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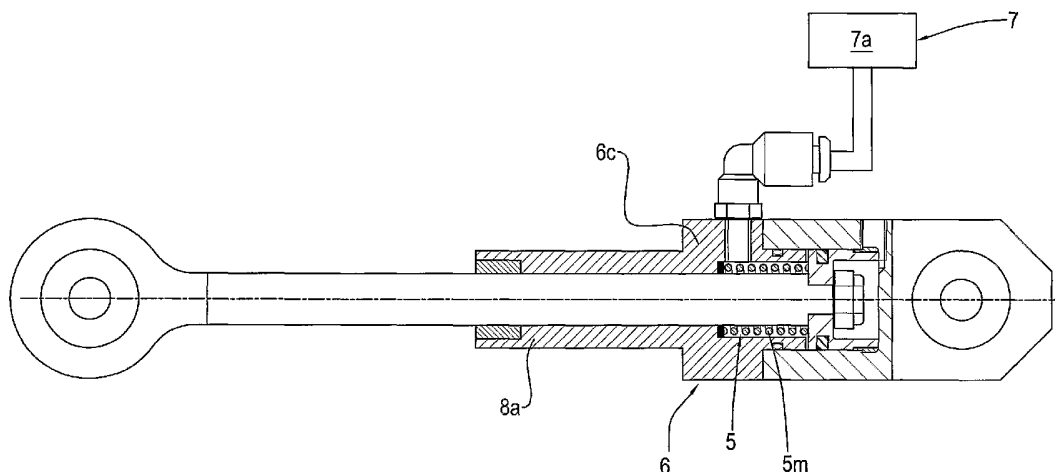
(43) International Publication Date
27 January 2005 (27.01.2005)

PCT

(10) International Publication Number
WO 2005/007513 A1

- (51) International Patent Classification⁷: **B65B 29/04**, B31F 5/00
- (21) International Application Number: PCT/IB2004/002363
- (22) International Filing Date: 15 July 2004 (15.07.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 03425488.8 21 July 2003 (21.07.2003) EP
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A DEVICE FOR SEALING LENGTHS OF FILTER PAPER



(57) Abstract: A device for sealing filter bags for products for infusion, where each filter bag is made from a flat web (1) of filter paper and has applied to it a tag (1b) and a tie string (1a) connecting the tag (1b) to the filter bag itself, comprises at least: a sealing sonotrode element (3) positioned so that it faces a first path (P) along which the flat web (1) is fed and so as to seal the string (1a), which is arranged according to a defined pattern, and the tags (1b) to each other and to the flat web (1) of filter paper; drive means (4) for imparting to the sealing sonotrode means (3) a defined motion towards and away from a sealing position; the drive means (4) in turn comprising first means (5) acted upon by the sealing sonotrode element (3) and designed to apply a predetermined force (F) to the sealing sonotrode element (3) itself; second means (6) for opposing the action of the first means (5), that is to say, for reducing its intensity, and third control means (7) for disabling the second means (6), during predetermined steps of passing the filter bag components under the sealing sonotrode element (3), so as to permit a predetermined sealing contact.

WO 2005/007513 A1

DescriptionA device for sealing lengths of filter paperTechnical Field

The present invention relates to a device for improving the control of sealing quality on lengths of filter paper.

We refer in particular to the sealing process performed in
5 machines for making filter bags containing a product for infusion
such as tea, camomile and the like.

Background Art

In such machines, the open end of the filter bag must be
10 sealed (after the product has been filled into the bag): sealing
can be accomplished by any of several known methods, for example,
using a staple or the string that joins the filter bag to the tag
(by knotting the length of string itself or another piece of
string) or by sealing the overlaid portions of the web of filter
15 paper.

In the case of sealing, operations may be carried out by
traditional sealing means with heating elements or, as in the
solutions of the latest generation, by ultrasound devices that use
sonotrodes placed in contact with the product to be sealed.

20 In practice, the sonotrode is the transducer element that
converts the power supply into vibrations that are discharged onto
the product to be sealed.

For example, one solution for this type of machine is
disclosed in patent application BO2002A000798 by the same
25 Applicant as the present.

