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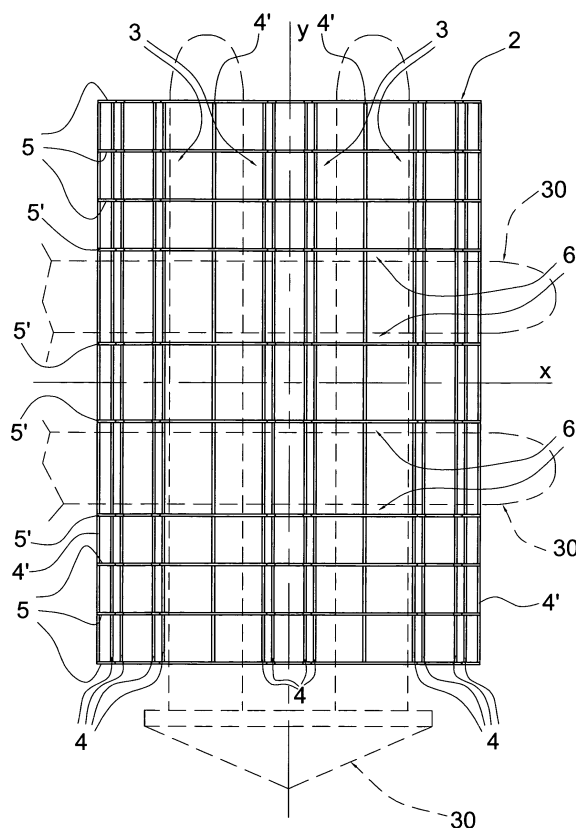
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(54) **A pallet and a process for manufacturing the pallet**

(57) A pallet comprises a structured element which on a side thereof defines a rest plane (A), while on another side thereof it defines at least two housings (3) which are suitable for receiving a lift fork. The structured element comprises a plastically-deformed metal net (2). The process for realising the pallet comprises the following stages: realisation of a flat metal net (2); plastic deformation of the flat metal net (2) in order to realise a structured element which on a side thereof defines a rest plane (A), while on another side thereof it defines at least two housings (3) which are suitable for receiving a lift fork.



**Fig.1**

## Description

**[0001]** Pallets, as is well-known, are constituted by an overall flat element having a rectangular plan, which on one side is a plane on which objects are placed and on the other side is a plane for resting the pallet on a surface. The flat element further comprises housings which are predisposed for receiving the prongs of a fork lift of a predetermined size. These housings are arranged to enable insertion of the fork lift below the pallet in two perpendicular directions.

**[0002]** The most widely used pallets are made of wood and comprise a rectangular frame to which a plurality of boards are fixed, which plurality of boards together defines the rest plane for objects. Wood is a rather expensive material which once worn out cannot be recycled - and is also expensive to discard. Also, wooden pallets, when not in use, are stacked in piles, one resting on top of another. The piles can get quite high and are indeed the sum of the heights of the individual pallets.

**[0003]** Other known-type pallets are made of plastic materials of various kinds, and exhibit more complex shapes which enable the pallets to be arranged in piles, but wherein the pallets at least partly insert one into another. This has the effect of reducing like-for-like height of pallet piles, but the materials used are rather expensive both to procure and to discard.

**[0004]** The main aim of the present invention is to provide a pallet and a process for making the pallet which overcomes the drawbacks in pallets of known type.

**[0005]** Further characteristics and advantages of the automatic store of the invention will better emerge from the detailed description made herein below with reference to the appended figures of the drawings, which are intended as non-limiting examples, and in which:

Figure 1 is a plan view of the pallet of the invention;  
Figure 2 is a front view of the pallet of figure 1.

**[0006]** With reference to the figures of the drawings, the pallet of the present invention comprises a structured element which on one side defines a rest plane A for resting objects, and on the other side defines at least two housing 3 suitable for receiving a one-size lift fork 30. The housings 3 are made of two parallel channels arranged below the rest plane A in which the prongs of a lift fork 30 can be inserted.

