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54 **System for winding and/or unwinding storage reels.**

57 The invention relates to a system for the winding- up and/or unwinding of rubber sheet material for tyres and an intervening liner onto or from storage reels, comprising a first reel handling section, a second reel handling section and a winding section located between the first reel handling section and the second reel handling section, wherein the system is provided with a first station and a second station, wherein the first station and the second station are stationed in a handling position in the first reel handling section and the second reel handling section, respectively, for handling the loading and/or unloading of the storage reels and the liner reels onto or from the stations, and wherein the first station and the second station are arranged to be alternately moved from their respective handling positions in the reel handling sections into a winding position in the winding section and vice versa.

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System for winding and/or unwinding storage reels

BACKGROUND

The invention relates to a system for the winding-up and/or unwinding of rubber sheet material for tyres and an intervening liner onto or from storage reels.

A system is known for the winding-up or unwinding of rubber sheet material for tyres and an intervening liner onto and from storage reels. In the known system, a storage reel and a liner reel are manually lifted and loaded onto a winding station. After the unwinding or winding-up of the storage reel has completed, operators have to replace the storage reel and the liner reel at the winding station with a new storage reel and a new liner reel, respectively. These changing operations interrupt the winding process and are furthermore hazardous due to the weight and size of the reels and the proximity of various moving parts of the winding station.

It is an object of the present invention to provide a system for the winding-up and/or unwinding of rubber sheet material for tyres and an intervening liner onto or from storage reels, wherein the continuity of the winding-up and/or unwinding can be increased.

SUMMARY OF THE INVENTION

According to a first aspect, the invention provides a system for the winding-up and/or unwinding of rubber sheet material for tyres and an intervening liner onto or from storage reels, comprising a first reel handling section, a second reel handling section and a winding section located between the first reel handling section and the second reel handling section, wherein the system is provided with a first station and a second station, wherein each station comprises a first set of carrying elements for holding a storage reel and a second set of carrying elements for holding a liner reel substantially in tandem with respect to the storage reel, wherein the first station and the second station are stationed in a handling position in the first reel handling section and the second reel handling section, respectively, for handling the loading and/or unloading of the storage reels and the liner reels onto or from the stations, and wherein the first station and the second station are arranged to be alternately moved from their respective handling positions in the reel handling sections into a winding position in the winding section and vice versa.

By alternately moving the first station and the second station into the winding section, the reels from the station that is in the reel handling section can already be unloaded and new reels can be loaded while the rubber sheet material is being wound-up or unwound onto or from the storage reel at the other station which, at the same time, is in the winding position in the winding section. In this manner, a new set of a storage reel and a liner reel can already be loaded onto the station that is in the reel handling section, prior to the entry of that station into the winding section. Thus the time to change the reels for winding-up and/or unwinding can be reduced and, as a result, the interruption in the flow of the rubber sheet material can be reduced. Furthermore, since all handling operations

are performed in the reel handling sections, the amount of operations which are to be performed in the hazardous environment of the winding section, can be reduced or even eliminated.

5 In an embodiment the first station and the second station are operationally coupled so as to be moved dependently of each other, wherein the second station is in the handling position in its respective reel handling section when the first station is in the winding position in
10 the winding section, and vice versa. By moving the first station and the second station dependently of each other, it can be achieved that the movement of the first station into the winding position causes the second station to be moved into its respective handling position, and vice versa.

15 In an embodiment the first station and the second station are operationally coupled to each other so as to be jointly moveable. By jointly moving the first station and the second station, it can be automatically achieved that the movement of the first station into the winding position
20 causes the second station to be moved into its respective handling position, and vice versa.

 In an embodiment the first station and the second station are fixedly attached to each other. The fixed attachment between first station and the second station can
25 ensure that they can be moved in unison.

 In an embodiment the system comprises a first divider which is placed between the first station and the second station. The first divider can prevent or detect a passage of an operator or an object from the first station
30 to the second station and vice versa. Therefore, the first divider can shield one station from the other.

 In an embodiment the first divider is operationally coupled to the stations so as to be moved dependently of the stations, wherein the first divider
35 shields the first station at the side of the first station facing towards the second reel handling section when the first station is in the winding position in the winding

section, and wherein the first divider shields the second station at the side of the second station facing towards the first reel handling section when the second station is in the winding position. When the storage reel of one station
5 is being wound-up or unwound in the winding section, an operator, being shielded by the first divider from hazardous movements of the reels in the winding section, can safely handle the loading and unloading of the reels at the adjacent station in the respective reel handling section.

10 In an embodiment the first divider is operationally coupled to the stations so as to be jointly moveable. By jointly moving the first station, the second station and the first divider, it can be automatically achieved that the movement of the first station into the
15 winding position causes the first divider to shield the side of the first station facing towards the second reel handling section, and that the movement of the second station into the winding position causes the first divider to shield the side of the second station facing towards the first reel
20 handling section.

In an embodiment the first divider is fixedly attached to at least one of the stations. The fixed attachment between the first divider and the first station and/or the second station can ensure that they can be moved
25 in unison.

In an embodiment the system comprises second and/or further dividers which, in combination with the first divider, are arranged to form a shield around the winding section and the first reel handling section when the first
30 station is in the winding position in the winding section, and which, in combination with the first divider, are arranged to form a shield around the winding section and the second reel handling section when the second station is in the winding position in the winding section. By forming a
35 shield around the winding section and the empty reel handling section associated with the station that is in the winding position at the winding section, the dividers can

effectively shield the other reel handling section from the other sections.

In an embodiment the second and/or further dividers are alternately moveable between a first position wherein they shield the first reel handling section and a second position wherein they shield the second reel handling section. By alternately moving the dividers, the number of dividers required to effectively shield said sections can be reduced.

In an embodiment the one or more dividers are each defined by a boundary of the group comprising a fence, a wall, an optical detection field or an array of light beams. A fence or a wall can prevent physical passage of objects or an operator. Although the optical detection field or the array of light beams can not physically prevent such passage, they can detect such passage and take appropriate action, such as shutting down the system. In the case of a divider being defined by an optical detection field or an array of light beams, said divider can simply and instantly be activated or de-activated.

In an embodiment each station comprises a carriage which allows for the station to be moved between its respective reel handling section and the winding section, wherein, preferably, the first set of carrying elements and the second set of carrying elements extend on opposite sides of the carriage. With the carrying elements extending on both sides of the carriage, the weight of the reels can be evenly balanced with respect to the carriage.

