Device and method for sleeving containers.

The invention relates to a container sleeving device for arranging sleeves around containers conveyed on a conveyor, comprising:
- a frame for supporting a spreading unit;
- a foil supply for supplying foil to the spreading unit, configured to open the foil to form sleeves and comprising a bottom part configured as a generally flat element, a top part configured as a generally cylindrical element and an intermediate part arranged between the bottom and top part;
- a first set of opposite upper guide rollers and a second set of opposite lower guide rollers, both the lower and upper guide rollers being arranged at the intermediate part in the plane of the flat element of the bottom part;
- a set of opposite drive rollers connected to the frame and arranged so as to transport the sleeve between the drive rollers and guide rollers in upward direction;
wherein the drive rollers are arranged below the upper guide rollers so as to support the spreading unit on the frame.
DEVICE AND METHOD FOR SLEEving CONTAINERS

The present invention relates to a device and method for arranging sleeves around containers. The invention also relates to a spreading element for a sleeving device.

Sleeving devices using a spreading element (for instance, a mandrel) and methods for arranging sleeves around containers are well known from prior art. For instance, reference is made to applications WO2011118105-A and WO2011031160-A in the name of the same applicant and incorporated by reference. A known method comprises feeding of a continuous strip of flattened tubular foil material wound around a foil supply reel towards a spreading element. The foil may be printed to form labels suitable for labeling the containers. The foil is arranged around the outer surface of a spreading element suspended from a stationary frame for spreading the foil from the closed (flattened) position to an open position, and the foil is cut by a cutting unit to provide a sleeve-like foil part. Then the sleeve-like foil part is arranged around a container that is transported by a container conveyor, allowing to form a labeled container, e.g. after heat shrinking the sleeve around the container.

Rollers can be provided on both the frame and the spreading element allowing the spreading element to be suspended while foil is transported between the respective rollers. During foil movement, the foil is located between rollers mounted on the frame and rollers mounted on the spreading element.

In the known sleeving device the spreading element is suspended from a frame in such a manner, that the sleeves are transported essentially vertically downward so as to arranged the sleeves in downward direction over a container passing beneath the spreading element. However, it may not always be possible to arrange a sleeve in a downward direction over a container, i.e. from the upper end of the container downward. For instance, in case of containers having a rim at their upper end, for instance food containers for maintaining liquids or similar products, and/or in case of conical containers the sleevings should be done from the bottom end of the container upwards.

Sleeving devices may be adapted for arranging sleeves in upward direction around an array of containers passing a spreading element located below the container conveyor. The continuous strip of flattened tubular foil material wound around a roller would then be forwarded towards the spreading element, the strip would be opened by the spreading element for forming sleeves and the sleeves would be discharged in upward direction to be moved over the container, starting with the bottom end of the container. When a spreading element for discharging sleeves in a downward direction would be used in a sleeving device wherein the sleeves are discharged upwardly a number of problems would arise.
As foil is moved along the spreading element the spreading element has the tendency to (slightly) move along in the upward direction due to friction and downward again. This phenomenon is also known as a “bouncing mandrel”. When the spreading element is bouncing while being suspended from the frame, the cutting quality of the cutting unit of the spreading element may deteriorate. The cutting unit may be a rotary cutter and comprise one or more knives. A bouncing spreading element may cause misalignment between the rotary cutter knives and the clearance in which the rotary cutter knives reside which may result in poor cutting quality and eventually even in damage to the knives of the cutting unit.

The suspension of the spreading element must be embodied in such a manner that a splice (i.e. connection between pieces of foil material from different foil supply reels) is able to pass over the spreading element. This means that not all of the support rollers may be in a fixed relationship with the drive rollers.

Furthermore, when the spreading element is suspended from the frame using a number of support rollers for supporting the spreading elements while allowing the foil to move along the rollers, the fold (herein also referred to as the “edges” of the foil material) in the flattened tubular foil should be removed or at least suppressed first before the fold reach the support rollers in order to reduce the risk of misalignment of the foil during movement of the foil along the spreading element and from the spreading element towards the container.

It an object of the present invention to provide a device and method for sleeving containers and/or a spreading element for use in such device and method wherein the above-identified and/or other disadvantages have been removed or at least reduced.

According to a first aspect at least one of these objects is achieved in a container sleeving device for arranging sleeves around containers conveyed on a conveyor, the container sleeving device comprising:

- a frame for supporting a spreading unit;
- a foil supply for supplying foil to the spreading unit, the spreading unit being configured to open the foil to form sleeves, the spreading unit comprising a bottom part configured as a generally flat element, a top part configured as a generally cylindrical element and an intermediate part arranged between the bottom part and top part;
- transport elements for transporting the sleeves upward along the spreading unit, the transport elements comprising:
  - a set of upper guide rollers and a set of lower guide rollers, both the lower and upper guide rollers being arranged in the plane of the flat element of the bottom part, the upper guide rollers being located at a position above the lower guide rollers;
- a set of drive rollers connected to the frame and arranged so as to transport the sleeve between the drive rollers and guide rollers in upward direction, the drive rollers being arranged below the upper guide rollers so as to support the spreading unit on the frame, wherein the lower guide rollers are resiliently mounted to the spreading unit so that the lower guide rollers are pressed to their respective drive roller.

In embodiments of the invention the lower guide rollers are arranged so as to be biased against the drive rollers, in the operational position. Due to the biasing force the folds formed in the flattened tubular foil material passing the lower guide rollers are at least partly removed before the foil material is transported upwardly by the drive rollers and upper guide rollers. The removal of the folds may increase the reliability of the sleeving process.

In an embodiment of the invention the lower guide rollers are supported by one or more resilient elements, wherein the resilient elements may be mounted to the bottom part and/or intermediate part of the spreading unit.

In embodiments of the invention the lower guide rollers in combination with the associated drive rollers exert a pressure on the folds of the foil material. This pressure should be sufficiently high to enable the sleeving device to remove (or at least reduce) folds (or edges) present in the foil material forming the sleeves. The drive rollers and lower guide rollers then function as pressure rollers to smoothen the edges in the flattened foil material. In other embodiments of the invention the lower guide rollers work together with a different set of rollers which are not driven rollers. These rollers are also known as pletter wheels and may be pivotally mounted to the frame.

The combination of the drive rollers (or non-driven rollers) and lower guide rollers enables removal of the fold in the flat tubular foil material supplied by the foil supply while the spreading unit is being supported by the upper guide rollers. The fold is removed before it foil passes the upper guide rollers. Removal of the foil enables (more) oversize during the sleeve application process, which may reduce the risk of damage to the sleeve and/or improve the shrink results. Furthermore, the risk of the foil material/sleeve to twist or rotate on the spreading unit is reduced, thereby reducing the occurrence of application jams.

In embodiments of the invention the upper and lower guide rollers are arranged at the intermediate part of the spreading unit. In other embodiments the upper guide rollers are arranged at the intermediate part and the lower guide rollers are arranged at the bottom part, while in still other embodiments the upper guide rollers and lower guide rollers are arranged in the bottom part of the spreading unit.

The shape of the spreading unit forces the foil material to transform from substantially flat to a substantially open shape to provide a sleeve that may be ejected towards a container.

