

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



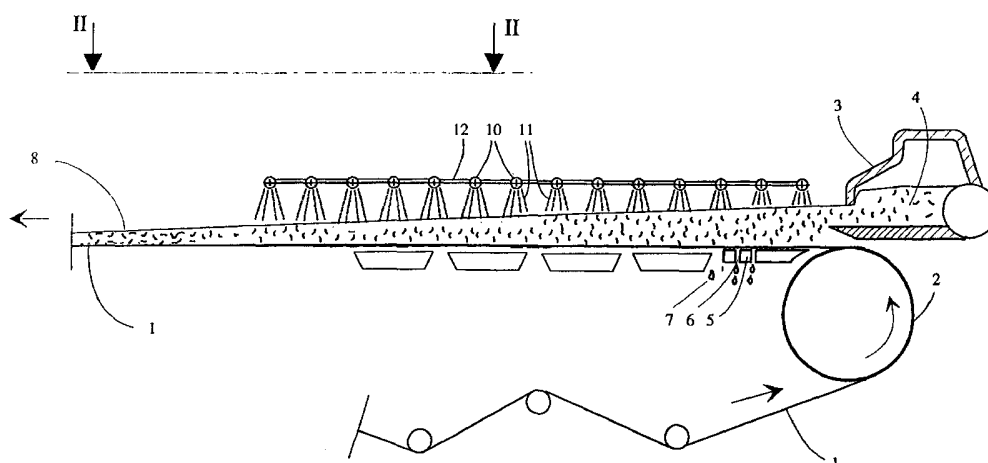
(43) International Publication Date
13 February 2003 (13.02.2003)

PCT

(10) International Publication Number
WO 03/012201 A1

- (51) International Patent Classification⁷: **D21H 23/50**, 23/00, 23/78, 17/28
- (21) International Application Number: PCT/FI02/00651
- (22) International Filing Date: 2 August 2002 (02.08.2002)
- (25) Filing Language: Finnish
- (26) Publication Language: English
- (30) Priority Data:
20011602 3 August 2001 (03.08.2001) FI
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, 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, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
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- 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: METHOD AND APPARATUS FOR THE DOSAGE OF BINDING AGENT



(57) Abstract: The invention relates to a method and an apparatus for the dosage of a binding agent. The invention relates to the manufacture of core board in particular, wherein fibres are bound together by supplying a slurry containing a binding agent, such as starch to the suspension, which has been fed onto the wire, or to the web being formed. According to the invention, the binding agent slurry is fed from feeding units installed above the wire (1), such as jet pipes (10), which are arranged sequentially at different points in the direction of travel of the wire. The jet pipes (10) can be separately adjustable, and they can be used to feed the binding agent throughout the couching of fibres onto the wire to provide an even distribution of binding agent in the direction of thickness.

WO 03/012201 A1

Method and apparatus for the dosage of binding agent

The object of the invention is a method for the dosage of a binding agent, comprising feeding a fibre suspension onto a moving wire, removing liquid from the suspension by sucking through the wire to form on the wire a web containing fibres, and supplying a slurry containing the binding agent to the suspension on the wire or to the web that is being formed to bind the fibres in the web together. Furthermore, the invention is directed at an apparatus for applying the method in question.

The method according to the description above is used when manufacturing core board by means of a Fourdrinier machine, tubular cores being further manufactured from the core board by binding and twisting them in a spiral manner to be used as cores of paper rolls, among others. Recyclable fibre is mainly used as the raw material of the core board, and mechanically defibrated chemical wood suspension can be used as an addition. The web is formed from the fibre suspension that is fed from the head box onto the machine wire, the fibres of the suspension being couched on the wire, while water exits through the openings of the wire under the effect of a sucking action. The fibres are bound to each other by means of the binding agent, whereby the bonding defines the strength of the board thus created in the direction of thickness (the z direction).

