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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 January 2002 (24.01.2002)

PCT

(10) International Publication Number
WO 02/06145 A1

(51) International Patent Classification[7]: B65H 39/16, 39/02, 20/00

(21) International Application Number: PCT/SE01/01532

(22) International Filing Date: 4 July 2001 (04.07.2001)

(25) Filing Language: Swedish

(26) Publication Language: English

(30) Priority Data:
0002651-8 13 July 2000 (13.07.2000) SE

(71) Applicant *(for all designated States except US)*: **EMSIZE AB** [SE/SE]; Vagnsgatan 2, S-745 37 Enköping (SE).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **PETTERSSON, Niklas** [SE/SE]; Fagerskogsgaten 41, S-745 39 Enköping (SE). **BOSTRÖM, Mikae** [/SE]; Råstensgatan 4, S-172 70 Sundbyberg (SE).

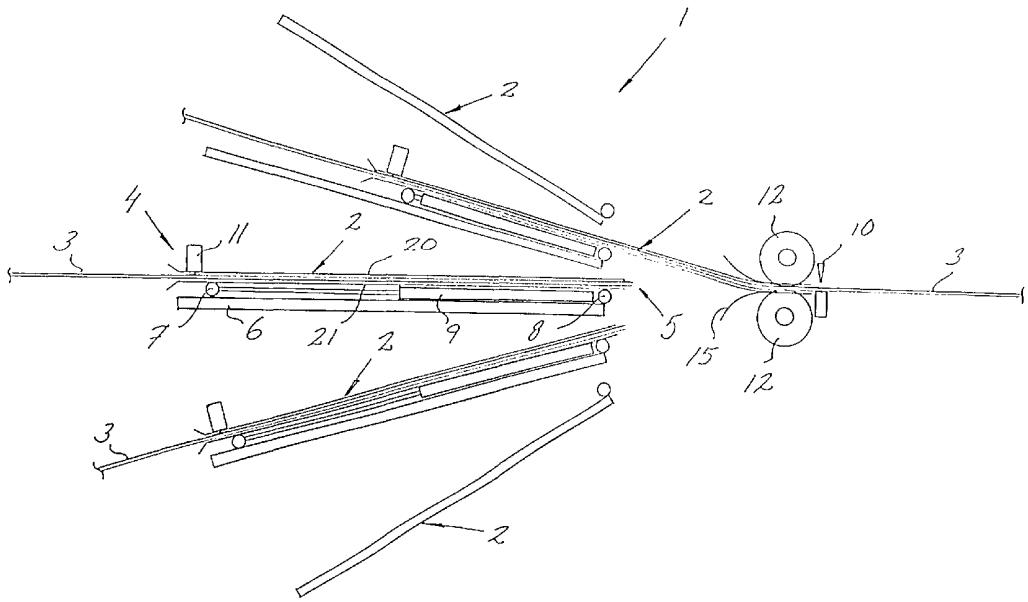
(74) Agent: **ANDERSSON, Carlåke**; Dr Ludwig Brann Patentbyrå AB, P.O. Box 1344, Drottninggatan 7, S-751 43 Uppsala (SE).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EC, EE, EE (utility model), ES, FI, FI (utility model), 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, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

*[Continued on next page]*

(54) Title: DEVICE AND METHOD FOR SWITCHING BETWEEN MATERIALS




(57) Abstract: Method and device for switching between web formed materials that are to be separately processed in a following process step, wherein each material (3) is supported and substantially enclosed by a separate feeder cassette (2) that is individually driven and controlled for shifting the materials individually, the feeder cassettes being formed so as to permit drive rollers (12) arranged downstream of the shifter device to engage the material through the feeder cassette for feeding the material through the feeder cassette.

WO 02/06145 A1

IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, 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.*

# Device and method for switching between materials.

## TECHNICAL FIELD

The present invention relates to a shifter arrangement for switching materials. More closely, the invention refers to an arrangement by which at least two separate materials may be shifted and individually fed into an associated processing device. The invention also refers to a method for shifting between at least two separate materials that are alternately processed in a subsequent procedure.

The present invention specifically relates to a method and device for shifting at least two planar web materials, such as planar packing materials like well board and other planar packing materials, that are shifted and fed into an associated device for converting the material into packing products or other articles. The shifter device is contemplated to operate with endless web materials that is fed to the shifter from supply rolls, and with folded, endless materials such as fanfold.

Shifters of this type are operative for switching between different material qualities, or between different material dimensions. A known shifter device for said purpose has rollers, vertically arranged in pairs, for separately feeding material in individual paths. When shifting between the materials, the pairs of rollers are alternately positioned to level with the input side of a converting device associated with the shifter in the feed direction.