In that solution, the apparatus for making filter bags for
infusion products is equipped with a revolving conveyor drum
driven by a first drive shaft to feed a web of filter paper along
a path on which there are positioned: a station for feeding the
30 filter paper web; a station for feeding a succession of tags; a
station for feeding tie string connecting the filter bags to the
respective tags; a station for arranging the tie string according
to a defined pattern; and a plurality of sealers facing the feed

path and designed to attach the tie string and the tags to the filter paper web. The sealers, which are sonotrodes, perform a defined movement between a sealing position and a waiting position, and this movement, which is performed simultaneously and synchronously by all the sealers, is imparted, through a transmission element shared by all the sealers, by a second cam drive shaft connected to the same source of motion to which the first shaft that drives the conveyor drum is connected.

In other words, the sonotrode is placed in a preferred position relative to the underlying part over which filter paper web moves, this preferred position depending on the inherent properties of the paper itself, on the speed at which it is fed and on the thickness of the components to be sealed (filter paper, tie string and tag) placed one over the other.

The Applicant has found that the relative position between the emitting surface of the sonotrode and the product supporting surface constitutes a fundamental variable for good sealing quality.

In practice, the constancy of sealing quality is directly proportional also to the force of the contact (besides contact time and the frequency of sonotrode activation) between the sonotrode and the product supporting surface, which means that the thrust force applied must be as constant as possible. This is not always easy to achieve since the components to be sealed (described above) are not always exactly the same in thickness and their total thickness varies within quite a wide range: as a result, the pressure applied to the products that move into the sealing area (under the sonotrode) tends to vary from one product to the other, thus leading to irregular sealing quality.

The present invention therefore has for an object to overcome the above mentioned drawback through a device that enables the sealer sonotrode to apply a substantially constant contact force on the product to be sealed, the application of the force being synchronised with the presence of the product in the sealing area.

Disclosure of the invention

According to the invention, this object is achieved by a device for sealing filter bags for products for infusion comprising at least: a sealing sonotrode element positioned so that it faces a first path along which the flat web is fed and so as to seal the string, which is arranged according to a defined pattern, and the tags to each other and to the flat web of filter paper; drive means for imparting to the sealing sonotrode means a defined motion towards and away from a sealing position; the drive means in turn comprising first means acted upon by the sealing sonotrode element and designed to apply a predetermined force to the sonotrode sealing element itself; second means for opposing the action of the first means, that is to say, for reducing its intensity, and third control means for disabling the second means, during predetermined steps of passing the filter bag components under the sealing sonotrode element, so as to permit a predetermined sealing contact.

Description of the drawings

The technical characteristics of the invention, with reference to the above aims, are clearly described in the claims below and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred embodiment of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

Figure 1 is a partial side view, with some parts cut away to better illustrate others, of an apparatus for making filter bags for products for infusion equipped with the sealing device according to the present invention for wrapping groups of products with film;

Figures 2 and 3 are, respectively, a side view and a front view, with some parts in cross section to better illustrate others, of a detail H of the device of Figure 1.

Detailed description of the preferred embodiments of the invention

With reference to the accompanying drawings, in particular Figure 1, the device according to the invention is used to seal filter bags for products for infusion.

By way of example, each filter bag is made from a flat web 1 of filter paper (shown by the dashed line in Figure 1) and has applied to it a tag and a tie string connecting the tag to the filter bag itself.

The device, denoted in its entirety by the numeral 2, may form part of a more complex machine for making the entire filter bags and filling them with product. Machines of this kind are very well known and will not be described here since they are described in detail in prior art, such as, for example, in patent application BO2002A000798 by the same Applicant as the present.

The device 2 essentially comprises:

- 15 - a sealer sonotrode 3 positioned so that it faces a first path P along which the flat web 1 is fed (see arrow P in Figure 1) and so as to seal the string 1a, which is arranged according to a defined pattern, and the tags 1b to each other and to the flat web 1 of filter paper;
- 20 - drive means 4 for imparting to the sealer sonotrode 3 a defined motion towards and away from a sealing position.

As also illustrated in Figures 2 and 3, the drive means 4 comprise:

- 25 - first means 5 acted upon by the sealer sonotrode 3 and designed to apply a predetermined force F to the sealer sonotrode 3 itself (as indicated by the corresponding arrow in Figure 1);
- second means 6 for opposing the action of the first means 5, that is to say, for reducing its intensity;
- 30 - third control means 7 for disabling the second means 6 during predetermined steps of passing the filter bag components under the sealing sonotrode element 3, so as to permit a predetermined sealing contact.

