

(19)



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(11)

EP 1 204 580 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

20.10.2004 Bulletin 2004/43

(21) Application number: **00922685.3**

(22) Date of filing: **28.04.2000**

(51) Int Cl.7: **B65H 19/22**

(86) International application number:
PCT/FI2000/000382

(87) International publication number:
WO 2000/066469 (09.11.2000 Gazette 2000/45)

(54) **A METHOD IN CONTINUOUS REEL-UP OF A PAPER WEB AND A REEL-UP**

VERFAHREN ZUM KONTINUIERLICHEN AUFWICKELN VON PAPIER UND WICKLER

PROCEDE D'ENROULEMENT CONTINU DE FEUILLE DE PAPIER ET ENROULEUR

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

(30) Priority: **28.04.1999 FI 990957**

(43) Date of publication of application:
15.05.2002 Bulletin 2002/20

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EP-A1- 0 306 092 **US-A- 4 508 279**

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Description

[0001] The invention relates to a method according to the preamble of claim 1 for Continuous reeling up of a paper web.

[0002] There are various prior art methods for conducting the reeling up process. An especially critical section in the continuous reeling up of a paper web is the reel change situation, in which the end of the paper web is cut after the preceding reeling core has become full, whereafter it is passed to a new reeling core. In the reeling up processes, the web speeds are constantly increased. Thus, problems occur especially in such constructive solutions which in the change situation of the reeling core are arranged to be transferred to such a position with respect to the machine frame in which the cut end of the paper web is forced to wind around a new reeling core in synchronization with the cutting of the end of the paper web and other process variables, because of the fast and accurately timed transfers required in connection with the change of the reeling core. With respect to the state of the art in particular, reference is made to the publication EP-483092 B1, which discloses a method for performing a paper reel change in such a manner that the new reeling core is brought in connection with a paper web passed by the same whereafter a change is conducted.

[0003] Document US-4,508,279 discloses a surface winder having two stationary winding stations. The web is guided alternately to the winding stations to start the winding on a new winding core.

[0004] It is an aim of the present invention to introduce a method by means of which it is possible to attain considerable advantages in continuous reeling up of a paper web at high web speeds; thus improving the state of art prevailing in the field. To attain these purposes, the method according to which the end of the paper web cut in the change situation of the reeling core is guided past the full paper reel in the machine direction, is characterized among other things in that the paper reel formed on the reeling core is transferred in the machine direction. Thus, for the part of reel change threading, the continuous reeling up according to the method can be implemented in such a way that the reel change threading apparatus is stationary both at the time of reel change and during the reeling. By this arrangement the reeling operation and the most critical stage of the continuous reeling up process of the paper web, i.e. the change of the reeling core, can be implemented in a reliable manner in a reeling up process operating at high web speeds.

[0005] The invention also relates a reel-up according to the preamble of the independent claim relating to the reel-up. By means of the reel-up it is possible to attain the advantages according to the method, wherein the reel-up, which is of the type where at least part of the reel change threading apparatus is placed in such a manner that it guides the end of the paper web cut in

the change situation of the reeling core past the full paper reel, is primarily characterized in that said at least part of the reel change threading apparatus is arranged to constitute the first part of the means for establishing a nip contact when the paper reel that is being formed on the reeling core is transferred in the machine direction. The appended dependent claims relating to the reel-up present some preferred embodiments of the reel-up.

[0006] As for the terminology used in this description, the following remarks are made

- "passing" refers in this description to the process in which the cut end of the paper web is transferred past the outer periphery of the paper reel, advantageously also in such a manner that it touches the full paper reel substantially tangentially in the beginning of the reel change situation,
- "reeling core" refers in this description both to the material reeling core and to a non-material reeling core, i.e. the initial fulcrum of the reeling up process in which the paper web begins to be wound on the reel,
- "supporting belt" or "supporting belt rotation" refers in this description to such a substructure which is as wide as the paper web and enables the act of supporting the paper web and the transfers of the cut end,
- "machine direction" refers in this description to the longitudinal direction of the paper web, and
- "threading" refers in this description to the cutting of the paper web implemented as diagonal cutting, and to the cutting of the paper web implemented as a side web cut from the paper web as well as a full-width web, and further, the guiding of the web forward in the reel change situation.

[0007] The method and reel-up according to the invention will be illustrated in more detail in the following description, in which reference is made to the embodiments shown in the appended drawings. In the drawings

Figs. 1a to d show a schematical side-view of an embodiment of the reel-up intended for applying a method not belonging to the invention, and the stages (a to d) of the reel change implemented by means of the same,

Figs. 2a to f show a top view of certain stages (a to f) of the said embodiment according to Figs. 1 to 4,

Fig. 3 shows a schematical side-view of a

- reeling carriage used in connection with said embodiment of the reel-up,
- Fig. 4 shows the actuators located in connection with the reeling carriage, seen in the direction IV of Fig. 3,
- Fig. 5 shows a schematical side-view of the overall function of a basic application according to the invention,
- Figs. 6a to 6d show a schematical side-view of the function of said basic application of the reel-up according to the invention in a phase diagram (a to d), and
- Figs. 7a to 7c show a top-view of the function of the embodiment according to Fig. 5 in stages (a to c) in a smaller scale.

[0008] With reference to Figs. 1a to d, the reel-up comprises a closed supporting belt rotation 1, which has been produced by means of guiding rolls 2 placed inside the supporting belt rotation 1, via which the endless supporting belt 1 rotates. The supporting belt rotation 1 is connected to the end of the drying section 3 from which the paper web is passed on top of the supporting belt rotation 1 to be guided to the reeling up stage. Inside the supporting belt rotation 1 there is a reel change threading apparatus 4 the function of which will be described in more detail hereinbelow for the part of certain functions. The ends of the reel change threading apparatus are provided with two rolls 2a, 2b which simultaneously participate in the guidance of the travel of the supporting belt rotation 1, said rolls belonging to the means for establishing nip contact, especially to the means for establishing a so-called secondary nip contact, i.e. the roll 2a constitutes a first nip member part, and the roll 2b constitutes a second nip member part. Furthermore, in the end accommodating the first nip member part 2a the supporting belt rotation 1 is provided with means for cutting the end of the paper web, i.e. a cutting device 5. In the embodiment of the reel-up according to Figs. 1a to d, the paper web rotates counter-clockwise in accordance with arrow K to the reeling cores 6 to 7, first passing the reel change threading apparatus 4 on top of the supporting belt rotation 1 in the machine direction, substantially in a horizontal position and travelling away from the end of the drying section 3, and turning towards the drying section 3 at the location of the cutting device 5, thereafter continuing its travel to the reeling core 6 or 7 in question.

[0009] The said embodiment of the reel-up is characterized in that two sets of reeling cores - a first and a second reeling core set - are established. In Figs 1a to d, the reference numeral 6 represents a reeling core belonging to the first reeling core set, and the reference numeral 7 represents a reeling core belonging to the

second reeling core set. The reeling cores 6 and 7, which are located in the reeling up station, are placed successively on the same horizontal level in the machine direction, within a horizontal distance from each other in such a way that their central axes are parallel to each other. In the vertical direction, the central axes of the reeling cores 6 and 7 are substantially located by the first 2a and second nip member part 2a, respectively. The reeling cores 6 and 7 are supported from underneath by means of nip member parts 8 and 9 (the reference numeral 8 indicating a third nip member part and the reference numeral 9 a fourth nip member part) for establishing a so-called primary nip contact, which nip member parts belong to the means for establishing a nip contact. During the reeling up process, the fulcrums of the rotating motion of the reeling cores 6, 7 are substantially stationary with respect to the frame structure of the reel-ups.