In an embodiment of the present invention the drive rollers are arranged between the upper guide rollers and lower guide rollers in order to restrict movement of the spreading unit in upward
and downward direction. Downward movement restriction and upward movement restriction may be provided by the upper guide rollers and lower guide rollers, respectively. In case the lower guide rollers are biased against the drive rollers the lower guide rollers may provide for a restriction of the “bouncing” effect, in addition to or instead of the biased guide rollers downstream of the drive rollers.

In an embodiment of the invention the bottom part of the spreading unit is detachable from the intermediate part of the spreading unit. In detached position the intermediate and top parts of the spreading unit may be moved upward to be able to remove them from the sleeving device, for instance for maintenance reasons. Once the intermediate part (and top part) of the spreading unit have been placed (back) into the sleeving device and are supported on the drive rollers, the bottom part of the spreading unit may be attached to the intermediate part. This enables a quick and easy removal of the spreading unit from the frame and/or replacement of the spreading unit.

In a further embodiment of the invention the lower guide rollers are movable between an operational position wherein the rollers extend from the surface of the spreading unit and a retracted position wherein rollers partly or fully extend in a recess in the spreading unit. This construction allows the device to be removed easily removed from the frame.

Generally, the drive rollers rotatably attached to the frame generally are in a fixed positional relationship with the operating position of the (guide rollers of the) spreading unit. Because the lower guide rollers can be moved to a retracted position, the intermediate part of the spreading unit (including the lower guide rollers) may be moved upward between the drive rollers, for instance to remove the spreading unit from the sleeving device. Similarly, when the spreading unit including the lower guide rollers are in the operational position, the lower guide rollers may remove the fold in the foil material supplied by the foil supply before the foil reaches the support rollers (formed by the upper guide rollers).

In an embodiment the lower guide rollers are pivotably mounted inside the spreading unit. More specifically, the lower guide rollers may be mounted so as to move to the retracted position under the influence of gravity.

In an embodiment the lower guide rollers are arranged to be biased against the drive rollers in the operational position. The guide rollers may be biased against the drive rollers with a sufficient force so as to be able to at least partly remove the fold in the supplied foil material, while still allowing the lower guiding roller to move back to the retracted position when the intermediate part of the spreading unit is moved upward so as to remove the spreading unit from the sleeving device.

In a first embodiment opposing lower guide rollers are mounted to respective pivot arms. The pivot arms enable the lower guide rollers to be easily moved between their operational and retracted positions. In a further embodiment these pivot arms are mounted to a common central
pivot axis (preferably provided at the vertical axis of symmetry of the spreading unit) so that the opposing guide rollers can pivot (rotate) along one central point. Using one central pivot point allows for a relatively simple and accurate guiding of the lower guide rollers between their operational and retracted positions. The rollers need to be aligned accurately since even a small deviation in the position and orientation of the rollers may result in misalignment of the sleeves. For instance, this misalignment may cause the sleeve to rotate on the spreading element.

In a second embodiment an upper guide roller comprises a pivot axis mounted to the spreading unit for pivotably supporting the upper guide roller. In this embodiment a lower guide roller may be mounted to a pivot arm, in turn mounted to the pivot axis of the upper guide roller. In this embodiment a central pivot point can be dispensed with and use is made of a pivot point of one of the wheels. This embodiment provides an accurate alignment of the wheels as well.

In embodiments of the invention the bottom part and intermediate part of the spreading unit are configured to have the lower guide rollers move from the retracted position to the operational position by attaching the bottom part to the intermediate part. Once the spreading unit has been placed on the frame (or, more generally, the spreading unit drive), the bottom part is positioned on the intermediate part thereby pushing the rollers automatically upward. Furthermore, the bottom part may comprise a recess configured to accommodate the lower end of the intermediate part of the spreading unit. As mentioned above, the guiding rollers, more specifically the lower guiding rollers, rollers in combination with the associated drive rollers function as pressure rollers for smoothing the edges formed in the foil material of the sleeve so as to remove or at least reduce the folds so that the sleeve may be given a sufficient amount of oversize relative to the spreading unit to reduce the risk of damage to the sleeve and/or to improve the results of the shrink process performed downstream of the sleeveing device.

In embodiments of the present invention the dimensions of the bottom part in the plane of the flat element diminish from the flat element upward towards the intermediate part. This may result in a reduced width of the spreading unit at the connection between the bottom part and intermediate part. Additionally, in a further embodiment, the bottom part may widen in the upward direction towards the intermediate part in a direction perpendicular to the plane of the flat element. In the further embodiment the width is reduced and the thickness is in upward direction. In this manner the closed foil arriving at the flat element of the bottom portion may be gradually opened while traveling upward along the outer surface of the spreading unit. The bottom part, intermediate and top part of the spreading unit may be dimensioned so that they have an at least substantially constant circumference in the direction from the bottom part to the intermediate part or even from the bottom part to the top part of the spreading unit. This enables the foil material to be opened gradually in a manner wherein the internal stress in the foil material can be maintained small.
In an embodiment the upper guide rollers comprise a running surface having a first width and the lower guide rollers a running surface with second width, wherein either the second width is larger than the first width or the first width is larger than the second width. In this way an over constraint situation can be avoided.

In embodiments of the present invention the transport elements comprise:
- a set of further guide rollers, arranged at the top part of the spreading unit;
- a set of second drive rollers, arranged at a position above the position of the further guide rollers so to drive the sleeve between the second drive rollers and further guide rollers;

wherein the second drive rollers are configured to exert on the further guide rollers a force having a downward force component.

The biasing force on the drive rollers increases the grip of the drive rollers on the sleeve. The biasing force in combination with the mutual positions of the drive roller and guiding roller creates a downward force for suppressing bouncing movements of the spreading unit.

More specifically, a drive roller exerts a force on a guide roller that has a horizontal inward force component pressing the drive roller against the drive roller proving grip on the foil material to transport the foil material in upward direction and at the same time a vertical downward force component pushing the guide roller downward, thereby preventing or at least reducing the bouncing effect.

In embodiments of the invention the drive rollers are positioned in the upper or intermediate part of the spreading unit, in a plane of the flat element of the bottom part.

Alternatively or additionally, in other embodiments, the drive rollers are the discharge rollers positioned in the uppermost part of the spreading element, which discharge rollers are configured for discharging (shooting) the sleeve towards containers passing by the spreading element.

In embodiments of the invention both the upper and lower guide rollers are arranged at the intermediate part of the spreading unit. When the bottom part is detached from the intermediate part the intermediate part can be removed easily from the support frame by sliding the pivotable lower guide rollers along the drive rollers. In other embodiments the upper guide rollers are arranged at the intermediate part and the lower guide rollers are arranged at the bottom part.

Once the bottom part has been detached from the intermediate part, the intermediate can be freely guided along drive rollers and removed from the support frame. In this embodiment the bottom part may be spring mounted to the intermediate part. Even if the lower guide rollers were fixedly mounted to the bottom part (instead of in a pivotable manner), the lower guide rollers could then be biased against the drive rollers to provide a suitable pressure on the foil material for removing the folds therein.

