

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 September 2001 (07.09.2001)

PCT

(10) International Publication Number
WO 01/65006 A1

(51) International Patent Classification⁷: **D21G 9/00**

(21) International Application Number: PCT/FI01/00204

(22) International Filing Date: 1 March 2001 (01.03.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20000500 3 March 2000 (03.03.2000) FI

(71) Applicant (for all designated States except US): **METSO PAPER, INC.** [FI/FI]; Fabianinkatu 9 A, FIN-00130 Helsinki (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KALLIO, Ismo** [FI/FI]; Merenkulkijankatu 5 D 49, FIN-02320 Espoo (FI). **LAITIO, Juha** [FI/FI]; Töyrymäki 5, FIN-02760 Espoo (FI).

(74) Agent: **TAMPEREEN PATENTTITOIMISTO OY;** Hermiankatu 6, FIN-33720 Tampere (FI).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, 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.

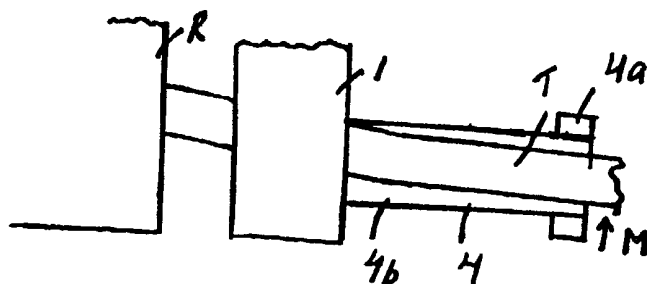
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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 DEVICE FOR CONVEYING A TAIL OF A PAPER WEB



(57) Abstract: The invention relates to a method for conveying a tail, in which a tail (T) separated from a paper web is passed for a fixed distance along a moving belt conveyor (4) in the longitudinal direction of a machine conveying the paper web by keeping the tail attached by means of a suction affecting through the belt conveyor. The tail (T) is conveyed on the belt conveyor (4) which is turned in the width direction of the machine. The invention also relates to a

belt conveyor (4) for conveying a tail (T) in the longitudinal direction of a paper machine or the like, which comprises a belt (4b) rotating around reversing rolls (4a), through which belt a suction is effective.

WO 01/65006 A1

METHOD AND DEVICE FOR CONVEYING A TAIL OF A PAPER WEB

The invention relates to a method and device for conveying a tail. The method complies with the appended claim 1, and the device is of the type presented in the preamble of the appended claim 5.

When a paper machine is started after a stoppage or a web break, the paper has to be passed through the machine again. Thus, a narrow edge strip is first separated from the edge of the paper web, which strip is first passed through the machine in the form of a so-called tail. When the tail has been passed through the machine or part of the machine, it can be spread into a full-width web. There are different guiding systems available for guiding the tail to make the tail follow the travel path of the paper web formed by cylinders and rolls. Such guiding systems, such as threading ropes and belts extend next to the actual travel path of the paper web.

One known way to transfer the narrow tail in a controlled manner is to utilize suction belts driven at the threading speed. The air permeable suction belts form loops that travel via reversing rolls, the tail being sucked against the upper surfaces of the loops by means of a suction arranged inside each loop. Typical examples of tail threadings by means of suction belt loops are disclosed for instance in the US patents 3355349 and 4022366 and in the European patent 232689.

In known threading methods the problem is that the travel of the tail is unstable before it enters the space between the ropes or belts, primarily due to forces in the lateral direction. The tail can be tightened against the rolls during the threading, wherein in diagonal threading the edge of the tail is tightened and the risk that the tail will break is increased. Furthermore, the amount of paper passed between the ropes or the belts is poorly controllable.

It is an aim of the present invention to eliminate the aforementioned drawbacks and to present a method by means of which it is possible to conduct the threading in a more reliable manner without malfunctions. To attain this purpose, the method according to the invention is primar-

ily characterized in what will be presented in the characterizing part of the appended claim 1. The device according to the invention is characterized in what will be presented in the characterizing part of claim 5.

5 It is also easy to adjust the amount of tail passed between the ropes or belts, because it is easy to stop the running of the tail at a desired point. The tail enters the space between the ropes or belts in a stable manner, and the tightening of the edge does not pose a problem. The method according to the invention can be applied in all vacuum transfer
10 belts.

At high speeds, it is of significance how the tail is guided between the threading ropes or belts. In the method according to the invention, the threading of the tail is implemented at that stage when it is devoid of
15 substantial tension in the machine direction, i.e. when the tail is slack in such a manner that it is not yet tightened against the rolls. The belt conveyor feeding the tail between the threading ropes or belts is transferred to a suitable position during threading. Negative pressure affects through the belt of the belt conveyor, said negative pressure
20 keeping the tail in its place on the surface of the belt. According to the invention, the belt conveyor is turned automatically and at the correct moment during threading so that the belt conveyor guides the tail away from between the ropes or belts. The belt conveyor is turned with respect to the turning point advantageously in the beginning of the belt.
25 Because the turning of the belt conveyor is conducted before the tail is tightened against the roll, the tail enters the space between the ropes or belts in a stable manner and the edge is not tightened under the forces that affect in the lateral direction. The method according to the invention can be applied in all vacuum transfer belts, in which the tail is
30 passed on a vacuum belt between threading ropes or belts. In threading tests by a pilot machine, the threading conducted by means of the method according to the invention raised the percentage of success to 75%, whereas experiments show that when prior art methods are used, the percentage of success is 33%. The running speed in the test was
35 1,800 m/min.