[0010] The first 2a and the second 2b nip member part are thus intended for establishing a so-called secondary nip contact to ensure the quality of the paper reel that is being formed, e.g. to prevent the access of air between the paper layers. The third 8 and the fourth nip member part 9, in turn, are intended for establishing a so-called primary nip contact, i.e. to control the formation of the paper reel. The nip member parts 8, 9 establishing the first or primary nip contact are located below the central axle of the reeling core 6, 7 of the paper reel that is being formed, and the nip member parts 2a, 2b establishing the second or secondary nip contact, as well as said at least part of the reel change threading apparatus 4, are placed above the fulcrum of the reeling core 6,7 of the paper reel that is being formed.

[0011] Fig. 1 a shows a situation in which the filling of the reeling core 6 (reel RA) belonging to the first reeling core set is started after the reeling core 7 belonging to the second reeling core set has become full, by guiding the end of the paper web cut by means of the cutting device 5 directly to the reeling core 6. The reeling up process to the reeling core 6 has proceeded so far that the preceding full paper reel has been removed and a new reeling core 7 belonging to the second reeling core set has been brought to the change station.

[0012] The fulcrum of the reeling cores 6 and 7 remains substantially stationary with respect to the machine frame during the reeling up process, and the third nip member part 8 is transferred downward in the direction of the arrow P1 (Fig. 1b) so that it maintains the nip contact when the size of the paper reel grows. The secondary nip contact is maintained by the first nip member part 2a. This stage is illustrated in Fig. 1b. According to Fig 1c, the paper reel R1 which is formed on the first reeling core 6 has become full, and the reel change threading (the end KP of the cut paper web) has to be conducted by means of the reel change threading apparatus 4 to the reeling core 7 belonging to the second reeling core set, passing the full paper reel R1 formed on the reeling core 6 belonging to the first reeling core

set in the machine direction (the end of the paper web remaining on the paper reel R1 being indicated by the letters KV). According to Fig. 1d, the reel change threading apparatus 4 is detached from the full reel R1 when the reeling of the paper reel to be formed on the reeling core 7 has begun (reel RA) and the full paper reel R1 is ready to be removed after a stoppage.

[0013] As can be seen in the embodiment according to Figs 1a to d, the threading unit PV which contains a reel change threading apparatus 4, a first nip member part 2a, a second nip member part 2b and a cutting device 5 for paper web, is transferred vertically during the reeling up process. The end of the threading unit PV accommodating the first nip member part 2a is transferred upward when the formation of the paper reel proceeds, in a similar manner, of course, as the end of the threading unit PV at the location of the second reeling core 7 is transferred downward towards the reeling core which is to be filled at the next stage (cf. arrow P2 in Fig. 1a) from a position in which it was when the preceding paper reel formed on the reeling core belonging to the second reeling core set became full and it was removed from the reeling up station (the position TR1 of the second nip member part 2b in Fig. 1a). The threading unit PV operates in a corresponding manner, but with the opposite direction of motion, in the reeling up process of a paper reel formed on the second reeling core 7 (i.e. when shifting from the stage according to Fig. 1d to the stage according to Fig. 1a). The first nip member part 2a is in a position TR2 corresponding to the removal of the full reel R1, from which it is transferred downward (arrow P4) into a nip contact with the reeling core 6.

[0014] The third and the fourth nip member part 8 and 9 which establish the so-called primary nip contact, are also transferred in a corresponding manner (in Fig. 1b the third nip member part 8 downward, arrow P, from the situation of Fig. 1d upward, arrow P3). In Figs. 1a to d the fourth nip member part 9 is substantially in its upper position due to the presentation sequence, and naturally it moves in corresponding directions (i.e. in the situation of Fig. 1d the nip member part 9 is transferred downwards, arrow P5 and the second nip member part 2b upwards, arrow P6). The above-presented distances travelled can be illustrated in the form of an equation in the following way:

$$LM_i = (D_{TR} - D_{RY})/2$$

LM_i = the distance travelled by the first and the third nip member part (2a, 8) or the second and the fourth nip member part (2b, 9) in the vertical direction during the reeling up process of the paper reel,

D_{TR} = diameter of the full paper reel, and

D_{RY} = diameter of the reeling core ($D_{RY} > 0$, when the reeling core is a material piece or when a hollow "shell" remains inside the paper reel,

$D_{RY} = 0$, when the reeling core is the initial fulcrum of the reeling up process).

[0015] To implement the above-described functions, the threading unit PV can be arranged to be transferred in the vertical direction, advantageously to swing with respect to its centre O (In Figs. 1a to d corresponding arrows represent the direction of rotation) by means of suitable members (not shown in the drawings).

[0016] Figs. 2a to f illustrate the functions of the embodiment according to Fig. 1, seen from the top. Figs. 2a and 2b substantially correspond to a situation which is shown from the side in Fig. 1a. In the situation of Fig. 2a, a full paper reel has been removed from the location of the fourth nip member part 9, in a direction transverse to the machine direction to an arranging station located outside the supporting belt rotation 1, and a new reeling core 7 is fixed on the supporting frame (see Figs. 3 and 4), wherein the reeling core 7 and its supporting frame are transferred in a direction transverse to the machine direction (arrow S1) to the corresponding reeling up station (i.e. reel change station) RVA. In a corresponding manner the reeling up of the reeling core 6 on the support of the third nip member part 8 has started. The reeling core 6 is coupled to a first drive 10a. Fig. 2a shows a situation in which the paper reel forming around the reeling core 6 is at the formation stage, and the second reeling core 7 is placed in a direction transverse to the machine direction to be positioned at the location of the second nip member part in such a manner, however, that the corresponding second drive 10b is not yet switched on. In Fig. 2c the formation of the paper reel to be formed on the first reeling core 6 proceeds to such a stage in which the second drive 10b is already switched on and the acceleration of the second reeling core 7 and a "capture" of the second nip member part 2b take place, wherein at the final stage of the situation according to Fig. 2c, it is possible to cut the paper web by means of the cutting device 5 and conduct the threading of the end of the cut paper web by means of the reel change threading apparatus 4 to the second reeling core. Fig. 2d illustrates this situation, wherein the reeling to the second reeling core 7 is already in progress, and the paper reel formed on the first reeling core 6 is decelerated. When the formation of the paper reel on the second reeling core 7 proceeds, the full paper reel R1 formed on the first reeling core 6 has already been stopped in the situation according to Fig. 2e, the first drive 10a has been switched off and has been transferred away from the supporting belt rotation 1 (arrow S2) transversely with respect to the machine direction to the arranging station JA. Thus, the full paper reel is removed for the purpose of further processing procedures, and a new reeling core 6 belonging to the first reeling core set is brought to the supporting frame in the arranging station JA (see Figs. 3 and 4), and they are both transferred perpendicularly to the machine direction in contact with the supporting belt rotation 1 (arrow

S3) when the formation of the paper reel on the second reeling core 7 is in progress. Thereafter the first reeling core 6 is subjected to procedures similar to those described in connection with Figs. 2b and 2c, wherein they were conducted for the second reeling core 7.

[0017] The reeling cores 6, 7 belonging to both reeling core sets can be completely similar to each other, a substantial functional difference being the fact that to the reeling cores 6 belonging to the first set, the paper web is brought directly from the end of the threading unit PV and to the reeling cores 7 belonging to the second set via the reel change threading apparatus 4.