The above discussed transport elements may be provided with orientation elements for orienting the spreading unit in the slewing device. For instance, the orientation elements may
comprise at least one ridge formed on the first drive rollers, which ridge may engage in the upper and/or lower guide rollers.

In embodiments of the invention a drive roller is positioned to drive both the associated upper and lower guide roller. In further embodiments the drive rollers and guide rollers are positioned to hold the foil between their running surfaces and to force the foil in an upward direction. The drive rollers are driven by a suitable drive (not shown), for instance one or more electric motors, while the guide rollers are driven by the rotation of the drive rollers. Since all rollers in contact with the foil are driven (directly or indirectly), all rollers can be given a suitable speed for transporting the foil (sleeves) upward. In case the rollers would not be driven, inertia of the guide rollers could make it difficult for the rollers to “follow” the foil material transported along the spreading unit.

According to another aspect of the present invention a spreading unit is provided. The spreading unit is to be supported in a sleeving device for arranging sleeves around containers and is configured to open a foil transported along the spreading unit to form sleeves. The spreading unit may comprise:

- a bottom part configured as a generally flat element, a top part configured as a generally cylindrical element and an intermediate part arranged between the bottom and top part;
- transport elements for transporting a supplied sleeve towards the top end of the spreading unit, the transport elements comprising a set of upper guide rollers and a set of lower guide rollers, both the lower and upper guide rollers being arranged in the plane of the flat element of the bottom part, the upper guide rollers being located at a position above the lower guide rollers;

wherein an upper and lower guide roller are positioned to receive between them a drive roller arranged to transport the foil along the spreading unit while supporting the spreading unit in the sleeving device.

The lower guide rollers may be resiliently mounted to the bottom part and/or the intermediate part so that, in an operational position, the lower guide rollers are pressed to their respective drive roller.

The pressing of the lower guide rollers against the drive rollers is performed to at least partly remove the folds formed in the flattened tubular foil material passing the lower guide rollers.

According to still another aspect of the present invention a method of arranging sleeves around containers conveyed on a conveyor is provided. The method may compress supplying foil to a spreading unit of a container sleeving device as defined herein, opening the foil to form a sleeve by transporting the foil upward along the outer surface of the spreading unit and discharging the sleeve upward to a container passing the spreading unit so as to arrange the sleeve around the container.
Further characteristics of the present invention will be elucidated in the accompanying
description of various preferred embodiments thereof. In the description reference is made to the
annexed figures, that show:

Figure 1 a schematic overview of a sleeving system according to an embodiment of the
present invention;

Figure 2 a front view of an embodiment of the spreading unit and transport elements;
Figure 3 a side view of the embodiment of figure 2;
Figure 4 a bottom view of the embodiment of the figures 2 and 3;
Figure 5A a schematic representation showing the arrangement of the further guiding
rollers and driving rollers in accordance with an embodiment of the present invention;
Figure 5B a schematic representation of the forces exerted on the spreading unit of figure
5A;
Figure 6 an elevational view of the embodiment of figures 1-3;
Figure 7A an exploded view, partly cut away, of a portion of the spreading unit of figure 6, with the lower guide rollers in retracted position;
Figure 7B the view of figure 7B, with the lower guide rollers in extended position; and
Figure 8 an elevational view, partly cut away, of another embodiment of the present
invention.

Figure 1 schematically shows an embodiment of a sleeving system 1 for sleeving
and labeling containers. The sleeving system 1 comprises a conveyor 2 for conveying one or more
parallel rows of containers 3, for instance food containers and the like, in a direction 22 along a
sleeving position at which sleeves are arranged around the containers. Embodiments of the
conveyor may comprise wires supporting a top rim of the container to allow the transport of the
containers. However, other types of conveyors may be employed as well. In fact, conveyor 2 may
be any type of conveyor capable of transporting an array of containers along the sleeving position. An example of a conveyor suitable for this purpose is a vacuum conveyor that holds the containers
using a vacuum source.

In the embodiment shown in figure 1 the containers 3 are suspended from the
conveyor 2 in such a manner that the bottom ends 4 of the containers “hang free”. The conveyor 2
may be configured to transport the containers 3 in a discontinuous manner (i.e. intermittently). In
preferred embodiments, however, the conveyor is arranged to transport the containers in a
continuous manner (i.e. non-interruptedly). In these embodiments the operation of arranging of
tsleeves around the container is performed on the fly and essentially without interrupting the
transport of the containers.

Figure 1 also shows a sleeving device 10 arranged at the sleeving position and
configured to arrange sleeves around containers transported by the conveyor 2. As mentioned
above, sleeves are formed by cutting a continuous strip of foil material configured as a flattened tube or envelope at a suitable length. In the present application “sleeve” may be used as an indication for the individual pieces of foil that are arranged around products, but may equally well refer to the foil or strip forming a flattened or opened tube before it is cut.

Flattened tubular foil material 11 wound on a supply reel 12 is caused to move along a spreading element 25, herein also referred to as the “mandrel”, that spreads the flattened foil material to an “open” position and cuts the foil material to a specific length so that foil material forms consecutive sleeves. A sleeve is sized to be arranged around the container. Securing the sleeve to the container may involve gluing or a heat shrinking process.

More specifically, according to embodiments of the invention, the sleeving system 1 may comprise a sleeve supply for supplying a continuous strip of sleeve-like foil material to the sleeving device 10. The sleeve supply comprises a foil stock 13 in which one or more of the above-mentioned supply reels 12 are arranged. On each of the supply reels 12 a continuous strip of sleeve-like foil material has been wound. The strip of foil material can be introduced into the sleeving device 10 by any suitable means, for instance several sets of wheels or rollers (not specifically shown in the figures). The foil material of a selected one of the supply reels 12 is transported (S1) towards a foil buffer 18. The foil buffer is arranged to allow for variations in operating speed of the device without the need to interrupt the sleeving process. In an embodiment a splicer is used in step S1 to connect a new strip of foil material from a further roll to the end of strip of foil material of an old reel to allow for a continuous feed of foil to the sleeving device 10.

More specifically, the foil fed to buffer 18 allows buffering (S2) of foil e.g. when a reel 12 is replaced, to provide a continuous supply of foil (direction 20) to the downstream applications such as the illustrated stationary spreading unit 25 of the sleeving device 10.

The sleeving device 10 comprises a spreading unit 25 for spreading the strip of foil (which initially has a flattened tubular form) to an open position. The spreading unit 25 comprises a frame 27 in which a spreading element 26 is suspended. The spreading unit also comprises a discharge unit 28 for shooting sleeves cut from the strip of foil material towards the containers passing by the spreading unit 25. The spreading element 26 is shaped to open the foil 11 delivered as a flat envelop of foil material into a tubular envelope or sleeve shape. More specifically, as the flattened tubular foil is guided along the spreading element 26 in an essentially upward direction 20, the foil is opened (S3) by the spear or tip 40 of the spreading element 26.

