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Remarks:

Amended claims in accordance with Rule 86 (2) EPC.

(54) **Method for embossing a container body at a precise position**

(57) A method for embossing a container body (40) at a precise position includes the steps of: (a) providing a first reference mark (41) on a tubular wall of the container body (40); (b) rotating the container body (40) until the first reference mark (41) reaches a predetermined first angular position; (c) vertically moving the container body (40) to an embossing region (20) where the container body (40) is sleeved around an inner die assembly (21), and where an outer die assembly (22) is disposed outwardly of the container body (40); (d) placing the inner and outer die assemblies (21,22) at a position operative for embossing the container body (40); (e) embossing a pattern (43) on the container body (40) at a position (42) which is predetermined relative to the position of the first reference mark (41) through the inner and outer die assemblies (21,22); and (f) stopping at least one of the inner and outer die assemblies (21,22) at a predetermined second angular position.

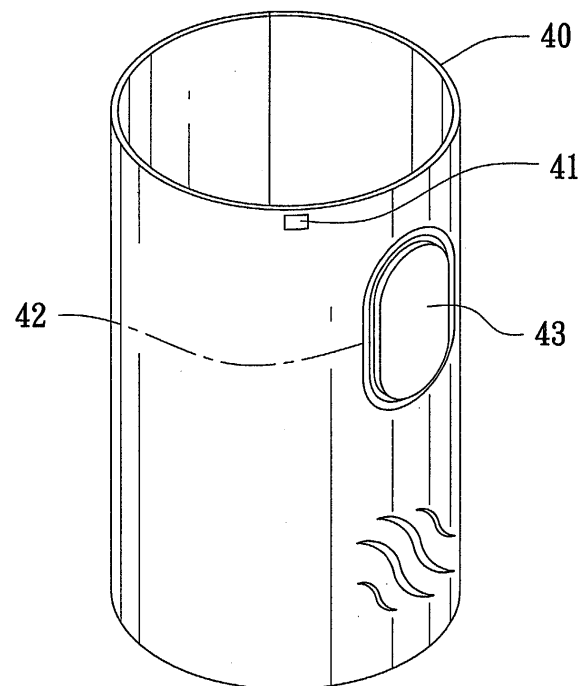


FIG. 5

Description

[0001] The invention relates to a method for embossing a container body, more particularly to a method for embossing a container body at a precise position.

[0002] Referring to Figure 1, a conventional method for embossing a container body 1 includes the steps of:

- 1) providing a blank of the container body 1:

A sheet of a predetermined size is cut from a substrate (for example, a tin plate), and is rolled and welded so as to form a blank having a welding line 4.

- 2) embossing:

The blank is moved to an embossing region where the blank is sleeved around an inner die assembly, and where an outer die assembly is disposed outwardly of the blank. The inner and outer die assemblies are then moved toward each other, and are rotated using a transmission mechanism so as to emboss the blank, thereby forming the container body 1 with a recess pattern 2 and/or a protrusion pattern 3.

- 3) removing:

The inner and outer die assemblies are separated from each other, and the container body 1 formed with the recess pattern 2 and/or the protrusion pattern 3 is removed from the inner die assembly.

[0003] Although the container body 1 formed with the recess pattern 2 and/or the protrusion pattern 3 can be made by the aforesaid conventional method, the conventional method can not emboss the pattern at a precise position of the container body 1.

[0004] The object of the present invention is to provide a method for embossing a container body at a precise position.

[0005] Accordingly, a method for embossing a container body at a precise position of this invention includes the steps of:

- (a) providing a first reference mark on a tubular wall of the container body;
- (b) rotating the container body until the first reference mark reaches a predetermined first angular position;
- (c) vertically moving the container body to an embossing region where the container body is sleeved around an inner die assembly, and where an outer die assembly is disposed outwardly of the container body;
- (d) placing the inner and outer die assemblies at a position operative for embossing the container body;

(e) embossing a pattern on the container body at a position which is predetermined relative to the position of the first reference mark through the inner and outer die assemblies; and

(f) stopping at least one of the inner and outer die assemblies at a predetermined second angular position.

