



US 20130126660A1

(19) **United States**

(12) **Patent Application Publication**  
**Guyomard et al.**

(10) **Pub. No.: US 2013/0126660 A1**

(43) **Pub. Date: May 23, 2013**

(54) **DEVICE FOR HANDLING A STRIP OF PRODUCT CONTAINING RUBBER AND METHOD FOR PRODUCING A WINDING DEVICE ONTO WHICH SAID STRIP IS A WOUND**

**Publication Classification**

(51) **Int. Cl.**  
*B65H 19/26* (2006.01)  
(52) **U.S. Cl.**  
CPC ..... *B65H 19/265* (2013.01)  
USPC ..... **242/526**

(75) Inventors: **Eugénie Guyomard**, Clermont-Ferrand (FR); **Jean-Michel Fournier**, Clermont-Ferrand (FR); **Frédéric Cottais**, Lezoux (FR); **David Champel**, Malauzat (FR); **Yves Hilbert**, Mussig (FR)

(57) **ABSTRACT**

(73) Assignees: **Michelin Recherche et Technique S.A.**, Granges-Paccot (CH); **Compagnie Generale Des Etablissements Michelin**, Clermont-Ferrand (FR)

A device for handling a rubber-containing product web (20) intended for the manufacture of a tire, of the type comprising: an endless belt (24) for conveying the web (20), which belt is guided and driven by a set of rollers (R1 to R8) rotatably mounted about axes parallel to a direction (Y), termed the transverse direction, at least some of these rollers (R1 to R8) separating a carrier strand (24P) of the belt, which is intended to carry the web (20), from a return strand (24R) of the belt, a reel (28) for winding the web (20), which reel is arranged above the carrier strand (24P) and rotatably mounted about an axis substantially parallel to the transverse direction; and (Y), means (46) for temporarily diverting the path of the carrier strand (24P) between a normal path of the carrier strand (24P), substantially tangential to the reel (28), and a temporary path for winding the carrier strand (24P) around a sector of the reel (28) that is more than 90°.

