



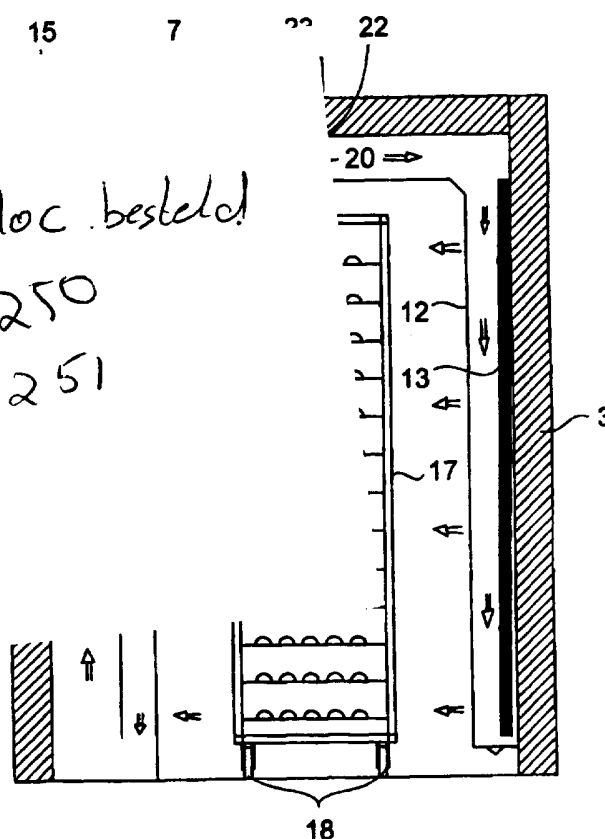
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A21B 1/44		A1	(11) International Publication Number: WO 96/24251 (43) International Publication Date: 15 August 1996 (15.08.96)
(21) International Application Number: PCT/SE96/00153 (22) International Filing Date: 8 February 1996 (08.02.96) (30) Priority Data: 9500471-9 9 February 1995 (09.02.95) SE (71) Applicant (for all designated States except US): SVEBA- DAHLEN AB [SE/SE]; S-513 82 Fristad (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): PERSSON, Jonas [SE/SE]; Munkåvägen 14, S-513 00 Fristad (SE). LARS- SON, Lennart [SE/SE]; P.O. Box 12054, Vallmovägen, S-500 12 Borås (SE). (74) Agents: KARLSSON, Leif et al.; L.A. Groth & Co. KB, P.O. Box 6107, S-102 32 Stockholm (SE).			(81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: METHOD AND DEVICE FOR BAKING-OVENS

(57) Abstract

A method pertaining to the baking of products (B) in a baking oven (1) in which the products are supported by at least one rotary oven trolley (17) comprises rotating the trolley through a number of revolution in one direction (R1) during the baking process, and reversing the direction of rotation and continuing the rotation of the trolley through several revolutions in the opposite direction (R2) before again reversing the direction of rotation of the trolley. The trolley (17) keeps the same axial position in both directions of rotation. The arrangement for carrying out the method includes means (20-26) for alternating rotation of the oven trolley through an equal number of revolutions in two opposite directions during the baking process.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

METHOD AND DEVICE FOR BAKING-OVENS**TECHNICAL FIELD**

5 The present invention relates to the baking of products in a baking oven, more particularly an oven of the kind in which the products are supported by at least one rotary oven trolley.

10 DESCRIPTION OF THE BACKGROUND ART

It is known, and generally common practice, to bake bread, buns, etc., in an oven wherein the bread, buns, etc., are supported in tiers on oven plates or oven sheets carried by an oven trolley which can be moved into and out of the oven. The trolley can be connected to floor-mounted or ceiling-mounted drive means for rotating the trolley slowly about its vertical centre axis. The trolley is rotated to obtain more uniform baking of the product, therewith obtaining a product of better quality than would otherwise be the case.

A baking oven of this kind is known from SE 395 595 and EP 112 786. When the trolley is to be removed from the oven, The rotational direction of the trolley is reversed so as to lower or lift the trolley in the process of removing the same. The trolley rotates in one direction during the actual baking process.

SUMMARY OF THE INVENTION

30 An object of the present invention is to improve still further the baking result in ovens provided with rotary trolleys. This object is achieved with the inventive method and inventive arrangement having the characteristic features set forth in the characterizing clauses of respective independent Claims.

