



(51) International Patent Classification:
B65H 73/00 (2006.01)

(21) International Application Number:
PCT/SE2013/050758

(22) International Filing Date:
24 June 2013 (24.06.2013)

(25) Filing Language: Swedish

(26) Publication Language: English

(30) Priority Data:
1200407-3 3 July 2012 (03.07.2012) SE

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

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(54) Title: METHOD FOR REMOVAL OF MATERIAL RESIDUES FROM ROLLS WITH A MATERIAL CARRYING CORE

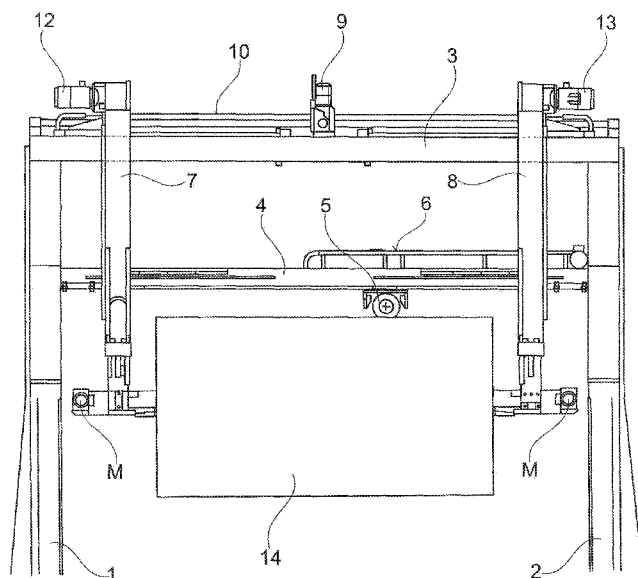


Fig. 2

(57) Abstract: The present invention concerns a method for removal of material residues, particularly tissue or similar porous, non- self-supporting materials, from a material-carrying core, which often has relatively large dimensions, e.g. a diameter of approx. 300 mm and a length of approx. 2540 mm, and thereby allow re-use of the core in the same way as new and unused cores a number of times for winding non-self-supporting or porous material, particularly tissue, wherein a cut section is made in the envelope surface of the roll having the material- carrying core from one end or end portion of the roll to the other end or end portion of the roll by means of a driven rotary knife, which is connected to a motor for rotation of the same.



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METHOD FOR REMOVAL OF MATERIAL RESIDUES FROM ROLLS WITH A
MATERIAL CARRYING CORE.

The present invention concerns a method according to the
5 preamble of claim 1.

Particularly in the tissue industry, large cores are used
having an inner diameter of, for instance, 250 to 600 mm and
having large lengths. For economical reasons, and not the
10 least environmental reasons, it is a large advantage if such
large cores can be re-used as many times as possible. For this
purpose, it is necessary to remove the material residues from
a roll for the exposure of the material-carrying core and this
has hitherto been done in a manual way by means of knives and
15 other tools. This often leads to damage to the extraordinarily
sensitive envelope material, which damage makes re-use of the
cores impossible. Attempts at mechanical cleaning, which means
cutting down of porous materials or non-self-supporting
materials, e.g. tissue, and the like by means of so-called
20 roll cutters of conventional type, often lead to problems with
the capacity. There arise so-called "confetti" and problem of
getting rid of cut-off material from the roll, i.e., the core
with the material, because of the surfaces not being smooth,
and therefore the cut away material has a tendency to stay on
25 the subjacent material not yet cut-off. The capacity problem
depends largely on the fact that, in a conventional roll
cutter, it is not possible to make a deep cut section, but the
material is pulled and torn away. Said material, the so-called
"confetti", whirls on one hand around in the air and on the
30 other hand falls down on the floor at the ends of the roll and
gives rise to disturbances to sensors, etc., as well as leads
to worse working environment around the equipment. Thus, there
is a large need of a method to eliminate said complex of
problems.