**[0007]** The structured element comprises a metal net 2 which is preferably made of Fe370 steel. The metal net 2 comprises a plurality of longitudinal elements 4, 4' parallel to a median longitudinal plane y of the metal net 2. The metal net 2 also includes a plurality of transversal elements 5, 5' associated to the longitudinal elements 4, 4', which transversal elements 5, 5' are parallel to a median transversal plane x of the metal net 2 perpendicular to the longitudinal plane y. The longitudinal elements 4, 4' are separated from one another by predefined distances and are connected, preferably by electro-welding, to

the transversal elements 5, 5'. The transversal elements 5, 5' are also arranged in such a way as to define at least two transversal corridors 6, parallel and symmetrical with respect to the median transversal plane x, suitable for receiving the prongs of a lift fork 30 of a single size. The longitudinal elements 4, 4' and the transversal elements 5, 5' are preferably made using a wire having a diameter of 5 or 6 mm.

**[0008]** The metal net 2 is conformed, preferably by plastic deformation, so that on a transversal plane parallel to the median transversal plane x, the metal net 2 exhibits a plurality of straight tracts 7, 7a, 8, which lie along two straight lines parallel to the medial transversal plane x and which are connected by inclined tracts 9 (figure 2). At least two straight tracts 7a are arranged symmetrically with respect to the median longitudinal plane y and delimit thereon, with the inclined tracts 9 to which they are connected, the housings 3 for the lift fork 30. Preferably all the straight tracts 7, 7a, 8 are arranged symmetrically with respect to the medial longitudinal plane y in such a way that the pallet is symmetrical with respect to the median longitudinal plane y. As can be seen in figure 2, a first part of the straight lines 7, 7a, defines the rest plane A of the pallet, while the remaining part of the straight lines 8 defines a lower rest plane B with which the pallet can rest on a surface. The upper rest plane A and the lower rest plane B are parallel to one another. Pallets made as illustrated in figures 1 and 2 can be piled in such a way that there is a partial penetration of one into another. The inclination of the inclined tracts 9 is about  $\pm 100^\circ$  with respect to the rest planes A and B, so that arranging or removing the pallets from the pile is made easier.

**[0009]** To obtain the above-described configuration of the metal net 2, the transversal elements 5, 5' are bent along bend lines parallel to the median longitudinal plane y and the longitudinal elements 4, 4'. As can be seen in figure 2, the plastic deformation of the metal net 2, which makes the pallet the described conformation, is concentrated in the transversal elements 5, 5', which are bent until they take on the shape illustrated in figure 2, in which the straight lines 7, 7a and 8 are arranged parallel along the rest planes A and B. The longitudinal elements 4, 4' maintain a straight configuration and at least a part thereof is arranged at the bend lines of the transversal elements 5, 5'. In the configuration illustrated in figures 1 and 2, the pallet of the present invention exhibits four housings for a lift fork 30; the housings 3, defined by plastic deformation of the metal net 2, and the corridors 6, defined by a predetermined arrangement of the transversal elements 5, 5'. The housings 3 are open in a downwards direction and are defined above by the straight tracts 7a and laterally by the inclined tracts 9 connected to the straight tracts 7a. The corridors 6 are open in downwards direction and are defined above by a tract of the longitudinal elements 4, 4' and laterally by two pairs of transversal elements 5'. In this way a lift fork 30 can lift the pallet by displacing either along a parallel direction

to the median longitudinal plane y, or along a parallel direction to the median transversal plane x.

**[0010]** Preferably longitudinal elements 4' are arranged at the end of the transversal elements 5, 5' and in an intermediate position with respect to the two straight tracts 7a arranged symmetrically with respect to the median longitudinal plane y in order to stiffen the metal net 2. In particular, the longitudinal elements 4' arranged in an intermediate position with respect to the straight lines 7a are made using 6 mm diameter wire in order to lend more rigidity to the pallet.

**[0011]** The pallet of the present invention can be made using the process described herein below.

**[0012]** The process comprises stages of realising a flat metal plane and plastic deformation of the flat metal plane in order to realise a structured element which on one side defines a rest plane A and on another side at least two housings 3 for receiving a lift fork. Preferably the stage of realising a metal net is done by electro-welding, but other methods could be used.

