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(54) **A transport unit with a protective wrapping foil and a method of manipulating said wrapping foil**

(57) The present invention concerns a transport unit comprising a plurality of panels (1), said panels being stacked on support means (3), wherein the panels and the support means are retained by a wrapping foil (2), wherein at least one drain aperture (4) is provided in the portion of the wrapping foil where water accumulation is most likely to occur, and that the at least one aperture is provided by a treatment in the wrapping foil so that the aperture preferably is reinforced along the rim of the apertures and if there is an overlap of layers of wrapping foil these are joined together along the rim of the apertures.

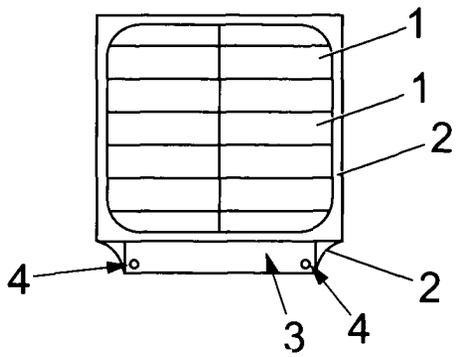

Fig. 1

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Description

[0001] The present invention relates to a transport unit according the preamble of claim 1 and 4 and a method of manipulating the wrapping foil.

[0002] From EP 0 946 394 B1, a transport unit is known, where a plurality of insulating panels are stacked in two or more stacks adjacent each other on mutually spaced support elements of a material suitable for use for insulation purposes. The support elements may have different orientations relative to the position of the stacks. The stacks of panels and the support elements are enclosed in a protective foil wrapping. This wrapping also provides for a stable transport unit. This transport unit is composed of insulating panels, e.g. 1000x600 mm or 2000x600 mm, length and width respectively, and it is lifted by normal lifting means, such as a lift fork. At the user's end, the panels may be cut into size before it is fitted into the building construction, e.g. a roof construction.

[0003] The fibrous material may alternatively be provided in rolls instead of stacked panels. Such rolls of insulation material are also wrapped with a wrapping foil in order to prevent the roll from unwinding and to protect the insulation material during transport.

[0004] With a protective wrapping foil surrounding most of the entire transport unit, there may be a risk of water penetrating through the uncovered foil free areas and becoming trapped in the bottom of the unit, e.g. the support element. Since the transport units often are free exposed and thereby subjected to rain, the penetration of water is always latent. Some regions of the transport unit may accumulate water, and this is a particular problem when for instance support elements of fibrous material useable for insulation purposes are used. These support elements are useless if they are soaked in water. Since in some circumstances the support elements are sold together with the rest of the transport unit, it is imperative to maintain the support elements dry to keep customers satisfied and to avoid the need for costly disposal of useless support elements of soaked fibrous material.

[0005] In this light, it is an object of the invention to provide a reliable solution to preventing the assembly of water in the support elements. Moreover, it is an object to provide a drainage, which does not critically reduce the strength of the wrapping foil and jeopardises the quality of the material in the transport unit.

[0006] These objects are obtained by a transport unit according to the invention.

[0007] The invention relates to a transport unit comprising a plurality of panels, said panels being stacked on support means, wherein the panels and the support means may be retained together by a wrapping foil surrounding them, or the transport unit comprising at least one roll of fibrous web material, in particular material for insulation purposes, wherein said roll may be stacked on support means, and wherein the at least one roll is retained together by a wrapping foil surrounding at least the fibrous material. It is irrelevant for the purpose of the invention how the foil is wrapped around the transport unit. The foil may be used as a single sheet enveloping the panels and the support means, but may also be used as sheets enveloping the support means and the panels or stacks of panels separately.

[0008] The invention consists of a transport unit of the above-mentioned kind, wherein at least one drain aperture is provided in the lower portion of the wrapping foil or the portion in contact with the support means, or the portion where water accumulation is most likely to occur, and that the at least one aperture is provided by a treatment in the wrapping foil so that the aperture is reinforced along the rim of the apertures and if there is an overlap of layers of wrapping foil these are joined together along the rim or part of the rim of the apertures. The treatment could be heat treatment, mechanical treatment or a chemical treatment, e.g. by use of an acid solution, or a combination of one or more of these treatments in order to achieve the same result.