The object of providing such a method that meets the above-mentioned need forms the basis of the present invention.

This object is realised by the present invention in the method
5 mentioned by way of introduction by it being given the characteristic features of claim 1.

By, according to the present invention, rotating the knife by means of a motor, no tearing up or away of materials occurs
10 and the section surface or cut section will become more or less free from loose material. The motor-driven rotary knife allows considerably greater depth of the cut section than previously. The depth of the cut section can be increased to several centimetres from, as previously, a few millimetres. By
15 the method according to the present invention, the amount of loose material is reduced to almost nothing at all. Furthermore, the capacity is increased by the greater cut section depth and by the material falling off the roll easily by rotation of the roll in different directions after the cut
20 section. This means large savings both from an economic and an environmental point of view.

In the following, the present invention will be described in more detail, reference being made to the appended drawings.
25 Fig. 1 shows a view from the front of a device for carrying out the method according to the present invention. Fig. 2 shows a similar view as Fig. 1 with parts in another position. Fig. 3 shows a similar view as Figs. 1 and 2 with parts in an additional position. Fig. 4 shows a view from above of a part
30 of the device in Figs. 1-3 with a part of the roll composed of core and material sectioned along the centre line. Figs. 5A-5D show a number of side views of a roll having material residues on a core for the illustration of different stages of an embodiment of a method according to the present invention.

In the following, an embodiment of a method according to the present invention will be described as well as a device for executing the same. The device shown in Figs. 1-3 is in the form of a portal having legs 1 and 2 as well as a beam 3 resting on the legs. The legs 1 and 2 rest on each side of a working surface, e.g. platform or a table (not shown). The legs 1 and 2 may be fixed but also movable along the working surface. A tool-carrying beam 4 extends between the legs 1 and 2 under the beam 3. The tool-carrying beam 4 may be fixed or movable up and down along the legs 1 and 2. The beam 4 supports a driven rotary knife 5. The driven rotary knife 5 is movable to and fro on the beam 4 between the legs 1 and 2 by means of a driving arrangement 6. From the beam 3, two pairs of vertical arms 7 and 8 extend, one of the pairs of vertical arms 7 being arranged near the leg 1 and the other pair of vertical arms 8 being arranged at the leg 2. The arms 7 and 8 are movable to and from the legs 1 by means of a motor 9 and tooth belts 10, or the like.

The part of the device shown in Fig. 4 for carrying out the method according to the present invention is provided with a rotary chuck 11 mounted on the lower end of the arms 7 and 8. The part according to Fig. 4 having the rotary chuck 11 is liftable and lowerable by means of a motor 12 on one arm pair 7 and a motor 13 on the other arm pair 8. The arms of each of the leg pairs 7 and 8 extend parallel to each other and on each side of the beam 4, which supports the driven rotary knife 5. The space between the arm pairs 7 and 8 and the end or end portion of the roll 14 allows handling of rolls 14, on which the material primarily in the outer turns has slid beyond the end or end portion of the roll 14. This can be made in gripper handling of the roll in vertical position. The gripper handling of the roll may cause the central part of the roll 14 to be displaced downward because of small friction between the material turns, so that the material projects up

over the end portion or end of the roll 14 and results in a funnel-like shape. The rotary chuck 11 may possibly be longer or be displaceable into and out of the core 15.

5 A roll 14 consists of a core 15 and a material of paper or the like, e.g. tissue, which also is denominated non-self-supporting material. As mentioned by way of introduction, the method according to the present invention is utilized to remove material residues from the core 15 for re-use of the
10 core 15. The roll 14 is lifted by means of the arms 7 and 8 to the working position shown in Figs. 1-3 after the rotary chucks 11 have been moved into the ends of the core 15 by moving the arms 7 and 8 toward the ends of the roll 14, which is placed on the working surface or platform, and/or only the
15 rotary chuck 11 and its carrying parts. The working position can be reached by moving the roll 14 to the driven rotary knife 5 and/or the beam 4, so that the roll 14 and the knife 5 meet in the working position. The diameter of the rotary chuck 11 is smaller than the diameter of the core 15 so that the
20 risk of damage to the core end is minimized. In Figs. 1-3, it is seen that the cut section in the material of the roll 14 is relatively deep, e.g. several millimetres and even several centimetres. A several centimeters deep cut section is possible thanks to the present invention, which in an
25 effective way facilitates the removal of the cut material from the roll 14. The rotary chuck 1 is rotatable by means of a motor M via a suitable driving arrangement.