[0006] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

Figure 1 is a perspective view of a container body made by a conventional embossing method;
Figure 2 is a flow diagram of the preferred embodiment of a method for embossing a container body according to this invention;
Figure 3 is a schematic view showing an apparatus for conducting the method;
Figure 4 is a perspective view of a container body used in the preferred embodiment; and
Figure 5 is a perspective view of a container body having patterns embossed at precise positions according to the preferred embodiment.

[0007] Referring to Figures 2, 3, 4 and 5, the preferred embodiment of the method for embossing a container body at a precise position according to this invention includes the following steps:

A) providing a container body 40 having a first reference mark 41:

[0008] A substrate, such as a tin plate, undergoes monochrome or color printing, and is cut to form a sheet of a predetermined size. The sheet is rolled and welded to form a container body 40. The container body 40 as formed has a first reference mark 41 and a forming area 42 on a tubular wall thereof. The first reference mark 41 can be a rectangular mark or any other suitable mark which is recognizable. The forming area 42 maybe provided with printed pattern if desired. The container body 40 is held vertically on a platform 10. In this preferred embodiment, the container body 40 is held on the platform 10 using a magnetic mechanism.

B) rotating the container body 40:

[0009] The container body 40 on the platform 10 is rotated relative to the platform 10 until the first reference mark 41 reaches a predetermined first angular position. The rotation of the container body 40 is driven by a first servo-motor 12. A first sensor 11 mounted on the platform 10 is used to detect the predetermined first angular position of the first reference mark 41. In the preferred embodiment, the first sensor 11 is a photoelectric sensor, and is associated with control software to control the first

servo-motor 12. The data of the relative distance between the first reference mark 41 and the forming area 42 to be embossed is stored in the first sensor 11.

C) vertically moving the container body 40:

[0010] The platform 10 is moved vertically so as to move the container body 40 to an embossing region 20 where the container body 40 is sleeved around an inner die assembly 21, and where an outer die assembly 22 is disposed outwardly of the container body 40. The inner and outer die assemblies 21,22 are provided with inner and outer embossing portions (not shown), respectively, which are aligned with the forming area 42 of the container body 40 in this step. One of the inner and outer embossing portions is a recess portion, whereas the other of the inner and outer embossing portions is a protrusion portion corresponding to the recess portion. The inner die assembly 21 is additionally provided with a second reference mark (not shown), and is driven by a second servo-motor 13. The inner and outer die assemblies 21,22 can be rotated simultaneously by a transmission belt 14. In the preferred embodiment, the second sensor 23 is a photoelectric sensor, and is associated with another control software to control the second servo-motor 13. The data of the relative distance between the first reference mark 41 and the forming area 42 to be embossed is stored in the second sensor 23.

[0011] It should be noted herein that the aforesaid steps B) and C) can be performed sequentially or simultaneously.

D) placing the inner and outer die assemblies 21,22 at a position operative for embossing:

[0012] The inner and outer die assemblies 21,22 are placed at a position operative for embossing the container body 40. The displacement of the inner die assembly 21 relative to the outer die assembly 22 can occur after a repeated operation of the method of this invention. The displacement can be detected using the second sensor 23 to detect the second reference mark so as to permit placing of the inner and outer die assemblies 21,22 at the position operative for embossing the container body 40 prior to embossing.

E) embossing:

[0013] The inner and outer die assemblies 21,22 are moved toward each other. The container body 40 is embossed with a pattern 43 (best shown in Figure 5) at a position (i.e., forming area 42) which is predetermined relative to the position of the first reference mark 41 through the inner and outer die assemblies 21,22. During the embossing, the inner die assembly 21 is rotated by the second servo-motor 13, and the outer die assembly 22 is rotated simultaneously through the transmission belt 14.

F) Stop embossing:

[0014] The inner die assembly 21 is rotated until the second reference mark on the inner die assembly 21 reaches a predetermined second angular position as detected by the second sensor 23 so as to stop the embossing.

G) Removing the container body 40:

[0015] The inner and outer die assemblies 21,22 are separated from each other, and the platform 10 is moved away from the embossing region 20 so as to remove the container body 40 formed with the pattern 43 at the forming area 42 away from the platform 10.

