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(54) **Method for web threading in a slitter-winder and a slitter-winder**

(57) The invention relates to a method for web threading in a slitter-winder comprising an unwinding section where a parent roll is unwound, a slitting section a full width web (W) unwound from the parent roll is slitted longitudinally to partial webs (W1, W2) and a winding section where the partial webs (W1, W2) are wound around cores or corresponding spools to partial web rolls, which winding section comprises a multistation winder in which two winding rolls (11, 12) are used, each providing for winding of a set of partial web rolls, in which method web is threaded from the unwinding section via the slitting section to the winding section and in which method after the slitting section in threading the partial webs (W1, W2) for each winding station are separated so that each other partial webs (W1) i.e. the partial webs (W1) of the inner side are passed to one winding roll (11) i.e. to a winding

roll (11) of the inner side and the other each other partial webs (W2) i.e. the partial webs (W2) of the outer side are passed to another winding roll i.e. a winding roll (12) of the outer side. In the method for web threading the web (W) is passed by passing a web tail wedge (T) through the slitter-winder, at least one rope-like transfer means is used for passing the partial webs to the winding stations on the winding rolls and that in the method the partial webs (W1) are adhered on the surface of at least one of the winding rolls (11, 12) by suction provided in the winding roll (11, 12) the web tail wedge (T) is lifted against a winding roll (11) by rope-like transfer means (15), over which rope-like transfer means (15) the web tail wedge (T) falls downwards when the winding roll (11) pulls more web (W) from the unwinding section. The invention also relates to a slitter-winder.

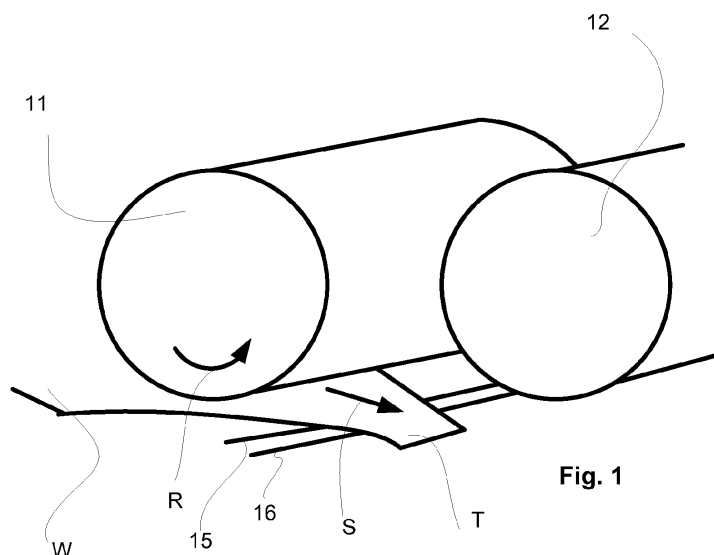


Fig. 1

Description

[0001] The invention relates to method for web threading in a slitter-winder and a slitter winder. Especially the invention relates to a method according to the features of preamble of claim 1 and to a slitter-winder according to the features of preamble of claim 1.

[0002] It is known that a fiber web, e.g. paper, is manufactured in machines which together constitute a paper-manufacturing line which can be hundreds of metres long. Modern paper machines can produce over 450,000 tons of paper per year. The speed of the paper machine can exceed 2,000 m/min and the width of the paper web can be more than 11 metres.

[0003] In paper-manufacturing lines, the manufacture of paper takes place as a continuous process. A paper web completing in the paper machine is reeled by a reel-up around a reeling shaft i.e. a reel spool into a parent roll the diameter of which can be more than 5 metres and the weight more than 160 tons. The purpose of reeling is to modify the paper web manufactured as planar to a more easily processable form. On the reel-up located in the main machine line, the continuous process of the paper machine breaks for the first time and shifts into periodic operation.

[0004] The web of parent roll produced in paper manufacture is full-width and even more than 100 km long so it must be slit into partial webs with suitable width and length for the customers of the paper mill and wound around cores into so-called customer rolls before delivering them from the paper mill. This slitting and winding up of the web takes place as known in an appropriate separate machine i.e. a slitter-winder.

[0005] On the slitter-winder, the parent roll is unwound, the wide web is slit on the slitting section into several narrower partial webs which are wound up on the winding section around winding cores, such as spools, into customer rolls. When the customer rolls are completed, the slitter-winder is stopped and the wound rolls i.e. the so-called set is removed from the machine. Then, the process is continued with the winding of a new set. These steps are repeated periodically until paper runs out of the parent roll, whereby a parent roll change is performed and the operation starts again as the unwinding of a new parent roll. Slitter-winders employ winding devices of different types depending on, inter alia, on the type of the fiber web being wound. On slitter-winders of the multistation winder type, the web is guided from the unwinding via guide rolls to the slitting section where the web is slit into partial webs which are further guided to the winding roll/rolls of the winding stations to be wound up onto cores into customer rolls. Adjacent partial webs are wound up on different sides of the winding roll / on different winding rolls. Multistation winders have one to three winding rolls and in them each partial web is wound to a partial web roll in its own winding station. During winding a winding nip is formed between the winding roll and the partial web roll to be wound.

