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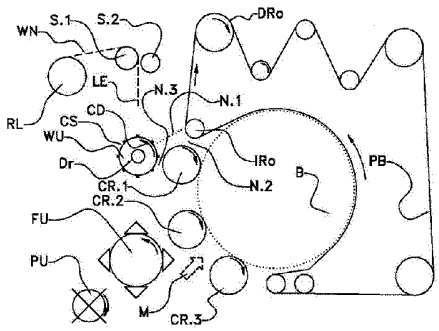
(54) **Wrapping Material Feeding Device and Method with Cleaning Function.**

(57) The invention refers to a feeding apparatus and a feeding method. The apparatus and the method feed wrapping material (WN) towards an inlet (N.1, N.2) of a chamber. An object (B) in this chamber is to be wrapped with wrapping material (WN). A wrapping material supply unit (S.1, S.2) supplies wrapping material (WN) from a reservoir (RL) towards the inlet (N.1, N.2) such that a loose end area (LE) is formed. A drive (Dr, VB) drives a conveying surface (CS) of a wrapping material feeding unit (WU) either in a feeding direction (FD) or in a cleaning direction (CD). If conveyed in the feeding direction (FD) the conveying surface (CS) conveys the loose end area (LE) towards the inlet (N1, N.2). If conveyed in the cleaning direction (CD) the conveying surface (CS) cleans the inlet (N1, N.2) from debris.



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Wrapping Material Feeding Device and Method with Cleaning Function

BACKGROUND

The invention refers to a feeding apparatus and feeding method for feeding wrapping material towards an inlet of a chamber. An object in this chamber has to be wrapped with this wrapping material.

The problem solved by the invention occurs in particular in a round baler for agricultural material which picks up material from the ground, forms a cylindrical bale from this material, wraps the bale with a net made of twine or yarn, and ejects the wrapped bale.

DE 3617155 A1 discloses a baler which creates a round bale (Erntegutballen 8) and wraps the created bale with a wrapping element (Hüllenelement 13). The bale 8 is created by endless belts. Fig. 2 shows one endless belt (Wickelelement 5) which is guided around several rollers 4 and a drive roller (Antriebswalze 9) which is in contact with the bale. A loose end of the wrapping element 13 (dotted lines in Fig. 2 to Fig. 5) is grasped by a clamping device (Klemmeinrichtung 26) mounted on an activation lever (Betätigungshebel 25), cf. Fig. 2 to Fig. 6, and is conveyed and guided by a feeding mechanism (Zuführmechanismus 15). The wrapping element is guided by a guide roller (Führungswalze 35) and is clamped between a clamping strip (Klemmleiste 29) with a rubber plate (Gummiplatte 34), cf. Fig. 6. The cutting device (Schneidvorrichtung 16) has a cutting knife (Trennmesser 44) which can be rotated from a parking position (Ruhestellung A, Fig. 3) into a cutting position (Schnittstellung B, Fig. 2). In order to wrap a bale, a lever apparatus (Gestänge 20) with the clamping device 26 is pivoted from a parking position (obere Ausgangsstellung C) into an operating position (angeschwenkte Lage E, Fig. 4) and pulls wrapping material 13 with a defined length (Vorlauflänge) from a reservoir (Vorratsrolle 14). The cutting device 16 is transferred into its parking position A. The loose end 13a of the wrapping element 13 lies on the fed material 54 or on a holding-down device (Niederhalter 55). Afterwards the loose end 13a is taken by the surface 12 of a so-called starting roller (Starterwalze 11). This start roller 11 is not in contact with a bale and conveys the wrapping element 13 through a nip (Spalt 37) between the starter roller 11 and the drive roller 9. The lever apparatus 20 remains in the operating position E of Fig. 4 until the defined length of the wrapping material 13 is pulled off.

In DE 102004023701 A1 a bale is created in a bale chamber (Ballenkammer 3). A bale creating apparatus (Ballenformeinrichtung 2) is conveyed by means of a driven roller (Antriebsrolle 7). The bale (Erntegutballen 29) is further rotated by two rollers 11, which are in contact with the bale 29, cf. Fig. 2. Wrapping material 28 is pulled out of a reservoir (Vorratsspeicher 27), cf. Fig. 2, and is guided around rollers (Umlenkrollen 50, 48, 47) and a guiding plate (Führungsplatte 37). The roller 48 is mounted on a lever arm (Hebelarm 49). This lever arm 49 is mounted on a further lever arm 51 and is rotated by a positioning apparatus (Stellmittel 31). A cutting device with a cutting arm (Schwenkarm 34) and parts 39, 41 is also connected the positioning apparatus 31. A conveying element (Förderelement 38) takes the loose end of the wrapping material 28 and shifts it towards one roller 11. The feeding element 38 has the form of a roller with cross-conveying edges (Querförderkanten 38.1). The wrapper material 28 is grasped by a roller 11 and the rotating bale 29, cf. Fig. 1. After the bale 29 is entirely wrapped, the positioning device 31 rotates the cutting device 34, 39, 41.

In DE 102004023758 B4 a baler 1 is described which creates a bale in a pressing chamber (Ballenkammer 3). A wrapping device (Wickelvorrichtung 26) wraps the bale (Erntegutballen 29). The wrapping material 28 is guided around the deflection means (Umlenkungen 50, 48, 47), cf. Fig. 2 and Fig. 3. An actor (Stellmittel 31) moves on its free side 32 a lever arrangement (Hebelanordnung 33) with a pivot arm (Schwenkarm 34), cf. Fig. 2 and Fig. 3. A guiding plate (Führungsplatte 37) can be pivoted with respect to the pivot arm 34. A cutting device (Teile 39, 41 einer Schneidvorrichtung) at the pivot arm 34 and a knife (Schneidestange 42) cut the wrapping material 28. The wrapping material 28 is further guided by means of a guiding element (Förderelement 38) having the shape of a roller. This guiding roller 38 guides the wrapping material 28 towards the inlet (Einlass 5) to the chamber 3. This inlet 5 extends between two parallel rollers 11. The guiding roller 38 has cross protrusions (Querförderkanten 38.1). The deflection means 50, 48, 47 act as a buffer storage for the wrapping material 28 and prevents that too much wrapping material 28 is pulled from the reservoir (Vorratsspeicher 27).

In WO 2011018455 A1 a round baler 10 is described. The bale forming chamber is defined by an apron assembly 28 with conveying units (slats 33) which convey the bale in the chamber and make the bale rotating in a first direction. A floor roller 26 also conveys the bale in the first direction. Material is injected into the

chamber through a traverse inlet 25. Wrapping material n is supplied from a reservoir 23 and is fed through the inlet 25 into the chamber. A further roll 27 called stripper roller extends along the width of the chamber rotates in a second direction which is opposite to the first direction in which the bale is rotated. This stripper roller 27 guides wrapping material n towards the bale in the chamber, cf. Fig. 7, and helps to inject the wrapping material n through a nip above the stripper roller 27.

In WO 2011018455 A1 the problem is addressed that wrapping material n may be attached to the stripper roller 27 and wraps the stripper roller 27 and not the bale in the chamber. To solve this problem the stripper roller 27 is divided into several segments 100 along the rotational axis of the stripper roller 27 , cf. Fig. 2 and Fig. 3. Stationary plates 103 are mounted between these segments 100. Every plate 103 has a cam-like protrusion 105.

DE 3617155 A1, DE 102004023701 A1, DE 102004023758 B4, and WO 2011018455 A1 do not address at all the problem that material from the bale can become an obstacle which prevents wrapping material from being conveyed towards the surface of the bale.

The Welger patent DE 10243294 B4 describes a baler for producing round bales. The bale is created in a pressing chamber (Pressraum 5) by means of a conveying and pressing belt (Förder- und Pressriemen 9) and several pressing rollers 6,7, 8 being in contact with material guided into the pressing chamber 5. Material to be pressed is supplied by a pick-up unit (Aufsammler 15) and a feeding unit (Förder-/ Schneidrotor 16) through a feeding aperture (Zuführöffnung 14) into the chamber 5. The bale is wrapped with wrapping material (Umhüllmaterial 22) which is stored in a reservoir (Vorratsbehälter 19) containing a wrapping material role (Umhüllmaterialrolle 20). Two pulling rollers (Vorzugswalzen 21) pull the wrapping material 22 from the role 20. A loose end (freies Vorlaufende 26) of the wrapping material 22 sags. A feeding roller (Zuführwalze 25) shifts the sagging wrapping material toward the pressing roller 8. The loose end 26 is guided through a nip (Einführspalt 23) between the pressing roller 8 and a roller 24 around which the belt 9 is guided. The feeding roller 25 can be shifted or pivoted between a parking position 27 which is shown in dotted lines and an operating position 29 shown in continuous lines. By shifting or pivoting the feeding roller 25 into the parking position 27 the nip 23 between the feeding roller 25 and the driven roller 8 is enlarged. Material in the nip 23 drops into the feeding unit. In the embodiment of Fig. 2 the pulling roller 21

and the feeding roller 25 (in Fig. 2: roller 30) are integrated into an assembly (Baueinheit 32) which can be rotated around the axis 33. Fig. 3 shows an embodiment where this assembly unit is shifted and not rotated.

