @ 36W

38 @ 18W

Temperature	Prior art (Fig. 1) °C	Invention (Fig. 2) °C
Position 1	-	-30.0
Position 2	-	- 4.0
Position 3	-16.0	+ 3.0
Position 4	- 5.0	+13.0
Position 5	+12.5	+16.0
Air @ Front	-22.8	-25.7
Air @ Middle	-20.3	-23.6
Air @ Back	-18.0	-21.4
Ambient	+26.0	+26.0

[0029] In all cases the merchandising units were left for some time to attain normal operating conditions.

[0030] The first fact to note is at the load limit line, there were only marginal differences between the temperature of the air in the two cabinets. Thus, the heating element had little or negligible effect on the critical temperature within the merchandising unit. However, there was a considerable difference in the temperature for example at Positions 3 and 4, let alone Position 5. Thus, there was no build up of condensation, nor was there any build up of ice observed. The main reason for there being no build up of condensation would appear to be that the temperature achieved at Position 5 was effectively the same of that of the Ambient Air.

[0031] Further tests were then carried out without making any comparison with the operation of a cabinet according to the prior art i.e. of Fig. 1

TEST NO. 3**[0032]** *Date of test July 10, 2001***[0033]** *Heating elements 38 @ 50W*

Temperature	Invention (Fig. 2) °C
Position 1	-23.8
Position 2	+13.0
Position 3	+15.7
Position 4	+15.0
Position 5	+18.0
Air @ Front	-22.8
Air @ Middle	-20.2
Air @ Back	-17.6
Ambient	+25.8

TEST NO. 4*Date of test July 10, 2001***[0034]** *Heating elements**37 @ 34W**38 @ 34W*

Temperature	Invention (Fig. 2) °C
Position 1	-27.0
Position 2	+11.0
Position 3	+15.0
Position 4	+13.7
Position 5	+18.0
Air @ Front	-26.0
Air @ Middle	-23.0
Air @ Back	-20.0
Ambient	+25.8

[0035] Referring to Fig. 3, there is illustrated an alternative construction or portion of a frame according to the invention, again identified by the reference numeral 21. In this embodiment the frame member 21 is of a resilient plastics material and has an inwardly facing re-entrant slot 40 housing a heating element in the form of a resistance wire 41 which can be pushed home within the re-entrant slot. The re-entrant slot 40 is closed by a resilient cap 42.

[0036] Fig. 4 shows a still further construction of frame, again identified by the reference numeral 40 in which there is provided a heating element 45 which is a strap or strip heater indicated therein by the reference numeral 45 comprising of an elongated strap like body 46 housing a heating wire 47 spirally wound therein.

[0037] Further, while in the embodiment described above the frame has been illustrated as constructed as a two part frame, it will be appreciated a one piece simple frame similar to the frame of Fig. 1 may be used with suitable elements. It is also envisaged that possibly one heating element may be sufficient in many instances, or indeed that more than one heating element may be used. It is also envisaged that various control means and temperature sensors may be

used to control the amount of heat supplied. Further, it is envisaged that various types of heating element may be used.

[0038] It is also envisaged that the heat may be provided using alternative heat sources such as light fitting.

[0039] There are advantages in having the heating element removable from the frame since when the heating element is mounted behind the frame, once insulation material has been placed in the merchandising unit, it can be difficult to gain access to the heating elements. One of the advantages of the present invention is that it is possible to have the evaporator coils extending up the unit and the frame and thus much higher in the cabinet than is possible with some conventional merchandising units that also incorporate a thermal barrier between the frame and the thermally conductive panels. The higher up in the merchandising unit that the evaporator coils may be placed, the higher up the load limit line can be. Thus, the present invention, in addition to providing a merchandising unit that greatly reduces condensation and ice build up, also provides a merchandising unit with increased capacity as heretofore the need to prevent condensation and ice build up effectively meant that the load limit line had to be kept relatively low within the merchandising unit and various thermal barriers had to be incorporated in the merchandising unit to ensure an adequate frame temperature.