[0018] With reference to Figs. 3 and 4 in particular, in the embodiment of the method and reel-up, the supporting frame used for the reeling cores 6, 7 is a reeling carriage 11, which constitutes a fixing frame, on one hand for the means establishing the so-called primary nip contact, i.e. to the third 8 and fourth nip member part 9, and on the other hand for the reeling cores 6 and 7. The cross-section of the fixing frame in the vertical plane perpendicular to the machine direction is U-shaped, wherein the formation of the paper reel takes place partly into the U-shape. The bottom 11a of the fixing frame is provided with a guide arrangement cooperating with the guide means placed on the base on which the reel-up is positioned. This guide means, by means of which the reeling carriage 11 can be transferred in a direction transverse to the machine direction at the point of location of the supporting belt assembly 1 in the vertical direction and away from underneath the supporting belt assembly 1 to the arranging station JA, is generally marked with the reference numeral 12.

[0019] Both vertical parts 11b of the U-shaped cross-section of the reeling carriage 11 are provided with a vertical guide arrangement 13, on the support of which the nip member parts 8 and 9 are able to move in the vertical direction. The nip member parts 8 and 9 are formed as a belt roll assembly 14, 15, 16, wherein the two adjacent vertical guides 13a, 13b in the guide arrangement 13 constitute a vertical guide line for the guiding carriages or the like 17 of the belt roll assembly. Thus, the belt roll assembly is formed by at least two pieces of rolls 14, 15, of which at least one 14 is driving, as well as an endless belt 16 between these rolls, paper reel that is being formed resting on the upper central part 16a of the same during the formation of the paper reel. According to Fig. 3, the reeling core 6, 7 is supported by means of locking jaws 19 protruding from the upper edge of the vertical parts 11 b in the U-shaped cross section of the reeling carriage.

[0020] With reference to Fig. 4 in particular and in view of the technical details, it can be stated that the reeling core 6, 7 contains a bearing housing 18, and the reeling core is extended by a switch 20 of the centre-drive, which is connected to a drive 10a, 10b according to Fig. 2. The axle 14a of the driving roll 14 is extended by a switch 21 by means of which the drive of the belt roll assembly is switched on (the switch is not shown). Fur-

thermore, in Fig. 4 unbroken lines illustrate the position of the belt roll assembly 14, 15, 16 at a particular formation stage of the paper reel R, and furthermore, broken lines illustrate another position of the belt roll assembly 14, 15, 16, in which it is when the paper reel becomes full. Furthermore, in the situation of Fig. 3, the belt roll assembly is shown with dotted lines, and the paper web with an unbroken line, wherein the second reeling core 7 is at the reeling up stage.

[0021] The rolls 14, 15 of the belt roll assembly can be lowered in the guides 13a, 13b of the guide arrangement, either at the same speed when the endless belt 16 is in a substantially horizontal position, wherein the loading affects vertically on the central part of the endless belt 16, or at least partly at different times or simultaneously in such a manner that the endless belt 16 lies in a diagonal position, wherein the loading affects diagonally with respect to the vertical direction.

[0022] Further referring to Fig. 5, the embodiment of the invention functions for the part of the threading unit PV in a substantially similar manner as the aforementioned embodiment, but in view of applying the invention, it is now stationary, and the reeling carriage 11, the basic structure of which can be substantially similar to the one described in connection with Figs. 3 and 4, moves in that direction in the machine direction in which the reel change threading apparatus 4 is directed upwards. When the nip member part 8 that establishes a so-called primary nip contact with the paper reel formed on the reeling core 6 is set to move in a corresponding manner in the vertical direction with respect to the reeling carriage 11, a gap opening in the transfer direction of the paper reel is formed, which, on the other hand, is connected to the supporting belt rotation 1, whose contact point with the paper reel that is being formed generates a so-called secondary nip at each point of location of the reel that is being formed. In the situation of Fig. 5, the paper web PR is passed to the reel located nearly in the reel change station. Furthermore, in Fig. 5 dotted lines illustrate two other forming stages of the paper reel (stages V1 and V2).

[0023] Figs. 6a to d illustrates a side-view of a reel change situation, wherein when the full paper reel R1 has become full when it is located at the end of the gap, a new reeling core 6' and the reeling carriage 11 have been brought to the reel change station in a corresponding manner, i.e. in contact with the reel change threading apparatus 4, for example with the end of the same. Fig. 6 shows a reel change threading apparatus 4 as a series of successive parallelograms 4a, which illustrate members, for example suction boxes, each of which can be preferably separately activated to a suction effect to guide the cut end of the web in the reel change situation to the reeling core 6' positioned in the reel change station RVA. In the situation according to Fig. 6a, only the sections (two vertically lined parallelograms) of the reel change threading apparatus 4 that are located at the final end of the gap are activated, wherein the paper web

is, at its final stages, still guided on the paper reel R1 that is becoming full. Fig. 6b schematically illustrates the cutting stage of the end of the paper web, performed e.g. by means of the cutting device 5. At the same time the entire reel change threading apparatus 4 is activated, i.e. the suction effect is switched on, wherein the cut end P of the paper web passes the full reel R1 under the control of the supporting belt assembly 1, being supported from above and it is transferred to a second reeling core 6' in the reel change station RVA. At this stage it is possible to bring a roll or the like 22 used in connection with the reel change in contact with the reeling core 6', which roll or the like produces a guiding nip contact with the reeling core 6 located in the reel change station RVA. Fig. 6c illustrates a situation in which the cut end KP of the paper web is transferred towards the second reeling core 6 under the guidance of the reel change threading apparatus 4 and furthermore, Fig. 6d illustrates a situation in which formation of the paper reel on the new reeling core 6' is already starting and the full paper reel R1 is decelerated (arrow 23). In the drawing, the supporting belt assembly 1 is illustrated by means of dotted lines, the paper web positioned on the paper reel R1 that is becoming full or on a full paper reel R1 with a thin, unbroken line, and the paper web passed on the new reeling core 6' with a thick broken line. The cut end of the paper web is represented with the letter combination KP. The end of the paper web remaining on the preceding full paper reel is marked with the letter combination KV.

[0024] Fig. 7 shows the stages which relate to the implementation of the embodiment of the invention, especially when seen from the above. In Fig. 7a, the reeling of the paper web on the reeling core 6 has been started in the reel change station RVA. The first drive 24 is then switched on. In Fig. 7b the paper reel that is becoming full proceeds in the gap (arrow 25; unbroken lines) leaving the reel change station RVA (dotted lines). In Fig. 7c the first paper reel which is driven by the first drive 24 has become full, and after braking and stoppage it is discharged from the supporting belt assembly 1 in the discharge station PA (arrow 26) to the arranging station JA, in which the finished paper reel is discharged from the reeling carriage functioning as a supporting frame, and a new reeling core 6 is fixed on the supporting frame. The second drive 27, which has been operating in the formation of the paper reel preceding the paper reel formed by the first drive 24, is brought back to the reel change station from the point of location of the discharge station PA in the machine direction in such a way that it is ready to receive a new reeling core 6' (arrow 28). When the new reeling core and the second drive 27 are switched on, the process is substantially in the situation of Fig. 7a, in which the new reeling core 6' is accelerated and it is ready to receive the cut end of the paper web according to Figs. 6c and 6d. The transfers in accordance with the arrows 26 and 28 take place in a direction transverse to the machine direction. From the

arranging station JA, it is possible to move the supporting frame at the point of location of the drive 27 in the machine direction (arrow 29).

[0025] The above-presented embodiment and the basic idea of the invention can also be used for the reeling of a paper web cut in sidewebs in the longitudinal direction to form several paper reels composed of the side webs, wherein the system is provided with a slitting apparatus before the reeling process.

