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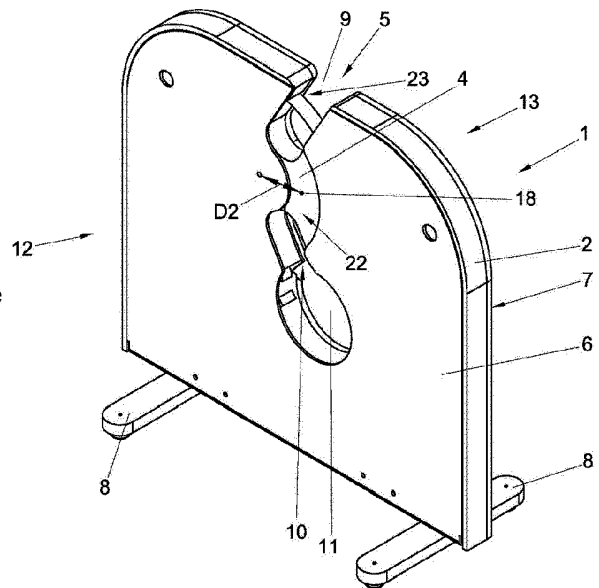
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54 **Apparatus and method for bundling, sealing and/or tying products.**

57 Apparatus for sealing or tying products, comprising a housing with at least a first tape dispenser and a star wheel, a slot defined by or through the housing, wherein the star wheel extends at least partly in said slot, wherein the star wheel comprises a series of first cells and a series of second cells, the first and second cells being intermittently disposed in the star wheel, each cell being open to a periphery of the star wheel and two opposite sides thereof wherein an urging device is provided having at least one edge portion for urging at least one product to be tied into one of the cells, especially a first cell.



NL C 2007689

Dit octrooi is verleend ongeacht het bijgevoegde resultaat van het onderzoek naar de stand van de techniek en schriftelijke opinie. Het octrooischrift komt overeen met de oorspronkelijk ingediende stukken.

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Title: Apparatus and method for bundling, sealing and/or tying products.

The invention relates to an apparatus and method for sealing or tying products. The invention more specifically relates to an apparatus and method for wrapping at least an adhesive strip of tape around at least part of a bundle of products for tying them together.

5 It is known to gather a bundle of products such as produce, for example flowers, and wrap an elastic band around part of said products, such as around the stems of the flowers, in order to bundle them. It is also known to gather such products into a bundle and then wrap an adhesive tape around part of them, such as around the stem of a bundle of flowers, for bundling
10 them. Such apparatus are for example known from US2841935, NL8902097 and US4545185.

In US2841935 a sealer is shown having a wheel comprising a series of slots defined in the periphery thereof, regularly spaced relative to each other along said periphery. Between each set of two adjacent slots a knife is housed
15 in the wheel, having a cutting edge extending slightly from said periphery. Tape fed over the periphery can be cut by such cutting edge when the wheel is turned during feed through of a bag to be closed and sealed.

In NL8902097 a sealer is shown having a star wheel having six identical slots provided evenly distributed around the periphery of the star
20 wheel. Products can be hand fed through a slot in the housing of this sealer for rotating the wheel and sealing the bag.

In US4545185 a sealer with a star wheel is disclosed, wherein the star wheel has four first slots into which the neck of a bag to be sealed can be fed, and in the middle between two adjacent first slots a second slot is provided
25 for allowing a knife to cut tape fed over the periphery of the wheel.

An aim of the present invention is to provide an alternative to these known apparatus and methods. Another aim of the present invention is to

provide a method and apparatus for sealing or tying products into bundles. A still further aim is to provide a method and apparatus for tying fresh produce, flowers or the like natural products. A still further aim of the present invention is to provide a method and apparatus in which bundles can be
5 formed and held more tightly, at least during tying and/or sealing thereof.

One or more of these and/or other aims can be obtained with an apparatus and/or method according to invention.

An apparatus for sealing or tying products can comprise a housing with at least a first tape dispenser and a star wheel. A slot can be defined by or
10 through the housing, wherein the star wheel extends at least partly in said slot. The star wheel comprises a series of first cells and a series of second cells, the first and second cells being intermittently disposed in the star wheel, each cell being open to a periphery of the star wheel and two opposite sides thereof. For each first cell a grabbing element can be provided for grabbing parts of
15 products extending in the first cell and forcing them together during movement of the star wheel and tying and/or sealing the products.

An urging device can be provided having at least one edge portion for urging at least one product to be tied into one of the cells, especially a first cell.

20 A method for sealing or tying products can be characterised by adhesive tape which is led over an open side of a cell of a star wheel, an adhesive side of the star wheel facing away from the star wheel. A product or a bundle of products is moved against the tape and into the cell, adhering at least part of the adhesive tape around at least part of the product or bundle of
25 products, and rotating the star wheel around an axis. The cell with the product or bundle of products is preferably moved along a feeding station for feeding a second tape, preferably non adhesive tape, over the cell and the product or bundle, adhering to the adhesive tape. The star wheel is rotated, tying the tape round the product or the bundle of products, wherein the star wheel is rotated
30 further and the tape is or the two adhered tapes are cut, allowing the bundle to

be removed from the cell. Upon entry into the first cell the product or bundle of products is pushed against at least one strap of a grabbing means which is wrapped tightly around the product or bundle of products, at least during applying the adhesive tape around the product or bundle of products, and is thereafter released and rotated further with the star wheel.

The product or bundle of products can be pushed into and held in the cell by an urging device and/or a pressing device, for example during part of the rotation of the star wheel.

Further use of a sealer with a star wheel is described, wherein an adhesive tape dispenser and a tape dispenser for a second tape, easier tearable than the adhesive tape are described, for binding products, especially fresh produce, wherein adhesive tape is dispensed from the dispenser and wound around at least part of a bundle of products using the star wheel. There after a second tape is adhered to the adhesive tape, such that ends of the adhesive tape are covered by the second tape and do not adhere to each other. In the relevant cell the product or bundle of products can be grabbed by grabbing means, for example a strap forced around the product or bundle of products and pulling a bag tightly around the product or products and/or the products tightly against each other, for improving bundling of products. The bundle of products can be pushed into and temporarily held in the cell by an urging device and/or a pressing device.

A bundle of products, especially obtained with a method, use or apparatus as described can be provided, which bundle is provided around part thereof with a piece of adhesive tape, binding the bundle together. Preferably a piece of a second tape, easier tearable than the adhesive tape, is provided to both ends of said piece of adhesive tape, extending over an interface where parts of the adhesive tape are interconnected and/or over a part of the bundle extending between said ends of said piece of adhesive tape. The bundle is tied by at least the tape, wherein a container or item is provided between the tape and the bundle of products.

By way of example apparatus, methods, use and products shall be described hereafter, schematically and in relative detail, with reference to the drawing, in which:

Fig. 1 schematically in perspective view an apparatus of the present description, in a first embodiment;

Fig. 2 schematically in frontal view, opened, an apparatus of fig. 1;

Fig. 3 schematically in perspective view an apparatus of the present description, in a second embodiment;

Fig. 4 schematically in frontal view, opened, an apparatus of fig. 3;

Fig. 5 schematically part of an apparatus of fig. 1 or 3, in a first position;

Fig. 6 schematically part of an apparatus of fig. 1 or 3, in a first position;

Fig. 7 schematically in perspective view an apparatus of fig. 3, from the rear;

Fig. 8 schematically in top view an apparatus of fig. 7, with part of a bundle engaging the star wheel;

Fig. 9 schematically in perspective view a knife assembly;

Fig. 10 schematically in frontal view an apparatus, in a further embodiment;

Fig. 11 in side view an apparatus of fig. 10;

Fig. 12 in rear view an apparatus of fig. 10 and 11;

Fig. 13 in perspective view an apparatus of fig. 10 - 12;

Fig. 14A – B the apparatus of fig. 10 - 13, with a bundle of flowers, together with the supply of containers to be tied with the bundle;

Fig. 15 in side view and frontal view an embodiment of an apparatus according to the present invention, partly broken away;

Fig. 16 in side view part of the apparatus of fig. 15, especially of a star wheel with grabbing means;

Fig. 17A - C in side view three steps of a method for tying, bundling and/or sealing of products, for example with a device having a star wheel and grabbing means of fig. 15;

Fig. 18 schematically part of actuating means for grabbing means according to fig. 15 or 16, with in broken lines the circumference of a star wheel with first and second cells; and

Fig. 19 shows schematically part of an apparatus of the invention with an alternative embodiment of grabbing means.

In this description the same or similar or corresponding parts can have the same or corresponding reference signs. The embodiments shown and described are exemplary embodiments only and should by no means be understood as limiting the scope of protection sought as defined by the claims. The apparatus and methods according to the invention are described in relation to fresh products such as flowers, produce and the like, uncovered or covered. This should not be considered limiting. A similar apparatus could be used for for example sealing or tying bags, wrappings, bundles of other products, such as but not limited to rods, sticks and other such elements.

In this description a container can be described to be tied by the tape with the product or products. Such container can be for example be, but is not limited to, a sachet, bag, flask, box, bottle or any container suitable for holding content. Alternatively other items could be tied to a product or bundle of products in the same or similar manner. Such items are, for the purpose of this description, also to be understood as encompassed by the description.

In this description apparatus will described which are hand-operated, that is wherein products to be tied or sealed are fed through the apparatus manually, or mechanically, for example motor driven. Mechanical means can be provided to feed the products through the apparatus, or at least assist a user in feeding the products through the apparatus, such as transport bands, chains and other transport means. Star wheel should be understood as at least including any element, rotational around a real or virtual axis,

provided with cells along the periphery forming positions for receiving products or parts thereof to be tied or sealed and/or receiving at least part of a knife or other cutting or slicing tool or element. The star wheel can be driven by products fed through or by it or can be driven autonomously, for example
5 motor driven.

Relevant following first cell can be understood as meaning a first cell following the said first cell seen in a direction of rotation of the star wheel, which can be used for tying or sealing products.

Fig. 1 and 2 show a first exemplary embodiment of an apparatus.
10 The apparatus 1 comprises a housing 2, at least a first tape dispenser 3 and a star wheel 4. A slot 5 is defined by or through the housing 2. The star wheel 4 extends at least partly in said slot 5. In this embodiment the housing 2 comprises a front panel 6 and back panel 7 and rests on legs 8 for providing stability and the possibility of moving the apparatus 1 to an appropriate
15 position. The apparatus can thus be mobile. However, it is also possible to install the apparatus permanently or semi permanently in one location, for example at a packaging line. In this embodiment the slot 5 extends from an inlet opening 9 to an outlet opening 10. The outlet opening 10 can be provided between the inlet opening 9 and the legs 8. In the embodiment of fig. 1 and 2
20 the outlet opening 10 opens into a hole 11 extending through the housing 2, opening to both the front 12 and back 13 thereof. The slot 5 is formed by cut outs in the front panel 6 and back panel 7.

In fig. 2 the front panel 6 has been removed, for example pivoted down around pivots 14, opening the housing 2. As can be seen the star wheel 4
25 can be mounted on an axis 15, extending substantially perpendicular to the front and back 12, 13 of the housing 2, such that it can be rotated around said axis 15 within the housing 2. In an embodiment the inlet opening 9 and outlet opening 10 can be positioned such that a straight line L drawn between a mid 16 of the inlet opening 9 and a mid 17 of the outlet opening 10 extends past the
30 axis 15 at a distance D1 there from. The slot 5 is curved between the inlet

opening 9 and outlet opening 10 such that it passes the axis 15, a mid 18 thereof being at a distance D2 from the axis 15. The distance D2 can in an embodiment be larger than the distance D1. In other embodiments it can be smaller or the same.

5 The star wheel 4 comprises a series of first cells 19 and a series of second cells 20. The position of each cell 19, 20 is for the sake of this description defined by a line J extending through the axis 15 and a mid M of a relevant cell 19, 20 at the periphery 21. The first cells 19 and second cells 20 can be intermittently disposed in the star wheel 4. This has to be understood
10 as including but not necessarily limited to an arrangement of the cells 19, 20 around the periphery 21 of the star wheel 4 such that between two adjacent first cells 19 seen around the periphery 21 a second cell 20 is provided. Each cell 19, 20 is open to the periphery 21 of the star wheel 4 and two opposite sides 22, 23 thereof. In the embodiments shown there is the same number of
15 first cells 19 as there are second cells 20. In an embodiment there can be three first cells 19 and three second cells 20. In an embodiment the first cells 19 can be distributed around the periphery 21 evenly, as can the second cells 20. For three first cells 19 this means that an angle α included between two lines J through adjacent first cells 19 will be approximately 120 degrees. Similarly for
20 three second cells 20 the angle β included between two lines J through adjacent second cells 20 will be approximately 120 degrees. For different numbers of first and second cells 19, 20 the angles α , β will be amended accordingly, by the definition 360 degrees divided by the number of first or second cells 19, 20 respectively.

25 In an embodiment each first cell 19 comprises a leading edge 24 and a trailing edge 25, whereas each of the second cells 20 has a leading edge 26 and a trailing edge 27, seen in a direction of rotation W of the star wheel 4. A direction of rotation W of the star wheel 4 is defined by rotation of the star wheel 4 around the axis 15 such that a cell 19, 20 moves from near the inlet
30 opening 9 to near the outlet opening 20 over the shortest path of travel, along

the slot 5. In an embodiment a distance D3 between a trailing edge 25 of a first cell 19 and a leading edge 26 of an adjacent second cell 20, measured along the periphery 21 of the star wheel 4 is smaller than the distance D4 between the trailing edge 27 of said second cell 20 and a leading edge 26 of the same second cell 20 and a following relevant first cell 19. In an embodiment the distance D3 can be less than half the distance between two adjacent relevant first cells 19. In an embodiment the first and second cells 19, 20 can be distributed around the periphery such that the angles α and β will be the same, but an angle γ between lines J through a first cell 19 and an adjacent trailing cell 20, that is the second cell following the first cell 19 in the direction of rotation W of the star wheel 4 is smaller than the angle δ between the lines J through said second cell 20 and the following first cell 19. In an embodiment the angles α , β can be 120 degrees, the angle γ can be between 5 and 60 degrees, more specifically between 10 and 45 degrees, for example approximately 30 degrees. The angle δ can be about $(\alpha - \delta)$, which can e.g. be about 90 degrees.

In an embodiment the edges 24, 25, 26, 27 can extend substantially parallel to the line J extending through the relevant cell 19, 20. In an embodiment the second cells 20 can be smaller than the first cells 19. The first cells 19 can have a width B1 measured between the leading and trailing edge 24, 25 perpendicular to the relevant line J through the cell 19 larger than the width B2 of the second cells 20. In an embodiment the first cells 19 can be distributed such that when a one of the first cells 19 is positioned adjacent the outlet opening 10 of the slot 5, a following relevant first cell 19 is positioned adjacent the inlet opening 9 of the slot 5. A second cell 20 can be positioned in between, extending within the housing and/or in the slot. In an embodiment the depth X of each second cell 20 can be such that it is enclosed within the housing 2, except when passing the inlet opening 9 and/or the outlet opening 10.

A knife carrier 28 is provided near the periphery 21, within the housing 2. The knife carrier 28 can be positioned near the periphery 21 of the

star wheel 4 and comprises at least one knife 31 that can be moved into and out of at least one of the second cells 20, for cutting tape, as will be discussed later on. Preferably the knife carrier 28 is at least partly operated by rotation of the star wheel 4.