[0040] In the specification the terms "comprise, comprises, comprised and comprising" or any variation thereof and the terms "include, includes, included and including" or any variation thereof are considered to be totally interchangeable and they should all be afforded the widest possible interpretation.

[0041] The invention is not limited to the embodiments hereinbefore described but may be varied in both construction and detail.

Claims

1. A refrigerated merchandising unit (10) of the chest type comprising: insulated base (12) and side walls (11) terminating in an open mouth (20) and having inner panels (15) of heat conducting material; evaporator tubes (14) forming part of a refrigeration unit, housed in the insulated walls and base (11, 12); a frame of low heat conducting material forming the open mouth (20); and a closure lid mounted in the frame (21); **characterised in that:** a heating element (35, 36) is mounted around the frame (21)
2. A merchandising unit (10) as claimed in claim 1 in which the frame (21) is a two-part frame comprising an outer lid mounting part (21a) and an inner thermal barrier (31) connecting the frame (21) to the side walls.
3. A merchandising unit (10) as claimed in claim 2 in which a heating element (36) is mounted adjacent to the thermal barrier (31).
4. A merchandising unit (10) as claimed in any preceding claim in which the heating element (35, 36) provides different heat outputs at different locations around the frame (21) where the ingress of air is more likely to occur.
5. A merchandising unit (10) as claimed in claim 4 in which the open mouth (20) is rectangular and the heating element (35, 36) provides the greatest heat output adjacent to the corners of the frame.
6. A merchandising unit (10) as claimed in claim 4 in which the open mouth (20) is rectangular; the lid comprises a plurality of sliding lid sections; and the heating element (35, 36) provides the greatest heat output adjacent the corners of the frame and where the lid sections meet when the unit (10) is closed.
7. A merchandising unit (10) as claimed in any preceding claim in which the frame (21) houses a temperature sensor, connected to a controller in turn connected to a power source for operating the heating element (35, 36).
8. A merchandising unit (10) as claimed in any preceding claim in which the heating element (35, 36) is connected to a timer.
9. A merchandising unit as claimed in any preceding claim in which the heating element is removably mounted on the inwardly facing surface of the frame.
10. A merchandising unit as claimed in claim 9 in which the frame (21) comprises: a resilient plastics material; an inwardly facing re-entrant slot (40) around its periphery for reception of heating element (41) and a closure for the slot (40).
11. A merchandising unit as claimed in claim 9 in which the heating element is a strip heater (45) comprising a heating

wire (47) housed within an elongate flexible strap-like body (46).

- 12.** A merchandising unit as claimed in any preceding claim in which the evaporator tubes (14) extend up the side walls (11) to adjacent the frame (21).