Claims

1. A method for continuous reeling up of a paper web, in which

- the paper web is guided with guiding means (1) to a reeling up stage,

wherein when the preceding paper reel (6) has become full

- the paper web is cut (5),
- the end of the paper web (KP) is guided on a new reeling core (6'),
- a paper reel is formed on the new reeling core (6'), and
- the end (KP) of the paper web cut at the change situation of the reeling core (6') is guided past the full paper reel (R1) in the machine direction, **characterized in that**
- the reeling core (6) is placed in a reel change station (RVA),
- the paper reel formed on the new reeling core (6') is transferred in the machine direction,
- the new reeling core (6') is placed in the reel change station, in the change situation of the new reeling core (6') the cut end (KP) of the paper web is guided by means of a reel change threading apparatus (4) past the full paper reel (R1) transferred in the machine direction.

2. A reel-up for continuous reeling up of a paper web, in which when the preceding paper reel has become full, the paper web is guided to a new reeling core, the reel-up being provided with

- guiding means (1) for guiding the paper web to a reeling up stage,
- means (5) for cutting the paper web,
- an apparatus which is arranged to guide the cut end (KP) of the paper web to a new reeling core (6') on which the next paper reel is formed, and
- means (2a, 2b; 4; 8) for establishing a nip contact with the paper reel that is being formed,
- a reel change threading apparatus (4), at least part of which is placed so that it guides the end (KP) of the paper web cut in the change situa-

tion of the reeling core (6) past the full paper reel (R1), **characterized in that** said at least part of the reel change threading apparatus (4) is arranged to constitute the first part of the means for establishing a nip contact when the paper reel that is being formed on the reeling core is transferred in the machine direction.

3. The reel-up according to claim 2, **characterized in that** said at least part of the reel change threading apparatus (4) is placed above the paper reel that is being formed and moves in the machine direction, and that the second part of the means for establishing a nip contact (8) is placed substantially below the paper reel that is being formed on the reeling core.
4. The reel-up according to claim 2 or 3, **characterized in that** said part (8) of the means for establishing the nip contact that is located underneath the reeling core, is formed as a so-called primary nip, the purpose of which is to control the formation of the paper reel and that said at least part of the reel change threading apparatus (4) that is placed above the paper reel that is being formed, establishes a so-called secondary nip contact, by means of which the quality of the paper reel is ensured.
5. The reel-up according to any of the claims 2 to 4, **characterized in that** the nip contacts above and below the paper reel that is being formed, form a gap opening in the machine direction in such a way that the path of motion of the means for establishing the lower or so-called primary nip contact forms the lower part of the gap, and the upper or so-called secondary nip contact is arranged by means of said part of the reel change threading apparatus (4).
6. The reel-up according to claim 2, **characterized in that** the reel change threading apparatus (4) is composed of series of successive members, such as suction boxes, each of which can be preferably separately activated especially in the reel change situation to transfer the end of the cut paper web past the full paper reel (R1).
7. The reel-up according to claim 2, **characterized in that** the means (5) for cutting the end of the paper web are located immediately before the reel change threading apparatus (4) in the travel direction of the paper web.
8. The reel-up according to claim 2, **characterized in that** the guiding means (1) in connection with the reel-up for guiding the paper web to the reeling up process comprise a closed supporting belt rotation, inside which at least part of the reel change threading apparatus (4) is placed.

9. The reel-up according to claim 8, **characterized in that** the supporting belt rotation (1) is arranged in such a manner that the transfer of the paper web takes place substantially tangentially to the paper reel formed on the reeling core (6).

10. The reel-up according to claim 2, **characterized in that** it has a first drive (24) and a second drive (27) movable in the machine direction and arranged to drive a first paper reel (R1) and a new reeling core (6'), respectively.

Patentansprüche

1. Verfahren zum ununterbrochenen Aufrollen einer Papierbahn wobei

- die Papierbahn mit Führungseinrichtungen (1) zu einer Aufrollstufe geführt wird,

wobei dann, wenn die vorangegangene Papierrolle (6) voll geworden ist,

- die Papierbahn abgeschnitten wird (5),
- das Ende der Papierbahn (KP) auf einen neuen Rollenkerne (6') geführt wird,
- eine Papierrolle auf dem neuen Rollenkerne (6') ausgebildet wird, und
- das Ende (KP) der in der Wechselsituation des Rollenkerne (6') abgeschnittenen Papierbahn an der vollen Papierrolle (R1) in Maschinenrichtung vorbeigeführt wird,

dadurch gekennzeichnet, dass

- der Rollenkerne (6) in einer Rollenwechselstation (RVA) positioniert wird,
- die auf dem neuen Rollenkerne (6') ausgebildete Papierrolle in Maschinenrichtung verlagert wird,
- der neue Rollenkerne (6') in der Rollenwechselstation positioniert wird,
- in der Wechselsituation des neuen Rollenkerne (6') das abgeschnittene Ende (KP) der Papierbahn mittels einer Rollenwechsel-Einfädelungsvorrichtung (4) an der in Maschinenrichtung verlagerten, vollen Papierrolle (R1) vorbeigeführt wird.

2. Aufroller zum ununterbrochenen Aufrollen einer Papierbahn, wobei dann, wenn die vorangegangene Papierrolle voll geworden ist, der Aufroller versehen ist mit

- Führungseinrichtungen (1) zum Führen der Papierbahn zu einer Aufrollstufe,
- Einrichtungen (5) zum Abschneiden der Pa-

- pierbahn,
- einer Vorrichtung, die zum Führen des abgeschnittenen Endes (KP) der Papierbahn auf einen neuen Rollen Kern (6') angeordnet ist, auf dem die nächste Papierrolle ausgebildet wird, und
 - Einrichtungen (2a,2b;4;8) zum Aufbauen einer Walzenspaltberührung mit der in der Ausbildung befindlichen Papierrolle,
 - einer Rollenwechsel-Einfädelungsvorrichtung (4), von der mindestens ein Teil so positioniert ist, dass sie das in der Wechselsituation des Rollenkernes (6) abgeschnittene Ende (KP) der Papierbahn an der vollen Papierrolle (R1) in Maschinenrichtung vorbeiführt,

dadurch gekennzeichnet, dass

der mindestens eine Teil der Rollenwechsel-Einfädelungsvorrichtung (4) so angeordnet ist, dass er den ersten Teil der Einrichtungen zum Aufbauen einer Walzenspaltberührung darstellt, wenn die auf dem Rollen Kern in der Ausbildung befindliche Papierrolle in Maschinenrichtung verlagert wird.

3. Aufroller nach Anspruch 2,
dadurch gekennzeichnet, dass
der mindestens eine Teil der Rollenwechsel-Einfädelungsvorrichtung (4) über der in der Ausbildung befindlichen Papierrolle positioniert ist und sich in Maschinenrichtung bewegt, und dass der zweite Teil der Einrichtung zum Aufbauen einer Walzenspaltberührung (8) im Wesentlichen unter der auf dem Rollen Kern in der Ausbildung befindlichen Papierrolle positioniert ist.
4. Aufroller nach Anspruch 2 oder 3,
dadurch gekennzeichnet, dass
der Teil (8) der unter dem Rollen Kern angeordneten Einrichtung zum Aufbauen der Walzenspaltberührung in Form einer sogenannten primären Walzenspaltberührung ausgebildet ist, deren Zweck in der Steuerung der Ausbildung der Papierrolle besteht, und dass mindestens ein Teil der über der in der Ausbildung befindlichen Papierrolle positionierten Rollenwechsel-Einfädelungsvorrichtung (4) eine sogenannte sekundäre Walzenspaltberührung aufbaut, mittels welcher die Qualität des Papiers sichergestellt wird.
5. Aufroller nach einem der Ansprüche 2 bis 4,
dadurch gekennzeichnet, dass
die Walzenspaltberührungen über und unter der in der Ausbildung befindlichen Papierrolle in Maschinenrichtung eine Spaltöffnung so ausbilden, dass die Bewegungsbahn der Einrichtung zum Aufbauen der unteren oder sogenannten primären Walzenspaltberührung den unteren Teil des Spaltes ausbildet, und die obere oder sogenannte sekundäre

Walzenspaltberührung mittels des Teils der Rollenwechsel-Einfädelungsvorrichtung (4) angeordnet ist.