A problem in connection with this known shifter is, that the material is subjected to a pushing force and a pressure load from the pair of rollers before the material is gripped by rollers or drive wheels that are arranged downstream of the shifter. Due to this effect, the material occasionally is crinkled which may often lead to interruption of the process.

SUMMARY OF THE INVENTION

The present invention has for its object to avoid this problem by providing a method and a shifter device by which separately fed materials are alternately controlled and forwarded by a pulling force, where after the materials are individually gripped by rollers of a processing machine, such as a machine for producing packing products, that is arranged downstream of the shifter.

This object is met in a shifting device and a method as defined in the accompanying claims, whereby advantageous embodiments are further defined in the subordinated claims.

Briefly, the invention suggests a shifter device in which separately fed web materials are controlled and forwarded by a feeder cassette in a pulling motion that reaches in between drive rolls arranged downstream of the shifter.

In a preferred embodiment, two or more feeder cassettes are supported in a frame and arranged adjacent and above each other in a fan shaped arrangement, triangularly spaced from each other. The feeder cassettes are separately driven in a feeding motion directed to the point where the triangle sides intersect. The web materials are brought into the motion of the cassettes, said cassettes having a built in flexibility that is controllable for driving the material in a feed direction that at least partially is arc-shaped. This way, the material path may be adjusted relative to an operative plane of process devices arranged downstream of the shifter.

In an alternative embodiment, the shifter device is pivoted about an axis for allowing all cassettes of the shifter to be driven in a linear feeding motion at an adequate feeding angle, in a shifter having two or more cassettes that are arranged in a fan-shaped configuration.

In yet another embodiment, the feeder cassettes of the shifter device may be arranged above each other in parallel or side-by-side. Upon shifting of materials, the cassettes are moved so that the subject cassette is controlled and positioned for a linear feeding motion in a plane that corresponds to a process plane arranged downstream of the shifter device.

In all embodiments of the invention, the materials are brought by the feeder cassettes to be gripped by pulling rolls that are allowed to operate through each cassette for feeding the material forward.

DRAWINGS

Embodiments of the invention will be more closely described below, reference being made to the accompanying, diagrammatic drawings wherein

Fig. 1 is a side view of a shifter device according to the invention;

Fig. 2 is a perspective view showing a feeder cassette from where an upper plate is omitted in order to reveal the inner configuration of the cassette;

Fig. 3 shows the principal configuration of an alternative material shifter device, and

Fig. 4 shows the principal configuration of another alternative embodiment of the shifter device.

DETAILED DESCRIPTION OF THE INVENTION

With reference made to fig. 1, the basic principle of a shifter device 1 is shown in a preferred embodiment of the invention.

A number of feeder cassettes 2 are supported in a frame structure that is not further specified herein. The feeder cassettes 2 define in section a narrow, box-shaped space, and are arranged on top of each other with angular

displacement in fan-shaped arrangement as seen in the side view of fig. 1. The number of feeder cassettes 2 may vary. From a material supply, not shown in the drawing, a planar web shaped material 3 is forwarded through each feeder cassette such that the material is substantially enclosed on all sides by the cassette. The expression "enclosed" as used herein indicates that the cassette is structured so that the material is restricted from movement in any other direction except the longitudinal direction of the web formed material.

Each feeder cassette 2 has a first end 4 facing upstream of the feed direction, and mechanically restricted by the frame structure. The feeder cassette is freely extending in the feed direction from said first end to a second end 5, facing downstream of the feed direction. The first end 4 is received in a guide 6, such as a slide or a roller guide 6, arranged on the frame. In a preferred embodiment, the feeder cassette is guided by a couple of rack gears 6, arranged on each respective side of the feeder cassette 2. Toothed wheels 7, fixedly arranged in each end of a common axis 7' that is carried for rotation in the first end 4 of the feeder cassette (see fig. 2) insures a linear feeding motion when the wheels 7 engages the rack gears 6. The second end 5 of the feeder cassette rests for sliding motion on a frame portion 8, or alternatively, on rollers 8.

Preferably, the feeder cassettes 2 are hydraulically, pneumatically or electrically driven for feeding the material in either direction towards or from a center of the fan shaped shifter device 1, or in other words, towards or from the apex of the angularly spaced feeder cassettes. To this purpose each feeder cassette may be associated with a linear drive 9, as suggested in fig. 1. The linear drive 9 may be an air cylinder that operates between the feeder cassette and the frame structure. Optionally, the feeding motion may be achieved by driving the toothed wheels 7 for rotation by means of a motor (not shown) connected to the axis 7'.