The knife 5 shown in Figs. 1-3 is suitably rotated by a
30 servomotor via a planetary bevel gear. On each side of the knife 5 driven into rotation, a plough and a blow-off nozzle may be arranged.

The method according to the present invention is illustrated
35 in Figs. 5A-5D. The roll 14 is suspended in the rotary chuck

11 and the arrow P is directed toward a cut section S, which has been provided by means of the driven rotary knife 5 in Figs. 1-3. When the driven rotary knife 5 has reached a position outside the end portion of the roll 14, the roll 14 is rotated counter-clockwise in the direction of the arrow PP to the position shown in Fig. 5B 90-135° from the position in Fig. 5A, or until the material intersected by the cut section S releases from the material remaining on the roll and is hanging principally vertically downward. From this position, with the cut section S approximately at 7, 8 or 9 o'clock, the roll 14 is rotated clockwise according to the arrow PP in Fig. 5C until the cut section S is right in front of the arrow P or approaches said position, or until the material intersected by the cut section S releases and falls down under the roll 14, where it is easy to take care of and remove for suitable further handling. With the roll 14 in this position, which is shown in Fig. 5D, a new cut section S is made approximately at 12 o'clock, whereupon the roll 14 is rotated counter-clockwise until the new cut section S is in the position shown in Fig. 5B, after which the procedure is repeated, until the desired amount of material has been removed from the roll 14. The core may now be restored as desired for re-use in the process.

Numerous modifications of the embodiments according to the present invention described above are naturally possible within the scope of the general idea of the invention defined in the subsequent claims.

CLAIMS

1. Method for removal of material residues, particularly tissue or similar porous, non-self-supporting materials, from
5 a roll having a material-carrying core, which often has relatively large dimensions, e.g. a diameter of approx. 300 mm and a length of approx. 2540 mm, and thereby allow re-use of the core in the same way as new and unused cores a number of times for winding non-self-supporting or porous material,
10 particularly tissue, **characterized in** that a cut section is made in the envelope surface of the roll having the material-carrying core from one end or end portion of the roll to the other end or end portion of the roll by means of a driven rotary knife, which is connected to a motor for rotation of
15 the same.

2. Method according to claim 1, **characterized in** that the roll with the cut section is rotated in one direction, so that the material intersected by the cut section releases from the
20 material remaining on the roll into a position principally hanging vertically downward, that, after the material relief, the core is rotated in the opposite direction, so that the rest of the material intersected by the cut section releases from the material remaining on the roll, and that, if
25 required, the different steps are repeated, until the desired amount of material has been removed.

3. Method according to claim 2, **characterized in** that the roll with the cut section is rotated approx. 90° in one direction,
30 until the cut section is tangent to or ends up on the underside of the roll, and, after the material relief, the roll with the cut section is rotated approx. 180° or more in the opposite direction for releasing the rest of the material intersected by the cut section, so that the same falls down
35 under the roll having the material-carrying core.

4. Method according to claim 3, **characterized in** that the roll with the cut section is rotated more than 90°, preferably 135°, in one direction.

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5. Method according to claim 3 or 4, **characterized in** that a new cut section is made using the driven rotary knife with the roll in said 180° position after the material intersected by the cut section has released and fallen down under the roll

10 having the material-carrying core.

