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(54) Package for pourable food products

(57) A package (1, 11) for pourable food products, having a container (2, 12) made of multilayer laminated sheet material defined by at least a first chartaceous-base layer, and by a second layer of a first thermoplastic material. The package (1, 11) has a cover portion (6, 16) made entirely of a second thermoplastic material and having an opening device (4, 14). According to the invention, the second thermoplastic material is preferably polyethylene, and has from 0.001% to 0.005% by weight of carbon black, and from 1 to 3% by weight of a pigment defining the colour of the cover portion, which pigment is preferably titanium dioxide.

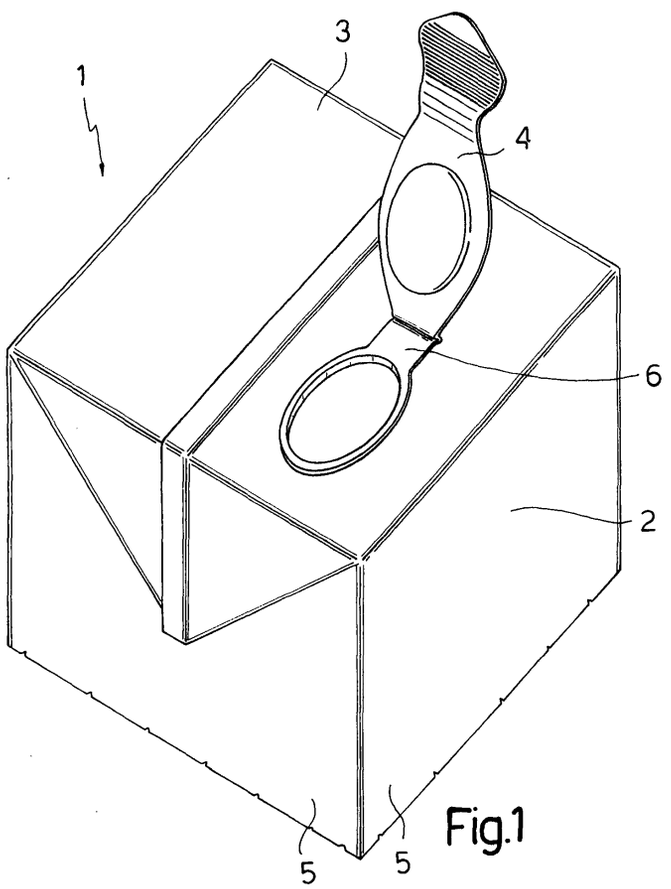

Fig.1

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Description

[0001] The present invention relates to a package for pourable food products.

[0002] As is known, many pourable food products, such as fruit juice, UHT (ultra-high-temperature processed) milk, wine, tomato sauce and others, are sold in packages made of sterilized packaging material.

[0003] A typical example of this type of package is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is produced by folding and sealing a web of laminated packaging material having a multilayer structure comprising a layer of fibrous material, e.g. paper, covered on both sides with layers of heat-seal plastic material, e.g. polyethylene.

[0004] The package is preferably used for aseptic packaging of long-storage products, such as UHT milk.

[0005] The packages are normally produced on fully automatic packaging machines, on which a continuous tube is formed from the web-fed packaging material; the web of packaging material is sterilized on the packaging machine, e.g. by applying a chemical sterilizing agent, such as a hydrogen peroxide solution, which, after sterilization, is removed, e.g. vapourized by heating, from the surfaces of the packaging material; and the web of packaging material so sterilized is kept in a closed, sterile environment and folded and sealed longitudinally to form a vertical tube.

[0006] The tube is filled with the sterilized or sterile-processed food product, and is sealed and cut at equally spaced cross sections to form pillow packs, which are then folded mechanically to form the finished, e.g. substantially parallelepiped-shaped, packages.

[0007] Alternatively, the packaging material may be cut into blanks, which are formed on forming spindles into packages, which are then filled with the food product and sealed. Examples of this type of package are the so-called "gable-top" package known by the trade name Tetra Rex (registered trademark), and the package with a top wall made entirely of thermoplastic material and known by the trade name Tetra Top®.