As seen also in fig. 2, the feeder cassette comprises an upper plate 20 (excluded in fig. 2 for better visibility) and a lower plate 21. The plates 20,21 are secured in the first end 4 but freely extending towards the second end 5. Two horizontal guides 22 extend in the feed direction X (see the crossing arrows of fig. 2), between the upper and lower plates 20,21. The horizontal guides 22 are supported from the first end of the feeder cassette so as to be mutually adjustable in the Y-direction. The horizontal guides 22 rest towards an upper side of the lower plate 21, and carry the upper plate 20 that is resting on the upper sides of the horizontal guides 22.

The horizontal guides 22 are formed in the opposite margins thereof to be operative for controlling the longitudinal sides of the web formed material that is fed through the feeder cassette in the X-direction. For this purpose, slots or grooves 23 may be formed in the inner, opposing margins of the horizontal guides 22. Alternatively, the horizontal guides may be formed from a material that is inherently flexible in a Z-direction, i.e. transversally to the general plane of the web formed material. In another alternative embodiment, the desired flexibility may be provided by producing the horizontal guides from elements that are assembled for relative motion in the longitudinal direction of the horizontal guides.

The slots or grooves 23 mentioned above may alternatively be realized in the forms of pins, heels 23' or cams that alternately extend from an upper plate 22' and a lower plate 22" of a horizontal guide, respectively. Said formations will then be dimensioned with a length that allows the longitudinal margins of the web material to be received between the plates for guidance in sliding contact with said pins, heels or cams.

Since the upper and lower plates, as well as the horizontal guides of the feeder cassette are connected only to the first end 4 from which these elements extend freely in the feed direction to the second end 5, the feeder cassette 2 is ductile or flexible in the Z-direction. Said flexibility is utilized for producing a feeder motion having an arc-shaped portion by which the web

material is controlled and adjusted relative to the operative plane of a processing machine arranged after the shifter device as seen in the feed direction. In fig. 1, the processing machine is plainly illustrated by a knife 10.

It will be realized, that even though plates 20,21 have been shown to structurally form the feeder cassette 2, these plates being interconnected only in one end of the feeder cassette firstly operate as guides for directing the material. The plates may be understood as guiding leaves, and may alternatively be formed as meshes or fingers extending in the feed direction of the material for restricting its movement in any other direction except the longitudinal direction of the web formed material.

Each feeder cassette 2 is associated with a holder means 11, for example an air cylinder 11 that is operative in its activated mode for preventing a relative motion between the feeder cassette and the web formed material. When shifting material to other dimensions or other material grade, the feeder cassette is shifted from a feeding position to a resting position. When the cassette is moved to the feeding position, the holder means 11 is activated for bringing the material in the motion of the feeder cassette. When the shifting motion of the feeder cassette is completed, rollers 12 arranged after the shifter device, engage the material. Simultaneously, the holder means 11 is de-activated for allowing the rollers 12 to feed the material through the feeder cassette.

The invention suggests that the rollers 12 reach through the feeder cassette for gripping the material. The rollers 12 are supported on a common axis, the rollers being spaced in the Y-direction. The intermediate space between rollers 12, as well as the width of the rollers in the Y-direction, is adapted to the width and spacing between slots or openings 13,14, formed in the upper and lower plates 20 and 21, respectively, of the feeder cassette. Alternatively, the rollers 12 may be realized as radial protruding portions formed by reducing the original diameter of a cylinder, thus forming the corresponding axial spaces between the rollers.

The rollers 12 engage and feed the material through the feeder cassette 2. For this purpose, slots 13 and intermediate tongues 13' may alternatively be correspondingly formed in the upper and lower plates of the feeder cassette such that the slots open in the ends of the plates. When the feeder cassette is moved to the feeding position, the feeder cassette is controlled for insertion of the tongues into the spaces between the drive rollers 12 whereby the drive rollers engage the material. If appropriate, the drive rollers may be separated during the shifting motions of the feeder cassette and then returned to an operative engagement with the material.

In another embodiment, openings 14 are correspondingly formed in the upper and lower plates of the feeder cassette, within the end margins of the plates. In this alternative embodiment, drive rollers preferably are controlled for separation during the shifting movements and then returned into operative engagement with the material through the openings 14. If appropriate, and in consideration of material properties and the forces involved, the feeder cassette may also be inserted between the drive rollers without a preceding separation of the rollers. This may be accomplished through properly adjusting a preset contact pressure between upper and lower drive rollers.

