(19) NL Octrooicentrum (11) **2003117**

(12)C **OCTROOI**

(21) Aanvraagnummer: **2003117**

(22) Aanvraag ingediend: **02.07.2009**

(51) Int.Cl.:
B65H 5/02 (2006.01)

(43) Aanvraag gepubliceerd:
-

(47) Octrooi verleend:
04.01.2011

(45) Octrooischrift uitgegeven:
12.01.2011

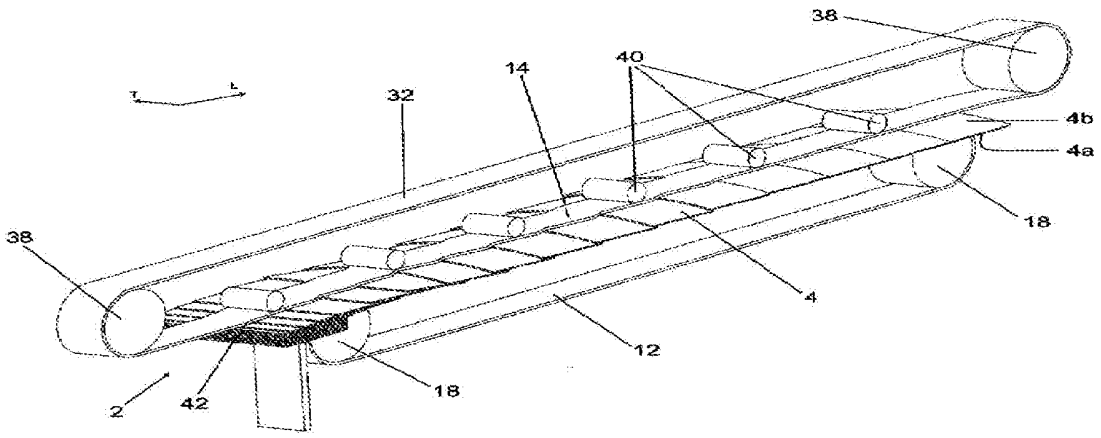
(73) Octrooihouder(s):
Buhrs-Zaandam B.V. te Zaandam.

(72) Uitvinder(s):
Freek Willem Laurens de Ridder te Haarlem.
Menno Koppen te Hilversum.

(74) Gemachtigde:
Drs. M.J. Hatzmann c.s. te Den Haag.

(54) **Document seperator and method for the same.**

(57) Method for processing substantially flat products (4) such as, for example, documents, comprising:
- providing a first transport surface (16);
- providing a second transport surface (36), disposed substantially parallel and opposite to the first transport surface, so as to define a product travel path (6) having a path direction (L) between them;
- moving the first transport surface and the second transport surface in the path direction (L) along the product travel path at different speeds;
- feeding two or more mutually overlapping products into between the first transport surface and the second transport surface at an upstream end of the product travel path; and
- conveying the products downstream along the product travel path, thereby allowing the transport surfaces to gradually decrease an overlap between successive products.
Also disclosed is an apparatus (1) for executing said method.



NL C 2003117

Title: Document separator and method for the same

Field of the Invention

The present invention relates to the automated handling of large volumes of documents, and more in particular, to the automated separation of individual documents from a stack of documents.

Background

Document separators, also called document feeders, serve the purpose of repeatedly separating a document from a stack of documents so as to allow for the performance of subsequent actions on each individualized document. Here the term 'document' is to be construed broadly, and intended to include substantially flat, somewhat flexible products, such as, for example, printed matter, envelopes, sheets, magazines, brochures, leaflets, newspapers etc. However, the term 'document' also includes stiff documents, i.e. documents that are relatively inflexible.

An exemplary application of document separators is a document wrapping line for the compilation of a bundle of mixed documents (i.e. documents of varying dimensions), such as a bundle of advertising brochures, and the wrapping thereof in a sealed plastic covering. Such a document wrapping line may comprise a main conveyor lane for transporting the document bundle in the making towards a wrapping unit, with a series of document feeders disposed alongside or above the main conveyor lane for successively adding individual documents to the bundle as it passes by. Each document feeder may comprise a document separator, the part of the feeder that individualizes documents from a document stack serving as the supply for document feeder.

Since the composition of a document bundle may vary per batch, a document separator is preferably capable of handling a variety of documents having different dimensions and made of different materials. Particularly

challenging are documents that comprise multiple folded pages, possibly stapled together in the form of a booklet. The folds and/or staples in the spines of the booklets make them thicker at the spine than at the open side. Consequently, only a limited number of such booklets can be stacked on top of each other before the pile starts to slide. Such booklets typically arrive from a printer in 'compensated stacks': stacks wherein a fixed number of booklets with the spine on one side is each time alternated with an equal number of booklets with the spine on an opposite side, so as to form a stack that is level and facilitates transport. Not all types of document separators are capable of properly separating booklets from a stack. Rotary feeders, for example, which use a suction cup to pull a lead product from the stack, which product is then engaged by a gripper mounted on a rotating drum, do not handle multi-page products such as booklets well. Other document separators typically require the spines of the booklets to be aligned one way or another. This is because these document separators apply a shear force to the (lead page of the) lead booklet in order to nudge it off the stack. As the booklets include several pages, chances are that a shear force, especially when exerted in a direction towards the spine of a booklet, will shear the pages from each other causing at least the page that is acted on to buckle, crease and possibly even tear. This threat is most immediate to documents that are made of very thin and/or flexible paper. In practice, therefore, stacks of easily shearable documents are often 'decompensated' before they are fed into the document separator. By providing all documents with the same orientation, such that the shear force of the separator can always act in the most favorable direction, the risk of damaging the documents is minimized. This approach works, but it is rather labor intensive – and therefore expensive – since the decompensation has to be carried out manually.

It is an object of the present invention to provide for a document separator and a method for separating documents from a stack, capable of reliably handling compensated stacks of easily shearable documents.

Summary of the Invention

According to one aspect of the invention, a product separator for separating substantially flat products is provided. The product separator comprises a first transport surface and a second transport surface. The first and second transport surfaces extend substantially parallel and opposite to each other, defining a product travel path having a path direction between them. The first and second transport surfaces are moveable in the path direction along the product travel path at different speeds. The product separator further comprises a product supply system, configured to insert products in an overlapping manner (i.e. partially overlapping/shingled, or completely overlapping) into between the first transport surface and the second transport surface at an upstream end of the product travel path, so as to allow the transport surfaces to convey the products downstream along the product travel path, and to thereby gradually decrease an overlap between successive products.

According to another aspect of the invention, a method for processing substantially flat products is provided. The method comprises providing a first transport surface and a second transport surface, the second transport surface being disposed substantially parallel and opposite to the first transport surface, so as to define a product travel path having a path direction between them. The method further comprises moving the first transport surface and the second transport surface in the path direction along the product travel path at different speeds. The method also comprises feeding two or more mutually overlapping products into between the first transport surface and the second transport surface at an upstream end of the product travel path, and conveying the products downstream along the product travel path, thereby allowing the transport surfaces to gradually decrease an overlap between successive products.

The device and method according to the present invention do not, unlike many known document separation devices and methods, attempt to separate individual documents from a stack at once. Instead, they do so in at least two stages: a first stage wherein products are successively nudged off the stack, each preferably without losing overlapping contact with either the product that preceded it or with the one that will follow behind, and a second stage wherein the overlap between successive products, separated from the stack, is gradually decreased as they are conveyed downstream along a product travel path. The second stage allows a continuous separation force to be applied over a longer period of time, instead of over a very short period. An optional third stage may be added at the downstream end of the product travel path to pull each most downstream product from the train of still partially overlapping (yet by then individually engageable products), so as to individualize them. It is noted that the removal of products from the stream of partially overlapping documents travelling downstream the product travel path to individualize these products, is truly optional for the purpose of document singulation since a sufficiently long product travel path itself will also lead to a stream of mutually separated, non-overlapping products. The third stage may be integrated or combined with a product positioning unit or action that orderly arranges the individualized products for further processing. Such a product positioning unit may thus expand the field of application of the disclosed product separator, and, for example, allow it to be employed to convert a stack of products or an irregularly shingled stream of products into a regularly arranged/shingled stream of products. The first two stages of the singulation process will now be elucidated somewhat further.