In the following, the invention will be described in more detail with reference to the appended drawings, in which

5 Fig. 1a shows the state of art in a side-view,

Fig. 1b shows the state of art in a top view,

10 Fig. 2a shows the method according to the invention in a side-view, and

Figs. 2b to 2c show the method according to the invention in a top view.

15 Figs. 1a to 1b show a method according to the state of art for threading a tail. The tail T is separated from a web unwound from a reel R. The tail T is tightened against the roll 1, and travels in this tight state to the point 2 in which it is passed between the threading ropes or belts. The tail T is guided by a belt conveyor 3, on top of which the tail T is arranged to fasten itself by means of negative pressure affecting through
20 the belt of the belt conveyor. The tail T travels in an angle with respect to the machine direction, wherein laterally loading forces are applied on the other edge of the same, said forces being capable of causing the breaking of the tail T.

25 Figs. 2a to 2c show a method according to the invention for threading a tail. The tail T is separated from a web unwound from a reel R. The threading is conducted at that stage during the travel of the tail T when said tail is slackened and conveyed to the point 2 where it is passed between the threading ropes or belts. The tail T is guided by a belt conveyor 4, on top of which the tail T is arranged to fasten itself by means of negative pressure affecting through the belt of the belt conveyor. The belt conveyor comprises reversing rolls 4a and a belt 4b, which belt can e.g. be made of the wire material of the paper machine. The negative pressure can be arranged in such a manner that a suction device is placed inside the suction belt loop, which device is connected to the lower surface of the belt and effects a holding suction
35 through the air permeable suction belt.

5 The suction device can be a vacuum box sealed against the lower surface of the belt, which is connected to the suction. The suction box can be divided into successive zones, or several suction boxes can be arranged successively, and these zones or suction boxes may contain negative pressures which can be adjusted separately.

10 The tail T which is substantially strainless, i.e. slack, is arranged to travel to the point 2 in such a manner that during the travel of the tail T under the control of the belt conveyor 4, said tail T is transferred more to the longitudinal direction of the machine. In Fig. 2c the lateral movement of the belt conveyor 4 is illustrated by means of an arrow M. Because the ropes and belts between which the tail is passed are on the side of the actual web area, the belt conveyors are typically located
15 in an angle with respect to the longitudinal direction of the machine when the threading begins. The movement of the belt conveyor 4 in the direction of arrow M is arranged by turning the belt conveyor 4 with respect to a suitable turning point. The turning function effective at the turning point can be a bearing arrangement or the like. The motion of
20 the belt conveyor is automatic, the timing is precise and relates to the threading sequence.

25 The invention is not restricted to the description above, but it may vary within the scope of the claims. The main aspect of the invention is that the tail is conveyed on a belt conveyor, which can be moved in the width direction of the machine during threading by turning it around a suitable turning point.

Claims:

1. A method for conveying a tail, in which a tail (T) separated from a paper web is passed for a fixed distance along a moving belt conveyor (4) in the longitudinal direction of a machine conveying the paper web by keeping the tail attached by means of a suction affecting through the belt conveyor, **characterized** in that the tail (T) is conveyed on the belt conveyor (4) which is turned in the width direction of the machine.
2. The method according to claim 1, **characterized** in that the belt conveyor (4) is turned around a turning point.
3. The method according to claim 2, **characterized** in that the turning point is located in the beginning of the belt conveyor (4) in the incoming direction of the paper web.
4. The method according to any of the preceding claims, **characterized** in that the tail (T) is conveyed in a substantially strainless state.
5. The method according to any of the preceding claims, **characterized** in that the belt conveyor (4) is turned by means of an automatic, precisely timed function, which relates to the threading sequence.
6. A belt conveyor (4) for conveying a tail (T) in the longitudinal direction of a paper machine or the like, which comprises a belt (4b) rotating around reversing rolls (4a), through which belt a suction is effective, **characterized** in that the belt conveyor (4) is arranged to be turned in the width direction of the machine.
7. The belt conveyor according to claim 6, **characterized** in that the belt conveyor (4) is arranged to be turned around a turning point.
8. The belt conveyor according to claim 7, **characterized** in that the turning point is located in the beginning of the belt conveyor (4) in the incoming direction of the paper web.

6

9. The belt conveyor according to any of the preceding claims 6 to 8, **characterized** in that the belt conveyor (4) is arranged to be turned by means of an automatic, precisely timed function, which relates to the threading sequence.