This reversal of the direction of trolley rotation further improves the evenness to which the product is baked. In the aforesaid patent publications, reversal of trolley rotation is effected during the baking process and is not effected with the aim of obtaining an improved baking result as a result of such reversal.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view of a baking oven provided with an arrangement according to the present invention;

Fig. 2 illustrates the oven in Fig. 1 from above;

Fig. 3 is a longitudinal sectioned view of the oven shown in Fig. 1, taken on the line III-III; and

Fig. 4 is a cross-sectional view of the oven shown in Fig. 1, taken on the line IV-IV.

DESCRIPTION OF PREFERRED EMBODIMENTS

There is shown a baking oven 1 which has two side walls 2 and 3, a back wall 4, a front wall 5, a door 6 fitted to the front wall, a roof 7 and a bottom 8. All parts 2-7 are heat insulated. The oven 1 further includes a ceiling 9, an inner wall 10, and two perforated inner walls 11 and 12. Mounted in the spaces between the walls 3, 12 and 10, 11 is a respective steam pack 13 and 14 which function to moisten the air within the oven, with hot steam. Mounted in the space between the oven roof 7 and the inner wall 9 is a fan 15 which forces the air in the oven 1 to flow in the paths illustrated by arrows in Fig. 1. A heat pack 16 for heating oven air is mounted between the side wall 2 and the inner wall 10. Connections to respective steam packs 13, 14, fan 15 and heat pack 16 have not been shown in the drawings since they are not required in obtaining an understanding of the

invention. This also applies to ventilation openings.

An oven trolley 17 having wheels 18 that can also be rotated in the horizontal plane is shown inserted into the oven. The oven trolley 17 includes a frame which supports a plurality of baking sheets 19. Fig. 3 shows buns B placed on sheets 19. Mounted centrally in the upper part of the trolley 17 is a suspension roller 21. The roller 21 can be hooked onto a hook 20 which is connected to a shaft 22 that extends through the roof 7 and there connected to an electric motor 23 through the medium of a belt pulley 22a, which is fixedly mounted on the shaft 22, a toothed belt 24, a gear housing 25, and a toothed belt 26.

The motor 23 is reversible and is connected to a pulse counter 27 which counts the number of revolutions made by the motor 23 and when reaching a predetermined number of revolutions sends a pulse to the motor 23 and therewith cause the motor to rotate in the opposite. The pulse counter 27 is therewith set to zero and again begins to count the number of revolutions made by the motor 23 in this reversed direction. Subsequent to counting the same predetermined number of revolutions, the counter 27 sends a pulse to the motor 23, causing the direction of rotation to be again reversed.

Rotation of the motor 23 causes the oven trolley 17 to rotate about its vertical centre axis at a predetermined speed. Reversal of the direction of rotation of the motor 23 will also result in reversal of the direction of rotation of the oven trolley 17. It has been found suitable to reverse the direction of motor rotation subsequent to having rotated the oven trolley 17 through 2-15 revolutions, preferably about 5 revolutions, in each direction.

It will be understood that any other suitable counter may be used as an alternative to the pulse counter 27, such as a revolution counter, which is actuated by the shaft 22, for

instance, and which causes the motor to reverse its direction of rotation subsequent to the shaft, and therewith the trolley 17, having rotated a predetermined number of revolutions. Alternatively, the motor 23 can be connected to a timing clock which functions to cause the motor 23 to change its direction of rotation subsequent to the passage of a predetermined time period, for instance 100 seconds, that has been set on the clock.

10 A motor which rotates in only one direction can be used as an alternative to a reversible motor 23, wherein there is arranged between the motor and the shaft 20 a mechanism which is actuated by impulses from, e.g., a pulse counter or a timing clock to reverse the rotational direction of the shaft
15 20.

The air heated by the heat pack 16 passes through the fan 15 and is forced downwards between the walls 3 and 12, where it is moistened by the steam pack 13, said pack normally
20 delivering steam once on each baking occasion. The space between these walls constitutes the pressure side of the oven. The air is then forced through the holes in the wall 12 and passes between the sheets 19 carried by the rotating oven trolley 17, such as to bake the buns B. The air then
25 passes through the holes in the wall 11 and is moistened by the steam pack 14, once with each baking occasion. The air then flows up between the walls 2 and 10, towards the heat pack 16. the space between the walls 11 and 2 constitutes the suction side of the oven.