(21) Appl. No.: **13/512,523**

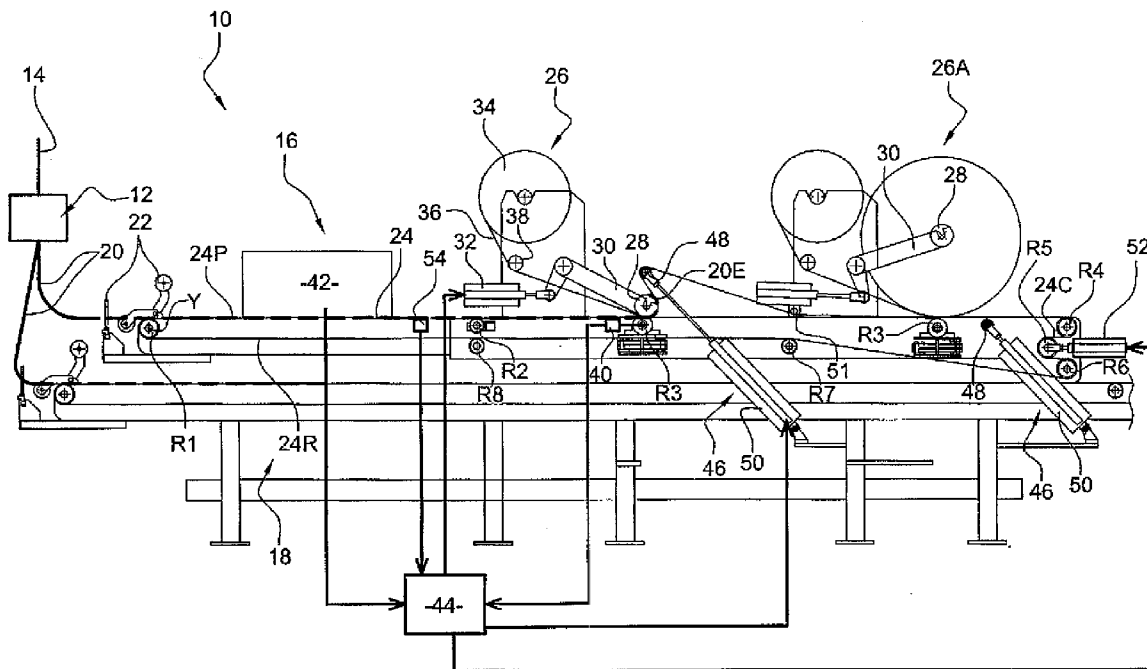
(22) PCT Filed: **Nov. 25, 2010**

(86) PCT No.: **PCT/FR10/52518**

§ 371 (c)(1),  
(2), (4) Date: **Oct. 18, 2012**

(30) **Foreign Application Priority Data**

Nov. 27, 2009 (FR) ..... 0958444



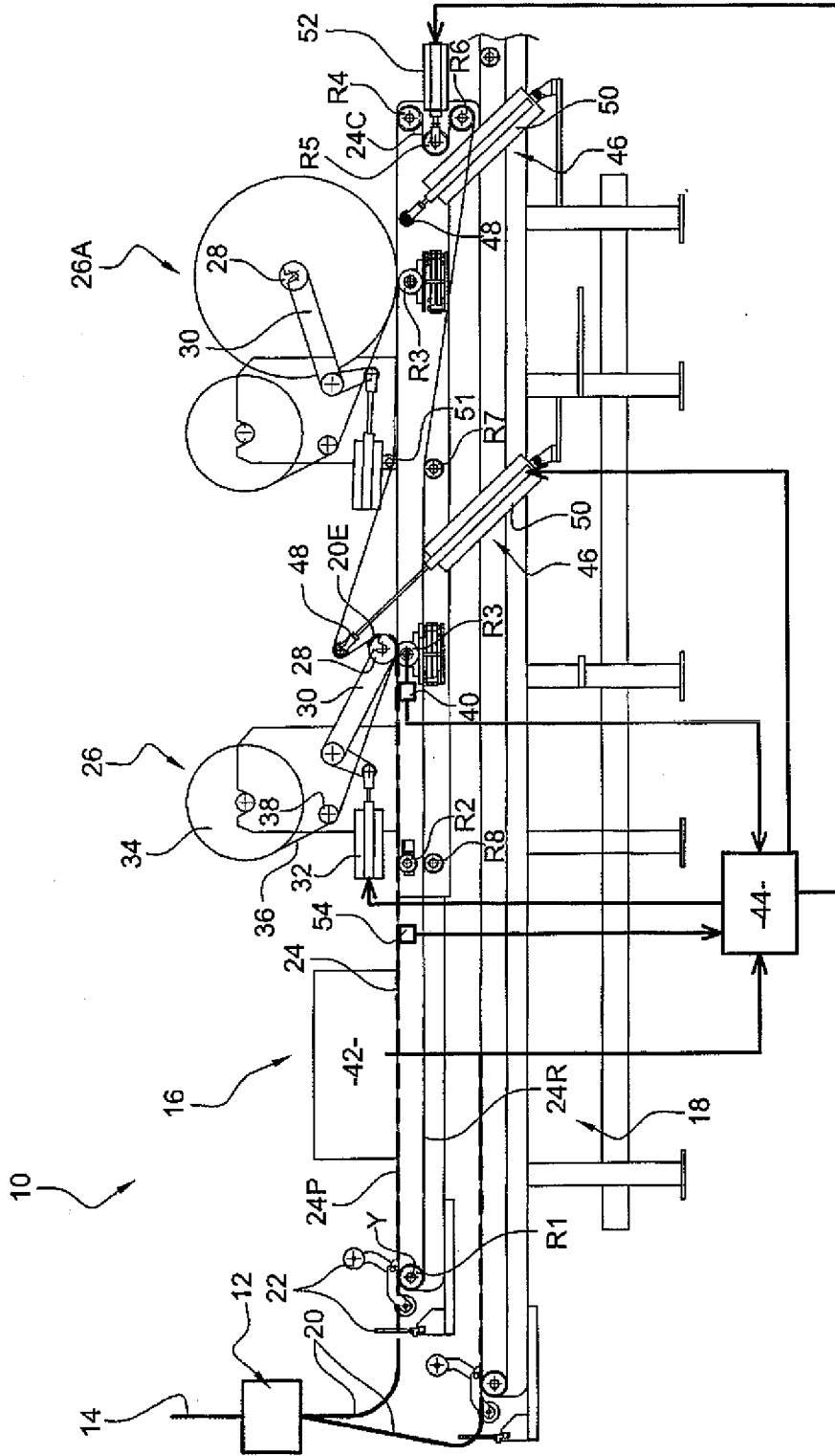


Figure unique

**DEVICE FOR HANDLING A STRIP OF  
PRODUCT CONTAINING RUBBER AND  
METHOD FOR PRODUCING A WINDING  
DEVICE ONTO WHICH SAID STRIP IS A  
WOUND**

[0001] The invention is concerned with the field of handling a rubber-containing product web intended for the manufacture of a tire.

[0002] In the following, the various possible methods of manufacturing a tire will include the retreading of a tire using a rubber-containing product web.

[0003] The prior art has already disclosed an installation for the manufacture of rubber-containing product webs that comprises means for longitudinally cutting a wide raw web into a plurality of narrow webs. The raw rubber-containing product web is obtained, for example, by a conventional calendaring process.

[0004] The webs obtained by longitudinally cutting the raw web have, for example, a thickness ranging between 0.6 and 3 mm and a width ranging between 20 mm and 1500 mm. It is possible, for example, to form from two to twenty four product webs by longitudinally cutting the raw web.

[0005] A conventional installation for manufacturing product webs generally comprises, downstream of the longitudinal-cutting means, at least one device for handling a product web that comprises an endless belt for conveying the web, which belt is guided and driven by a set of rotating rollers whose axes are parallel to a reference direction, termed the transverse direction.