[0009] Hereby, a drain aperture is provided by "burning" or "etching" a relatively small hole in the plastic wrapping foil. By "burning" or etching the apertures through the layers of foil, the overlapping layers of foil may be joined together by being melted together along the rim or part of the rim. This means that the holes in the individual layers of foil cannot be displaced relative to each other, which in turn means that the drain openings are not subsequently closed and the drainage function jeopardised. By melting the apertures in the wrapping foil, a reinforced edge along the aperture or part of the aperture may be provided, which compensates for the tensile weakness, which would otherwise be occurring by providing a hole in the wrapping foil.

[0010] In a first embodiment of the invention, the panels are panels of fibrous insulating material, preferably stacked in at least one stack on support means consisting of mutually spaced support elements consisting of fibrous material suitable to be used for insulation purposes.

[0011] In a second embodiment, a roll of fibrous material is provided in the transport unit and the at least one roll is provided on support means consisting of mutually spaced support elements consisting of fibrous material suitable to be used for insulation purposes.

[0012] Preferably, the at least one aperture is provided in the portion of the wrapping foil covering the support elements. In the preferred embodiment, at least two apertures are provided in connection with each of the support elements. As mentioned above, the aperture(s) independently of how the foil is used, shall be provided in the region or regions where water accumulation (water ponding) is most likely to occur. Often this occurs in the region near the support elements or in the lower region of the stack of panels, which faces the support elements.

[0013] The invention also relates to a method of making an aperture in a wrapping foil, preferably a polymeric

foil, which is surrounding a stack of panels on support means in a transport unit by advancing a heated member into engagement with the wrapping foil and melting an aperture having a geometry corresponding to the shape of the engagement end of the tuberous member.

[0014] Alternatively, drainage may be accomplished by providing a cut or similar mechanical treatment in the foil, whereby the at least one aperture has a geometry corresponding substantially to the shape of the engagement end of the cutting means.

[0015] Drainage may also be accomplished by means of a chemical treatment in the foil, whereby the at least one aperture may acquire a random geometry but is big enough to allow for the evacuation of accumulated water.

[0016] The aperture provided by a heated member may be a generally round hole. In the method of providing this aperture, the heated member is preferably a tubular member with a generally circular or oval cross-section. The aperture could also be provided by a laser. Preferably, the at least one aperture is circular, preferably with a diameter between 0.5 to 50 mm, more preferably between 5 and 30 mm and most preferably between 15 and 25 mm. A large number of very small holes could be an alternative way of obtaining an equivalent result. Since the wrapping foil is usually wound around the fibrous material with an overlap and/or with a multiple of layers, by providing a substantially circular hole, the concentration of tensile stress around the hole it is kept low thus reducing the risk of damaging the wrapping foil.

[0017] In a preferred embodiment of the invention, the at least one aperture is a semi-annular opening leaving an uppermost connecting portion, so that a flap is provided which is connected to the wrapping foil. The semi-annular opening is preferably semi-circular, elliptical, or similar smooth partially annular shape. The opening preferably circumscribes 25-98% and more preferably 50-90% of a full circle. This type of aperture may be provided by a method wherein the heated member is provided with an end section engaging the wrapping foil, which has a generally U-shaped or semi-circular shape. By providing a semi-circular or equivalently shaped flap, i.e. by only melting away 50%-90%, e.g. 80%, of the full circle, no waste material is produced, which otherwise must be removed from the production site.

[0018] In the preferred embodiment, the wrapping foil is multi-layered. According to the method, the heated member joins together a multiple of layers of polymeric wrapping foil along the rim of the apertures in a plastic welding process. The apertures are provided by a heat welding treatment in a polymeric wrapping foil and that the layers of wrapping foil are joined together along the rim of the apertures. The equipment for carrying out the method may be a portable equipment with an extendable heating member or equipment installed in the production line subsequent to the packaging line where the transport units are built and wrapped with the foil.

[0019] In the following, the invention is illustrated with reference to some most preferred embodiments shown in the accompanying drawings, in which:

Fig. 1	is a front view of a transport unit according to a first preferred embodiment of the invention;
Fig. 2	is a side view of a transport unit according to the invention;
Figs. 3 and 4	are detailed views of two embodiments of the invention;
Figs. 5 and 6	are principal side views of the method of making apertures in the wrapping foil; and
Fig. 7	is a front view of a transport unit according to second preferred embodiment of the invention.

[0020] In figure 1 a transport unit comprising one or more stacks of panels 1, in particular panels of insulation material is shown. The stack of panels 1 is supported on support elements 3 and wrapped in a protective wrapping foil 2, which also constitutes the retention means for retaining the panels 1 in their stacked position during transport.

