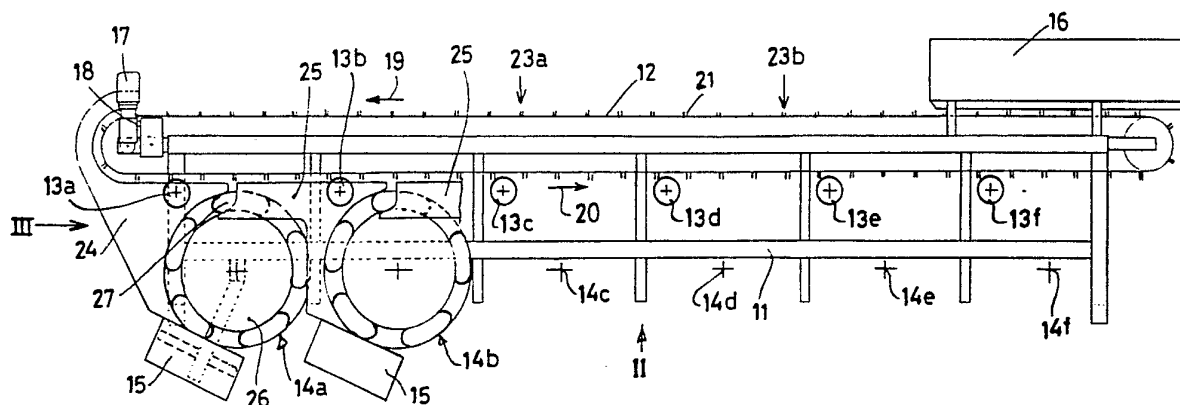




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(54) Title: DEVICE FOR PROCESSING CUT FLOWERS, PARTICULARLY ROSES



(57) Abstract

A device for processing cut flowers, particularly roses, comprises a conveyor (12) for conveying the flowers one by one, which is provided with suspension elements (21) gripping directly below a flower bud or calyx, so that each flower is conveyed in the position with the stem hanging down, means for sorting by stem length and grouping of the flowers into a number of stem length classes, and a number of collection units (14) disposed near the conveyor for collecting the flowers by stem length class. The device is provided with means (13) disposed next to the conveyor for cutting off the flower stems to a predetermined standard cut length for each stem length class, these means being disposed upstream of the collection unit (14) for the particular stem length class, viewed in the direction of conveyence (19, 20) of the flowers. Each collection unit (14) is arranged in such a way that in the collection unit the cut ends of the flower stems lie essentially in line with one another.

Device for processing cut flowers, particularly roses.

The invention relates to a device for processing cut flowers, particularly roses, comprising a conveyor for conveying the flowers one by one, which is provided with suspension elements gripping directly below a flower bud or calyx, so that each flower is conveyed in a position with the stem hanging down, means for sorting by stem length and grouping of the flowers into a number of stem length classes, and a number of collection units disposed near the conveyor for collecting the flowers by stem length class.

Such a device is known in various embodiments. In the case of the known devices the flowers to be sorted are conveyed by the conveyor past means for measuring the length of the flower stems and past the collection units. The flowers are in this case fed per stem length class from the conveyor to a specific collection unit intended for the stem length class concerned. In the collection unit the flowers are bundled into bunches. The stems of the flowers in a bunch are subsequently generally cut to equal lengths.

The disadvantage of the known devices is that the stems of the flowers in the bunches supplied are not of equal lengths. If the stems are not cut off to equal lengths, the appearance of the flowers leaves something to be desired. If the stems are cut to equal lengths, this is carried out by hand. Cutting off the flower stems manually means that there is a risk of damage to the flower stems and the leaves and it is quite inaccurate, so that, in order to ensure that all flower stems in bunches of a specific stem length class are of the required minimum length, during the sorting by stem length the limits between the different stem length classes must be laid well above the officially established limits.

This means that flowers with a stem length which lies just above an official class limit are often placed in a lower class, which means a financial disadvantage when selling.

