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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 February 2002 (14.02.2002)

PCT

(10) International Publication Number
WO 02/12065 A1

(51) International Patent Classification[7]: B65B 11/00

(21) International Application Number: PCT/FI01/00702

(22) International Filing Date: 8 August 2001 (08.08.2001)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:
20001779 10 August 2000 (10.08.2000) FI

(71) Applicant *(for all designated States except US)*: **UNITED PACKAGING PLC** [GB/GB]; Dewsbury Road, Cleckheaton, West Yorkshire BD19 5BQ (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **HERAVA, Ismo** [FI/FI]; Järvihaankuja 6 as 5, FIN-21100 Naantali (FI).

(74) Agent: **PATENTTITOIMISTO KARI PIRHONEN OY**; P.O. Box 71, FIN-20101 Turku (FI).

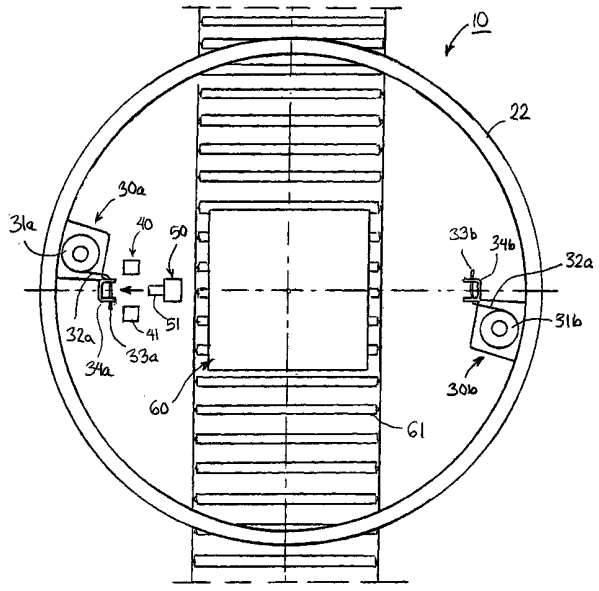
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, 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, 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 METHOD AND AN APPARATUS FOR IMPROVING FUNCTIONING OF A WRAPPING MACHINE



(57) **Abstract:** A method and an apparatus for improving the operating efficiency of a wrapping machine (10), by providing the wrapping machine (10) with two or more wrapping carriages (30a, 30b) or similar devices for two or more plastic film band rolls (31a, 31b), each of which can be taken into use in turn at any time. To permit a roll change, the wrapping machine is provided with a switch-over gripper (50) for gripping the end (33b) of the plastic film band (32b) coming from a full plastic film band roll (31b) and for pulling it onto a seaming gripper (40) before the wrapping of the next object (10) to be wrapped is started.

WO 02/12065 A1

A method and an apparatus for improving functioning of a wrapping machine

METHOD OF THE INVENTION

The present invention relates to a method for improving the operating efficiency of a wrapping machine, in which wrapping method

- at least two plastic film band rolls are placed inside the wrapping machine,
- plastic film band from at least one roll is wrapped about the object to be wrapped next,
- after the object has been wrapped up, the plastic film band is seamed and severed, whereupon the next object can be wrapped,
- and that the wrapping action can be continued until the plastic film band on the roll has been used up.

PRIOR-ART METHOD

According to a prior-art wrapping method, the wrapping machine is stopped when the plastic film band on the roll has been used up. After that, the empty roll is replaced with a full one either manually or by means of an automatic roll changing mechanism. However, changing the roll always involves the waste of a considerable deal of valuable wrapping time.

In a manual roll changing operation, first the safety screen of the wrapping machine is opened and then also the wrapping carriage inside the wrapping machine. The empty roll on the wrapping carriage is removed and replaced with a full roll. Finally, the wrapping carriage and the safety screen of the wrapping machine are closed.

An automatic roll changing operation also takes a long time because even in this case the roll changing mechanism must first get the empty roll out of the stopped wrapping machine and then bring in a full roll to replace the empty one from outside the wrapping machine.

APPARATUS OF THE INVENTION

The invention also relates to an apparatus for improving the operating efficiency of a wrapping machine, said wrapping machine comprising

- at least two wrapping devices, such as wrapping carriages, provided with plastic film band rolls to allow plastic film band to be wound about the object to be wrapped,
- and means for seaming and severing the plastic film band.

PRIOR-ART APPARATUS

A known solution is to provide the wrapping machine with an automatic device for changing the plastic film band roll, by means of which an exhausted plastic film band roll can be replaced with a full one. The change of rolls is performed with the wrapping machine in a fully inactive state. The changing mechanism extracts the empty roll from inside the wrapping machine and moves it out of the machine. After that, the changing mechanism takes a full roll onto the wrapping carriage inside the machine.

However, the automatic roll changing mechanism is technically complicated and its operation takes a relatively long time because the wrapping machine has to be brought to a complete standstill for the duration of the roll change. The roll changing mechanism must first get the empty roll out of the wrapping machine and then bring in a full roll from outside the machine to replace the exhausted one.

OBJECT OF THE INVENTION

The object of the invention is to achieve a method and an apparatus for improving the operating efficiency of a wrapping machine which do not have the above-described disadvantages.

FEATURES CHARACTERISTIC OF THE METHOD OF THE INVENTION

The method of the invention is characterized in that, after one plastic film band roll has been used up, wrapping is continued from another, full plastic film band roll placed inside the wrapping machine.