Referring to figures 2-4, the sleeving device 10 further comprises a cutting unit 50 for cutting (S4) of sleeves 51 from the supplied opened foil material. The foil material may be guided past the cutting means unit for cutting the foil material at certain intervals so as to obtain individual sleeve-like foil envelopes or sleeves 51 of a suitable length.
The discharge unit 28 may comprise a number of guiding wheels or rollers 29a, 29b provided on the spreading element 26 and drive wheels or rollers 30a, 30b rotatably mounted at the frame 27 of the spreading unit 25. The guiding wheels 29a, 29b and driven wheels 30a, 30b work together to impart on the sleeves 51 an acceleration in the upward direction 21 so that the sleeves may be ejected in the direction of a container 3 positioned above the spreading element 26.

In the configuration shown in figure 1 the containers 3 have a generally tapering shape, i.e. near a top end the container essentially has a larger cross-section than at bottom end of the container. The container may have a frusto-conical shape as is shown in the figures, but other shapes are possible as well. A container 3 may have an opening near a top side that may be closed by a removable seal. In some embodiments a container has a rim (not shown in figure 1) so as to facilitate maintaining the container in a suitable upright position. The containers may be empty or may have previously been filled with content, such as food. It is clear that the system and method according to the present invention may equally well be applied to differently shaped containers.

Furthermore, the containers (herein also referred to as “cups”) may be transported one by one, for instance in one or more rows of containers. In other embodiments the containers may be combined into a number of container assemblies, each container assembly comprising more than one container or cup.

Furthermore, according to embodiments of the invention, the containers should be kept in an upright position wherein relatively wide top end of the container extends above the relatively small bottom end of the container, for instance in case of thermoformed plastic containers or cups for storing food or a similar content. These containers or cups should not be rotated upside down and should maintained the upright position throughout the entire sleeving process.

As described above, the discharge unit 28 in the shown embodiment comprises two rotatable guiding wheels 29a, 29b and two rotatable driving wheels 30b for physically engaging the cut sleeve 51, accelerating the sleeve and shooting (S5) the sleeve from the spreading element 26 to a position wherein the sleeve is arranged around the container 3. A suitable controller is arranged to operate the discharge unit 28 and the conveyor 2 to synchronize the ejecting with the movement of the containers transported on the conveyor 2. More specifically, a suitable controller is arranged to synchronize the ejection, container supply, cutting and other method steps.

Once the a sleeve 51 has been formed by the cutting unit 50, ejected towards the container by the discharge unit 28 and arranged around the container by having the sleeve slide upwardly along the bottom end 4 of the container 3, the combination of sleeve 51 and container 3 is conveyed (S6) further in direction 22 by conveyor 2. Conveyor 2 transports the sleeved containers further downstream, e.g. into a heated steam oven 60 (schematically shown in figure 1).
In the oven 60 the sleeve 51 may be heat shrunk (S7) so that the sleeve 51 is attached to the container 2, providing a labeled container 61. In a subsequent step a drying process can be applied.

Advantages of a system set up according to figure 1 are high speed, accuracy, reliability and reduced space. Not only sleeves are provided at high speed using the ejection unit, but also the heat shrinking in the oven is executed quickly, limiting the actual heating of the container that could already contain the product such as a dairy product. The illustrated system also allows handling of thin foils of less than 60 μm.

Figures 2-4 show a first embodiment of the spreading unit 25 of figure 1 in more detail. The spreading unit 25 comprises a spreading element 26 configured for opening sleeves and ejecting the same in an upward direction. The spreading element 26 comprises a bottom part 65 having at the bottom end a generally flat element 78, a top part 67 configured as a generally cylindrical element and an intermediate part 66 arranged between the bottom and top part. The bottom part 65 is widened at least in the plane perpendicular to the plane of the flat continuous strip of foil material 11. This causes the foil material moving upwardly along the bottom part 65 to be opened.

The intermediate part 66 of the spreading element 25 comprises in the plane of the generally flat element 71 of the bottom part 65 (i.e. in the plane of the generally flat tubular foil material) stationary transport elements for transporting the foil material upwardly. The transport elements comprise several sets of rotatable guiding wheels or rollers. More specifically, in the shown embodiment, the intermediate part 65 comprises a pair of opposing upper guiding rollers 71a,71b and a pair of opposing lower guiding rollers 72a,72b. Furthermore, a set of opposing (first) drive rollers 73a,b is connected to the frame 27. A drive rollers 73a,73b can be driven by a drive unit, for instance comprising one or more electric motors (not shown) for rotating a rotation axis 74. The drive rollers 73a,73b are arranged at a position between the upper and lower guide rollers 71,72. The drive rollers 73 in combination with the guiding rollers 71,72 together engage the foil material and transport the foil material held in between these rollers in an upward direction 21. The upper guiding rollers 71a,b act as support for the spreading element 25. The spreading element 25 rests with the upper guiding rollers 71a,b on the first frame rollers 73.

The lower guiding rollers 72a,b are mounted on the spreading element 25 at a lower position than the upper guiding rollers 711,b. The lower guiding rollers are arranged to flatten the two folds in the strip of foil material by pressing the strip between their circumferential outer surface and the outer surface of the drive rollers 73a,b. This causes the fold in the foil material to be flattened before it passes the support rollers (i.e. the upper guide rollers 71a,b).

The strip of foil material is caused to move further along the spreading element. In order to obtain an adequate orientation of the spreading element 26 in the frame and to further advance the sleeve along the outer surface thereof, the spreading element 26 is provided with a set
of opposite further guide rollers 69a, 69b, which further guide rollers are likewise disposed in slots or recesses 75 in the spreading element 26. Opposing further guiding rollers 69a, b are mounted on the spreading element 25 in the same plane as the guiding rollers 71, 72 and opposing drive rollers 70a, 70b mounted on the frame of the spreading unit 26 are provided to transport the foil material further. The drive rollers 70a, b are arranged at the frame in such a manner, that a lateral force is exerted on the drive roller and thereby on the guide rollers 69a, 69b to provide a good grip of the drive/guide rollers on the foil material.

At the upper end of the top part 67 of the spreading element 26 a pair of opposing discharge rollers 29a, 29b are mounted. The rollers 29a, 29b are arranged in the plane perpendicular to the plane of the essentially flat element 78 of the bottom part 65. The opposing discharge rollers together with a pair of discharge driving rollers 30a, 30b act to accelerate the sleeve and eject the same towards the container passing above the spreading element. The top part 67 may have a circumference smaller than the circumference of the intermediate part 66 so that transport of the sleeve 51 is not hindered in this manner. In other embodiments the top part may have a similar or exact the same circumference than the intermediate part.

The rollers 69a, 69b and 70a, 70b may be arranged at substantially the same height so that the sleeve formed by the opened foil material is driven by the rollers in upward direction. The lateral force biasing the drive rollers 70a, 70b to respective guide rollers 69a, 69b are essentially only directed at providing an improved grip, as mentioned above. Referring to figure 5, in other embodiments, however, the driving rollers 70a, 70b are arranged at a position somewhat higher than the respective guiding rollers 69a, 69b. Furthermore, an external lateral force (F) may be exerted by the driving rollers 70a, 70b on the respective guiding rollers 69a, 69b, not only to increase the grip of the driving rollers 70a, 70b on the guiding rollers 69a, 69b (i.e. to provide a suitable horizontal force component F_h), but also to provide a downward force component F_d. The downward force components (F_d figure 5B) pushes the spreading element 25 downward into the support wheels 71a, 71b, 73a, 73b of the spreading unit 25. The downward force suppresses any tendency the spreading element 26 may have to bounce under the influence of friction caused by the sleeve traveling upward along the spreading element. This may result in a better cutting quality and/or may avoid damage to the knives present in the cutting of the cutting unit 50.