In an embodiment the system comprises a guide that extends through each of the sections in the direction in which the sections are located adjacent to each other, wherein the carriages of the stations are placed on the guide. The guide can facilitate the movement of the carriages between the various sections.

In an embodiment the first set of carrying elements and the second set of carrying elements are moveable with respect to each other in the axial direction

of the reels. The sets of carrying elements can be moved in the axial direction of the reels to align the set of carrying elements for loading or unloading of the reel. Furthermore, the sets of carrying elements can be moved in
5 the axial direction of the reels to adjust the tandem alignment of the reels during winding-up or unwinding, to correct for irregularities in the material to be wound.

In an embodiment each set of carrying elements comprise two arms which are arranged for engaging an axis of
10 a reel from both sides of the reel, wherein, for each set of carrying elements, the arms are moveable with respect to each other in the axial direction of the reel. By having the arms of each set of carrying elements moveable with respect to each other, the arms can be moved towards each other to
15 engage with a reel. Additionally, the intermediate distance between the arms can be varied in order to accommodate varies reel sizes.

In an embodiment the arms are moveable with respect to each other in a translatory manner in the axial
20 direction of the reel. The translatory movement can ensure that the arms are able to coaxially engage a reel.

In an embodiment the system further comprises a first lift mechanism at the first reel handling section and a second lift mechanism at the second reel handling section,
25 wherein the lift mechanisms are arranged for lifting or lowering the storage reels and the liners reels to and from their respective stations. The lift mechanisms can reduce the hazard for operators handling during the handling of heavy reels.

30 According to a second aspect, the invention provides a method for the winding-up and/or unwinding of rubber sheet material for tyres and an intervening liner onto or from storage reels, using a system comprising a first reel handling section, a second reel handling section
35 and a winding section located between the first reel handling section and the second reel handling section, wherein the system is provided with a first station and a

second station, wherein each station comprises a first set of carrying elements for holding a storage reel and a second set of carrying elements for holding a liner reel substantially in tandem with respect to the storage reel, wherein the method comprises the steps of stationing the first station and the second station in a handling position in the first reel handling section and the second reel handling section, respectively, loading and/or unloading the storage reels and the liner reels onto or from the stations, and alternately moving the first station and the second station from their respective handling positions in the reel handling sections into a winding position in the winding section and vice versa.

Again, by alternately moving the first station and the second station into the winding section, the reels from the station that is in the reel handling section can already be unloaded and new reels can be loaded while the rubber sheet material is being wound-up or unwound onto or from the storage reel at the other station which, at the same time, is in the winding position in the winding section.

In an embodiment the first station and the second station are moved dependently of each other, wherein the method comprises the step of moving the second station into the handling position in its respective reel handling section when the first station is in the winding position in the winding section, and vice versa. By moving the first station and the second station dependently of each other, it can be achieved that the movement of the first station into the winding position causes the second station to be moved into its respective handling position, and vice versa.

In an embodiment the first station and the second station are jointly moved. By jointly moving the first station and the second station, it can be automatically achieved that the movement of the first station into the winding position causes the second station to be moved into its respective handling position, and vice versa.

In an embodiment the system comprises a first

divider which is placed between the first station and the second station, wherein the method comprises the steps of moving the first divider dependently of the stations, thereby shielding the first station at the side of the first station facing towards the second reel handling section when the first station is in the winding position in the winding section, and shielding the second station at the side of the second station facing towards the first reel handling section when the second station is in the winding position.

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10 When the storage reel of one station is being wound-up or unwound in the winding section, an operator, being shielded by the first divider from hazardous movements of the reels in the winding section, can safely handle the loading and unloading of the reels at the adjacent station in the respective reel handling section.

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In an embodiment the first divider and the stations are jointly moved. By jointly moving the first station, the second station and the first divider, it can be automatically achieved that the movement of the first station into the winding position causes the first divider to shield the side of the first station facing towards the second reel handling section, and that the movement of the second station into the winding position causes the first divider to shield the side of the second station facing towards the first reel handling section.

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In an embodiment the system comprises a sensor, wherein the method comprises the steps of detecting the end of the liner with the sensor as the liner is being wound-up onto one of the reels, controlling the rotation of the reel onto which the liner is being wound-up based on the detected end of the liner so that, after the controlled rotation, the detected end of the liner is located in a predetermined position on the reel. Thus, the predetermined position of the end of the liner on the reel can easily be found by an operator.

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According to a third aspect, the invention provides a method for the winding-up and/or unwinding of

rubber sheet material for tyres and an intervening liner onto or from storage reels, using a system comprising a reel handling section with a storage reel and a liner reel, wherein the method comprises the steps of detecting the end
5 of the liner with the sensor as the liner is being wound-up onto one of the reels, controlling the rotation of the reel onto which the liner is being wound-up based on the detected end of the liner so that, after the controlled rotation, the detected end of the liner is located in a predetermined
10 position on the reel. Thus, the predetermined position of the end of the liner on the reel can easily be found by an operator.

The various aspects and features described and shown in the specification can be applied, individually,
15 wherever possible. These individual aspects, in particular the aspects and features described in the attached dependent claims, can be made subject of divisional patent applications.

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BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be elucidated on the basis of an exemplary embodiment shown in the attached schematic
25 drawings, in which:

figure 1 shows a system for winding and unwinding storage reels according to a first embodiment of the invention, in a first position; and

figure 2 shows the system according to figure 1 in
30 a second position.

DETAILED DESCRIPTION OF THE INVENTION

Figures 1 and 2 show a system 1 for the winding-up
35 and/or unwinding of rubberized sheets or rubber sheet material 91 for tyres and an intervening liner 92 onto or from storage reels 6 according to an exemplary embodiment of

the invention.

In this example, the rubber sheet material 91 comprises a plurality of cut rubber strips with metal reinforcement cord. Such strips are generally known as
5 breakers which form the carcass layer of a green tyre. The liner 92 comprises a continuous layer of non-sticky material.

In winding-up mode of the system 1, the liner 92 is supplied from a roll 70 of liner 92 on the full liner
10 reel 7 and combined with the rubber sheet material 91 before being wound-up onto an initially empty storage reel 6 to form a roll 60. The rubber sheet material 91 is imposed on the intervening liner 92 so that, when the rubber sheet material 91 is wound-up as a roll 60 onto the storage reel
15 6, the rubber sheet material 91 of each winding of the roll 60 around the storage reel 6 is separated by the intervening liner 92 from the previous and/or the next winding of rubber sheet material 91. Thus, with the intervening liner 92, sticking together of multiple windings of the rubber sheet
20 material 91 within the roll 60 can be prevented.