It is obvious that substantially faster operation is achieved if wrapping is continued from a roll already at hand than if a new roll has to be brought in from outside the wrapping machine.

EMBODIMENTS OF THE METHOD OF THE INVENTION

According to a preferred embodiment of the method of the invention,

- each plastic film band roll is placed on a separate wrapping device, and that
- after the plastic film band roll being used for wrapping has been exhausted, the wrapping operation is continued using another wrapping device which contains a full plastic film band roll.

According to a second preferred embodiment of the method of the invention, the wrapping operation is started or continued using a wrapping device containing a full plastic film band roll by gripping the end of the plastic film band coming from the full plastic film band roll and locking it in place before starting the wrapping of the next object to be wrapped.

FEATURES CHARACTERISTIC OF THE APPARATUS OF THE INVENTION

The apparatus of the invention is characterized in that the wrapping machine comprises means for switching the wrapping process from an exhausted plastic film band roll to a full plastic film band roll.

The means for switching the wrapping process from one roll to another are technically simple and therefore reliable in operation.

EMBODIMENTS OF THE APPARATUS OF THE INVENTION

A preferred embodiment of the apparatus of the invention is characterized in that

- the wrapping machine comprises at least two separate wrapping devices, such as wrapping carriages, containing a plastic film band roll, and that
- the wrapping machine is provided with a switch-over gripper for gripping the end of the plastic film band coming from a full plastic film band roll.

A second preferred embodiment of the apparatus of the invention is characterized in that

- the switch-over gripper can be moved to a position near the end of the plastic film band coming from the plastic film band roll and in a direction away from said plastic film band end, and that
- a seaming gripper is placed near the path of the switch-over gripper, and that
- the seaming gripper has been arranged to grip the plastic film band drawn out from the plastic film band roll by the switch-over gripper.

A third preferred embodiment of the device of the invention is characterized in that the wrapping device, such as wrapping carriage, containing a plastic film band roll is provided with a holder in which the end of the plastic film band is set so that it can be gripped by the switch-over gripper.

EXAMPLES OF EMBODIMENTS

In the following, the invention will be described by the aid of a few examples with reference to the attached drawings, wherein

LIST OF DRAWINGS

Fig. 1 presents a diagrammatic side view of a wrapping machine with two wrapping carriages.

Fig. 2-4 present the wrapping machine of Fig. 1 at different stages of a roll change operation.

Fig. 5 presents the wrapping machine of Fig. 1 at the start of a wrapping operation.

Fig. 6 presents the wrapping machine of Fig. 1 in diagrammatic top view.

DESCRIPTION OF THE DRAWINGS

Fig. 1 presents a side view of a wrapping machine 10 for winding a plastic film band 32 about an object 60 to be wrapped, which is placed on a conveyor track 61. In this example, the wrapping machine 10 is a ring-type wrapping machine with a hoisting frame 20 vertically movable along vertical rails 21. Supported by support rollers 23 on the hoisting frame 20 is the rotating ring 22 of the wrapping machine 10, carrying two wrapping carriages 30a and 30b. Attached to the hoisting frame 20 is a seaming unit 40 provided with a gripper 41 for gripping the plastic film band as well as means for seaming and severing the plastic film band.

Each wrapping carriage 30a and 30b carries a roll 31a, 31b of plastic film band 32a, 32b to be wound about the object to be wrapped 60. In the wrapping carriages 30a and 30b, the ends 33a and 33b of the plastic film bands are placed in holders 34a and 34b. The wrapping machine 10 further comprises a switch-over gripper unit 50, which moves horizontally on a slide 52. The switch-over gripper unit 50 is provided with gripper jaws 51 which can grip the plastic film band ends 33a and 33b in the holders 34a and 34b on the wrapping carriages 30a and 30b. In a roll change situation, the rotating ring 22 of the wrapping machine 10 is turned to a position such that the holder 34a of the a plastic film band end 33a on one of the wrapping carriages, in Fig. 1 wrapping carriage 30a, is aligned with the gripper jaws 51 of the switch-over gripper unit 50.

Fig. 2 illustrates the initial stage of a roll change operation in the wrapping machine 10. At this point, the switch-over gripper unit 50 has been raised so that the gripper jaws 51 are at the level of the plastic film band ends 33a and 33b in the holders 34a and 34b of the wrapping carriages 30a and 30b. While the switch-over gripper unit 50 is moving horizontally on the slide 52, in Fig. 2 to the left, the gripper jaws 51 are opened.

In Fig. 3 the gripper jaws 51 of the switch-over gripper unit 50 of the wrapping machine 10 have gripped the end 33a of the plastic film band. After that, the switch-over gripper unit 50 has moved to the right in Fig. 3 along the slide 52, so that the plastic film band end 33a has been released from the holder 34a. The jaws 51 of the switch-over gripper unit 50 have pulled the plastic film band end 33a and the plastic film band 32a off the roll 31a so that the plastic film band 32a has now reached the gripper 41 of the seaming unit 40.

In Fig. 4, the gripper 41 of the seaming unit 40 of the wrapping machine 10 has engaged the plastic film band 32a and the gripper jaws 51 of the switch-over gripper unit 50 have been opened. This situation corresponds to a situation in a prior-art wrapping machine where the end of the plastic film band to be used for wrapping has been set into the gripper of a seaming unit to allow the wrapping to be started or continued from a new, full roll.