The drive rollers 12 may be associated with the shifter device 1, or alternatively associated with a processing machine arranged downstream of the shifter and structured for converting the forwarded material. Supporting surfaces or feeding guides 15 may be arranged upstream of the drive rollers for controlling the end of the feeder cassette in a shifting motion that is partially arc-shaped in its path. This way, the web material is advantageously directed and adjusted to the parting line between the rows of drive rollers and to the operative planes of process steps that are to be performed downstream of the shifter device.

In fig. 1, the shifter device 1 comprises five feeder cassettes 2 of which the second one from above is shifted into the material feeding position. In this

position, the material 3 is released by the holder means 11 and allowed for feeding through the feeder cassette, whereby the drive rollers 12 engage with the material through the upper and lower plates 20 and 21, respectively. In the other cassettes of shifter device 1, the associated holder means 12 are activated for preventing relative motion between the subject materials and the feeder cassettes. Upon shifting of materials, the processed web material is cut close to the drive rollers and closely outside the front end of the operative feeder cassette. The holder means is activated for bringing the material with the feeder cassette in the retracting motion, and another feeder cassette is moved forward towards the drive rollers. The holder means of the new cassette is activated for bringing the new material in the shifting motion to a forward position where the drive rollers are allowed to engage the material. Since the feeder cassette encloses the web material in the shifting motion until the drive rollers engage the material through the upper and lower plates of the feeder cassette, the material is brought in a pulling motion into engagement with the drive rollers, and thus crease formations in the material are prevented.

The invention may be modified within the scope of invention as defined by the accompanying claims. If appropriate, the feeder cassettes may be formed to allow the drive rollers for engagement with the material through the upper or the lower plate 20 or 21, separately. For example, this may be advantageous when processing low friction material and a strong frictional engagement is contemplated for feeding the material by the drive rollers.

Alternative embodiments of the invention are shown with reference to figs. 3 and 4. The shifter device 1' of fig. 3 comprises a number of feeder cassettes 2' arranged above each other in fan-shaped configuration, driven and controlled for a substantially linear feeding motion. The shifter device 1' is pivotal about an axis 24 for alternately positioning of a feeder cassette into a desired angle relative to the operative plane of a process station arranged downstream of the shifter device.

The shifter device 1" of fig. 4 comprises a number of feeder cassettes 2" arranged in parallel and driven and controlled for a substantially linear feeding motion. Upon shifting of material, the shifter 1" is controlled for shifting the subject feeder cassette to level with the operative plane of a process station arranged downstream of the shifter where after feeding of the material may be accomplished in a linear feeding motion.

In the latter alternatives, flexibility is not required in the feeder cassettes or in the horizontal guides. A common feature for all embodiments is that the feeder cassettes control the web formed material for engagement with the drive rollers that are allowed to operate through the cassette for feeding the material forward.

Other modifications of the detailed structure, apparent for a man skilled in the art, will be included within the principal technical solution as defined by the claims.

CLAIMS

1. A shifter (1) for two or more web materials (3) that are separately brought into engagement with drive rollers (12) for feeding the material through a process step performed downstream of the shifter (1), characterized in that each web material (3) is supported and substantially enclosed by a separate feeder cassette (2) that is driven and controlled for shifting materials in a shifting motion wherein the material is brought into engagement with the drive rollers such that the drive rollers reach through the feeder cassette to engage and to feed the material forward through the feeder cassette.

2. The shifter of claim 1, characterized in that a holder means (11) is associated with the feeder cassette and operable for preventing a relative motion between the material and the feeder cassette during shifting motion, and releasable in the feed position for allowing the drive rollers to feed the material forward through the feeder cassette.

3. The shifter of claim 1, characterized in that each feeder cassette comprises two plates (20 and 21) arranged with an intermediate spacing there between, and the web material being received between horizontal guides (22) that are mutually adjustable transversally to the feed direction (X) in said spacing.

4. The shifter of claim 1, characterized in that two or more feeder cassettes are movably supported in a frame structure, triangularly spaced and associated with drive and control means for moving each feeder cassette separately towards the apex of the triangle in a shifting motion.

5. The shifter of claim 4, characterized in that each feeder cassette, as seen in the feed direction, has a first end (4) which is mechanically supported in the frame structure, the interspaced plates being supported in the first end and freely extending in the feed direction towards a second end (5),

the second end being flexible in a Z-direction transversally to the plane of the web material

6. The shifter of claim 3, characterized in that the lower plate (21) connected in the first end of the feeder cassette rests in supporting contact on the frame structure, and the upper plate (20), likewise connected in said first end of the feeder cassette, rests in supporting contact on an upper side of the horizontal guides (22), the horizontal guides resting on the lower plate.