In unwinding mode of the system 1, the liner 92 and the rubber sheet material 91 are taken back onto an initially empty liner reel 7 from a full storage reel 6 and the rubber sheet material 91 is separated from the liner 92.

25 Once the winding-up or unwinding for a certain storage reel 6 and certain liner reel 7 is completed, they have to be interchanged with or alternated by a new storage reel 6 and a new liner reel 7 quickly, in order to ensure continuity in tyre building process.

30 To this end, the system 1 according to the invention comprises a first station 2 and a second station 3 which are arranged to be alternately moveable in an alternation direction G between a reel handling position for handling the loading and unloading of storage reels 6 and
35 liner reels 7 and a winding position for the winding-up or unwinding of storage reels 6 and liner reels 7 in a manner which will be described in more detail hereafter.

As schematically shown in figures 1 and 2, the system 1 can be divided into a first reel handling section 11, a winding section 12 and a second reel handling section 13. The winding section 12 is located in-between the first
5 reel handling section 11 and the second reel handling section 13. The sections 11-13 are located adjacent to each other in the alternation direction G. In this example, the sections 11-13 are of elongated, rectangular shape and border with each other along their longitudinal sides. The
10 system 1 is provided with a main guide 8 that extends through each of the sections 11-13 in the alternation direction G. The main guide 8 comprises a base 80, for example a factory floor or an elevation on the factory floor. On the base 80, the main guide 8 is provided with a
15 set of main rails 81, 82 which facilitate the movement of the stations 2, 3 between the various sections 11-13 in the alternation direction G. As shown in figures 1 and 2, the stations 2, 3 are each retracted into or stationed in their own reel handling section 11, 13 when the other station 2, 3
20 is in the winding position in the winding section 12.

As shown in figures 1 and 2, each station 2, 3 is provided with a carriage 20, 30 which is arranged on the main rails 81, 82 of the main guide 8 so as to be moveable over the main guide 8 in the alternation direction G. The
25 stations 2, 3 are positioned and moved dependently with respect to each other in such a manner that the first station and the second station 2, 3 are alternately moved from a handling position in their respective reel handling sections 11, 13 into a winding position in the winding
30 section 12. More in particular, a movement of the carriages 2, 3 between the positions as shown in figures 1 and 2 is achieved, wherein figure 1 shows the situation wherein the second station 3 is in the winding position in the winding section 12 and the first station 2 is in the handling
35 position in the first reel handling section 11, and wherein figure 2 shows the situation wherein the first station 2 is in the winding position in the winding section 12 and the

second station 3 is in the handling position in the second reel handling section 13. When the first station 2 and the second station 3 are in the winding section 12, their respective reel handling sections 11, 13 are inactive, in the sense that there are no handling operations being performed.

In this exemplary embodiment, the carriages 20, 30 of the stations 2, 3 are interconnected or fixed to each other via a coupling 41, so that the stations 2, 3 are able to jointly move, or move in unison. As movement of one of the stations causes movement of the other, only one drive (not shown) is required for automatically achieving the aforementioned dependent movement. In an alternative embodiment, the stations 2, 3 are individually moved by separate drives. However, in such an alternative embodiment, the drives are controlled dependently of each other to achieve the aforementioned dependent movement of the stations 2, 3.

Each carriage 20, 30 is provided with a first arm 23a, 33a and a second arm 23b, 33b which form a first set of carrying elements, and a third arm 23c, 33c and a fourth arm 23d, 33d which form a second set of carrying elements. The first set of carrying elements and the second set of carrying elements extend from opposite sides of the carriage 20, 30 for with the first arm 23a, 33a and the second arm 23b, 33b holding a storage reel 6 at one side of the carriage 20, 30 and with the third arm 23c, 33c and the fourth arm 23d, 33d holding a liner reel 7 at the opposite side of the carriage 20, 30, respectively. In this example, the carrying elements extend in a direction transverse to the alternation direction G. As a result, the first set of carrying elements and the second set of carrying elements also extend on opposite sides of the main guide 8.

The arms 23a-d, 33a-d are provided with clamps 24, 34 at their respective distal ends, which clamps 24, 34 are arranged for engaging the storage reel 6 and the liner reel 7 at their respective axes S, R. The storage reel 6 and the

liner reel 7 are rotatable with respect to the arms 23a-d, 33a-d around their respective axes S, R. For each set of carrying elements, one of the arms, in this case the second arm 23b, 33b and the fourth arm 23d, 33d, are provided with
5 reel drives 25, 26 for driving and/or braking the rotation of the respective engaged reel.

The arms 23a, 23b, 33a, 33b of the first set of carrying elements are individually coupled to a first adjustment guide in the form of a first adjustment rail 21, 31 at one side of the carriage 20, 30. The arms 23c, 23d, 33c, 33d of the second set of carrying elements are individually coupled to a second adjustment guide in the form of a second adjustment rail 22, 32 at an opposite side of the carriage 20, 30 with respect to the first set of
10 carrying elements. The first arms 23a 33a, the second arms 23b, 33b, the third arms 23c, 33c and the fourth arms 23d, 33d are individually moveable with respect to each other along the respective adjustment rails 21, 22, 31, 32 in a
15 translatable manner in a first engagement direction A, a second engagement direction B, a third engagement direction C and a fourth engagement direction D, respectively. The movement of the arms 23a-d, 33a-d does allow for the clamps 24 to engage or disengage from the reels 6, 7 in various
20 positions along the main guide 8. Thus, the reels 6, 7 do not have to be centered perfectly between the arms 23a-d, as the arms 23a-d are able to move to the position of the reel 6, 7. Additionally, for each set of carrying elements, the distance between two respective arms 23a-d, 33a-d of said set of carrying elements can increased or decreased, in
25 order to accommodate various sizes of reels 6, 7.