[0021] The stack of panels 1 is placed on support elements 3 constituting the bottom side of the transport unit. The transport unit further has a top surface, a front and rear surfaces and two surfaces. The foil 2 is typically wrapped around the top and bottom and the side surfaces as shown in fig. 1. The wrapping foil 2 also provides the retention of the stack during transport besides protecting the fibrous insulation panels 1. The panels may be rectangular panels or wedge-shaped panels. As mentioned above, the fibrous material may alternatively be provided in rolls.

[0022] The support elements 3 are preferably made of fibrous material, which is suitable for insulation purposes. The wrapping foil 2 encompasses both the panels 1 and the support elements 3. In the section of the wrapping foil covering the support elements 3, which in the embodiment in fig. 1 includes the region of potential water accumulation, apertures 4 are provided in the vicinity of each of the exterior comers of the support elements 3, for instance as shown in fig. 1.

[0023] In fig. 4, the transport unit is shown in a side view. As indicated in this figure, the apertures 4 are positioned adjacent the exterior longitudinal sides of the support elements.

[0024] The apertures 4 may be circular as shown in fig. 2 or semi-circular as shown in fig. 3. In order to prevent water from accumulating in the support elements in the bottom of the transport unit, an aperture having a free opening is not necessary. It can be sufficient to have a slit, as it is the case with the embodiment having semi-circular apertures 4, see fig. 3. The advantage of the aperture being a partially annular slit is that there are no blanks which are cut away from the holes and which

must be removed. This makes the production of the apertures 4 easier as the need for tidying the production floor is reduced compared to making "full" holes.

[0025] As shown in figs. 5 and 6, the apertures 4 are produced by advancing a member 5, preferably a heated member, having at least a preferably heatable end section 6 towards the wrapping foil 2 at the position for the apertures 4. The heated member 5 is advanced forward to engage the wrapping foil 2, which is supported by the support element 3 immediately behind the foil 2. As the end section 6 of the heated member 5 is fully engaged with wrapping foil, the aperture is melted through the foil or foils 2. Since the fibrous insulation material behind the foil is fire resistant, there is no danger of damaging the fibrous panels in the transport unit during the aperture-making process.

[0026] In fig. 7 is shown another embodiment of the invention, where the water accumulation region is at the bottom region of the stack of panels 1. In this embodiment, the stack of panels 1 is partially wrapped in a foil 2 and the support means 3 are separately wrapped in an additional foil 2'. The support means 3 are at the upper surfaces of the support wrapping foils 2' adhesively attached to the wrapping foil 2. The apertures 4 are provided in the lowermost region of the "panel stack" portion of the transport unit, as this is the most likely region for water accumulation.

[0027] By the invention, it is realised that the apertures may have different shapes. Accordingly, by the term circular is meant any annularly shape having a continuous curvature. Accordingly, elliptical, oval or other equivalent shapes are considered to be comprised in the term circular, as well as multi-edged holes which in practise have the same function. Furthermore, forces in the single or multiple layer foil may stretch it and thereby change the initial shape of any aperture.

Claims

1. A transport unit comprising a plurality of panels and/or rolls, said panels and/or rolls being stacked on support means, wherein the panels and the support means are retained by wrapping foil,
   characterised in that
   at least one drain aperture is provided in the portion of the wrapping foil, where water accumulation is most likely to occur, and that the at least one aperture is provided by a treatment in the wrapping foil.

2. A transport unit according to claim 1, wherein the panels and/or rolls are of fibrous insulating material.

3. A transport unit according to claim 2, wherein the panels are stacked in at least one stack on support means consisting of mutually spaced support elements consisting of fibrous material suitable to be used for insulation purposes.

4. A transport unit according to claim 3, wherein the at least one aperture is provided in the portion of the wrapping foil covering the support elements.

5. A transport unit according to claim 3 or 4, wherein at least two apertures are provided in connection with each of the support elements.

6. A transport unit according to claim 3, wherein the at least one aperture is provided in the portion of the wrapping foil covering the lowermost section of the stack of panels and/or rolls above the support elements.

7. A transport unit according to claim 3 or 6, wherein at least two apertures are provided on at least two sides of the transport unit.

8. A transport unit according to any of the preceding claims, wherein the at least one aperture is a generally round hole.