[0008] To open the above packages, various solutions have been proposed, such as fitting the packages with closable opening devices, which substantially comprise a frame defining an opening and applied over a hole or a pierceable or removable portion on a wall of the package, and a cap hinged to the frame. The cap is normally molded integrally with the frame, and is initially sealed to the frame, along a peripheral edge surrounding the opening, by a thin breakable annular connecting portion. Once unsealed, the cap is movable between a closed position, in which it cooperates hermetically with the frame, and an open position. Alternatively, threaded caps are also used, which are separate from and initially screwed to the frame.

[0009] One problem encountered with opening devices of the type described is that the cap must be detachable from the frame with practically no effort when unsealing the package. For which reason, opening devices of the above type are made of low-break-strength plastic material.

[0010] Opening devices are preferably white, which the consumer associates with product freshness, and which is believed to be particularly favoured in the case of products such as milk.

[0011] The opening device, for example, may be made entirely of one thermoplastic polymer material, preferably polyethylene, and more preferably low-density polyethylene or LDPE, and, to obtain a white opening device, a white pigment, preferably titanium dioxide (TiO_2), is added to the thermoplastic polymer material.

[0012] Alternatively, the opening device may be made of coloured material; in which case, a pigment of the desired colour, as opposed to the white pigment, is added to the thermoplastic polymer material.

[0013] The plastic materials from which white, but also coloured, opening devices are normally made, however, do not constitute a sufficient light barrier.

[0014] The absence of a light barrier has been found to result in alteration and deterioration of the pourable food products in the package, which in turn also alters the taste and smell of the products. For example, milk acquires a highly oxidized, metal taste.

[0015] Various materials from which to manufacture the opening device have been tested in an attempt to solve the problem. In particular, the average thickness of the opening device has been increased from 0.75 mm to 1 mm, but this only results in a 25% reduction in transmittance, i.e. the ratio between transmitted and incident light intensity (I_T/I_I) in a 300 to 800 nm wavelength range. Increasing the percentage by weight of the white pigment has also been tried, but results in a similar, i.e. insufficient, reduction in transmittance. Alternatively, attempts have also been made using a second coloured, in particular blue, pigment in addition to the white, but, in this case too, the results are poor in terms of reducing transmittance.

[0016] Adding carbon black to the plastic material has also been tried, but, though excellent results are obtained in terms of reducing transmittance, the resulting opening devices are of a grey/black colour, which, being associated by the consumer with dirt, is to be avoided at all costs in the packaging of food products. The same also applies to coloured opening devices, in which case, the addition of carbon black blackens and darkens the colour, resulting in an unpleasant shade which the consumer associates with deterioration of the cap and of the food product in the package.

[0017] The problem obviously also exists when the entire top wall of the package is made of thermoplastic material, as in the case of Tetra Top® packages.

[0018] It is an object of the present invention to provide a package for pourable food products, designed to eliminate the aforementioned drawbacks, and which, in particular, is made entirely of high-light-barrier material, and is of a colour agreeable to consumers.

[0019] According to the present invention, there is provided a package as claimed in Claim 1.

[0020] Further particularly advantageous embodiments are described in the dependent Claims.

[0021] A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a top side view in perspective of a portion of a first embodiment of a package in accordance with the present invention;

Figure 2 shows a top side view in perspective of a portion of a second embodiment of a package in accordance with the present invention;

Figure 3 shows a transmittance-wavelength graph relative to examples of opening devices for packages in accordance with the present invention.

[0022] A first preferred embodiment of the present invention is shown by way of example in Figure 1, in which number 1 indicates as a whole a package for pourable food products.

[0023] Package 1, known by the name of Tetra Brik Aseptic®, is defined by a parallelepiped-shaped container 2. Container 2 is defined by a number of walls 5, and is made from a multilayer laminated sheet material comprising a layer of chartaceous-base material, e.g. paper, to provide the necessary strength and light barrier and which is covered on both sides with layers of a first thermoplastic material, e.g. polyethylene, and preferably low-density polyethylene (so-called LDPE).