More specifically, in a preferred embodiment, the means 4 for driving the sealer sonotrode 3 may comprise a four-point linkage 8 driven by cam means 9 (partially illustrated in Figure 1) designed to move the working end of the sealer sonotrode 3 along a respective second closed path C comprising a sealing

section S that substantially coincides with the first path P, and a return section R extending outside the first path P.

In this specific case, the first and second means 5 and 6 define a part of the four-point linkage 8.

5 Looking in more detail (again with reference to Figures 2 and 3), the first means 5 may consist of elastic means comprising a helical spring 5m positioned on one of the arms 8a of the four-point linkage 8.

10 The second means 6 may consist of a pneumatic cylinder 6c (for example, of the single acting type) defining the arm 8a of the four-point linkage 8 linked at one end to the sonotrode sealer 3 and at the other to the cam means 9.

15 The cylinder 6 houses the helical spring 5m defining the first means 5 in such a way as to interact with the spring when the sealer sonotrode 3 moves along the aforementioned sections of its path.

20 The aforementioned third control means 7 may comprise a unit 7a for charging and discharging fluid under pressure (for example air) into and out of the pneumatic cylinder 6c in such a way as to vary the intensity of the force F applied to the sealer sonotrode 3 according to the section of the second path C the sealer sonotrode 3 is moving along.

25 In other words, the air is discharged from the cylinder 6c (so that only the load F of the spring 5m, with a slight spring overtravel, is applied) when the sealer sonotrode 3 is moving along the sealing section S whilst the cylinder 6c is charged with air during the idle, return section R of the path.

30 It will be understood that the invention can be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A device for sealing filter bags for products for infusion; each filter bag being made from a flat web (1) of filter paper and having applied to it a tag and a tie string connecting the tag to the filter bag itself; the device (2) comprising at least:
- 5 - one sealer sonotrode (3) positioned so that it faces a first path (P) along which the flat web (1) is fed so as to seal the string (1a), which is arranged according to a defined pattern, and the tags (1b) to each other and to the flat web (1) of filter paper;
- 10 - drive means (4) for imparting to the sealer sonotrode (3) a defined motion towards and away from a sealing position, the device being characterised in that the drive means (4) comprise:
- first means (5) acted upon by the sealer sonotrode (3) and designed to apply a predetermined force (F) to the sealer sonotrode (3) itself;
- 15 - second means (6) for opposing the action of the first means (5), that is to say, for reducing its intensity;
- third control means (7) for disabling the second means (6) during predetermined steps of passing the filter bag components under the sealing sonotrode element (3), so as to permit a predetermined sealing contact.
- 20
2. The device according to claim 1, where the means (4) for driving the sealer sonotrode (3) comprise a four-point linkage (8) driven by cam means (9) designed to move the working end of the sealer sonotrode (3) along a respective second closed path (C) comprising a sealing section (S) that substantially coincides with the first path (P), and a return section (R) extending outside the first path (P), the device being characterised in that the first and second means (5, 6) define a part of the four-point linkage
- 25 (8).
- 30
3. The device according to claims 1 and 2, characterised in that the first means (5) are elastic means.
4. The device according to claims 2 and 3, characterised in that the elastic means (5) comprise a helical spring (5m) positioned on
- 35 one of the arms (8a) of the four-point linkage (8).