In Fig. 5, the gripper 41 of the seaming unit 40 of the wrapping machine 10 has turned into a horizontal position in a known manner and the ring 22 with the wrapping carriages 30a and 30b has started to rotate, so the wrapping of the object 60 with plastic film band 32a has begun. At the same time, the switch-over gripper unit 50 has returned to its initial position, i.e. to the low position so that it is out of the way of the circulating wrapping carriages 30a and 30b.

In Fig. 5, the object 60 is being wrapped with plastic film band 32a obtained from a roll 31a on wrapping carriage 30a. The roll 31b on the other wrapping carriage 30b attached to the rotating ring 22 is circulating with the ring but only as a stand-by roll ready for use when roll 31a is exhausted. When roll 31a runs out of plastic film band, the wrapping is continued using the roll 31b on the other wrapping carriage 30b. Roll 31b is put into active use by steps identical with those for roll 31a as illustrated in Fig. 2-4. However, since both rolls 31a and 31b are already within the wrapping machine 10, the roll change can be performed substantially faster and more effectively than in prior-art wrapping machines, in which the new roll is always brought in from outside the machine.

Fig. 6 presents a simplified top view of the wrapping machine 10 in Fig. 1. As shown in the figure, the rotating ring 22 of the wrapping machine 10 is provided with two wrapping carriages 30a and 30b, each carrying a plastic film band roll 31a, 31b. The end of the plastic film band 32a, 32b on each roll 31a, 31b is placed in a holder 34a, 34b attached to the wrapping carriage 30a, 30b.

Fig. 6 illustrates an initial situation in which each wrapping carriage 30a, 30b of the wrapping machine 10 is provided with a full plastic film band roll 31a, 31b. In preparation for the start of the wrapping action, the rotating ring 22 has been turned to an initial position such that the end 33a of the plastic film band 32a in the band holder 34a of the first wrapping carriage 30a is aligned with the jaws 51 of the switch-over gripper unit 50.

Next, the switch-over gripper unit 50 moves to the left in Fig. 6 and the gripper jaws 51 grip the end 33a of the plastic film band 32a in holder 34a, as is also shown in Fig. 2. After that, the gripper jaws 51 pull the end 33a of the plastic film band 32a to the right in Fig. 6 so that the plastic film band 32a extends across the gripper 41 of the seaming unit 40. This situation is also illustrated in Fig. 3. The gripper 41 now engages the plastic film band 32a and the jaws 51 of the switch-over gripper unit 50 are opened, as is also shown in Fig. 4. After the switch-over gripper unit 50 has moved down to be out of the way of the wrapping carriages 30a and 30b, the machine can start wrapping the object 60 on the conveyor track 61 from the roll 31a on wrapping carriage 30a.

ADDITIONAL REMARKS

It is obvious to the person skilled in the art that different embodiments of the invention may be varied within the scope of the claims presented below. Thus, the invention is not limited to the ring-type wrapping machine presented in the drawings. In a corresponding manner, other types of wrapping machine can equally well be provided with two or more wrapping carriages or similar wrapping devices for winding a plastic film band, so that a substantially more effective roll change can be achieved.

CLAIMS

1. Method for improving the operating efficiency of a wrapping machine (10), in which wrapping method

- at least two plastic film band rolls (31a, 31b) are placed inside the wrapping machine (10),
- plastic film band (32) from at least one roll (31) is wound about the object (60) to be wrapped next,
- after the object (60) has been wrapped, the plastic film band (32) is seamed and severed, whereupon the next object can be wrapped,
- and the wrapping action can be continued until all the plastic film band (32) on the roll (31) has been used up,

c h a r a c t e r i z e d in that

- after one plastic film band roll (31a) has been exhausted, the wrapping operation is continued from another, full plastic film band roll (31b) placed inside the wrapping machine (10).

2. Method as defined in claim 1, c h a r a c t e r i z e d in that

- each plastic film band roll (31a, 31b) is placed in a separate wrapping device (30a, 30b), and that
- after the plastic film band roll (31a) being used for wrapping has been exhausted, the wrapping operation is continued using another wrapping device (30b) containing a full plastic film band roll (31b) .

3. Method as defined in claim 1 or 2, c h a r a c t e r i z e d in that the wrapping operation is started or continued using a wrapping device (30a) containing a full plastic film band roll (31a) by gripping the end (33a) of the plastic film band (32a) coming from the full plastic film band roll and locking it in place before starting the wrapping of the next object to be wrapped.

4. Apparatus for improving the operating efficiency of a wrapping machine (10), said wrapping machine comprising

- at least two wrapping devices (30a, 30b), such as wrapping carriages, provided with plastic film band rolls (31a, 31b) to allow plastic film band (32a, 32b) to be wound about the object (60) to be wrapped,
- and means (40) for seaming and severing the plastic film band (32a, 32b) .

c h a r a c t e r i z e d in that

- the wrapping machine (10) comprises means (50) for switching the wrapping process from an exhausted plastic film band roll (31a) to a full plastic film band roll (31b).

5. Apparatus as defined in claim 4, c h a r a c t e r i z e d in that
- the wrapping machine (10) comprises at least two separate wrapping devices (30a, 30b) containing a plastic film band roll (31a, 31b), such as wrapping carriages, and that
- the wrapping machine (10) is provided with a switch-over gripper (50) for gripping the end (33b) of the plastic film band (32b) coming from a full plastic film band roll (31b).