Claims

1. A method for embossing a container body (40) at a precise position, **characterized by** the steps of:
 - (a) providing a first reference mark (41) on a tubular wall of the container body (40) ;
 - (b) rotating the container body (40) until the first reference mark (41) reaches a predetermined first angular position;
 - (c) vertically moving the container body (40) to an embossing region (20) where the container body (40) is sleeved around an inner die assembly (21), and where an outer die assembly (22) is disposed outwardly of the container body (40);
 - (d) placing the inner and outer die assemblies (21, 22) at a position operative for embossing the container body (40) ;
 - (e) embossing a pattern (43) on the container body (40) at a position (42) which is predetermined relative to the position of the first reference mark (41) through the inner and outer die assemblies (21,22); and
 - (f) stopping at least one of the inner and outer die assemblies (21,22) at a predetermined second angular position.
2. The method as claimed in Claim 1, **characterized in that** a first sensor (11) is used to detect the predetermined first angular position of the first reference mark (41) in the step (b).
3. The method as claimed in Claim 1, **characterized in that** the step (f) includes providing a second reference mark on the inner die assembly (21), using a second sensor (23) to detect the second reference mark, and rotating the inner die assembly (21) until the second reference mark reaches the predetermined second angular position as detected by the second sensor (23).

4. The method as claimed in Claim 2, further characterized in that the step (b) includes placing the container body (40) and the first sensor (11) on a platform (10), and rotating the container body (40) relative to the platform (10) through a servo-motor (12), and that the step (c) includes moving vertically the platform (10). 5
5. The method as claimed in Claim 3, further **characterized in that** the inner die assembly (21) is rotated by a servo-motor (13) in the step (e). 10

the container body (40) and the first sensor (11) on a platform (10), and rotating the container body (40) relative to the platform (10) through a servo-motor (12), and that the step (c) includes moving the platform (10) vertically.

5. A method as claimed in any one of claims 1 to 4, further **characterised in that** the inner die assembly (21) is rotated by a servo-motor (13) in the step (e).

Amended claims in accordance with Rule 86(2) EPC.

1. A method for embossing a container body (40) at a precise position,
characterised by the steps of :

- (a) providing a first reference mark (41) on a tubular wall of the container body (40); 20
- (b) rotating the container body (40) until the first reference mark (41) reaches a predetermined first angular position;
- (c) vertically moving the container body (40) to an embossing region (20) where the container body (40) is sleeved around an inner die assembly (21), and where an outer die assembly (22) is disposed outwardly of the container body (40); 25
- (d) placing the inner and outer die assemblies (21, 22) at a position operative for embossing the container body (40); 30
- (e) embossing a pattern (43) on the container body (40) at a position (42) which is predetermined relative to the position of the first reference mark (41) through the inner and outer die assemblies (21, 22); and 35
- (f) stopping at least one of the inner and outer die assemblies (21, 22) at a predetermined second angular position; wherein 40
- the step (f) includes providing a second reference mark on the inner die assembly (21), and rotating the inner die assembly (21) until the second reference mark reaches the predetermined second angular position as detected by the second sensor (23). 45

2. A method as claimed in claim 1, **characterised in that** a first sensor (11) is used to detect the predetermined first angular position of the first reference mark (41) in the step (b). 50

3. A method as claimed in claim 1 or claim 2, **characterised in that** a second sensor (23) is used to detect the second reference mark. 55