In the present manufacturing process of core board, bonding of fibres takes places by feeding slurry containing the binding agent into the web formed on the wire from a feeding box placed above the wire, from where the slurry is drained onto the web travelling under the box. A problem with the method is that different types of core board are made by means of the machines, the weight of which can vary within 150 to 600 g/m², and the density of the fibre suspension and the speed of the wire vary for different grades of board. Therefore, the location of the feeding box of slurry is seldom optimal with respect to an even distribution of the binding agent. For lighter boards, part of the binding agent is flushed through the wire before a sufficient amount of web for retaining the binding agent has been couched on the wire, whereas for thicker boards, the binding agent is concentrated in a certain layer of the board, depending on the location of the feeding box. In practice, as the strength of the board is defined in accordance with its weakest point, the unevenness of the distribution ends in an overdose of the binding agent.

The purpose of this invention is to provide a solution, which can be used to improve the dosage of the binding agent to the web that is couched onto the wire so that an even distribution of the binding agent in the direction of thickness is accomplished,

independent of the weight of the board to be manufactured and, respectively, of the density of the fibre suspension and the speed of the wire, an overdose of the binding agent is avoided, and wasting the binding agent along with water exiting the web is prevented. The invention is characterized in that the slurry containing the binding agent is fed from feeding units installed above the wire, the units being arranged sequentially at different points in the direction of travel of the wire.

Thus, the invention makes it possible to feed the binding agent gradually, continuing throughout the couching of the fibres to form a web on the wire. In that case, the fibres bind the binding agent similarly to the deposition of the web, resulting in an even binding agent concentration throughout the thickness of the wire.

A binding agent suitable for the invention can be a native starch, which is generally used for forming the bonds of core board. The starch is not made swell in advance, and forming the bonds requires starting the web formation; in other words, there should be couched fibres on the wire in order for the starch to bind.

Alternatively, carboxy-methyl cellulose or cationic starch can be used as the binding agent. On the other hand, a positively charged binding agent is capable of adhering to negative fibres so that the bonding of the binding agent is not dependent on the start-up of couching.

The concentration of starch in the binding agent slurry varies within 0.5-3%. The content of binding agent in the slurry can preferably be used as a controlled variable, which is varied in accordance with the weight of the board to be manufactured or with other changes in the conditions of the process. In that case, the flow of the binding agent slurry led to the feeding units can be kept constant.

It is appropriate for a steady feed of binding agent that the feeding units of the slurry are located at even intervals in the direction of travel of the wire. The feeding units of slurry can be formed from feeding beams transversal to the direction of travel of the wire, such as jet pipes, which distribute the slurry essentially evenly throughout the width of the web thus formed. Each feeding unit of slurry can preferably be adjusted separately so that, for example, one or more units can be closed, when necessary, for a case-specific fine adjustment of the binding agent feeding.

The apparatus according to the invention for the formation of web by means of the method described above comprises, as elements known per se, a moving endless wire, a head box for feeding fibre suspension onto the wire, and a means for bringing slurry containing an additive to the suspension on the wire or to the web formed from the fibres onto the wire. According to the invention, the apparatus is characterized in that the feeding units of slurry are installed above the wire, being arranged

sequentially at different points in the direction of travel of the wire. The feeding units of slurry are preferably feeding beams located at even intervals in the direction of travel of the wire, transversal to the direction in question, which can be used to distribute the slurry evenly throughout the couching area of the web thus formed.

In the following, the invention is described in detail with the aid of an example and with reference to the appended drawings, in which

Fig. 1 shows the formation of web on the wire in an apparatus according to the invention, shown as a longitudinal section in the figure, and

Fig. 2 shows a top view of part of the apparatus according to Fig. 1.

The apparatus according to the drawings comprises an endless wire 1, which is, for example, made of woven web and moves along controlled by rolls 2. Fibre suspension 4 is fed onto the wire 1 from a head box 3, its consistency, i.e., solids content being about 1%. A dewatering member 5 is located below the wire 1, comprising ports 6. Fibres start to couch together on the wire from the suspension 4 fed onto the wire 1, while water 7 is removed from the suspension through the wire by means of a suction effect exerted on the suction ports 6. Thus a fibrous web is formed on the wire 1, its thickness and solids content increasing in the direction of travel of the wire. At the end of the wire section, where the web 8 diverges from the wire, the dry content of the web is in the order of about 20%.