6. Aufroller nach Anspruch 2,
dadurch gekennzeichnet, dass
die Rollenwechsel-Einfädelungsvorrichtung (4) aus Reihen aufeinanderfolgender Bauteile, wie Saugkästen, besteht, wovon jedes insbesondere in der Rollenwechselsituation vorzugsweise separat zur Verlagerung des Endes der abgeschnittenen Papierbahn an der vollen Papierrolle (R1) vorbei aktivierbar ist.
7. Aufroller nach Anspruch 2,
dadurch gekennzeichnet, dass
die Einrichtungen (5) zum Abschneiden des Endes der Papierbahn unmittelbar vor der Rollenwechsel-Einfädelungsvorrichtung (4) in Bewegungsrichtung der Papierbahn positioniert sind.
8. Aufroller nach Anspruch 2,
dadurch gekennzeichnet, dass
die Führungseinrichtungen (1) in Verbindung mit dem Aufroller zum Führen der Papierbahn zu dem Aufrollvorgang einen geschlossenen Tragriemenumlauf umfassen, innerhalb welchem mindestens ein Teil der Rollenwechsel-Einfädelungsvorrichtung (4) positioniert ist.
9. Aufroller nach Anspruch 8,
dadurch gekennzeichnet, dass
der Tragriemenumlauf (1) so angeordnet ist, dass die Verlagerung der Papierbahn im Wesentlichen tangential zu der auf dem Rollen Kern (6) ausgebildeten Papierrolle erfolgt.
10. Aufroller nach Anspruch 2,
dadurch gekennzeichnet, dass
er einen ersten Antrieb (24) und einen zweiten Antrieb (27) aufweist, der in Maschinenrichtung bewegbar und dafür vorgesehen ist, jeweils eine erste Papierrolle (R1) und einen neuen Rollen Kern (6') anzutreiben.

Revendications

1. Procédé d'enroulement continu d'une feuille de papier, dans lequel :
 - la feuille de papier est guidée avec un moyen de guidage (1) jusqu'à un niveau d'enroulement,

dans lequel, lorsque la bobine de papier précédente (6) est pleine

- la feuille de papier est découpée (5)
 - l'extrémité de la feuille de papier (KP) est guidée sur un nouveau noyau d'enroulement (6')
 - une bobine de papier est formée sur le nouveau noyau d'enroulement (6'), et
 - l'extrémité (KP) de la feuille de papier découpée pendant la situation de changement du noyau d'enroulement (6') est guidée après la bobine de papier pleine (R1) dans la direction de la machine, **caractérisé en ce que**
 - le noyau d'enroulement (6) est placé dans la station de changement de bobine (RVA),
 - la bobine de papier formée sur le nouveau noyau d'enroulement (6') est transférée dans la direction de la machine,
 - le nouveau noyau d'enroulement (6') est placé dans la station de changement bobine, dans la situation de changement du nouveau noyau d'enroulement (6') l'extrémité découpée (KP) de la feuille de papier est guidée à l'aide d'un appareil d'introduction de changement de bobine (4) après la bobine de papier pleine (R1) transférée dans la direction de la machine.
2. Enrouleur destiné à enrouler de manière continue une feuille de papier, dans lequel, lorsque la bobine de papier précédente est pleine, la feuille de papier est guidée vers un nouveau noyau d'enroulement, l'enrouleur étant doté :
- d'un moyen de guidage (1) destiné à guider la feuille de papier jusqu'à un niveau d'enroulement,
 - un moyen (5) destiné à découper la feuille de papier,
 - un appareil qui est agencé pour guider l'extrémité découpée (KP) de la feuille de papier vers un nouveau noyau d'enroulement (6') sur lequel la bobine de papier suivante est formée, et
 - des moyens (2a, 2b ; 4 ; 8) destinés à rétablir un contact par pincement avec la bobine de papier qui est formée,
 - un appareil d'introduction de changement de bobine (4), dont au moins une partie est placée de façon à guider l'extrémité (KP) de la bande de papier découpée dans la situation de changement du noyau d'enroulement (6) après la bobine de papier pleine (R1), **caractérisé en ce que** ladite au moins partie de l'appareil d'introduction de changement de bobine (4) est agencée pour constituer la première partie des moyens destinés à établir un contact par pincement lorsque la bobine de papier qui est formée sur un noyau d'enroulement est transférée dans la direction de la machine.
3. Enrouleur selon la revendication 2, **caractérisé en ce que** ladite au moins partie de l'appareil d'introduction de changement de bobine (4) est placée au-dessus de la bobine de papier qui est formée et se déplace dans la direction de la machine, et **en ce que** la deuxième partie des moyens destinés à établir un contact par pincement (8) est placée sensiblement en dessous de la bobine de papier qui est formée sur le noyau d'enroulement.
4. Enrouleur selon la revendication 2 ou 3, **caractérisé en ce que** ladite partie (8) des moyens destinés à établir le contact par pincement qui se trouve en dessous du noyau d'enroulement, est formée sous forme d'un pincement dit primaire, dont le but est de contrôler la formation de la bobine de papier et **en ce que** ladite au moins partie de l'appareil d'introduction de changement de bobine (4) qui est placée au-dessus de la bobine de papier qui est formée, établit un contact par pincement dit secondaire, à l'aide duquel la qualité de la bobine de papier est assurée.
5. Enrouleur selon l'une quelconque des revendications 2 à 4, **caractérisé en ce que** les contacts par pincement au-dessus et en dessous de la bobine de papier qui est formée, forment un espace dans la direction de la machine de manière à ce que le chemin de déplacement des moyens destinés à établir le contact par pincement inférieur ou dit primaire forment la partie inférieure de l'espace, et que le contact par pincement supérieur ou dit secondaire soit agencé à l'aide de ladite partie de l'appareil d'introduction de changement de bobine (4).
6. Enrouleur selon la revendication 2, **caractérisé en ce que** l'appareil d'introduction de changement de bobine (4) est composé d'une série d'éléments successifs, tels que des caisses d'aspiration, dont chacune peut être de préférence activée séparément en particulier dans la situation de changement de bobine pour transférer l'extrémité de la feuille de papier découpée après la bobine de papier pleine (R1).
7. Enrouleur selon la revendication 2, **caractérisé en ce que** le moyen (5) destiné à découper l'extrémité de la feuille de papier est situé juste avant l'appareil d'introduction de changement de bobine (4) dans la direction d'acheminement de la feuille de papier.
8. Enrouleur selon la revendication 2, **caractérisé en ce que** le moyen de guidage (1) en association avec l'enrouleur destiné à guider la feuille de papier vers le processus d'enroulement comprend une rotation de ceinture de support fermée, dans laquelle au moins une partie de l'appareil d'introduction de changement de bobine (4) est placée.
9. Enrouleur selon la revendication 8, **caractérisé en**

ce que la rotation de ceinture de support (1) est agencée de manière à ce que le transfert de la feuille de papier a lieu sensiblement de manière tangentielle par rapport à la bobine de papier formée sur le noyau d'enroulement (6).

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10. Enrouleur selon la revendication 2, **caractérisé en ce qu'**il comporte un premier dispositif d'entraînement (24) et un second dispositif d'entraînement (27) mobiles dans la direction de la machine et agencés pour entraîner respectivement une première bobine de papier (R1) et un nouveau noyau d'enroulement (6').