Although this is not shown in the figures, the drive rollers may be provided with orientation elements, such as ridges or the like, for precisely orienting and fixing the spreading element 26 in the correct orientation of the device. The orientation elements may to that end form part of the discharge means and, for example, comprise a ridge formed on the drive rollers 73a, 73b, which ridge engages in a groove (not shown) formed in the circumferential surface of the guide rollers 71a, 71b, respectively. This makes it possible to realize a correct fixation and orientation of the spreading element 26 in the device, whilst also the exchanging of the spreading element 26 can
be carried out quickly and without any additional adjustments, and thus without unnecessary loss of time.

Figures 6 and 7 show one of the embodiments of the spreading unit 25 in more detail. Figure 6 shows a spreading element 25 comprised of a top part 67 and intermediate part 66 and a bottom part 65. The bottom part 65 comprises a generally flat element 78. More specifically, the bottom part 65 is configured as a flat element having edges 80, 81 and functioning as an inlet side for the sleeve-like foil material 11 which is supplied by the foil supply in a flat orientation. To open the individual flat sleeve-like foil the thickness of the bottom part 65 increases as the foil material advances in an upward direction. In other words, the bottom part 65 of the spreading element 25 widens from the flat element 78 of the bottom part 65 towards the intermediate part 66 in a direction perpendicular to the plane of the flat element 78 (and consequently also of the flat sleeve-like foil material). Furthermore, the bottom part 65 is so constructed that it narrows towards the intermediate part, seen in the plane of the flat element portion. This is illustrated by means of the upper part of the edges 80 of the flat element sector 1 which edges have a curved but inwardly extending construction. More specifically, in certain embodiments, the bottom part 65 of the spreading element 26, optionally also the intermediate and/or top part thereof, are constructed so that it has a substantially constant circumference, at least in the upward direction. This configuration of the bottom part 65 makes it possible to realize an efficient deformation of the foil material 2 and opens sleeve of foil material, which is ready to be arranged around a container. In the material of the sleeve a low level of material stress may be maintained.

Referring to the embodiment shown in figures 7A and 7B, the bottom part 65 (shown in figure 7A in a detached or disconnected position) is provided with a central recess 82 to accommodate a similarly formed projection 83 formed at a movable actuator 86 provided in the bottom end of the intermediate part 66 of the spreading element 26. The projection makes it possible to releasably connect or couple the bottom part to the intermediate part. The bottom part 65 can be fixed to the intermediate part 66 by the suitable means, for instance screws 104 that may arranged in the openings 105, 106.

The intermediate part 66 is in the plane of the essentially flat element 78 of the bottom part 65 provided with opposing recesses 90a, 90b. In these recesses 90a, 90b openings 91a,b and 92a,b are provided to accommodate the earlier-described rollers 71a, 71b and 72a, 72b, respectively. The rollers 71a, 71b are stationary rollers rotatably mounted in the recess 91a,b in such a manner that the roller partly extends beyond the surface of the respective recess 90a, 90b. In the embodiment shown in figure 6, the lower guiding rollers 72a, 72b are not mounted stationary. The rollers 72a,b are rotatably mounted on respective arms 84a, 84b. Both arms 84a, 84b are pivotal with respect to a center pivot axis 85 so that the wheels or rollers 72a, 72b may swing inwardly and outwardly between a retracted position wherein the wheels are retracted to a position
at least partially or fully inside the respective openings 92a, 92b (figure 7A) and an operational position (shown in figure 7B) wherein the wheels 72a, 72b extend more outside the spreading element.

When the bottom part 65 is removed from the intermediate part 66 the rollers 72a, 72b can swing freely around the centre axis 85. The rollers 72a, 72b swing downward automatically under the influence of gravity towards the retracted position wherein they do not extend outside the surface of the spreading unit 25 or at least extend only to limited extent from the surface of the recesses 90a, 90b.

When the bottom part of 65 is removed from the intermediate part 66 and the lower guide rollers 72a, 72b are in the retracted position, the intermediate part of the spreading unit may be removed easily from the frame 27 by simply moving the intermediate part 66 upward. Since the lower guide rollers 72a, 72b are retracted, the drive rollers 73a, 73 may pass the openings 92a, 92b, respectively.

When the spreading element 25 and more specifically the intermediate part 66 thereof is placed back into the frame 27 (fig. 1) the bottom part 65 of the spreading element 20 can be coupled to the intermediate part by moving the same upwardly so that the projection 83 is received inside the recess 82 of the bottom part 65. A protruding portion 107 at the bottom of the recess 82 is formed so as to move upwards inside a channel 108 formed in the projection 83 of an actuator 86. Inside the channel 108 a coil spring 93 has been arranged. Once the bottom part 65 is coupled to the intermediate part 66, the rollers 27a, 27b are caused to move from the retracted position (figure 7A) towards the operational position (illustrated in figure 7B). A stop 109 is provide to restrict the freedom of movement of the wheels 72a, 72b in the upward direction. Under the influence of the coil spring 93 the actuator 86, and hence the flat plate-like element, is urged to move upwardly, thereby swinging the arms 84a, 84b of the wheels 72a, 72b against the gravitational force from the retracted position to the operational position. The coil spring 93 then biases the lower guide rollers 72a, 72b against the drive rollers 73a, 73b.

Depending on the spring force the lower guide rollers 72a, 72b may be able to reduce the earlier described tendency of the spreading element 26 to bounce up and down when a sleeve is travelling upward. The reduction of the bouncing movement by the biased lower guide rollers 72a, 72b can be accomplished in addition to or as an alternative for the earlier described bouncing reducing structure of the further rollers 69a, 69b and drive rollers 70a, 70b.

Figure 8 shows an alternative embodiment of a portion of the spreading unit 94 according to the invention. In the further embodiment the upper guiding rollers 71a and 71b are stationary rollers rotatably mounted to the intermediate part 66 of the spreading element. The rotation axes 87a, 87b of the guiding rollers 71a, 71b function as pivot axis for respective arms 88a, 88b to which the lower guiding rollers 72a, 72b are rotatably mounted. The respective arms 88a
and 88b are forced to an outward (operational) position due to the presence of respective springs 89a, 89b provided respective recesses 97a, 97b in the spreading element. The springs 89a, 89b provide a bias force urging the lower guiding rollers 72a, 72b to the operational position (shown in figure 8). When, however, the bottom part 65 of the spreading element is removed from the intermediate part 66 by sliding the projection 99 out of the recess 100, the intermediate part 66 can be moved upwardly. During the upward movement of the intermediate part 66 (and therefore also the lower guide rollers 72a, 72b), the lower guide rollers 72a, 72b are pressed from the operational position to the retracted position by the drive rollers 73a, 73b. This enables the drive rollers 73a, 73b to pass the lower guide rollers so that the intermediate part 66 may be removed from the frame of the spreading unit 25.