6. Method according to claim 3, **characterized in** that the driven rotary knife is rotated down into the material on the roll under movement of the knife from one end or end portion to the other end or end portion, and that the rotation of the knife is reversed under movement of the same from the other end or end portion back to said one end or end portion.

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7. Method according to any one of claims 2-5, **characterized in** that the roll having the material-carrying core is rotated by means of driven chucks, which fit in the core.

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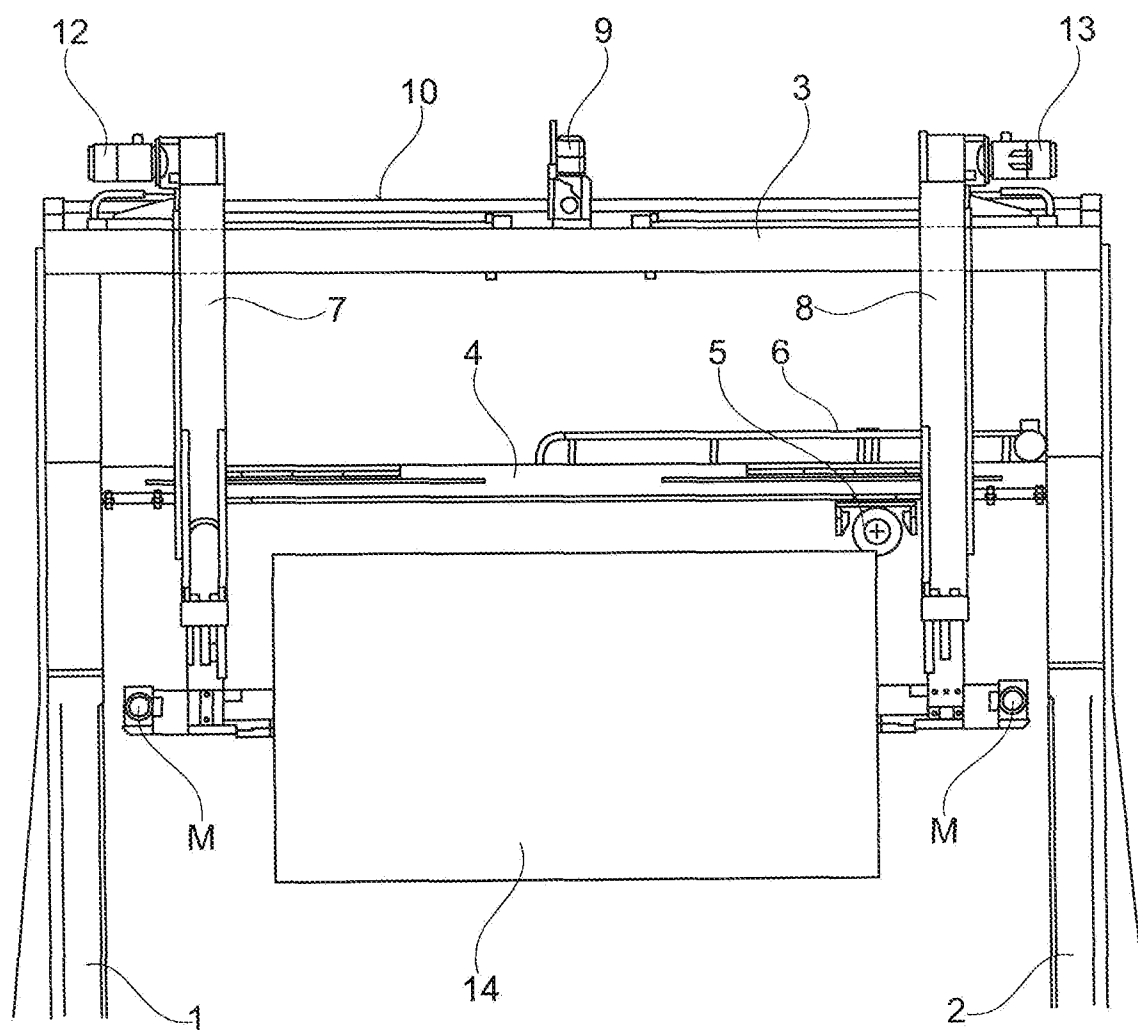