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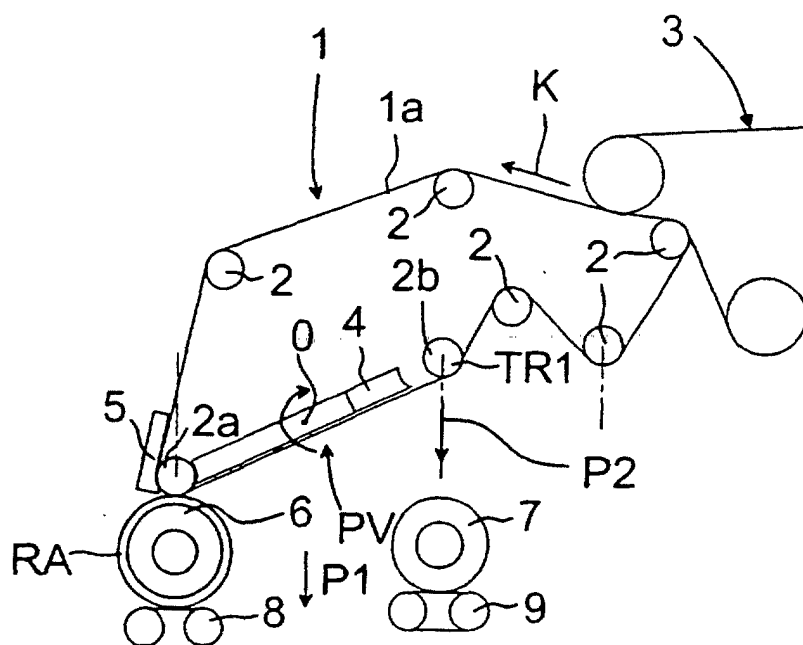