In the embodiments depicted in the figures all guiding rollers are components which are arranged on a single constructional part (i.e. the intermediate part 66). This means that proper alignment of the rollers can accomplished easily. However, the present invention is not limited to this construction and in other embodiments, not specifically shown in the figures, the guiding rollers have been arranged on one or more different parts 65, 66, 67 of the spreading element of the spreading unit.

The present invention is not limited to the embodiments thereof described herein. The rights sought are defined by the following claims, within the scope of which numerous modifications can be envisaged.
1. Container sleeving device for arranging sleeves around containers conveyed on a conveyor, the sleeves being formed of flattened tubular foil material, the container sleeving device comprising:
   - a frame for supporting a spreading unit;
   - a foil supply for supplying foil to the spreading unit, the spreading unit being configured to open the foil to form sleeves, the spreading unit comprising a bottom part configured as a generally flat element, a top part configured as a generally cylindrical element and an intermediate part arranged between the bottom part and top part;
   - transport elements for transporting the sleeves upward along the spreading unit, the transport elements comprising:
     - a set of upper guide rollers and a set of lower guide rollers, both the lower and upper guide rollers being arranged in the plane of the flat element of the bottom part, the upper guide rollers being located at a position above the lower guide rollers;
     - a set of drive rollers connected to the frame and arranged so as to transport the sleeve between the drive rollers and guide rollers in upward direction, the drive rollers being arranged below the upper guide rollers so as to support the spreading unit on the frame, wherein the lower guide rollers are resiliently mounted to the spreading unit so that the lower guide rollers are pressed to their respective drive roller.

2. Container sleeving device as claimed in claim 1, wherein the lower guide rollers are supported by resilient elements and/or are arranged to remove the folds formed in the flattened tubular foil material passing the lower guide rollers before the foil material is transported by the combination of drive rollers and upper guide rollers in upward direction.

3. Container sleeving device as claimed in claim 1, 2 or 3, wherein the lower guide rollers in combination with the associated drive rollers exert a pressure on the folds of the foil material.

4. Container sleeving device as claimed in any of the preceding claims, wherein the drive rollers are arranged between the upper guide rollers and lower guide rollers to restrict movement of the spreading unit in upward and downward direction.

5. Container sleeving device as claimed in any of the preceding claims, wherein the lower guide rollers are movable between an operational position wherein the rollers extend from the
surface of the spreading unit and a retracted position wherein rollers partly or fully extend in a recess in the spreading unit.

6. Container sleeving device as claimed in claim 5, wherein the lower guide rollers are pivotably mounted inside the spreading unit.

7. Container sleeving device as claimed in any of the preceding claims, wherein the lower guide rollers are arranged to be biased against the drive rollers in the operational position.

8. Container sleeving device as claimed in any of the preceding claims, wherein the lower guide rollers are spring mounted so as to urge the rollers to the operational position.

9. Container sleeving device as claimed in any of the preceding claims, wherein opposing lower guide rollers are mounted to respective pivot arms, the pivot arms preferably being mounted to a common central pivot axis.

10. Container sleeving device as claimed in any of the preceding claims, wherein an upper guide roller comprises a pivot axis mounted to the spreading unit for pivotably supporting the upper guide roller and wherein a lower guiding roller is mounted to a pivot arm, the pivot arm being mounted to the pivot axis of the upper guide roller.

11. Container sleeving device as claimed in any of the preceding claims, wherein the bottom part is detachable from the intermediate part of the spreading unit.

12. Container sleeving device as claimed in any of the preceding claims, wherein the lower guide rollers are mounted so as to move to the retracted position under the influence of gravity and/or to move from the retracted position to the operational position by attachment of the detachable bottom part to the intermediate part of the spreading unit.

13. Container sleeving device as claimed in any of the preceding claims, wherein the bottom part comprises a recess configured to accommodate the lower end of the intermediate part of the spreading unit.

14. Container sleeving device as claimed in any of the preceding claims, the upper guide rollers comprising a running surface having a first width and the lower guide rollers comprising a
running surface having a second width, wherein either the second width is larger than the first width or the first width is larger than the second width.

15. Container sleeving device as claimed in any of the preceding claims, wherein the transport elements comprise:
   - a set of further guide rollers, arranged at the top part of the spreading unit;
   - a set of second drive rollers, arranged at a position above the position of the further guide rollers so to drive the sleeve between the second drive rollers and further guide rollers;
   wherein the second drive rollers are configured to exert on the further guide rollers a force having a downward force component.

16. Container sleeving device as claimed in any of the preceding claims, wherein the upper and lower guide rollers are arranged at the intermediate part of the spreading unit, or wherein the upper guide rollers are arranged at the intermediate part and the lower guide rollers are arranged at the bottom part or wherein the upper guide rollers and lower guide rollers are arranged in the bottom part of the spreading unit.

17. Container sleeving device as claimed in claim 16, wherein the bottom part is spring mounted to the intermediate part.

18. Container sleeving device as claimed in any of the preceding claims, wherein the dimensions of the bottom part in the plane of the flat element diminish from the flat element upward towards the intermediate part.

19. Container sleeving device as claimed in any of the preceding claims, wherein the bottom part widens in the upward direction towards the intermediate part in a direction perpendicular to the plane of the flat element and the spreading unit has an at least substantially constant circumference at least in the direction from the bottom part to the intermediate part or even to the top part of the spreading unit.

20. Container sleeving device as claimed in any of the preceding claims, wherein transport elements are provided with orientation elements for orienting the spreading unit in the sleeving device, the orientation elements preferably comprising at least one ridge formed on the first drive rollers, which ridge engages in the upper and/or lower guide rollers.
21. Spreading unit to be supported in a sleeving device for arranging sleeves around containers, the spreading unit being configured to open a foil transported along the spreading unit to form sleeves, the spreading unit comprising:
   - a bottom part configured as a generally flat element, a top part configured as a generally cylindrical element and an intermediate part arranged between the bottom and top part;
   - transport elements for transporting a supplied sleeve towards the top end of the spreading unit, the transport elements comprising a set of upper guide rollers and a set of lower guide rollers, both the lower and upper guide rollers being arranged in the plane of the flat element of the bottom part, the upper guide rollers being located at a position above the lower guide rollers;
   wherein an upper and lower guide roller are positioned to receive between them a drive roller arranged to transport the foil along the spreading unit while supporting the spreading unit in the sleeving device, wherein the lower guide rollers are resiliently mounted to the bottom part and/or the intermediate part so that, in an operational position, the lower guide rollers are pressed to their respective drive roller.

22. Spreading unit as claimed in claim 21, wherein the lower guide rollers are configured to remove the folds formed in the flattened tubular foil material passing the lower guide rollers.