[0006] At least some of these rollers separate a carrier strand of the belt, which is generally substantially horizontal, from a lower return strand of the belt. The product web is intended to be carried by the carrier strand as far as a reel for winding the web that is arranged above the carrier strand and rotatably mounted about an axis substantially parallel to the transverse direction.

[0007] The product web is temporarily stored on the reel between the time of its manufacture and the time of its use for manufacturing a tire.

[0008] Conventionally, an insert web is wound simultaneously with the product web, this insert web being intended to radially separate from one another the various turns of the product web around the reel so as to prevent the various turns of product web from sticking together.

[0009] The operation of winding the product web onto the reel generally takes place according to a method that comprises an initial step of attaching a free end of the web to the empty reel.

[0010] It is conventional for the step of attaching the free end of the web to the reel to be performed by an operator who grasps that end of the web driven by the belt and winds it partially around the empty reel. The winding of the web around the reel then continues automatically by virtue of the fact that this reel is rotated by being in contact with the endless belt.

[0011] However, in order to be able to grasp the free end of the web, the operator must slow down the speed of movement of the web, and hence of the carrier strand of the belt, an operation which may change the geometric parameters of this web. Moreover, if the speed of the carrier strand is too high when attaching the web, the operator may trap a finger between the belt and the reel.

[0012] The invention is particularly aimed at avoiding having an operator grasp the free end of the web in order to attach this web to the empty reel.