6. Apparatus as defined in claim 4 or 5, c h a r a c t e r i z e d in that
- the switch-over gripper (50) can be moved to a position near the end (33) of the plastic film band (32) coming from the plastic film band roll (31) and in a direction away from said plastic film band end, and that
- a seaming gripper (40) is placed near the path of the switch-over gripper (50), and that
- the seaming gripper (40) has been arranged to grip the plastic film band (32) drawn out from the plastic film band roll (31) by the switch-over gripper (50).

7. Apparatus as defined in claim 4, 5 or 6, c h a r a c t e r i z e d in that the wrapping device (30), such as wrapping carriage, containing a plastic film band roll (31) is provided with a holder (34) in which the end (33) of the plastic film band (32) is set so that it can be gripped by the switch-over gripper (50).

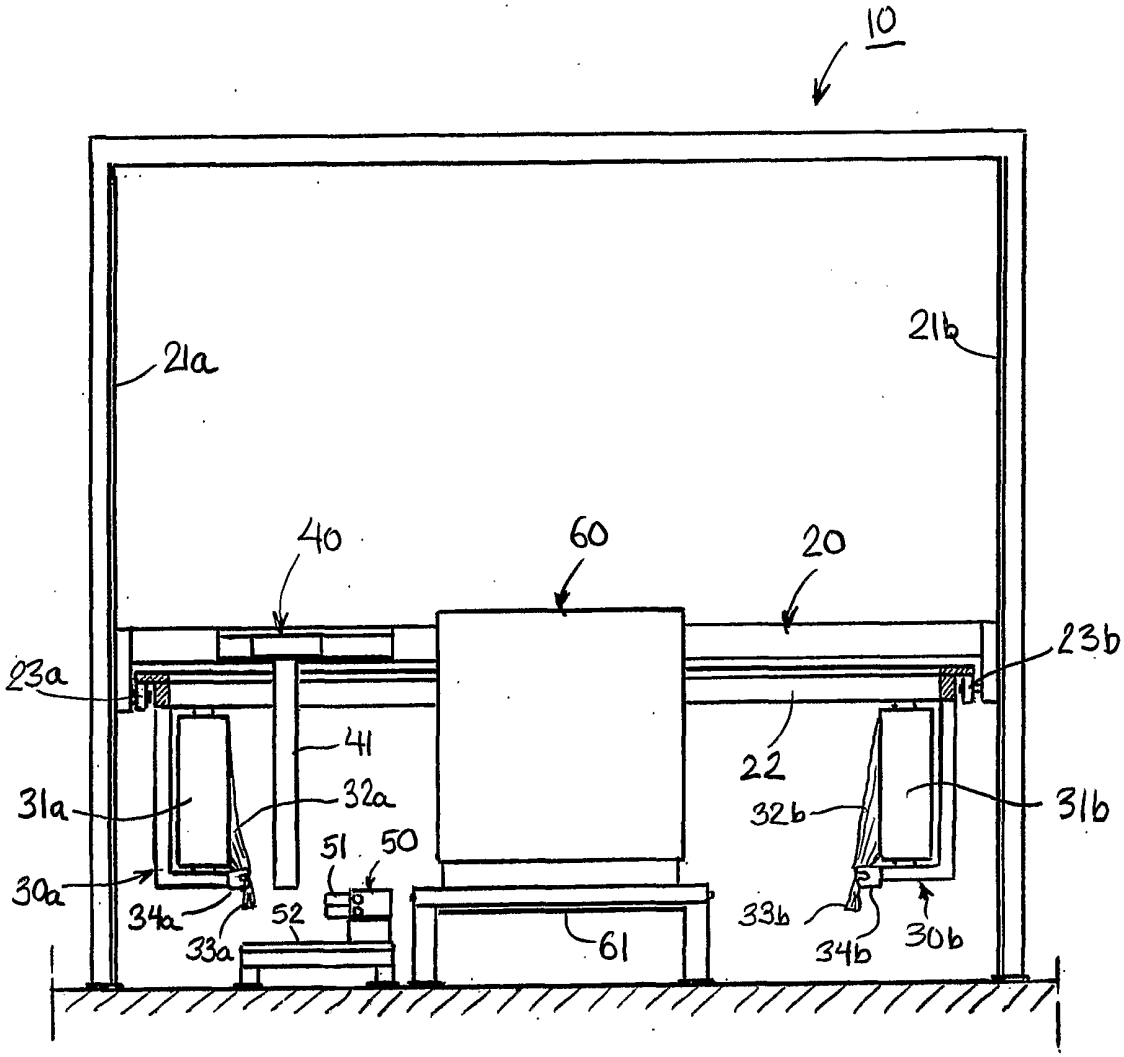

10
21a
21b
40
60
20
23a
23b
41
22
31a
32a
32b
31b
51
50
30a
34a
52
33a
61
33b
34b
30b