In the first stage, a main surface of a substantially flat lead product of the stack may be engaged by means of a shear force that pushes it into between the first and second transport surface. As soon as the product makes frictional contact with at least one of the transport surfaces, it is not only pushed but also pulled in the direction of the product travel path. The

pulling action of the transport surfaces in the transport direction helps to prevent buckling of the product that might result from the shearing push action. Furthermore, the lead product may preferably be pushed off the stack before it loses overlapping contact with its predecessor. Consequently, the lead product is clamped between the supply stack on the one side, and the last product (i.e. the previous lead product) of a train of shingled products on the other. This clamping configuration counteracts a tendency of the product to buckle under the applied shear force. This is even more so in case the stack is oriented vertically and lead products are fed from the top, such that a lead product is always carrying part of the weight of its predecessor, which weight presses down on the lead product thereby preventing its deformation.

The second stage of the separation process takes place between the two parallel transport surfaces that define the product travel path between them. To allow for an effective separation, the two transport surfaces are preferably spaced apart closely, possibly such that they contact each other where no products are present between them, and that they are parted by products where present. Consequently, each inserted product typically contacts at least one of the first and the second transport surface. (This is different only for so-called multi-feeds comprising three or more products that completely overlap each other, and wherein only the outer products contact the transport surfaces.) The transport surfaces both move in a downstream direction of the product travel path, yet at different speeds. The speed of the slowest transport surface is preferably close to the speed with which the lead product is nudged off the stack in the first stage, promoting a smooth transition from the stack into between the transport surfaces. Due to the difference in speed between the two transport surfaces, the at least partially overlapping products clamped between them are gradually separated as they move along the product travel path. The separation process is somewhat erratic, but observed to be very effective. The erratic nature of the process may be explained by the continuously changing interaction between the

products on the one hand and the fast- and slow-moving transport surfaces on the other. A product typically moves with the speed of one of the transport surfaces. Which one of the transport surfaces effectively dictates the speed with which a product moves along the product travel path may change any time, depending on the frictional inter-product forces between the product and its neighbors, and the surface area of its main surfaces across which it is in frictional contact with either transport surface.

Because the products travel along the product travel path in an at least partially overlapping manner, typically shingled, the transition between the main surfaces of successive products – viewed in the path direction – is stepwise, in particular when the products have a certain non-negligible thickness. The transport surfaces may preferably be flexible to enable them to follow the contours of the stream of mutually overlapping products, ensuring optimal frictional contact between the transport surfaces and the main surfaces of the products present there between. Two-sided clamping of the products across their main surfaces by – in effect – the two transport surfaces additionally prevents buckling of the products in the direction of the product travel path.

Indeed, the force responsible for the gradual separation of the products as they move along is a shear force, generated by the difference in speed between the two transport surfaces that engage the products from opposite sides. Nevertheless, the products hardly deform as a result of the shearing action. Apart from the clamping action of the transport surfaces, this is partly because the separation takes place gently, over a relatively long product travel path. In a preferred embodiment, the product travel path is long enough to accommodate at least 1.5 products (i.e. the product travel path is at least 1.5 longitudinal – longitudinal being the direction of the product travel path – product dimensions long). By virtue of the minimum length, the graduality of the separation process is optimized. The gradual decrease of the mutual overlap causes the products to progressively take up more path

length along the product travel path. To enable a continuous separation process on a finite product travel path, path length between the transport surfaces must be freed continuously, for example by periodically removing the most downstream product from the stream at the end of the product travel path. Removal of downstream products may be performed before the documents have been separated from each other completely; downstream products having only a modest partial overlap with the products that follow them are individually engageable, and may therefore be quickly pulled from the stream.

The device and method according to the invention thus allow vulnerable shearable documents, such as for example the above-described paper booklets, to be reliably separated from a stack without damaging them. Shear forces are applied gently, and measures are taken to prevent buckling at every stage.

It is noted that some known document processing apparatus and methods employ two oppositely disposed, moving transport surfaces to singulate a stack or stream of documents. United States patent 6,135,341, for example, discloses a singulating apparatus including a singulator having a retard assembly and a feed assembly disposed opposite to each other along a document feed path. The retard assembly and the feed assembly co-operate on a stream of documents being transported along the document feed path. As the documents arrive at the feed assembly and the retard assembly, they are separated and transported, one by one, downstream along the document feed path. The method disclosed by US'341 is quite different from the method proposed by the present invention.

The method according to the invention effects a gradual decrease in overlap between successive products by enabling two substantially parallel transport surfaces to act on the overlapping products inserted between them. In doing so, the transport surfaces move in the same direction so as to shear the products relative to each other while transporting them downstream.

Even in case the faster transport surface does not get a (static) hold of a product, it is still transported downstream by the slower transport surface, making way for the insertion of new lead products at an upstream point of the product travel path. This is all in contrast to US'341, in which the retard assembly and the feed assembly run in *opposite* directions, so as to *prevent* shingled products from being inserted between them. In US'341, the separation of products is not gradual, but to take place at a defined location and before any of the products makes contact with both assemblies. To this end, a first, upstream section of the retard assembly is disposed at an angle with the feed assembly, thereby defining a wedge-shaped document entry opening. As a shingled stack of documents approaches the document entry opening, documents other than the lead document are fed upstream relative to the document feed path due to frictional contact with the retard assembly, while the lead document is fed downstream through frictional contact with the feed assembly. A distinct drawback of this way of separating shingled documents is that it does not work satisfactorily for shearable documents, as is acknowledged by the publication itself (see col.7, ln.10-53). Also, the spine must be leading. The effect achieved by the present invention is thus not achieved by US'341 and similar devices and methods.

According to an elaboration of the invention, at least one of the transport surfaces has a dimension, transverse to the path direction, that is smaller than a transverse dimension of the products.

Using transport surfaces that are narrow relative to the products conveyed between them, especially when the transport surfaces are set up to engage center portions of the products, improves control over the motion imparted to the products. Transport surfaces that extend over the full transverse dimension of the products may engage them at many different, difficultly controllable positions across their main surfaces. This may cause a product to experience a moment that works to turn it around an axis perpendicular to the product travel path. Such rotation causes misalignment

of the respective product, which misalignment may then propagate along the product travel path and give rise to jams and damaged products. Relatively narrow transport surfaces that centrally engage the products' main surfaces prevent this.

According to a further elaboration of the invention, the products are conveyed along the product travel path in a transversely bent condition relative to the path direction.

The shear forces exerted on the products by the transport surfaces act in a direction parallel to the product travel path. Bending the products in a direction transverse to the direction of the shear forces/product travel path (i.e. such that (at least a directional component of) an axis of curvature extends parallel to the path direction), significantly increases their stiffness and resistance to buckling due to the shear forces. The products do not need to be bent much to achieve the advantageous stiffening effect. The bending of the products may be effected in any suitable manner, and for example include the use of curved transport surfaces, product bending guides alongside the product travel path, or gravity to pull the product sides protruding sideways from between the transport surfaces downwards.

Allowing gravity to bend the products is perhaps easiest. By using first and second transport surfaces that, viewed in a direction transverse to the path direction, extend substantially horizontally, and of which at least the lower one has a transverse dimension (i.e. the dimension perpendicular to the path direction of the product travel path) that is smaller than a transverse dimension of the products, gravity is enabled to bend the sideward protruding edges of the products downwards, around said lower transport surface.

It is noted that the bending of products may not be restricted to the second stage of conveying the products along the product travel path, but may to the same effect be applied to the first stage during which products are inserted into between the transport surfaces. To this end, the product supply

system of the product separator may be configured to insert the products in a transversely bent condition. In a constructionally simple yet effective embodiment, for example, this may mean that a vertically oriented stack of products is supported by a transversely bent support plate, whereby the products – thus held in a bent conditions – are nudged off the top of the stack.

These and other features and advantages of the invention will be more fully understood from the following detailed description of certain embodiments of the invention, taken together with the accompanying drawings, which are meant to illustrate and not to limit the invention.

Brief Description of the Drawings

Fig. 1 schematically illustrates a longitudinal cross-sectional view of a first embodiment of an exemplary document separator according to the present invention;

Fig. 2 schematically illustrates a longitudinal cross-sectional view of a second embodiment of an exemplary document separator according to the present invention;

Fig. 3 schematically illustrates a perspective view of a document separator similar to the one shown in Fig. 2; and

Figs. 4-6 schematically illustrate three transversal cross-sectional views of a product being conveyed in a transversely bent condition between two transport surfaces.