5 The knife carrier 28 can, as is further elucidated in fig. 9, be provided with a number of arms 29, extending from a central core 30, for example substantially radially. In an embodiment there can be four such arms 29. Each arm 29 can comprise a knife 31 with a cutting surface and/or teeth 32 extending substantially away from the core 30. The core 30 can be positioned
10 on an axis 33 extending substantially parallel to the first axis 15. As can be seen especially in fig. 9, each of the arms 29 can be provided with a first side 34 and a second side 35, the knives 31 being provided between said sides 34, 35. Each of the first sides has a blade 36 that extends at least with a tip region 37 at a side 22 of the star wheel 4. Near the periphery 21 and adjacent a
15 trailing edge 27 of a second cell 20 an operating element 38 is provided that extends from the side 22 of the star wheel 4. The element 38 can for example be a notch, pin, edge, rib or any other suitable element. As will be discussed later, the blade 36 can be brought into contact with the operating element 38, for operating the knife carrier 28.

20 As can be seen in fig. 2 at one side of the slot 5 a first tape dispenser 3 is provided, comprising a roll of adhesive tape 39. A second tape dispenser 40 is provided, for holding a second role of tape 41. In an embodiment the first tape dispenser 3 can be provided at a side of the slot 5 opposite the side of the second tape dispenser 40. The second tape dispenser 40 can be provided at a
25 side of the slot at which the knife carrier 28 is also provided. Sides to the slot should be understood as to the left or right of the line L as seen in a front or rear view of the apparatus 1. Near the knife carrier 28 a tautening device 42 is provided, preferably in the housing 2. The tautening device 42 comprises an arm 43, pivotally connected to the housing 2 in a pivot point 44. A side arm 45
30 is connected to the arm spaced apart from the pivot point 44, extending

substantially in a direction away from the star wheel 4. The knife carrier 28 can be positioned substantially between the star wheel 4 and the arm 43. A spring 46 is connected between the housing 2 and the arm 43, biasing the arm towards the knife carrier 28. The second side 35 of the arms 29 is substantially
5 in the same plane as the arm 43, such that, as is shown in fig. 2 and 5, at least one arm 29 is in contact with the arm 43 at all times. At the side arm 45 a pin 47 is provided, extending substantially parallel to the axis 15. At two opposite sides of the pin 47 the housing is provided with guide elements 48A, B.

From the first tape dispenser 3 adhesive tape 39 is fed over the
10 periphery 21 of the star wheel 4, at least past a first cell 19 near or adjacent to the inlet opening 9 of the slot 5, an adhesive side 49 of the tape 39 extending outward, away from the star wheel 4. At the side of the slot 5 near the inlet opening 9, between the slot 5 and the arm 43, a guide 50 for the second tape 41 dispensed from the second tape dispenser 40 is provided, for guiding the
15 second tape 41 towards the periphery 21 of the star wheel 4, at a position downstream from the inlet 9. The second tape 41 is preferably non adhesive tape, such as but not limited to paper tape. The second tape preferably is easily tearable, preferably more easily than the adhesive tape 39. The second tape is led from the second tape dispenser 40 over the sides of the guide
20 elements 48A, B facing away from the star wheel 4 and over the side of the pin 47 facing the star wheel 4, and then through the guide 50 towards the periphery 21 of the star wheel 4, over which it is led in a downstream direction, towards the outlet opening 10, adhered to the adhesive tape 39.

As can be seen in for example fig. 2 and 5, the knife carrier 28 can be
25 positioned in a rest position, in which the arm 43 is in contact with two arms 29 of the knife carrier 28. The spring 46 keeps the arm 43 in this position during rotation of the star wheel 4. In the position of fig. 2 a bundle of products, such as the stems S of a bunch of flowers, schematically shown in cross section in fig. 2 directly above the star wheel, in the inlet opening 9, can
30 be pushed into the relevant first cell 19 adjacent the inlet opening 9, in the

direction F, thereby pushing the tape 39 extending over the opening of the relevant first cell 19 into the cell 19, adhering at the same time to the stems S of the flowers and dispensing tape 39. By pushing the stems S further in the general direction F the star wheel 4 will be rotated in the direction W, leading
5 the stems S through the slot 5 towards the outlet opening 10. Tape 39 will be dispensed from the first dispenser 3. Since the second tape 41 is adhered to the first tape 39 at the downstream side of the relevant first cell 19, tape 41 will also be dispensed from the second dispenser 40. The tape will be kept taut by the tautening device 42, also keeping the knife carrier 28 in the rest position.
10 The first tape 39 and the second tape 41 adhered thereto will thus be extended over the second cell 20 following the relevant first cell 19.

When the star wheel 4 is rotated further in the direction W, the operating element 38 of a second cell 20 upstream adjacent the relevant first cell 19 in which the stems S extend is brought into contact with the tip region
15 37 of the side 36 of an arm 29 of the knife carrier 28 extending substantially into the direction of the slot 5 and inlet opening 9, as is shown in fig. 6. The tip region 37 can be provided with a guide surface 51 which is curved. The guide surface 51 faces outward and is positioned such that upon further rotation of the star wheel 4 the operating element 38 is forced along the guide surface 51,
20 pushing the arm 29 and especially the knife 31 into the second cell 20, bringing the knife carrier 28 and knife 31 in a working position, cutting the tapes 39 extending over the second cell 20. At the same time the arm 43 is pushed away from the star wheel 4, releasing to some extent the tension on the second tape 41 and allowing the knife carrier 28 to rotate further when the
25 star wheel is rotated further in the direction W. This can bring the knife carrier back into a rest position. The stems S are thus enclosed between the first tape 39 extending to a high extent and preferably almost entirely around the bundle of stems S and the second tape 41 extending over a gap 52 between two parts of the first tape 39. This makes it easy to remove the tapes 39, 41

from the stems, by tearing one of the tapes, preferably the second tape 41 by pulling the two tabs 53A, B, formed on either side of the gap 52, apart.

The position of the knife carrier 28 along the periphery 21 relative to the inlet opening 9 and the relative positions of each first cell 19 and the adjacent upstream second cell 20 defined the length 54 of the tabs 53. Once the tapes 39, 41 have been cut by the knife 31, the star wheel 4 will rotate relative to the tapes, until the stems S are released from the cell 19 and a further bundle of stems S is introduced into the next first cell 19 then adjacent the inlet opening 9. by reducing the distance D between the cell 19 and the position in which the knife 31 cuts the tapes 39, 41 in the adjacent second cell 20 the tab length 54 can be limited, reducing use of tape and preventing excessive tab lengths, which is especially desirable when bundles of products have to be tied or sealed having a relatively large size in cross section.

Fig. 3 and 4, 7 and 8 disclose an alternative embodiment of an apparatus according to the description, having the same or a similar star wheel 4, first and second tape dispensers 3, 40, knife carrier 28 and tautening device 42. In this embodiment the housing is divided basically in two parts 55, 56, the slot 5 extending between and being substantially defined by facing edges 57, 58 of the two parts 55, 56. A carrier 59 is provided, connecting the first and second part 55, 56. The carrier 59 is substantially U shaped, extending substantially perpendicular to the sides 12, 13 of the housing 2, having a central element 60 and two arms 61, connecting ends of the central element 60 with the first and second part 55, 56 respectively. The carrier therefore extends at a distance from the slot 5. In this embodiment the apparatus 1 can be mounted with the carrier on a working surface (not shown) such that a bundle of products such as flowers with stems S can be pushed from the slot 5 through the outlet opening 10 further in the direction of movement they had when passing through the slot 5.

In the description the embodiments are disclosed having the slot 5 or at least the line L extending substantially vertically. It is however obviously

possible to have the slot extend in any desired direction and position, for example substantially horizontally or inclined relative to a horizontal and vertical plane.

In an embodiment the inlet opening 9 and first cell 19 can have
5 corresponding widths. In another embodiment the width of the first cell 19 can differ from the inlet 9, for example smaller. The width B1 can for example be between 20 and 100 mm, for example between 30 and 80 mm. In an example the width B1 can be about 30 mm, about 40 mm or about 50 mm. The star wheel can have a diameter of any size, for example between 100 and 500 mm.
10 In an example the star wheel can have a diameter of between 200 and 300 mm, for example about 240 to 250 mm. These sizes are only given by way of example. The star wheel 4 need not be circular. In an embodiment different star wheels 4 can be provided, interchangeable in the same housing. Different star wheels 4 can have for example but not limited to different positions of the
15 first and second cells, different numbers of such cells, different sizes of first and/or second cells or combinations thereof, suitable for for example different sizes of bundles of products or bags or different products. Star wheels can have cells having for example a padding for protecting products from damage by the forces exerted thereon when being bundled, tied and/or sealed.

20 Figs. 10 - 12 show a further embodiment of an apparatus 1, again comprising a housing 2, at least a first tape dispenser 3 and a star wheel 4. A slot 5 is again defined by the housing 2, extending between an inlet 9 and an outlet 10. As can be seen, especially in fig. 10 and 12, the star wheel 4 extends partly in the slot 5. Products fed through the slot 5 therefore have to engage
25 the star wheel 4. In this embodiment the star wheel 4 is substantially the same as disclosed in the previous figures. However, in all embodiments star wheels 4 could be used having the first and second cells 19, 20 distributed differently, for example evenly spaced around the periphery, whereas the cells 19, 20 could all have the same sizes.

In this embodiment an urging device 62 is provided, at least partly upstream of the star wheel 4. A support surface 63 is provided at least on one side of the slot 5, for supporting products to be tied and/or a transport device fed over the support surface 63. Such transport device can for example be a substantially flexible conveyer 100, which can in embodiments have a relatively soft top side for supporting the products or parts thereof. As can be seen in for example fig. 13, the support surface 63 can have a wavy portion 64 next to the star wheel 4, such that when the support surface 63 extends substantially horizontally a first part 65 of the transport surface 63 next to the star wheel 4 extends higher than an axis 15 of the star wheel 4 and two adjacent parts 66 of the supporting surface 63 extend on either side of the first part 65 at a lower level. The structure is preferably chosen such that when a first cell 19 is open to the inlet opening 9, an edge flush with the transport surface or transport element supported thereon, another first cell is open to the outlet in a similar manner, whereas the curvature of the wavy part is such that upon rotation of the star wheel to bring the relevant cell from the inlet side to the outlet side, a bottom portion 67 of the cell follows the wavy pattern of the first part 65, thus allowing support of the product or products by the supporting surface, directly or indirectly, during such movement.

As can be seen, in fig. 12 especially, the urging device 62 can have a central portion 68, mounted on or formed by an axis of rotation 69, preferably extending substantially parallel to the axis 15 of the star wheel 4. In the embodiment shown the urging device comprises three pairs of protrusions or fingers 70, extending substantially tangential to the axis 69, at even angles τ of 120 degrees, between their length directions T. Of each pair the fingers 70 are spaced apart in the length direction 69L of the axis 69, such that of each pair the fingers extend on opposite sides of the star wheel 4, at least partly, as is especially clear from fig. 11. The star wheel 4 and the urging device 62 have the same direction of rotation 71, in fig. 12 counter-clockwise, and can both be driven by a motor. Each finger 70 has, seen in the direction of rotation 71, a

forward side forming an edge portion 72 for urging products into a cell 19 of the star wheel. This edge portion can be substantially straight and substantially parallel to the length direction T of the finger 70. The opposite, trailing side 73 of the fingers 70 can extend at a slight angle relative to the length direction T and/or the edge portion 72, and there can be a bent transition position 74 between the edge portion 72 of one finger and the trailing side 73 of the an adjacent finger 70. As can be seen the edge portion 72 can be brought into a position in which it extends substantially parallel to and substantially at the same level as the adjacent support surface 63. In fig. 12 this position is shown, wherein the adjacent finger preceding this finger 70 extends to a side of a cell 19 of the star wheel 4. Above the slot 5 near the urging device 62 a sensor 75 is mounted, such as for example an optical sensor, registering during use movement of products into the slot 5, over fingers 70 of the urging device 62.

Above the slot 5 furthermore a pressing device 76 can be mounted. In the embodiment shown the pressing device 76 comprises two substantially parallel arms 77, extending partly on opposite sides of the star wheel 4, above the fingers 70. The arms 77 are mounted on a common carrier 78, mounted on an axis of rotation 79 and biased in a downward direction P, for example by one or more springs 80 and/or gravity. As can be seen in fig. 12 the arms 77 can rest on ends 81 of the fingers 70, such that a rotation of the urging device 62 will move the arms up and down, pivoting around the axis 79.

Preferably the urging device has a first number N1 of fingers or at least edge portions 73, whereas the star wheel has a second number N2 of first cells 19, wherein the first and second number N1, N2 are related by the formula $N1=N*N2$ or $N2=N*N1$, wherein N is an integer. In the embodiment shown N=1, resulting in the same number of cells 19 and fingers 70. N could also be a different number, for example but not limited to 2 or 3. When N=1 the revolutions of the star wheel 4 and the urging device 62 can be synchronised one to one.

In fig. 12 a knife arrangement 82 is shown, above the star wheel 4. A first and second dispenser 3, 40 are shown, for dispensing adhesive tape 39 and paper 41 respectively, in the same or similar manner as discussed with respect to the previous figures. In this embodiment the adhesive tape 39 is fed
5 over the periphery of the star wheel 4, the adhesive side facing outward, from substantially a lower side 84 of the star wheel 4. The paper or second tape 41 is fed from the second dispenser 40 over guide and tensioning wheels 86, 87, towards an upper side 85 of the star wheel 4.

The knife arrangement 82 can comprise a knife or blade 32, which
10 can be movable in a linear direction K, substantially radial to the star wheel 4, into and out of a cell 20, for cutting the tape 39 or combined tapes 39, 41. The knife 32 can be moved by a pneumatic or hydraulic driver 88, or in another suitable way, such as but not limited to electrically or mechanically, for example coupled to the rotation of the star wheel 4.

15 In fig. 13 in perspective view a device or apparatus 1 is shown, according to fig. 10 - 12. Such device can be used as follows, referring also to the previous description of other embodiments.

A product or bundle of products 51, such as flowers, vegetables, rod like elements or the like, which may or may not be enclosed at least partly in a wrap or bag, can be fed into the slot 5 from the inlet 9, over a pair of fingers 70.
20 In fig. 11 and 12 stems 90 of a bundle of flowers are shown as a bundle of products 51 to be tied. When the stems 90 are moved over the fingers 70, for example by a transport conveyer 100, extending over the support surface 63, and below the sensor 75, a control unit 91 will drive the star wheel 4 and the
25 urging device 62 in the direction 71, such that the edge portion 72 will urge the stems 90 together and into the cell 19 of the star wheel 4, against the tape 39 extending over said cell 19. By rotating further the tape will be forced into the cell, together with the stems 90, as discussed before, whereas the arms 77 of the pressing device will come down and will be forced against the stems 90 on
30 either side of the star wheel 4, urging the stems 90 down towards the bottom

portion 67 thereof, keeping them together during tying. Then the star wheel 4 and urging device will be rotated further, such that (if applicable) paper or such tape 41 will be provided in an earlier described manner over part of the adhesive tape 39, forming a tie as discussed and shown in for example fig. 2, in
5 a position leaving the apparatus 1. The knife 32 will then be forced downward, into the relevant second cell 20, for cutting the tape 39 or combined tapes 39, 41, such that the tied stems 90 or at least products 51 can be removed when the star wheel is rotated further, such that the relevant cell 19 holding the stems 90 will be flush with the slot 5 again. For each bundle 51 to be tied the
10 star wheel 4 and urging device 62 will be rotated over the same angle of approximately 120 degrees.

The knife arrangement 82 can be provided with a supporting roll 92, supported on a periphery of the star wheel 4. In an embodiment the knife 32 can be biased by the driver 88 into an extended position, such that the roll 92
15 is forced against the periphery and that the knife 32 will automatically be forced through the tape or tapes 39, 41 when the cell 20 arrives at the roll 92 which will then be forced into said cell 20, together with the knife 32. The driver 88 can then retract the knife and roll 92 after the cutting. Alternatively the knife 32 can be actively forced into the cell 20 by the driver 88, triggered by
20 for example the control unit. Other means of operation are also possible, whereas a similar knife arrangement 82 could be used in the other embodiments, whereas other knives and knife carriers, such as but not limited to the rotating knife carriers as described before could also be used in an apparatus according to fig. 10 - 14.