Fig 1a

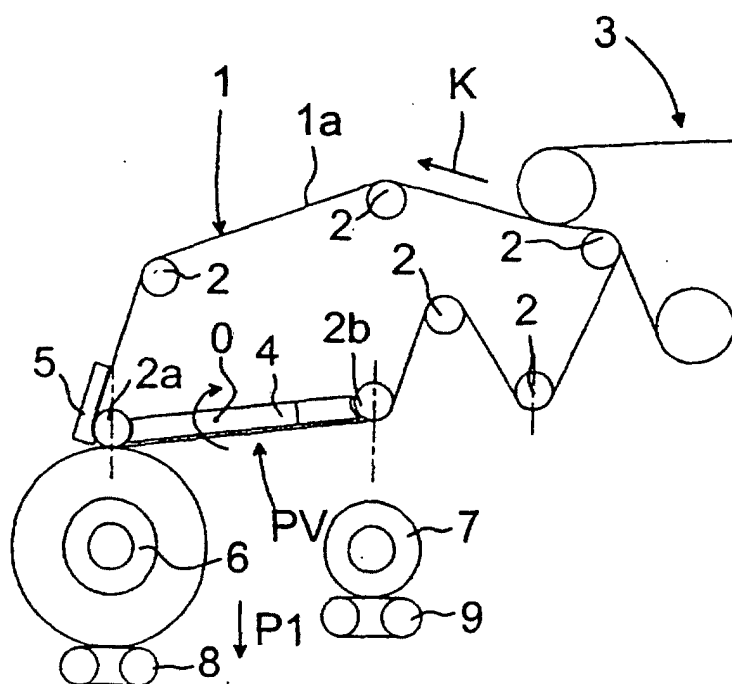


Fig 1b

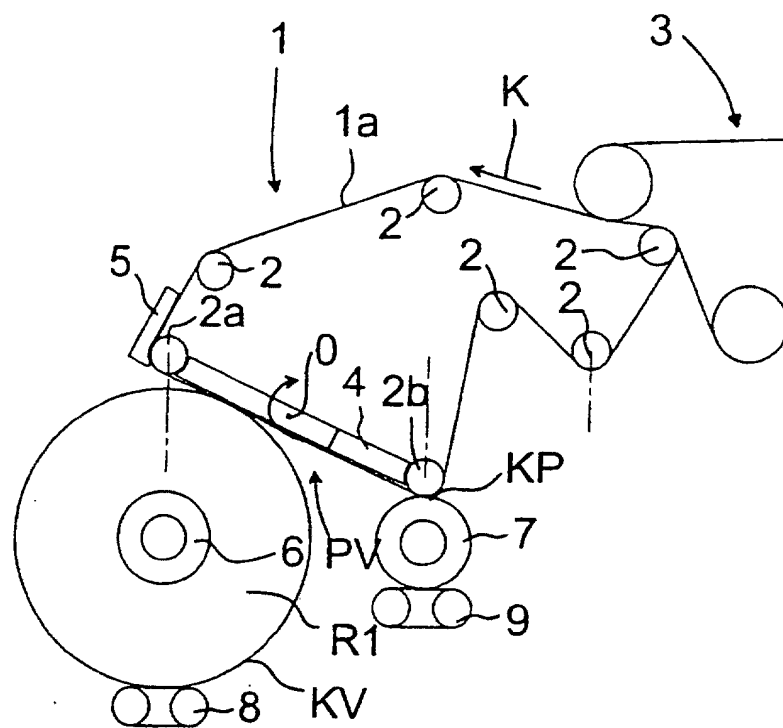


Fig 1c

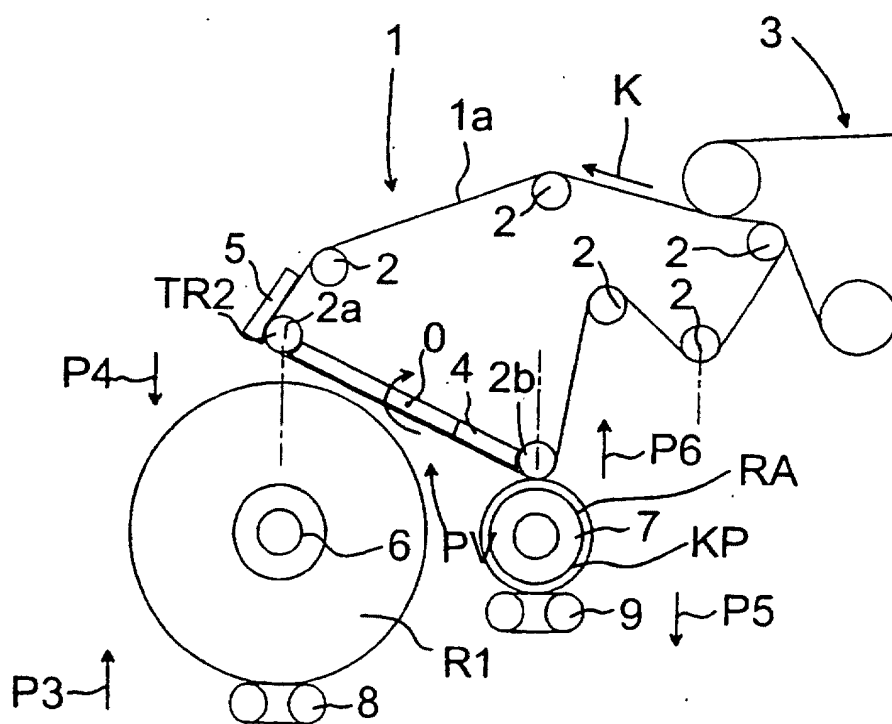
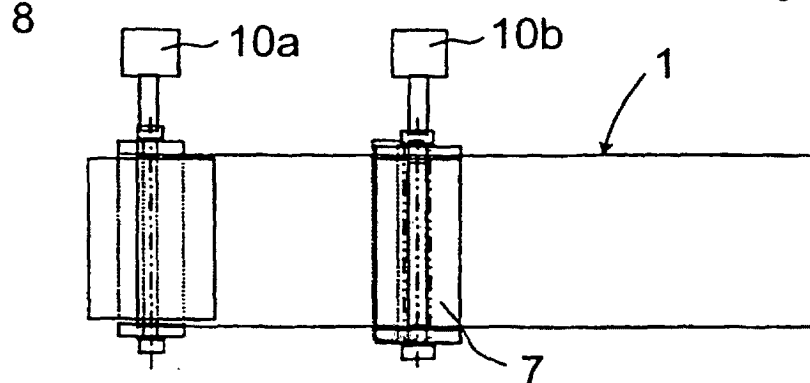
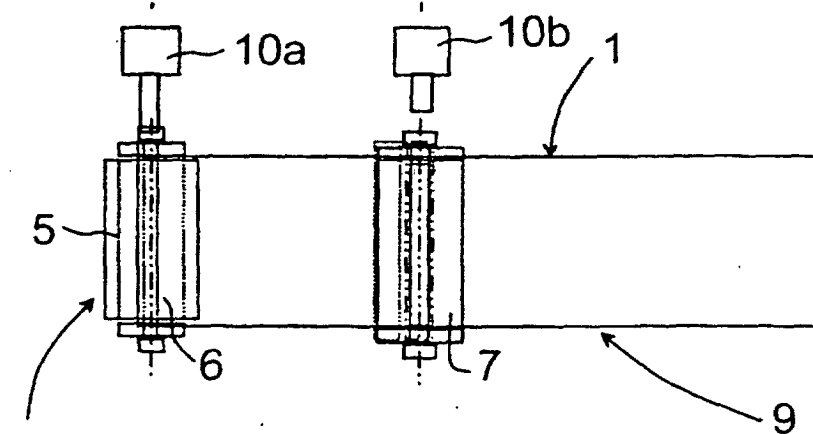
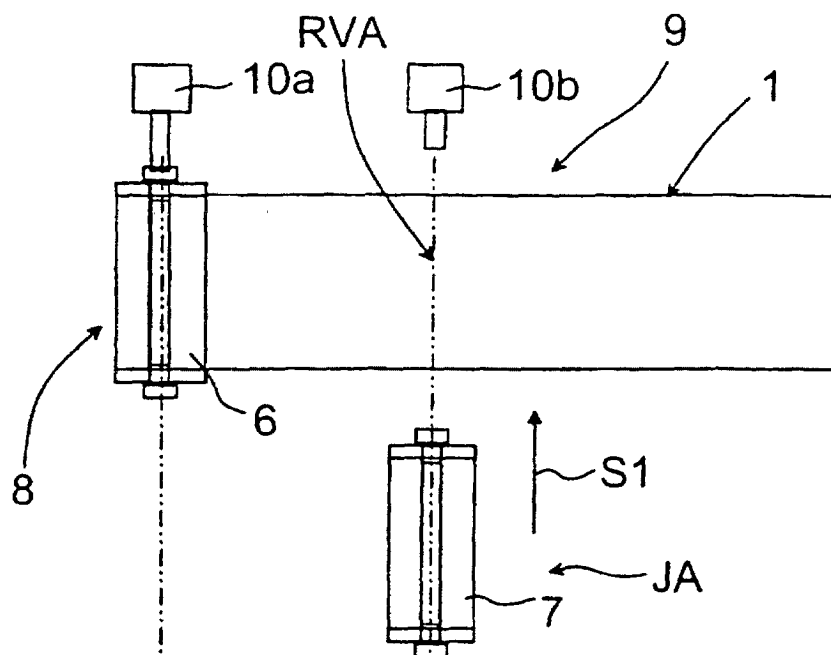