The object of the invention is to provide a device for

processing cut flowers, in particular roses, with which the above-mentioned disadvantages are eliminated.

This object is achieved by a device of the type mentioned in the preamble, which is characterized in that the device
5 is provided with means disposed next to the conveyor for cutting off the flower stems to a predetermined standard cut length for each stem length class, these means being disposed upstream of the collection unit for the particular stem length class, viewed in the direction of conveyance of
10 the flowers, and in that each collection unit is arranged in such a way that in the collection unit the cut ends of the flower stems lie essentially in line with one another.

What is achieved with the device according to the invention is that the only operations which now have to take
15 place manually are the placing on the conveyor of the cut flowers to be sorted, particularly roses, and the removal of the flowers grouped into bunches, while the whole further processing takes place automatically. This produces a considerable saving of labour. The flower stems are cut off
20 very accurately, and sorting by stem length is also very accurate and reliable, so that narrow tolerances on stem length can be maintained, which produces a considerable financial advantage. The appearance of the bunches of flowers is very attractive, due to the fact that the stems
25 of the flowers in each bunch are the same length and at the bottom lie virtually in line with one another, and damage to the stems and the leaves on the stems is minimized.

Preferred embodiments of the device according to the invention are laid down in the sub-claims and described in
30 the example of an embodiment below with reference to the drawing, in which:

Fig. 1 is a schematic top view of a first embodiment of the device according to the invention;

Fig. 2 is a view of the device of Fig. 1 in the direction
35 of the arrow II;

Fig. 3 is a view of the device of Fig. 1 in the direction of the arrow III;

Fig. 4 is a top view on an enlarged scale of a cutting unit used with the device of Figs. 1 - 3;

Fig. 5 is a side view of the cutting unit of Fig. 4, viewed in the direction of the arrow V;

5 Fig. 6 is a side view of the last cutting unit, viewed in the direction of conveyance along the line VI-VI in Fig. 4;

Fig. 7 is a top view of a collection unit;

Fig. 8 is a side view of the collection unit of Fig. 7, viewed in the direction of the arrow VIII;

10 Fig. 9 is a cross-section of the collection unit along the line IX-IX in Fig. 8;

Fig. 10 is a schematic top view of a second embodiment of the device according to the invention;

15 Fig. 11 is a view of the device of Fig. 10 in the direction of the arrow XI;

Fig. 12 is a side view on an enlarged scale of a measuring and cutting device used with the device of Figs. 10 and 11, viewed in the direction of the arrow XII in Fig. 10;

20 Fig. 13 is a view of the measuring and cutting device of Fig. 12, viewed in the direction of the arrow XIII; and

Fig. 14 is a cross-section of the measuring and cutting device along the line XIV-XIV in Fig. 13.

25 Figs. 1 to 3 show schematically a device for sorting roses by stem length and collecting them by stem length class and bundling them into bunches. The device comprises a frame 11 to be placed on a floor and on which the various units of the device are mounted. These units are, inter alia, a conveyor 12 for conveying the roses to be sorted through the device, a number of schematically shown cutting units 13a-f, which are disposed next to the conveyor 12 and in which
30 the stems of the roses are cut off to the correct length, a number of collection units 14a-f arranged next to the conveyor 12 and downstream of a cutting unit 13 for removing the roses from the conveyor 12 and bundling them into
35 bunches, a number of binding units 15 each disposed next to a collection unit 14 for binding the bunches of roses in the appropriate collection units, and a control cabinet 16. A

main drive motor 17 with a transmission 18 is also mounted on the frame and ensures intermittent driving of the conveyor 12 in the direction of the arrows 19 and 20.

5 The conveyor 12 is equipped to convey the roses in a position with the stem hanging down. The conveyor 12 comprises in the direction of conveyance 19, 20 fork-shaped suspension elements 21 placed one after the other and gripping round the stem of the rose directly below the flower or flower bud. One single rose can be suspended in
10 each suspension element 21.