**[0013]** Advantageously the stage of making a flat metal net is performed by realising a continuous metal net which is subsequently cut into fractions of a determined length.

**[0014]** Preferably the stage of making a flat metal net is done by taking at least a plurality of longitudinal elements 4, parallel to a median longitudinal plane y of the metal net, and at least a plurality of transversal elements 5, 5', parallel to a median transversal plane x of the metal net itself. The transversal elements 5, 5' are arranged in such a way that at least two transversal corridors 6 are defined, symmetrical with respect to the median transversal plane x, suitable for receiving a lift fork 30 of a single size. The longitudinal elements 4 and the transversal elements 5, 5' are preferably electro-welded one to another.

**[0015]** It is important to note that the above-described stages and in general the realisation of the flat metal net can be obtained by the use of commonly-used continuous machines for production of electro-welded nets. These machines, which are quite widely-used and reliable, exhibit the considerable advantage of being rather highly productive at relatively contained costs.

**[0016]** Advantageously the stage of plastic deformation of the metal net is performed by pressing. As already illustrated with regard to the pallet of the invention, the plastic deformation stage of the metal net is performed in such a way as to define a configuration of the metal net in which, on a transversal plane parallel to the median transversal plane x, the metal net exhibits a plurality of straight tracts 7, 7a, 8 lying along two straight lines parallel to the median transversal line x and connected by inclined tracts 9. The stage of plastic deformation is performed in such a way that at least two straight tracts 7a are arranged symmetrically with respect to the median longitudinal plane y and delimit, with the inclined tracts 9 to which they are joined, the housings 3 for the lift fork 30. Preferably the stage of plastic deformation of the flat

metal net determines the folding of the transversal elements 5, 5' along a plurality of lines that are parallel to the median longitudinal plane y. In this way the forces necessary for obtaining the desired deformation of the metal net are relatively small, as it is sufficient that the forces cause the bending of the transversal elements 5, 5'. The stage of deformation of the metal net can be defined by press-forming, but in reality it is more a bending stage of the transversal elements 5, 5'. A similar pressing operation performed, for example, on a sheet of steel having mechanical characteristics that are comparable to those of the metal net 2, would require much stronger forces.

**[0017]** The pallet of the present invention and the process for realising the pallet offer important advantages. The pallet is notably economical in that the making of the metal net and the deformation thereof can be done in-line, using a high-speed continuous production process. Thanks to its conformation the pallet can be made of a metal material such as, for example, Fe370 steel, an easily recyclable material with zero costs for waste disposal. The pallet is also quite light and, thanks to its conformation, when empty can be arranged in stacks of a limited height.

## Claims

1. A process for manufacturing a pallet, comprising following stages:
  - realisation of a flat metal net (2);
  - plastic deformation of the flat metal net (2) in order to realise a structured element which on a side thereof defines a rest plane (A) and on another side thereof defines at least two housings (3) for receiving a lift fork (30).
2. The process of claim 1, wherein the realisation of the metal net (2) is achieved by electro-welding.
3. The process of claim 1 or 2, **characterised in that** the stage of realising a flat metal net (2) is achieved by realising a continuous metal net which is subsequently cut into tracts of pre-determined lengths.
4. The process of any one of the preceding claims, **characterised in that** the stage of realising a flat metal net is done by a continuous machine for realising electro-welded nets.
5. The process of any one of the preceding claims, **characterised in that** the stage of realising a flat metal net is obtained by providing at least a plurality of longitudinal elements (4, 4') which are parallel to a median longitudinal plane (y) of the metal net.
6. The process of any one of the preceding claims,