The invention described in DE 10243294 B4 solves the problem of removing debris from an injection nip. This baler requires a feeding roller which can be rotated as well as shifted laterally and perpendicular to its rotation axis.

PROBLEM, SOLUTION

Therefore it is an object of the invention to provide a feeding apparatus and a feeding method for feeding wrapping material towards an inlet of a chamber in which an object is to be wrapped with wrapping material wherein a wrapping material feeding unit succeeds in conveying the wrapping material towards the inlet even if debris may have polluted the inlet and wherein the need of enlarging and narrowing a nip between conveying elements is avoided.

The problem is solved by a feeding apparatus with the features of claim 1 and a feeding method with the features of claim 0. Preferred embodiments are specified in the dependent claims.

Wrapping material is fed towards an inlet of a chamber. An object in this chamber is to be wrapped automatically with this wrapping material.

The feeding apparatus according to the invention comprises

- a wrapping material supply unit,
- a wrapping material feeding unit with a conveying surface and
- a drive.

The wrapping material supply unit supplies wrapping material from a reservoir. A loose end area of the supplied wrapping material is formed during operation of the wrapping material supply unit. This loose end area is to be injected through an inlet into the chamber.

The wrapping material feeding unit has a conveying surface. This conveying surface is moved in a feeding direction and touches the loose end area as soon as the loose end area is long enough. Being touched and conveyed causes the loose end area of wrapping material being conveyed towards the inlet as the loose end area is in contact with the conveying surface.

The same conveying surface is moved in a cleaning direction before being conveyed in the feeding direction. This cleaning direction is different from the

feeding direction. The conveying surface moved in the cleaning direction conveys and transports material, e.g. debris, away from the inlet such that this material cannot cause a blockade of the feeding apparatus.

The drive effects the movement of the conveying surface in the cleaning direction and afterwards in the feeding direction.

ADVANTAGES

One basic idea of the invention is to clean actively and automatically the inlet and use the wrapping material feeding unit additionally for this active cleaning. No manual clearing is required.

The feeding apparatus and the feeding method according to the invention actively remove a pollution with debris which otherwise may inhibit the wrapping material from being conveyed through the inlet into the chamber. Therefore the invention prevents a blockade of a wrapping apparatus for wrapping an object in the chamber. The invention therefore ensures that the object in the chamber is wrapped even if the wrapping material has a very low stiffness, e.g. because the wrapping material is made of twine or yarn or has the form of a net. The invention allows to feed wrapping material in a dirty environment, e.g. on an agricultural field.

The inlet for injecting wrapping material into the chamber often has the form of a narrow nip. Often only a narrow nip prevents an object in the chamber from being pressed out of the chamber, in particular if the object is a bale of agricultural material. A broader nip can therefore often not be implemented. Or the available space or the properties of the wrapping material require providing a narrow nip. Such a narrow nip is in danger of being polluted by debris. Thanks to the invention this narrow nip is actively cleaned.

An apparatus and a method according to the invention neither requires a drive nor a guide unit for enlarging and narrowing such a nip between the wrapping material feeding unit and a wrapping material injection unit for injecting the loose end area through the inlet into the chamber. Thanks to the invention, this nip is actively cleaned by conveying the conveying surface in the cleaning direction. The nip needs not to be enlarged for cleaning purposes. Therefore the invention saves space which would otherwise be required by the wrapping material feeding unit for enlarging the nip. In addition the invention saves mechanical and/or hydraulic parts for enlarging

the nip. As no conveying unit needs to be shifted laterally, the bearing for the wrapping material feeding unit can be implemented in an easy way.

In contrast to cleaning the nip by enlarging it the invention also does not rely on the force of gravity for removing debris from the inlet. A rigid object blocking the nip may be broader than the nip even after enlarging the nip. Thanks to the invention also such a rigid object is conveyed away from the inlet.

The invention also does not require a pushing unit, in particular not a plunger, which pushes material out of this nip and by this removes debris. In contrast to a pusher element which necessarily oscillates the invention enables implementing a continuous cleaning procedure. A pusher element may damage the wrapping material or the object to be wrapped. To avoid such an undesired effect, the operation of a pusher element must be monitored. Thanks to the invention such a monitoring is not required. The invention also does not require a blower or a sucking unit for cleaning the inlet.

Thanks to the invention no additional cleaning unit is required for removing pollution and for cleaning the inlet, even if the inlet has the form of a narrow nip. The pollution is removed by the same conveying surface which also conveys the wrapping material towards the inlet. The invention therefore saves a further unit of the feeding apparatus only used for cleaning purposes. As the same wrapping material feeding unit is used for feeding and for permanent cleaning, no sensor for detecting debris in the inlet and no activation unit for such a specific unit are required. An optical sensor has the big disadvantage that the sensor may also be polluted and can no longer work properly.

Thanks to the invention no specific cleaning step before starting the wrapping procedure is required. Such a cleaning step requires time. In contrast to a specific cleaning step the cleaning performed by the wrapping material feeding unit may be performed in parallel with other operations, e.g. in parallel to forming a bale in the chamber.

The invention can in general easily be integrated into an existing feeding apparatus and therefore into an existing wrapping apparatus with a feeding apparatus. An existing feeding apparatus often has a wrapping material feeding unit comprehending a conveying surface and a controlled drive for this conveying surface. This conveying surface is adapted for conveying the wrapping material in the feeding direction towards the inlet. To implement the invention the existing wrapping

material feeding unit only needs to be amended such that the existing conveying surface can additionally be conveyed in the cleaning direction. This only requires amending the drive and a control unit for this drive. Besides a part for changing the conveying direction of the drive no additional mechanical part is needed. No further space in the feeding apparatus is required for implementing the invention.

The feeding apparatus and the feeding method according to the invention may be used in a wrapping apparatus with a chamber. An object to be wrapped is either created in or transported to this chamber. Wrapping material is supplied and injected into this chamber by means of the feeding apparatus and the feeding method according to the invention.

PREFERRED EMBODIMENTS

In a preferred embodiment the drive for the conveying surface is connected with the wrapping material supply unit in a mechanical or electronic manner, e.g. by means of a mechanical switch or an electronic control unit controlling both units. This wrapping material supply unit is operated either in an operating mode or in a waiting mode. The control unit switches the wrapping material supply unit into the operating mode if an object in the chamber is to be wrapped. The wrapping material supply unit supplies wrapping material. Switching the wrapping material supply unit into the operating mode additionally causes the conveying surface to be conveyed in the feeding direction.

The wrapping material supply unit is switched into the waiting mode if an object is entirely wrapped or if the wrapping material is supplied by a further means, e. g. pulled by the rotating object itself. The conveying surface is permanently or at least temporally conveyed in the cleaning direction if the wrapping material supply unit is operated in the waiting mode. As no wrapping material has to be injected in the waiting mode, this idler lime is used for cleaning the inlet. This embodiment further saves time as no additional cleaning step is required.

This embodiment enables to convey the conveying surface in the cleaning direction as long as possible. This effect increases the cleaning duration and therefore further reduces the risk that debris in the inlet leads to a jam or blockade of the feeding apparatus.

In one embodiment a cleaning trigger signal is automatically generated. This cleaning trigger signal triggers the event that the conveying surface of the

wrapping material feeding unit is conveyed in the cleaning direction. The cleaning trigger signal is triggered as soon as or after the wrapping material has reached the surface of the object in the chamber and on the other hand so late that the conveying surface being moved in the cleaning direction cannot remove the wrapping material from the object. Generating the cleaning trigger signal too early could yield to an interference with the wrapping procedure in an undesired manner. The cleaning trigger signal is generated before or together with completing the wrapping procedure. Preferably the cleaning trigger signal is generated as early as possible, i.e. as soon as the conveying surface is no longer required for conveying the loose end area. This is the case as soon as the wrapping material is grasped by the object to be wrapped or by a further unit.