FIG. 1

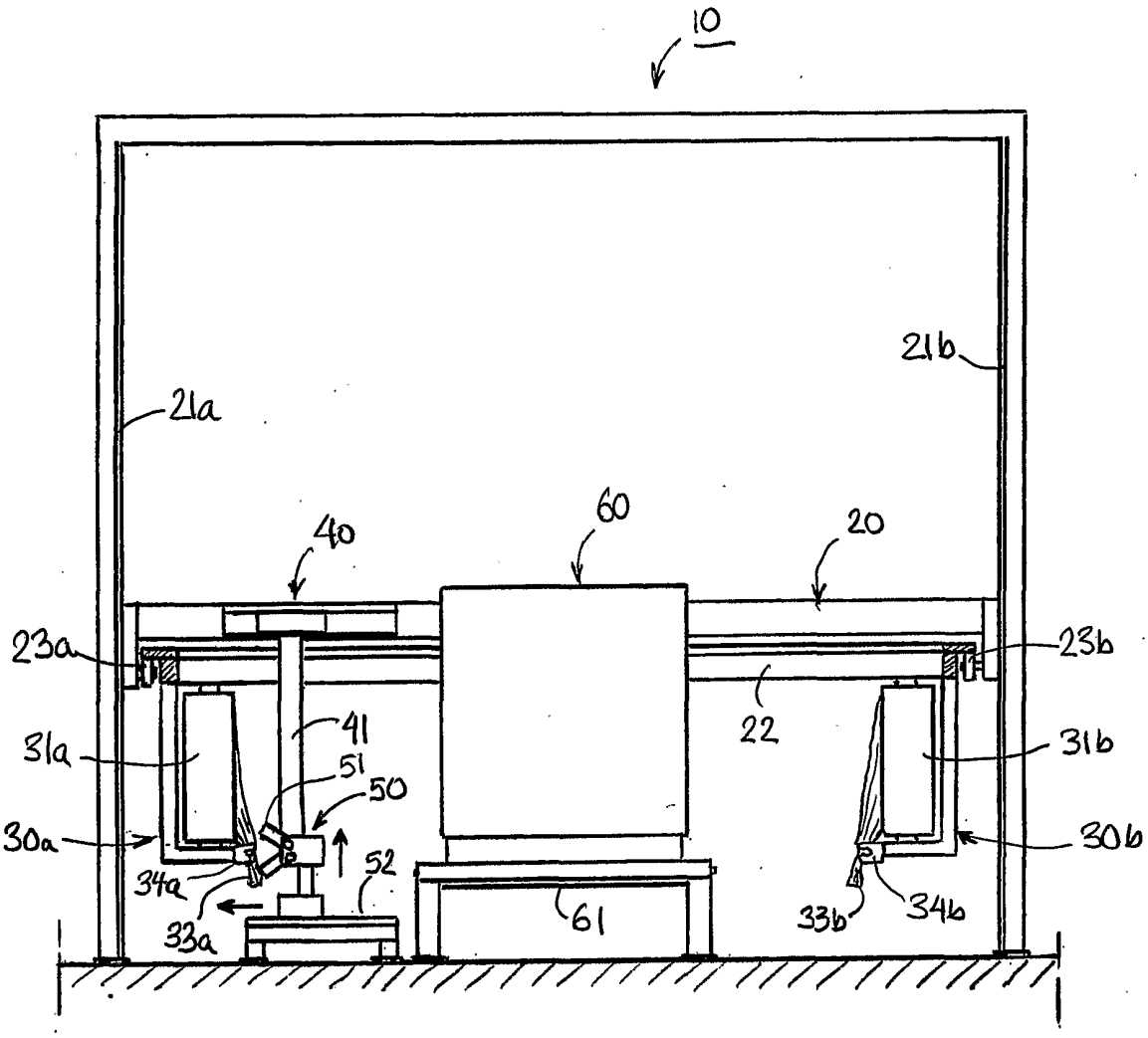

10
21b
21a
40
60
20
23a
23b
22
41
31a
31b
51
50
30a
30b
52
34a
33a
61
33b
34b

FIG. 2

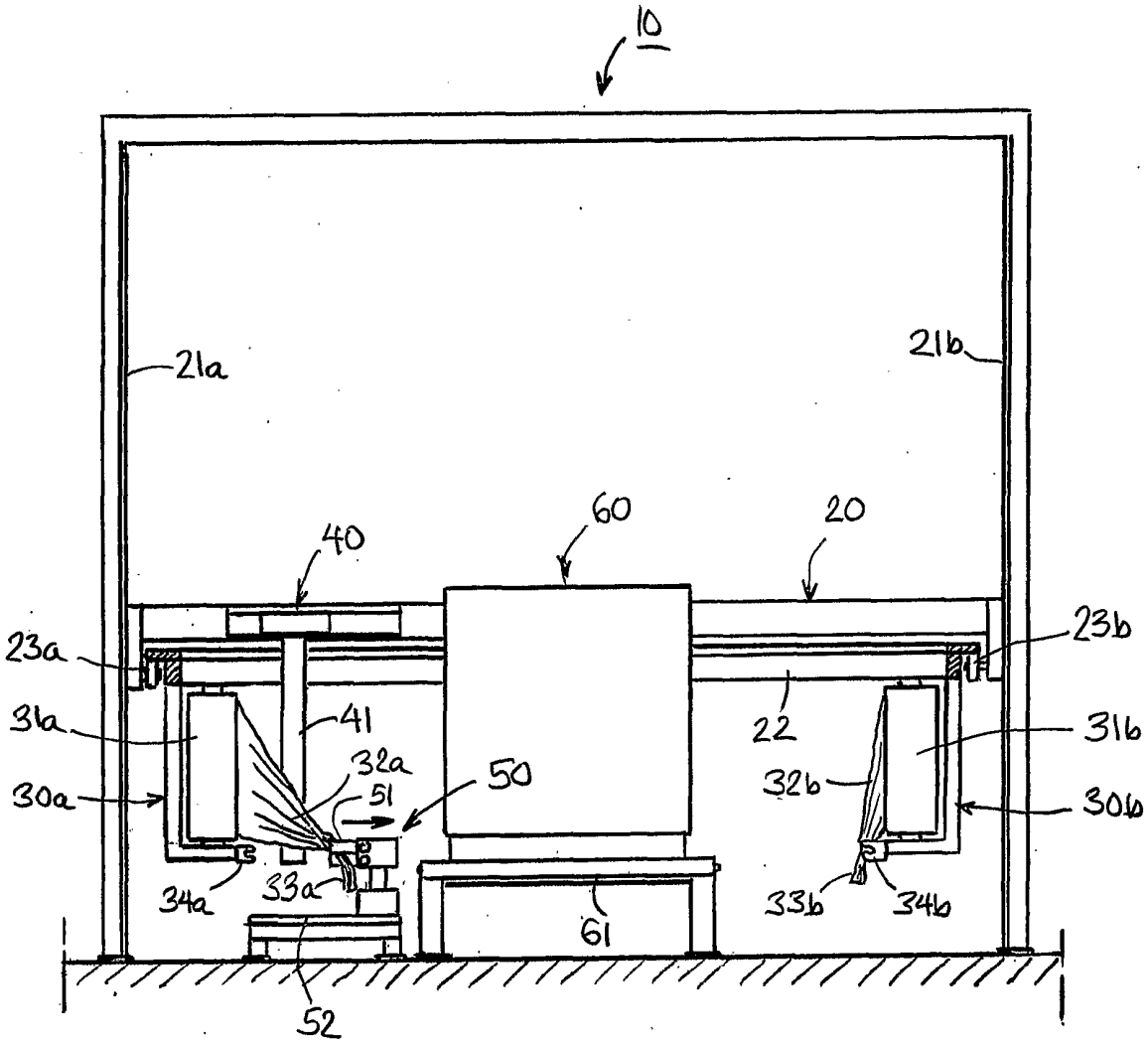

10
21a
21b
60
20
40
23a
23b
31a
41
22
31b
32a
50
32b
30a
51
30b
34a
33a
33b
34b
61
52