- characterised in that** the stage of realising a flat metal net is achieved by providing at least a plurality of transversal elements (5, 5') which are parallel to a median transversal plane (x) of the metal net, so that at least two transversal corridors (6) are defined, which at least two transversal corridors (6) are symmetrical with respect to the median transversal plane (x) and are suitable for receiving a lift fork (30).
7. The process of claim 1, **characterised in that** the stage of plastic deformation of the metal net is achieved by press-forming.
8. The process of claim 1, **characterised in that** the stage of plastic deformation of the metal net is performed in order to define a configuration of the metal net according to which, on a transversal plane parallel to the median transversal plane (x), the metal net exhibits a plurality of straight tracts (7, 7a, 8) which lie along two straight lines parallel to the median transversal plane (x) and which are connected to one another by inclined tracts (9).
9. The process of claim 8, **characterised in that** the stage of plastic deformation of the metal net is done in such a way that at least two straight tracts (7a) are arranged symmetrically with respect to the median longitudinal plane (y) and delimit, together with the inclined tracts (9) to which the at least two straight tracts (7a) are connected, the housings (3) suitable for receiving a lift fork (30).
10. The process of claim 8 or 9, **characterised in that** the straight tracts (7, 7a, 8) are arranged symmetrically with respect to the median longitudinal plane (y).
11. The process of any one of claims from 8 to 10, **characterised in that** the stage of plastic deformation of the flat metal net causes a bending of the transversal elements (5, 5') along a plurality of lines which are parallel to the median longitudinal plane (y).
12. A pallet, comprising a structured element which on a side thereof defines a rest plane (A) and on another side thereof defines at least two housings (3) suitable for receiving a lift fork (30), **characterised in that** the structured element comprises a metal net (2).
13. The pallet of claim 12, **characterised in that** the metal net comprises a plurality of longitudinal elements (4, 4') which are parallel to a median longitudinal plane (y) of the metal net (2).
14. The pallet of claim 12, **characterised in that** the metal net (2) comprises a plurality of transversal elements (5, 5') which are parallel to a median transversal plane (x) of the metal net (2), the transversal elements (5, 5') being arranged in such a way as to define at least two transversal corridors (6), parallel to one another and symmetrical to the median transversal plane (x), suitable for receiving a lift fork (30).
15. The pallet of claim 12, **characterised in that** the metal net (2) is conformed in such a way that on a transversal plane which is parallel to the median transversal plane (x), the metal net exhibits a plurality of straight tracts (7, 7a, 8) which lie along two straight lines that are parallel to the median transversal plane (x) and which are connected by inclined tracts (9).
16. The pallet of claim 15, **characterised in that** at least two straight tracts (7a) are arranged symmetrically with respect to the median longitudinal plane (y) and delimit, together with the inclined tracts to which they are connected, the housings (3) suitable for receiving a lift fork (30).
17. The pallet of claim 15 or 16, **characterised in that** the straight tracts (7, 7a, 8) are arranged symmetrically with respect to the median longitudinal plane (y).
18. The pallet of any one of claims from 15 to 17, **characterised in that** the transversal elements (5, 5') are bent along bend lines that are parallel to the median longitudinal plane (y) and to the longitudinal elements (4, 4') in order to obtain the configuration of the metal net (2).
19. The pallet of claim 18, **characterised in that** the longitudinal elements (4, 4') are arranged at the bend lines.
20. The pallet of claim 18, **characterised in that** the longitudinal elements (4, 4') are arranged at ends of the transversal elements (5, 5') and in an intermediate position with respect to the two straight tracts (7a) arranged symmetrically with respect to the median longitudinal plane (y).