The first arms 23a, 33a and the second arms 23b, 33b can however also be controlled to be jointly moved in a first alignment direction K along the first adjustment rail 21, 31. In a similar manner, the third arms 23c, 33c and the
35 fourth arms 23d, 33d can be controlled to be jointly moved in a second alignment direction L along the second adjustment rail 22, 32. This allows for movement of the

first set of carrying elements and the second set of carrying elements, and thus of the reels 6, 7 to be held in-between said carrying elements, to be moved with respect to each other. As shown in figures 1 and 2, the storage reel 6
5 and the liner reel 7 are held substantially in succession or in tandem alignment with respect to each other, such that the storage reel 6 and the liner reel 7 can be coupled to each other in substantially the same plane for in mutual cooperation winding-up or unwinding the rubber sheet
10 material 91 and the liner 92 onto or from the storage reel 6. However, small adjustments of the tandem alignment in the first alignment direction K or the second alignment direction L might be required to compensate for irregularities in the windings of the liner 92 and/or the
15 rubber sheet material 91 on the liner 92.

As shown in figures 1 and 2, the first reel handling section 11 and the second reel handling section 13 are provided with a first lift mechanism 51 and a second lift mechanism 52, respectively. The lift mechanisms 51, 52
20 each comprise a first lifting beam 53 and a second lifting beam 54 extending on opposite sides of the main guide 8, parallel to the set of carrying elements of the stations 2, 3. The first lifting beam 53 is provided with two transverse support bars 55, 56 which are spaced apart from each other
25 for in-between the support bars 55, 56 supporting a storage reel 6 along a part of the circumference thereof. The second lifting beam 54 is provided with two transverse support bars 58, 59 which are spaced apart from each other for in-between the support bars 58, 59 supporting a liner reel 7 along a
30 part of the circumference thereof.

At the coupling 41 between the stations 2, 3, the system 1 is provided with a first divider 42. The first divider 42 preferably extends between the stations 2, 3 along substantially the entire length of the sections 11-13
35 in the longitudinal direction of the sections 11-13. The first divider 42 is either fixedly coupled to the coupling 41 to jointly move or move in unison with the stations 2, 3,

or is provided with its own drive which is controlled in a manner wherein the stations 2, 3 and the first divider are moved dependently of each other. In this example, the first divider 42 comprises a fence or a wall which defines a physical boundary between the first station 2 and the second station 3. When the second station 3 is in the winding position in the winding section 12, as shown in figure 1, the first divider 42 shields the second station 3 at the side of the second station 3 facing towards the first reel handling section 11. When the first station 2 is in the winding position in the winding section 12, as shown the in figure 2, the first divider 42 shields the first station 2 at the side of the first station 2 facing towards the second reel handling section 13. Thus, an operator, being shielded by the first divider 42 from hazardous movements of the reels 6, 7 in the winding section 12, can safely handle the loading and unloading of the reels 6, 7 in the adjacent reel handling section 11, 13.

The system 1 further comprises a second divider 14 and a third divider 15 which are strategically placed at the transverse sides of the winding section 12. The second divider 14 and the third divider 15 comprise a wall or a fence which, in combination with the wall or fence of the first divider 42, form a physical shield around three sides of the winding section 12. The system 1 is also provided with a fourth divider 16 and a fifth divider 16 which are placed along the outer longitudinal sides of the first reel handling section 11 and the second reel handling section 13, respectively. Finally, the remaining transverse sides of the first reel handling section 11 and the second reel handling section 13 are provided with a sixth divider 18a, 18b and a seventh divider 19a, 19b, comprising an optical detection field or an array of light beams. The sixth divider 18a, 18b and the seventh divider 19a, 19b can simply and instantly be selectively activated or de-activated for each reel handling sections 11, 13 to allow for passage of operators and objects between the reel handling sections 11, 13 and the

environment outside the system 1.

Together, the dividers 14-17, 18a, 18b, 19a, 19b, 42 form a shield around the winding section 12 and the inactive reel handling section 11, 13 and the sixth divider 18a, 18b and the seventh divider 19a, 19b at the active reel handling section 11, 13 are deactivated. Thus, the one stations 2, 3 which is in its handling position in its respective reel handling section 11, 13 is accessible, while the operators handling the loading and unloading of reels 6, 7 of said one station 2, 3 in said active reel handling section 11, 13 are completely shielded from the other sections.

It will be apparent to one skilled in the art that variations in the types of boundaries which form each divider 14-17, 18a, 18b, 19a, 19b, 42 fall under the scope of the invention. Each of the dividers 14-16, 18a, 18b, 19a, 19b, 42 could comprise a boundary defined by a wall, an optical detection field or an array of light beams or other means of passage detection and/or prevention. The fence and the wall can prevent passage of an operator or objects from one station or section to the other. Although the optical detection field or the array of light beams can not physically prevent a passage, they can detect such passage and take appropriate action, such as shutting down the system 1, in case of an unauthorized passage.

The method for the winding-up and unwinding of rubber sheet material 91 for tyres and an intervening liner 92 onto or from storage reels 6 will be elucidated below on the basis of figures 1 and 2. As both stations 2, 3 cycle through substantially the same steps during the method, only the steps relating to the first station 2 will be described in detail and the steps relating to the second station 3 will be briefly discussed.

Figure 1 shows the situation wherein the first station 2 is in the handling position in the first reel handling section 11. If the system 1 is in winding-up mode, a full storage reel 6 with a roll 60 of rubber sheet

material 91 and liner 92 and an empty liner reel 7 are unloaded from and lowered down from the first station 2 via the first lift mechanism 51 in the loading/unloading directions E, F and a new, empty storage reel 6 and a full liner reel 7 with a roll 70 of liner 92 are lifted up to and loaded onto the first station 2 via the first lift mechanism 51 in the loading/unloading directions E, F. If the system 1 is in unwinding mode, an empty storage reel 6 and an full liner reel 7 with a roll 70 of liner 92 are unloaded from and lowered down from the first station 2 via the first lift mechanism 51 in the loading/unloading directions E, F and a new, full storage reel 6 with a roll 60 of rubber sheet material 91 and liner 92 and an empty liner reel 7 are lifted up to and loaded onto the first station 2 via the first lift mechanism 51 in the loading/unloading directions E, F.

When the clamps 24 of the arms 23a-d have engaged with the newly loaded reels 6, 7, the first lift mechanism 51 can be lowered so that the reels 6, 7 are freely suspended from the arms 23a-d. Subsequently, the liner 92 of from the full reel 6, 7 is partially unwound so that the free end thereof can be connected to the circumference of the empty reel 6, 7. The first station 2 is now ready to be moved in the alternation direction G into the winding section 12, directly after the winding of the reels 6, 7 of the second station 3 in the winding section 12 has been completed.