Detailed Description

Fig. 1 schematically illustrates a longitudinal cross-sectional view of a first embodiment of an exemplary product separator 1 according to the present invention. The product separator 1 includes a first belt conveyor 10, a second belt conveyor 30 disposed opposite the first belt conveyor, and a product supply system 50 that is disposed at an upstream location relative to the belt conveyors 10, 30.

In the embodiment of Fig. 1, the product supply system 50 comprises an elevator 52 that supports a stack 2 of products 4. The elevator 52 is controlled by a central control unit 8 that aligns the top of the stack 2 with the product travel path 6 extending between the first and second belt conveyors 10, 30. The depicted product supply system 50 further comprises a nudge wheel 54 that rests on the top of the stack 2. The nudge wheel 54 is bearingly mounted to a motorized arm 56 that, under the control of central control unit 8, periodically moves the nudge wheel from left to right, and back. When the nudge wheel 54 is moved from left to right, its rotational motion relative to the arm 56 is restrained by a freewheel assembly (not shown). Accordingly, the nudge wheel 54 makes frictional contact with the lead product 5, and pushes it sideways into between the first belt conveyor 10 and second belt conveyor 30. After such a nudge stroke the arm 56 is retracted to the left. The nudge wheel 54 thereby rolls back across the top of the stack 2, from the just nudged lead product 5 onto the next, to subsequently make a new nudge stroke, and so on. A new nudge stroke is preferably initiated before the last-nudged product clears the stack 2 completely, so as to ensure an overlapping insertion of products between the belt conveyors 10, 30.

For reasons of clarity, the document separator 1 shown in Fig. 1 is depicted at the start of a new batch process. Because of this, no products 4 (other than the lead product 5) are present along the product travel path 6. In full operation though, these further downstream products play an important role in preventing buckling of the lead product 5 as is it nudged off the stack. This is because the products 4 are inserted into between the first and second belt conveyors 10, 30 in an overlapping manner, such that each product at least partially rests on the product following it. Accordingly, the tendency to buckle under the action of the nudge wheel 54 is effectively counteracted by the weight of the preceding product(s). This is clearly visible in Fig. 3, which shows a perspective view of an alternative embodiment of the document separator 1 to be discussed below.

One skilled in the art will recognize that various modifications may be made to the product supply system 50 just described. The nudge wheel 54, for example, may be replaced by an elongate roller possessing a larger surface area to contact the products 4 than the nudge wheel. Such a roller may allow the force required to nudge a product 5 off the stack to be distributed over a larger portion of a main surface 4b of the product, so as to minimize the chance of damaging it. Further, although a top feed assembly 50 as shown in Fig. 1 is preferable because it limits the inter-product frictional forces that must be overcome when a product 5 is nudged from the stack 2, a bottom feed assembly is conceivable as well. In that case, however, the weight of the stack 2 is likely to press on the lead (bottom) product, and to be too large to allow the product to be nudged from the stack without significant shear forces. Of course, in a bottom feed assembly an elevator 52 to lift products may be omitted. As an intermediate alternative, the orientation of the stack 2 may be changed. The stack 2 may, for example, extend horizontally with the products 4 having a vertical orientation. Other orientations are possible as well. It is also contemplated that the product supply system 50 may not feed products 4 off a stack 2. It may, for example, include a supply conveyor feeding an irregularly shingled stream of products into between the first and second belt conveyors 10, 30.

An advantageous alternative embodiment of the product supply system 52 may comprise two elevators that are moveable upwards within a vertically extending elevator shaft. The shaft may snugly accommodate the stack of products to prevent the products from accidentally sliding relative to each other, while the elevators may move the products upwards through the shaft. The elevator shaft may not be closed all-around, and may for example comprise a series of horizontally spaced, upright bars that define its cross-section (seen from above or below). Each of the elevators, in turn, may include a forklift whose fork teeth reach through the bars of the shaft to support and lift a stack of products. At any one time only one of the elevators is intended

to support the stack of products from below. As the stack is slowly depleted due to the continuous removal of products off the top, and the stack-supporting elevator moves upwards to keep the top of the stack in alignment with the product travel path, room is created in the shaft for the other elevator to bring in a new supply of products. The new supply may be inserted into the shaft from an underside thereof, and be moved upwards by the other elevator so as to connect it to the stack held by the stack-supporting elevator. Upon connection, the stack-supporting elevator may be retracted sidewards from the shaft, passing its load on to the other forklift, which at that moment becomes the stack-supporting elevator. Outside of the shaft, the retracted elevator may be reloaded with a supply of the products, from which point on the cycle may start all over again. Two (or more) forklifts may thus 'leapfrog' over one another to provide a continuous supply of products.

The elevator 52 may comprise a support surface 53 to support and lift the stack 2 of products 4. The support surface 53 may be continuous (e.g. a plate, as shown) or discontinuous, including several sub-surfaces that together define the support surface (e.g. a number of teeth of a forklift). In either situation, the support surface may be transversely bent, such that products supported by the elevator 52 are curved with respect to an axis of curvature that has a least a directional component parallel to the direction in which the shear force, exerted by the nudge wheel 54, is applied to the lead product 5. In the case of the continuous support surface 53, such a situation may be achieved by bending the support surface accordingly. In the case of the discontinuous support surface, the sub-surfaces may be thought of as selected portions of a transversely bent continuous support surface. The transversely bent condition of the products 4, 5 has a stiffening effect, and counteracts the tendency of the products to buckle under any shear force applied in a direction parallel to the axis of curvature.

As the lead product is nudged from the stack, it is received between the first belt conveyor 10 and the second belt conveyor 30. Each of the belt

conveyors 10, 30 features a flexible belt 12, 32 that is wrapped around a number of pulleys 18, 38. At least one of the pulleys 18, 38 of each belt conveyor 10, 30 may be driveable by a motor (not shown) that is under the control of the central control unit 8; the other pulleys may be idler pulleys, possibly spring loaded to keep the respective belt taut. The belt conveyors 10, 30 are disposed opposite to each other, on opposite sides of a product travel path 6. The immediately opposing belt runs 14, 34 of belts 12, 32 define this product travel path 6 between them. It is clear that, in the embodiment of Fig. 1, the product travel path 6 is straight and extends entirely in a path direction L. Furthermore, the path direction L at the point where products 4 are inserted into between the belt runs 14, 34 is substantially parallel to the direction in which the nudge wheel 34 pushes the products 4 off the stack 2. Although this latter relation is preferably preserved, it is contemplated that the product travel path 6 may not be straight in other embodiments. The product travel path 6 may for example be curved around a rotating drum, a circumference of which may provide for the first transport surface. It is further understood that, for reasons of clarity, the (vertical) distance that separates the belt runs 13 and 24 is somewhat exaggerated; in practice, the belt runs may even abut each other in case no products are present between them. It is also contemplated that different embodiments of the product separator according to the invention do not include belt conveyors 10, 30, but instead different conveying devices, such as, for example series of separate, juxtaposed (driveable) wheels, to define the product travel path, and to receive the products and carry them forward.

The belt runs 14, 34 provide a first transport surface 16 and a second transport surface 36 respectively. Viewed in both the path direction L and the transverse direction T (i.e. the two mutually perpendicular directions that define the plane of the transport surfaces), the transport surfaces 16, 36 extend in a substantially horizontal plane. In other embodiments, however, the orientation of the transport surfaces may be chosen differently.

The two belt conveyors 10, 30 are driven such that the belt runs 14, 34 both move in the path direction L, but at different speeds. In the embodiment of Fig. 1, the speed of the first, lower transport surface 16 is close to the speed with which a lead product 5 is nudged off the stack 2 by the nudge wheel 54. This promotes a smooth, buckle-free transition of the lead product 5 from the stack 2 into between the transport surfaces 16, 36. The speed of the second, upper transport surface 36 is preferably higher than that of the first, lower transport surface 16. In some embodiments, however, the lower transport surface 16 may move faster than the upper transport surface 36.