[0013] Accordingly, the invention relates to a device for handling a rubber-containing product web intended for the manufacture of a tire, of the type comprising

[0014] an endless belt for conveying the web, which belt is guided and driven by a set of rollers rotatably mounted about axes parallel to a direction, termed the transverse direction, at least some of these rollers separating a carrier strand of the belt, which is intended to carry the web, from a return strand of the belt, and

[0015] a reel for winding the web, which reel is arranged above the carrier strand and rotatably mounted about an axis substantially parallel to the transverse direction, characterized in that it further comprises means for temporarily diverting the path of the carrier strand between a normal path of the carrier strand, substantially tangential to the reel, and a temporary path for winding the carrier strand around a sector of the reel that is more than 90°.

[0016] The means for temporarily diverting the path of the carrier strand of the belt make it possible to attach a free end of the product web to an empty reel without an operator having to grasp the free end of this web. Specifically, when it is desired to attach the free end of a product web to the empty reel, the means for temporarily diverting the path of the carrier strand of the belt are activated. This has the effect of partially winding the carrier strand of the belt, together with the free end of the product web, over a sector of the reel that is more than 90°. The grip between the product web and the empty reel is then sufficient to attach this free end to the reel. The operation of winding the web around the reel is continued by the reel being rotated through its contact with the endless belt.

[0017] Conventionally, the carrier strand of the endless belt is substantially horizontal. The partial winding of the product web achieved by the diverted carrier strand is facilitated by the separation of the product web from the diverted carrier strand under the effect of gravity.

[0018] The handling device according to the invention may also comprise at least one of the following optional features:

[0019] in its temporary path, the carrier strand winds around a sector of the reel ranging between 120 and 160°;

[0020] the carrier strand is elongated between its normal and temporary paths, the belt comprising a compensation strand whose length varies conversely to the length of the carrier strand;

[0021] the diverting means comprise a diverting roller rotatably mounted about an axis parallel to the transverse direction, and means for translationally moving this diverting roller orthogonally to the transverse direction, between an inoperative position and an active position in which it diverts the path of the carrier strand, these means for moving the diverting roller preferably comprising a cylinder actuator, the set of guide and drive rollers comprising a compensation roller that guides the compensation strand and is connected to means for translationally moving this compensation roller orthogonally to the transverse direction, these means for moving the compensation roller preferably comprising a cylinder actuator;

[0022] the device comprises means for transversely cutting the web that are arranged upstream of the reel;

[0023] the device comprises means for controlling the means for moving the diverting roller and means for moving the compensation roller as a function of at least one parameter selected from a measurement of the speed of movement of the belt and a status parameter of the means for transversely cutting the web;

[0024] the device comprises means for moving the reel parallel to a plane perpendicular to the transverse direction, particularly comprising a cylinder actuator;

[0025] the device comprises means for controlling the means for moving the reel as a function of at least one parameter selected from a measurement of the pressure exerted on the belt by the reel, and a status parameter of the means for transversely cutting the web.

[0026] The invention also relates to an installation for the manufacture of rubber-containing product webs intended for the manufacture of a tire, of the type comprising

[0027] means for longitudinally cutting a raw rubber-containing product web into adjacent product webs,

[0028] one or more devices for handling the product web, and

[0029] means for guiding said webs towards the respective handling device or devices,

characterized in that at least one handling device is one according to the invention.

[0030] According to another optional feature of this installation, in the case where it comprises a plurality of handling devices, the latter are offset in terms of height relative to one another.

[0031] The invention also relates to a method for producing a reel onto which is wound a rubber-containing product web intended for the manufacture of a tire, of the type comprising a step of attaching a free end of the web to the empty reel, characterized in that the attachment step is carried out using the means for temporarily diverting the path of the carrier strand that belong to a handling device according to the invention.

[0032] A better understanding of the invention will be gathered from reading the description below given purely by way of example and with reference to the single FIGURE, which represents an elevation view of an installation for the manufacture of product webs, according to the invention.

[0033] The FIGURE depicts an installation according to the invention, designated by the general reference 10, for the manufacture of rubber-containing product webs. These webs are intended for the manufacture of tires.