[0024] Package 1 has a top wall 3, to which a closable opening device 4 defining a cover portion 6 is applied either by conventional fastening systems, e.g. adhesive substances, or by microflame or laser heat-seal techniques. A closable opening device 4 defining a cover portion 6 may also be injection-molded directly onto top wall 3 (as described, for example, in the Applicant's European Patent n. 0949992).

[0025] Opening device 4 is made entirely of a second thermoplastic material, preferably polyethylene, and even more preferably low-density polyethylene (LDPE); and the second and first thermoplastic material are preferably the same, and preferably polyethylene, to achieve optimum heat sealing of opening device 4 to container 2, and so ensure an aseptic package 1.

[0026] The second thermoplastic material comprises from 1% to 3% by weight of a pigment defining the colour of opening device 4. The pigment is preferably a white pigment, and even more preferably titanium dioxide (TiO_2), of preferably 2% to 3% by weight.

[0027] A smaller quantity of added pigment does not produce opening devices of uniform white colour, whereas a larger quantity makes opening device 4 fragile.

[0028] According to the present invention, the second thermoplastic material also comprises from 0.001% to 0.005% by weight of carbon black.

[0029] Adding even extremely small quantities of carbon black surprisingly produces a thermoplastic material, and therefore opening device 4, with extremely low transmittance values and so constituting an excellent light barrier, and at the same time produces an opening device 4 of pleasing colour, e.g. ice-white.

[0030] An alternative embodiment of a package in accordance with the present invention is that known by the trade name Tetra Top® produced as described previously and shown in Figure 2. In this case, the package 11 comprises a parallelepiped-shaped container 12 defined by a number of walls 15; and a top wall 13 defining the whole of the cover portion 16 and including the opening device 14.

[0031] Cover portion 16 is made entirely of the second thermoplastic material, which, in this case too, is made as described previously.

[0032] Clearly, changes may be made to package 1, 11 as described and illustrated herein without, however, departing from the scope of the accompanying Claims.

[0033] For example, coloured pigments, as opposed to a white pigment, may be used to produce coloured opening devices 4, 14. In this case too, adding extremely small percentages of carbon black to the thermoplastic material prevents dulling or darkening of the colour of opening device 4, which is distasteful to consumers, but at the same time provides for achieving the necessary light barrier.

EXAMPLES 1-5

[0034] Tests were conducted on white opening devices for packages of milk. The opening devices or caps tested are known by the trade name Flexicap®, are normally made of 97.5% by weight LDPE, and comprise 2.5% by weight titanium dioxide.

[0035] Varying percentages of carbon black were added to the above opening devices to determine the transmittance, and hence light barrier, and colour obtainable.

[0036] The carbon black was added by premixing it with the LDPE and TiO_2, and the resulting mixture fed directly to a single injection unit to form the opening device. Premixing advantageously provides for a homogenous mixture and therefore uniform opening devices. Alternatively, a masterbatch of LDPE, TiO_2 and carbon black (Printex F alpha®) can be used and added to the polymer.

[0037] The materials listed in Table 1 were prepared and used to form Flexicap® opening devices of 0.75 mm average thickness.

Table 1

	Polymer	Coloured pigment	Carbon black
1	LDPE 98 %	TiO_2 2 %	None
2	LDPE 98 %	TiO_2 2 %	0,001 %
3	LDPE 98 %	TiO_2 2 %	0,002 %
4	LDPE 98 %	TiO_2 2 %	0,003 %
5	LDPE 98 %	TiO_2 2 %	0,005 %
6	LDPE 97 %	TiO_2 3 %	0,002 %

[0038] Tetra Brik® packages were then produced using the above opening devices.