25 By using the urging device 62 and/or the pressing device 76, and preferably both, the products can be brought into and/or held in a compact bundle during tying thereof.

It shall be clear that an urging device 62 and/or a pressing device 76 could also be used in the same or similar manner with embodiments of the
30 apparatus 1 as discussed before.

In fig. 14A and B schematically two embodiment are shown of an apparatus 1, for example according to fig. 2 and 12 respectively, combined with a device 95 for feeding containers or other items 96 to the tape 39 between the first dispenser 3 and the slot 5. In the embodiment shown in fig. 14A the device 95 comprises or is formed by a pick and place type robot 97, picking containers or items 96 from a supply and pushing the container or item 96 against the adhesive side of the tape 39 at a first cell 10, such that when released by the robot 97 the container or item 96 will rotate with the star wheel 4 towards the inlet side 9 of the slot. In fig. 14B the device 95 comprises a movable table 98 below the star wheel 4, on which a container or item 96 is placed, for example by a transport element such as but not limited to a conveyer, or a robot. The table is then pushed up, for example pneumatically or hydraulically, electrically or mechanically, such that the container or item 96 is adhered to the adhesive side of the tape 39, preferably in a position at a first cell 19. Again, when the star wheel 4 is then rotated such that the said cell 19 comes flush with the slot, the item or container 96 will be facing the slot inlet side 9. Alternative solutions for attaching the containers or items 96 can be envisaged and will be directly clear to the person skilled in the art. For example the belt 99 supplying the items or containers 96 could be fed directly under the star wheel, such that the items or containers 96 are adhered to the tape 39 directly and lifted off the belt by rotation of the star wheel 4.

When in this embodiment a product or bundle of products 51, such as the stems 90 are forced into the relevant cell 19, pushing the tape 39 into the cell, the container or item 96 will be enclosed between the tape 39 and the product or bundle of products 51, such that it will be tied to the product or bundle 51 simultaneously. An example of a container or item 96 can be, but is not limited to a bag, sachet, flask, bottle, leaflet, gift or the like. When bundling flowers the item 96 can for example be a sachet containing nutrition or fertiliser. When packaging produce the item can for example be additives to be used with the produce, such as but not limited to herbs, spices or the like.

Fig. 15 shows schematically in side view and frontal view an apparatus 1 according to the invention, which can be basically as described here before with reference to the earlier drawings and embodiments, and comprises a star wheel 4 with grabbing means 100 near at least one first cell and preferably near each first cell 19, especially the first cells 19 used or usable for receiving products. The grabbing means 100 can be provided on one side or both sides of the star wheel 4. The grabbing means 100 can comprise an arm assembly 101 at a side of the star wheel 4, carrying at least one strap 102. The at least one strap 102 is provided extending across or along an open side of the relevant first cell 19, such that products forced into the cell 19 will be forced against said strap 102 or straps 102. The at least one strap 102 is biased in said position extending across or along said open side of the cell 19 by a biasing element 103. In the embodiment shown the biasing element 103 is shown as a spring. In other embodiments this can be or comprise an actuator, such as an electrical or pneumatically driven actuator, or the strap can be at least partly elastic, such that it is tensioned when extended. The at least one strap 102 can be forced into or along the side of said cell 19 by the products to be tied or sealed. During such movement the strap 102 is forced to form a loop 109 and is thereby tightly around at least part of the product and a bag or the products, for holding them together during movement of the star wheel and providing tape around the product(s).

The grabbing means 100, especially the arm assembly 101 can comprise at least one arm 104, a first part 105 of which is movable along or across at least part of the open side of said first cell 19, wherein the strap 102 is guided over or held by said first part 105. The strap is therefore to be moved with said first part 105. In the embodiment shown at least two arms 104, 106 are provided, substantially near opposite sides of the cell 19. These two arms 105, 106 are provided on the same side of the star wheel 4. The strap 102 is guided over a first part 107 of said second arm 106 too. The first part 107 of the second arm 106 can be brought to a position near the first part 105 of the

first arm 104, above or next to a side of the open side of the first cell 19. Thus the strap part 108 extending from the first part 105 of the first arm 104 to the first part 107 of the second arm 106 can form a substantially closed loop 109 around the product or bundle or products and/or a bag extending there around, if provided for. The strap 102 preferably is free to move over at least one of the first parts 105, 107 of the arms 104, 106, such that the biasing element 103 can tighten the loop 109. In embodiments the strap 102 can be guided over guide elements 110 at or near the parts 105, 107, such as for example but not limited to rolls, bearings or smooth pins or the like.

10 In embodiments the grabbing means can be arranged to surround parts of the products extending through the relevant first cell 19, such that the products are tightly grabbed by the grabbing means 100 and held in a position at or near the open side of the first cell at the periphery 21 of the star wheel 4, at least during tying and/or sealing as described before.

15 The movement of the first arm 104 and, if available, the second arm 106 can be obtained by the pressure applied by the products pushed into the cell 19. In embodiments as shown in for example fig. 15 - 18 the movement of at least the first arm 104 can be forced by movement of the star wheel 4. In the embodiment shown the arm unit or arm assemblies 101 on either one side or both sides of the star wheel 4 are rotated together with the star wheel, such that they rotate together with the relevant cell 19 from the inlet opening 9 to the outlet opening 10. In embodiments the grabbing means 100 can be operated during rotation of the star wheel 4 by at least a cam plate 126, as schematically shown in fig. 18 and as will be described hereafter. However, other means for actuating the grabbing means are also possible, for example motor driven arm assemblies, which can be controlled by an electronic controller, for example based on signals from sensors sensing the position of products to be sealed and/or tied relative to the star wheel, the position of the star wheel and/or the position of the products relative to a cell 19 and/or to the tape or tapes 39, 41.

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In the embodiments shown, the arm assemblies 101 each comprise a first arm 104 and a second arm 106 on each side of the star wheel, at each first cell 19. The first arm 104 is mounted with an end 112 of a second part 114 opposite the first part 105 to a pivoting axis 113, extending through the star wheel 4 next to the cell 19. In the embodiment shown the axis 113 is positioned on a side of the cell 19 opposite the side closest to a second cell 20. Other positions are also possible. The first arm 104 is slightly bent, such that when the second part extends alongside an edge of the first cell 19, a free end 115 of the first part 105 extends near a first corner 116 of the cell 19, said corner 116 formed by the leading edge 24 of the cell 19 and the periphery 21 of the star wheel 4. A guide element 110 is positioned near said free end said first end 105, over which the strap 102 is led. The second arm 106 is in the embodiment substantially U shaped, having a first leg, forming a first part 107 of the arm 106, and a second leg forming a second part 117 of the arm 106. The two legs 107, 117 are connected by a bottom portion 118. A free end 119 of the second part 117 is pivotally connected to the first arm 104 in a pivot point 120 near the axis 113. The shape and dimensions of the second arm 106 are chosen such that it can extend around the edge of the first cell 19, along the leading and trailing edges 24, 25 and a bottom portion thereof, whereas a free end 121 of the first part 107 can extend next to a second corner 122 of the cell 19, formed by the trailing edge 25 of the cell 19 and the periphery 21 of the star wheel 4. Again a guide element 110 is positioned at said free end 121 of the first part 107 of the second arm 106. The strap 102 is guided over this guide element 110 too.

In the embodiment shown the axis 113 is connected at one end to a third arm 123, extending at an angle relative to the second part 114 of the first arm 104, for example an angle α of about 90 degrees, which has at its free end 124 guide element 125, such as a bearing element, for example a wheel, as is more clearly shown in fig. 18 too. A cam plate 126 is provided next to the star wheel 104, having an outer periphery 127 forming a running surface 128 for

the guide element 125. The star wheel 4, in fig. 18 shown in broken lines, has a diameter which can be larger than the maximum diameter of the cam plate 126. The cam plate is preferably stationary. Biasing means, such as a spring 129 connected to the star wheel 4, in fig. 18 shown by part of the cam plate 126 being broken away, are provided for biasing the guide element 125 against the running surface 128. In the embodiment shown the running surface 128 is over its larger part 130 substantially circular having a radius R, but has near its top side, or at least at a position where it guides the guide elements 125 when the relevant cell 19 is moved from the inlet opening 9 to the outlet opening 10, the guide surface has a somewhat flattened portion 131. During rotation of the star wheel 4 the guide elements will run over and in close contact with the running surface 128. Over the larger, substantially circular portion the guide surface will force the guide element 125 outward, against the biasing force, keeping the free ends 115, 121 of the first and second arms 104, 106 apart over a distance which can be comparable to the width of the open side of the cell 19 at the periphery, as is shown in fig. 17A. When the guide element 125 runs on the flattened portion 131, the third arm 123 can pivot because the guide element 125 will move towards a centre 313 of the cam plate 126, meaning that the free ends 115, 121 can move towards each other. By pivoting the third arm 123, the first arm 104 will also be pivoted, in the same direction as the third arm 123.

In the embodiment shown, the end portion 132 of the first part of the second arm 106, forming the free end 121 thereof, is connected to the star wheel 4 by a pivot point 133, spaced apart from the guide element 110 on said free end 121. A connecting plate 135, connected to said free end 121 is pivotally connected to the end 134 of the first part 107 of the second arm 106 by a pivot 136. When the first arm 104 is pivoted such that the free end 115 thereof is moved towards the free end 121 of the second arm 106, the pivot point 120 is moved towards the cell 19, forcing the pivot 136 away from the cell 19, thereby pivoting the connecting plate 135 and thus moving the guide element 110 on

the free end 121 towards the free end 119. The first, second and third arms 104, 106 and 123, and the cam plate 126 are designed such that the guide elements 110 on the free ends 115, 121 can be brought close together, effectively closing off the cell 19.

5 The strap 102 can be a closed loop or a longitudinal band or the like. The strap is guided over the guide elements 110 on both free ends 115, 121, and guided over two guide pins or such elements 137, 138 on the star wheel 4, near the bottom part of the cell 19, at the side of the trailing edge 25 thereof, and is then bent towards a direction of a second cell 20 leading the relevant
10 first cell 19. A connecting point 139 is provided on the star wheel 4, at a trailing edge of the said second cell 120, to which a spring or such biasing element 103 is connected with one end, the opposite end of said biasing element 103 being connected to the strap 102, such as to tension the strap 102. As can be seen in the drawings, the strap 102 can pass along a side of the cell
15 19 and, in side view, across the open side facing the periphery 21.

As shown in fig. 17 A - C, the grabbing means can be used to grab products 90 or parts thereof extending in a cell, especially a first cell 19, on one or both sides of the star wheel 4, and forcing them together and/or a bag around such product(s), for holding them tight during sealing or tying. In fig.
20 17 for the sake of clearness the tapes 39, 41 are left out but are extensively discussed in the previous part of the description. In fig. 17A a first cell 19 is open towards the inlet opening 9. A bundle 90 of products, such as for example flowers, or at least stems thereof, is moved towards the cell 19. The stems are moved against the strap or straps 102, against the part or parts 108 thereof
25 extending alongside or across the opening of the cell 19. By moving the stems further into the cell, the strap 102 is taken along, forming a part of a loop 109 around the stems. At the same time the star wheel is moved towards the position as shown in fig. 17B, wherein as described before the guide element 125 on the third arm 123 is moved onto and along the flattened part 131 of the
30 running surface 128 as shown in Fig. 18 at the top, allowing the arm 123 to

pivot and bringing the guide elements 110 together. The strap is tensioned by the biasing element 103, such that the strap is tightened around at least most of the stems in the cell 19. At the same time during rotation of the star wheel the tape or tapes 39, 41 is or are provided around the stems, tying them
5 together in a tight bundle. As discussed before, containers or the like additional products can also be provided in the same bundle.

Upon further rotation of the star wheel 4 the cell 19 with the bundle is brought to the exit opening 10 as shown in fig. 17C, in which the guide element 125 is brought onto the first, substantially circular part 130 of the
10 running surface 128 of the plate 126, bringing the third arm 123 back and therefore moving the guide elements 110 on the free ends 115, 121 of the first and second arms 104, 106 back away from each other, allowing the bundle to exit the cell 19, which can be aided by the tautening of the strap 102 reforming straight part 108 again. At the same time a next first cell 19 is brought in front
15 of the opening 9, for a next bundle of products.

In fig. 19 part of an apparatus of the invention is shown with an alternative embodiment of grabbing means 100, wherein similar first and second arms 104, 106 are shown. However, in this embodiment the arms 104, 106 are prepositioned or biased into the closed position, wherein the guide
20 elements 110 are closed together, as shown at the first cell 19 at the lower side of fig. 19. There is not a third arm 123 as is shown in the previously discussed embodiment but in stead the connecting plate 135 is extended in a direction away from the free end 121. At the end 140 opposite the free end 121 a guide element 141 such as a bearing, wheel, pin or the like is mounted on the plate
25 135. A guide bar 142 is placed alongside the star wheel 4, near the lower side of the opening 9, in the path of travel of said guide element 141. Upon rotation of the cell 19 towards the opening 9 the guide element 141 is moved against and along the guide bar 142, forcing the guide element inward, somewhat towards the centre 33 of the star wheel 4, thereby pivoting the connecting
30 plate 135 such that the free end 121 with the guide element 110 thereon is

moved out of the way of a bundle 90 of products entering the cell 19. This forces the second arm 106 to move too, such that it pushes the first arm 104 to pivot around the pivot point 113. This moves the free end 115 with the guide element 110 thereon away from the free end 121 of the second arm 106, opening up the cell 19 for a bundle 90 of products or similar to enter into the cell 19. Upon further rotation of the star wheel 4 the guide element 141 is again released from the guide bar 142 and can move back into the original position, closing the cell and the strap around the products extending therein. At the outlet opening 10 or the side thereof the products can be moved out of the cell 19 again, for example by pulling them out from between the strap 102 and/or the arms 104, 106, or by forcing the arms 104, 106 or at least the free ends 115, 121 thereof apart in a manner similar to as described before with respect to the guide bar 142 and guide element 141 assembly.

In a further alternative embodiment the straps can be replaced by or supplemented by resilient elements on part of one or more of the arms 104, 106, such as but not limited to foam material, elastomeric material, rubber material or the like, for grabbing the products relatively softly but firmly in or at least next to the first cells 19. By way of example, the material can be an open or, preferably, closed cell foam, made of a plastic or rubber material, such as known from transporting devices for flowers. In the embodiments described and shown in the drawing, there is a first and a second dispenser 3, 40. However, in all embodiments it could be sufficient to have one tape dispenser only, especially the first dispenser for the adhesive tape.

At least one of the knife arrangement or knife carrier, the star wheel and the urging device and/or pressing device, and/or at least one dispenser 3, 40 could be connected to a counter, registering the number of revolutions or cutting actions during a period, which will be indicative for the number of products or bundles of products that have been tied during that period. This information can be read directly from the counter or could be transferred to another location, for example by wireless, sms or the like.