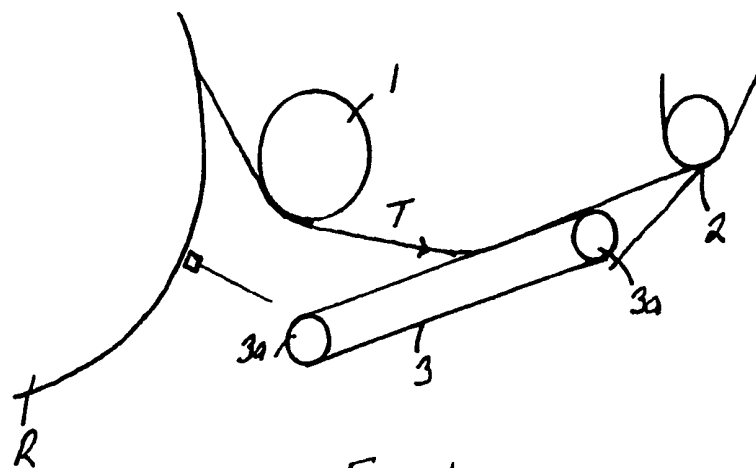
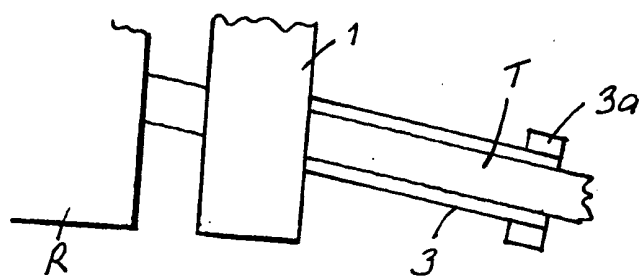


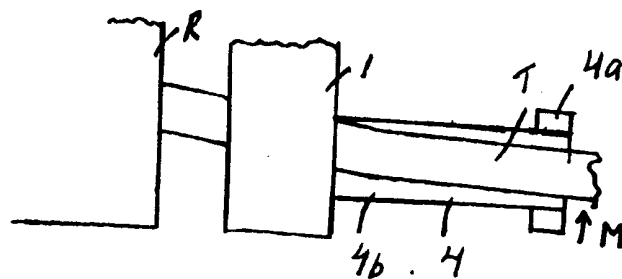
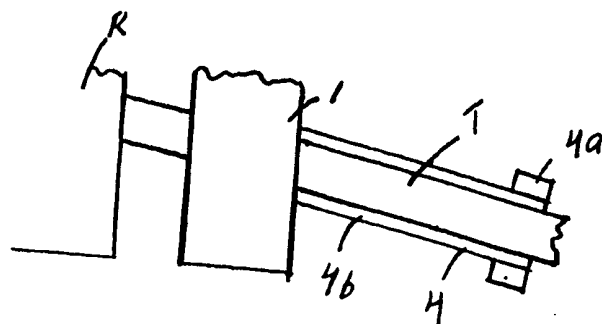
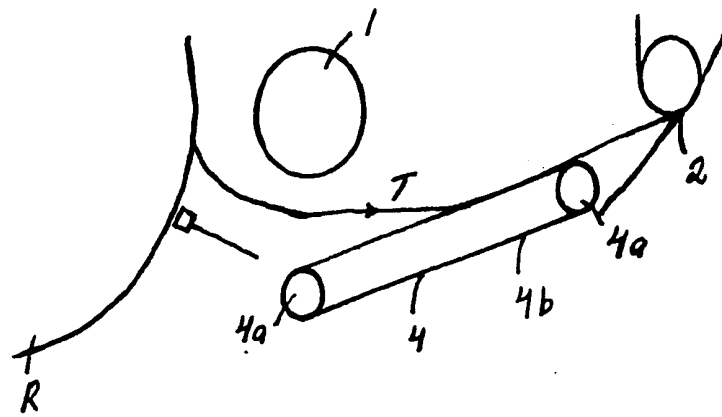
Fig. 1a.



PRIOR ART

Fig. 1b.

2/2



INTERNATIONAL SEARCH REPORT

International Application No

PCT/FI 01/00204

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 D21G9/00

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 D21G

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 296 20 474 U (VOITH SULZER PAPIERMASCH GMBH) 16 January 1997 (1997-01-16) page 9; figure 4	1-9
X	US 4 692 215 A (KERTTULA REIMA) 8 September 1987 (1987-09-08) column 5, line 30 - line 47 abstract; figures 1,4	1-9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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

13 June 2001

Date of mailing of the international search report

11.07.01

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Nina Bergström

331662

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/05/01

International application No.

PCT/FI 01/00204

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
DE	29620474	U1	27/02/97	NONE	
US	4692215	A	08/09/87	CA 1268789 A	08/05/90
				DE 3524006 A	06/02/86
				FI 69145 B,C	30/08/85
				FI 842711 D	00/00/00
				SE 8503332 A	06/01/86