[0006] In US patent 5,152,471 (EP0315569B1) is disclosed a web threading apparatus for a web slitting machine which longitudinally divides a wide web in a slitting or cutting station, including a threading device having a threading rod guided by chains through the machine. The threading device supplies first and second groups of sub-webs to first and second groups of associated winding apparatus. In this prior art arrangement the web is threaded through the slitting machine from the unwinder as a full width web using the threading rod and at a cutting station the wide web is longitudinally divided by means of longitudinally cutting means into narrower sub-webs which are guided to a take-up station by guide means that operable along with the threading device for capturing the tail of the web to be unwound and drawing the web along the path defined by the guide means through the cutting station and up to the take-up station. The take-up station comprises a plurality of take-up unit by means of which the sub-webs can be rewound to narrower rolls, the take-up units of the group having substantially aligned winding axes which are spaced from the substantially aligned winding axes of the other group. In this prior art arrangement the threading device further includes a first path for carrying at least a sub-web up to a take-up unit of one group and a second path for carrying an adjacent sub-web to a take-up unit of a second group and a single threading rod operating along a threading rod guide means defining said first path firstly to draw all sub-webs for said first group to said take-up units of said first group and thereafter said threading rod operating along a threading rod guide means defining said second path to draw all webs of said second group to said take-up units of said second group. In this prior art arrangement to enable the sub-webs to be brought up by the transfer means to the one group of take-up units to be led away from the region of the other group a transverse severing means may be provided which may operate automatically but in many cases it is preferred to perform the severing with a suitable device by hand.

[0007] In EP patent 0818409 is disclosed a method in winding of a paper web and a winding device. On this prior art arrangement the paper web is unwound from a paper reel and the paper web is slit in a slitter-winder longitudinally into component webs which are further wound into component rolls on winding drums of winding stations and the paper web is passed through the slitting station of the slitter-winder in which slitting station component web are slit out of the web by means of blades. The tails of the slit component webs are cut off in the cross direction by a cutter device so that the tails of the component webs extend onto the winding drums to desired, predetermined points. the component webs are separated by means of separators to component webs passing to different winding stations and the component webs passing to the first winding station are transferred onto the winding drum of the first winding station by means of a threading member, and the component webs passing to the second winding station are transferred on-

to the winding drum of the second winding station by means of a threading member. The threading members are bar-like member which extend across the width of the winding device in cross direction of the component webs and said members move along rail provided both sides of the winding device. The running of the web is stopped for the time between the cutting to specified measure and the starting of the rewinding.

[0008] In EP patent 1151947 is disclosed a method for threading a plurality of part webs which are cut from a material web onto par-web reels, in which the start of the material web is inserted into winder, the material web is conveyed through the winder on a first path which lead to a disposal device until the said material web is present with its full width and is cut into the part webs and the said material web is severed transversely with respect to its running direction as soon as the part webs are present and the part web starts which are formed by the severing are guided through a diverter arrangement into a second path which branches off from the first path to winding positions.

[0009] The prior art arrangements in which the web threading is done in full width of the web are expensive due to expensive structures of the arrangements, for example guides at the side of the slitter-winder and mechanisms for attaching the tail to the threading bar and mechanisms for moving the threading bar, and the separation of partial webs has proven difficult due to locating the winding rolls and often special devices are needed for separation of the partial webs to the winding stations.

[0010] It is also known from prior art to thread the web as so called wedge threading in which the tail of the web is severed not in straight cross directional cut of the web but by cutting the web tail to have a wedge shaped form. In prior art arrangements this threading technique has involved manual threading and separating of the partial web and it has thus been time consuming and not very cost effective and especially problematic has been that the wedge tail needs to be removed manually or separate arrangements have been needed for this. Also it has set limits to web run and to locating winding and guide rolls in the slitter-winder layout.

[0011] An object of the invention is to create a method for web threading in a slitter-winder and a slitter-winder in which the problems and disadvantages relating to web threading in prior art arrangements have been eliminated or minimized.

[0012] Another object of the invention is to create a method for web threading in a slitter winder and a slitter-winder which is cost effective and well-functioning.

[0013] In order to achieve the previously mentioned objects and to achieve those that will come apparent later the method according to the invention is mainly characterized by the features of the characterizing clause of claim 1.

[0014] The slitter-winder according to the invention is mainly characterized by the features of the characterizing clause of claim 4.