[0034] The installation 10 comprises, from upstream to downstream when considering the direction of travel of the product webs in this installation, conventional means 12 for longitudinally cutting a raw product web 14 and at least two devices for handling product webs, an upper handling device 16 and a lower handling device 18, respectively.

[0035] Since the upper handling device 16 and lower handling device 18 are similar, only the upper handling device 16 will be described in more detail below.

[0036] The raw rubber-containing product web 14 is manufactured, for example, using a conventional calendaring process and comprises, where appropriate, reinforcement cords.

[0037] The raw web 14 is cut longitudinally by the means 12 into at least two adjacent product webs 20. In the FIGURE, the webs 20 are represented by a thick broken line.

[0038] The installation 10 comprises first conventional guide means 22 for guiding a first web 20 towards the upper

handling device 16 and second conventional guide means for guiding the second web 20 towards the lower handling device.

[0039] The handling device 16 comprises an endless belt 24 for conveying the web 16. This belt 24, made, for example, of a cotton-based material, is guided and driven by a set of rollers R1 to R8 rotatably mounted about axes parallel to a reference direction Y, termed the transverse direction.

[0040] The belt 24 comprises an upper carrier strand 24P, which is substantially horizontal, and a lower return strand 24R.

[0041] The carrier strand 24P, which is intended to carry the product web 16, extends, for example, from an upstream deflection roller R1 to an upper downstream deflection roller R4. The return strand 24R extends, for example, from a lower downstream deflection roller R6 as far as the upstream deflection roller R1.

[0042] In the example described, the upper downstream deflection roller R4 is motor-driven and thereby drives the belt 24.

[0043] The handling device 16 also comprises at least one reel assembly 26. This assembly 26 comprises a reel for winding the web 16, this reel being arranged above the carrier strand 24P. The reel 28 is rotatably mounted about an axis substantially parallel to the transverse direction Y.

[0044] The reel 28 is carried by a first end of a rocker 30 articulated about an axis parallel to the transverse direction Y. A second end of the rocker 30 is connected to a rod of a cylinder actuator 32. This cylinder actuator 32 forms means for moving the reel 28 parallel to a plane perpendicular to the transverse direction Y.

[0045] The assembly 26 also comprises a spool 34 which is rotatably mounted about an axis parallel to the transverse direction Y and which feeds out a conventional insert web 36. The FIGURE shows the insert web 36 extending between the spool 34 and the reel 28. The insert web 36 is guided by a smoothing roller 38 intended to smooth out the web 36, which is generally a textile, for example cotton, web.

[0046] The web 36 is intended to be inserted between the turns of the product web 16 so as to avoid them sticking together. The insert web 36 is attached to the reel 28 in a manner known per se.

[0047] It will be noted that a guide roller R3, in contact with the inner surface of the belt 24, is arranged substantially in vertical alignment with the reel 28. This roller R3 is connected to conventional means 40 for measuring the pressure exerted by the reel 28 on the belt 24.

[0048] Where appropriate, as is illustrated in the FIGURE, the handling device 16 comprises a second reel assembly 26A, similar to the assembly 26, arranged downstream of this assembly 26. Those elements of the assembly 26A that are similar to the elements of the assembly 26 are designated by identical references. The assembly 26A will not be described further.

[0049] The handling device 16 also comprises conventional means 42 for transversely cutting the web 20 that are arranged upstream of the assemblies 26 and 26A, that is to say upstream of the reel 28 of each assembly.

[0050] The transverse-cutting means 42 are activated periodically so as to alternately supply the assemblies 26 and 26A with product web.

[0051] It will be noted that the FIGURE shows the reel 28 of the assembly 26 in an empty state and the reel 28 of the assembly 26A in a full state.

[0052] The handling device 16 also comprises conventional means 44 for controlling various means of the handling device 16.