One embodiment to generate the cleaning trigger signal is as follows: After having completed the wrapping procedure an actuator cuts off the wrapping element from the further wrapping material. A time period is given. The cleaning trigger signal is generated after the actuator has cut off the further wrapping material and the preset time period has passed. This embodiment does not require a further sensor.

In one embodiment a wrapping trigger signal is generated. This wrapping trigger signal triggers the procedure for wrapping the object and in particular sets the wrapping material supply unit into the operating mode. In addition the drive is triggered to convey the conveying surface in the feeding direction. Preferably the conveying surface is conveyed in the feeding direction as long as no wrapping trigger signal is generated.

According to the invention the cleaning direction differs from the feeding direction. These two directions may be anti-parallel, i.e. the cleaning direction is opposite to the feeding direction. It is also possible that there is an angle between the cleaning direction and the feeding direction, e. g. a right angle.

In one embodiment the wrapping material feeding unit moves the conveying surface along two endless loops. If moved in the feeding direction, the conveying surface describes a first endless loop. If moved in the cleaning direction, the conveying surface describes a second endless loop. This embodiment enables a continuous movement of the conveying surface which is only interrupted for changing the conveying direction. Such a continuous movement stresses the wrapping material feeding unit less than an oscillating movement.

The wrapping material feeding unit of this embodiment can be implemented by means of a roller, a rotor, a cam, an endless belt or an endless chain, e. g. The conveying surface is the outer, circumferential surface of the wrapping material feeding unit.

Preferably the conveying effect is improved by protrusions mounted onto the conveying surface. Such a protrusion may have the shape of a traversal rip along the entire width of the conveying surface. The protrusion can be rigid or flexible. A flexible protrusion may engage into a nip to be cleaned. A rigid as well as a flexible protrusion can be mounted on the conveying surface.

Preferably the feeding apparatus is arranged such that there is always a gap between the conveying surface and the wrapping material when the conveying surface is moved in the cleaning direction. Or there is a gap between the conveying surface conveyed in the cleaning direction and the wrapping material at least as long as the wrapping procedure lasts. These embodiments prevent an undesired interaction between the wrapping material feeding unit conveyed in a cleaning operation and the wrapping material supply unit. Such an interaction may lead to a blockage or jam or may damage the wrapping material.

Preferably there is also a gap between the conveying surface and the chamber such that the wrapping material feeding unit does not contact an object in the chamber. Preferably a wrapping material injection unit separated from the conveying surface injects the wrapping material into the chamber such that the wrapping material comes into contact with the surface of the object in the chamber. These embodiments further reduce the risk that the wrapping material feeding unit causes damage to the wrapping material.

Preferably a wrapping material injection unit injects the loose end area through the inlet into the chamber. This unit facilitates to inject a flexible wrapping material. A gap between this injection unit and the wrapping material feeding unit occurs always or at least as long as the conveying surface is conveyed in the cleaning direction. This distance inhibits an undesired interaction between the injection unit and the feeding unit conveyed in the cleaning direction.

In one embodiment the chamber with the inlet is used for wrapping as well as for forming a bale of material, in particular a bale of agricultural material. The chamber is therefore a baling chamber as well as a wrapping chamber. This embodiment enables to wrap a bale which would fall apart if being transported out of

the chamber before being wrapped. The baling chamber may be of fixed size or may be increased during forming a bale (variable chamber). In an alternate embodiment the object to be wrapped is formed outside the chamber of the wrapping apparatus and is conveyed into the chamber for being wrapped.

The object may be a bale created from agricultural material, e. g. hay, straw, silage, or from waste or recycling material. The object may also be a rigid body which has to be wrapped. The wrapping material may in particular be a net created from a thread or a sheet.

DESCRIPTION OF DRAWINGS

The drawings show an embodiment of the invention which will be described in greater detail in the following.

- Fig. 1 schematically shows the round-chamber baler of the embodiment during the phase of creating a bale;
- Fig. 2 schematically shows the round-chamber baler of Fig. 1 after having created the entire bale and before wrapping this bale;
- Fig. 3 schematically shows the round-chamber baler of Fig. 2 after having wrapped the bale;
- Fig. 4 shows one embodiment for driving the wrapping unit into two directions.

DESCRIPTION OF EMBODIMENT

In the embodiment the invention is used in a round baler for creating cylindrical bales of agricultural material (hay, straw, silage ...) by means of a variable round chamber.

The baler of the embodiment picks up material from the ground by means of a pick-up unit and conveys it with a material feeding unit. The picked-up material is transferred through a material inlet into a pressing chamber. The circumferential surface of the pressing chamber is formed by at least one endless belt and/or a sequence of conveying rollers. Therefore the material is surrounded by these conveying belts or rollers. This endless belt or these rollers are driven in one direction and rotates and presses the material such that the pressed material forms a growing bale consisting of material. The chamber of the embodiment has a variable size and increases during the process of creating the bale.

Fig. 1 schematically shows a baler which creates a bale B in a bale forming chamber. This chamber has an approximately cylindrical shape and two side walls (not shown) and is growing as the bale B is created. The symmetrical axis of the chamber is perpendicular to the drawing plane of Fig. 1. The chamber is formed by at least one pressure belt PB which is guided around a set of rollers. The chamber may be formed by several parallel pressure belts PB. Fig. 1 shows a driven roller DRo, an idler roller IRo, and several other rollers. Some rollers press the pressure belt PB against the bale B in the chamber, e.g. by means of hydraulic cylinders (not shown).

A pick-up unit PU with tines picks up material from the ground. A material feeding unit FU with several feeding rotors conveys the material in the direction of the arrow M towards a material inlet of the chamber where the chamber is surrounded and formed by the pressing belt PB and other belts. The material in the chamber is conveyed by the pressing belts PB as well as by several conveying rollers CR.1, CR.2, CR.3 in the anti-clockwise direction. Therefore a rotating and growing bale is created in the chamber. The rotation axis of the bale is perpendicular to the drawing plane.

If the created bale B in the chamber has reached the required size or pressure or weight or if another terminating condition is fulfilled, the bale B has to be wrapped by surrounding the bale B with a wrapping element (a pre-manufactured grid or net of twine, e. g.) before being ejected out of the pressing chamber. The wrapping material has a very low stiffness as it is a net of thin flexible material. The bale B must be kept in the chamber during the wrapping procedure as the bale B outside the chamber and without a wrapping would fall apart.

The term “wrapping element” denotes the element entirely surrounding and wrapping the bale B whereas the term “wrapping material” is the material used for creating the wrapping element.

In the embodiment sketched by Fig. 2 and Fig. 3 the baler is stopped such that no further material is injected into the chamber. The baler is stopped as soon as the bale B in the chamber is completely created. In one embodiment the pick-up unit PU and the material feeding unit FU are also stopped. A wrapping material supply unit pulls wrapping material from a reservoir, e. g. from a reel RL, by means of pulling rollers or two spring-mounted levers (arranged like a beak of a duck), e. g. After having pulling the wrapping material, a loose end area is formed

downwards from the wrapping material supply unit. A loose end area of the wrapping material sags by force of gravity and is increased while the wrapping material supply unit pulls further wrapping material from the reservoir.

Fig. 1 to Fig. 3 show a reel RL with wrapping material WN in the form of a net. The rotational axis of the reel RL is perpendicular to the drawing plane of Fig. 1 to Fig. 3. The wrapping material WN is held between two driven rollers S.1, S.2. In the situation of Fig. 1, the wrapping material supply unit is in a waiting mode and the driven rollers S.1, S.2 are stopped, and a loose end area LE of the wrapping material WN sags down. The loose end area LE is that part of the wrapping material which is already pulled from the reservoir RL and is downwards from the two rollers S.1, S.2 of the wrapping material supply unit.

As soon as the bale B is completely created, a wrapping trigger signal is automatically created. This wrapping trigger signal transfers the wrapping material supply unit S.1, S.2 into an operating mode in which both rollers S.1, S.2 rotates in different directions and clamp and pull wrapping material from the reel RL.

The two driven rollers S.1, S.2 pull at the loose end area LE which causes further wrapping material WN to be pulled from the rotating reel RL. The front end of the increasing loose end area LE reaches the conveying surface CS of a wrapping material feeding unit WU. In the embodiment the wrapping material feeding unit WU comprises a role which is mounted on a shaft or axis Dr. The circumferential outer surface of this roller forms the conveying surface CS. The shaft Dr may be driven and imply a torque onto the material feeding unit WU. It is also possible that Dr is just an axis carrying the material feeding unit WU rotatable.