[0015] In this description term "a partial web" is used for each longitudinally slitted component web, or sub-web and correspondingly term "a partial web roll" is used for a component web roll, or sub-web roll, or customer roll. Also the following terminology of a slitter-winder is used: the slitter-winder comprises an unwinding section where the parent (machine) roll (reel) is unwound, in a slitting section the full width web unwound from the parent roll is slitted longitudinally to partial webs and in a winding section the partial webs are wound around cores or corresponding spools to partial web rolls. In this invention the winding section comprises a multistation winder in which two winding rolls are used, each providing for winding of a set of partial web rolls. After the slitting section separation of the partial webs for each winding station is done so that each other partial webs (the partial webs of the inner side) are passed to one winding roll (to the winding roll of the inner side) and the winding stations in connection with the winding roll of the inner side and the other each other partial webs (the partial webs of the outer side) are passed to another winding roll (the winding roll of the outer side) and the winding stations in connection with the winding roll of the outer side. By use of terms inner and outer is not necessarily meaning to define the order or location of any kind in connection with the arrangement.

[0016] According to an advantageous feature of the invention at least one rope-like transfer means is used for passing the partial webs to the winding stations on the winding rolls. Preferable two rope-like transfer means are used.

[0017] According to an advantageous feature of the invention at least one of the winding rolls is provided with suction for ensuring the adherence or the partial webs on the surface of the winding roll.

[0018] According to the invention the web tail wedge is lifted against a winding roll by rope-like transfer means, over which rope-like transfer means the web tail wedge falls downwards when the winding roll pulls more web from the unwinding section.

[0019] By rope-like transfer means is meant a transfer rope or any corresponding means suitable for transferring the web tail wedge in accordance with the invention. The rope-like transfer means can also be a in cross-direction tensioned wire of like or a bar-like with good bending stiffness. Preferably the rope-like transfer means is an in cross-direction tensioned transfer rope.

[0020] According to an advantageous aspect of the invention in the method for web threading in a slitter-winder

- the web tail wedge is passed over the rope-like transfer means, and
- the rope-like transfer means of the inner side lifts the web tail wedge against the winding roll of the inner side, which winding roll is provided by suction means
- the web tail wedge is run forward in jogging speed until full width such that the web tail wedge running over the rope-like transfer means is drawn down-

wards by gravity

- when the web is straight, longitudinal slitting of the web into partial webs is begun
- when the slit-beginnings in the web have passed the rope-like transfer means, the rope-like transfer means is moved to the extreme of its movement in relation to the winding roll of the inner side and the jogging of the web is stopped
- the partial webs of the inner side are cut / severed near the rope-like transfer means to desired length and the rope-like transfer means is lowered whereby the partial webs of the outer side will lower downwards with the rope-like transfer means
- a rope-like transfer means of the outer side takes the partial webs for the outer side to the winding roll of the outer side where the partial webs are severed to desired length.

[0021] According to an advantageous aspect of the invention

- from an unwinding section the web tail is threaded as a web tail wedge
 - o the wedge is made manually to the tail of the web on the parent roll or the wedge may be cut to the tail while it is lead in the slitter-winder.
 - o in advantageous cases the web tail is already wedge shaped and the wedge has been cut already at a reel-up during a reel change
- the web tail wedge is passed through the slitting section while the slitter blades or corresponding slitting means are not in slitting position
- the web tail wedge is passed over the rope-like transfer means
- the web tail wedge is lifted and the web tail is passed on jogging speed during lifting
- the web tail falls downwards from the rope-like transfer means and the slitter-winder is still on jogging speed and thus the web in jogging
- the rope-like transfer means is lifted up and the beginnings of the slitted longitudinal cuts are below of the rope-like transfer means
- running is stopped
- the partial webs for the inner side are severed either by severing means or manually
- after severing the partial webs for the inner side, the rope-like transfer means return back same or different path and the movement path of the rope-like transfer means disconnects the partial webs of the outer side from the suction of the winding roll of the inner side
- the rope-like transfer means is lowered and another rope-like transfer means lifts the partial webs of the outer side to the winding roll of the outer side.

[0022] In the following the invention is further explained

in detail with reference to the accompanying drawing in which

[0023] Figures 1 - 6 show schematically one example of method steps for web threading in a slitter-winder according to an advantageous aspect of the invention.

[0024] A slitter-winder comprises an unwinding section where the parent roll is unwound, slitting section in which the full width web unwound from the parent roll is slitted longitudinally to partial webs and winding section in which the partial webs are wound around cores or corresponding spools to partial web rolls. In the example of figures 1 - 6 only the winding section rolls of a slitter-winder is shown. The winding section comprises a multistation winder in which two winding rolls 11, 12 are used, each providing for winding of a set of partial web rolls. After the slitting section separation of partial webs for each winding station is done as shown in the example of figures 1 - 6 by using a rope-like transfer means 15 so that each other partial webs (first partial webs) are passed to one (first) winding roll and the (first) winding stations in connection with this (first) winding roll and the other each other (second) partial webs are passed to another (second) winding roll and the (second) winding stations in connection with this (second) winding roll. The winding rolls 11, 12 are provided with suction for ensuring the adherence of the partial web on the surface of the winding roll 11, 12.