7. The shifter of claim 3, characterized in that grooves (23) are formed in mutually opposing sides of the horizontal guides, and the web material being received and guided in said grooves during the feeding.

8. The shifter of claim 7, characterized in that at least a portion of the horizontal guides is flexible in a direction transversally to the plane of the web material.

9. The shifter of claim 6, characterized in that the horizontal guides are formed from an inherently flexible material, or comprising elements assembled to provide a certain relative motion in the longitudinal direction of the horizontal guides, said elements having pins, heels (23') or cams that alternately extend from an upper plate 22' and a lower plate 22" of each horizontal guide, respectively, said formations having a length adapted to the thickness of the web material and allowing the longitudinal margins of the web material to be received between the plates for guidance in sliding contact with said pins, heels or cams.

10. The shifter of any previous claim, characterized in that each feeder cassette has slots or openings (13,14) formed on the upper or on the lower side thereof for the drive rollers to engage at least one side of the material through said slots or openings.

11. The shifter of any previous claim, characterized in that the feeder cassette has openings (14) formed in the upper and lower sides thereof, respectively, for the drive rollers to engage both sides of the material through said openings.

12. A method for switching between two or more web formed materials that are to be separately processed in a following process step, characterized in that

-each material is assigned a separate feeder cassette that substantially encloses the material for guidance;

-the feeder cassettes are alternately driven and controlled for shifting and inserting each web material individually between drive rollers arranged downstream of the feeder cassettes, and

-the feeder cassettes being formed with slots or openings through which the drive rollers are allowed to engage the subject material for feeding the material through the feeder cassette.

13. The method of claim 12, characterized in that

-the feeder cassettes are arranged above each other, triangularly spaced in a fan shaped configuration;

-the feeder cassettes are formed to be flexible in a direction transversally to the plane of the web material, and

-the feeder cassettes being driven and controlled in a partially arc-shaped shifting motion towards the apex of the triangle for directing the feeder cassette and the web material in adjustment to a process plane of a following process step.

14. The method of claim 12, characterized in that

-the feeder cassettes are arranged above each other, triangularly spaced in a fan shaped configuration;

-the feeder cassettes being driven and controlled for a substantially linear shifting motion towards the apex of the triangle, and

-all feeder cassettes being pivoted about a common axis for angular adjustment of the subject feeder cassette and web material relative to the process plane of a following process step.

15. The method of claim 12, characterized in that
-the feeder cassettes being arranged above each other in parallel;
-the feeder cassettes being driven and controlled for a substantially linear shifting motion, and
-all feeder cassettes being simultaneously controlled for bringing the subject feeder cassette and web material in alignment and adjustment to the process plane of a following process step.