The invention is by no means limited to the embodiments shown and discussed here above. Many amendments and variations are possible within the scope of the invention. The star wheel can be driven differently, for example through a step motor engaging the axis 15 or by the feeding and/or discharging means. The knife carrier can be made differently, for example as an arm extending partly in the outlet opening 10, such that when the products are moved through the outlet opening the knife 31 is forced into a second cell 20, cutting loose the stems S. In stead of the star wheel 8 in the present form, rotatable around an axis 15, a star wheel can be in the form of an endless star belt, formed as a belt having a series of cells in an outwardly facing surface, guided over at least two end wheels, such that a series of cells 19, 20 is fed along the guide surface, allowing a series of bundles to be handled at the same time. Means can be provided to print information on and/or in the tape and/or the foil strip, such as sealing date, expiration date of the product, packing apparatus identification, advertisements or other information. In the embodiments shown the width of the strip of tape 39 is about the same as the width of the tape 41. These widths can be different, for example the second tape 41 can have a greater width in order to provide further information, such as user information, warranties and other communications. The urging means can be designed differently, for example moving substantially linearly. A transport belt or conveyer could be provided on both sides of the star wheel, or on only one side, and could be provided with elements for urging the products into a cell of the star wheel. The pressing device could also be designed differently, for example a flexible element extending alongside one or both of the sides of the star wheel, at an upper side of the cells 19 when opening towards the inlet 9 and/or outlet 10, for holding the products at a lower side of the cell 19. These and other modifications, including all combinations and permutations of aspects and parts of the embodiments shown are supposed to have been disclosed here, both in isolation and in combination.

Conclusies

1. Apparaat voor het sealen en/of het vastbinden van producten, omvattende een behuizing met ten minste een eerste tapedispenser en een sterwiel, een sleuf gevormd door de behuizing of door de behuizing heen, waarbij het sterwiel zich ten minste gedeeltelijk in genoemde sleuf
5 uitstrekt, waarbij het stelwiel een serie eerste cellen en een serie tweede cellen omvat, de eerste en tweede cellen intermitterend opgesteld in het sterwiel, waarbij elke cel open is aan een omtrek van het sterwiel en twee overstaande zijden daarvan, waarbij voor elke eerste cel een grijpelement is voorzien voor het grijpen van delen van producten die zich uitstrekken in de
10 eerste cel en het in de eerste cel samendrukken daarvan tijdens het bewegen van het sterwiel en het vastbinden en/of het sealen van het product.
2. Apparaat volgens conclusie 1, waarbij het grijpmiddel ten minste in of aan één zijde van de relevante eerste cel, bij voorkeur aan beide zijden van
15 de eerste relevante cel, ten minste één band omvat die zich uitstrekt over of langs een open zijde van de cel, zodanig dat producten die in de cel worden gedrukt, tegen genoemde band worden gedrukt, waarbij de band is voorgespannen in genoemde positie die zich uitstrekt over of langs genoemde open zijde door een voorspanmiddel en die door de vast te binden
20 of te sealen producten in of langs de zijde van genoemde cel kan worden gedrukt.
3. Apparaat volgens conclusie 2, waarbij de grijpmiddelen ten minste één arm omvatten, waarvan een eerste deel beweegbaar is langs of over ten
25 minste een deel van de open zijde van genoemde eerste cel, waarbij de band over genoemd eerste deel is geleid of door genoemd eerste deel wordt gehouden, om met genoemd eerste deel bewogen te worden, waarbij bij voorkeur ten minste twee armen zijn voorzien in hoofdzaak nabij

tegenovergestelde zijden van de cel, aan genoemde zijden van het sterwiel, waarbij de band over een eerste deel van genoemde tweede arm is geleid die in een positie kan worden gebracht nabij het eerste deel van de eerste arm, boven of naast de zijde van de open zijde van de eerste cel.

- 5 4. Apparaat volgens conclusie 3, waarbij de beweging van ten minste de eerste arm wordt geforceerd door de beweging van het sterwiel.
5. Apparaat volgens één der conclusies 1-4, waarbij de grijpmiddelen zijn opgesteld om genoemd deel van de producten die zich door de eerste cel uitstrekken te omsluiten, zodanig dat de producten vast worden gegrepen
- 10 door het grijpmiddel en bij of nabij de open zijde van de eerste cel in een positie worden gehouden, ten minste gedurende het vastbinden en/of sealen.
6. Apparaat volgens één der voorgaande conclusies 1-5, waarbij de grijpmiddelen worden bediend tijdens het roteren van het sterwiel door ten minste een nokschijf.
- 15 7. Apparaat volgens één der voorgaande conclusies, waarbij een drijfmechanisme is voorzien met ten minste een randgedeelte voor het drijven van ten minste één vast te binden product in één van de cellen, in het bijzonder een eerste cel, waarbij het randgedeelte bij voorkeur een deel is van een uitsteeksel of vinger van een wiel, zondanig roteerbaar dat genoemd
- 20 uitsteeksel of genoemde vinger ten minste deels kan roteren naast het sterwiel, langs een deel van de cel waarin het ten minste ene product wordt gedreven.
8. Apparaat volgens conclusie 7, waarbij de drijfmechanisme ten minste een paar randdelen heeft, één randgedeelte van een paar aan elke
- 25 tegenovergestelde zijde van het sterwiel, voor het drijven van ten minste één product in een cel aan genoemde tweede tegenovergesteld zijde en/of waarbij een uitsteeksel of vinger is voorzien aan beide zijden van het sterwiel.

9. Apparaat volgens één der voorgaande conclusies 7 of 8, waarbij de drijfinrichting een eerste aantal randgedeeltes of paren van randgedeeltes heeft, verdeeld langs een omtrek van een as of wiel, en het sterwiel heeft een tweede aantal eerste cellen, waarbij het eerste aantal gelijk is aan n
5 keer het tweede aantal, waarbij n een geheel getal is.
10. Apparaat volgens één der voorgaande conclusies, waarbij een drukinrichting is voorzien voor het in een cel drukken van een product of set van producten, in het bijzonder een eerste cel, weg van de open zijde daarvan, waarbij de drukinrichting bij voorkeur ten minste één arm heeft
10 die zich uitstrekt langs een deel van een zijde van het sterwiel en bij voorkeur een paar armen, die zich uitstrekken langs een deel van de tegenovergesteld zijden van het sterwiel, voorgespannen in de richting van een as van het sterwiel en/of zodanig is voorzien dat deze door het bewegen van de drijfinrichting and/of het sterwiel in en uit samenwerking wordt
15 gebracht met het ten minste ene product in de relevante cel.
11. Apparaat volgens één der voorgaande conclusies, waarbij een sensor is voorzien nabij de drijfinrichting, voor het besturen van de drijfinrichting gebaseerd op de beweging van ten minste één product door een
20 waarneemgebied van de sensor.
12. Apparaat volgens één der voorgaande conclusies, waarbij een heen en weer gaand mes is voorzien langs de omtrek van het sterwiel, voor het in en uit een cel van het sterwiel bewegen, in het bijzonder een tweede cel, voor het snijden van door de tapedispenser aangevoerde tape over genoemde omtrek, waarbij het mes bij voorkeur pneumatisch wordt aangedreven.
25
13. Apparaat volgens één der voorgaande conclusies, waarbij elk van de eerste en tweede cellen een voorrand en een achterrاند heeft, gezien in een rotatierichting van het sterwiel, waarbij een afstand tussen de achterrاند van een eerste cel en de voorrand van een aangrenzende tweede cel, gemeten langs de omtrek van het sterwiel, kleiner is dan de helft van de

afstand tussen de voorrand van genoemde eerste cel en een voorrand van een opvolgende relevante eerste cel.

14. Apparaat volgens één der voorgaande conclusies, waarbij de sleuf is voorzien met een inlaatopening en een uitlaatopening, waarbij de eerste
5 cellen zijn verdeeld over het sterwiel, zodanig dat wanneer zich een eerste cel opent naar de inlaatopening van de sleuf, zich een andere eerste cel opent naar de uitlaatopening van de sleuf, waarbij zich een ondersteuningsvlak langs het sterwiel en/of de sleuf uitstrekt, welk ondersteuningsvlak een golvend gedeelte naast het sterwiel heeft, zodanig
10 dat wanneer het ondersteuningsvlak zich in hoofdzaak horizontaal uitstrekt een eerste deel van het transportvlak zich naast het sterwiel hoger uitstrekt dan een as van het sterwiel en twee aangrenzende delen van het ondersteuningsvlak zich aan weerszijden van het eerste deel op een lager niveau uitstrekken.

15. 15. Werkwijze voor het sealen en/of samenbinden van producten, waarbij klevend tape over een open zijde van een cel van een sterwiel wordt geleid, waarbij een klevende zijde van de klevende tape is afgekeerd van het sterwiel, waarbij een product of bundel producten tegen de tape en in de cel wordt gedrukt, ten minste een deel van de klevende tape rond ten minste
20 een deel van het product of bundel producten klevend, en het roteren van het sterwiel rond een as, waarbij de cel met het product of bundel producten bij voorkeur langs een aanvoerstation wordt bewogen voor het aanvoeren van een tweede tape, bij voorkeur een niet-klevende tape, over de cel en het product of bundel, klevend aan de klevende tape, het samenbinden van de
25 tape rond het product of de bundel producten, waarbij het sterwiel verder wordt geroteerd en de tape wordt of de twee verkleefde tapes worden gesneden, toestaand dat de bundel wordt verwijderd uit de cel, waarbij bij het intreden in de eerste cel het product of bundel producten ten minste tegen één band van een grijpmiddel wordt gedrukt welke vast rond ten

minste een deel van het product of bundel wordt geslagen, ten minste tijdens het aanbrengen van de klevende tape rond het product of de bundel producten, en daarna wordt losgelaten en verder geroteerd met het sterwiel.

16. Werkwijze volgens conclusie 15, waarbij de grijpmiddelen worden
5 bediend door de rotatie van het sterwiel.

17. Werkwijze volgens conclusie 15 of 16, waarbij het product of de bundel producten in de cel wordt gedrukt en in de cel wordt gehouden door een drijf-inrichting en/of een drukinrichting.

18. Gebruik van een sealer met een sterwiel, een klevende tapedispenser
10 en een tapedispenser voor een tweede tape, die gemakkelijker scheurbaar is dan de klevende tape, voor het binden van producten, in het bijzonder vers product, waarbij klevende tape wordt afgegeven van de dispenser en ten minste rond een deel van een bundel producten wordt gewikkeld, gebruikmakend van het sterwiel, waarna een tweede tape aan de klevende
15 tape wordt gekleefd, zodanig dat einden van de klevende tape worden bedekt door de tweede tape en niet aan elkaar kleven, waarbij het product of de bundel producten wordt gegrepen en gehouden in een cel van het sterwiel door het grijpmiddel tijdens het binden en/of het sealen van het product of bundel producten.

20 19. Gebruik van een sealer volgens conclusie 18, waarbij de bundel producten in de cel wordt gedrukt en tijdelijk in de cel wordt gehouden door een drijf-inrichting en/of een drukinrichting.