The conveying surface CS is moved in a feeding direction FD which is the clockwise direction in the example of Fig. 2. The loose end area LE lies on the conveying surface CS such that the conveying surface CS shifts and / or pulls the loose end area LE. The loose end area LE is conveyed through the nip N.1 between the rollers WU and IRo and afterwards through the nip N.2 between the rollers IRo and CR.1 and reaches the surface of the bale B.

In the situation shown by Fig. 2 the front end of the loose end area LE has reached a contact surface between the bale B and the conveying roller CR.1. The conveying roller CR.1 presses the loose end area LE against the surface of the bale B. The conveying roller CR.1 is part of a wrapping material injection unit WU.

In the figures the wrapping material feeding unit WU comprises a rotating part having the form of a driven roller. The wrapping material feeding unit WU can also comprise an endless belt or a chain. In all cases the conveying surface describes an endless loop while the wrapping material feeding unit WU is moved. This endless loop enables a continuous operation of the wrapping material feeding unit whereas a pusher element necessarily oscillates and therefore works discontinuously.

Preferably the conveying surface CS has some protrusions, e.g. rigid ribs or flexible flaps, for taking and grasping the loose end area LE. These protrusions are sketched in the figures. In the figures the protrusions are rigid rips. It is also possible to mount flexible flaps at the conveying surface CS such that a flexible flap engages into the nip N.1 or touches the surface of the roller CR.1.

The distance between the two rollers WU and CR.1 (nip N.3) is so small that the loose end area LE cannot drop into the gap between these two rollers but either drops onto the roller WU or in the roller CR.1 both having protrusions.

A gap (nip N.1) between the wrapping material feeding unit WU and the chamber with the bale B occurs during the entire process of creating and wrapping the bale B. Therefore the wrapping material feeding unit WU does not come in contact with the bale B and does not become dirtied or moistened by the rotating bale B. There is also a gap (nip N.3) between the wrapping material feeding unit WU – or at least the rigid parts of the unit WU - and the conveying roller CR.1 such that these two rollers can be conveyed independently from each other and do not interfere with each other.

The bale B is rotated all the time by the pressure belt PB, the conveying rollers SR.1, SR.2, CR.3 and other elements. The rotating bale B grasps the loose end area LE of the wrapping material WN after the foremost part of the loose end area LE is injected through the nip N.2 and is pressed against the surface of the rotating bale B. The rotating bale B pulls further wrapping material WN from the reel RL. The two rollers S.1, S.2 are set into a free rolling mode and are rotated as idler rollers by the pulled wrapping material WN. The bale B is rotated several times such that a required number of layers of wrapping material WN is applied onto the bale B. After having applied the required number of layers, a cutting unit CU cuts off the wrapping material WN wrapped around the bale B. A complete wrapping element has put around the bale B and the wrapping procedure is completed. The wrapped bale B

is ejected out of the chamber. Fig. 3 shows the baler after having wrapped the bale B. The bale B is entirely wrapped into a wrapping element WE with several layers.

The invention solves the problem that debris from the rotating bale B or from a conveying unit may be injected into the nip N.1 or into the nip N.2. Injecting debris may be caused by the frictional force exerted onto the rotating bale or by friction force effectuated by the endless belt PB or the conveying rollers CR.1, CR.2, CR.3. This debris may be an obstacle which inhibits the loose end area LE of the wrapping material WN from being injected into the chamber. In this case the loose end area LE may not reach the rotating bale B but comes into the material feeding unit FU. This may cause a blockade of the baler. To avoid such a blockade, the nips N.1, N.2 are actively cleaned in advance, i.e. before starting the wrapping procedure. According to the invention no time has to be spent for a specific cleaning step between terminating the creation and wrapping the bale.

According to the invention the nips N.1, N.2 are actively cleaned by the wrapping material feeding unit WU itself and not by a separate cleaning unit. The conveying surface CS is conveyed continuously in a cleaning direction CD. This cleaning direction CD is different from the feeding direction FD. In the figures the cleaning direction CD is antiparallel to the feeding direction FD. In Fig. 1 and Fig. 3 the conveying surface CS is conveyed in the cleaning direction CD (anti-clockwise), and in Fig. 2 the conveying surface CS is conveyed in the feeding direction FD (clockwise). This is achieved by rotating the shaft or axis Dr in the anti-clockwise direction (cleaning direction CD) and in the clockwise direction (feeding direction FD), resp.

If the conveying surface CS is conveyed in the cleaning direction CD, it conveys debris out of the nips N1, N.2. This debris drops onto the material feeding unit FU and is later conveyed back into the chamber. The gap N.3 between the conveying surface CS and the conveying roller CR.1 enables to rotate both rollers in different directions or in the same direction without interference. The horizontal offset between the conveying surface CS and the roller CR.1 is large enough such that debris conveyed by the conveying surface CS drops onto the feeding unit FU and is not conveyed back to the nip N.2 by the conveying roller CR.1. According to the embodiment the conveying surface CS is rotated again in the cleaning direction CD as soon as the bale B is entirely wrapped. This situation is shown in Fig. 3. In the situation shown by Fig. 3 the wrapping material WN has just lost contact with the

conveying surface CS and cannot be stretched by the conveying surface CS rotating in the cleaning direction CD. As shown in Fig. 3 it is possible to rotate the conveying surface CS again in the cleaning direction CD even before the wrapping procedure has terminated. In one embodiment the conveying surface CS is conveyed in the cleaning direction CD as soon as the wrapping material supply unit S.1, S.2 is set into an idler mode.

In the figures a driven shaft or an axis Dr is shown. In one embodiment this driven shaft Dr acts as a drive moving the conveying surface either in the feeding direction FD or in the cleaning direction CD. The rotational axis of this shaft Dr is perpendicular to the drawing plane of the figures and is held by a suitable bearing in the front housing of the baler. In one embodiment the driven shaft Dr and therefore the wrapping material feeding unit WU is rotated by a hydraulic motor. A hydraulic material, e.g. oil, is moved by an electrical motor and is driven either in one direction for achieving the conveying surface CS to be moved in the cleaning direction CD or in the other direction for achieving the conveying surface CS to be moved in the feeding direction FD. In the preferred embodiment the hydraulic material is conveyed in pipelines of an open loop system. The motor conveys the hydraulic material from a reservoir through pipelines to a collecting device. In an alternative embodiment the hydraulic material circulates in a closed loop. In both embodiments, a controlled 4/2 directional valve effectuates the rotation of the roller WU in the cleaning direction CD as well as in the feeding direction FD.

An alternative embodiment for rotating the wrapping material feeding unit WU is a V-belt ("Keilriemen") together with a clutch. A third possible embodiment is a planetary gear with one clutch.

Fig. 4 shows one embodiment for driving the wrapping material feeding unit WU either in the feeding direction FD or in the cleaning direction CD. A V-belt VB is guided under tension around the following rollers:

- the wrapping material feeding unit WU,
- the conveying rollers CR.1 and CR.2, and
- two further idler rollers IRo.1, IRo.2.

The two conveying rollers CR.1 and CR.2 both have a free wheel when rotating in one direction and drives the V-belt VB when rotating in the other direction. For driving the wrapping material feeding unit WU in the cleaning direction CD (anti-clockwise in Fig. 4) the conveying roller CR.1 drives the V-belt VB (anti-clockwise in

Fig. 4). The conveying roller CR.2 runs in a free wheel mode. For driving the wrapping material feeding unit WU in the feeding direction FD (clockwise in Fig. 4) the conveying roller CR.2 drives the V-belt VB (clockwise in Fig. 4). The conveying roller CR.1 runs in a free wheel mode. A control unit switches the conveying rollers CR.1 and CR.2 in a suitable manner.

In one embodiment the wrapping material feeding unit WU is permanently driven such that the conveying surface CS is permanently moved either in the cleaning direction CD or in the feeding direction FD. The conveying surface CS is moved in the cleaning direction CD as long as possible and is moved in the feeding direction FD only as long as required. As long as the bale B is created, the conveying surface CS is moved in the cleaning direction CD and cleans the inlet. If the bale B is completely created and must be wrapped, the wrapping trigger signal is generated. This wrapping trigger signal sets the wrapping material supply unit with the two rollers S.1, S.2 into the operating mode. The two rollers S.1, S.2 pull wrapping material WN from the reel RL. In addition this wrapping trigger signal changes the direction into which the driven shaft Dr moves the conveying surface CS: The conveying surface CS is now conveyed into the feeding direction FD, cf. Fig. 2.