The formation of the web 8 described above is part of the manufacture of core board, wherein the weight of the board obtained can vary within 150-600 g/m², for example. The basis weight of the board can be adjusted by varying the flow of fibre suspension 4 from the head box. The speed of the wire 1 can be adjustable, for example, within 50-250 m/min.

Binding the fibres of the web 8 together takes place by means of the binding agent slurry fed into the suspension, which is fed onto the wire, and into the web thus formed, which slurry according to the invention is distributed onto the web as evenly as possible in its direction of spreading and thickness. The purpose is to accomplish an even and sufficient bonding strength in the direction of thickness of the manufactured board. The slurry contains a binding agent, the concentration of which is, for example, 0.5-3%. For feeding the starch slurry, jet pipes 10 transversal to the direction of travel of the wire are installed above the wire 1 at even intervals, slurry being sprayed through the orifices 11 of the jet pipes to the suspension on the wire and to the web formed from the suspension, according to the drawings, throughout the couching area of the web. The jet pipes 10 are connected to a common feed pipe 12, and each pipe is provided with a respective control valve 13.

Thus, each jet pipe can be adjusted separately, whereby some pipes can be kept closed, when necessary. For example, when making thin board at a high travelling speed of the wire and/or at a low suspension density, it can be preferable to keep the jet pipes at the forward end of the wire closed, and not to feed the starch slurry until at a point where enough fibres have coached together on the wire to retain the starch. Correspondingly, the jet pipes at the tail of the wire are kept closed, when coaching no longer takes place in the area in question.

It is obvious to those skilled in the art that the embodiments of the invention are not limited to the example described above but can vary within the following claims.

Claims

1. A method for the dosage of a binding agent, comprising feeding a fibre suspension (4) onto a moving wire (1), removing liquid (7) from the suspension by sucking through the wire to form on the wire a web containing fibres, and supplying a slurry containing the binding agent to the suspension on the wire or to the web that is being formed to bind the fibres in the web together, **characterized** in that feeding the slurry that contains the binding agent takes place from feeding units (10) installed above the wire (1), the units being arranged sequentially at different points in the direction of travel of the wire.
2. A method according to claim 1, **characterized** in that the binding agent contained in the slurry is starch.
3. A method according to claim 2, **characterized** in that the starch content of the slurry is generally 0.5-3%, but it is not limited.
4. A method according to claim 1, **characterized** in that the binding agent contained in the slurry is carboxy-methyl cellulose.
5. A method according to any of the preceding claims, **characterized** in that the feeding units (10) for the slurry are located at even intervals in the direction of travel of the wire (1).
6. A method according to any of the preceding claims, **characterized** in that each feeding unit (10) for the slurry is adjusted separately.
7. A method according to any of the preceding claims, **characterized** in that the feeding of the slurry is adjusted by changing the binding agent content of the slurry, while the amount of slurry fed into the feeding unit is kept constant.
8. A method according to any of the preceding claims, **characterized** in that the feeding units for the slurry are feeding beams (10) transversal to the direction of travel of the wire (1), distributing the slurry essentially evenly throughout the width of the web (8) that is being formed.
9. A method according to any of the preceding claims, **characterized** in that a board web (8) is manufactured by the method.
10. A method according to claim 9, **characterized** in that the board is core board.
11. An apparatus for the dosage of a binding agent, comprising a moving endless wire (1), a head box (3) for feeding fibre suspension (4) onto the wire, and a means (10) for supplying slurry containing an additive to the suspension on the wire or to

the web formed from the fibres on the wire, **characterized** in that the feeding units (10) for the slurry are installed above the wire (1) and arranged sequentially at different points in the direction of travel of the wire.

12. An apparatus according to claim 11, **characterized** in that the feeding units for slurry are feeding beams (10) transversal to the direction of travel of the wire (1), the slurry being distributable by means of the beams essentially evenly throughout the width of the web (8) that is being formed.

13. An apparatus according to claim 12, **characterized** in that there are feeding beams (10) at even intervals in the direction of travel (1) of the wire.