Fig. 1

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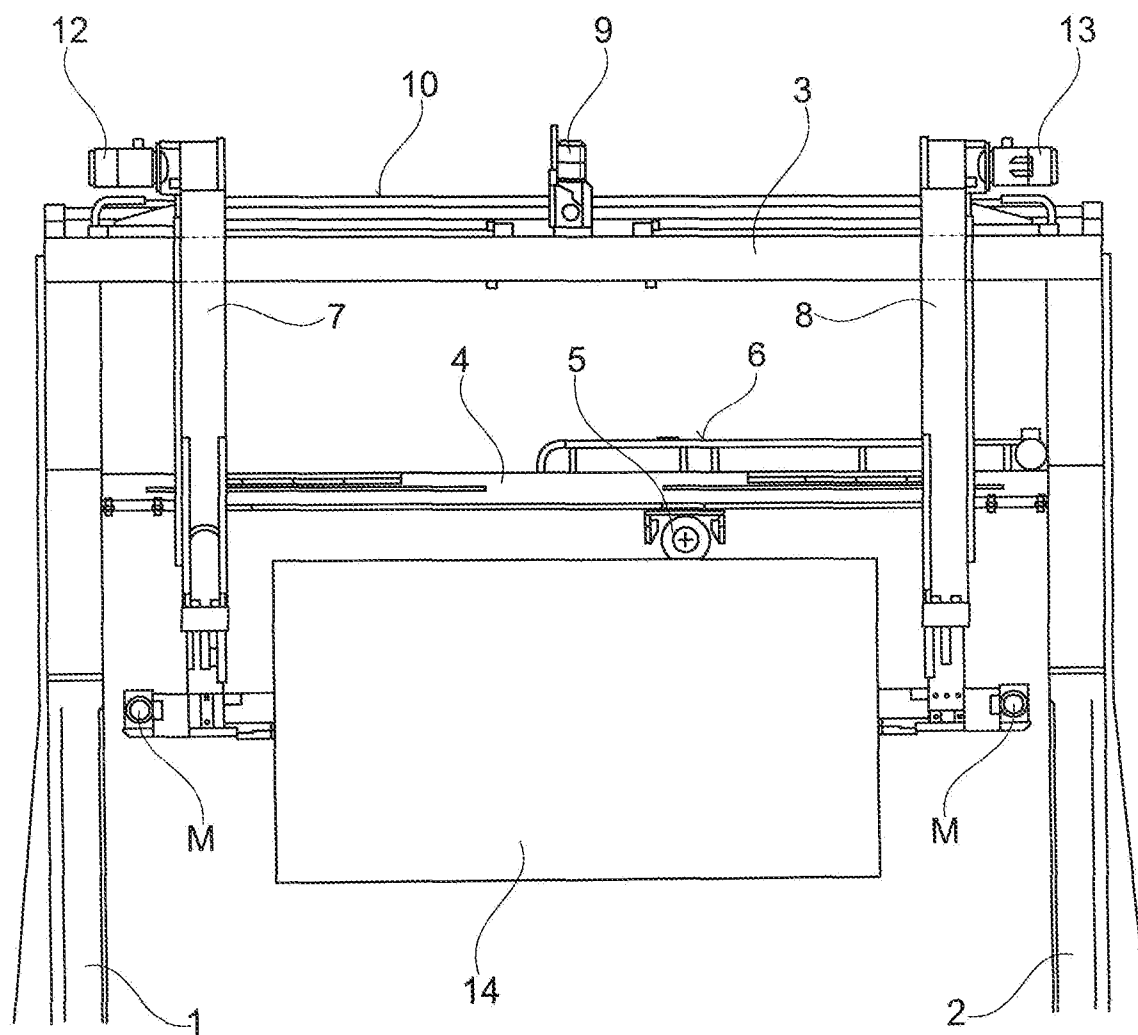