23. Spreading unit as claimed in claim 21 or 22, further being defined in accordance with any of the claims 1-20.

24. Method of arranging sleeves around containers conveyed on a conveyor, the method comprising supplying foil to a spreading unit of a container sleeving device as claimed in any of the claims 1-20, opening the foil to form a sleeve by transporting the foil upward along the outer surface of the spreading unit and discharging the sleeve upward to a container passing the spreading unit so as to arrange the sleeve around the container.
CONCLUSIES

1. Containeromhulinrichting voor het rangschikken van omhulsels rondom containers die getransporteerd worden op een transporteur, waarbij de omhulsels gevormd zijn van vlak buisvormig foliemateriaal, de containeromhulinrichting omvattende:
   - een frame voor het ondersteunen van een spreideenheid;
   - een folietoevoer voor het toevoegen van folie aan de spreideenheid, waarbij de spreideenheid uitgevoerd is om de folie te openen om omhulsels te vormen, waarbij de spreideenheid een onderste deel dat is uitgevoerd als een in het algemeen vlak element, een bovenste deel dat is uitgevoerd als een in het algemeen cilindrisch element en een tussenliggend deel dat gerangschikt is tussen het onderste en bovenste deel, omvat;
   - transportelement voor het transporteren van de omhulsels in opwaartse richting langs de spreideenheid, waarbij de transportelementen omvatten:
     - een verzameling bovenste geleidingsrollen en een verzameling onderste geleidingsrollen, waarbij zowel de bovenste als de onderste geleidingsrollen gerangschikt zijn in het vlak van het vlakke element van het onderste deel, waarbij de bovenste geleidingsrollen gelokaliseerd zijn op een positie boven de onderste geleidingsrollen;
     - een verzameling aandrijfrollen die verbonden zijn met het frame en gerangschikt zijn om het omhulsel tussen de aandrijfrollen en geleidingsrollen in opwaartse richting te transporteren, waarbij de aandrijfrollen gerangschikt zijn onder de bovenste geleidingsrollen teneinde de spreideenheid op het frame te ondersteunen, waarin de onderste geleidingsrollen verend bevestigd zijn aan de spreideenheid om de onderste geleidingsrollen tegen hun respectievelijke aandrijfrol te drukken.

2. Containeromhulinrichting volgens conclusie 1, waarin de onderste geleidingsrollen ondersteund worden door verende elementen en/of gerangschikt zijn om de vouwen die zijn gevormd in het vlakke foliemateriaal dat de onderste geleidingsrollen passeert te verwijderen voordat het foliemateriaal in opwaartse richting getransporteerd wordt door de combinatie van aandrijfrollen en bovenste geleidingsrollen.

3. Containeromhulinrichting volgens conclusie 1, 2 of 3, waarin de onderste geleidingsrollen in combinatie met de bijbehorende aandrijfrollen een druk uitoefenen op de vouwen van het foliemateriaal.
4. Containeromhulinningrichting volgens een van de voorgaande conclusies, waarin de aandrijfrollen gerangschikt zijn tussen de bovenste geleidingsrollen en de onderste geleidingsrollen teneinde beweging van de spreideenheid in de opwaartse en neerwaartse richting te beperken.

5. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin de onderste geleidingsrollen beweegbaar zijn tussen een operationele positie waarin de rollen zich uitstrekken vanaf het oppervlak van de spreideenheid en een teruggetrokken positie waarin rollen zich gedeeltelijk of geheel uitstrekken in een uitsparing in de spreideenheid.

6. Containeromhulinningrichting volgens conclusie 5, waarin de onderste geleidingsrollen zwenkbaar bevestigd zijn binnen in de spreideenheid.

7. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin de onderste geleidingsrollen gerangschikt zijn om voorgespannen te worden tegen de aandrijfrollen in de operationele positie.

8. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin de onderste geleidingsrollen met een veer bevestigd zijn teneinde de rollen naar de operationele positie te dwingen.

9. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin tegenoverliggende onderste geleidingsrollen bevestigd zijn op respectievelijke zwenkarmen, waarbij de zwenkarmen aan een gemeenschappelijke centrale zwenkas bevestigd zijn.

10. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin een bovenste geleidingsrol een zwenkas omvat die bevestigd is aan de spreideenheid voor het zwenkbaar ondersteunen van de bovenste geleidingsrol en waarin een onderste geleidingsrol bevestigd is aan een zwenkarm, waarbij de zwenkarm bevestigd is aan de zwenkarm van de bovenste geleidingsrol.

11. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin het onderste deel ontkoppelbaar is van het tussenliggende deel van de spreideenheid.

12. Containeromhulinningrichting volgens één van de voorafgaande conclusies, waarin de onderste geleidingsrollen bevestigd zijn teneinde zich te verplaatsen naar de teruggetrokken positie onder de invloed van de zwaartekracht en/of om zich te verplaatsen vanaf de teruggetrokken
positie naar de operationele positie door koppeling van het ontkoppelbare onderste deel aan het tussenliggende deel van de spreideenheid.

13. Containeromhulninrichting volgens één van de voorafgaande conclusies, waarin het onderste deel een uitsparing omvat die uitgevoerd is om het onderste einde van het tussenliggende deel van de spreideenheid in zich op te nemen.

14. Containeromhulninrichting volgens één van de voorafgaande conclusies, waarin de bovenste geleidingsrollen een loopvlak met een eerste breedte en de onderste geleidingsrollen een loopvlak hebben met een tweede breedte omvatten, waarin hetzij de tweede breedte groter is dan de eerste breedte of de eerste breedte groter is dan de tweede breedte.

15. Containeromhulninrichting volgens één van de voorafgaande conclusies, waarin de transportelementen omvatten:

   een verzameling verdere geleidingsrollen, gerangschikt aan het bovenste deel van de spreideenheid;

   een verzameling tweede aandrijfrollen, gerangschikt op een positie boven de positie van de verdere geleidingsrollen teneinde het omhulsel aan te drijven tussen de tweede aandrijfrollen en verdere geleidingsrollen;

   waarin de tweede aandrijfrollen uitgevoerd zijn om op de verdere geleidingsrollen een kracht met een neerwaartse component uit te oefenen.

16. Containeromhulninrichting volgens één van de voorafgaande conclusies, waarin de bovenste en onderste geleidingsrollen gerangschikt zijn op het tussenliggende deel van de spreideenheid, of waarin de bovenste geleidingsrollen gerangschikt zijn op het tussenliggende deel en de onderste geleidingsrollen gerangschikt zijn op het onderste deel of waarin de bovenste geleidingsrollen en onderste geleidingsrollen gerangschikt zijn in het onderste deel van de spreideenheid.

17. Containeromhulninrichting volgens conclusie 16, waarin het onderste deel met een veer bevestigd is aan het tussenliggende deel.

18. Containeromhulninrichting volgens één van de voorafgaande conclusies, waarin de afmetingen van het onderste deel in het vlak van het vlakke element afnemen vanaf het vlakke element naar boven toe in de richting van het tussenliggende deel.
19. Containeromhulinrichting volgens één van de voorafgaande conclusies, waarin het onderste deel breder wordt in de opwaartse richting naar het tussenliggende deel in een richting loodrecht op het vlak van het vlakke element en de spreideenheid een ten minste in hoofdzaak constante omtrek heeft ten minste in de richting vanaf het onderste deel naar het tussenliggende deel of zelfs naar het bovenste deel van de spreideenheid.

20. Containeromhulinrichting volgens één van de voorafgaande conclusies, waarin transportelementen voorzien zijn van oriëntatie-elementen voor het oriënteren van de spreideenheid in de omhulselrichting, de oriëntatie-elementen verder omvattende ten minste één rand die gevormd is op de eerste aandrijfrollen, welke rand aangrijpt in de bovenste en/of onderste geleidingsrollen.