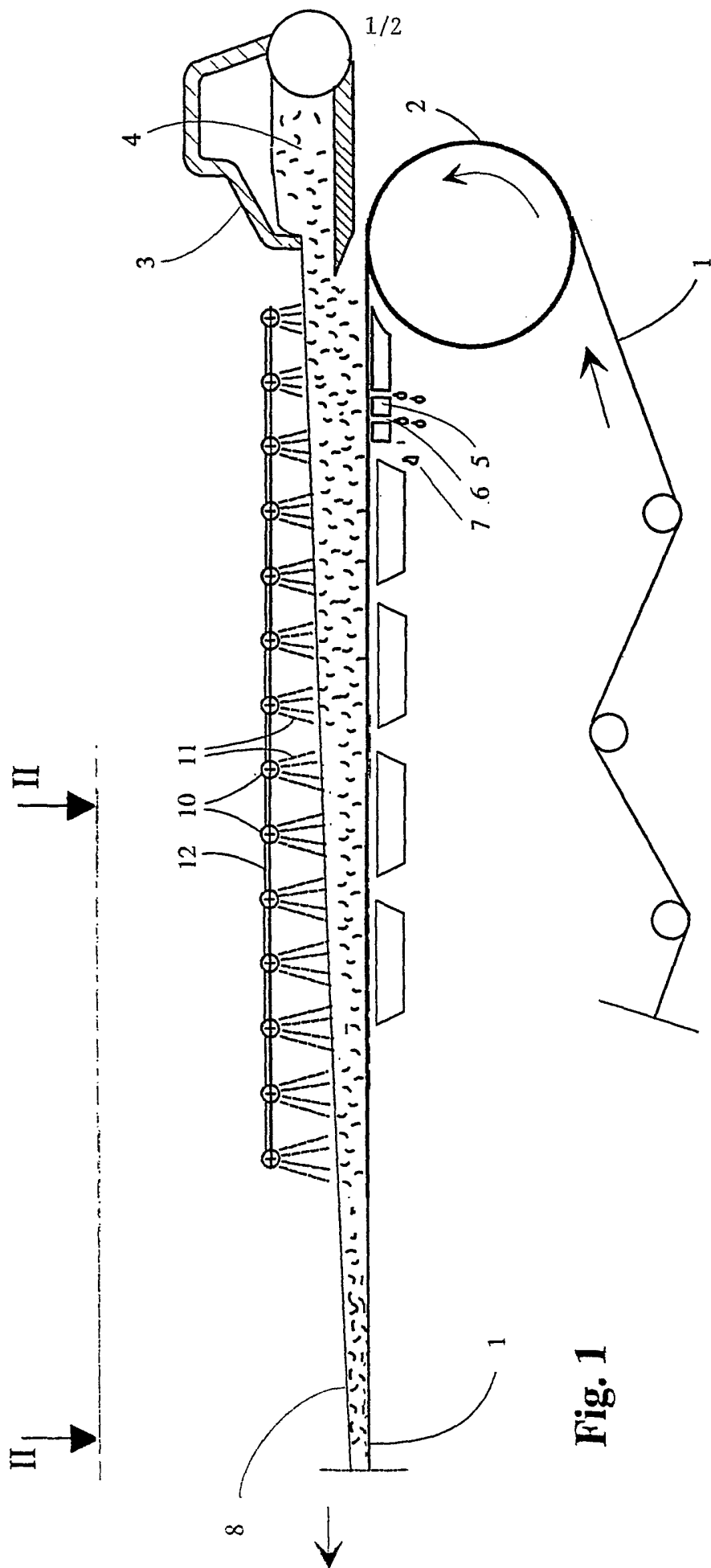


Fig. 1

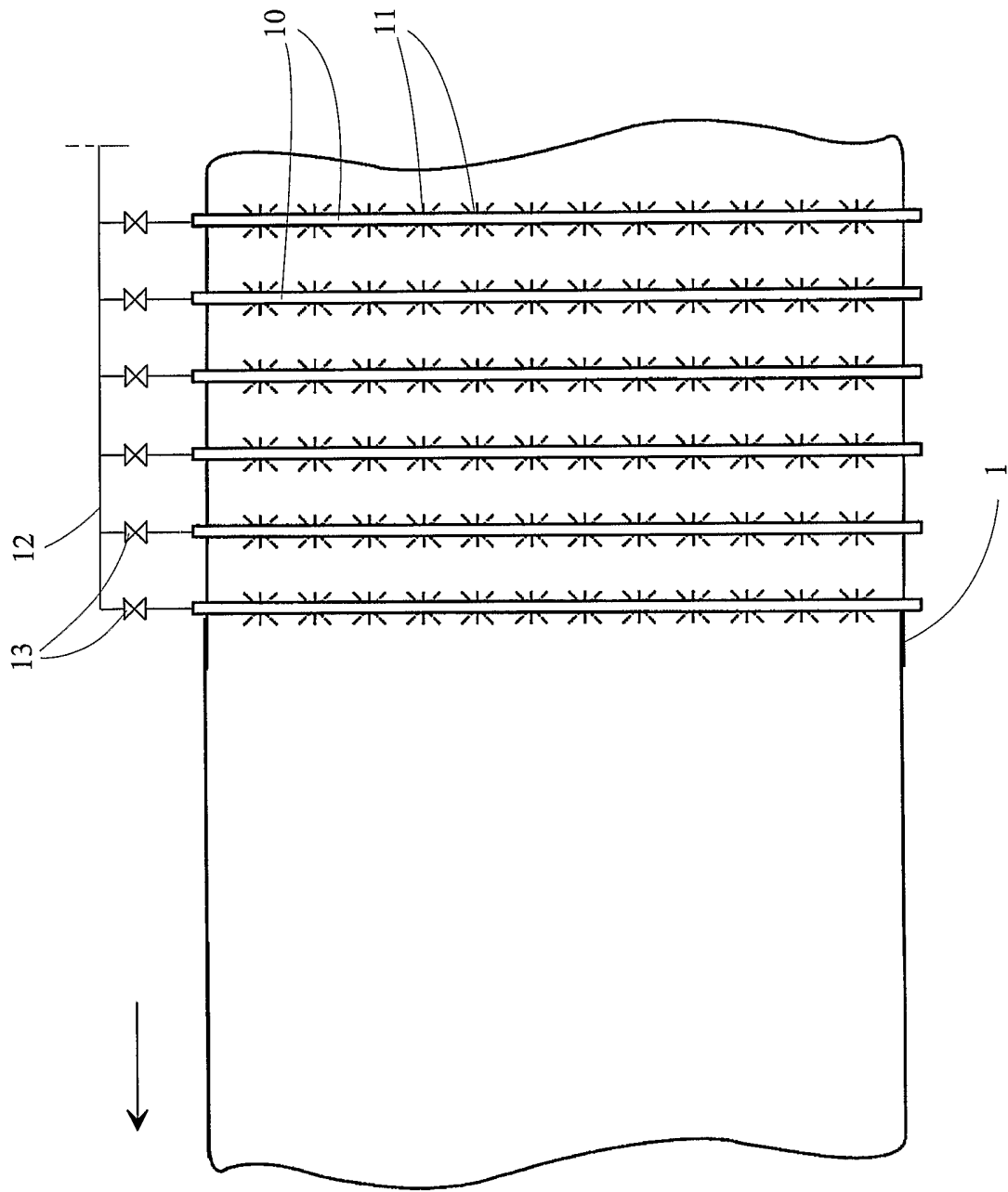


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00651

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D21H 23/50, D21H 23/00, D21H 23/78, D21H 17/28
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)

IPC7: D21H, D21F

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 9522655 A1 (WEYERHAEUSER COMPANY), 24 August 1995 (24.08.95), page 12, line 9 - page 13, line 22, figure 1 --	1-4,11
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Y	--	1-6,8-10
X	EP 0373276 A1 (TENSTAR AQUITAINE S.A.), 20 June 1990 (20.06.90), column 4, line 8 - line 15, figure 4	11-13
Y	--	1-6,8-10

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 1 November 2002	Date of mailing of the international search report 12-11-2002
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer SUSANNA LINDFORS/BS Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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