30

Fig. 4 shows from above a plate 19 and a plurality of buns B supported thereby. The buns located furthest out in two corners are designated B1 and B2.

35 If it is assumed that the trolley 17 rotates in one single direction R1, that the peripheral speed of each bun B1, B2 will be V2, and that the hot, moist air passes between the

5 sheets 19 at a speed of V_1 , then the bun B1 will be impinged upon at an air speed of V_1+V_2 , whereas the bun B1 will be impinged upon at an air speed of V_1-V_2 . This means that the bun B1 will be subjected to relatively large quantities of hot air with the result that the bun will be baked noticeably on the side thereof which faces forwardly in the direction of rotation. When the bun B1 reaches the position earlier occupied by the bun B2, the bun B1 will be subjected to relatively small quantities of hot air and the opposite side of the bun B1 will therefore be baked to a lesser extent. This means that one side of the bun B1 will either be baked sufficiently or excessively, and that its other side is insufficiently or sufficiently baked as the oven trolley rotates in one direction over a large number of revolutions. This naturally applies to all buns B on the sheets 19.

On the other hand, if the trolley 17 rotates in alternate directions through one and the same number of revolutions, the buns B will be baked equally on both sides. When the peripheral speed V_2 of the buns B1 and B2 and the air speed V_1 are equally as great in both directions of rotation R1 and R2, one side of each bun B1 and B2 will be impinged upon at an air speed of $(V_1+V_2 + (V_1-V_2))$ in the direction R1, and the opposite side of the same bun will be impinged upon at an air speed of $(V_1-V_2 + (V_1+V_2))$ in direction R2. These air speeds are mutually identical, meaning that the air flowing between the sheets will have the same effect on both sides of the buns B when the trolley 17 rotates through the same number of revolutions in each rotational direction, and therewith provide a uniform baking result.

Although the invention has been described and illustrated with reference to only one embodiment together with some alternatives, it will be understood that the invention is not restricted hereto and that the invention is only limited by the scope of the following Claims.

CLAIMS

1. A method of baking products (B) in an oven (1) in which the products are supported by at least one rotary oven trolley (17), **characterized** by rotating the trolley (17) through part of or through several revolutions in one direction (R1), whereafter the rotational direction is reversed and rotation continued through part of or through several revolutions in the opposite direction (R2) before again reversing the direction of rotation, wherein rotation in both directions and the reversals in rotational directions take place during the baking process, and wherein the oven trolley retains the same axial position in both directions of rotation.
2. A method according to Claim 1, **characterized** by continuing rotation in one direction (R1) through the same number of revolutions as rotation in the opposite direction (R2).
3. A method according to Claim 1 or Claim 2, **characterized** by rotating the oven trolley in one and/or said opposite direction (R1, R2) through 2-15 revolutions, preferably through about 5 (five) revolutions.
4. An arrangement for baking products (B) in a baking oven (1) in which the products are supported by at least one rotary oven-trolley (17), wherein the oven has a pressure side from which hot air flows towards the trolley, and an opposing suction side to which air flows after heating the products, and wherein the arrangement includes drive means (20-26) for rotating the trolley in one direction, **characterized** in that during the baking process the drive means (20-26) can be actuated to reverse the direction of rotation (R1, R2) of the trolley (17); and in that the oven trolley is adapted to retain one and the same axial position in both directions of rotation.

5. An arrangement according to Claim 4, **characterized** in that the drive means (20-26) includes a motor (23) mounted on the oven roof (7) or the oven floor (8).

5 6. An arrangement according to Claim 5, **characterized** in that the motor (23) is reversible.

10 7. An arrangement according to any one of Claims 4-6, **characterized** by means (27) for causing the drive means (20-26) to reverse the direction of rotation (R1, R2) of the trolley (17) subsequent to a predetermined time period or subsequent to a predetermined number of revolutions.