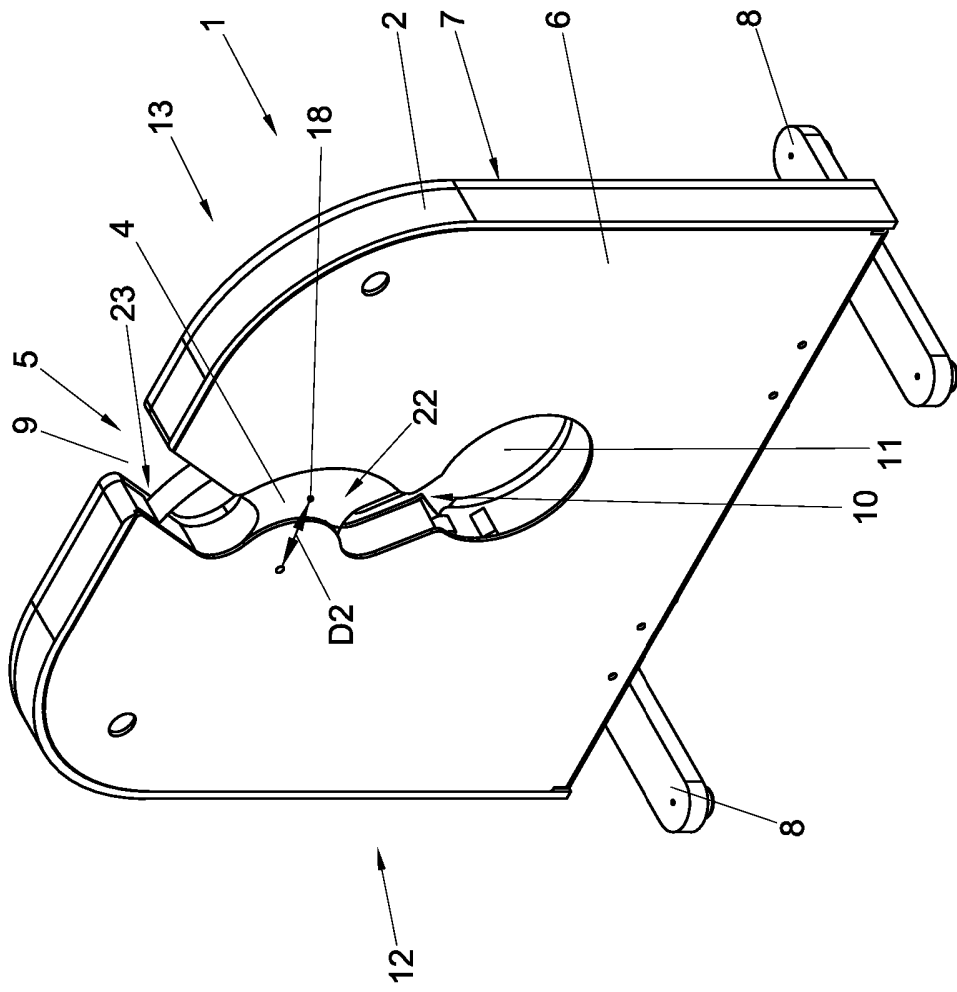


FIG. 1

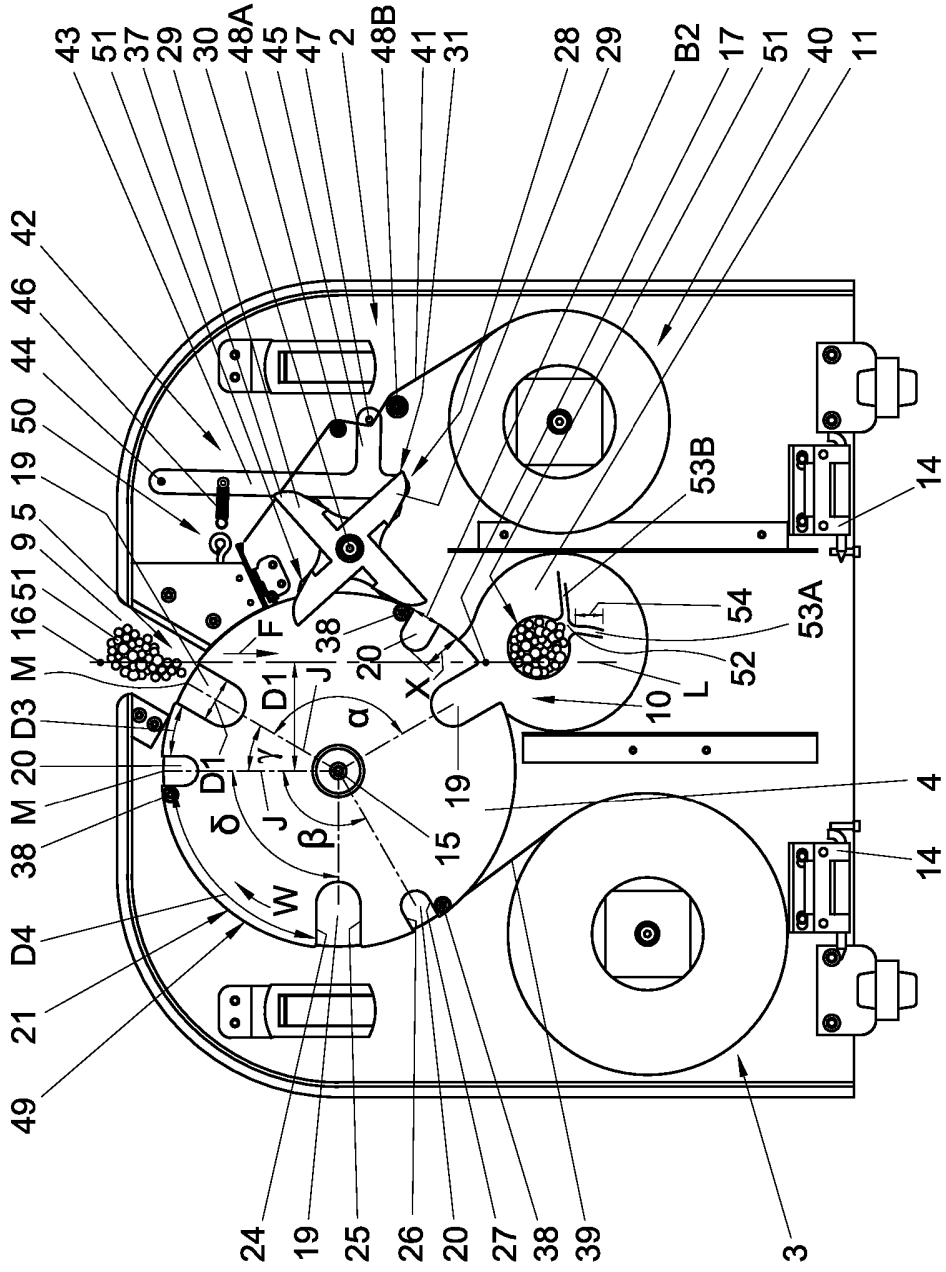


FIG. 2

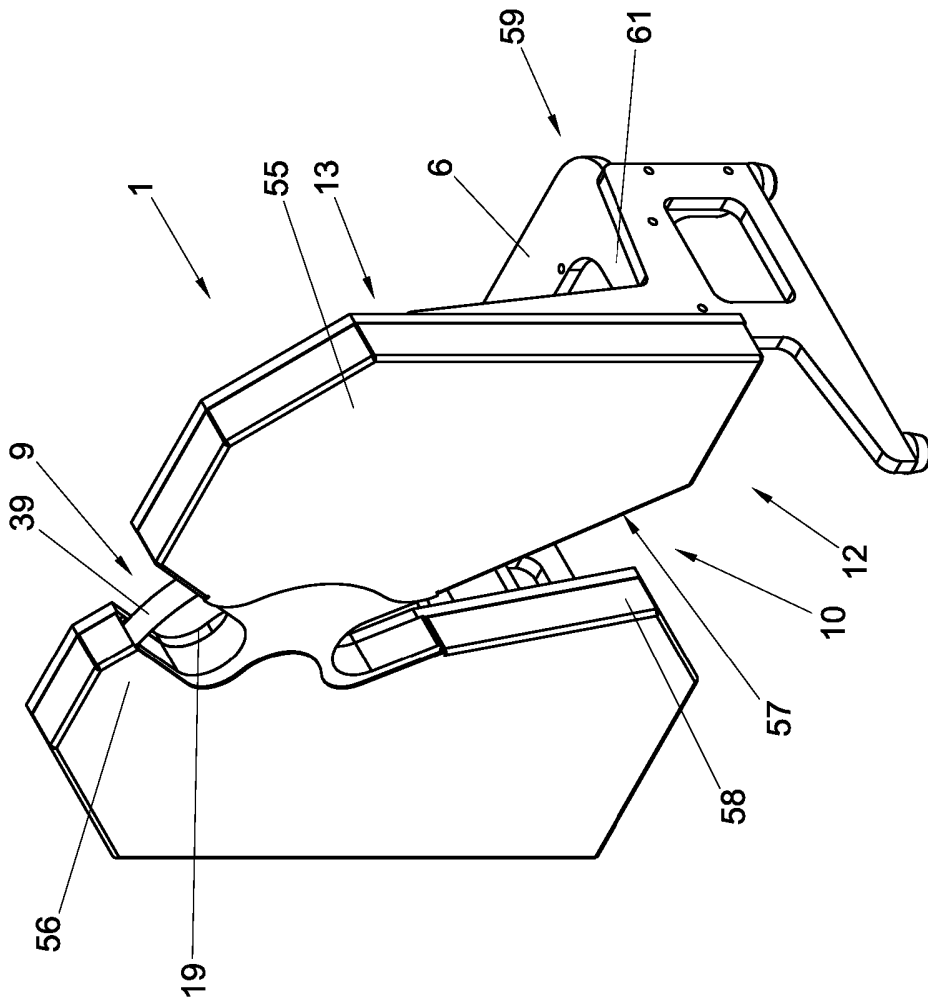


FIG. 3

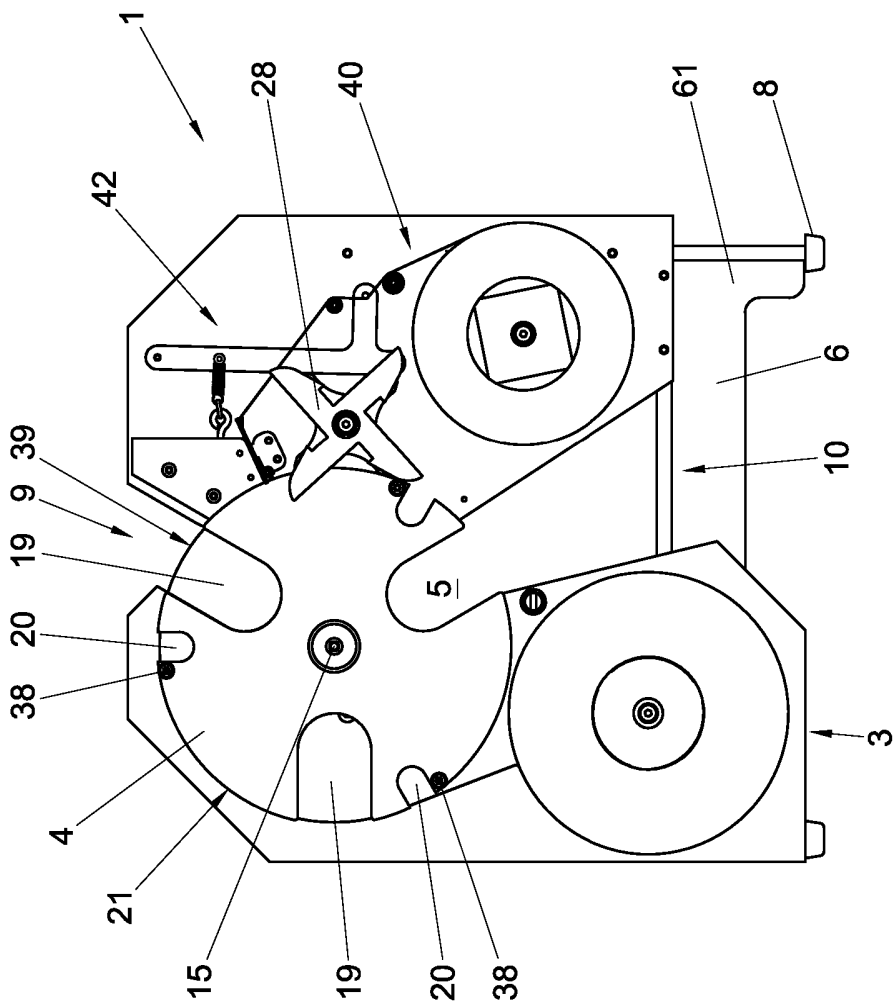


FIG. 4

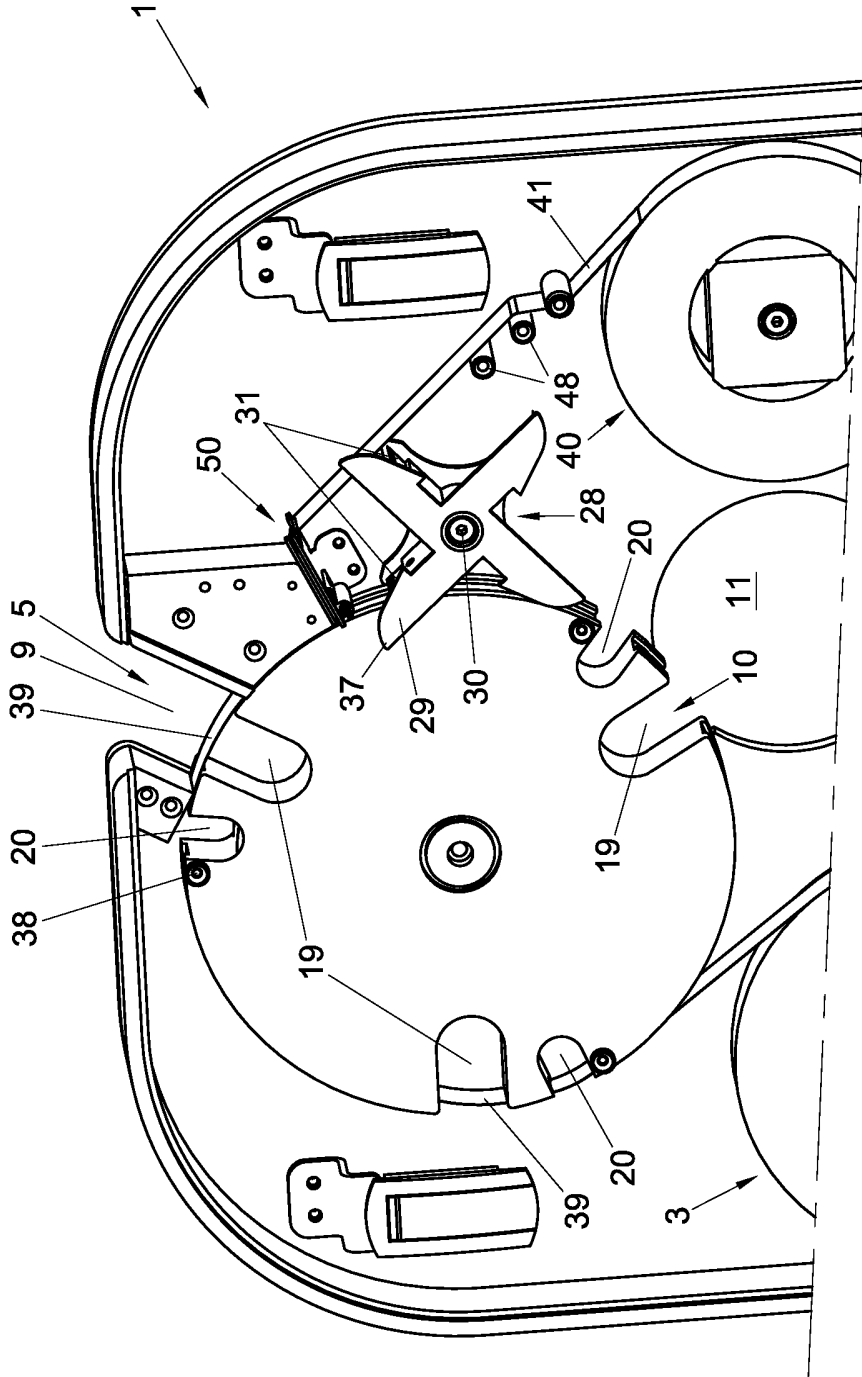


FIG. 5

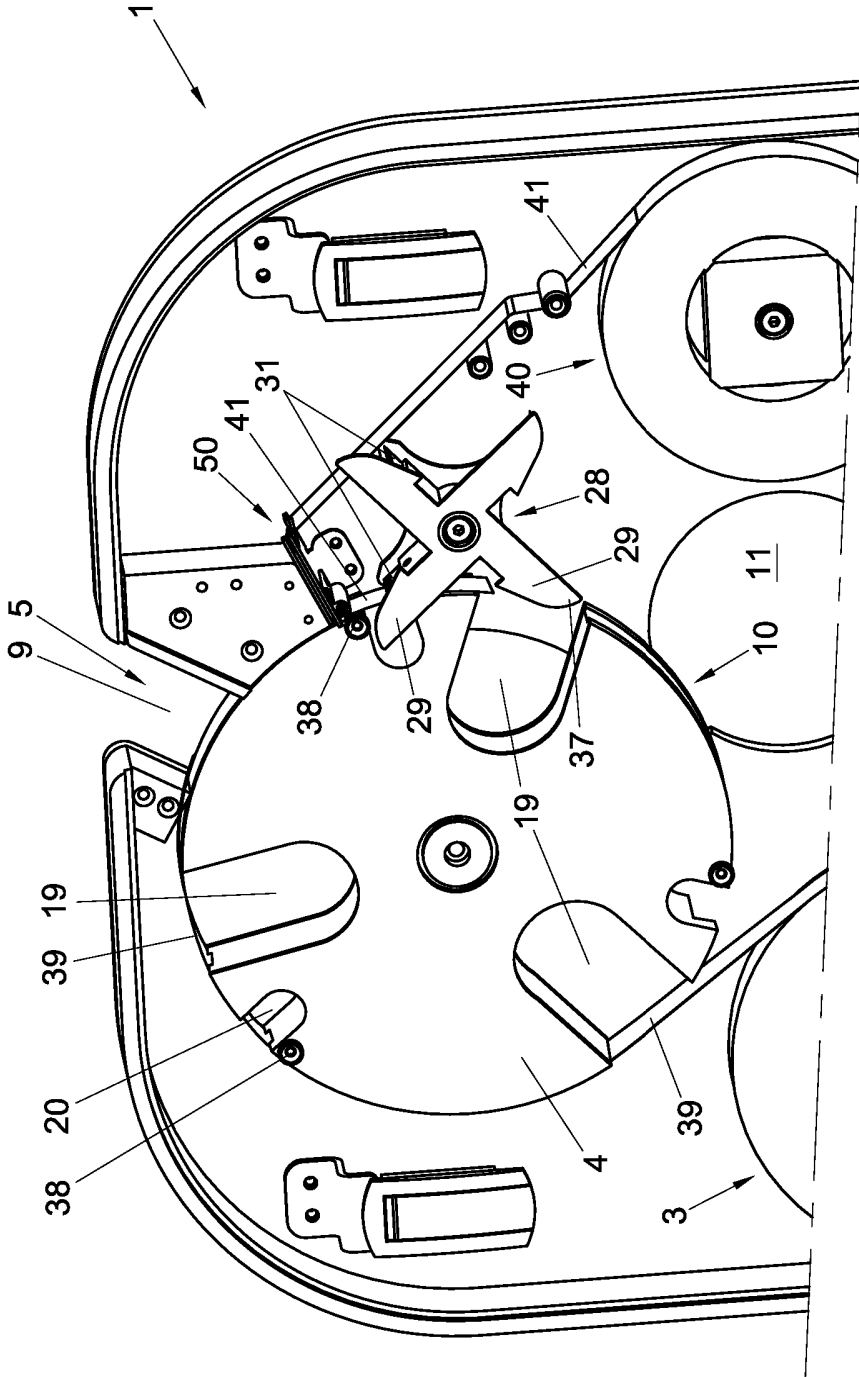


FIG. 6

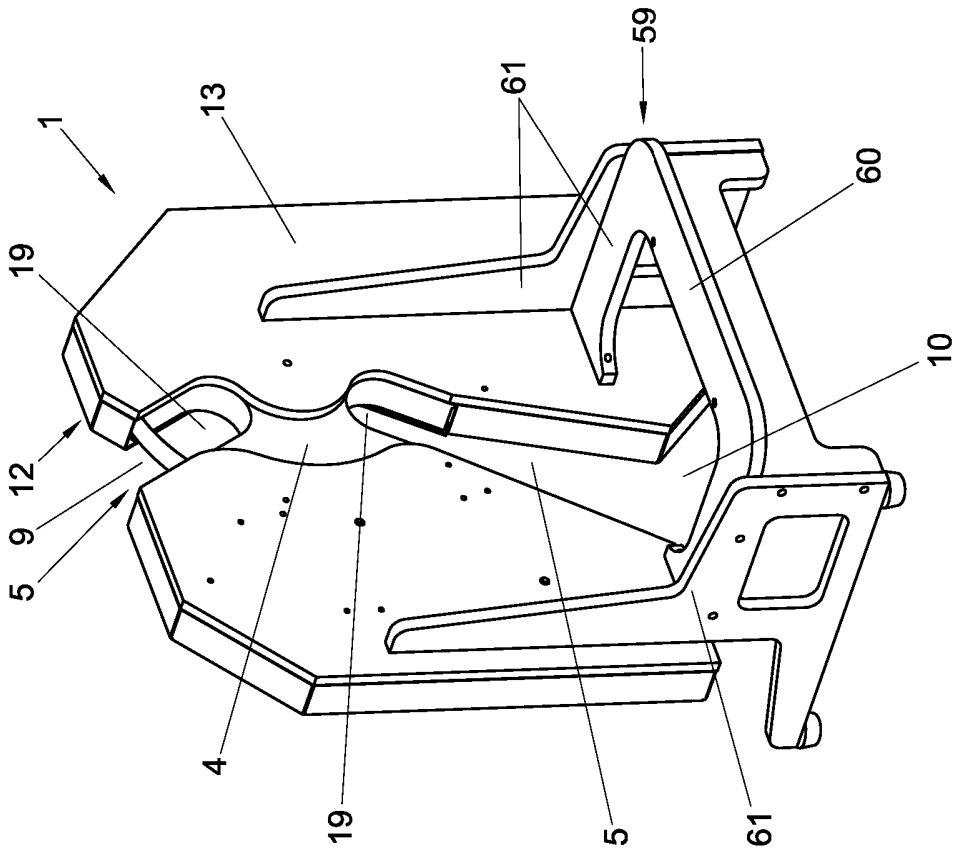


FIG. 7

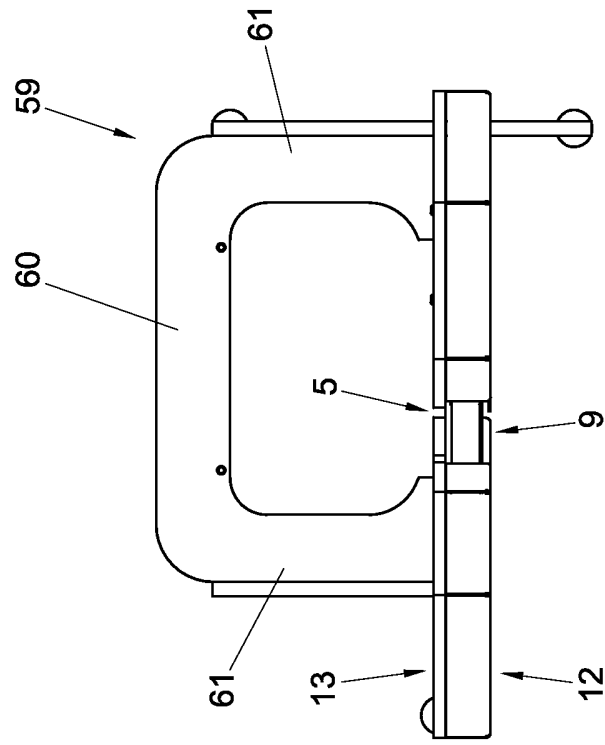


FIG. 8

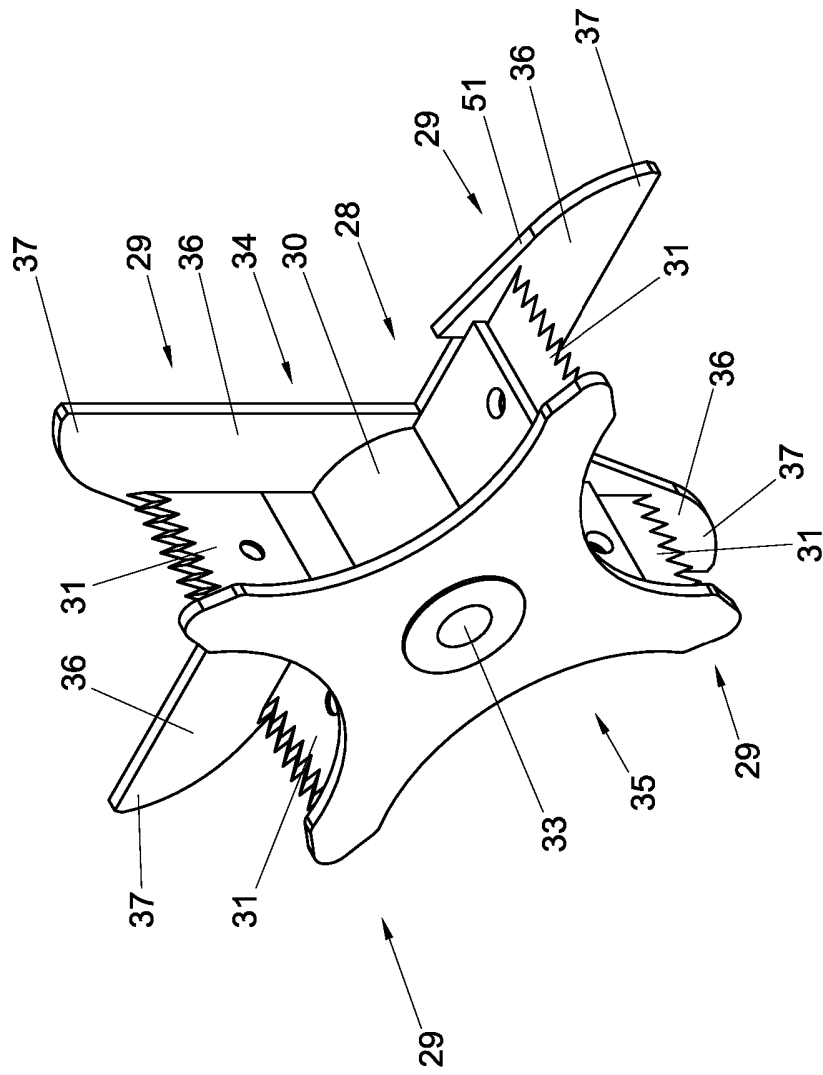


FIG. 9

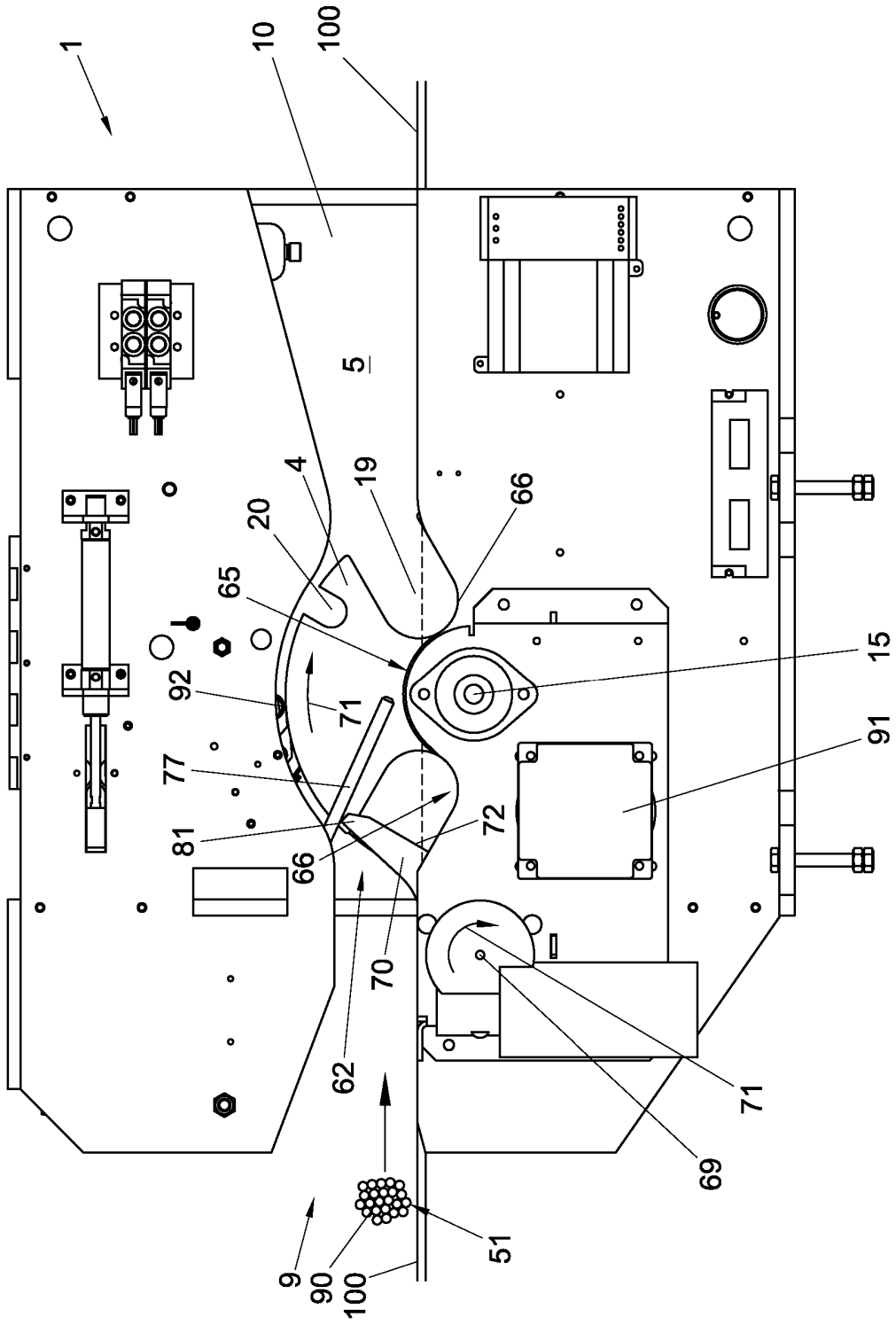


FIG. 10

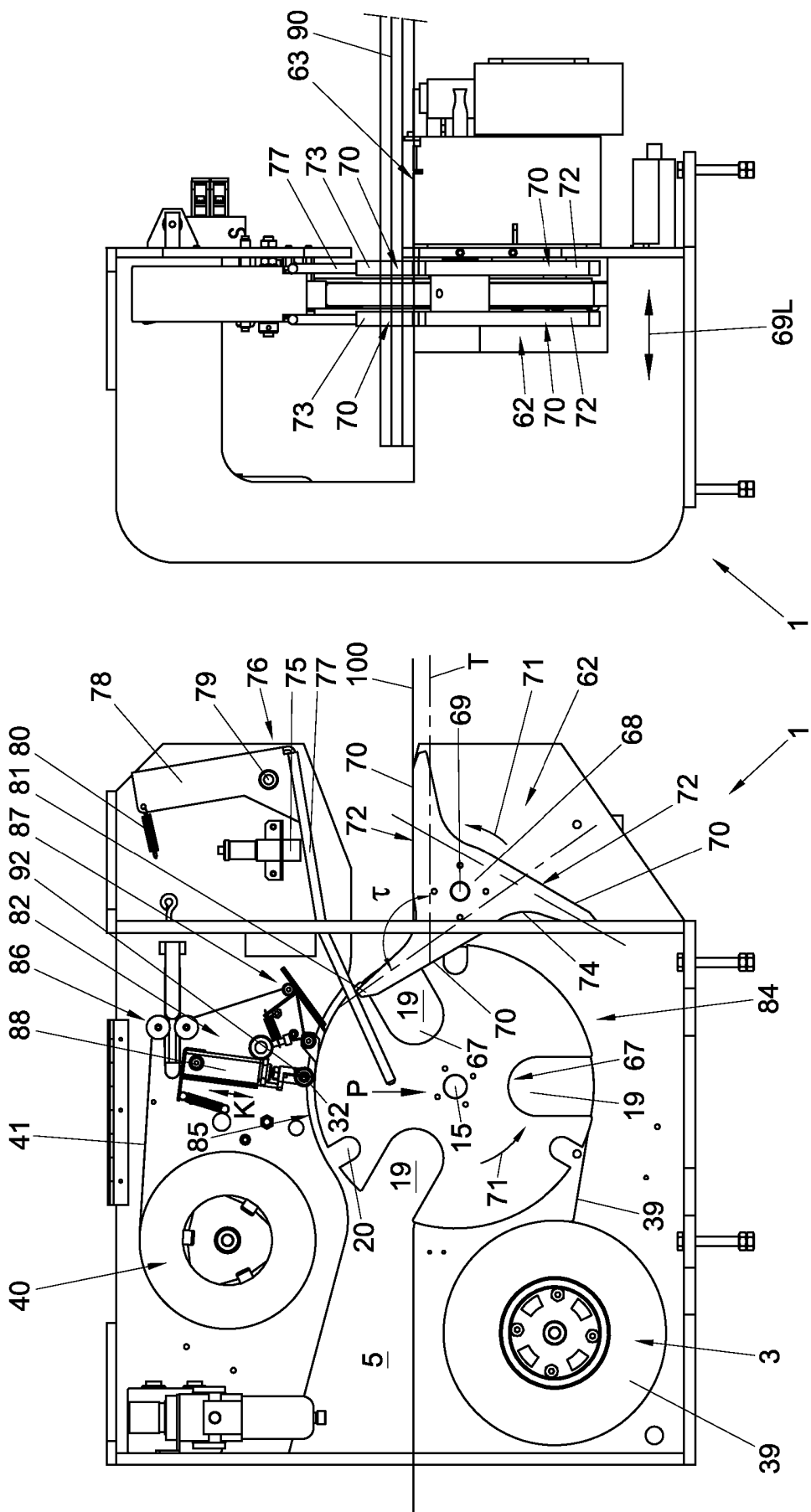


FIG. 11

FIG. 12

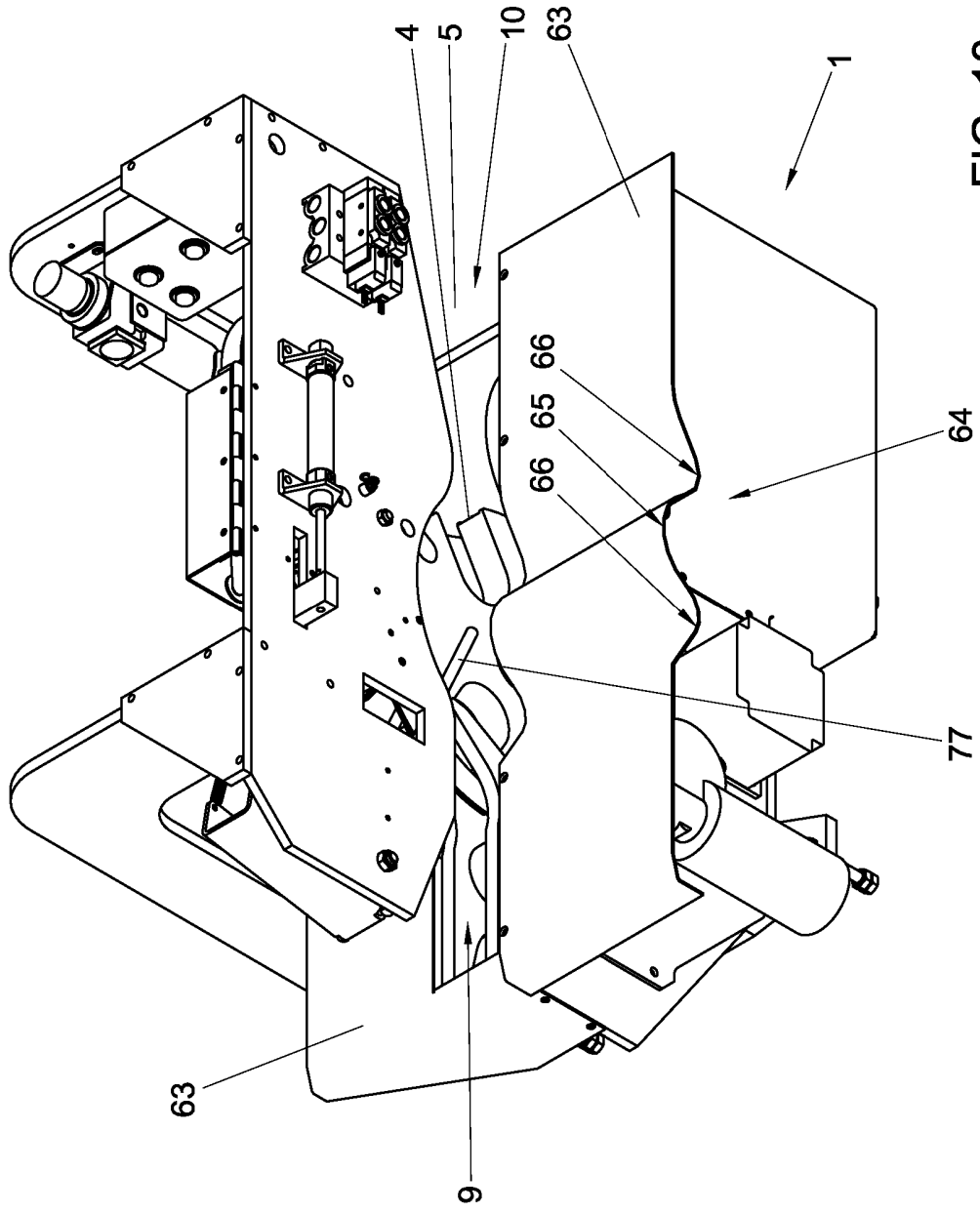


FIG. 13

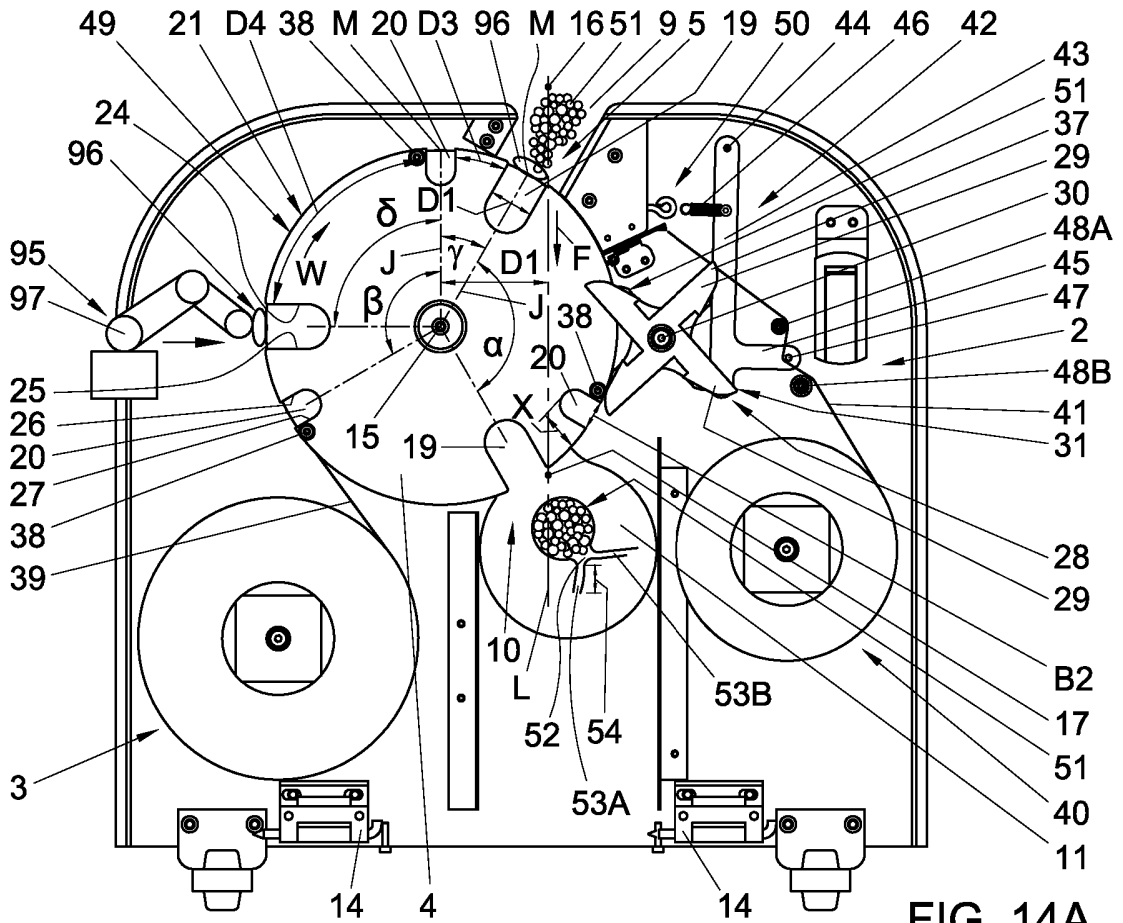


FIG. 14A

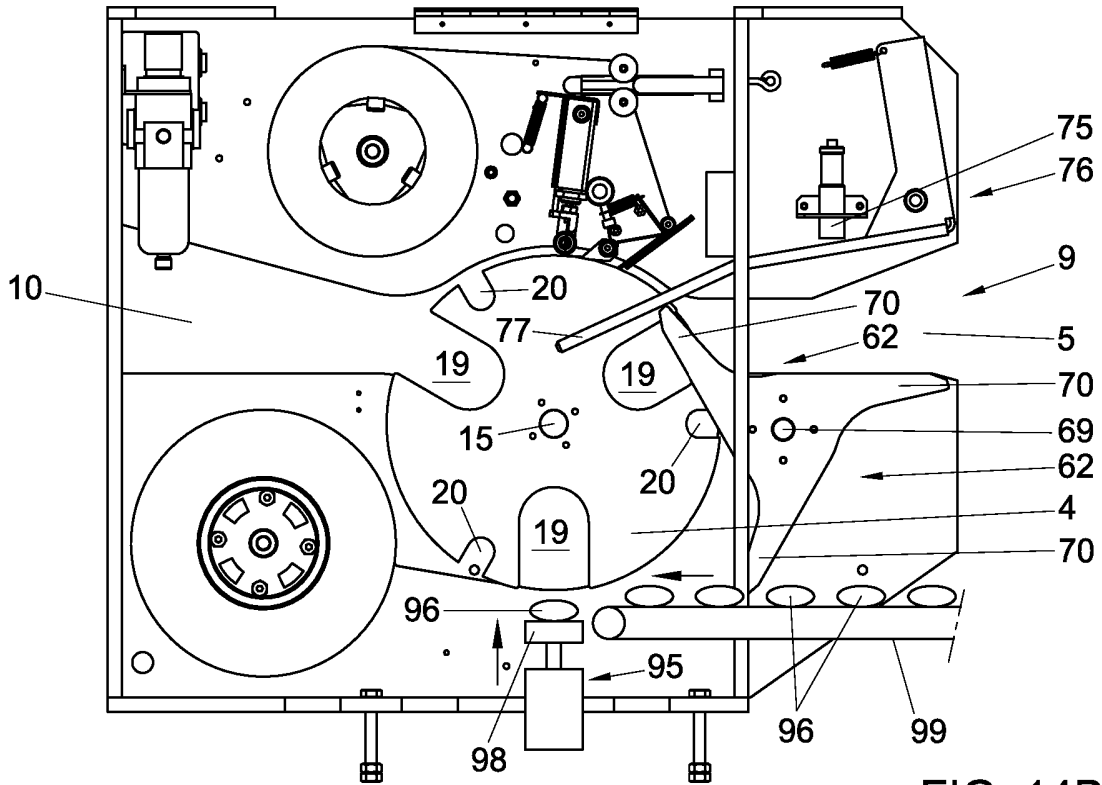


FIG. 14B

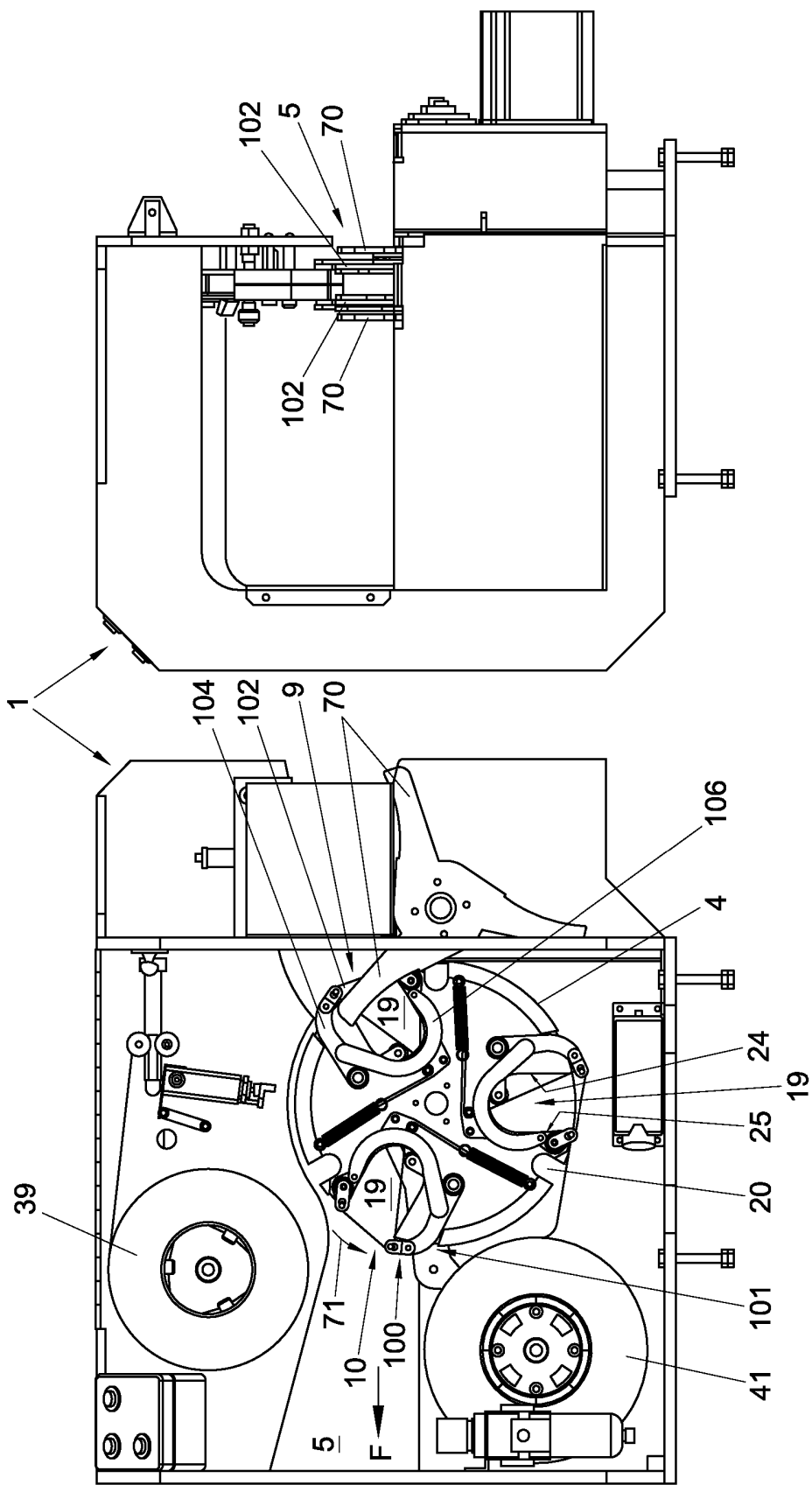


FIG. 15

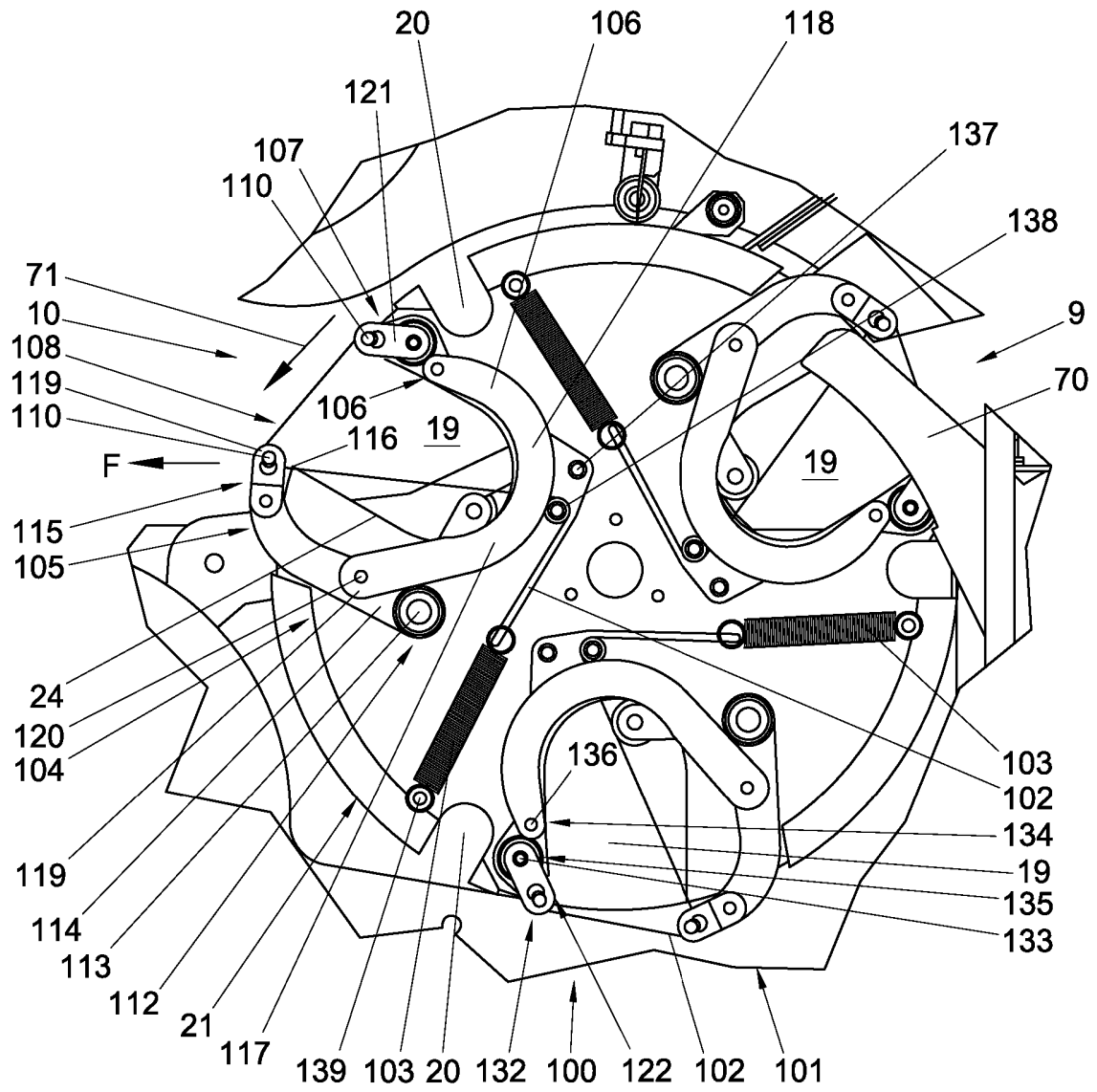


FIG. 16

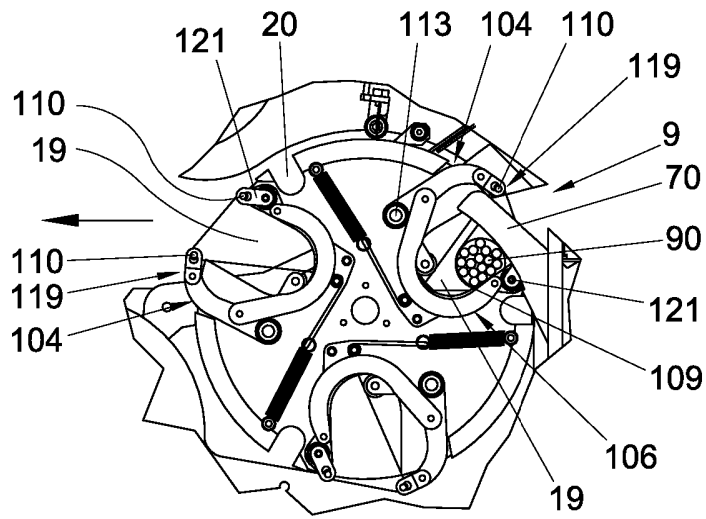


FIG. 17A

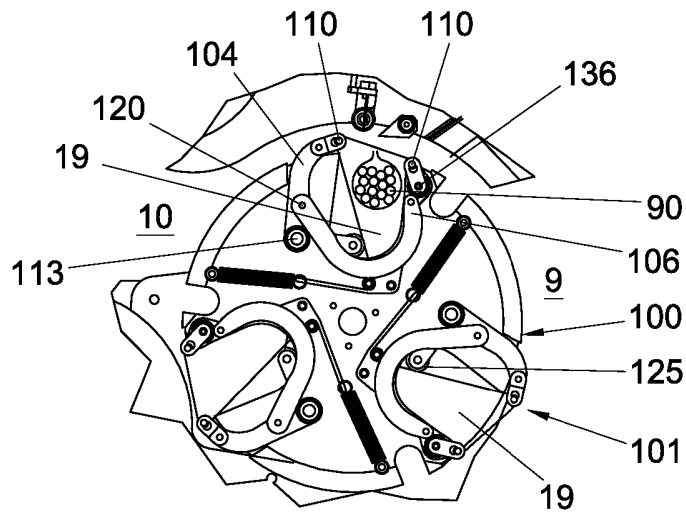


FIG. 17B

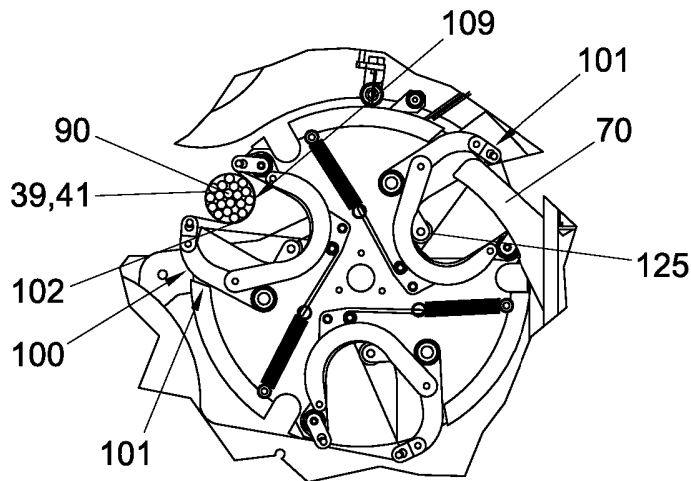


FIG. 17C

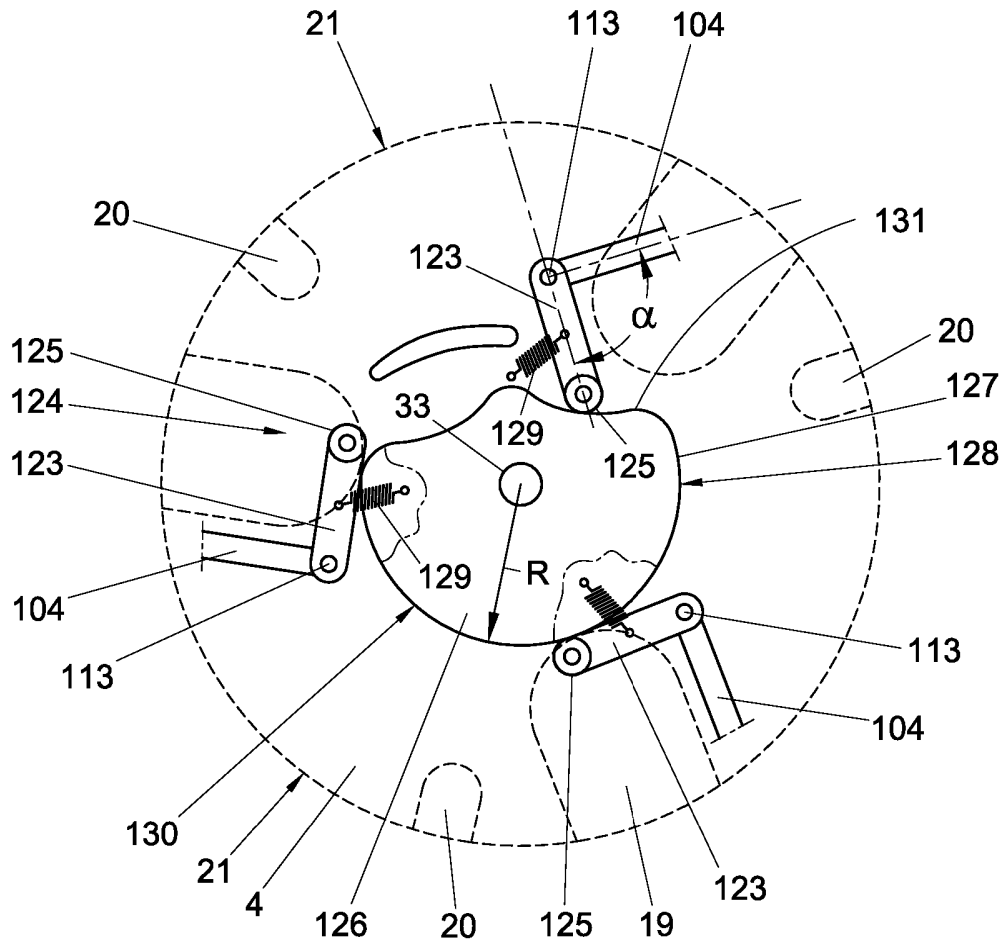


FIG. 18

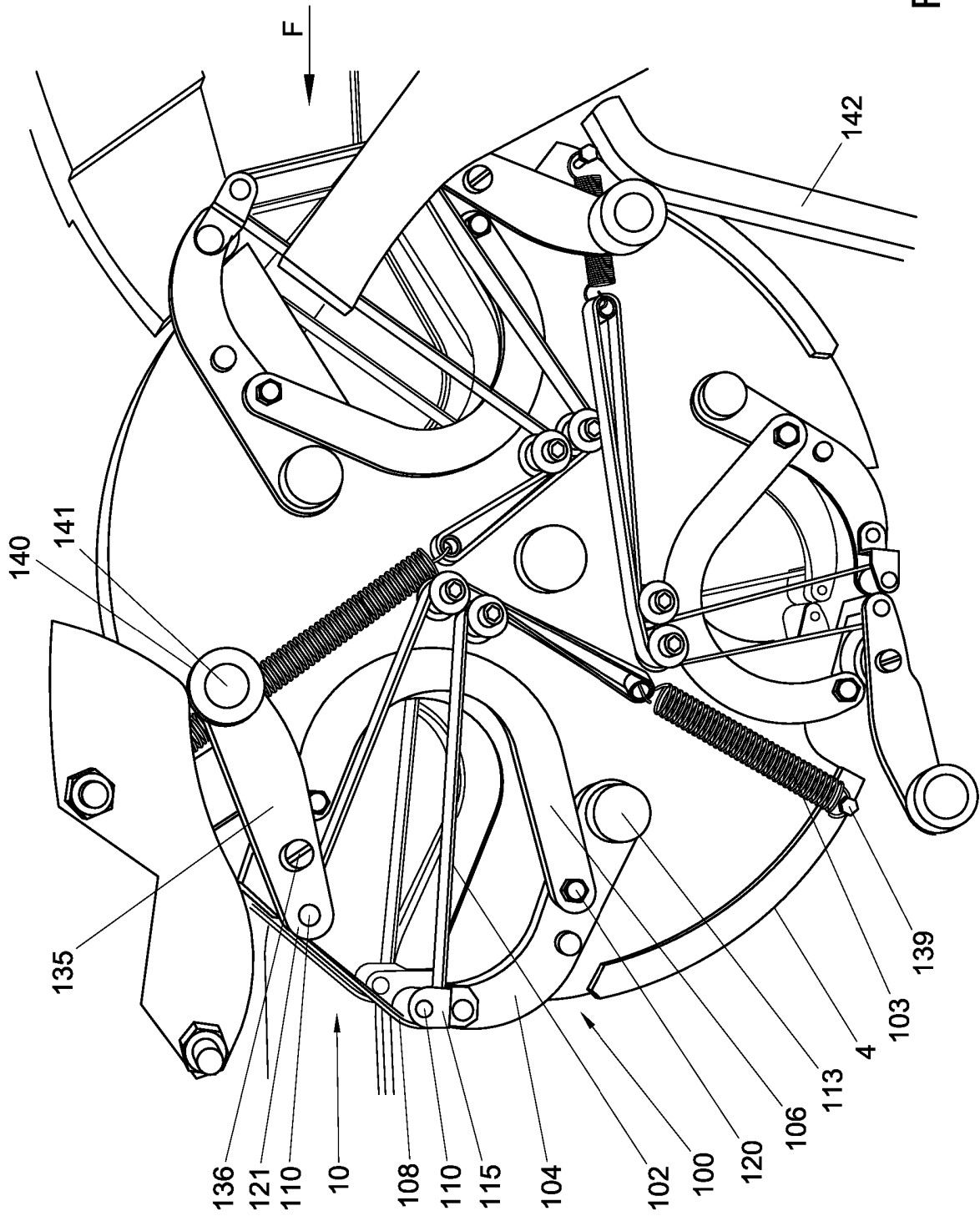


FIG. 19

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE P94973NL00
Nederlands aanvraag nr. 2007689	Indieningsdatum 31-10-2011
	Ingeroepen voorrangsdatum
Aanvrager (Naam) AA Specialty Products B.V.	
Datum van het verzoek voor een onderzoek van internationaal type 04-02-2012	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN 57613
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC) B65B25/02 B65B27/10 B65B51/06 B65B67/06	
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
IPC	B65B
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III. <input type="checkbox"/>	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV. <input type="checkbox"/>	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 2007689