In figure 2, the situation is shown wherein the first station 2 has moved from its handling position in the first reel handling section 11 into the winding position in the winding section 12. In this position, the drive 25, 26 of the empty reel 6, 7 can be driven to take on the connected liner 92 from the full reel 6, 7. As the liner 92 is transferred from the full reel 6, 7 onto the empty reel 6, 7, the drive 25, 26 of the full reel 6, 7 is activated to keep tension in the liner 92 and to prevent the liner 92 from slacking. In the winding-up mode of the system 1, the

rubber sheet material 91 is imposed on the liner 92 before the liner 92 is wound-up around the storage reel 6. In the unwinding mode of the system 1, the rubber sheet material 91 is separated from the liner 92 before the liner 92 is wound-up onto the liner reel 7. The rubber sheet material 91 is supplied or extracted by a conveyor (not shown) along a rubber sheet material inflow/outflow direction H.

Once the winding of the reels 6, 7 of the first station 2 has been completed, the first station 2 can be moved back again to its handling position in the first reel handling section 11 to unload the reels 6, 7 and replace them with new reels 6, 7, after which the aforementioned steps can be repeated.

During the aforementioned steps, the second station 3 has alternated with the first station 2 by moving into the winding position, while the first station 2 was in the handling position and vice versa. During the loading and unloading of the reels 6, 7 of the first station 2, the reels 6, 7 of the second station 3 have cooperated in order to wind-up or unwind the storage reel 6, depending on the mode of the system 1. As the first station 2 moved into the winding position, it caused the second station 3 to move from the winding position into its handling position in the second reel handling section 13. At the same time in which the reels 6, 7 of the first station 1 were being wound in the winding section 12, the storage reel 6 and the liner reel 7 of the second station 3 were unloaded and replaced or interchanged by new reels 6, 7 in a similar manner as described before in relation to the unloading and loading of the reels 6, 7 of the first station 2.

By alternately moving the first station 2 and the second station 3 into the winding section 12, a new storage reel 6 and a liner reel 7 can already be loaded onto the station 2, 3 that is in the reel handling section 11, 13, prior to the entry of that station 2, 3 into the winding section 12. Thus the time to change the reels 6, 7 for winding-up and/or unwinding can be reduced and, as a result,

the interruption in the inflow or outflow H of the rubber sheet material 91 can be reduced.

In an embodiment the system 1 comprises a sensor (not shown), wherein the method comprises the step of
5 detecting the end of the liner 92 with the sensor as the liner 92 is being wound-up onto one of the reels 6, 7. After the end of the liner 92 has been detected, the drive 25, 26 of the reel 6, 7 on which the liner 92 is being wound-up is controlled so that the further rotation of the reel 6, 7
10 past the point of detection of the end of the liner 92 is known. By controlling said further rotation and by stopping the rotation once the end of the liner 92 has travelled a predetermined distance from the point of detection, the final position of the end of the liner 92 on the reel 6, 7
15 can be accurately controlled. As a result, the predetermined position of the end of the liner 92 on the reel 6, 7 can easily be found by an operator.

It is to be understood that the above description is included to illustrate the operation of the preferred
20 embodiments and is not meant to limit the scope of the invention. From the above discussion, many variations will be apparent to one skilled in the art that would yet be encompassed by the spirit and scope of the present invention.

C O N C L U S I E S

1. Systeem voor het opwickelen en/of afwickelen van rubbervelmateriaal voor banden en een tussenvoering op of vanaf opslaghaspels, omvattend een eerste haspelhanteergedeelte, een tweede haspelhanteergedeelte en
5 een wikkelgedeelte dat gelegen is tussen het eerste haspelhanteergedeelte en het tweede haspelhanteergedeelte, waarbij het systeem is voorzien van een eerste station en een tweede station, waarbij elk station een eerste set draagelementen omvat voor het houden van een opslaghaspel
10 en een tweede set draagelementen voor het houden van een voeringshaspel in hoofdzaak in tandem ten opzichte van het opslaghaspel, waarbij het eerste station en het tweede station gestationeerd zijn in een hanteerpositie in respectievelijk het eerste haspelhanteergedeelte en het
15 tweede haspelhanteergedeelte, voor het hanteren van het inladen en/of uitladen van de opslaghaspels en de voeringshaspels op en vanaf de stations, en waarbij het eerste station en het tweede station zijn ingericht om afwisselend te worden bewogen vanaf hun respectievelijke
20 hanteerposities in de haspelhanteergedeelten naar een wikkelpositie in het wikkelgedeelte en vice versa.

2. Systeem volgens conclusie 1, waarbij het eerste station en het tweede station operationeel gekoppeld zijn teneinde afhankelijk van elkaar bewogen te worden,
25 waarbij het tweede station in de hanteerpositie in het respectievelijke haspelhanteergedeelte daarvan is wanneer het eerste station in de wikkelpositie in het wikkelgedeelte is, en vice versa.

3. Systeem volgens conclusie 2, waarbij het
30 eerste station en het tweede station operationeel aan elkaar gekoppeld zijn teneinde gezamenlijk beweegbaar te zijn.

4. Systeem volgens conclusie 3, waarbij het eerste station en het tweede station vast aan elkaar bevestigd zijn.

5. Systeem volgens één der conclusies 2-4, 5
omvattend een eerste scheider welke is geplaatst tussen het eerste station en het tweede station.

6. Systeem volgens conclusie 5, waarbij de eerste scheider operationeel gekoppeld is aan de stations teneinde afhankelijk van de stations bewogen te worden, 10
waarbij de eerste scheider het eerste station afschermt aan de zijde van het eerste station die gericht is naar het tweede haspelhanteergedeelte wanneer het eerste station in de wikkelpositie is in het wikkeldedeelte, en waarbij de eerste scheider het tweede station afschermt aan de zijde 15
van het tweede station dat gericht is naar het eerste haspelhanteergedeelte wanneer het tweede station in de wikkelpositie is.

7. Systeem volgens conclusie 6, waarbij de eerste scheider operationeel gekoppeld is aan de stations 20
teneinde gezamenlijk beweegbaar te zijn.

8. Systeem volgens conclusie 7, waarbij de eerste scheider vast bevestigd is aan ten minste één van de stations.

9. Systeem volgens één der conclusies 5-8, 25
omvattend tweede en/of verdere scheiders welke, in combinatie met de eerste scheider, zijn ingericht voor het vormen van een afscherming rondom het wikkeldedeelte en het eerste haspelhanteergedeelte wanneer het eerste station in de wikkelpositie in het wikkeldedeelte is, en welke, in 30
combinatie met de eerste scheider, zijn ingericht voor het vormen van een afscherming rondom het wikkeldedeelte en het tweede haspelhanteergedeelte wanneer het tweede station in de wikkelpositie in het wikkeldedeelte is.