Fig. 2

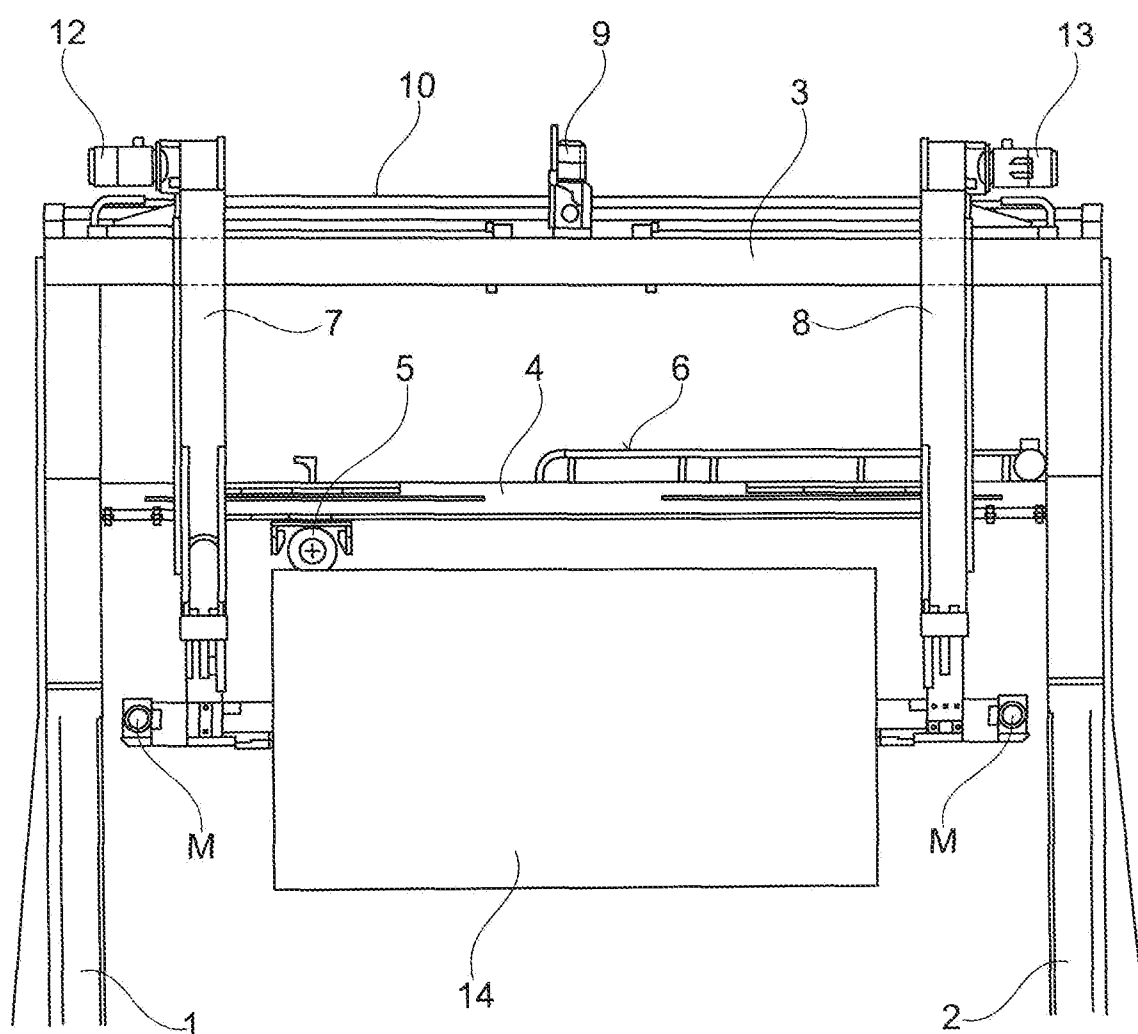


Fig. 3

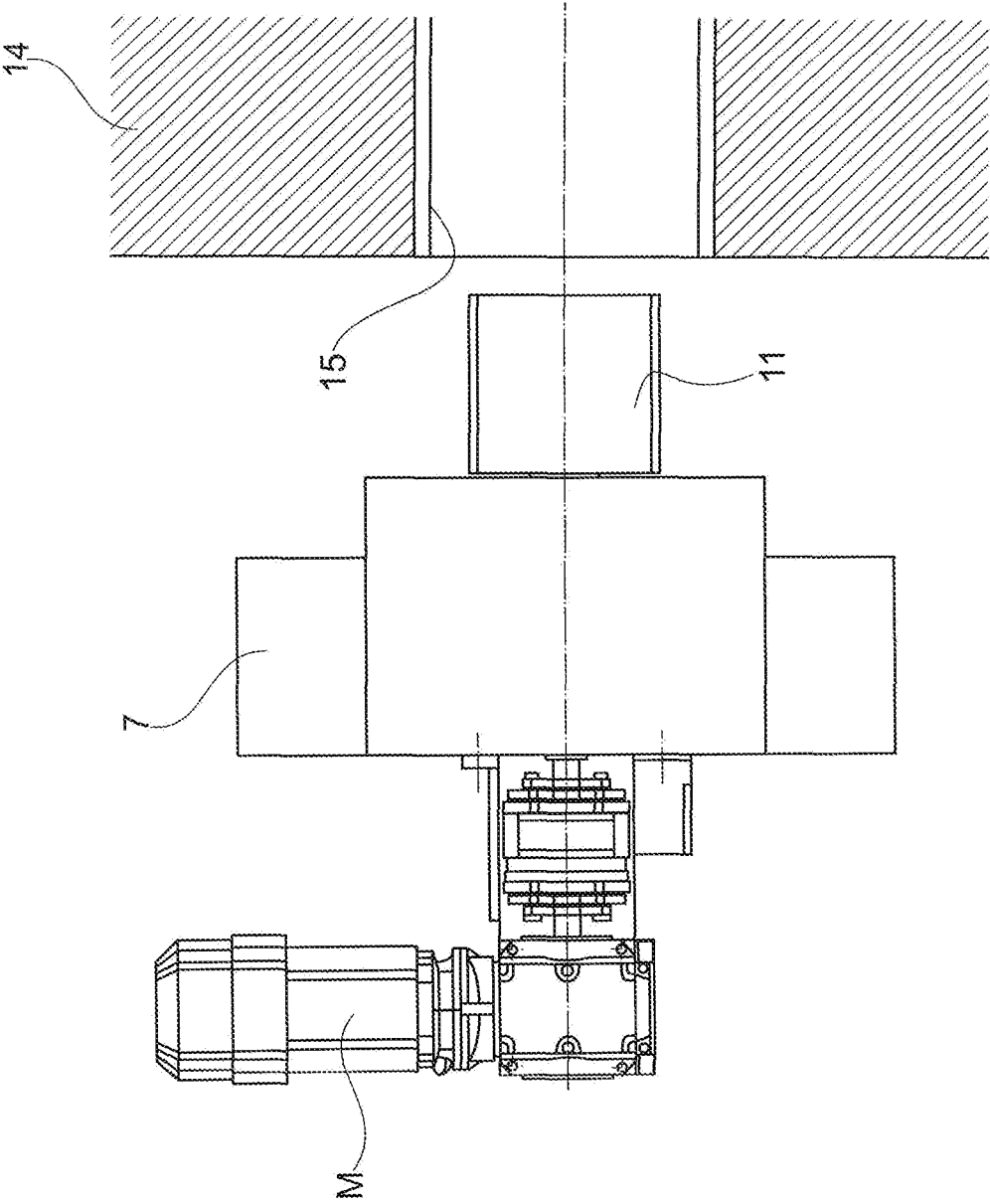


Fig. 4

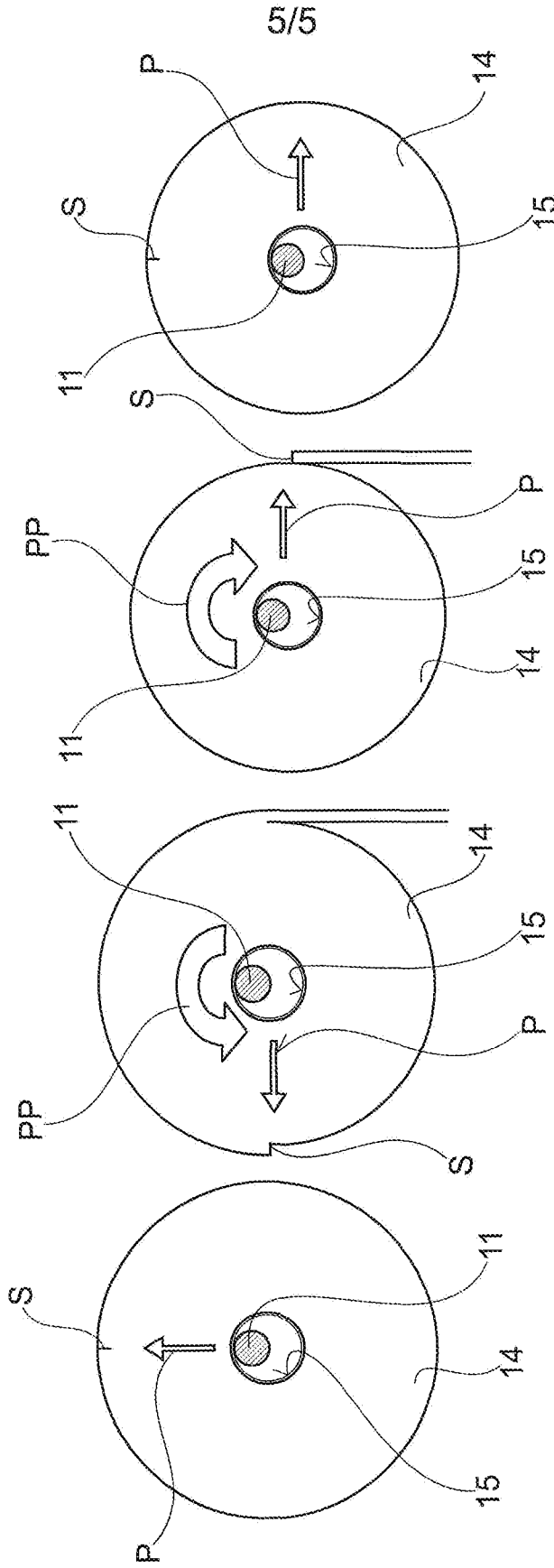


Fig. 5A

Fig. 5B

Fig. 5C

Fig. 5D

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2013/050758

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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: B26D, 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)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE 519378 C2 (CORE LINK AB), 18 February 2003 (2003-02-18); page 3, line 12 - page 3, line 13; page 3, line 16 - page 3, line 21 --	1-7
A	SE 533080 C2 (RAUMASTER PAPER OY), 22 June 2010 (2010-06-22); whole document --	1-7
A	US 4864906 A (HALL TROY L), 12 September 1989 (1989-09-12); whole document --	1-7
A	US 5243890 A (OBER FRANK), 14 September 1993 (1993-09-14); whole document --	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 application or patent but published on or after the international filing date

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“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

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Date of the actual completion of the international search

30-10-2013

Date of mailing of the international search report

30-10-2013

Name and mailing address of the ISA/SE

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2013/050758

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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B65H 73/00 (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

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