[0039] The devices in Table 1 were transmittance tested using a CINTRA 20 UV-visible spectrometer, and over a wavelength range of 300 to 800 nm. The results are shown in Figure 3, in which each line corresponds to the testing of one specimen in Table 1. As can be seen, whereas the reference specimen 1 containing no carbon black gives a transmittance of 8% to 16% in the visible and close to UV wavelengths, specimens 2-6 containing a percentage of carbon black in accordance with the present invention have a very low transmittance, and at any rate much lower than reference specimen 1.

[0040] All the opening devices tested are ice-white. The addition, however, of even as little as 0.01% by weight of carbon black to the thermoplastic material has been found to make the opening device grey.

Claims

1. A package (1, 11) for pourable food products, comprising a container (2, 12) made of multilayer laminated sheet material; said sheet material being defined by at least a first chartaceous-base layer, and by a second layer of a first thermoplastic material; and said package (1, 11) comprising a cover portion (6, 16) made entirely of a second thermoplastic material; **characterized in that** said second thermoplastic material comprises from 0.001% to 0.005% by weight of carbon black, and from 1 to 3% of a pigment defining the colour of said cover portion.

2. A package as claimed in Claim 1, **characterized by** being defined by a number of walls (5, 15), and by comprising an opening device (4, 14) applied to one of said walls; said cover portion (16) comprising said opening device (14).

3. A package as claimed in Claim 2, **characterized in that** said cover portion (16) is defined by a wall (13) of said package (11).

4. A package as claimed in Claim 2, **characterized in that** said cover portion (6) is defined by said opening device (4).

5. A package as claimed in any one of the foregoing Claims, **characterized in that** said second thermoplastic material comprises from 2 to 3% by weight of said pigment.

6. A package as claimed in any one of the foregoing Claims, **characterized in that** said pigment is titanium dioxide (TiO_2).

7. A package as claimed in any one of the foregoing Claims, **characterized in that** said second thermoplastic material is polyethylene.

8. A package as claimed in Claim 7, **characterized in that** said polyethylene is LDPE.

9. A package as claimed in any one of the foregoing Claims, **characterized in that** said first and said second thermoplastic material are the same.

10. A package as claimed in any one of the foregoing Claims, **characterized in that** said first and said second thermoplastic material are defined by polyethylene.