10. Systeem volgens conclusie 9, waarbij de 35
tweede en/of verdere scheiders afwisselend beweegbaar zijn tussen een eerste positie waarin zij het eerste haspelhanteergedeelte afschermen en een tweede positie

waarin zij het tweede haspelhanteergedeelte afschermen.

11. Systeem volgens één der conclusies 5-10, waarbij de één of meer scheiders elk bepaald zijn door een begrenzing van de groep omvattende een hekwerk, een wand,
5 een optisch detectieveld of een reeks van lichtstralen.

12. Systeem volgens één der voorgaande conclusies, waarbij elke station een onderstel omvat welke toelaat dat het station wordt bewogen tussen het respectievelijke haspelhanteergedeelte daarvan en het
10 wikkelgedeelte, waarbij de eerste set draagelementen en de tweede set draagelementen zich aan tegenovergestelde zijden van het onderstel uitstrekken.

13. Systeem volgens conclusie 12, omvattend een geleiding die zich uitstrekt door elk van de gedeelten in
15 de richting waarin de gedeelten naast elkaar gelegen zijn, waarbij de onderstellen van de stations op de geleiding zijn geplaatst.

14. Systeem volgens één der voorgaande conclusies, waarbij de eerste set draagelementen en de
20 tweede set draagelementen ten opzichte van elkaar beweegbaar zijn in de axiale richting van de haspels.

15. Systeem volgens één der voorgaande conclusies, waarbij elke set draagelementen twee armen omvat welke zijn ingericht voor het aangrijpen van een as
25 van een haspel vanaf beide zijden van de haspel, waarbij de armen, voor elke set draagelementen, beweegbaar zijn ten opzichte van elkaar in de axiale richting van de haspel.

16. Systeem volgens conclusie 15, waarbij de armen op translerende wijze ten opzichte van elkaar
30 beweegbaar zijn in de axiale richting van de haspel.

17. Systeem volgens één der voorgaande conclusies, verder omvattend een eerste liftmechanisme bij het eerste haspelhanteergedeelte en een tweede liftmechanisme bij het tweede haspelhanteergedeelte,
35 waarbij de liftmechanismes zijn ingericht voor het optileen of neerlaten van de opslaghaspels en de voeringshaspels naar en vanaf hun respectievelijke stations.

18. Werkwijze voor het opwickelen en/of afwickelen van rubbervelmateriaal voor banden en een tussenvoering op of vanaf opslaghaspels, met gebruikmaking van een systeem dat een eerste haspelhanteergedeelte, een
5 tweede haspelhanteergedeelte en een wikkelgedeelte omvat dat gelegen is tussen het eerste haspelhanteergedeelte en het tweede haspelhanteergedeelte, waarbij het systeem is voorzien van een eerste station en een tweede station, waarbij elk station een eerste set draagelementen omvat
10 voor het houden van een opslaghaspel en een tweede set draagelementen voor het houden van een voeringshaspel in hoofdzaak in tandem ten opzichte van het opslaghaspel, waarbij de werkwijze de stappen omvat van het stationeren van het eerste station en het tweede station in een
15 hanteerpositie in respectievelijk het eerste haspelhanteergedeelte en het tweede haspelhanteergedeelte, het laten en/of lossen van de opslaghaspels en de voeringshaspels op of vanaf de stations, en het afwisselend bewegen van het eerste station en het tweede station vanuit
20 hun respectievelijke hanteerposities in de haspelhanteergedeelten naar een wikkelpositie in het wikkelgedeelte en vice versa.

19. Werkwijze volgens conclusie 18, waarbij het eerste station en het tweede station afhankelijk van elkaar
25 bewogen worden, waarbij de werkwijze de stap omvat van het bewegen van het tweede station tot in de hanteerpositie in het respectievelijke haspelhanteergedeelte daarvan wanneer het eerste station in de wikkelpositie in het wikkelgedeelte is, en vice versa.

30 20. Werkwijze volgens conclusie 19, waarbij het eerste station en het tweede station gezamenlijk worden bewogen.

21. Werkwijze volgens één der conclusies 18-20, waarbij het systeem een eerste scheider omvat welke is
35 geplaatst tussen het eerste station en het tweede station, waarbij de werkwijze de stappen omvat van het bewegen van de eerste scheider in afhankelijkheid van de stations,

daarbij het eerste station afschermend aan de zijde van het eerste station die gericht is naar het tweede haspelhanteergedeelte wanneer het eerste station in de wikkelpositie in het wikkeldedeelte is, en het tweede station afschermend aan de zijde van het tweede station die gericht is naar het eerste haspelhanteergedeelte wanneer het tweede station in de wikkelpositie is.

22. Werkwijze volgens conclusie 21, waarbij de eerste scheider en de stations gezamenlijk worden bewogen.

23. Werkwijze volgens één der conclusies 18-22, waarbij het systeem een sensor omvat, waarbij de werkwijze de stappen omvat van het met de sensor detecteren van het uiteinde van de voering terwijl de voering opgewikkeld wordt op één van de haspels, het controleren van de rotatie van de haspel waarop de voering wordt opgewikkeld gebaseerd op het gedetecteerde uiteinde van de voering zodanig dat, na de gecontroleerde rotatie, het gedetecteerde uiteinde van de voering gelegen is in een voorafbepaalde positie op de haspel.

24. Systeem voorzien van één of meer van de kenmerkende maatregelen zoals beschreven in de bijgevoegde beschrijving en/of zoals getoond in de bijgevoegde tekeningen.

25. Werkwijze voorzien van één of meer van de kenmerkende maatregelen zoals beschreven in de bijgevoegde beschrijving en/of zoals getoond in de bijgevoegde tekeningen.