[0025] In the example of the figures 1 - 6 in the step shown in figure 1 web threading in a slitter-winder the web tail wedge T is passed over the rope-like transfer means 15, as indicated by arrow S.

[0026] In the step of figure 2 the rope-like transfer means 15 of inner side lifts the web tail wedge T against the winding roll 11 of the inner side, which winding roll 11 is provided by suction means. As indicated by arrows S the web tail wedge T is run forward in jogging speed until full width of the web W such that the web tail wedge T running over the rope-like transfer means 15 is drawn downwards by gravity, as indicated by arrow G and the winding roll 11 pulls more web W from the unwinding section, as indicated by arrow R.

[0027] When the web W is straight and desired tension has been achieved, slitting of the web W into partial webs W1, W2 is begun.

[0028] In the step of figure 3 the slit-beginnings B have passed over the rope-like transfer means 15 and the rope-like transfer means 15 is moved to the extreme of its movement area on the winding roll 11 of the inner side and the jogging is stopped.

[0029] In the step of figure 4 the partial webs W1 of the inner side have been severed / cut in cross-direction near the rope-like transfer means 15 to desired length and the partial webs W1 of the inner side adhere onto the surface of winding roll 11 of the inner side by suction. The reject tail ends WX are led to a pulper.

[0030] In the step of figure 5 the rope-like transfer means 15 is lowered whereby the partial webs W2 of the outer side will lower downwards with the rope-like trans-

fer means 15.

[0031] In the step of figure 6 a rope-like transfer means 16 of outer side takes the partial webs W2 for outer side to the winding roll 12 of the outer side where the partial webs W2 are severed to desired length. Alternatively the rope-like means 15 of the inner side can also be used for taking the partial webs W2 to the winding roll 12 of the outer side.

[0032] The rope-like transfer means 15, 16 are attached at end pieces (not shown) at each end and they are moved by chains (not shown).

[0033] In the example of figures 1 - 6 for web threading in a slitter-winder from unwinding section the web tail is threaded as a web tail wedge T and the web tail wedge T is passed through the slitting section while the slitter blades or corresponding slitting means are not in slitting position. At winding station the web tail wedge T is passed over the rope-like transfer means 15 and the web tail wedge is lifted by a rope-like transfer means 15 and the web tail wedge T is passed on jogging speed during lifting. The web tail wedge T falls downwards from the rope-like transfer means 15 and the slitter-winder is still on jogging speed. In the next step the rope-like transfer means 15 is lifted up and slitting beginnings B are passed past the rope-like transfer means 15. The running of the slitter-winder is stopped. There after the partial webs W1 for inner side are severed either by severing means or manually. After severing the rope-like transfer means 15 returns back same or different path and the movement path of the rope-like transfer means 15 disconnects the partial webs W2 of outer side from the suction of the winding roll 11 of the inner side. The rope-like transfer means 15 is lowered and another rope-like transfer means 16 lifts the partial webs W2 of the outer side to the winding roll 12 of the outer side.

[0034] In the above the invention has been described in reference to one advantageous example presented in the figures 1 - 6, only. Many modifications and alterations are possible within the inventive web threading method for slitter-winder and in the slitter-winder.

Claims

1. Method for web threading in a slitter-winder comprising an unwinding section where a parent roll is unwound, a slitting section a full width web (W) unwound from the parent roll is slitted longitudinally to partial webs (W1, W2) and a winding section where the partial webs (W1, W2) are wound around cores or corresponding spools to partial web rolls, which winding section comprises a multistation winder in which two winding rolls (11, 12) are used, each providing for winding of a set of partial web rolls, in which method web is threaded from the unwinding section via the slitting section to the winding section and in which method after the slitting section in threading the partial webs (W1, W2) for each winding station