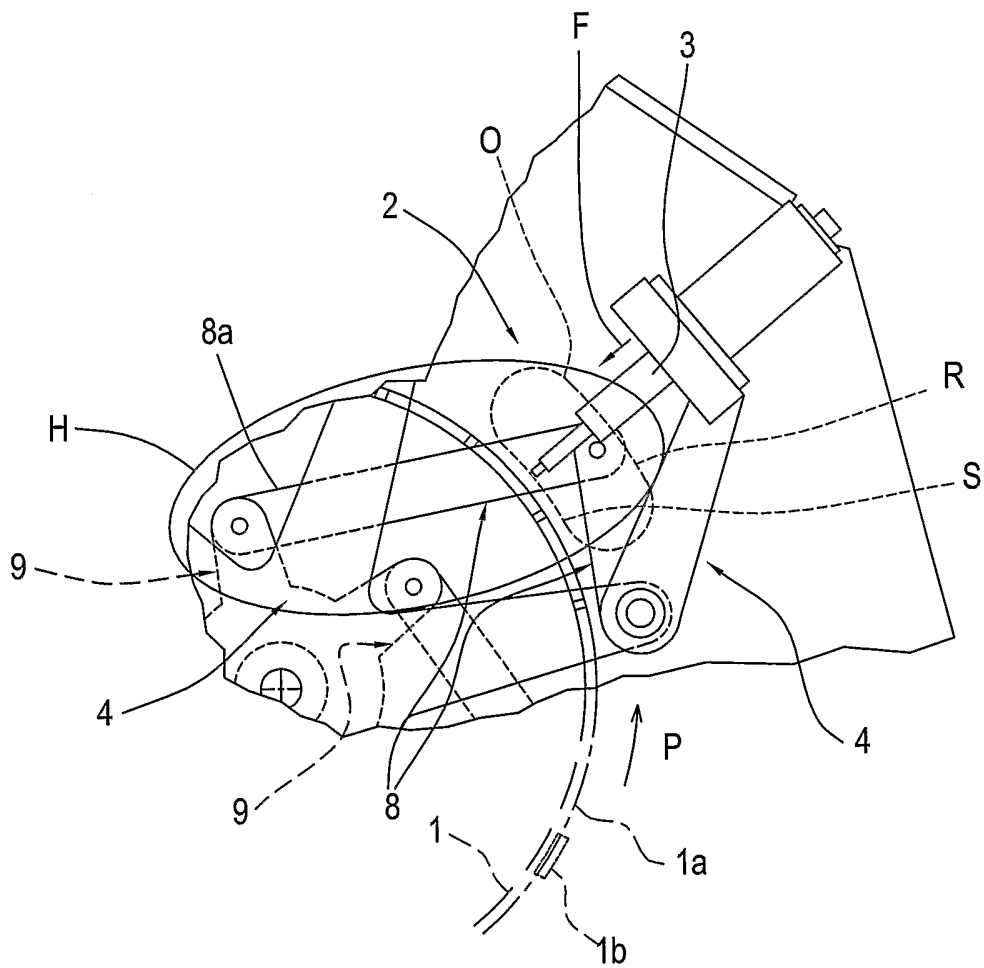
5 5. The device according to claims 1 and 2, characterised in that the second means (6) consist of a pneumatic cylinder (6c) defining one of the arms (8a) of the four-point linkage (8) linked at one end to the sonotrode sealer (3) and at the other to the cam means (9).

10 6. The device according to claims 1 and 2, characterised in that the second means (6) consist of a pneumatic cylinder (6c) defining one of the arms (8a) of the four-point linkage (8) linked at one end to the sonotrode sealer (3) and at the other to the cam means (9); the cylinder (6) housing the first means (5) consisting of a helical spring (5m).

15 7. The device according to claims 1, 2 and 6, characterised in that the third control means (7) comprise a unit (7a) for charging and discharging a fluid under pressure into and out of the pneumatic cylinder (6c) in such a way as to vary the intensity of the force (F) applied to the sealer sonotrode (3) according to the section of the second path (C) the sealer sonotrode (3) is moving along.