1/3

Fig. 1

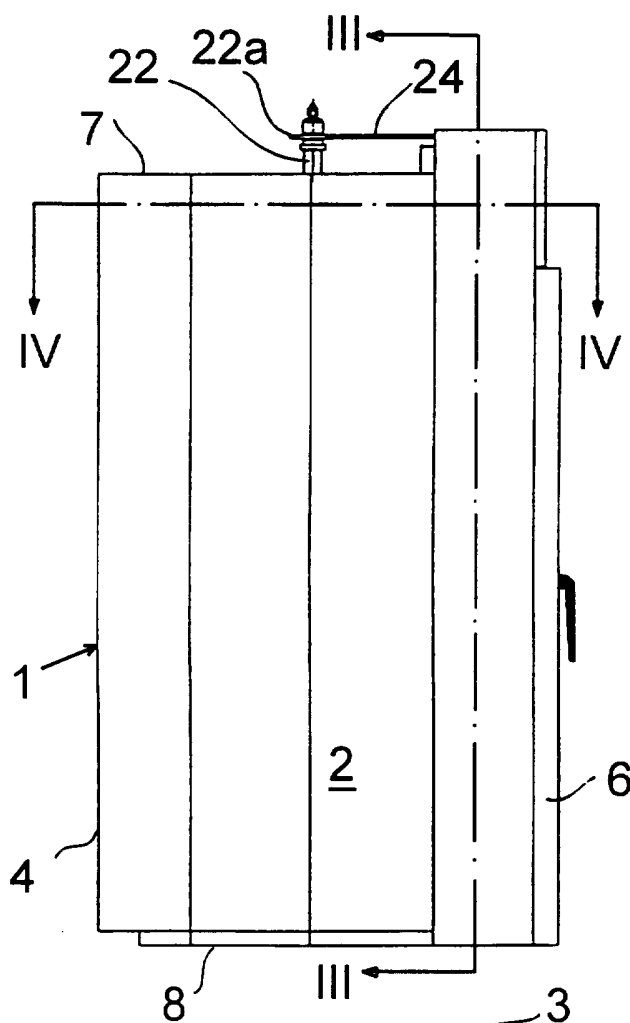
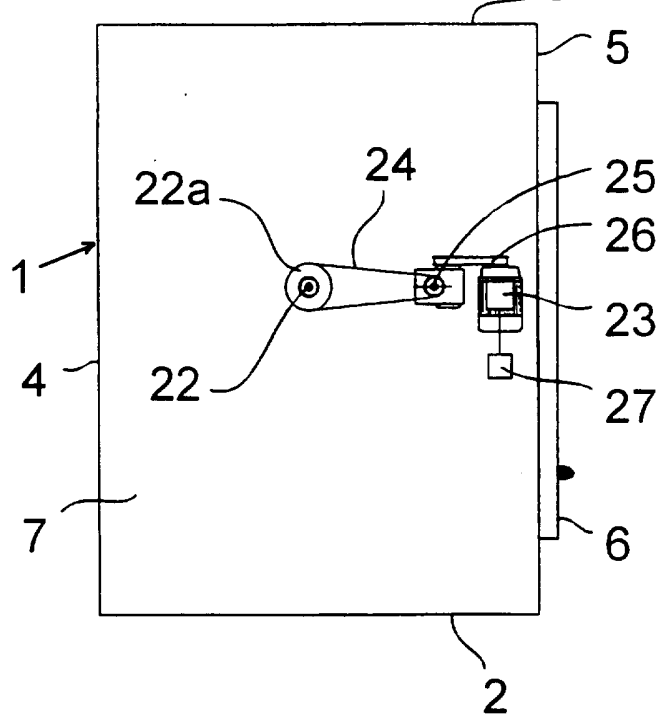
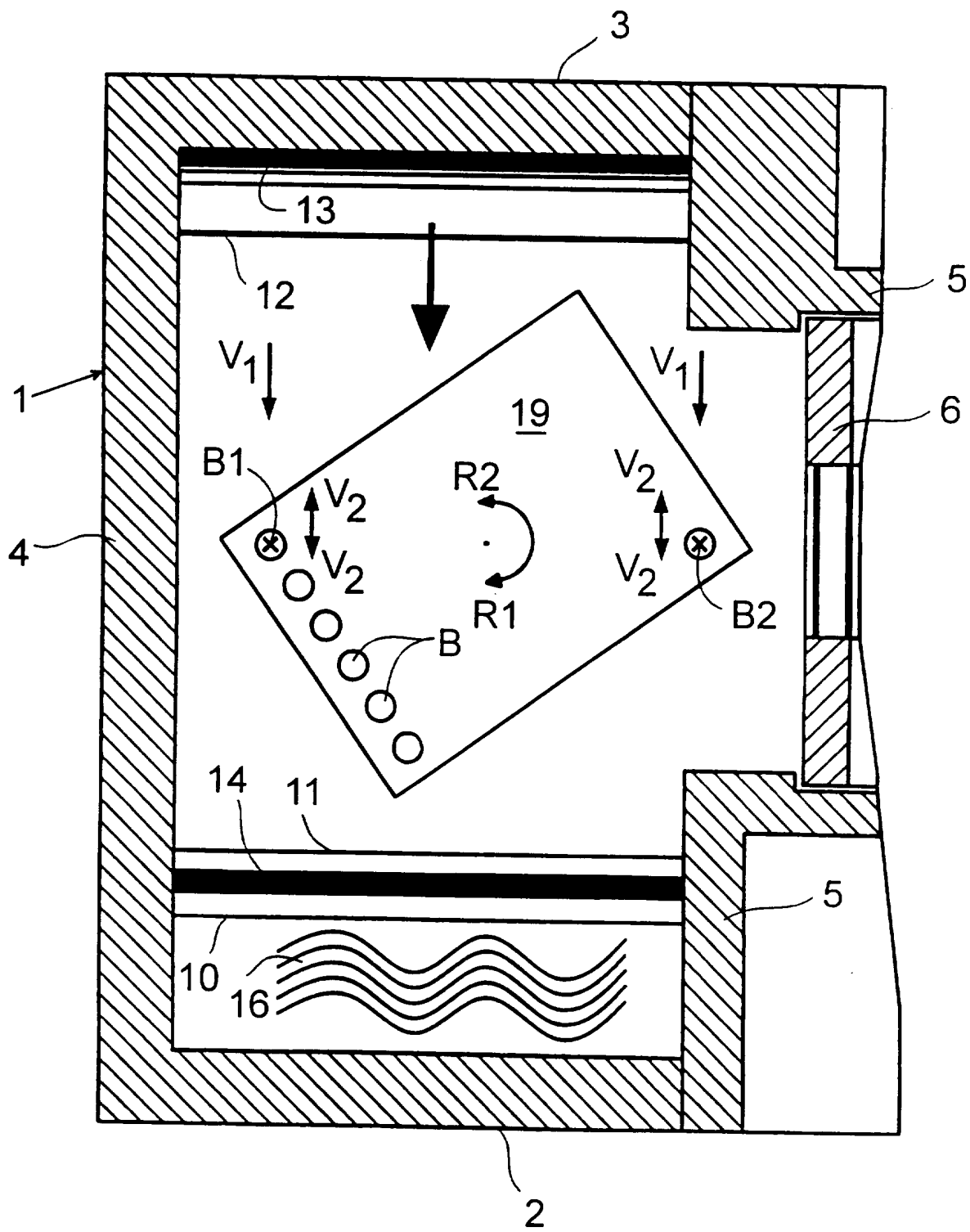