FIG.3

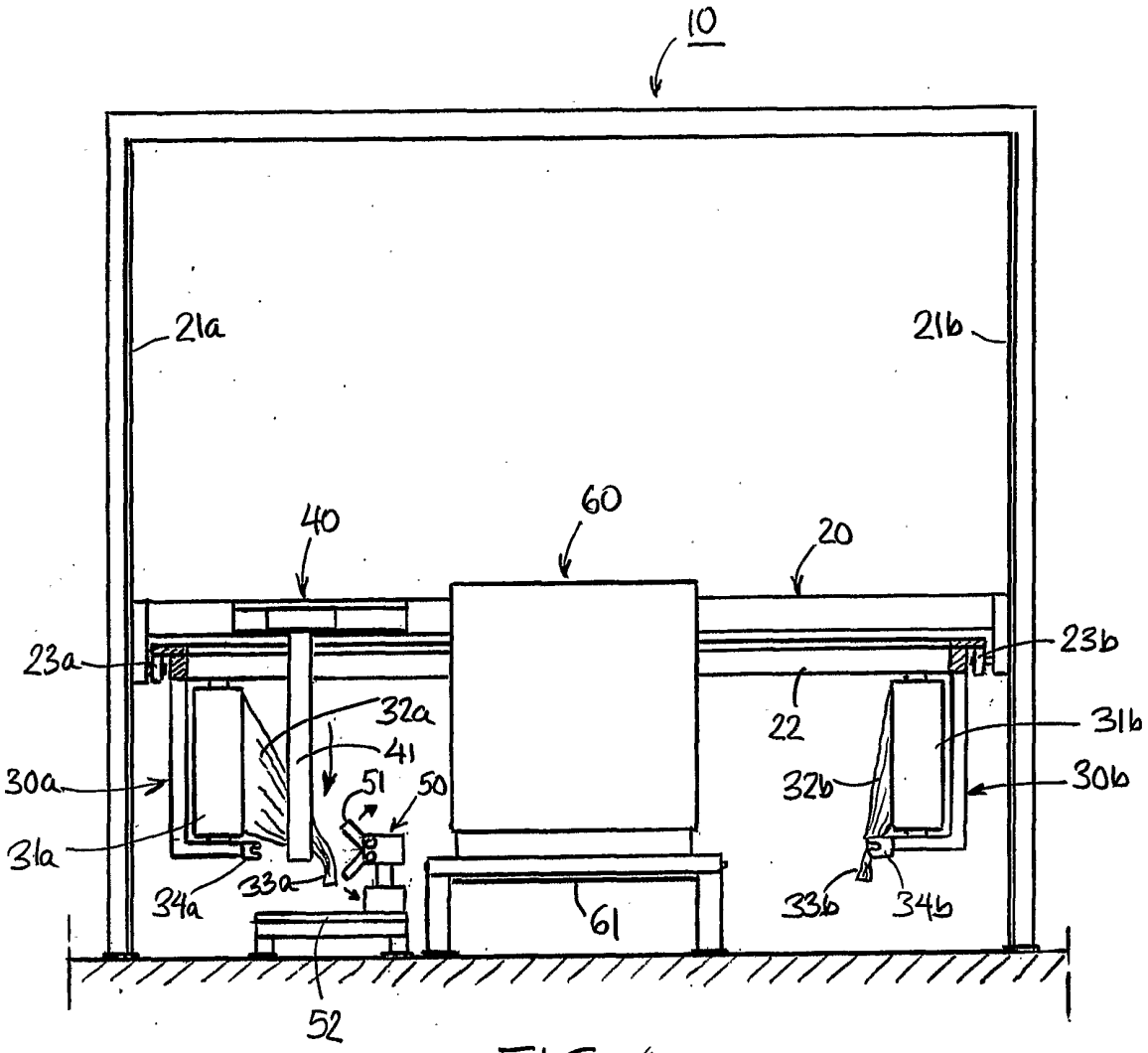

10
21a
21b
40
60
20
23a
23b
22
32a
41
51
50
30a
31a
34a
33a
61
32b
31b
30b
33b
34b
52