Using the setup shown in Fig. 1 a continuous stream of overlapping, typically shingled products 4 may be inserted between the two transport surfaces 16, 36. As mentioned, such a stream of shingled products is clearly illustrated by Fig. 3. The continuity of the stream contributes to a high throughput capacity, but is not a strict requirement otherwise. As the products 4 travel downstream along the product travel path 6, their main surfaces 4a, 4b are in contact with the transport surfaces 16, 36: the lower main surfaces 4a of the products are, at least partially, in frictional contact with the first transport surface 16, while the upper main surfaces 4b are, at least partially, in frictional contact with the second transport surface 36. Due to the flexibility of the belts 12, 32, the transport surfaces 16, 36 are capable of following the step-wise transitions between the main surfaces 4a, 4b of adjacent products 4 so as to ensure optimal frictional contact between the transport surfaces 16, 36 and the main surfaces 4a, 4b of the products. As can be seen in Fig. 3, the degree of mutual overlap between the inserted products 4 is relatively large at the upstream side of the product travel path 6. It is even possible that occasional multi-feeds occur: two or more products 4 having a one hundred percent overlap, incidentally fed from the stack 2 as a whole due to relatively high inter-product frictional forces. Such multi-feeds

do not present a problem to the apparatus and method according to the invention and may, in some embodiments, even be inserted purposefully.

Due to the difference in speed between the two transport surfaces 16, 36, which are in contact with the overlapping products 4 as described above, the products are gradually separated as they move along the product travel path 6. It is conjectured that the difference between the dynamic and static friction coefficients of the transport surfaces 16, 36 plays an important role in the gradual separation process. A transport surface 16, 36 that drags a product 4 along does so under static friction; the product does not move relative to that transport surface. At the same time, the product 4 will move relative to the other transport surface 16, 36 under dynamic friction.
Both the static and dynamic friction experienced by a product 4 depend on the normal contact force, i.e. the force with which a main surface 4a, 4b of a product 4 is pressed against a transport surface 16, 36. The larger the surface area of a main surface 4a, 4b contacting the respective transport surface 16, 36, the larger the frictional force between the product and said transport surface is. The size of the contacting surface area is, of course, dependent on the overlap between successive products 4. Due to the continuous interaction between the transport surfaces 16, 36 and the main surfaces 4a, 4b of the products 4, the amount of surface area through which a product contacts either one of the transport surfaces changes over time. Accordingly, a product 4 may at one moment favor being dragged under static friction by the first transport surface 16, while at the next it may have made sufficient areal contact with the second transport surface 36 to attach thereto, or vice versa. The underlying frictional force balance for each product may tip back and forth as the products travel along the product travel path 6, causing the products 4 to move relative to each other, thereby gradually diminishing their mutual overlaps.

Referring again to Fig. 1. Downstream of the belt conveyors 10, 30 a product positioning unit 70 is disposed. By the time the products 4 reach the

product positioning unit 70, the separation process is in a sufficiently advanced phase to ensure that possible multi-feeds have been rectified, and that the overlap between successive products 4 has become small enough to allow a most-downstream product to be quickly extracted from the stream. This is what the product positioning unit 70 does. The unit 70 may comprise two rollers 72 or other rotational elements, disposed on opposite sides of the product travel path 6. The rollers 72 may be disposed at fixed mutual positions, so as to define a certain gap between them of approximately the thickness of a single product. Alternatively, at least one of the rollers 72 may be (spring-) biased into contact with the other, so as to allow for a flexible gap size between them. At least one of the rollers 72 is driveable, preferably at a relatively high speed compared to the speeds of the belts 12, 32. In the embodiment of Fig. 1, both rollers 72 are driveable under the control of the central control unit 8. Extraction of products 4 from the stream of products requires that the driveable rollers 72 rotate in the directions indicated in Fig. 1: clockwise for the lower roller 72 and counter-clockwise for the upper roller 72. As soon as a lead edge of a most-downstream product 4 comes into frictional contact with the rotating rollers 72, the product will be pulled into between them and be accelerated in the path direction L. The fast acceleration draws the most-downstream product loose from any remaining overlap with the product following it, and effects its definitive separation from the stream.

Downstream of the product positioning unit 70, a further belt conveyor or another product handling unit may be disposed to accept the individualized products for further processing. In the case of a further belt conveyor, for example, the product positioning unit 70 may arrange the individualized products in a regularly shingled manner on a belt thereof, so as to transport them to a further processing station.

The product separator 1 according to the invention may be fitted with a control unit 8 that controls one or more of the product supply system

50, the first belt conveyor 10, the second belt conveyor 30 and the product positioning unit 70. The control unit 8 may be configured to gear the operations of these components towards one another, enabling a smooth operation of the separator 1 as a whole. To this end the control unit 8 may for example provide an adjustable master clock signal, from which clock signals for driving the other components, such as the product supply system 50 and the conveyor belts 10, 30, may be derived through a fixed multiplier. Additionally, the control unit 8 may comprise a number of sensors, disposed at various locations in or around the separator 1, to provide the control unit with operational information, e.g. about the number of inserted and extracted documents, the occurrence of multi-feeds, extraction timing information, normal pressure applied to the transport surfaces 16, 36, etc. The control unit 8 may further include an operator control panel through which an operator can monitor and adjust the performance of the product separator 1. It is understood that conventional technology, e.g. Siemens' SIMATIC product range, may be used to implement the control unit and its functionality.

Fig. 2 schematically illustrates a second exemplary embodiment of a product separator 1 according to the invention. Relative to the embodiment shown in Fig. 1, both the product supply system 50 and the belt conveyors 10, 30 have undergone some modifications. Fig. 3 depicts a perspective view of an embodiment of a product separator 1 similar to the second embodiment shown in Fig. 2, but in some more detail and in an advanced phase of operation. Both figures clearly illustrate the modifications of the second embodiment relative to the first embodiment of Fig. 1

The product supply system in Figs. 2 and 3 does not make use of a nudge wheel 54 that executes discrete nudge strokes to push products 5 off the top of the stack 2. Instead, the belt 32 of the second, upper belt conveyor 30 has been extended with a belt run 42 that extends up to above the top of the vertically oriented stack 2. The elevator 52 forces the top of the stack in contact with this belt run 42, which provides a third transport surface 44. As

the second belt conveyor 30 is driven, the third transport surface 44 moves (in unison with the second transport surface 36) in the path direction L, and products 5 forced in contact with the third transport surface 44 will be successively nudged off the stack in a shingled manner. Again, the flexibility of the belt 32, and hence of the belt run 42, is important. Due to its flexibility, the third transport surface 44 is able to follow the step-wise transitions between the main surfaces 4b of successive lead products 5, and thus to engage a following product before a certain preceding product is fully clear of the stack 2. This aspect is well illustrated by Fig. 3.

The belt conveyors 10, 30 of the embodiment of Fig. 2 have additionally been adapted to include a number of pressure pulleys 20, 40. A first series of pulleys 20 is associated with the first belt conveyor 10, such that belt run 14, and hence the first transport surface 16, is supported from below at a series of discrete points along the product travel path 6. A second series of pulleys 40 is associated with the second belt conveyor 30, such that belt runs 34, 42, and hence the second transport surface 36, are pressed on from above at a series of discrete points above the stack 2 and along the product travel path 6. The pulleys in each series may be disposed equidistantly from each other, whereas the two series may be shifted relative to each other in the path direction L, so that the pulleys of the first series 20 and the second series 40 are alternatingly and non-opposingly disposed along the product travel path 6, as shown in Fig. 2. Here the phrase 'alternatingly and non-opposingly' is intended to convey that the idea that, viewed along the path direction L, a number of pulleys 20 of the first series disposed on a first side of the product travel path 6 is alternated with a number of pulleys 40 of the second series disposed on a second side of the product travel path, and so on, such that the pulleys of the first and second series do not immediately oppose each other. Along the product travel path 6, the pressure pulleys 20, 40 gently force the first and second transport surfaces 16, 36 towards each other, whereby their alternating, non-opposing placement distributes the

overall pressing force. It has been observed that a finer distribution of the pressing force leads to more efficient separation of products. The pressing force exerted by the pulleys 20, 40 is preferably non-progressive in the sense that thicker products 4 would cause the transport surfaces 16, 36 to be pressed together harder. This is because a larger normal pressing force increases the inter-product frictional forces between overlapping products 4 conveyed along the product travel path 6, and thus renders separation of these products through shearing more difficult. An alternative approach to applying normal forces between products 4 and transport surfaces 16, 36 may employ vacuum belt conveyors. An advantage of using vacuum belts it that they barely affect the inter-product frictional forces. This is because they do not force overlapping products 4 onto each other, but merely suck the products against the belts (indeed often diminishing inter-product frictional forces).