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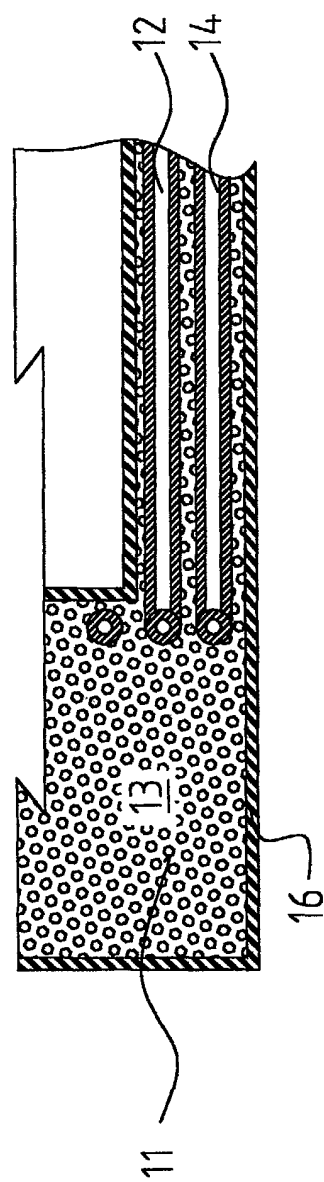
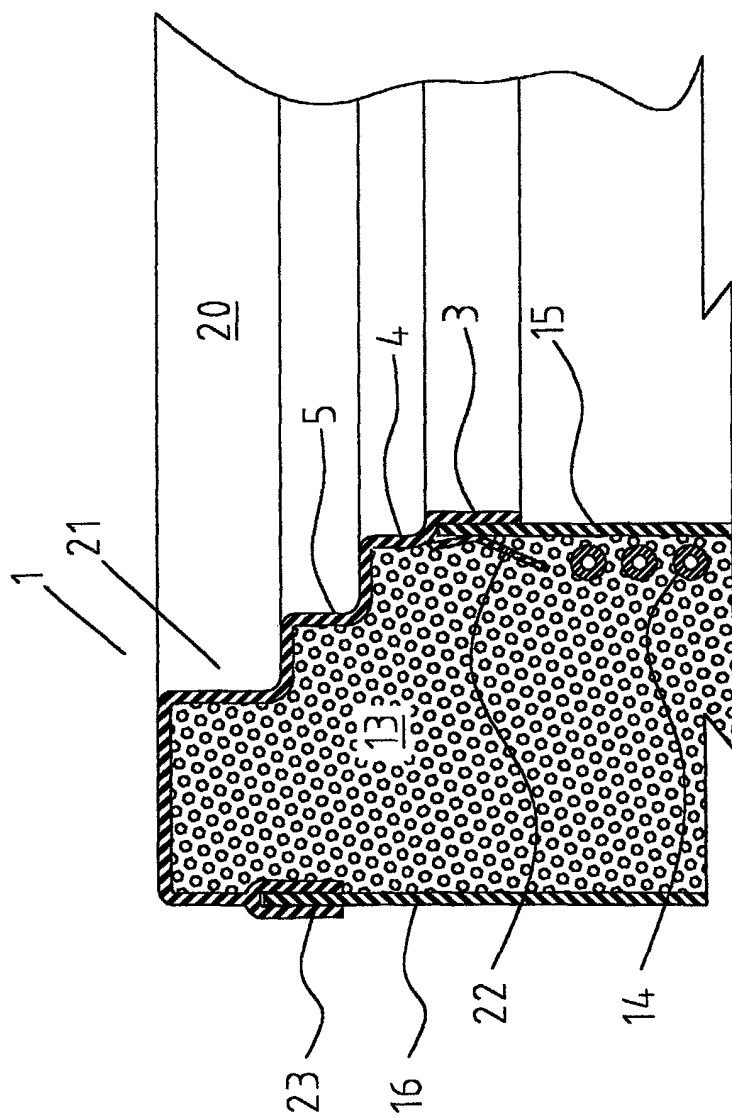