1/2

FIG.1



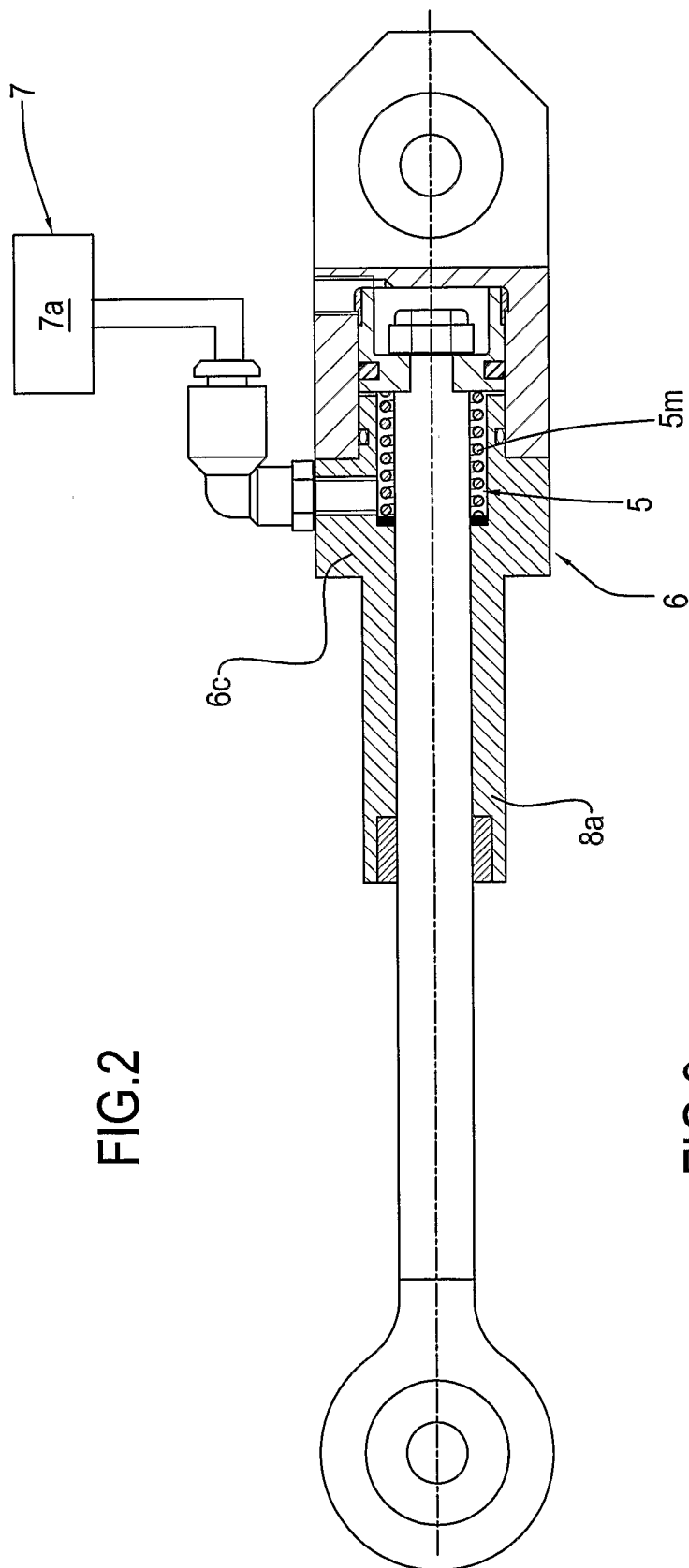


FIG. 2

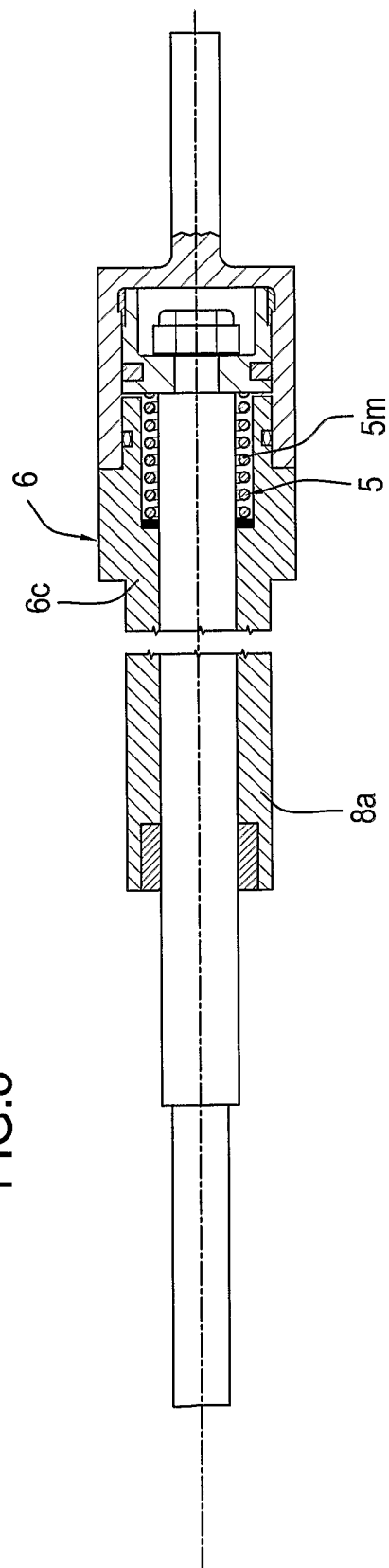


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2004/002363

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B65B29/04 B31F5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 B65B B29C B31F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 05, 30 May 1997 (1997-05-30) -& JP 09 024907 A (FUSO SANGYO KK), 28 January 1997 (1997-01-28) abstract; figures 1,2 paragraphs '0013!-'0015! ---	1, 3
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

27 September 2004

Date of mailing of the international search report

11/10/2004

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2004/002363

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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Information on patent family members

International Application No

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