In an alternative embodiment the wrapping material feeding unit WU is operated in a start-stop manner. As in the embodiment described above, the wrapping trigger signal makes the conveying surface CS to be conveyed into the feeding direction FD. After having completed the wrapping of the bale B, the conveying surface CS is stopped. During the process of creating a further bale, the conveying surface CS is temporally stopped and only temporally moved in the cleaning direction CD.

In the embodiment shown in Fig. 1 and Fig. 2 the inlet (nips N.1, N.2) is cleaned and debris is removed only by rotating the roller WU with the conveying surface CS in the cleaning direction CS. In a further embodiment this cleaning mechanism using the roller WU is combined with other cleaning mechanisms. A pusher element may push debris from outside into the chamber. This pusher element penetrates the nip N.1 or the nip N.2 or both nips before the wrapping procedure starts. The inlet may also be cleaned additionally by means of a blower which blows a fluid through the nips or a sucking unit which sucks debris out of these nips.

List of reference signs

B	bale of agricultural material in the chamber, is to be wrapped
CD	cleaning direction
CR.1, CR.2, CR.3	driven conveying rollers for conveying the bale B in the chamber
CS	conveying surface of the wrapping material feeding unit WU
CU	cutting unit for cutting wrapping material WN
Dr	driven shaft for rotating the roller WU
DRo	driven roller around which the endless belt PB is guided
FD	feeding direction
FU	feeding unit for feeding material into the bale forming chamber
IRo	idler roller around which the endless belt PB is guided
LE	loose end area of the wrapping material WN
M	material inlet through which material is fed into the chamber
N.1	nip between the idler roller IRo and the wrapping material feeding unit WU
N.2	nip between the idler roller IRo and the conveying roller CR.1
N.3	nip between the wrapping material feeding unit WU and the conveying roller CR.1
PB	endless pressure belt, is guided around the idler roller IRo, the driven roller DRo and other rollers
PU	pick-up unit for picking up material from the ground
RL	reel with wrapping material WN
S.1, S.2	driven rollers of the wrapping material supply unit
VB	V-belt for driving the wrapping material feeding unit WU in both directions
WE	wrapping element, completely surrounds the bale B with several layers
WN	wrapping material, has the form of a net
WU	wrapping material feeding unit, has the form of a driven roller

Conclusies

1. Toevoerinrichting voor het toevoeren van wikkelmateriaal (WN) richting een inlaat (N.1, N.2) van een kamer waarin een object (B) omwikkeld zal worden met wikkelmateriaal (WN),
waarbij de toevoerinrichting omvat

- een wikkelmateriaalvoorraadeenheid (S.1, S.2) voor het aanvoeren van wikkelmateriaal vanuit een reservoir (RL) zodanig dat een los eindgedeelte (LE) van het wikkelmateriaal (WN) wordt gevormd tijdens bedrijf van de wikkelmateriaalvoorraadeenheid (S.1, S.2),
- een wikkelmateriaal toevoereenheid (WU) omvattende een transportoppervlak (CS), en
- een aandrijving (Dr, VB) voor het bewegen van het transportoppervlak (CS),
- waarbij de aandrijving (Dr, VB) is ingericht
  - voor het in een toevoerrichting (FD) bewegen van het transportoppervlak (CS) zodanig dat het los eindgedeelte (LE) van het wikkelmateriaal (WN) getransporteerd wordt richting de inlaat (N.1, N.2), en
  - voor het bewegen van het transportoppervlak (CS) in een reinigingsrichting (CD) anders dan de toevoerrichting (FD) zodanig dat object materiaal (M) weg van de inlaat (N.1, N.2) getransporteerd wordt.

2. Toevoerinrichting volgens conclusie 1, **met het kenmerk dat** de toevoerinrichting is ingericht voor het omschakelen van de wikkelmateriaalvoorraadeenheid (S.1, S.2)

- naar een in-bedrijf toestand waarin de wikkelmateriaalvoorraadeenheid (S.1, S.2) wikkelmateriaal (WN) aanvoert en
- naar een wachttoestand waarin de aanvoer van wikkelmateriaal (WN) door de wikkelmateriaalvoorraadeenheid (S.1, S.2) is onderbroken en waarbij
- de aandrijving (Dr, VB) is ingericht voor
- het transporteren van het transportoppervlak (CS) in de toevoerrichting (FD) als de wikkelmateriaalvoorraadeenheid (S.1, S.1) zich in de in-bedrijf toestand bevindt en

– voor het transporteren van het transportoppervlak (CS) in de reinigingsrichting (CD) als de wikkelmateriaalvoorraadeenheid (S.1, S.2) zich in de wachttoestand bevindt.

3. Toevoerinrichting volgens conclusie 2, **met het kenmerk dat** de toevoerinrichting is ingericht voor het genereren van een wikkelstartsignaal dat de wikkelmateriaalvoorraadeenheid (S.1, S.2) naar de in-bedrijf toestand schakelt en daarna de aandrijving (Dr, VB) in een modus schakelt waarin de aandrijving (Dr, VB) het transportoppervlak (CS) in de toevoerrichting (FD) transporteert.

4. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de toevoerinrichting is ingericht voor het genereren van een reinigingsstartsignaal nadat het los eindgedeelte (LE) het oppervlak van een object (B) in de kamer heeft bereikt, waarbij het reinigingsstartsignaal de aandrijving (Dr, VB) aanzet tot het in de reinigingsrichting (CD) transporteren van het transportoppervlak (CS).

5. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de reinigingsrichting (CD) antiparallel is aan de toevoerrichting (FD).

6. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de wikkelmateriaal toevoereenheid (WU) zodanig is ingericht dat de aandrijving (Dr, VB) het transportoppervlak (CS) beweegt

– langs een eerste eindeloze lus wanneer het in de toevoerrichting (FD) beweegt en

– langs een verdere eindeloze lus wanneer het in de reinigingsrichting (CD) beweegt.

7. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de aandrijving (Dr, VB) voor het transportoppervlak (CS) omvat

– een V-snaar (VB) en

– een inrichting (CR.1, CR.2) voor het transporteren van de V-snaar (VB) in een eerste richting en in een tweede richting, waarbij het transportoppervlak (CS) verbonden is met de V-snaar (VB) zodanig dat het transporteren van de V-snaar (V belt)(vert: VB) in de eerste richting er voor zorgt dat het transportoppervlak (CS) wordt bewogen in de toevoerrichting (FD) en dat het transporteren van de V-snaar (V belt) (vert: VB) in de tweede richting er voor zorgt dat het transportoppervlak (CS) wordt bewogen in de reinigingsrichting (CD).

8. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** ten minste één star of flexibel uitsteeksel op het transportoppervlak (CS) bevestigd is.

9. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de toevoerinrichting is ingericht zodanig dat een ruimte tussen het transportoppervlak (CS) en het wikkelmateriaal (WN) ontstaat zolang het transportoppervlak (CS) in de reinigingsrichting (CD) wordt getransporteerd.

10. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de toevoerinrichting is ingericht zo dat het transportoppervlak (CS) alleen in de reinigingsrichting (CD) wordt getransporteerd als er een ruimte ontstaat tussen het wikkelmateriaal (WN) en een te omwikkelen object (B).

11. Toevoerinrichting volgens een van de voorgaande conclusies, **met het kenmerk dat** de toevoerinrichting verder een wikkelmateriaalinbrengeenheid (CR.1) omvat voor het inbrengen van het los eindgedeelte (LE) door de inlaat (N.1, N.2) in de kamer zodanig dat het los eindgedeelte (LE) in contact komt met het object (B) in de kamer, waarbij er een ruimte is tussen de wikkelmateriaal toevoereenheid (WU) en de wikkelmateriaalinbrengeenheid (CR.1) ten minste zolang het transportoppervlak (CS) in de reinigingsrichting (CD) getransporteerd wordt.

12. Wikkelinrichting omvattende

– een kamer voor het vasthouden van een object (B) welke omwikkeld dient te worden met wikkelmateriaal (WN),

– een inlaat (N.1, N.2) die is ingericht voor het mogelijk maken van het inbrengen van wikkelmateriaal (WN) in de kamer,

– een toevoerinrichting volgens een van de conclusies 1 tot 0 (vert: 11) voor het toevoeren van wikkelmateriaal (WN) richting de inlaat (N.1, N.2), en

– een inrichting (CR.1, CR.2, CR.3, PB) voor het omwikkelen van het object (B) welke is vastgehouden in de kamer.