Fig. 1

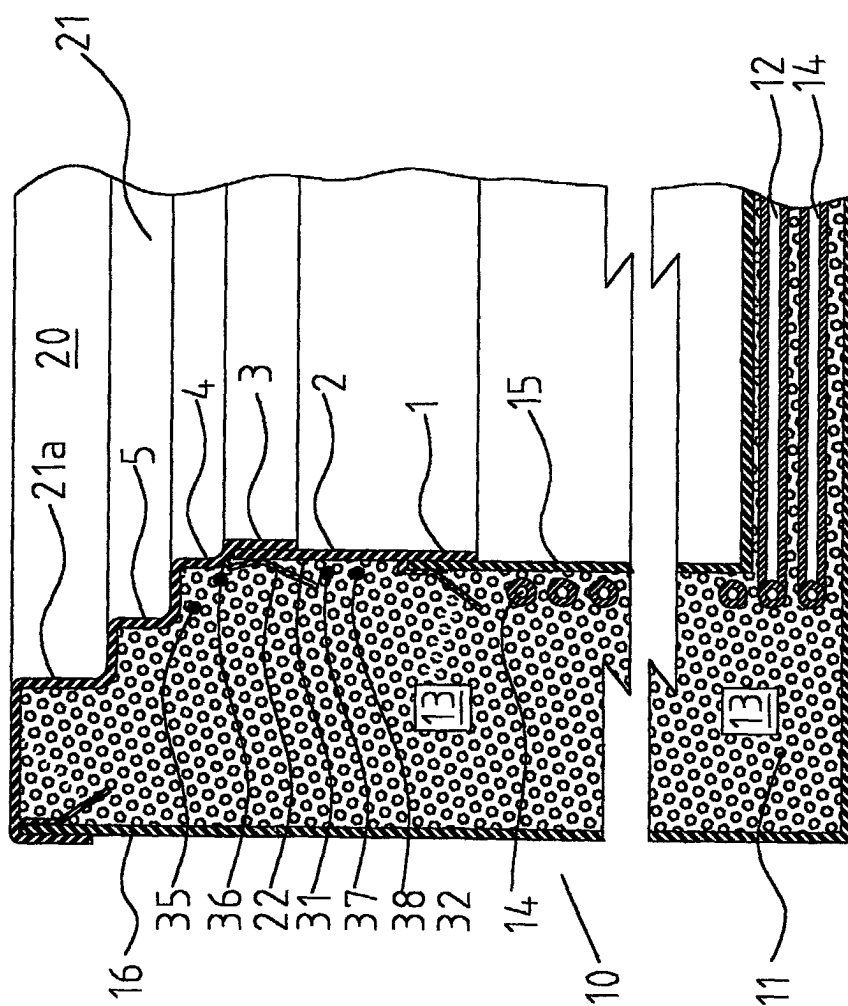


Fig. 2

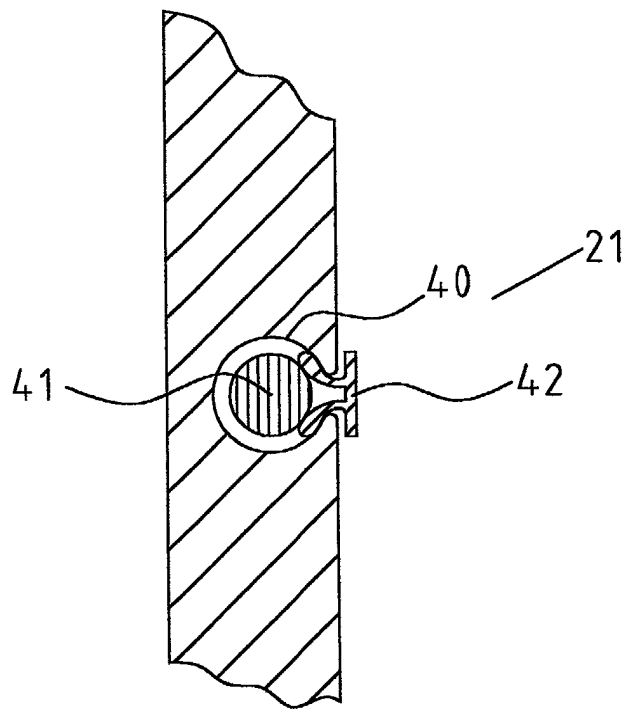


Fig. 3

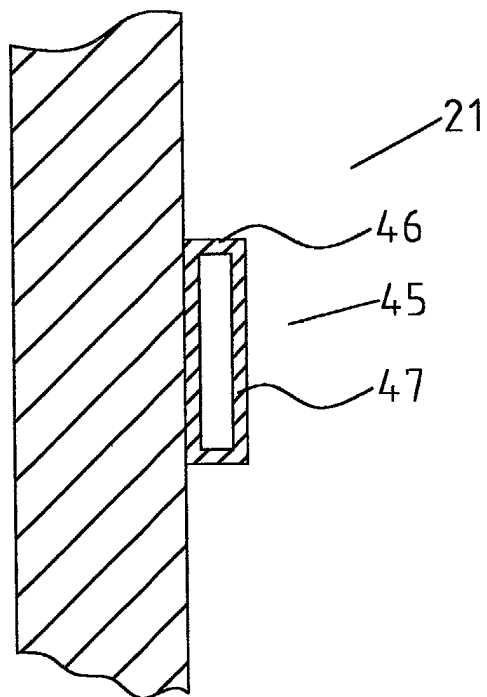


Fig. 4



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Application Number
EP 01 65 0081

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Place of search THE HAGUE		Date of completion of the search 30 November 2001	Examiner CORREIA DOS REIS, I
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EUROPEAN SEARCH REPORT

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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