FIG.4

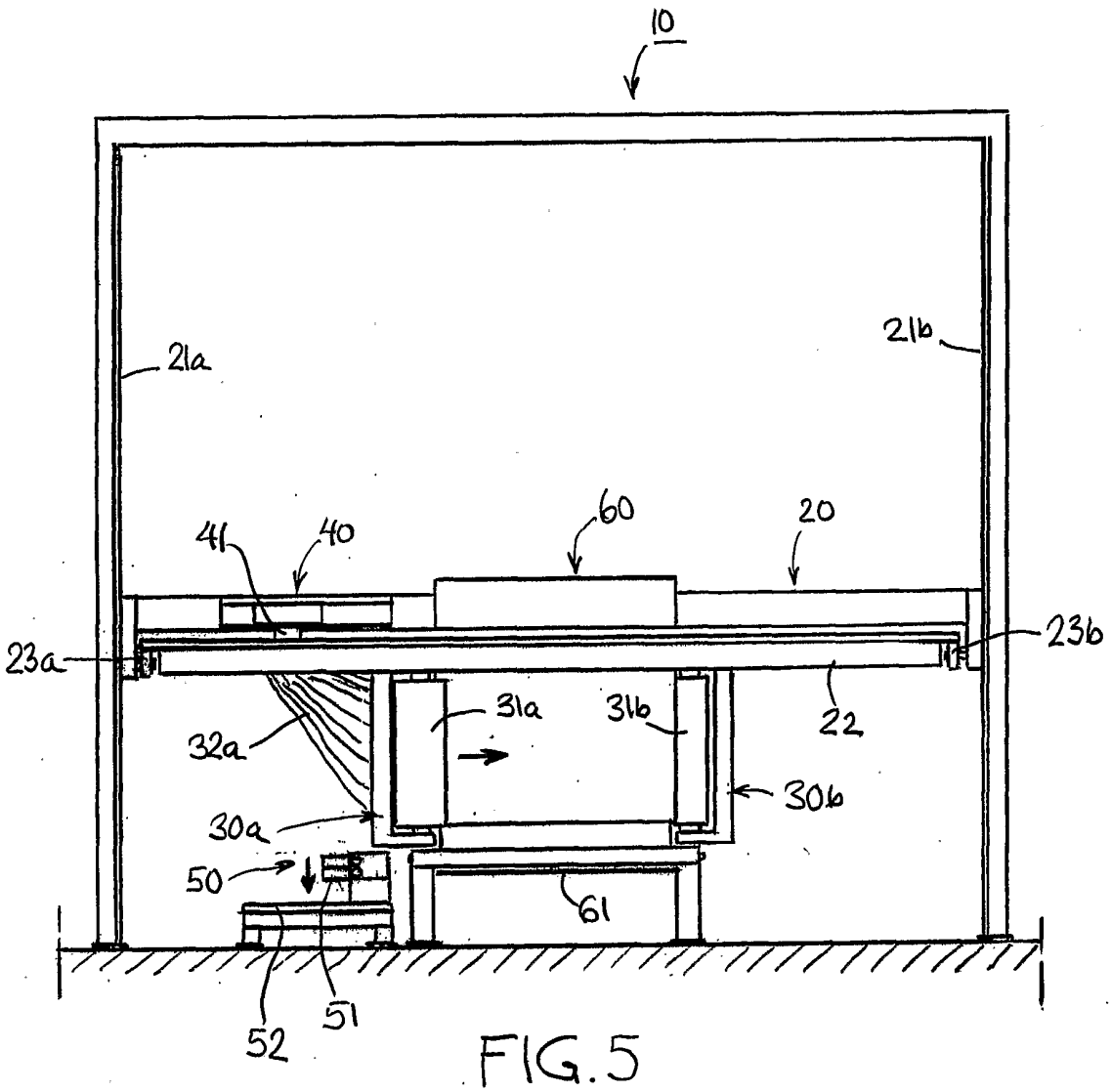


FIG.5

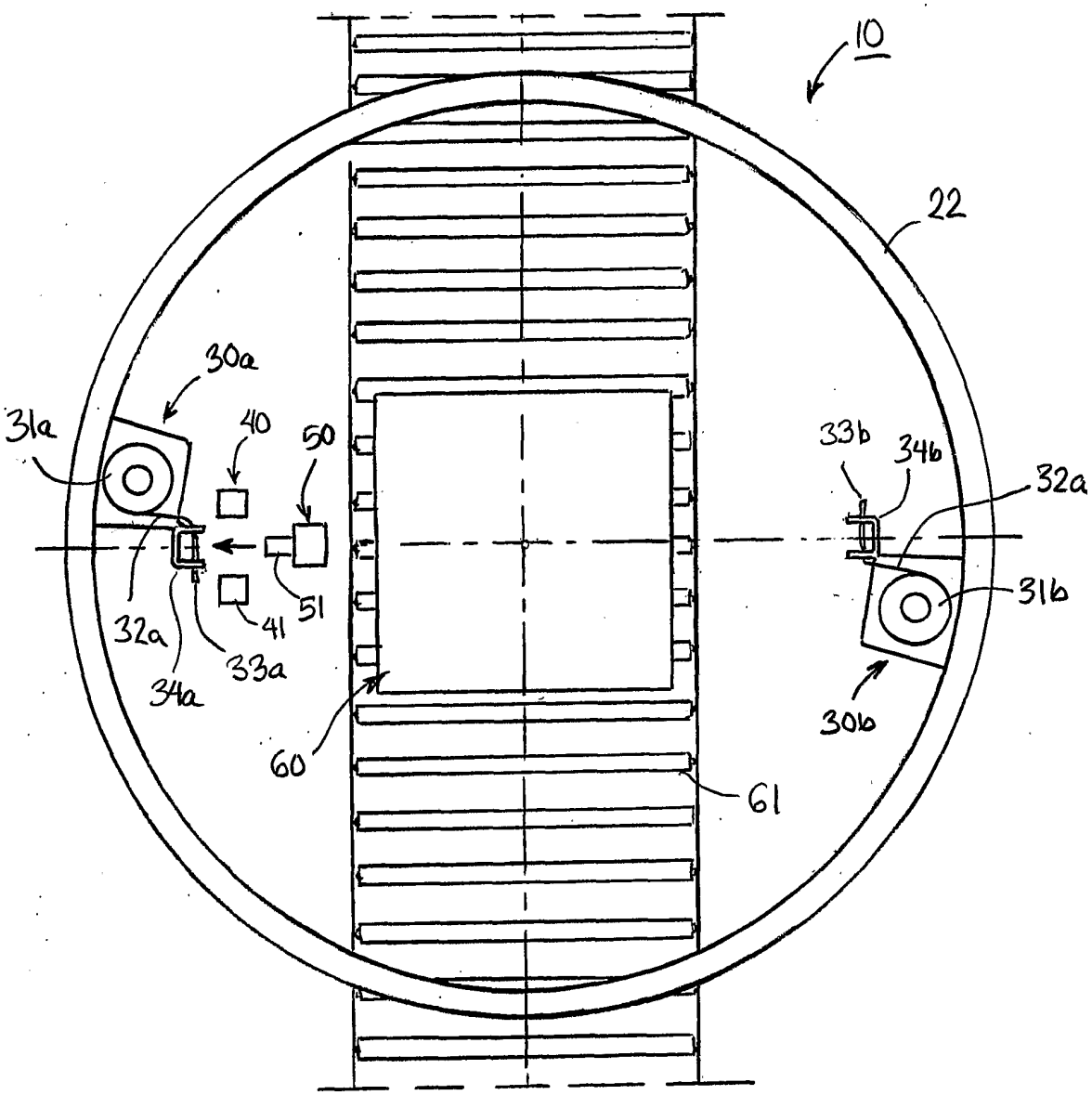


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 01/00702

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65B 11/00
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: B65B

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0016607 A1 (WELMOUNT LIMITED), 30 March 2000 (30.03.00), page 17, line 7 - line 28	1,2,3,4
Y	--	5,6,7
Y	Patent Abstracts of Japan, Vol 17,No 667, M-1524 abstract of JP 52-21409 A (FUJI SEISAKUSHO:KK), 31 August 1993 (31.08.93)	5,6,7
	--	
A	EP 0293352 A2 (OY M. HALOILA AB), 30 November 1988 (30.11.88)	1-7
	--	

[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
25 October 2001	26 -10- 2001
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 Kristina Berggren/Els Telephone No. +46 8 782 25 00

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 01/00702