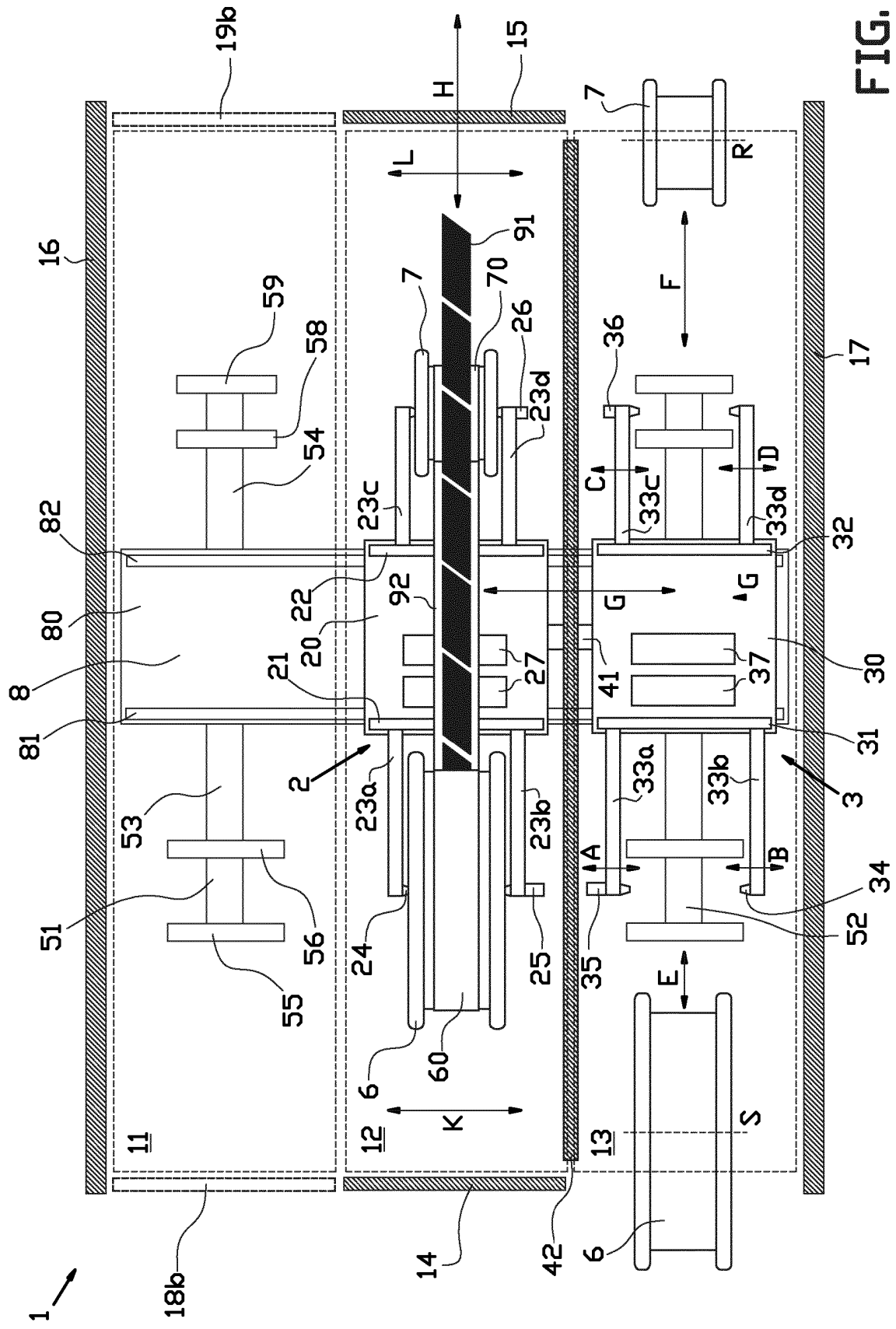


FIG. 2

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE	
	NLP191206A	
Nederlands aanvraag nr.	Indieningsdatum	
2009182	13-07-2012	
	Ingeroepen voorrangsdatum	
Aanvrager (Naam)		
VMI Holland B.V.		
Datum van het verzoek voor een onderzoek van internationaal type	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr.	
24-11-2012	SN 59179	
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)		
Volgens de internationale classificatie (IPC)		
B29D30/00		
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK		
Onderzochte minimumdocumentatie		
Classificatiesysteem	Classificatiesymbolen	
IPC8	B29D	B65H
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen		
III.	<input checked="" type="checkbox"/>	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV.	<input type="checkbox"/>	GEBREK AAN EENHEID (opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2009182

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B29D30/00
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
B29D B65H

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
	ONVOLLEDIG ONDERZOEK zie aanvullingsblad C -----	
A	US 1 648 990 A (T. P. LITTLE) 15 november 1927 (1927-11-15) * bladzijde 1, regel 30 - bladzijde 2, regel 5; figuren 1-5 *	1-23
A	US 1 891 273 A (STACEY ERNEST W) 20 december 1932 (1932-12-20) * bladzijde 1, regel 99 - bladzijde 3, regel 43; figuren 1-6 *	1-23
A	EP 1 236 669 A1 (GOODYEAR TIRE & RUBBER [US]) 4 september 2002 (2002-09-04) * alinea [0017] - alinea [0037]; figuren 1-6 *	1-23
	----- -/--	

Verdere documenten worden vermeld in het vervolg van vak C.

Leden van dezelfde octroofamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

A niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

D in de octrooiaanvraag vermeld

E eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

L om andere redenen vermelde literatuur

O niet-schriftelijke stand van de techniek

P tussen de voorrangdatum en de indieningsdatum gepubliceerde literatuur

T na de indieningsdatum of de voorrangdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

X de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

Y de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

& lid van dezelfde octroofamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

20 februari 2013

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
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De bevoegde ambtenaar

Fregosi, Alberto

1

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2009182

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A	WO 2011/101738 A1 (PIRELLI [IT]; PORTINARI GIANNI [IT]; STEGAGNO FRANCESCO [IT]; DALE PIE) 25 augustus 2011 (2011-08-25) * bladzijde 17, regel 8 - bladzijde 32, regel 9; figuren 1-6 * -----	1-23
A	US 2005/189448 A1 (SCHMIDT-HEBBEL HARALD [BR] ET AL) 1 september 2005 (2005-09-01) * alinea [0014] - alinea [0025]; figuren 1,2 * -----	1-23
A	WO 2010/097515 A1 (METSO PAPER INC; ENWALD PETRI [FI]; KOJO TEPPU [FI]) 2 september 2010 (2010-09-02) * bladzijde 16, regel 26 - bladzijde 30, regel 28; figuren 1-8 * -----	1-23

**ONVOLLEDIG ONDERZOEK
AANVULLINGSBLAD C**

Octrooiaanvraag Nr.:

SN 59179
NL 2009182

Dit verslag van het onderzoek heeft geen betrekking op bepaalde conclusies omdat deze betrekking hebben op delen van de nationale aanvraag die niet voldoen aan de voorgeschreven vereisten, en wel in die mate dat geen zinvol nieuwheidsonderzoek verricht kan worden, in het bijzonder:

Volledig onderzoekbare conclusie(s):
1-23

Niet onderzochte conclusie(s):
24, 25

Reden voor de beperking van het onderzoek:

Claims 24 and 25 contain references to one or more of the technical features disclosed in the description and/or in the drawings. This wording implies such a great number of possible combinations, that a meaningful search and a practical examination are impossible. Moreover, lack of clarity of the claims as a whole arises, since the claimed pluralities of possible combinations of features makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

**ONDERZOEKSRAPPORT BETREFFENDE HET
 RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
 VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
 de stand van de techniek

NL 2009182

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 1648990	A	15-11-1927	GEEN

US 1891273	A	20-12-1932	GEEN

EP 1236669	A1	04-09-2002	BR 0200346 A 08-10-2002 EP 1236669 A1 04-09-2002

WO 2011101738	A1	25-08-2011	CN 102781654 A 14-11-2012 EP 2539139 A1 02-01-2013 US 2012312451 A1 13-12-2012 WO 2011101738 A1 25-08-2011

US 2005189448	A1	01-09-2005	BR PI0500620 A 18-10-2005 CA 2497414 A1 01-09-2005 CN 1663896 A 07-09-2005 EP 1571109 A1 07-09-2005 MX PA05002357 A 05-12-2005 US 2005189448 A1 01-09-2005

WO 2010097515	A1	02-09-2010	EP 2401218 A1 04-01-2012 WO 2010097515 A1 02-09-2010

WRITTEN OPINION

File No. SN59179	Filing date (<i>day/month/year</i>) 13.07.2012	Priority date (<i>day/month/year</i>)	Application No. NL2009182
International Patent Classification (IPC) INV. B29D30/00			
Applicant VMI Holland B.V.			

This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the application
- Box No. VIII Certain observations on the application

	Examiner Fregosi, Alberto
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WRITTEN OPINION

Application number

NL2009182

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - on paper
 - in electronic form
 - c. time of filing/furnishing:
 - contained in the application as filed.
 - filed together with the application in electronic form.
 - furnished subsequently for the purposes of search.
3. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION

Application number
NL2009182

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step, or to be industrially applicable have not been examined in respect of

- the entire application
- claims Nos. 24, 25

because:

- the said application, or the said claims Nos. relate to the following subject matter which does not require a search (*specify*):
- the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):
- no search report has been established for the whole application or for said claims Nos. 24, 25
- a meaningful opinion could not be formed as the sequence listing was either not available, or was not furnished in the international format (WIPO ST25).
- a meaningful opinion could not be formed without the tables related to the sequence listings; or such tables were not available in electronic form.
- See Supplemental Box for further details.

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	1-23
	No: Claims	
Inventive step	Yes: Claims	1-23
	No: Claims	
Industrial applicability	Yes: Claims	1-23
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims **24** and **25** contain references to one or more of the technical features disclosed in the description and/or in the drawings.

This wording implies such a great number of possible combinations, that a meaningful search and a practical examination are impossible.

Moreover, lack of clarity of the claims as a whole arises, since the claimed pluralities of possible combinations of features makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Prior art

Reference is made to the following documents:

D1: US 1648990 - A;

D2: US1891273 - A;

D3: EP 1236669 - A;

D4: WO 2011/101738 - A;

D5: US 2005/0189448 - A;

D6: WO 2010/097515 - A.

2. Claims 1 - 23 - Novelty and inventive step

2.1 The present application essentially deals with (claim 1) a system for winding on, and un-winding from storage reels, rubber sheet material with the interposition of suitable anti-adhesion backing layers.

The claimed system discloses a first (11) and a second (13) reel handling section and a reel winding section (12) located between said first (11) and second (13) reel handling sections. Suitable reel carrying means move alternatively the storage reels and the relative backing reels from said first (11) and second (13) reel handling sections to said reel winding section (12) and viceversa.

2.2 In tire manufacturing, devices essentially comprising one station for winding/unwinding rubber band storage reels (including the relative backing reels) and one station for handling the reels are well known: see for instance documents **D1** (US 1648990 - A) and **D2** (US1891273 - A).

2.3 In tire manufacturing, devices essentially comprising a carriage carrying two or more reels arranged side-by-side, to be wound/unwound alternatively, are also known: see for instance documents **D3** (EP 1236669 - A) and **D4** (WO 2011/101738 - A).

2.4 In the more general field of handling paper, textile or plastics webs, document **D5** (US 2005/0189448 - A) describes a first (18) and a second (20) reel handling station, both stations being located above a reel winding station (28).

In this case however the reel handling stations are used only to temporary store empty reels of different sizes; furthermore, no handling of backing reels is disclosed.

2.5 Document **D6** (WO 2010/097515 - A) relates to a movable reel storage for receiving, storing and handing over reels intended for the handling of fiber webs, typically used in the paper-making field.

2.6 Claim 1 of the present application essentially differs from the mentioned prior art disclosures in the combination of constructional and functional features recited therein.

In short, the combination of a first and a second reel handling station and of a reel winding station located in-between, wherein suitable reel carrying means move alternatively the storage reels and the relative backing reels from said said first and second reel handling stations to said reel winding station and viceversa, is not disclosed in any of the available prior art disclosures.

Claim **1** is therefore novel.

2.7 The problem to be solved is regarded as to speed up the winding/unwinding processes of semifinished tire rubber products (thus improving the overall productivity of the tire manufacturing plant) and to reduce the amount of manual operations to be performed in the hazardous environment of the winding section of the plant.

2.8 This problem is solved by the combination of features as recited in claim **1**, whereby the claimed first and second stations provided with suitable reel carrying means, are alternatively moved into the winding station, thus achieving the advantageous effects described in page 2, line 24 to page 3, line 4 of the application as filed.

2.9 The subject-matter of claim **1** cannot be derived in an obvious way from the available prior art disclosures, taken alone or in combination.

The claim is thus regarded as inventive.

2.10 Independent method claim **18** teaches in practice a combination of steps in order to operate the novel and inventive apparatus of claim **1** and, as such, is also regarded as novel and inventive.

2.11 The dependent claims **2** to **17** and **19** to **23**, as such, are also regarded as novel and inventive.