Fig. 2



SUBSTITUTE SHEET

Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 96/00153

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A21B 1/44

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)

IPC6: A21B, F24C

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)

WPI, CLAIMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0112786 A1 (PAVAILLER), 4 July 1984 (04.07.84), page 9, line 12 - line 26, figures 1-2 --	1-7
A	SE 395595 B (ELEKTRO-DAHLEN AB), 22 August 1977 (22.08.77), figure 1, claim 1 --	1-7
A	EP 0173005 A2 (WERNER & PFLEIDERER), 5 March 1986 (05.03.86), figures 1-3, abstract --	1-7
A	EP 0041287 A2 (ELEKTRO-DAHLEN AB), 9 December 1981 (09.12.81), figures 1-2, abstract -- -----	1-7

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"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)

"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

"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

"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

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

3 May 1996

06 -05- 1996

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

Mårten Hulthén

Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/04/96

International application No.

PCT/SE 96/00153

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP-A1-	0112786	04/07/84	FR-A,B-	2536734	01/06/84
SE-B-	395595	22/08/77	SE-A-	7513967	12/06/77
EP-A2-	0173005	05/03/86	SE-T3-	0173005	
			DE-C-	3431505	28/11/85
			US-A-	4619607	28/10/86
EP-A2-	0041287	09/12/81	AU-A-	7092981	03/12/81
			JP-A-	57018933	30/01/82
			SE-B,C-	426013	06/12/82
			SE-A-	8004036	01/12/81
			US-A-	4375354	01/03/83