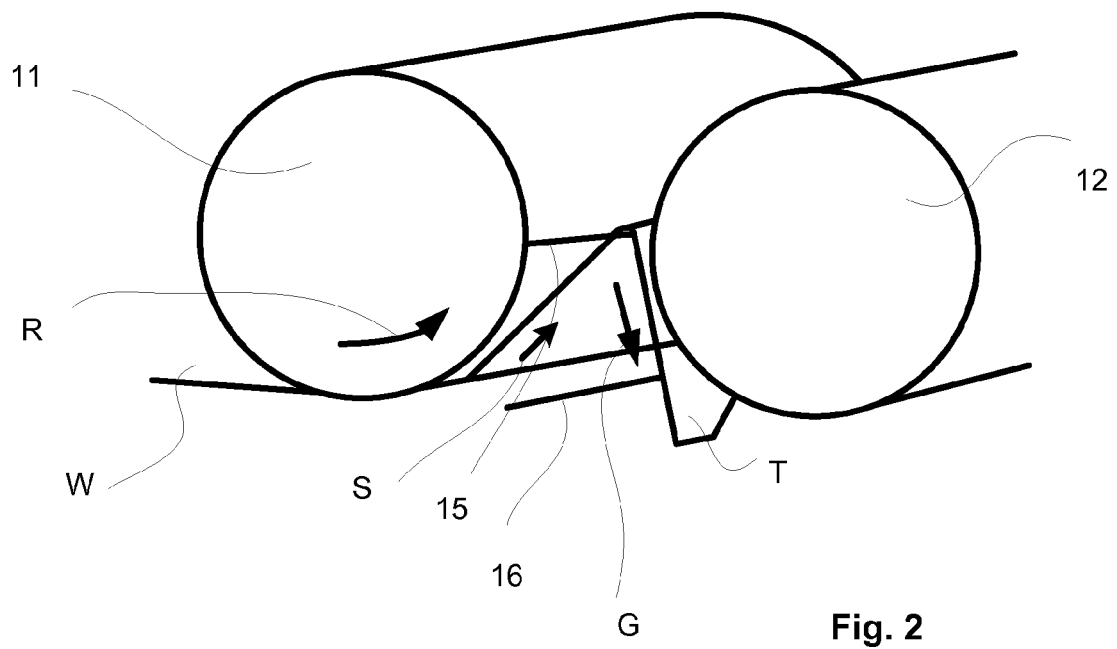
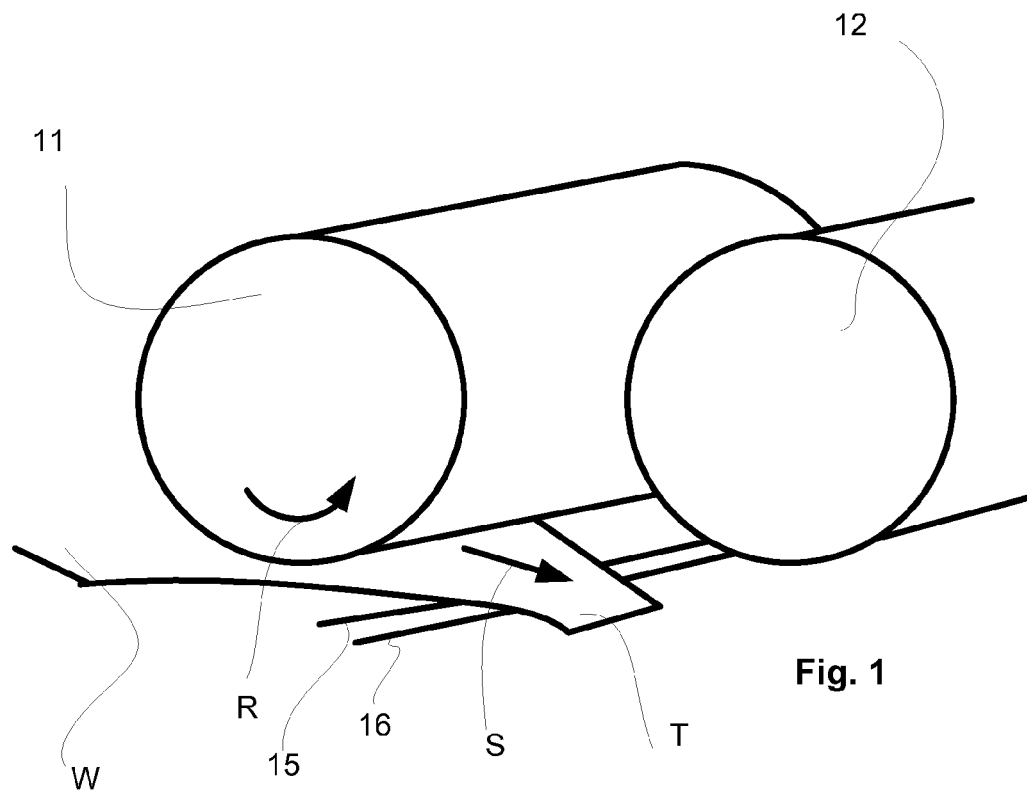
are separated so that each other partial webs (W1) i.e. the partial webs (W1) of the inner side are passed to one winding roll (11) i.e. to a winding roll (11) of the inner side and the other each other partial webs (W2) i.e. the partial webs (W2) of the outer side are passed to another winding roll i.e. a winding roll (12) of the outer side, **characterized in that**, in the method for web threading the web (W) is passed by passing a web tail wedge (T) through the slitter-winder, that in the method at least one rope-like transfer means is used for passing the partial webs to the winding stations on the winding rolls and that in the method the partial webs (W1) are adhered on the surface of at least one of the winding rolls (11, 12) and that in the method the web tail wedge (T) is lifted against a winding roll (11) by rope-like transfer means (15), over which rope-like transfer means (15) the web tail wedge (T) falls downwards when the winding roll (11) pulls more web (W) from the unwinding section.