4. A method as claimed in claim 2 or claim 3, further **characterised in that** the step (b) includes placing

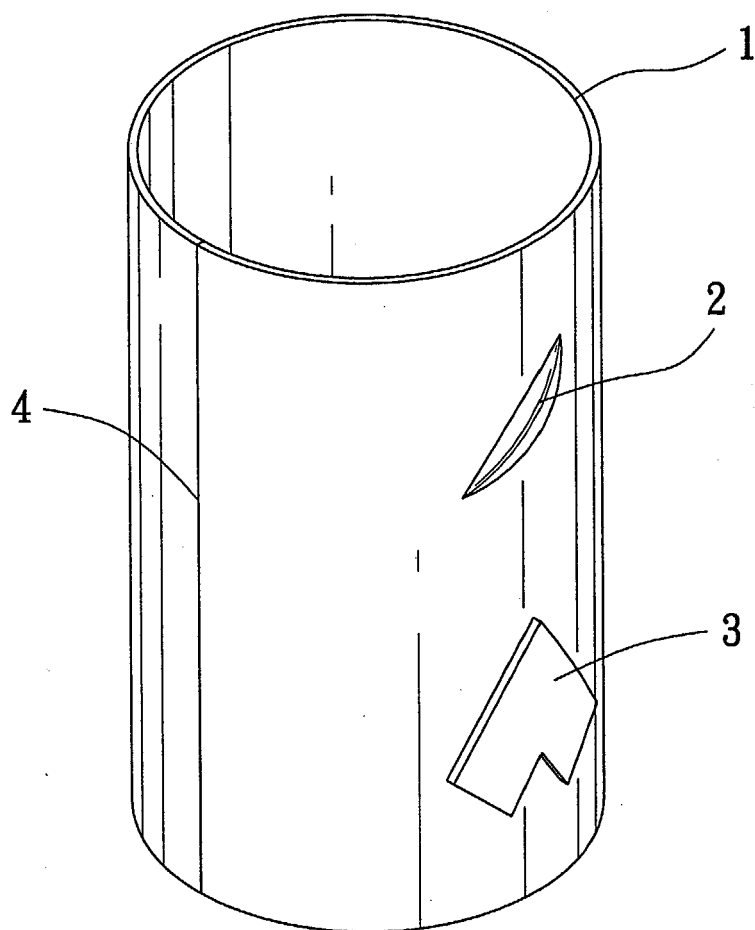


FIG. 1
PRIOR ART

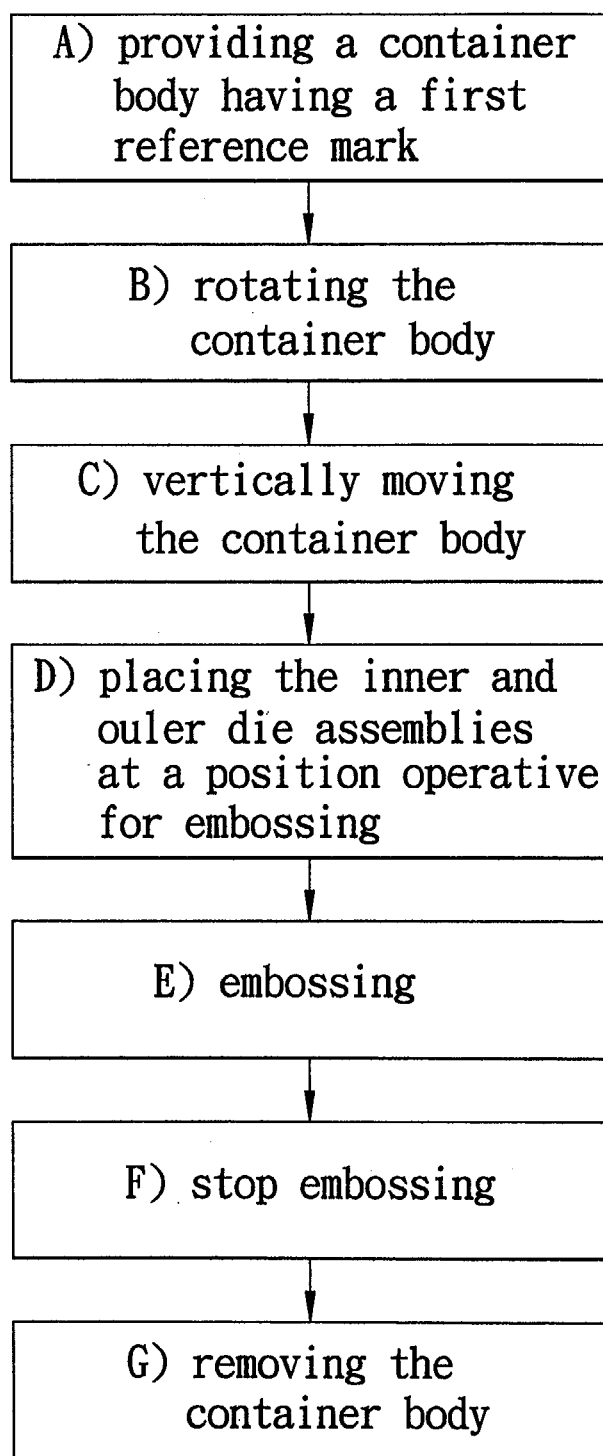


FIG. 2

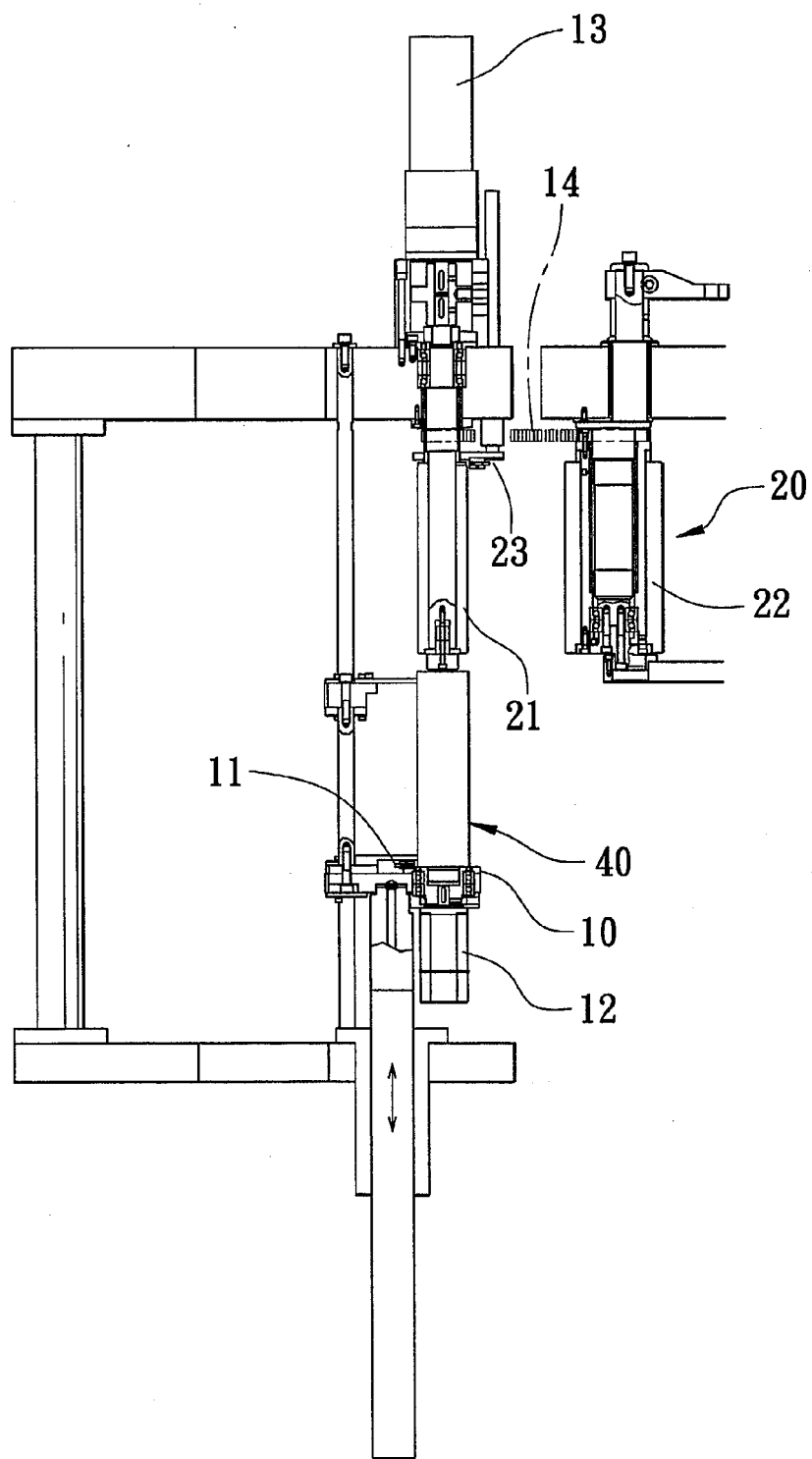