13. Baalvorminrichting omvattende

– een perskamer die is ingericht voor vasthouden van het materiaal dat in de kamer is ingevoerd,

– een inlaat (N.1, N.2) die is ingericht voor het mogelijk maken van het inbrengen van wikkelmateriaal (WN) in de kamer,

– een transporteerinrichting (CR.1, CR.2, CR.3, PB) voor het transporteren van materiaal dat zich in de perskamer bevindt zodanig dat dit materiaal onder druk wordt gevormd in een baal (B),

– een toevoerinrichting volgens een van de conclusies 1 tot 0 (vert: 11) voor het toevoeren van wikkelmateriaal (WN) richting de inlaat (N.1, N.2), en

– een inrichting (CR.1, CR.2, CR.3, PB) voor het omwikkelen van de baal (B) gevormd in de kamer.

14. Werkwijze voor het toevoeren van wikkelmateriaal (WN) richting een inlaat (N.1, N.2) van een kamer waarin een object (B) automatisch omwikkeld dient te worden met wikkelmateriaal (WN),

waarin de werkwijze de automatisch uitgevoerde stappen omvat dat

– wikkelmateriaal (WN) wordt aangevoerd vanuit een reservoir (RL) zodanig dat een groter wordend los eindgedeelte (LE) wordt gecreëerd, en

– een aangedreven transportoppervlak (CS) het los eindgedeelte (LE) in een toevoerrichting (FD) richting de inlaat (N.1, N.2) transporteert,

de werkwijze omvat verder een automatisch uitgevoerde reinigings stap welke reinigings stap het bewegen van het transportoppervlak (CS) in een reinigingsrichting (CD) anders dan de toevoerrichting (FD) omvat, zodanig dat het object materiaal (M) weg van de inlaat (N.1, N.2) wordt getransporteerd, waarbij de reinigings stap wordt uitgevoerd voordat het transportoppervlak (CS) het los eindgedeelte (LE) in de toevoerrichting transporteert.

15. Toevoerwerkwijze volgens conclusie 0 (vert: 14), **met het kenmerk dat**

– het transportoppervlak (CS) in de toevoerrichting (FD) wordt getransporteerd als wikkelmateriaal (WN) wordt aangevoerd vanuit het reservoir (RL) en

– het transportoppervlak (CS) in de reinigingsrichting (CD) wordt getransporteerd als bevoorrading van wikkelmateriaal (WN) wordt onderbroken.

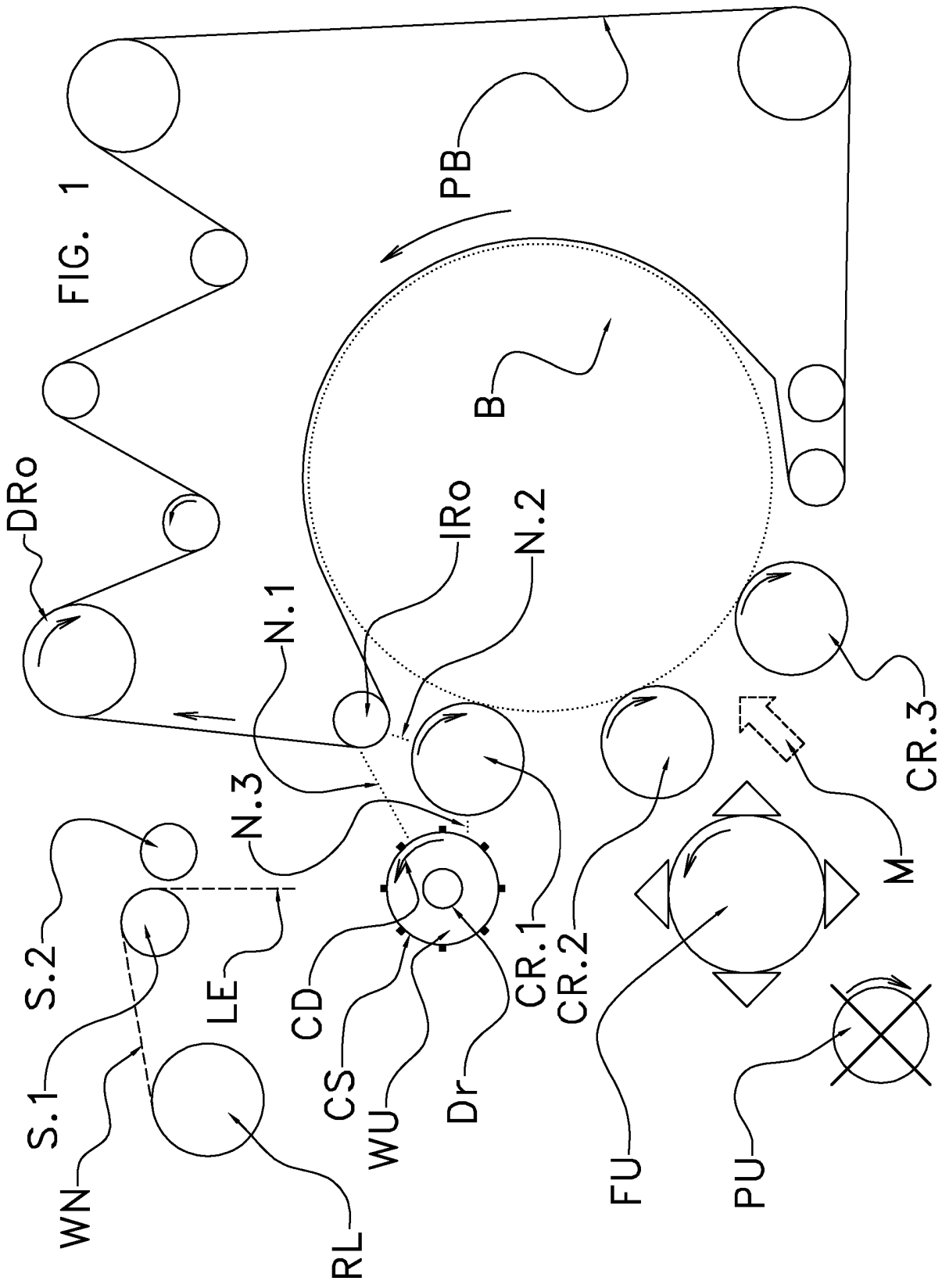
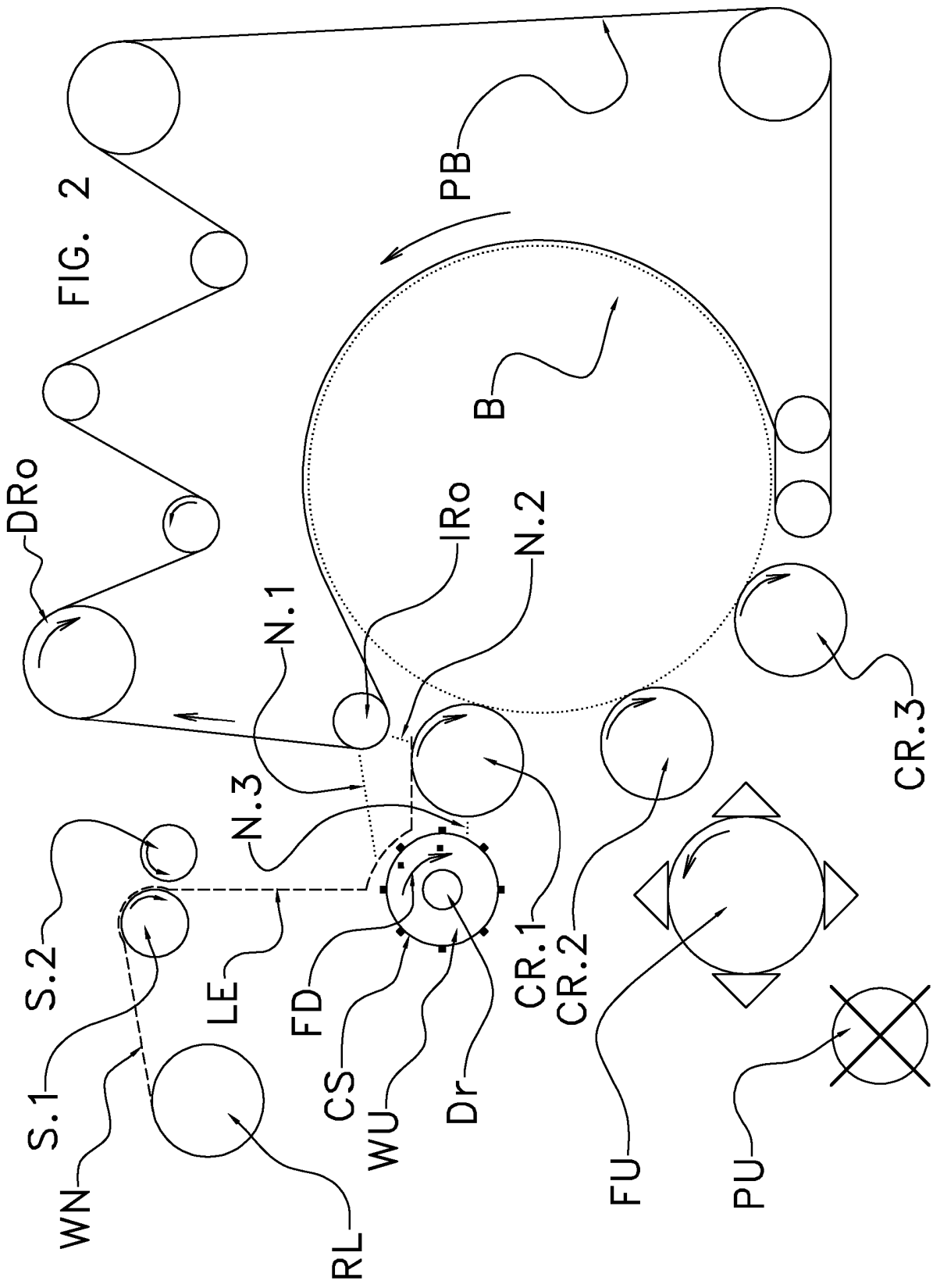