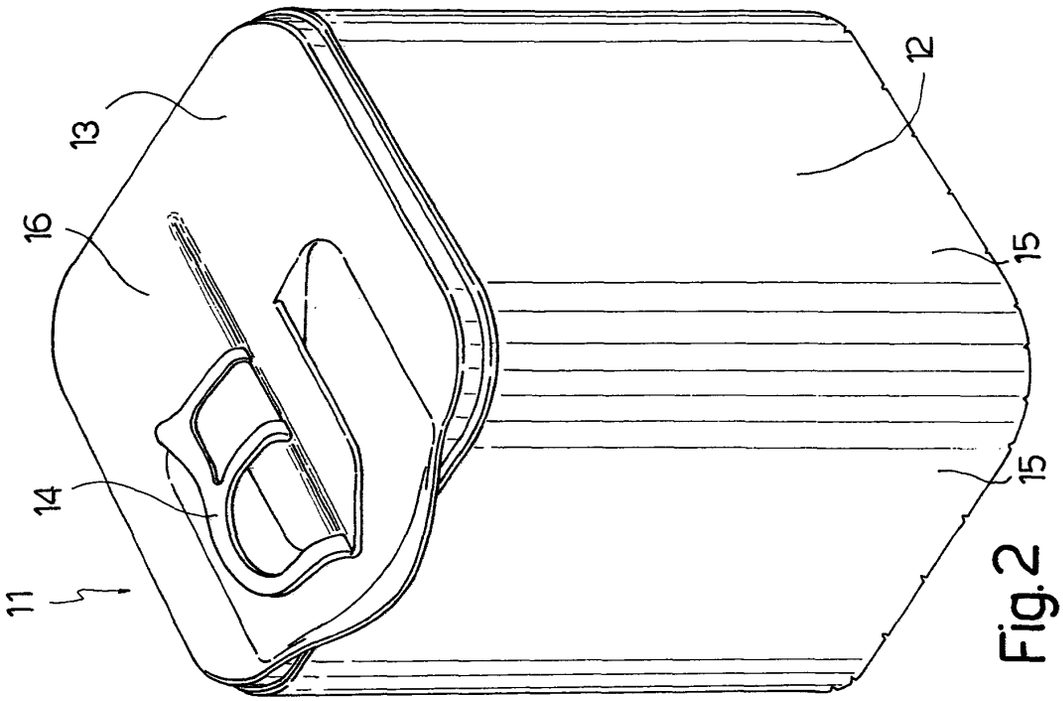

Fig.2

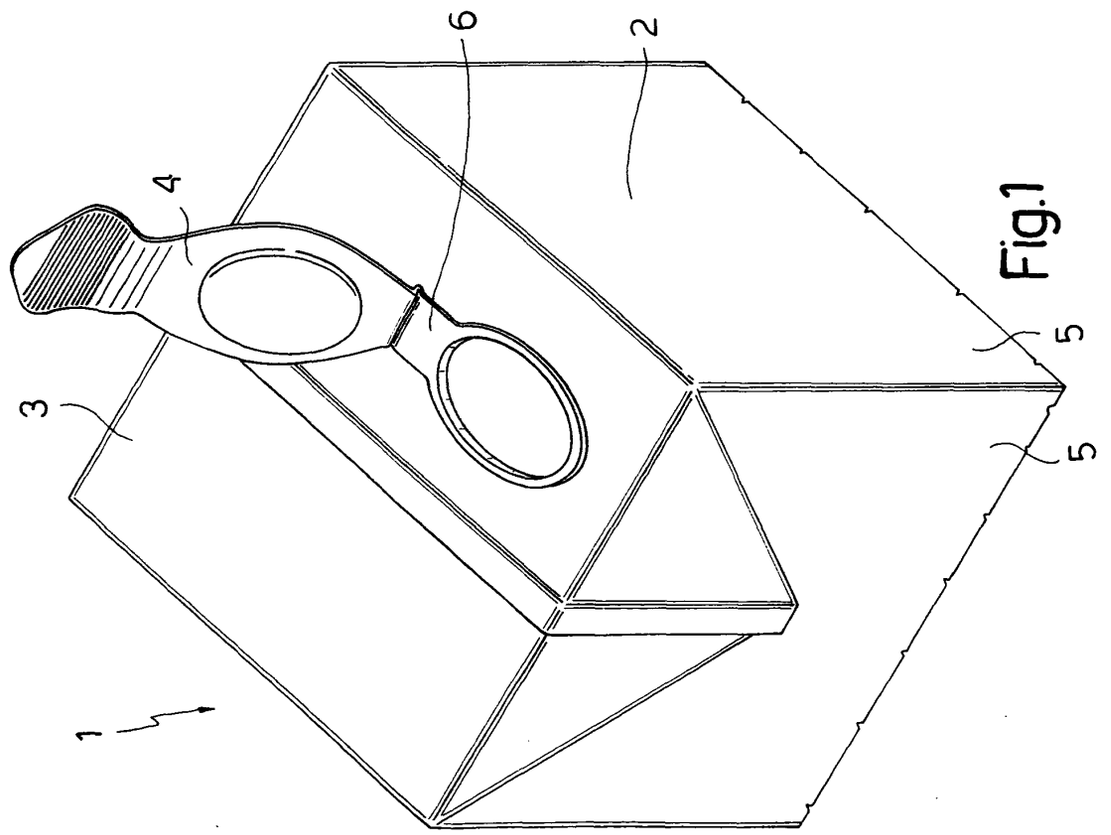

Fig.1

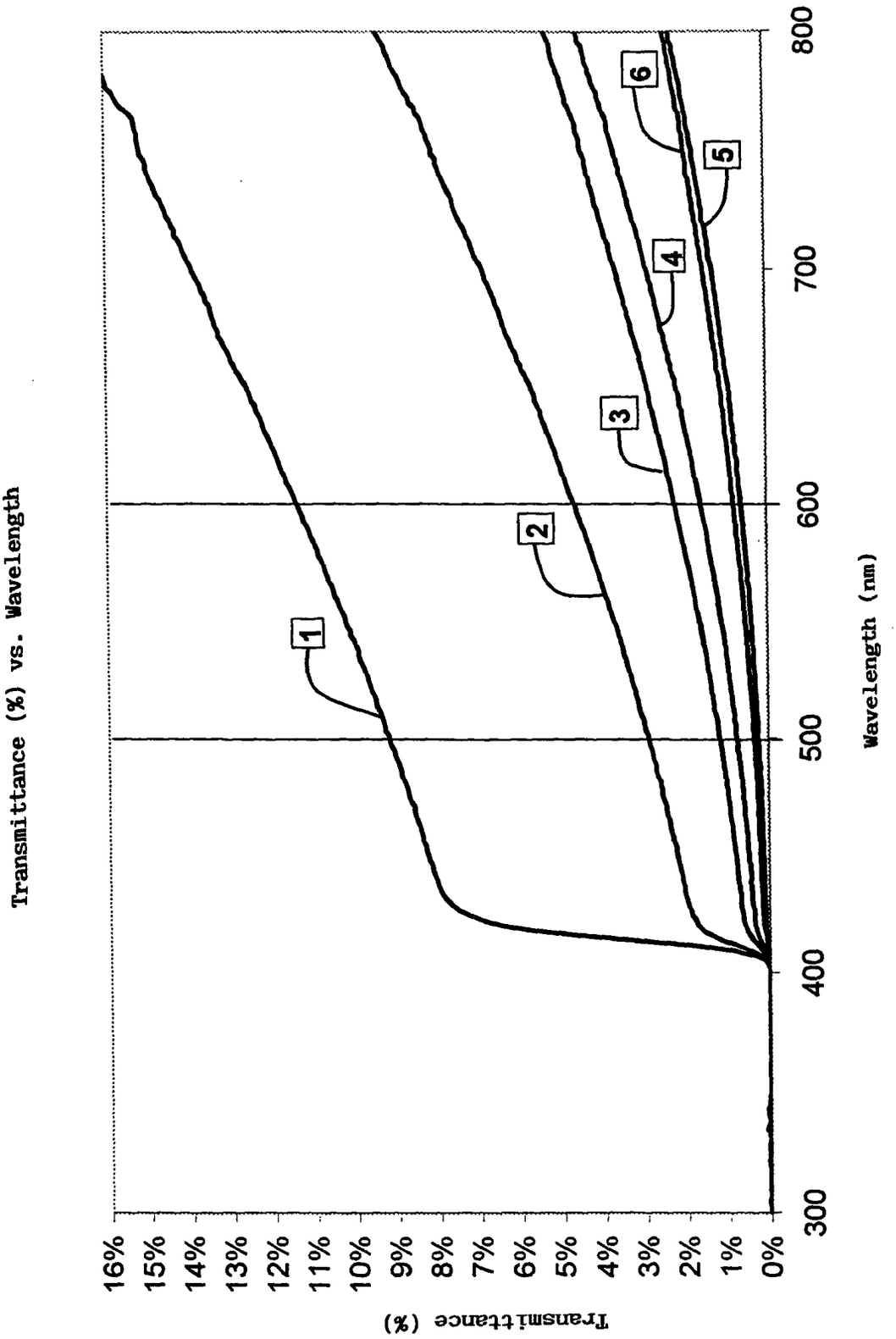
Transmittance (%) vs. Wavelength
Transmittance (%)
16%
15%
14%
13%
12%
11%
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
300
400
500
600
700
800
Wavelength (nm)
1
2
3
4
5
6

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5425

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)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	19 November 2003	Bevilacqua, V

CATEGORY OF CITED DOCUMENTS

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