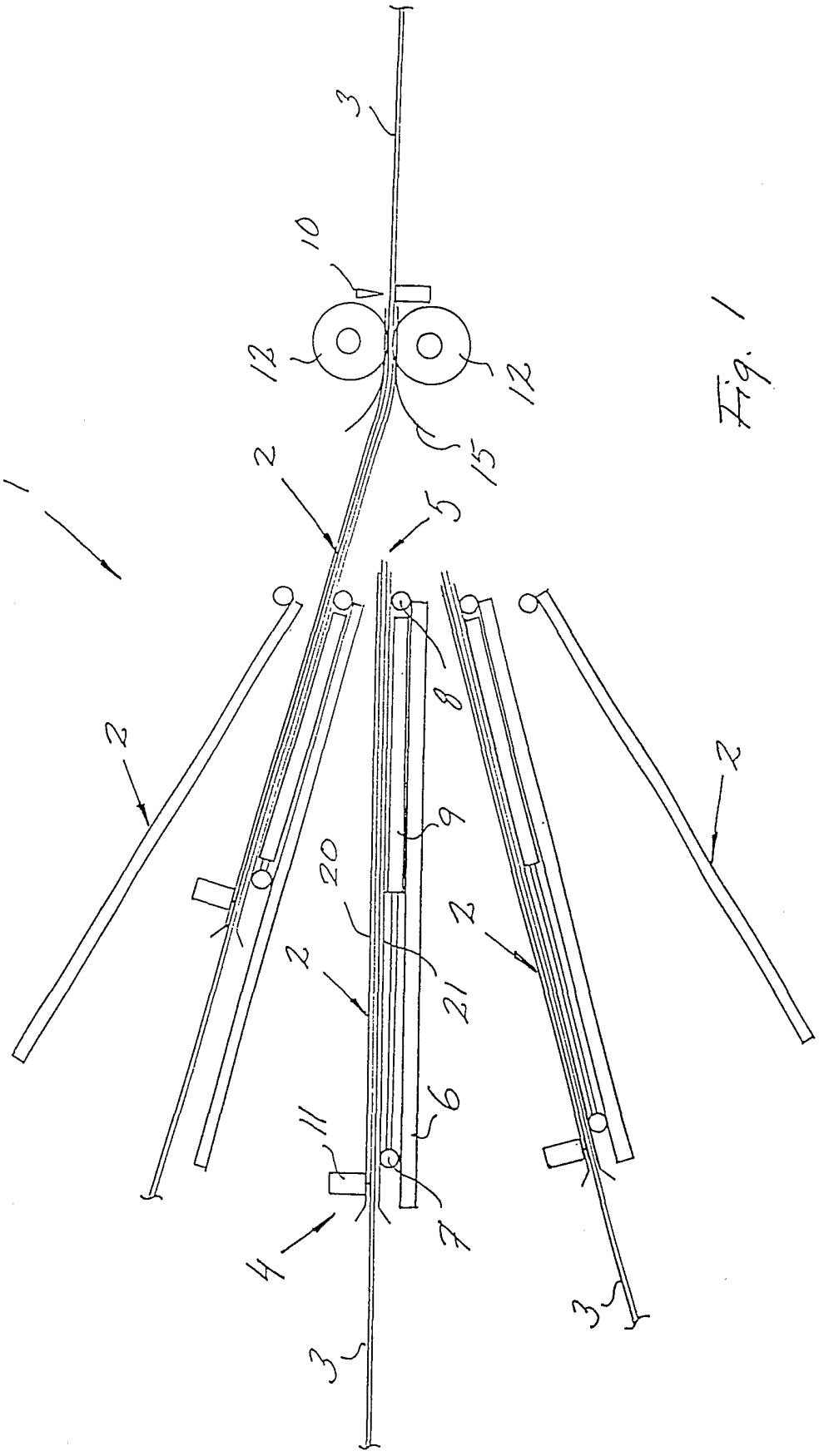



Fig. 1

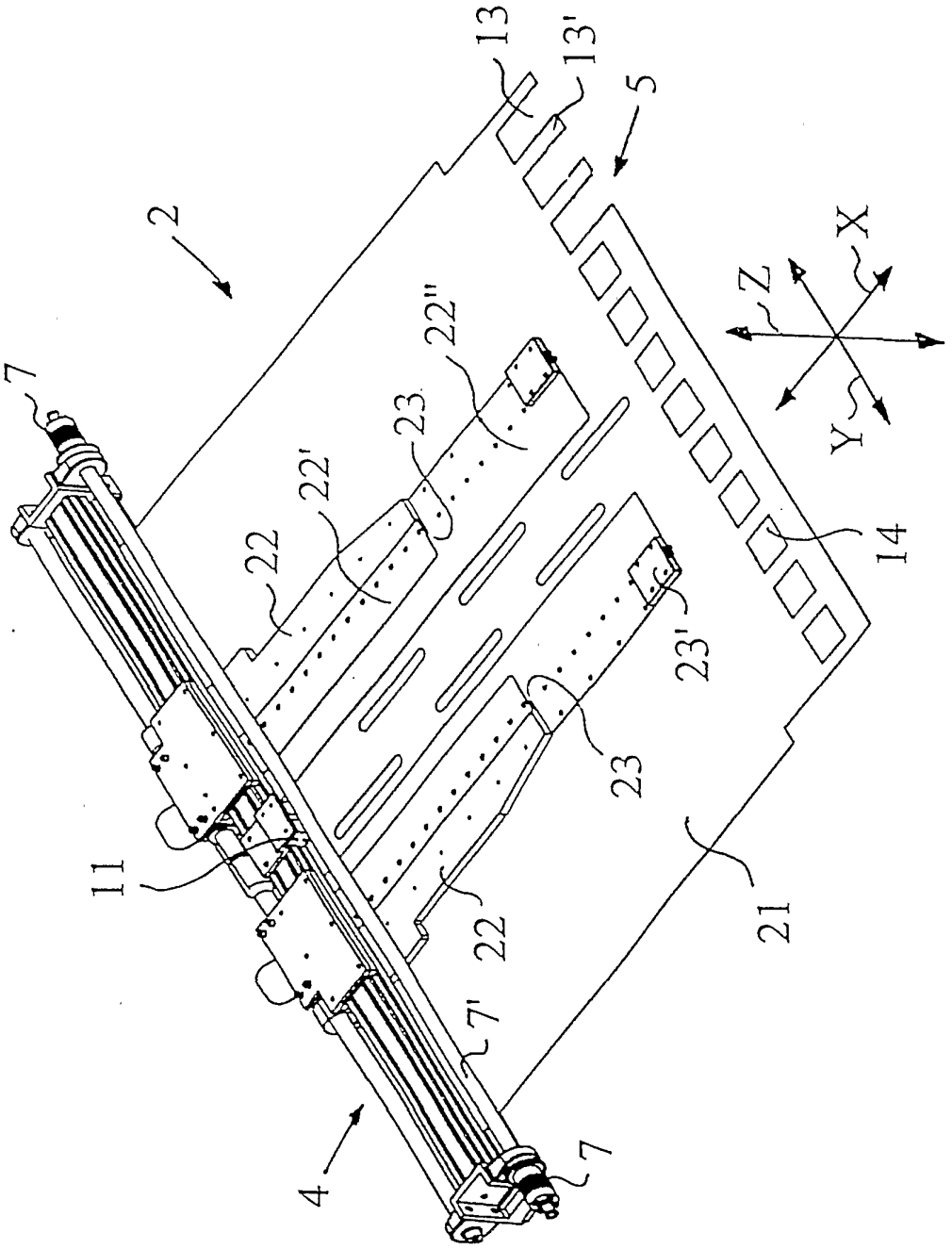



Fig. 2

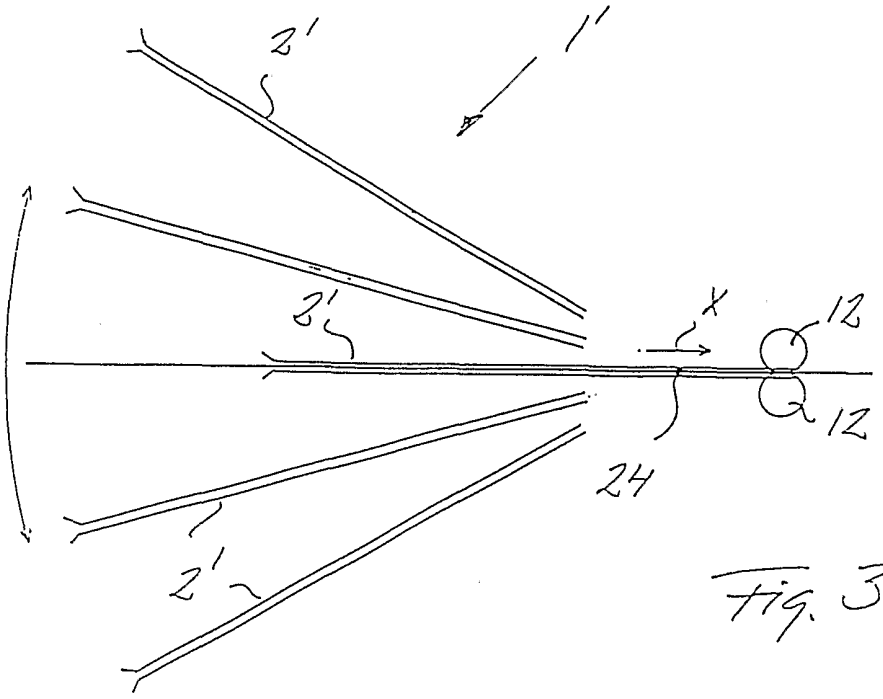



Fig. 3

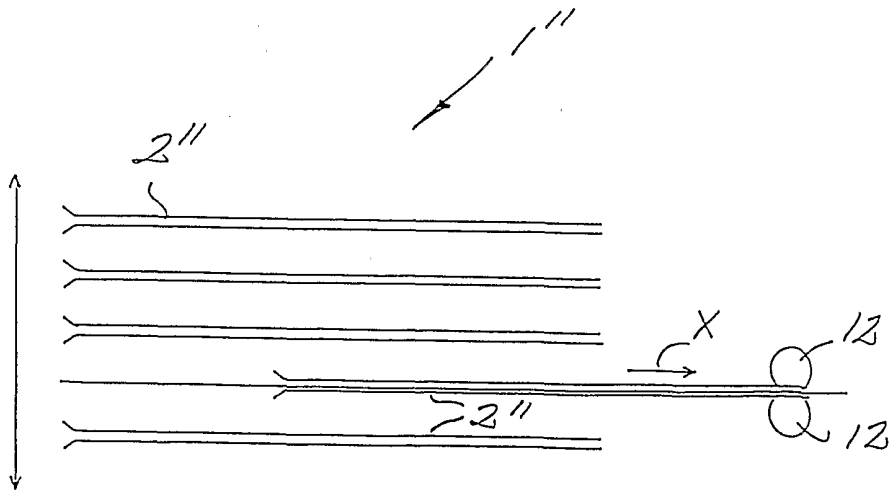



Fig. 4

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/01532

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65H 39/16, B65H 39/02, B65H 20/00
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)