Fig. 3 illustrates an embodiment of the document separator 1 that is similar to that shown in Fig. 2, this time in a perspective view. Some aspects illustrated by Fig. 3 have already been referred to above, but are summarized here briefly for the sake of completeness. Firstly, the figure elucidates the gradually diminishing overlap between successive products 4 as they travel down the product travel path 6. As can be seen, most upstream products 4 overlap with their neighbors and the transitions between the main surfaces 4a, 4b of these overlapping products are step-wise. The flexibility of belts 12 (not visible) and 32 enables them to follow these transitions, thereby promoting proper frictional contact between the main surfaces and the belts. Fig. 3 also illustrates how gravity mildly bends the products 4 in a transverse direction as they are conveyed. This manner of bending the products 4 to counteract buckling is further discussed in relation to Fig. 5.

Figs. 4-6 schematically illustrate, in transverse cross-sectional views, three alternative approaches to transversely bending products 4 as they are conveyed downstream along the product travel path 6. In the

embodiment of Fig. 4, two bending guides or rails 80 are used to bend the products 4. The bending guides 80 extend in the path direction L, parallel to the product travel path 6. For symmetry, one guide or rail is disposed on either side of the product travel path 6. The guides or rails 80 are configured to engage a side portion of the products 4 so as to bend them around an axis of curvature C, parallel to the path direction L. To minimize friction between the products 4 and the guides 80, the guides may for example be provided with small, interfacing rollers (not shown). In the embodiment of Fig. 5, gravity is used to bend the products 4. This is made possible by using first and second transport surfaces 16, 36 that, viewed in the transverse direction T, extend substantially horizontally, while at least the first, lower transport surface 16 has a transverse dimension that is smaller than a transverse dimension of the products 4. The products 4 thus protrude from between the transport surfaces 16, 36, which allows gravity to bend them transversely, relative to an axis of curvature C. In the embodiment of Fig. 6, the transport surfaces 16, 36 themselves are curved relative to an axis of curvature C. Consequently, the products 4 clamped and conveyed between them are too. It will be appreciated that the illustrated manners of bending products are merely exemplary, and that other approaches may be implemented to the same effect.

Although illustrative embodiments of the present invention have been described above, in part with reference to the accompanying drawings, it is to be understood that the invention is not limited to these embodiments. Variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of the phrases "in one embodiment" or "in

an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, it is noted that particular features, structures, or characteristics of one or more embodiments may be combined in any suitable manner to form new, not explicitly described embodiments.

List of elements

1	product separator
2	stack of products
4	product
4a,b	first, lower (a) and second, upper (b) main surface of product
5	lead product of stack
6	product travel path
8	central control unit
10	first belt conveyor
12	belt of first belt conveyor
14	belt run defining first transport surface
16	first transport surface
18	pulleys of first belt conveyor
20	pressure force distributing pulleys
30	second belt conveyor
32	belt of second belt conveyor
34	belt run defining second transport surface
36	second transport surface
38	pulleys of second belt conveyor
40	pressure force distributing pulleys
42	belt run defining third transport surface
44	third transport surface
50	product supply system
52	elevator
53	elevator support surface
54	nudge wheel
56	motorized arm
70	product positioning unit
72	wheel or roller
80	product bending guide
C	axis of curvature
L	path direction
T	transverse direction relative to path direction

Conclusies

1. Een productscheider (1) voor het scheiden van in hoofdzaak platte producten (4, 5), zoals bijvoorbeeld documenten, omvattende:

- een eerste transportoppervlak (16) en een tweede transportoppervlak (36), waarbij het eerste en tweede transportoppervlak zich in hoofdzaak parallel aan en tegenover elkaar uitstrekken, zodanig dat zij tussen zich een productpad (6) met een padrichting (L) definiëren, en waarbij het eerste transportoppervlak en het tweede transportoppervlak met onderling verschillende snelheden langs het productpad beweegbaar zijn in de padrichting; en
- een productaanvoersysteem (50), ingericht voor het op een overlappende wijze invoeren van producten tussen het eerste transportoppervlak en het tweede transportoppervlak aan een stroomopwaarts einde van het productpad, teneinde het de transportoppervlakken mogelijk te maken de producten stroomafwaarts langs het productpad te voeren, en daarbij een overlap tussen opeenvolgende producten geleidelijk te verminderen.

2. De productscheider volgens conclusie 1, waarbij een eerste bandtransporteur (10) het eerste transportoppervlak (16) verschaft, en waarbij een tweede bandtransporteur (30) het tweede transportoppervlak (36) verschaft.

3. De productscheider volgens conclusie 1 of 2, waarbij het productpad (6) voldoende lang is om ten minste 1,5 producten (4) op te nemen.

4. De productscheider volgens een van de voorgaande conclusies, waarbij het productaanvoersysteem (50) is ingericht om de producten (4) in een ten opzichte van de padrichting (L) dwarsgebogen toestand in te voeren.

5. De productscheider volgens een van de voorgaande conclusies, waarbij ten minste één van de transportoppervlakken (16, 36) een afmeting heeft, dwars op de padrichting (L), die kleiner is dan een dwarsafmeting van de producten (4).

6. De productscheider volgens een van de voorgaande conclusies, waarbij het eerste en tweede transportoppervlak (16, 36) zich, bezien in een richting dwars op de padrichting (L), in hoofdzaak horizontaal uitstrekken.

7. De productscheider volgens een van de voorgaande conclusies, ingericht voor het langs het productpad (6) vervoeren van producten (4) in een ten opzichte van de padrichting (L) dwarsgebogen toestand.

8. De productscheider volgens een van de voorgaande conclusies, waarbij ten minste één van het eerste transportoppervlak (16) en het tweede transportoppervlak (36) ten opzichte van de padrichting (L) dwars gekromd is.

9. De productscheider volgens een van de voorgaande conclusies, voorts omvattende ten minste één productbuigende geleider (80), geplaatst langs het productpad (6) en ingericht om aan te grijpen op de producten (4) die tussen de transportoppervlakken (16, 36) worden vervoerd teneinde ze ten opzichte van de padrichting (L) dwars te verbuigen.

10. De productscheider volgens een van de voorgaande conclusies, waarbij het productaanvoersysteem (50) een bovenaanvoersamenstel omvat

dat producten aanvoert vanaf de bovenzijde van een in hoofdzaak verticaal georiënteerde stapel (2).

11. De productscheider volgens conclusies 2, 6 en 10, waarbij het tweede transportoppervlak (36) boven het eerste transportoppervlak (16) is geplaatst, waarbij de tweede bandtransporteur (30) voorts een derde transportoppervlak (44) verschaft dat zich in hoofdzaak in het verlengde van het tweede transportoppervlak (36) uitstrekt en dat is geplaatst boven de verticaal georiënteerde stapel (2), en waarbij het productaanvoersysteem (50) is ingericht om de stapel (2) continu zo te positioneren dat een bovenzijde van de stapel in contact is met genoemd derde transportoppervlak, welk oppervlak is ingericht om in overeenstemming met het tweede transportoppervlak te bewegen.

12 De productscheider volgens een van de voorgaande conclusies, voorts omvattende:

- een eerste serie rollen (20) die met de eerste bandtransporteur (10) geassocieerd is; en
- een tweede serie rollen (40) die met de tweede bandtransporteur (30) geassocieerd is;

waarbij de eerste en tweede series rollen zijn ingericht om respectievelijk het eerste transportoppervlak (16) en het tweede transportoppervlak (26) richting elkaar te drijven, waarbij de rollen van de eerste serie en de rollen van de tweede serie op niet-tegenoverliggende wijze langs het productpad (6) zijn geplaatst.

13. De productscheider volgens een van de voorgaande conclusies, voorts omvattende een productpositioneringseenheid (70), geplaatst aan een stroomafwaarts einde van het productpad (6) en omvattende twee rolwielen (72), waarbij genoemde rolwielen onderling parallel en aan weerszijden van

het productpad zijn geplaatst, en waarbij elke rolwiel een rotatie-as heeft die zich in hoofdzaak dwars op de padrichting (L) uitstrekt, zodat een product (4) dat het stroomafwaartse einde van het productpad bereikt tussen de rolwielen kan worden ontvangen, en waarbij ten minste één van de rolwielen aandrijfbaar is om een ontvangen product te versnellen.

14. De productscheider volgens ten minste conclusie 2, waarbij ten minste één van de eerste bandtransporteur (10) en de tweede bandtransporteur (30) een vacuümbandtransporteur is.

15. De productscheider volgens een van de voorgaande conclusies, waarbij de werking van één of meer van het productaanvoersysteem (50), de eerste bandtransporteur (10), de tweede bandtransporteur (30) en de productpositioneringseenheid (70) wordt bestuurd door een besturingseenheid (8), welke is ingericht om hun werking onderling af te stemmen.