The conveyor 12 is a circulating endless conveyor comprising a number of individual, parallel narrow belts 12a-e with spaces between them. The suspension elements 21 are fixed on the top belt 12a. Carrier elements 22a-d for
15 the flower stems are fixed on the belts 12b-e. Designing the conveyor 12 in this way means that space is created to allow access at all sides between the belts 22a-e to the flower stems.

As can be seen in Fig. 3, the entire device is disposed at
20 a slight angle. The object of this is to ensure that the roses which are suspended at, for example, two places 23a and 23b in the suspension elements 21 are pressed by their own weight against the belts 12 b-e and can no longer fall out of the suspension elements 21. On the other hand, it
25 means that at the removal side of the device, at the collection units 14, the roses are easy to remove from the conveyor 12.

The embodiment of the device according to the invention shown in Figs. 1 to 3 comprises six cutting units 13a-f and
30 six collection units 14a-f, only two (14a, b) of which are shown in Fig. 1, and only one (14a) of which is shown in Fig. 2, and of which the other units are indicated only by means of their axis. With this device, roses can be divided into six stem lengths and bundled into bunches by stem
35 length class. It will be clear that the device can also be made suitable for a division into more or fewer stem length classes.

Roughly speaking, the device of Figs. 1 to 3 works as follows:

The roses are suspended in the suspension elements 21 of the conveyor 12 by one or two persons at 23a and/or 23b. This takes place when the intermittently driven conveyor 12 is at a standstill. The roses are then conveyed to the other side of the device by the conveyor 12 past the cutting units 13a-f and the collection units 14a-f. The stem of each rose is cut off in one of the cutting units 13a-f, depending on the stem length class in which the length of the stem of the rose in question falls, to a predetermined standard cut length appropriate to the particular stem length class. The limits of the stem length classes usually lie 5 cm apart here. The stem of each rose is cut off to a length which is slightly greater, for example 0.5 cm greater, than the minimum required stem length for a particular class. Since the roses are suspended by the top in a fork-shaped suspension element 21 and are cut off at the bottom, the stems of all roses in a particular stem length class are of equal length.

Each rose of which the stem has been cut off in one of the cutting units 13a-f is then removed by the collection unit 14 of the conveyor 12 disposed immediately downstream of the cutting unit 13 in question. Through the slanting position of the device, the roses have a tendency to slip out of the fork-shaped suspension elements 21 at the removal side, i.e. at the side where the collection units 14a-f lie. In order to prevent this, guide plates 24 and 25 are fitted next to the conveyor 12.

Each collection unit 14, which will be described in greater detail below, essentially comprises an intermittently turning wheel 26 which is provided with compartments 27 on the outer periphery. In a collection unit 14 the roses are removed from the conveyor 12 and placed in a nearby compartment 27 of the collection unit 14. During the filling of a compartment 27 the wheel 26 of the collection unit 14 continues to turn slowly, so that the

roses are distributed evenly over the compartment. When the desired number of roses has been placed in a particular compartment, the wheel 26 turns on faster until the next compartment has arrived at the removal point. Through the continued turning of the wheel, a compartment filled with roses comes to lie next to the binding unit 15 belonging to the collection unit. The roses present in this compartment are then combined by a bunching element, following which the binding unit 15 places an elastic band round the bunched roses. When the wheel of the collection unit 14 turns further again the bound bunch of roses falls out of the collection unit 14.

In the collection unit 14 the stems of the roses at the bottom side stand on the cut ends. The cut ends of all stems consequently finally lie essentially in line with one another.

The roses with the longest stems (for example, longer than 60 cm) are cut to a predetermined standard length (for example, 60.5 cm) by the first cutting unit 13a. These roses are removed from the conveyor 12 by the first collection unit 14a, which is disposed directly downstream of the first cutting unit 13a, and are bundled into bunches. In the following combinations of a cutting unit 13 and a collection unit 14 roses with increasingly short stems are subsequently cut to length per stem length class and removed from the conveyor 12 and bunched.

Figs. 4 to 6 show in greater detail a cutting unit 13 used with the device of Figs. 1 - 3.