9. A transport unit according to any of the preceding claims, wherein the at least one aperture is circular, preferably with a diameter of 0.5 to 50 mm, more preferably 5 to 30 mm, and most preferably 15 to 25 mm.

10. A transport unit according to any of the claims 1 to 8, wherein the at least one aperture is a semi-annular opening leaving an uppermost connecting portion, so that a flap is provided which is connected to the wrapping foil.

11. A transport unit according to claim 10, wherein the semi-annular opening is semi-circular, preferably circumscribing 50-90% of a full circle.

12. A transport unit according to any of the preceding claims, wherein the wrapping foil is multi-layered.

13. A transport unit according to any of the preceding claims, wherein the wrapping foil is single-layered.

14. A transport unit according to any of the preceding claims, wherein the at least one aperture is reinforced along the rim of the aperture.

15. A transport unit according to any of the preceding claims, wherein the at least one aperture is provided in the wrapping foil comprising an overlap or multiple of layers of wrapping foil at the position of the aperture, by said layers being joined together along the rim of the aperture.

16. A transport unit according to claim 15, wherein the overlap or multiple of layers of wrapping foil at the position of the aperture is provided by a heat mem-

ber.

17. A transport unit according to claim 15, wherein the heat member is substantially tubular.

18. A transport unit according to claim 1, wherein the panels and the support means are retained together by a common wrapping foil.

19. A transport unit according to claim 18, wherein the transport unit is provided with additional support elements placed in between the stack of panels and the support means.

20. A transport unit according to claim 19, wherein the additional support elements are made of a material selected from a group comprising wood, plastic or the like.

21. A method of making an aperture in a wrapping foil, which is surrounding a stack of panels on support means in a transport unit by advancing a member into engagement with the wrapping foil and providing an aperture having a geometry corresponding to the shape of the engagement end of the tuberous member.

22. A method according to claim 21, whereby the member is a heated tubular member with a generally circular cross-section.

23. A method according to claim 21, whereby the member is provided with an end section engaging the wrapping foil, which has a generally U-shaped or semi-circular shape.

24. A method according to any of the claims 21 to 23, whereby the member joins together a multiple of layers of polymeric wrapping foil along the rim of the apertures in a plastic welding process.

25. A method according to any of the claims 21 to 24, whereby the member, which is advanced towards the wrapping foil, is a heated member and the aperture is melted in the wrapping foil.

26. A method according to any of the claims 21 to 25, whereby the member, which is advanced towards the wrapping foil, applies a chemical means, such as an acid or an basic solution, for forming one or more apertures in the wrapping foil.