FIG. 1
PB
B
DRo
IRo
N.2
N.1
N.3
S.2
S.1
WN
RL
LE
CD
CS
WU
Dr
CR.1
CR.2
FU
PU
M
CR.3

FIG. 2



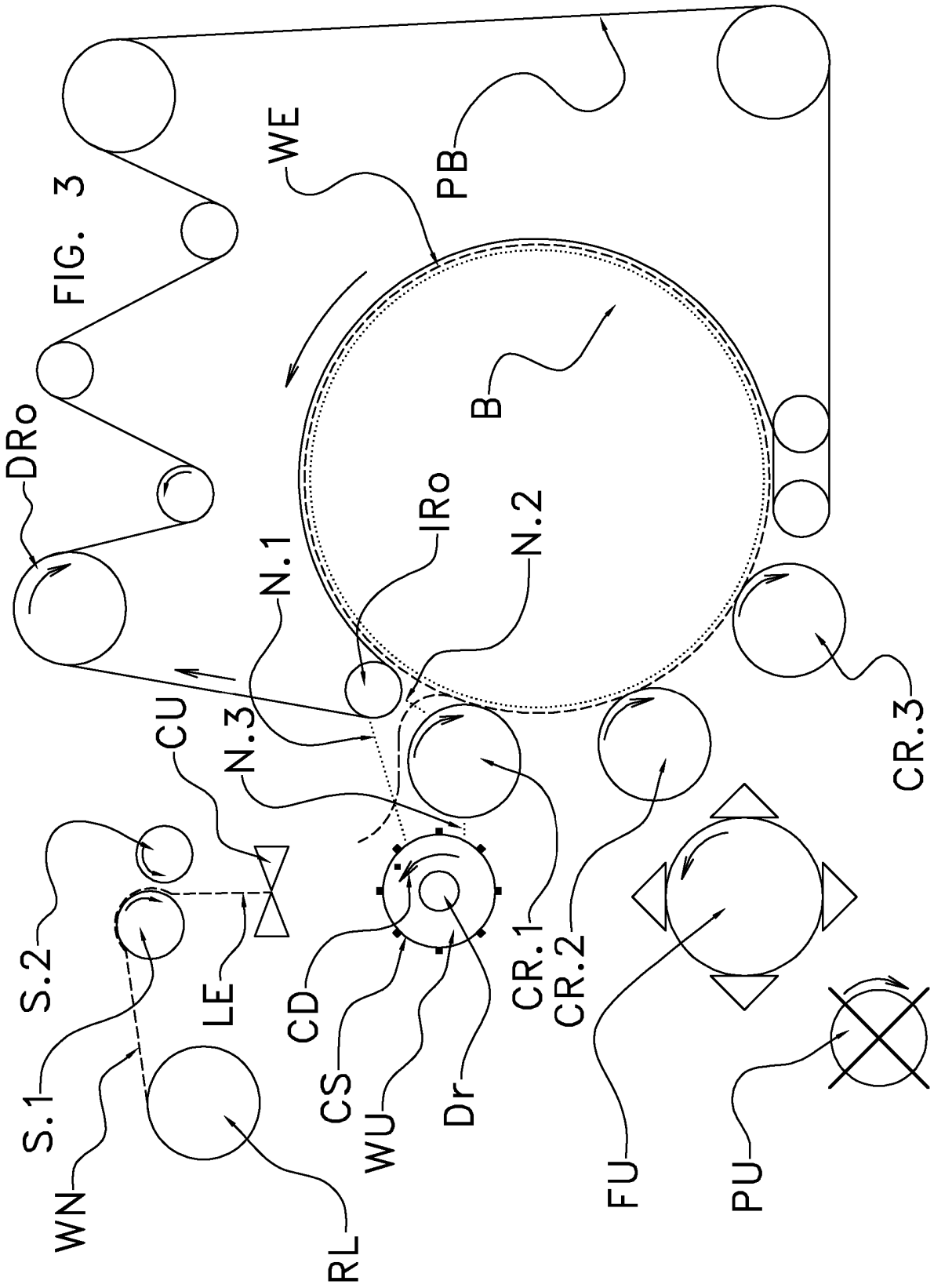
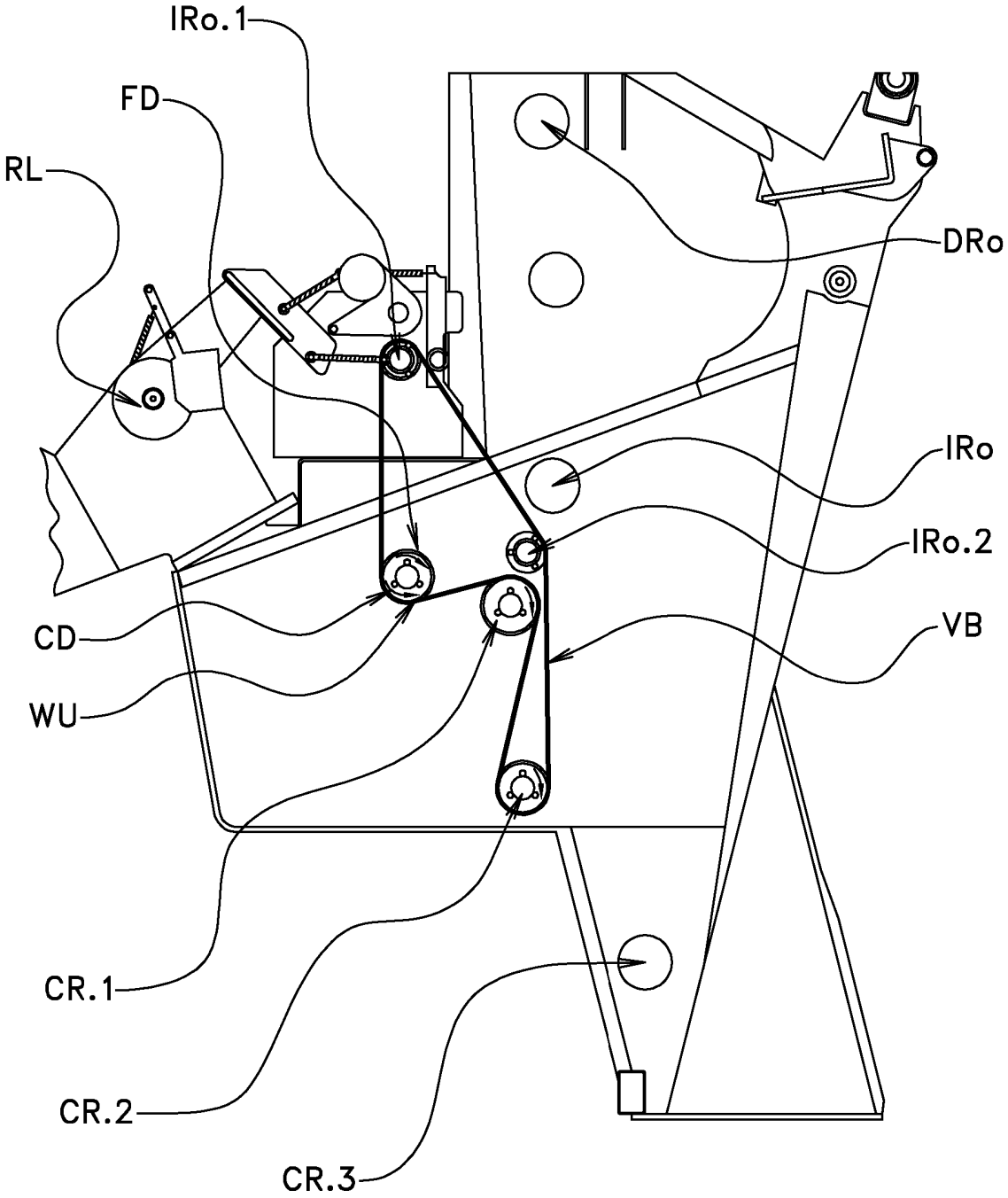