16. Werkwijze voor het verwerken van in hoofdzaak platte producten (4), zoals bijvoorbeeld documenten, omvattende:

- het verschaffen van een eerste transportoppervlak (16);
- het verschaffen van een tweede transportoppervlak (36) dat in hoofdzaak parallel aan en tegenover het eerste oppervlak is geplaatst teneinde tussen beide een productpad (6) met een padrichting (L) te definiëren;
- het met onderling verschillende snelheden in de padrichting (L) langs het productpad bewegen van het eerste transportoppervlak en het tweede transportoppervlak;
- het invoeren van twee of meer onderling overlappende producten tussen het eerste transportoppervlak en het tweede

transportoppervlak aan een stroomopwaarts einde van het productpad; en

- het stroomafwaarts langs het productpad vervoeren van de producten, waarbij het de transportoppervlakken mogelijk is om een overlap tussen opeenvolgende producten gradueel verminderen.

17. De werkwijze volgens conclusie 16, waarbij het productpad (6) voldoende lang is om ten minste 1,5 producten (4) op te nemen.

18. De werkwijze volgens conclusie 16 of 17, waarbij de producten (4) tussen de transportoppervlakken (16, 36) worden ingevoerd in een ten opzichte van de padrichting (L) dwarsgebogen toestand.

19. De werkwijze volgens een van de conclusies 16-18, waarbij de producten (4) langs het productpad (6) vervoerd worden in een ten opzichte van de padrichting (L) dwarsgebogen toestand.

20. De werkwijze volgens een van de conclusies 16-19, waarbij ten minste één van de transportoppervlakken (16, 36) een afmeting heeft, dwars op de padrichting (L), die kleiner is dan een dwarsafmeting van de producten (4).

21. De werkwijze volgens een van de conclusies 16-20, waarbij de eerste en tweede transportoppervlakken (16, 36), bezien in een richting (T) dwars op de padrichting (L), zich in hoofdzaak horizontaal uitstrekken.

22. De werkwijze volgens een van de conclusies 20 en 21, waarbij de laagst geplaatste van de eerste en tweede transportoppervlakken (16, 36) een afmeting heeft, dwars op de padrichting (L), die kleiner is dan een dwarsafmeting van de producten (4), waardoor het voor de zwaartekracht

mogelijk is de producten rond genoemd laagst geplaatste transportoppervlak te verbuigen.

23. De werkwijze volgens een van de conclusies 16-22, waarbij het invoeren van twee of meer onderling overlappende producten (4) omvat:

- het verschaffen van een verticaal georiënteerde stapel (2) van in hoofdzaak platte producten;
- het continu zodanig positioneren van de stapel dat een bovenste product (5) zich in het verlengde van het productpad (6), dat wordt gedefinieerd door het eerste en het tweede transportoppervlak (16, 36), bevindt; en
- het herhaaldelijk aangrijpen van het bovenste product en het invoeren ervan tussen het eerste transportoppervlak (16) en het tweede transportoppervlak (36).

24. De werkwijze volgens conclusie 23, waarbij een derde transportoppervlak (44) wordt verschaft boven de verticaal georiënteerde stapel (2), een waarbij de stapel continu zodanig gepositioneerd wordt dat het bovenste product (5) van de stapel in contact gedreven wordt met het derde transportoppervlak (44), welke derde transportoppervlak wordt bewogen in de padrichting (L) van het productpad (6) teneinde het bovenste product in te voeren tussen het eerste (16) en het tweede (36) transportoppervlak.

25. De werkwijze volgens een van de conclusies 16-24, voorts omvattende:

- het richting het tweede transportoppervlak (36) drijven van het eerste transportoppervlak (16) op een eerste serie posities langs het productpad (6); en
- het richting het eerste transportoppervlak drijven van het tweede oppervlak op een tweede serie posities langs het productpad,

waarbij de posities van de eerste serie enerzijds en de posities van de tweede serie anderzijds zich niet tegenover elkaar langs het productpad bevinden.

26. De werkwijze volgens een van de conclusies 16-25, voorts omvattende:

- het aangrijpen van een product (4) dat naar een stroomafwaarts einde van het productpad (6) is gevoerd, en het versnellen van het aangegrepen product teneinde het te onttrekken aan een resterende overlap met een daarop volgend product, waarbij het aangegrepen product wordt geïndividualiseerd.

27. De werkwijze volgens conclusie 26, voorts omvattende:

- het herschikken van de aangegrepen en geïndividualiseerde producten (4) volgens een vooraf bepaalde ordening.

28. De werkwijze volgens een van de conclusies 16-27, waarbij ten minste één van het eerste, het tweede en het derde transportoppervlak (16, 36, 44) flexibel is.

29. De werkwijze volgens een van de conclusies 16-28, waarbij ten minste één van het eerste transportoppervlak (10) en het tweede transportoppervlak (30) is voorzien van perforaties, en waarbij een vacuüm wordt aangelegd op de perforaties teneinde producten (4) tegen genoemd ten minste ene transportoppervlak te zuigen.

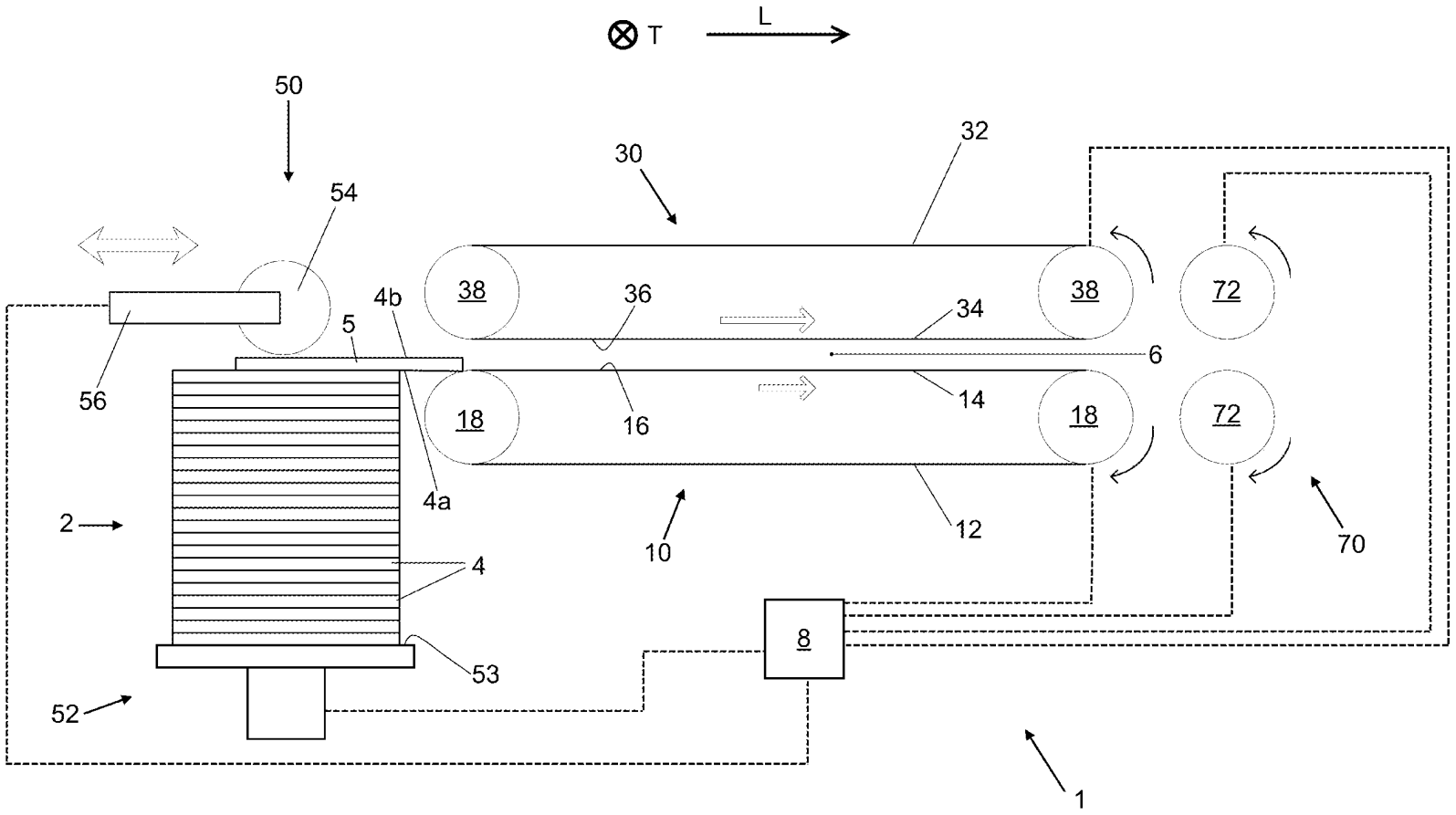

T
L
50
54
30
32
38
36
34
38
72
4b
5
6
56
18
16
14
18
72
4a
2
10
12
70
4
8
53
52
1