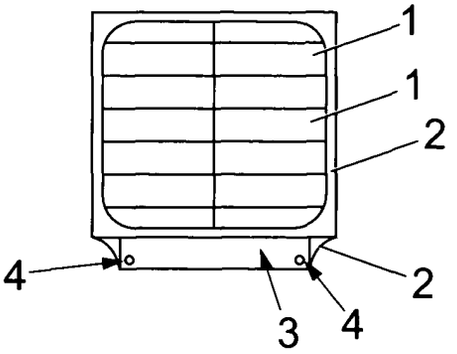

Fig. 1

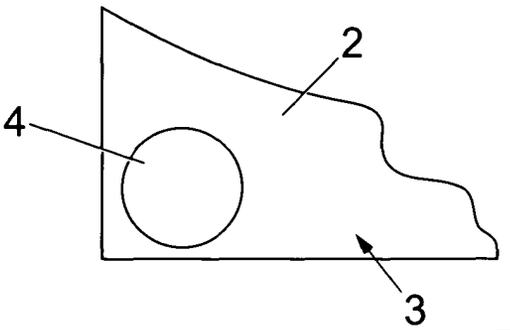

Fig. 2

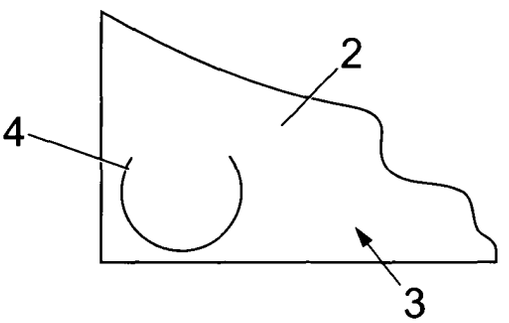

Fig. 3

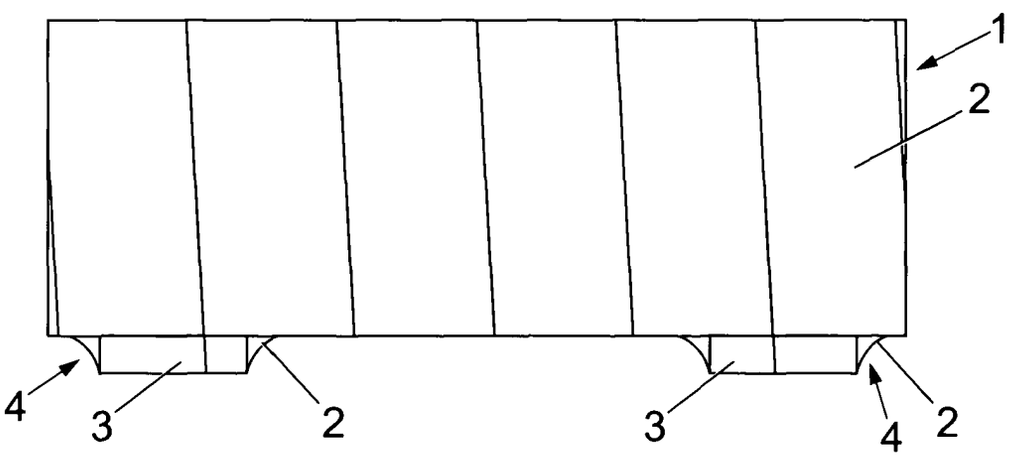

Fig. 4

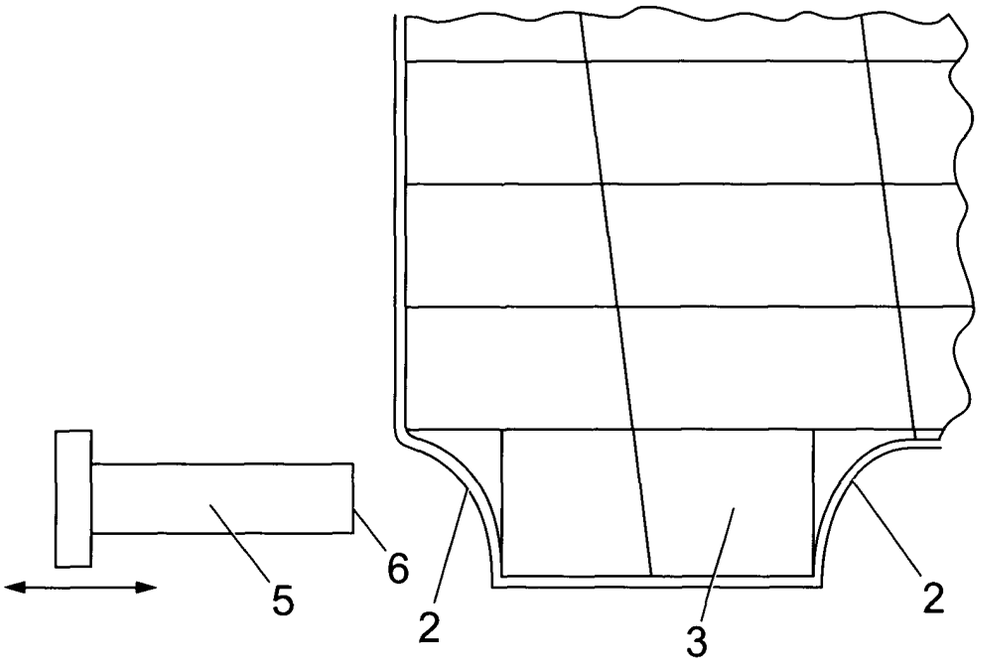

Fig. 5

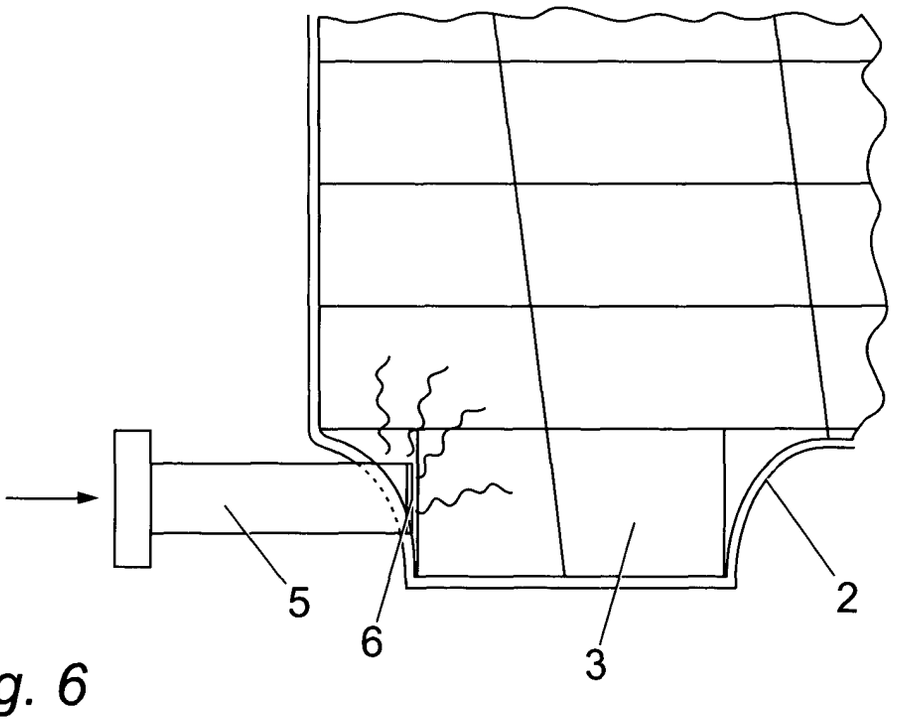

Fig. 6

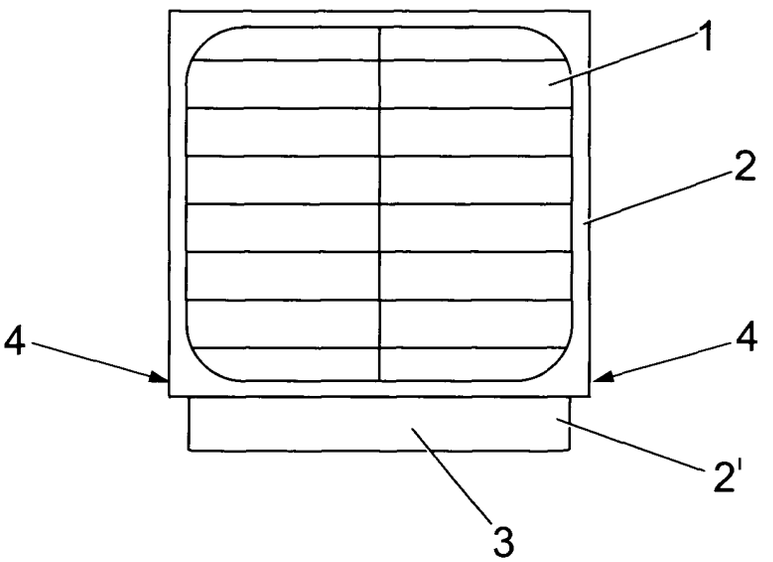

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 07 8605

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	EP 1 002 738 A (ROCKWOOL MINERALWOLLE) 24 May 2000 (2000-05-24) * the whole document *	1-3,12, 13,18	B65D71/06
A	DE 23 03 128 A (PLATMANUFAKTUR AB) 1 August 1974 (1974-08-01) * the whole document *	21	
A	EP 0 909 721 A (TIOZZO GOBETTO EUGENIO) 21 April 1999 (1999-04-21)		
A	EP 0 017 213 A (BASF AG) 15 October 1980 (1980-10-15)		
A	FR 2 161 527 A (APPLIC THERMIQUES) 6 July 1973 (1973-07-06)		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 February 2003	SERRANO GALARRAGA, J

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 07 8605

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-02-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1002738 A	24-05-2000	DE 19858201 A1	31-05-2000
		DE 19861057 A1	31-05-2000
		EP 1002738 A2	24-05-2000
		EP 1002739 A2	24-05-2000
DE 2303128 A	01-08-1974	DE 2303128 A1	01-08-1974
EP 0909721 A	21-04-1999	IT 1295487 B1	12-05-1999
		EP 0909721 A1	21-04-1999
EP 0017213 A	15-10-1980	DE 2914138 A1	09-10-1980
		DK 144980 A	08-10-1980
		EP 0017213 A1	15-10-1980
FR 2161527 A	06-07-1973	FR 2161527 A7	06-07-1973

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