Fig 1d



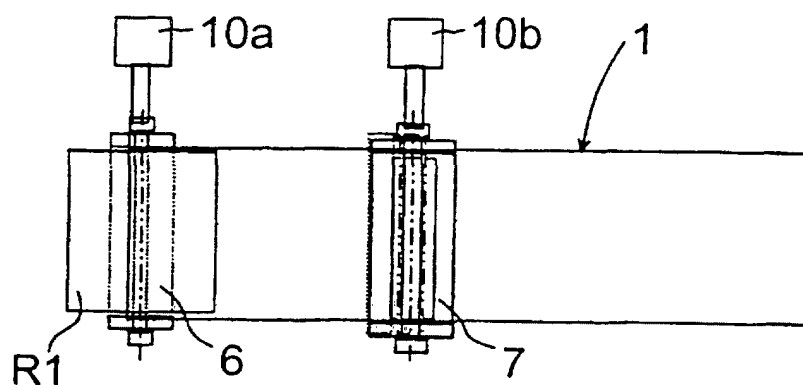


Fig 2d

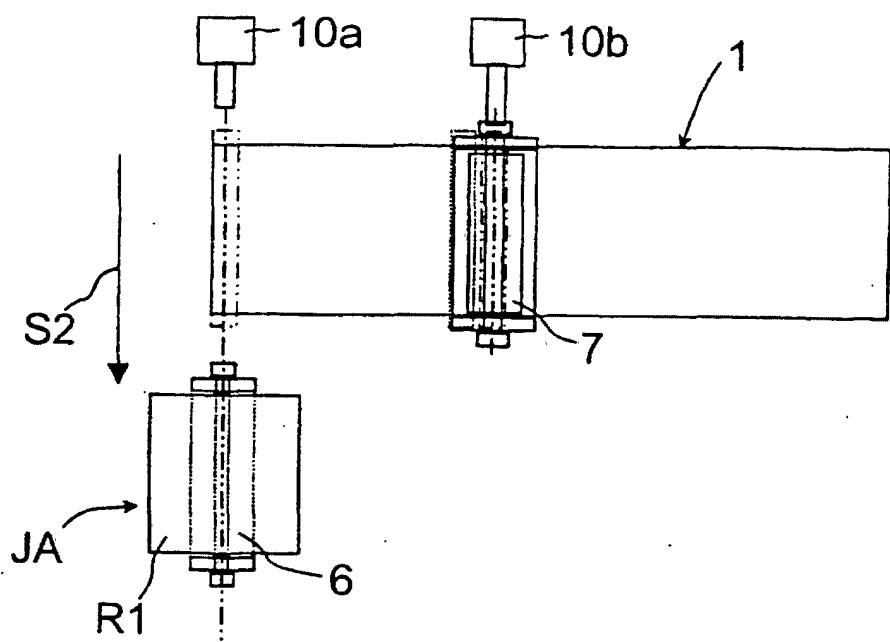


Fig 2e

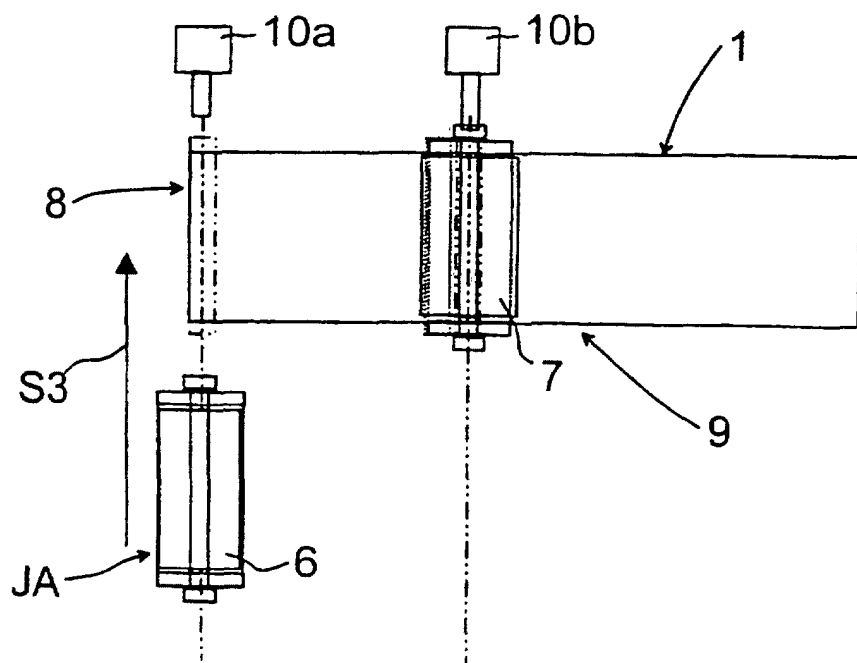


Fig 2f

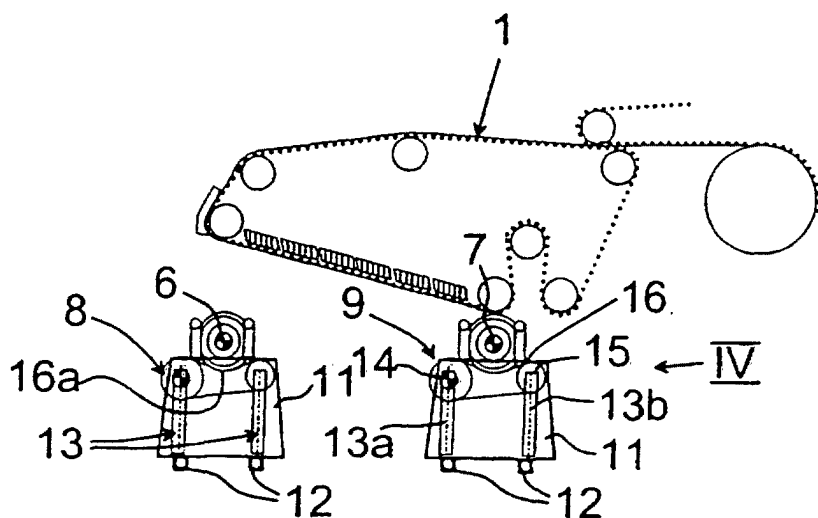


Fig 3

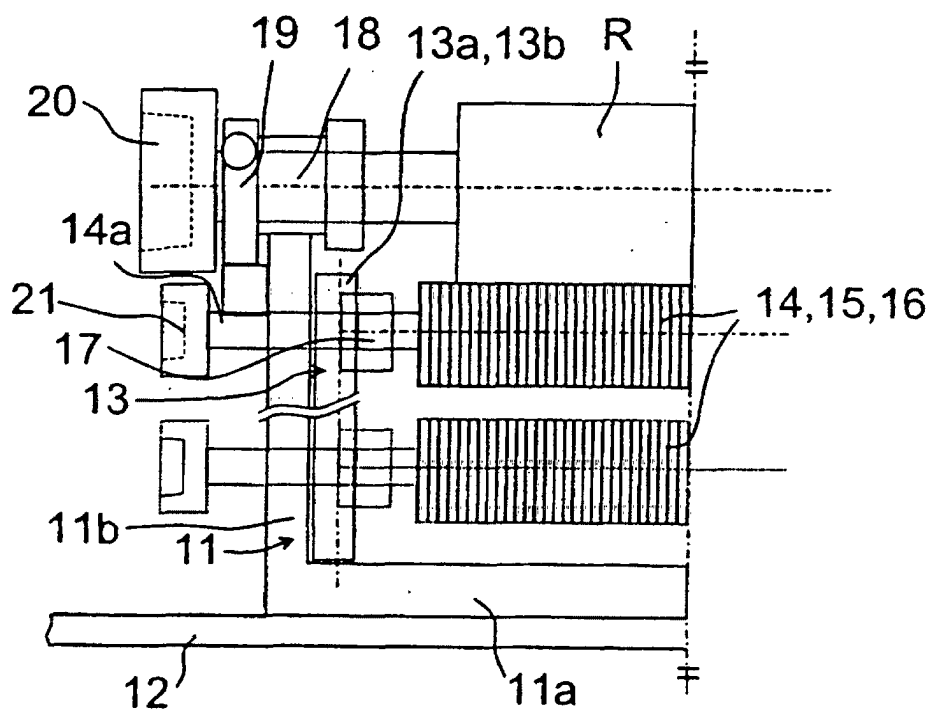


Fig 4

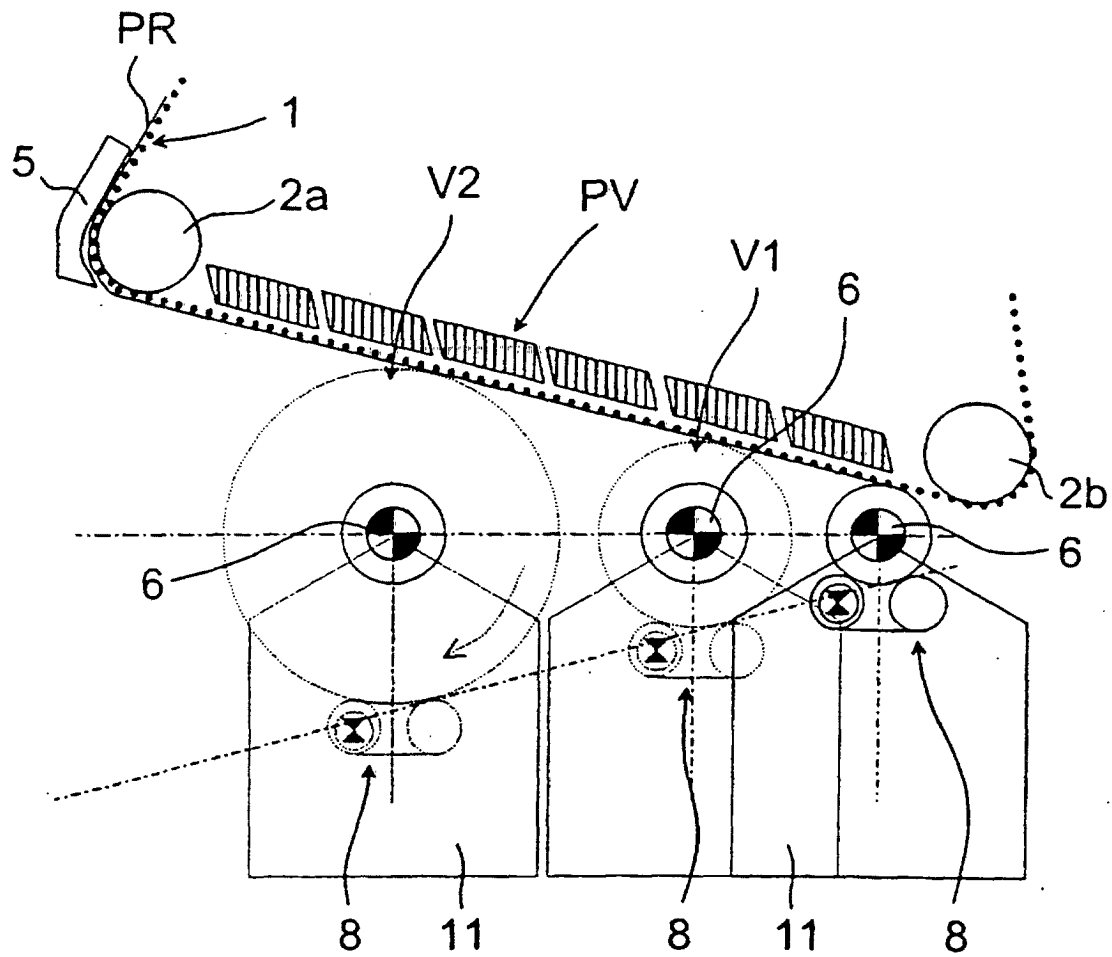


Fig 5