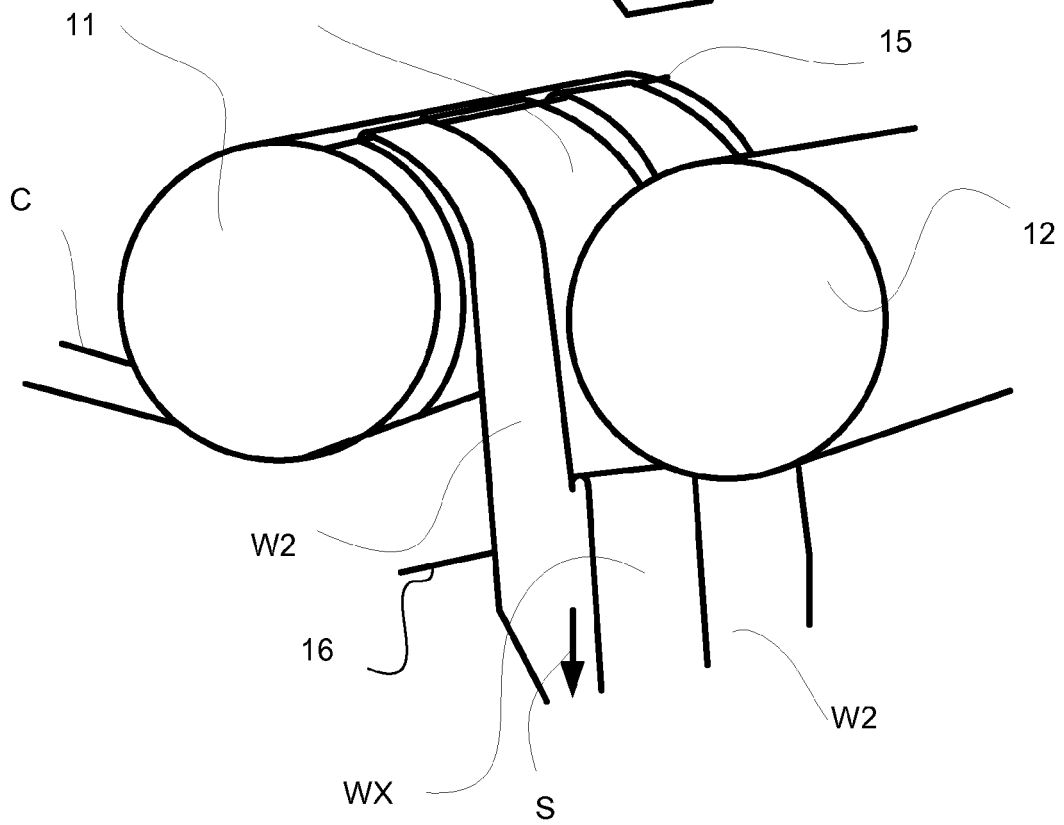
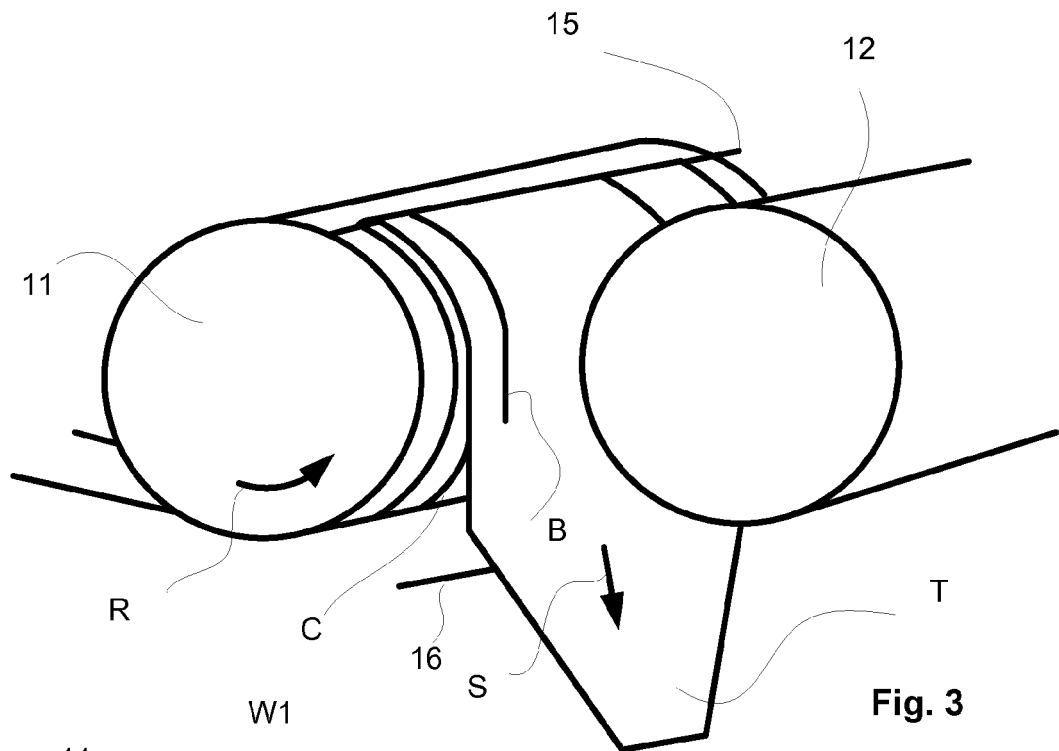
2. Method according to claim 1, **characterized in that** in the method from unwinding section the web tail is threaded as a web tail wedge (T) and the web tail wedge (T) is passed through the slitting section while the slitter blades or corresponding slitting means are not in slitting position, that at winding section the web tail wedge (T) is passed over the rope-like transfer means (15) and the web tail wedge (T) is lifted by a rope-like transfer means (15) and the web tail wedge (T) is passed on jogging speed during lifting, that the web tail wedge (T) falls downwards from the rope-like transfer means (15) and the slitter-winder is still on jogging speed, that the rope-like transfer means (15) is lifted up and slitting ends (B) of the longitudinal cuttings between the partial webs (W) are below of the rope-like transfer means (15), that the running of the slitter-winder is stopped, that the partial webs (W1) for inner side are severed, that the rope-like transfer means (15) returns back and that the rope-like transfer means (15) is lowered and that a rope-like transfer means (15; 16) lifts the partial webs (W2) of the outer side to the winding roll 12 of the outer side.