21. Spreideenheid die te ondersteunen is in een omhulselrichting voor het rangschikken van omhulsels rondom containers, waarbij de spreideenheid uitgevoerd is om een langs de spreideenheid getransporteerde folie te openen teneinde omhulsels te vormen, de spreideenheid omvattende:

   een onderste deel dat algemeen als een vlak element is uitgevoerd, een bovenste deel dat als een in het algemeen cilindrisch element is uitgevoerd en een tussenliggend deel dat gerangschikt is tussen het onderste en bovenste deel;

   transportelementen voor het transporteren van een geleverd omhulsel in de richting van het bovenste uiteinde van de spreideenheid, waarbij de transportelementen een verzameling bovenste geleidingsrollen en een verzameling onderste geleidingsrollen omvatten, waarbij zowel de onderste als bovenste geleidingsrollen gerangschikt zijn in het vlak van het vlakke element van het onderste deel, waarbij de bovenste geleidingsrollen gelokaliseerd zijn op een positie boven de onderste geleidingsrollen;

   waarin een bovenste en onderste geleidingsrol gepositioneerd zijn teneinde hiertussen een aandrijfrol te ontvangen die gerangschikt is om de folie langs de spreideenheid te transporteren terwijl de spreideenheid in de omhulselrichting ondersteund wordt, waarin de onderste geleidingsrollen verend bevestigd zijn aan het onderste deel en/of het tussenliggende deel om in de operationele positie de onderste geleidingsrollen tegen hun respectievelijke aandrijfrol te drukken.

22. Spreideenheid volgens conclusie 21, waarin de onderste geleidingsrollen uitgevoerd zijn om de vouwen te verwijderen die zijn gevormd in het vlakke buisvormige foliemateriaal dat de onderste geleidingsrollen passeert.

24. Werkwijze voor het rangschikken van omhulsels rondom op een transporteur getransporteerde containers, de werkwijze omvattend het leveren van folie aan de spreideenheid van de containeromhulsels in de inrichting zoals gedefinieerd in één van de conclusies 1-20, het openen van de folie teneinde een omhulsel te vormen voor het transporteren van de folie opwaarts langs het buitenoppervlak van de spreideenheid en het opwaarts afvoeren van het omhulsel naar een de spreideenheid passerende container teneinde het omhulsel rondom de container te rangschikken.
# SAMENWERKINGSVERDRAG (PCT)

**RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE**

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## I. CLASSIFICATIE VAN HET ONDERWERP
(bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

| B65B9/14 | B29C63/42 | B65C3/06 |

## II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

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## III. GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES
(opmerkingen op aanvullingsblad)

## IV. GEBREK AAN EENHEID
(opmerkingen op aanvullingsblad)

Form PCT/ISA 201 A (11/2000)
ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONAAL TYPE

A. CLASSIFICATIE VAN HET ONDERWERP

INV. B65B9/14 B29C63/42 B65C3/06
ADD.

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

B. ONDERZOEKTE GEBIEDEN VAN DE TECHNIEK

Onderzocht minimum documentatie (classificatie gevolgd door classificatiesymbolen)

B65B B29C B65C

Onderzocht 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, WPI Data

C. VAN BELANG GEACHTTE DOCUMENTEN

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<td>FR 2 603 019 A1 (SCHIEDEGGER ALBERT [FR]) 26 februari 1988 (1988-02-26) * bladzijde 3, regel 34 - bladzijde 4, regel 16; figuren 1,2 *</td>
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Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltoid

17 februari 2014

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Fax (+31-70) 340-3016

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

De bevoegde ambtenaar

Schelle, Joseph

X Verdere documenten worden vermeld in het vervolg van vak C.

X Leden van dezelfde ontrooffamilie zijn vermeld in een bijlage

Formulier PCT/SA/2001 (tweede blad) (Januari 2004)
<table>
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<th>Categorie</th>
<th>Gedetailleerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages</th>
<th>Van belang voor conclusie nr.</th>
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* alinea [0057] - alinea [0077]; figuren  
1,2 *  
----- | 19 |
| A         | US 2010/037556 A1 (FRESNEL ERIC [FR])  
18 februari 2010 (2010-02-18)  
* het gehele document *  
----- | 1,21,24 |
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<tr>
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<td>JP S6393597 A</td>
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<td></td>
<td></td>
<td>ES 383557 A1</td>
<td>16-12-1972</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR 2061240 A5</td>
<td>18-06-1971</td>
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<tr>
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<td>GB 1326782 A</td>
<td>15-08-1973</td>
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<tr>
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<td>JP S4919670 B1</td>
<td>18-05-1974</td>
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<tr>
<td></td>
<td></td>
<td>US 3594975 A</td>
<td>27-07-1971</td>
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<tr>
<td>FR 2603019 A1</td>
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<td>CA 2674898 A1</td>
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<td>ES 2382239 T3</td>
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<td>FR 2934985 A1</td>
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</table>
This opinion contains indications relating to the following items:

- [x] 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
- [x] 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

Schelle, Joseph

Form NL237A (Dekblad) (July 2006)
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:

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 1-24
   - No: Claims

   Inventive step
   - Yes: Claims 5, 6, 9, 10, 12, 14
   - No: Claims 1-4, 7, 8, 11, 13, 15-24

   Industrial applicability
   - Yes: Claims 1-24
   - No: Claims

2. Citations and explanations

   see separate sheet

NL237B (July 2006)
Re Item V

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

1 Reference is made to the following documents:

D1 JP S63 93597 A (KYOTO SEISAKUSHO; FUJI SEAL IND CO LTD) 23 april 1988 (1988-04-23)

D2 US 3 594 975 A (ABRECHT WILLIAM A) 27 juli 1971 (1971-07-27)


2 The present application does not meet the criteria of patentability, because the subject-matter of claim 1 does not involve an inventive step.

Document D1 (see in particular the figures 1 and 2) shows the closest prior art turned upside down in order to enable the known sleeving device to do the sleeving from the bottom end of the containers upwards (see the present description, page 1, lines 23-35).

One of the problems to be solved is to embody the suspension of the spreading element in such a manner that a splice is able to pass over the spreading element (see the present description, page 2, lines 9-12).

Document D2 (see in particular: col. 3, line 18 - col. 4, line 33) teaches the skilled person the perfect solution to this problem, viz. resiliently mounting guide rollers to the spreading unit so that guide rollers are pressed to their respective drive roller.

3 The above reasoning also applies to the spreading unit according to claim 21.

4 Since it is obvious to use the obvious sleeving device as claimed in claim 1 in the manner specified in claim 24, the method according to this claim also lacks an inventive step.

5 The respective subject-matters of the dependent claims 2 to 4, 7, 8, 10, 11, 13, and 16-18, 22 and 23 also result from the obvious combination D1+D2.
The respective subject-matters of claims 15 and 20 are rendered obvious by the combination D1+D2+D3 (see in particular: page 3, line 34 - page 4, line 16; figures 1, 2).

The subject-matter of claim 19 is rendered obvious by the combination D1+D2+D4 (see in particular: paragraphs [0057] - [0077]; figures 1, 2).