FIG. 1

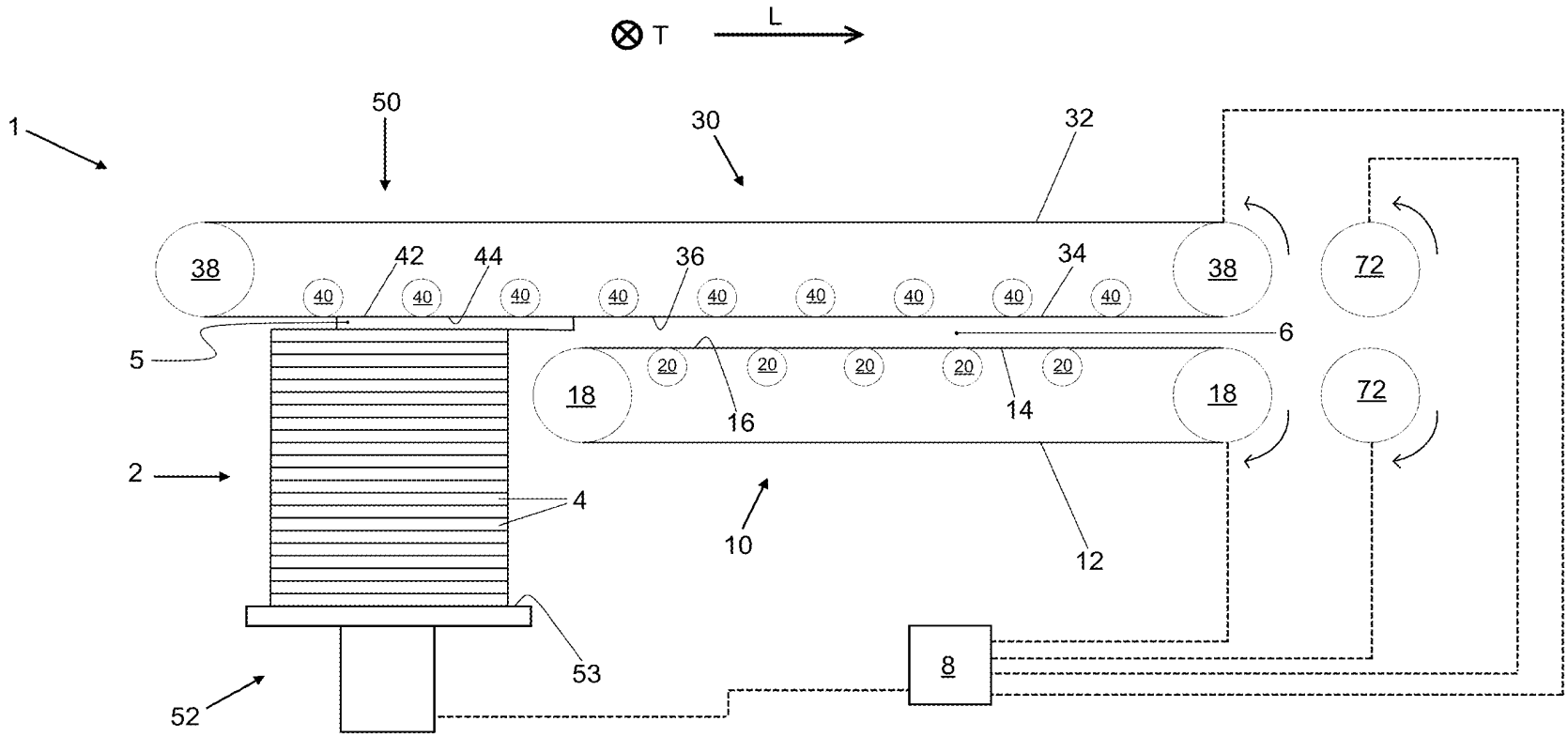

T
L
1
50
30
32
38
42
44
36
34
38
72
40
40
40
40
40
40
40
40
40
5
6
20
20
20
20
20
18
16
14
18
72
2
4
10
12
53
8
52

FIG. 2

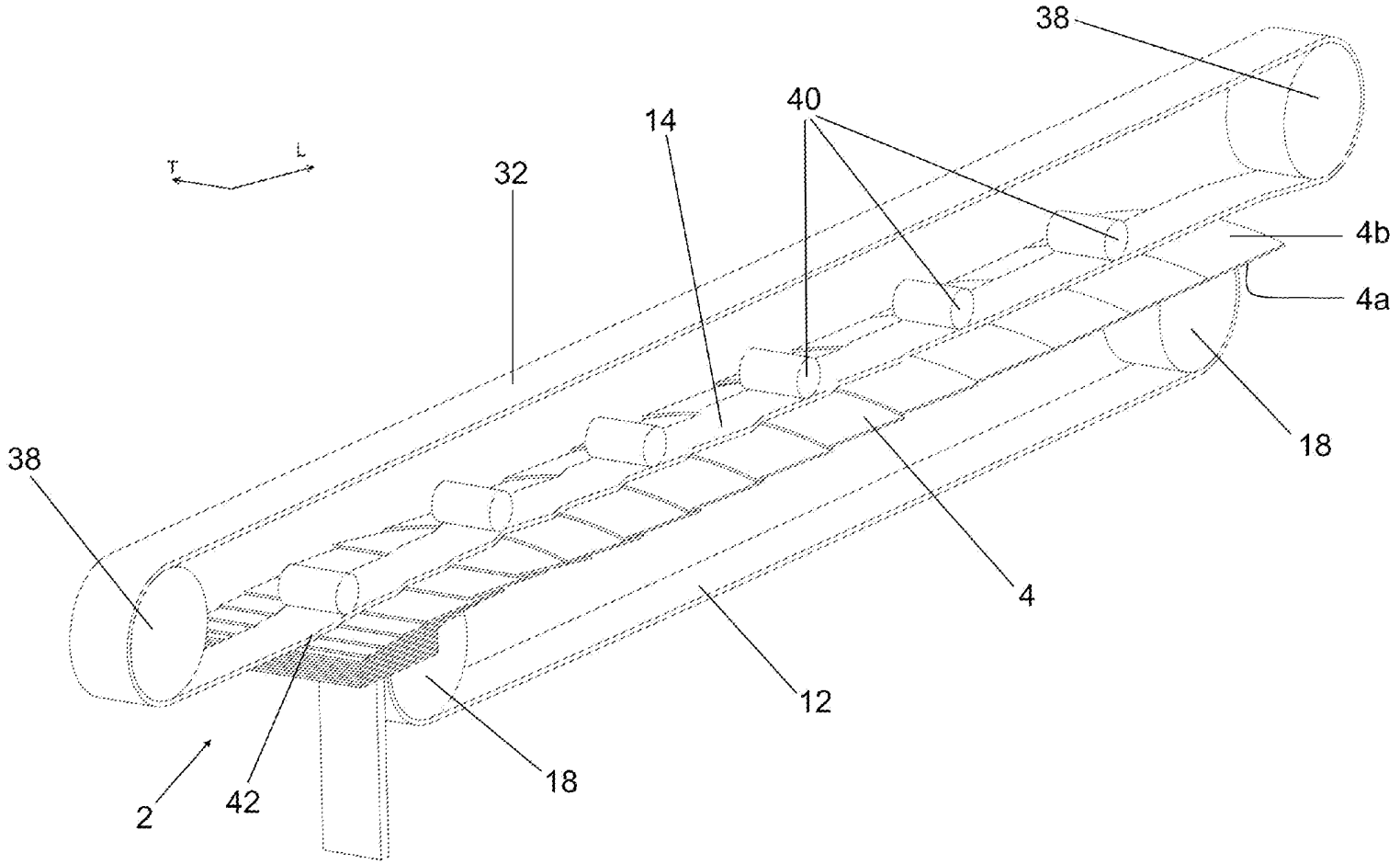
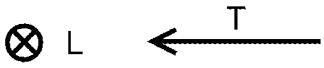