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 0076852 A1 (PESMEL OY), 21 December 2000 (21.12.00) -- SE 463914 B (A BILLBERG AB), 11 February 1991 (11.02.91) -- --------	1-7 1-7

INTERNATIONAL SEARCH REPORT

Information on patent family members

01/10/01

International application No.
PCT/FI 01/00702

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0016607 A1	30/03/00	AU 5996099 A	10/04/00
		EP 1115276 A	18/07/01
EP 0293352 A2	30/11/88	SE 0293352 T3	
		CA 1305402 A	21/07/92
		DE 3874212 A,T	08/10/92
		ES 2034390 T	01/04/93
		FI 78433 B,C	28/04/89
		FI 872358 A	28/11/88
		US 4914891 A	10/04/90
WO 0076852 A1	21/12/00	AU 4409300 A	02/01/01
		AU 4570100 A	02/01/01
		FI 106785 B	00/00/00
		FI 991327 A	11/12/00
		US 6276116 B	21/08/01
		WO 0076851 A	21/12/00
SE 463914 B	11/02/91	AT 97867 T	15/12/93
		DE 69004956 D	00/00/00
		EP 0470196 A,B	12/02/92
		SE 8901489 D	00/00/00
		SE 9000181 A	25/10/90
		WO 9012737 A	01/11/90