[0053] In particular, the means 44 are intended to control the cylinder actuator 32 for moving the reel 28 as a function of at least one parameter selected from a measurement provided by the pressure-measuring means 40 and a status parameter of the transverse-cutting means 42. Thus, the control means 44 are able to control the cylinder actuator 32 for moving the reel 28 in such a way as to limit the pressure exerted thereby on the belt 24 commensurately with the increase in the weight of product web wound onto this reel 28.

[0054] Assigned to each of the assemblies 26, 26A, the handling device 16 comprises means 46 for temporarily diverting the path of the carrier strand 24P of the belt. The diverting means 46 make it possible to temporarily divert the path of the carrier strand 24P between a normal path of the carrier strand 24P, substantially tangential to the reel 28 (which, according to the case in question, is empty, in the course of being filled, or full), and a temporary path for winding the carrier strand 24P around a sector of the reel 28 that is more than 90°.

[0055] Considering the FIGURE, it will be noted that the diverting means 46 assigned to the assembly 26 are represented in a state in which they impose on the carrier strand 24P a temporary path winding partially around the reel 28, whereas the diverting means 46 assigned to the assembly 26A are represented in a state in which they impose a normal path on the carrier strand 24P.

[0056] In its temporary path, the carrier strand 24P preferably winds around a sector of the reel ranging between 120° and 160°.

[0057] It will be noted that the carrier strand 24P is elongated between its normal and temporary paths. In order to take account of this elongation, the belt 24 comprises a compensation strand 24C (see downstream section of the belt 24) whose length varies conversely to the length of the carrier strand 24P.

[0058] In the example illustrated, the diverting means comprise a diverting roller 48 that is rotatably mounted about an axis parallel to the transverse direction Y and is in contact with the inner surface of the belt 24.

[0059] The diverting roller 48 is carried by the free end of a rod of a cylinder actuator 50 forming means for translationally moving this diverting roller 48 orthogonally to the transverse direction Y, between an inoperative position (in the FIGURE, see the cylinder actuator 50 assigned to the assembly 26A) and an active position in which it diverts the path of the carrier strand 24P (in the FIGURE, see the cylinder actuator 50 assigned to the assembly 26).

[0060] Where appropriate, the temporary path of the carrier strand 24P is also formed by conventional guide means 51 intended to come into contact with the outer surface of the belt 24.

[0061] The compensation strand 24C connects the carrier strand 24P to the return strand 24R and extends, in the example described, from the upper downstream deflection roller R4 as far as the lower downstream deflection roller R6. Moreover, the strand 24C is guided by the roller R5, forming a compensation roller.

[0062] This compensation roller R5 is carried by the free end of a rod of a cylinder actuator 52 forming means for translationally moving this compensation roller R5 orthogonally to the transverse direction Y.

[0063] Where appropriate, the movements of the rod of the cylinder actuator 50, which carries the diverting roller 48, and of the rod of the cylinder actuator 52, which carries the compensation roller R5, are controlled by the means 44 as a function of at least one parameter selected from a status parameter of the transverse-cutting means 42 and a measurement of the speed of movement of the belt 24 that is provided by conventional means 54.

[0064] The handling device 16 makes it possible to easily attach the free end of the product web 20. Specifically, when the free end 20E of the web arrives in the vicinity of the empty reel 28, the means 44 control the movement of the diverting roller 48 in such a way as to partially wind the belt 24 around the empty reel 28, as is depicted in the FIGURE for the assembly 26. This has the effect of separating the free end 20E from the belt 24 and of causing it to adhere to the empty reel 28 so as to attach the web 20 to this reel 28. It will be noted that gravity facilitates the separation of the free end 20E of the web from the belt 24 and the attachment of this free end 20E to the empty reel 28.

[0065] Once the free end 20E of the web has been attached to the reel 28, the diverting roller 48 is returned to its position in which it re-establishes the normal path of the carrier strand 24P.