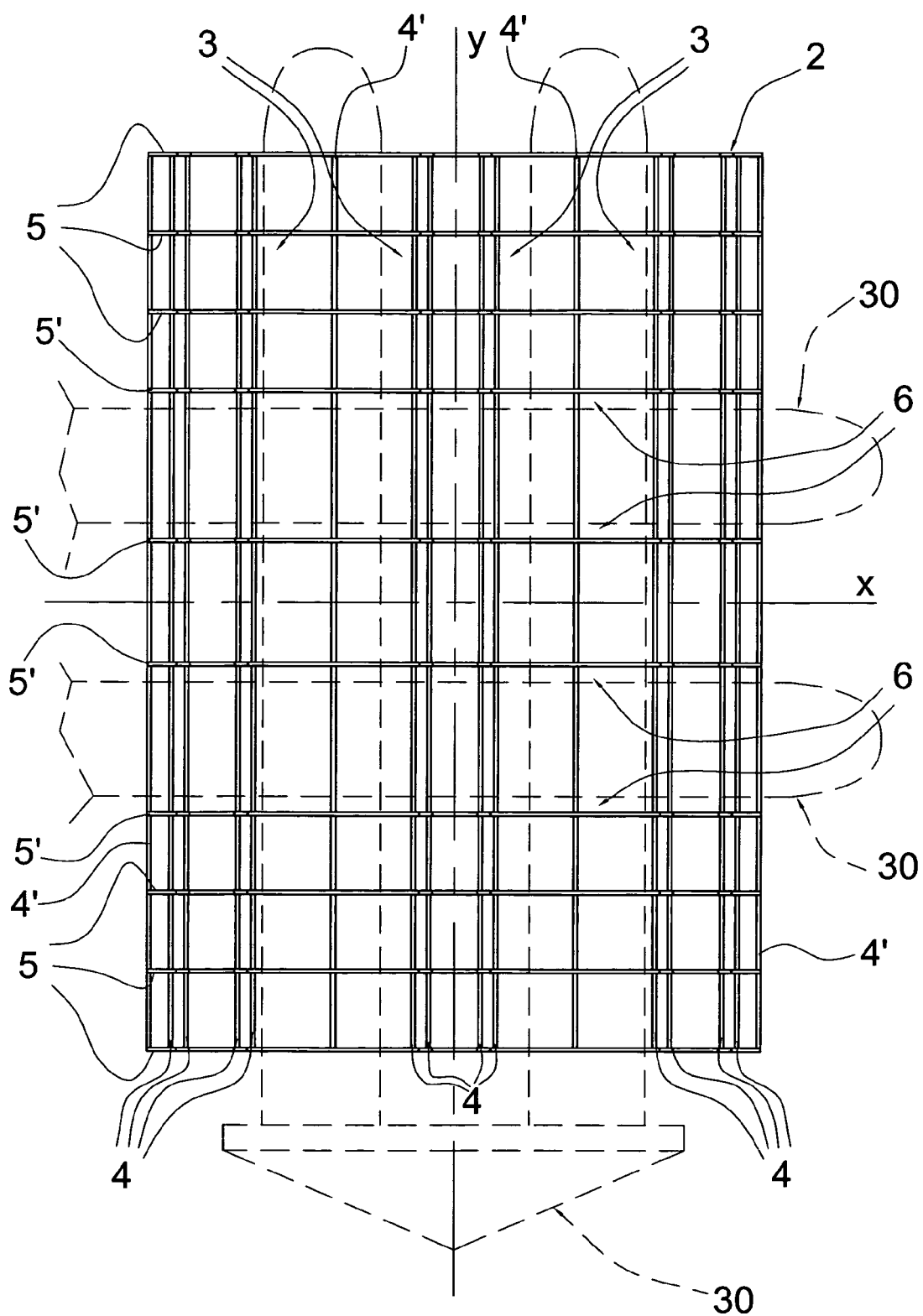


Fig.1

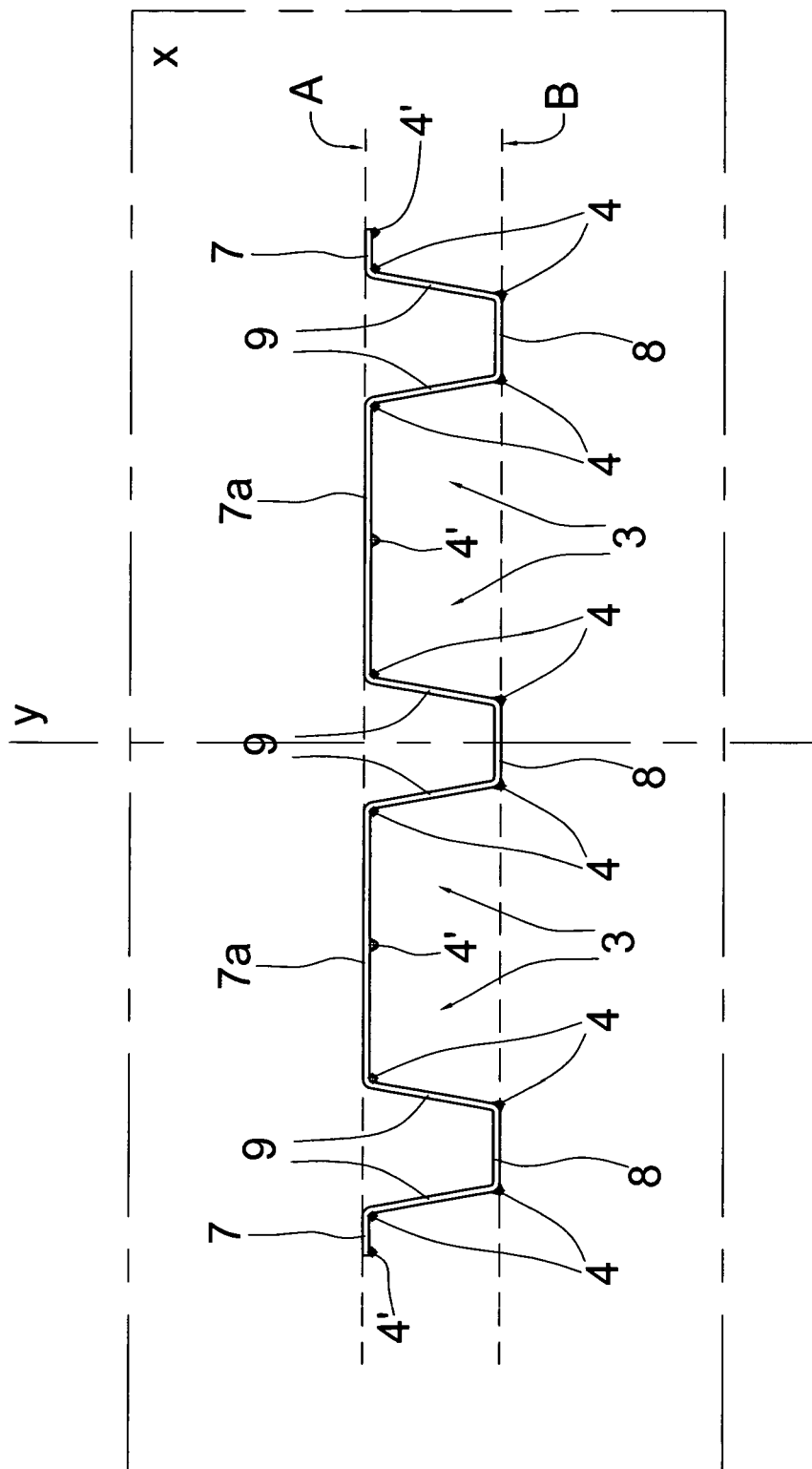


Fig.2



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 981 249 A (HERRMANN ET AL) 21 September 1976 (1976-09-21) * column 2, line 48 - column 5, line 3 * * figures 1-3,8 * -----	1,5-20	INV. B65D19/30
X	FR 2 180 496 A (TREFILUNION,FR) 30 November 1973 (1973-11-30) * page 2, line 14 - page 3, line 6 * * figures 1,2 * -----	1,5-7, 12-14	
X	AU 19553 67 A (MUURLINK M J F) 2 October 1969 (1969-10-02) * page 9 - page 12 * * figures 1-7 * -----	1,5-7, 12-14	
X	GB 1 587 993 A (DI PALMA E) 15 April 1981 (1981-04-15) * page 2, line 20 - line 66 * * claim 1; figures 1-3 * -----	1-7, 12-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D B21F
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>5 July 2006</b>	Examiner <b>Fitterer, J</b>
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 05 42 5717

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3981249	A	21-09-1976	NONE	
FR 2180496	A	30-11-1973	NONE	
AU 1955367	A	02-10-1969	NONE	
GB 1587993	A	15-04-1981	AU 516019 B2	14-05-1981
			AU 3623578 A	22-11-1979
			CH 622220 A5	31-03-1981
			FR 2391922 A1	22-12-1978
			IT 1107806 B	02-12-1985
			PT 68084 A	01-06-1978