A. CLASSIFICATIE VAN HET ONDERWERP

INV. B65B25/02 B65B27/10 B65B51/06 B65B67/06
ADD.

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

B. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
B65B

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

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

EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
Y A	WO 2011/002287 A1 (DUOSEAL AUTOMATICS B V [NL]; AARTS GUIDO MAURINUS ADRIANA MARIA [NL]) 6 januari 2011 (2011-01-06) * het gehele document *	1,6-8, 10-14, 18,19 2-5,9, 15-17
Y	----- NL 6 804 235 A (N:V. MACHINEFABRIEK "OOST-GRONINGEN") 30 september 1969 (1969-09-30) * bladzijde 3, regel 30 - bladzijde 4, regel 1; figuren 1,2 *	1,6,8, 10-14, 18,19
Y A	----- NL 8 801 612 A (LUDMILLA VISSER) 16 januari 1990 (1990-01-16) * bladzijde 4, regel 28 - regel 35; figuren 1,2 *	7,8,19 9
	----- -/-	



Verdere documenten worden vermeld in het vervolg van vak C.



Leden van dezelfde octroofamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

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

D in de octrooiaanvraag vermeld

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

L om andere redenen vermelde literatuur

O niet-schriftelijke stand van de techniek

P tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

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

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

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

Z lid van dezelfde octroofamilie of overeenkomstige octrooipublicatie

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

4 april 2012

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

Naam en adres van de instantie

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

De bevoegde ambtenaar

Schelle, Joseph