FIG. 3

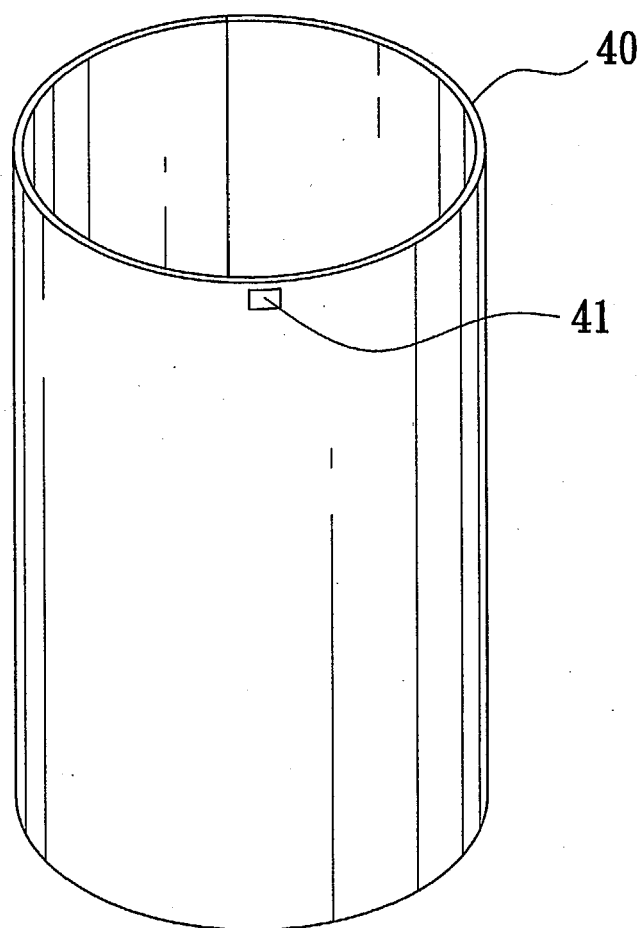


FIG. 4

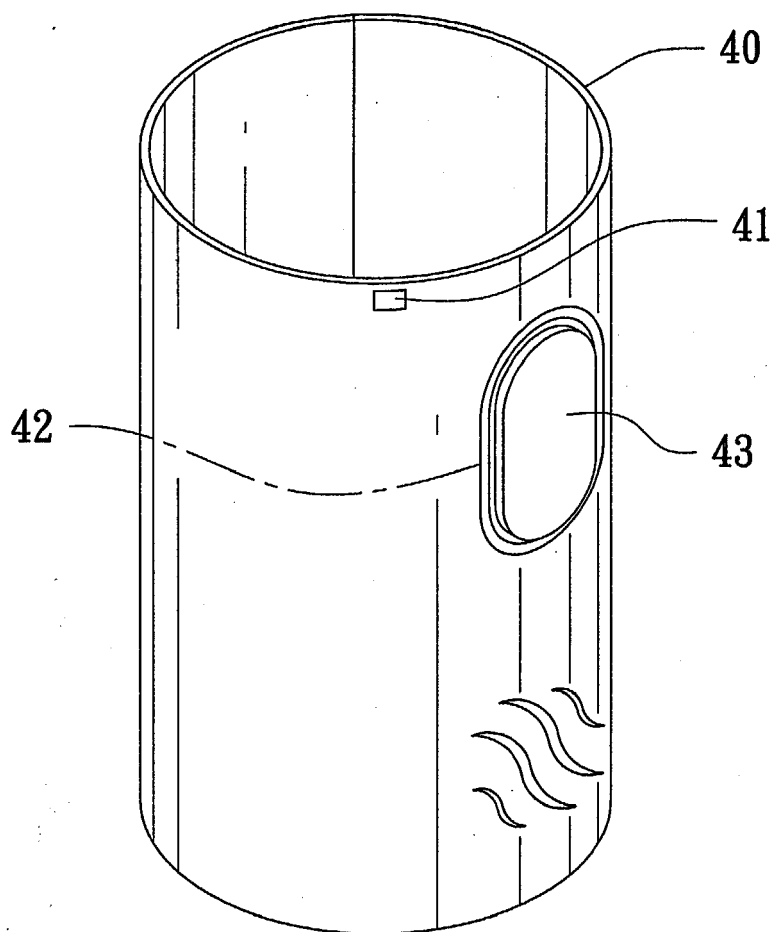


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 04 25 7642

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search		Date of completion of the search	Examiner
The Hague		26 May 2005	Gerard, O
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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EP 04 25 7642

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