[0066] Thus, it will be noted that, by virtue of the invention, the step of attaching a free end of the product web 20 to the empty reel 28 is performed using especially mechanical means without an operator having to grasp the free end 20E of the web.

[0067] The installation according to the invention is not limited to the embodiment described. In particular, the cutting means 12 may cut the raw web 14 into a plurality of, in particular more than two, adjacent webs 20. A plurality of, in particular more than two, handling devices may be used while being offset in terms of height relative to one another. In that case, guide means guide the webs 20 towards the respective handling devices.

1. A device for handling a rubber-containing product web intended for the manufacture of a tire, of the type comprising:

an endless belt for conveying the web, which belt is guided and driven by a set of rollers (R1 to R8) rotatably mounted about axes parallel to a direction, termed the transverse direction, at least some of these rollers (R1 to R8) separating a carrier strand of the belt, which is intended to carry the web, from a return strand (24R) of the belt;

a reel for winding the web, which reel is arranged above the carrier strand and rotatably mounted about an axis substantially parallel to the transverse direction; and,

means for temporarily diverting the path of the carrier strand between a normal path of the carrier strand, substantially tangential to the reel, and a temporary path for winding the carrier strand around a sector of the reel that is more than 90°.

2. The device according to claim 1, wherein, in its temporary path, the carrier strand winds around a sector of the reel ranging between 120 and 160°.

3. The device according to claim 1, wherein the carrier strand is elongated between its normal and temporary paths, the belt comprising a compensation strand whose length varies conversely to the length of the carrier strand.

4. The device according to claim 3, wherein the diverting means comprise a diverting roller rotatably mounted about an axis parallel to the transverse direction, and means for trans-

lationally moving this diverting roller orthogonally to the transverse direction, between an inoperative position and an active position in which it diverts the path of the carrier strand, these means for moving the diverting roller preferably comprising a cylinder actuator, the set of guide and drive rollers comprising a compensation roller that guides the compensation strand and is connected to means for translationally moving this compensation roller orthogonally to the transverse direction.

**5.** The device according to claim **1**, comprising means for transversely cutting the web that are arranged upstream of the reel.

**6.** The device according to claim **4**, comprising means for transversely cutting the web that are arranged upstream of the reel, and comprising means for controlling the means for moving the diverting roller and means for moving the compensation roller as a function of at least one parameter selected from a measurement of the speed of movement of the belt and a status parameter of the means for transversely cutting the web.

**7.** The device according to claim **1**, comprising means for moving the reel parallel to a plane perpendicular to the transverse direction.

**8.** The device according to claim **5**, and comprising means for moving the reel parallel to a plane perpendicular to the transverse direction, particularly comprising a cylinder actuator and comprising means for controlling the means for moving the reel as a function of at least one parameter selected

from a measurement of the pressure exerted on the belt by the reel, and a status parameter of the means for transversely cutting the web.

**9.** An installation for the manufacture of rubber-containing product webs intended for the manufacture of a tire, of the type comprising

means for longitudinally cutting a raw rubber-containing product web into adjacent product webs, one or more devices for handling the product web, and means for guiding said webs towards the respective handling device or devices, wherein the at least one handling device is one according to claim **1**.

**10.** The installation according to claim **9**, wherein, in the case where it comprises a plurality of handling devices, the latter are offset in terms of height relative to one another.

**11.** A method for producing a reel onto which is wound a rubber-containing product web intended for the manufacture of a tire, of the type comprising a step of attaching a free end of the web to the empty reel, wherein the attachment step is carried out using the means for temporarily diverting the path of the carrier strand that belong to a handling device according to claim **1**.

**12.** The device according to claim **4**, wherein the means for moving the compensation roller comprise a cylinder actuator.

**13.** The device according to claim **7**, wherein the means for moving the reel comprise a cylinder actuator.

\* \* \* \* \*