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 2007689

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A	US 4 537 005 A (HOYLAND TREVOR B [GB]) 27 augustus 1985 (1985-08-27) * het gehele document * -----	1,15

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

Informatie over leden van dezelfde octrooifamilie

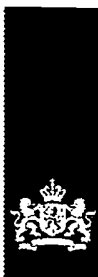
Nummer van het verzoek om een onderzoek naar
 de stand van de techniek
NL 2007689

In het rapport genoemd octrooigeeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
WO 2011002287	A1	06-01-2011	GEEN

NL 6804235	A	30-09-1969	GEEN

NL 8801612	A	16-01-1990	GEEN

US 4537005	A	27-08-1985	CA 1212090 A1 30-09-1986
		DE 3377055 D1 21-07-1988	
		EP 0099621 A2 01-02-1984	
		JP 1016735 B 27-03-1989	
		JP 1533370 C 12-12-1989	
		JP 59026404 A 10-02-1984	
		US 4537005 A 27-08-1985	



Agentschap NL
Ministerie van Economische Zaken,
Landbouw en Innovatie

WRITTEN OPINION

File No. SN57613	Filing date (day/month/year) 31.10.2011	Priority date (day/month/year)	Application No. NL2007689
International Patent Classification (IPC) INV. B65B25/02 B65B27/10 B65B51/06 B65B67/06			
Applicant AA Specialty Products 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 Schelle, Joseph
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WRITTEN OPINION

Application number
NL2007689

Box No. I Basis of this opinion

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

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

1. Statement

Novelty	Yes: Claims	1-19
	No: Claims	
Inventive step	Yes: Claims	2-5, 9, 15-17
	No: Claims	1, 6-8, 10-14, 18, 19
Industrial applicability	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

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

- 1 Reference is made to the following documents:
 - D1 WO 2011/002287 A1 (DUOSEAL AUTOMATICS B V [NL]; AARTS GUIDO MAURINUS ADRIANA MARIA [NL]) 6 januari 2011 (2011-01-06)
 - D2 NL 6 804 235 A (N:V. MACHINEFABRIEK "OOST-GRONINGEN") 30 september 1969 (1969-09-30)
 - D3 NL 8 801 612 A (LUDMILLA VISSER) 16 januari 1990 (1990-01-16)
- 2 The present application does not meet the criteria of patentability, because the subject-matter of claim 1 and 18 does not involve an inventive step.
The closest prior art is shown by document D1.
The apparatus according to claim 1 differs from the known apparatus in that "for each cell a grabbing element is provided".
The use according to claim 18 differs from the use known from D1 in that "the product or bundle of products is grabbed and held in a cell of the star wheel by grabbing means during tying and/or sealing of the product or bundle of products".
However, such a "grabbing element" and such a use of "grabbing means" are clearly suggested by document D2 (see page 3, line 30 to page 4, line 1 and figures 1 and 2).
- 3 Due to the fact that the method according to claim 15 includes the use of specific "grabbing means" which are not derivable from the available prior art, the subject-matter of claim 15 appears to meet the criteria of patentability.
- 4 The additional features of the dependent claims 2 to 5 and 9 are not suggested by the available prior art either.
- 5 The additional features of the dependent claims 6 to 8 and 10 to 14, however, cannot be said to be result of an inventive step in view of the available prior art and in view of the skilled person's general technical knowledge. The Applicant's attention is in particular drawn to the "urging device" suggested by

document D3 (see page 4, lines 28-35 and figures 1 and 2) and to the fact that the gripper arms 18 known from document D2 also form a "pressing device" in the sense of claim 10.