FIG. 3



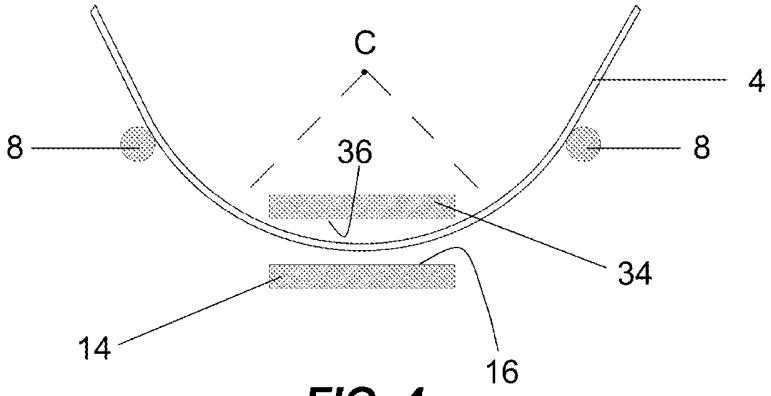


FIG. 4

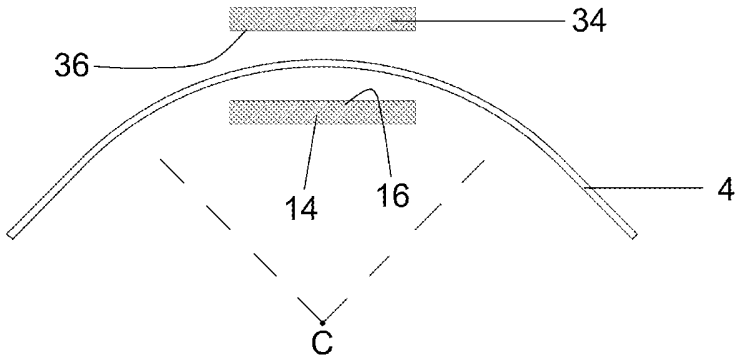


FIG. 5

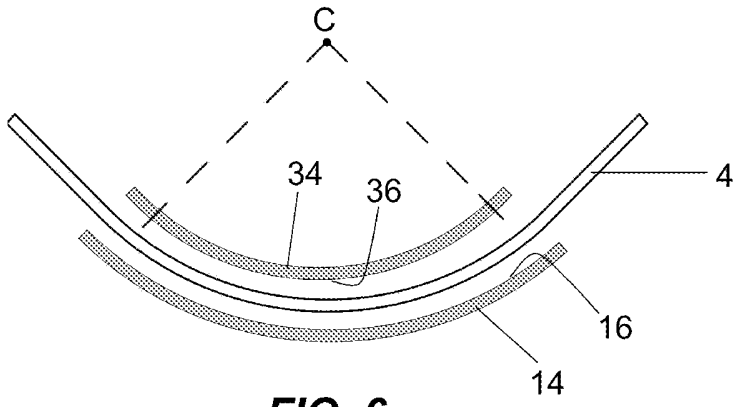


FIG. 6

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	P88450NLOO
Nederlands aanvraag nr. **2003117**	Indieningsdatum **02-07-2009**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **Buhrs-Zaandam B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **26-11-2009**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN 53276**

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

Volgens de internationale classificatie (IPC)

B65H5/02

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen	
IPC 8	**B65H**	**B70C**

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

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

IV. ☐ **GEBREK AAN EENHEID VAN UITVINDING** (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 2003117

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B65H5/02

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

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
B65H B07C

Onderzochte andere documentatie dan de mimimum 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.
X	US 2009/160118 A1 (PURCELL DAVID W [US] ET AL) 25 juni 2009 (2009-06-25)	1-3, 12-17, 25-28
A	het gehele document	4-11, 18-24,29
A	DE 103 50 352 B3 (SIEMENS AG [DE]) 13 januari 2005 (2005-01-13) alinea [0008] - alinea [0029]; figuren 1,2	1-29
A	EP 0 507 661 A (POSTE ETABLISSEMENT AUTONOME D [FR]) 7 oktober 1992 (1992-10-07) kolom 4, regel 34 - regel 57; figuren 1-8	1-29
A	GB 1 034 056 A (T & T VICARS LTD) 29 juni 1966 (1966-06-29) het gehele document	1,16

-/--

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

[X] Leden van dezelfde octrooifamilie 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 octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), 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 voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, 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 octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
18 Februari 2010	
Naam en adres van de instantie	**De bevoegde ambtenaar**
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Henningsen, Ole

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 2003117

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
E	WO 2009/082622 A (PITNEY BOWES INC [US]; PURCELL DAVID W [US]; DACUNHA STEVEN J [US]; ST) 2 juli 2009 (2009-07-02) het gehele document ----	1-3, 12-17, 25-28

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 2003117

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 2009160118 A1	25-06-2009	GEEN	
DE 10350352 B3	13-01-2005	CN 1874943 A	06-12-2006
		EP 1678064 A1	12-07-2006
		WO 2005051816 A1	09-06-2005
		JP 2007533567 T	22-11-2007
		KR 20060111477 A	27-10-2006
		US 2007085259 A1	19-04-2007
EP 0507661 A	07-10-1992	DE 69200177 D1	14-07-1994
		DE 69200177 T2	08-12-1994
		FR 2674834 A1	09-10-1992
GB 1034056 A	29-06-1966	BE 661969 A	02-08-1965
		ES 311548 A1	16-06-1965
		NL 6504311 A	08-10-1965
WO 2009082622 A	02-07-2009	US 2010013142 A1	21-01-2010

OCTROOICENTRUM NEDERLAND

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN53276	02.07.2009		NL2003117

International Patent Classification (IPC)
INV. B65H5/02

Applicant
Buhrs-Zaandam B.V. te Zaandam

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
	Henningsen, Ole

Application number

WRITTEN OPINION

NL2003117

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	3-11,14,18-24,29
	No:	Claims	1,2,12,13,15-17,25-28
Inventive step	Yes:	Claims	4-11,18-24
	No:	Claims	1-3,12-17,25-29
Industrial applicability	Yes:	Claims	1-29
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VI Certain documents cited

☒ Certain published documents

see the Search Report

☐ Non-written disclosures

Re Item V

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

Reference is made to the following documents:

D1: US 2009/160118 A1 (PURCELL DAVID W [US] ET AL) 25 June 2009

The present application does not meet the criteria of patentability, because the subject-matter of the independent claims 1 and 16 is not new.

The document D1 discloses (the references in parentheses applying to this document):
A product separator (16) for separating substantially flat products (paragraph 11, 12) such as, for example, documents, comprising:
— a first transport surface (36) and a second transport surface (34),
whereby the first and second transport surfaces extend substantially parallel and opposite to each other (fig. 2), defining a product travel path having a path direction (P) between them, and whereby the first transport surface (36) and the second transport surface (34) are moveable in the path direction along the product travel path at different speeds (paragraph 36); and
— a product supply system, configured to insert products in an overlapping manner into between the first transport surface and the second transport surface at an upstream end of the product travel path (paragraph 23-25), so as to allow the transport surfaces to convey the products downstream along the product travel path, and to thereby gradually decrease an overlap between successive products (paragraph 43-46).

Hence, all the features specified in claim 1 are known from the document D1.

For similar reasons the method specified in claim 16 is not new either.

Further, the additional features of the dependent claim 2, 12, 13, 15, 17, and 25 to 28 are known from D1 as well, see in particular paragraph 32 to 46 concerning claims 2, 12, 15, 17 and 25 to 28 and paragraph 48 concerning claim 13.

Further more the dependent claim 3, 14 and 29 respectively do not contain any features which, in combination with the features of any claim to which they refer, could lead to subject-matter involving an inventive step, because the length of the travel path specified in claim 3 and the choice of a vacuum belt conveyers referred to in claims 14

and 29 are obvious design possibilities.

The additional features of dependent claims 4 to 11, 18 to 24 are neither known from, nor rendered obvious by, the available prior art.

Re Item VI

Certain documents cited

Certain published documents

Application No Patent No	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date *(valid claim)* *(day/month/year)*
WO2009/082622	02.07.2009	10.12. 2008	21.12.2007 26.09.2008