DRo
WE
PB
B
IRo
N.1
N.2
N.3
CU
CR.3
S.2
S.1
WN
LE
CD
CS
WU
Dr
RL
CR.1
CR.2
FU
PU

FIG. 3

FIG. 4



SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	D4713/NLP
Nederlands aanvraag nr. **2010352**	Indieningsdatum **22-02-2013**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **Forage Innovations B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **22-06-2013**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN60273**

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

Volgens de internationale classificatie (IPC)

A01F15/07

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**A01F**

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 2010352

A. CLASSIFICATIE VAN HET ONDERWERP
INV. A01F15/07
ADD.

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)
A01F

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	EP 1 400 163 A1 (LELY MASCHINENFABRIK GMBH [DE]) 24 maart 2004 (2004-03-24) * alinea [0013] - alinea [0018] * * figuur 1 * -----	1-3,5, 7-15
X	WO 2011/033494 A1 (SOLVESIDE LTD [IE]; MCHALE PADRAIC CHRISTOPHER [IE]; MCHALE MARTIN WIL) 24 maart 2011 (2011-03-24)	1-5,8-15
A	* bladzijde 7, regel 22 - bladzijde 8, regel 10 * * bladzijde 13, regel 1 - bladzijde 14, regel 16 * * bladzijde 21, regel 3 - regel 18 * * figuren 4, 5, 8a-8d * -----	6
	-/--	

[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 november 2013	

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	Baltanás y Jorge, R

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 2010352

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	EP 1 808 065 A1 (GALLIGNANI S P A [IT]) 18 juli 2007 (2007-07-18) * alinea [0095] - alinea [0097] * * alinea [0100] * * figuren 2-4f * -----	1-5,7, 11-15
X	DE 195 39 297 C1 (DEERE & CO [US]) 10 april 1997 (1997-04-10) * kolom 3, regel 21 - kolom 6, regel 25 * * figuren 1, 2 * -----	1-3,5, 11-15
A	US 5 433 059 A (KLUVER LEROY [US] ET AL) 18 juli 1995 (1995-07-18) * kolom 9, regel 35 - regel 65 * * figuren 6-8 * -----	1,12-14

Formulier PCT/ISA/201 (vervolg tweede blad) (Januari 2004)

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 2010352

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
EP 1400163 A1	24-03-2004	DE 10243294 A1	19-05-2004
		EP 1400163 A1	24-03-2004
WO 2011033494 A1	24-03-2011	GEEN	
EP 1808065 A1	18-07-2007	AT 398917 T	15-07-2008
		EP 1808065 A1	18-07-2007
DE 19539297 C1	10-04-1997	GEEN	
US 5433059 A	18-07-1995	US 5433059 A	18-07-1995
		US 5568716 A	29-10-1996

OCTROOICENTRUM NEDERLAND

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN60273	22.02.2013		NL2010352

International Patent Classification (IPC)
INV. A01F15/07

Applicant
Forage Innovations B.V.

This opinion contains indications relating to the following items:

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

	Examiner
	Baltanás y Jorge, R

Application number

WRITTEN OPINION

NL2010352

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	6, 7
	No:	Claims	1-5, 8-15
Inventive step	Yes:	Claims	6
	No:	Claims	1-5, 7-15
Industrial applicability	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VII Certain defects in the application

see separate sheet

Item V

Reference is made to the following documents:

D1 EP 1 400 163 A1 (LELY MASCHINENFABRIK GMBH [DE]) 24 maart 2004 (2004-03-24)

D2 WO 2011/033494 A1 (SOLVESIDE LTD [IE]; MCHALE PADRAIC CHRISTOPHER [IE]; MCHALE MARTIN WIL) 24 maart 2011 (2011-03-24)

D3 EP 1 808 065 A1 (GALLIGNANI S P A [IT]) 18 juli 2007 (2007-07-18)

D4 DE 195 39 297 C1 (DEERE & CO [US]) 10 april 1997 (1997-04-10)

D5 US 5 433 059 A (KLUVER LEROY [US] ET AL) 18 juli 1995 (1995-07-18)

1 Document D1 discloses a feeding device comprising a wrapping material supply unit (21) for feeding wrapping material from a reservoir (20) so that a hanging portion of wrapping material is formed (see figure 1: material fed by supply unit 21 will unavoidably hang loose after said unit), a wrapping material feeding unit (25) comprising a transport surface which is driven, wherein the feeding unit (25) can be driven so that the transport surface is moved in a first direction which introduces the hanging portion of wrapping material into an inlet (23; transport surface is displaced towards the right position in figure 1), or in a cleaning direction (see figure 1: displacement of transport surface towards the left position) opposite the first direction such that compressed material is transported away from the inlet (23; see paragraphs 15 and 16).

Thus claim 1 is not acceptable for lack of novelty.

Furthermore, each of the documents D2 (supply unit 38, feeding unit 42, feeding direction J, cleaning direction H; see page 21, lines 3 to 18), D3 (supply unit 21, feeding unit 31, feeding direction 5, cleaning direction 6; see paragraphs 95 to 97; if some material is prevented from getting out of the inlet when feeding unit 31 is moved in the feeding direction, it necessarily follows that some material accumulates in that region and is moved out once feeding unit 31 is displaced in the cleaning direction) D4 (supply unit 24, 31, feeding

unit 48, feeding direction in figure 1, cleaning unit in figure 2; see column 5, line 64, to column 6, line 26; the same considerations as for D3 apply) discloses the whole of the subject-matter of claim 1.

2 Dependent claims 2, 3, 4, 5, 8, 10, 11, 12, 13, 14 and 15 seem to be disclosed in the above mentioned documents (for claims 2, 3, 5 and 15: see any of D1-D4; for claim 8: see D1, figure 1, or D2, figures 4 and 5; for claim 9: see D1 or D2, figures; for claim 10: see D2; for claim 11: see D1, wrapping material transport unit 8, or D2, 32, or D3, 206, or D4, 20; for claims 12, 13 and 14: see point 1 above), or are usual options for the person skilled in the art in order to solve well-known problems (for claim 7: the use of V-belts for driving elements in agricultural machinery is extremely well-known for the skilled person, and thus it would be obvious to use any of those possibilities in order to displace the feeding unit of D1).

Thus claims 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14 and 15 are not acceptable for lack of novelty, and the subject-matter of claim 7 does not involve an inventive step.

3 Claim 6 differs from D1 in that the feeding unit is adapted to move its transport surface in first endless loop in the feeding direction and in a second endless loop in the cleaning direction.

The problem to be solved by the present invention may therefore be regarded as avoiding the longitudinal displacement of the feeding unit, thus simplifying its configuration.

The solution to this problem proposed in claim 6 of the present application is considered as involving an inventive step for the following reasons: no document of the prior art discloses or suggests said non-obvious solution for solving the above mentioned problem.

Item VII

1 Some claim numbers in the description (page 4, line 16) and in some dependent claims (claims 12, 13, 15) seem to be missing or defectively cited.

2 Independent claims 1, 12, 13 and 14 are not in the two-part form, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble and with the remaining features being included in the characterising part.

3 Documents D1 and D2 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

4 The same feature (reference WU) seems to be cited in the description with two different names (see page 12, lines 19 and 33), thus throwing doubt on the real meaning of the feature.

5 On page 13, line 24 of the description, reference is made to the references SR.1 and SR.2 which, however, are missing from the drawings.