The cutting unit 13 comprises a disc-shaped rotary knife 31 which is driven by means of a right angle transmission 32 by an electric motor 33. The electric motor 33 is fixed by means of a plate 34 to the frame 11 of the device. A disc 35 with a slightly smaller diameter than the knife 31 is fitted on the top of the disc-shaped rotary knife 31, concentrically with said knife.

The cutting unit 13 also comprises a guide 36 for guiding flower stems in the tangential direction to the knife 31.

The guide 36 is formed by two guide elements 37 and 38, of which the sides facing each other in the direction of conveyance 20 first run towards each other and then run roughly parallel to each other again, and which together bound a guide slit 39.

5 An arm 40 which is hinged in the plane of the disc-shaped knife 31 is disposed at the end of the guide slit 39 and in line therewith. The end 41 of this arm 40 is designed like a fork which grips with slight play around the peripheral edge
10 of the knife 31. The hinge point of the arm is indicated by the reference number 42. At the other side of this hinge point 42 the arm is extended by an extension piece 43 standing approximately at right angles to the arm 40. A spring 44, which is fixed at the other side to a fixed point
15 45, is fixed to the extension piece 43. The spring 44 is in the form of a tension spring and exerts such force on the arm 40 that the latter is pressed in the direction of the disc-shaped knife 31. The arm 40 is limited in its movement towards the knife 31 through the fact that the extension
20 piece 43 runs against a stop 46. The position of the stop 46 is adjustable and will generally be adjusted in such a way that the end 41 of the arm 40 lies at a short distance (approximately 0.5 mm) from the periphery of the disc 35. In the other direction the movement of the arm 40 is limited by
25 a stop 47 which is also intended as a stop for the extension piece 43. The position of the stop 47 is also adjustable.

The end of the extension piece 43 interacts with a detection element 48, for example an electric switch. In the idle position of the arm 40, which is indicated by dashed
30 and dotted lines in Fig. 4, the end of the extension piece 43 lies near the detection element 48 or lies against it.

The whole cutting unit 13 is fixed to the frame 11 of the device in such a way that the disc-shaped knife 31 projects into the path of the stems of the roses hanging from the
35 fork-shaped suspension elements 21 of the conveyor belt 12. The vertical distance between the disc-shaped knife 31 and the fork-shaped suspension elements 21 is such that stems of

the roses hanging in the suspension elements 21 are cut off by the knife 31 to a standard cut length belonging to a particular stem length class. Stems with a length within this stem length class are carried along by the carrier elements 22 of the conveyor belt 12, and the bottom end part of these stems is conveyed through the guide slit 39 of the guide 36 and guided to the periphery of the disc-shaped rotating knife 31. Fig. 4 indicates such a stem by reference number 49. The stem is drawn by the knife 31 into the V-shaped space between the periphery of the knife 31 and the arm 40 and is then cut off by the knife 31. During the cutting, the flower stem presses the end 41 of the arm 40 against the spring force of the spring 44 of the knife 31. This causes the end of the extension piece 43 of the detection element 48 to be moved away, as a result of which a signal is generated to indicate that a stem has been cut off. This signal is directed to the control of the drive of the collection unit 14 disposed directly downstream of the cutting unit 13, so that the rose whose stem has been cut off is removed from the conveyor 12 by this collection unit.

When a thin stem for which less cutting force is required is cut off, the bottom side of the stem cut off moves through between the outer periphery of the disc 35 and the end 41 of the arm 40, in which case then again the arm 40 is pressed against the spring force of the spring 44 away from the periphery of the disc 35 and from the knife 31.

If instead of a stem a leaf hanging down is cut off by the knife 31, hardly any force will be exerted on the arm 40, and the arm 40 will not be moved. No signal will then be sent to the collection unit 14 disposed directly downstream of the cutting unit 13. Through this design it is possible to signal very reliably that a stem has been cut.