IPC7: B65H

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 DATA, EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | SE 408546 B (LUIS MESTRE DEVELOPMENT CORP.), 18 June 1979 (18.06.79), figure 1, abstract<br>--- | 1-15 |
| A | GB 2235183 A (YASUMI SONODA), 27 February 1991 (27.02.91), figure 2, abstract<br>--- | 1-15 |
| A | US 5915301 A (DAVID CLARKE POLLOC), 29 June 1999 (29.06.99), figure 4, abstract<br>--- | 1-15 |
| A | WO 9942397 A1 (LTS LOHMANN THERAPIE-SYSTEME GMBH), 26 August 1999 (26.08.99), figure 1, abstract<br>--- | 1-15 |

[X] Further documents are listed in the continuation of Box C. [X] 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 application or patent 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 |
|---|---|
| 1 October 2001 | 03 -10- 2001 |
| Name and mailing address of the ISA/<br>Swedish Patent Office<br>Box 5055, S-102 42 STOCKHOLM<br>Facsimile No. +46 8 666 02 86 | Authorized officer<br>Ulrika Nilsson/MP<br>Telephone No. +46 8 782 25 00 |

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/01532

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | SE 448296 B (RENGO CO LTD), 9 February 1987 (09.02.87), figure 1, abstract<br><br>--<br>-------- | 1-15 |

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/SE 01/01532

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| SE 408546 B | 18/06/79 | BE 821603 A | 17/02/75 |
| | | CA 1021364 A | 22/11/77 |
| | | CH 593850 A | 15/12/77 |
| | | DE 2451156 A,C | 30/04/75 |
| | | FR 2249013 A,B | 23/05/75 |
| | | GB 1447847 A | 02/09/76 |
| | | IT 1032111 B | 30/05/79 |
| | | JP 50078416 A | 26/06/75 |
| | | SE 7413529 A | 30/04/75 |
| | | US 3970297 A | 20/07/76 |
| GB 2235183 A | 27/02/91 | CA 2023736 A | 22/02/91 |
| | | DE 4026431 A | 28/02/91 |
| | | FR 2653625 A | 26/04/91 |
| | | GB 9018247 D | 00/00/00 |
| | | IT 1243058 B | 23/05/94 |
| | | IT 9021290 D | 00/00/00 |
| | | JP 3078366 A | 03/04/91 |
| US 5915301 A | 29/06/99 | EP 0908310 A | 14/04/99 |
| | | JP 11193178 A | 21/07/99 |
| WO 9942397 A1 | 26/08/99 | AU 2923199 A | 06/09/99 |
| | | DE 19806966 A | 09/09/99 |
| | | EP 1056673 A | 06/12/00 |
| | | NO 20004150 A | 18/08/00 |
| SE 448296 B | 09/02/87 | AT 385468 B | 11/04/88 |
| | | AT 419981 A | 15/09/87 |
| | | AU 550332 B | 20/03/86 |
| | | AU 7594881 A | 08/04/82 |
| | | CA 1175931 A | 09/10/84 |
| | | CH 645942 A | 31/10/84 |
| | | DE 3138673 A,C | 15/04/82 |
| | | FR 2491390 A,B | 09/04/82 |
| | | GB 2085200 A,B | 21/04/82 |
| | | IT 1140212 B | 24/09/86 |
| | | IT 8124277 D | 00/00/00 |
| | | JP 1227150 C | 31/08/84 |
| | | JP 57077556 A | 14/05/82 |
| | | JP 59001654 B | 13/01/84 |
| | | MX 6902 E | 13/10/86 |
| | | NL 189037 B,C | 16/07/92 |
| | | NL 8104363 A | 03/05/82 |
| | | NZ 198399 A | 24/08/84 |
| | | SE 8105750 A | 03/04/82 |
| | | US 4392910 A | 12/07/83 |
| | | ZA 8106548 A | 29/09/82 |