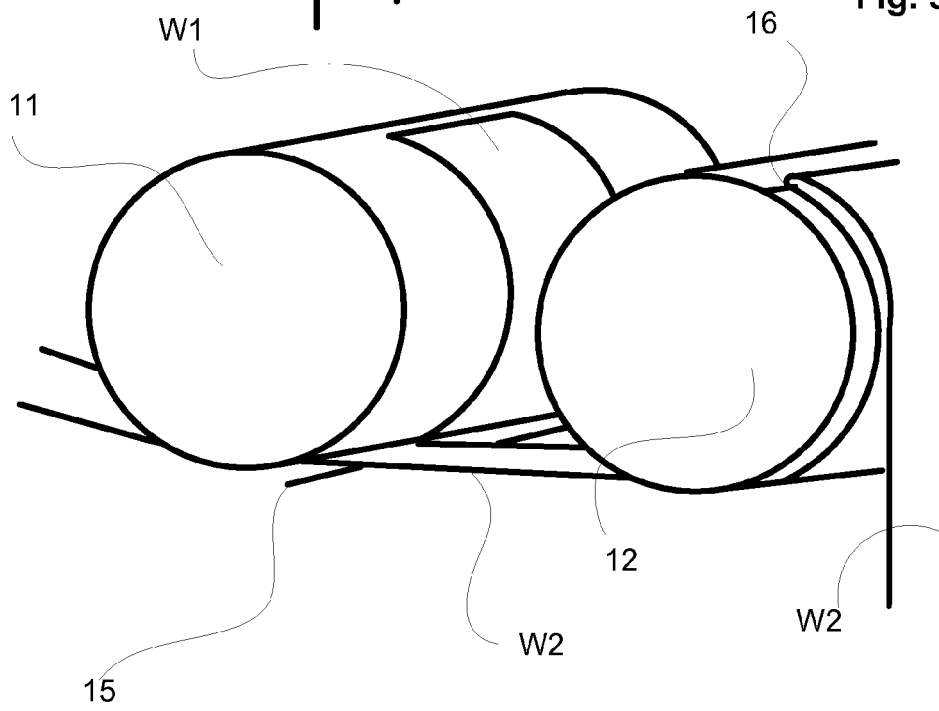
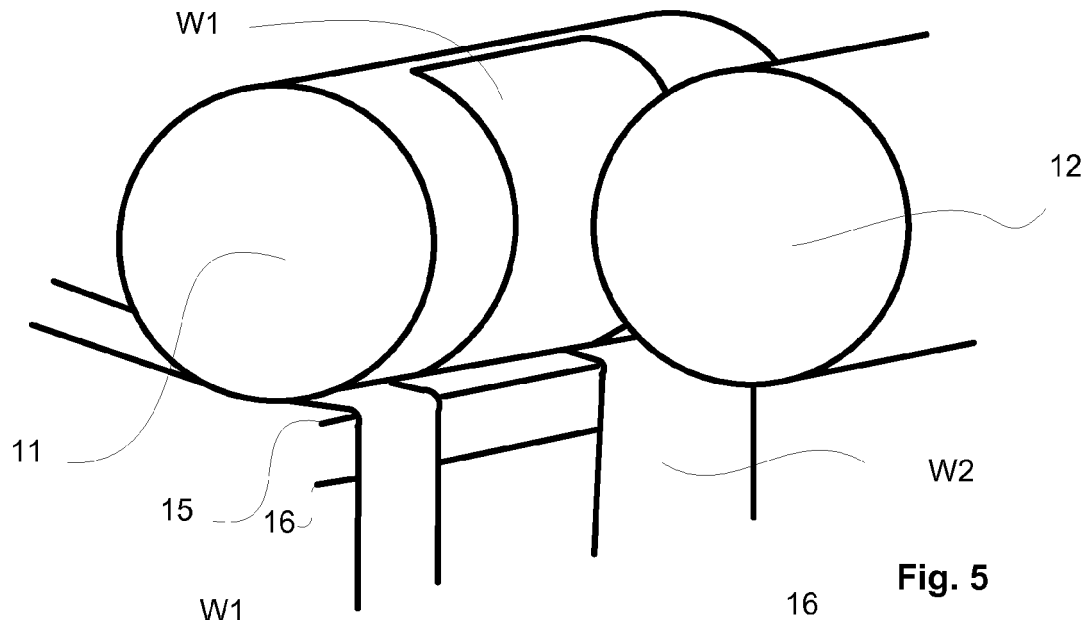
3. Method according to claim 1, **characterized in that** the method comprises the steps in following order:

- the web tail wedge (T) is passed over the rope-like transfer means (15), and
- the rope-like transfer means (15) of the inner side lifts the web tail wedge (T) against the winding roll (11) of the inner side, which winding roll (11) is provided by suction means,
- the web tail wedge (T) is run forward in jogging speed until full width such that the web tail wedge (T) running over the rope-like transfer means (15) is drawn downwards by gravity

- when the web (W) is straight, longitudinal slitting of the web (W) into partial webs (W1, W2) is begun,
 - when the slit-beginnings (B) in the web (W) have passed the rope-like transfer means (15),
the rope-like transfer means (15) is moved to the extreme of its movement in relation to the winding roll (11) of the inner side and the jogging of the web (W) is stopped
 - the partial webs (W1) of the inner side are cut / severed near the rope-like transfer means (15) to desired length and the rope-like transfer means (15) is lowered whereby the partial webs (W2) of the outer side will lower downwards with the rope-like transfer means (15)
 - a rope-like transfer means (16) of the outer side takes the partial webs (W2) for the outer side to the winding roll (12) of the outer side where the partial webs (W) are severed to desired length.
4. A slitter-winder, which comprises an unwinding section, a slitting section and a winding section comprising a multistation winder comprising two winding rolls (11, 12), which slitter-winder comprises means for threading the web tail from the unwinding section to the winding section and means for separating the partial webs (W1, W2) for each winding station formed in connection with each winding roll (11, 12) i.e. for the partial webs (W1) of the inner side and for the partial webs (W2) of the outer side, **characterized in that**, in the slitter-winder the means for web threading comprise means for passing a web tail wedge (T) through the slitter-winder, that the slitter-winder comprises at least one rope-like transfer means (15; 16) for passing the partial webs to the winding stations on the winding rolls (11, 12) and that at least one of the winding rolls (11, 12) is provided with suction.
5. Slitter-winder according to claim 4, **characterized in that**, in the slitter-winder comprises two rope-like transfer means (15, 16) and that one rope-like transfer means is for the passing of the partial webs (W1) of the inner side onto the surface of the winding roll (11) of the inner side and that one is for the passing of the partial webs (W2) of the outer side onto the surface of the winding roll (12) of the outer side.









EUROPEAN SEARCH REPORT

Application Number
EP 12 16 8258

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	EP 0 818 409 A1 (VALMET CORP [FI] METSO PAPER INC [FI]) 14 January 1998 (1998-01-14)	4,5	INV. B65H19/28
A	* column 1, lines 27-47 * * column 2, lines 21-24 * * column 4, line 20 - column 5, line 49 * * column 6, lines 3-15 * * figures 1-5 *	1-3	
A	----- DE 37 10 142 A1 (JAGENBERG AG [DE]) 13 October 1988 (1988-10-13) * column 1, lines 47-59 * * column 2, lines 5-8,25-56 * * column 3, lines 10-31,47-51 * * claim 1 * * figure 1 *	1,4	
A	----- EP 0 820 946 A1 (VALMET CORP [FI] METSO PAPER INC [FI]) 28 January 1998 (1998-01-28) * column 3, line 43 - column 4, line 37 * * figures 1-3 *	1,4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65H
Place of search		Date of completion of the search	Examiner
The Hague		14 August 2012	Cescutti, Gabriel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 16 8258

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