As indicated in Figs. 4 - 6, all parts of the cutting unit 13 are connected by means of connecting parts suitable for the purpose to either the motor 33 or the right angle transmission 32. The cutting unit 13 is thereby connected as a whole via the motor 33 and the plate 34 to the frame 11

and can thereby be fitted and positioned or exchanged in a simple manner.

It is pointed out that it is not strictly necessary for the disc-shaped knife 31 to be provided with a disc 35. The disc 35 is advantageous for indicating the cutting off of thin stems. On the other hand, a disc 35 driven by a motor (thus without knife 31) in conjunction with an arm 41 can be used for indicating the passage of a stem, which in that case is drawn by the rotating disc 35 through between the arm and the periphery of the disc.

In the embodiment shown of the device according to the invention six cutting units 13a-f are fitted, each being fitted at a different distance from the suspension elements 21 of the conveyor belt 12. Fig. 6 shows two of these units, 13c and 13f, while the other cutting units, 13a, b, d and e, are indicated schematically by a dashed and dotted line. The cutting unit 13a furthest left in Fig. 1 is fitted at the greatest distance from the suspension elements 21, while to the right the distance between the cutting units 13 and the suspension elements 21 becomes increasingly smaller, for example always decreasing by 5 cm. This means that the longest flower stems are cut off first, while the shorter flower stems can pass the cutting unit in question unimpeded.

Figs. 7 to 9 show a collection unit 14 in further detail. The collection unit 14 is mounted by means of a column 61 (see Fig. 2) on the frame 11 of the device. The collection unit 14 comprises a wheel 26 which is rotatable about its axis, and which comprises a number of rings 63a-c lying above one another. Each ring 63a-c is provided on the outer periphery with five pairs of hooks 64 and 65 bent towards each other. The pairs of hooks 64 and 65 lying above one another together form a compartment 27 for the accommodation of the roses coming off the conveyor 12. Each wheel 26 is thus provided on the periphery with five compartments 27. Each ring 63a-c is supported at the inner periphery in three slippers 66 which are fixed to three columns 67, 68 and 69

extending between a fixed bottom plate 70 and a fixed top plate 71 of the collection unit 14. Each ring 63a-c is near the inner periphery also provided with a toothing 72 which meshes with a gear wheel 73. The gear wheels 73 are fixed on
5 a common shaft 74 driven by a motor 75 for driving the wheel 26 in the direction of rotation 76.

For the removal of the roses from the conveyor 12 and placing thereof in a nearby compartment 27, each collection unit 14 comprises a transmission element which is
10 essentially composed of a number of interconnected L-shaped hooks 77 to be placed between the roses on the conveyor 12 from the side of the wheel 62. These hooks 77 can grip behind the stem of a rose hanging in a suspension element 21 and place this rose in the nearby compartment 27 of the
15 wheel 26. The roses are guided here by the edges of the guide plates 24 and/or 25. When the roses are removed from the conveyor 12 and are situated in a compartment 27, the cut bottom side of the stem rests on an annular plate 78 connected to the bottom ring 63c. The roses are thus
20 conveyed further in the upright position by the wheel 26, as a result of which in the bunch finally formed the cut ends of the stems of the roses lie essentially in line with one another.

The L-shaped hooks 77 of the collection unit 14 are fixed
25 by their end to a common rod 79 which is moved to and fro at right angles to its lengthwise direction by an arm 80 which is hingedly connected to the rod 79 and which at the other end is fixed to a rotary shaft 81. The movement of the arm 80 is derived from the main drive of the device via a
30 connecting rod 82 and a lever 83 also fixed to the shaft 81. In the idle position shown in Figs. 7 and 9, the arm 80 is retained through the shaft 81 being blocked against rotation. A second lever 84 is also connected to the shaft
81, on the end of which lever a tension spring 85 acts. This
35 tension spring 85 has the tendency to move the lever 84, and thereby the arm 80, in such a direction that the hooks 77 are moved into the path of the roses. At the moment when a

rose has to be removed from the conveyor 12 the blocking of the shaft 81 is lifted and the arm 80 is moved to the left in Figs. 7 and 9 under the influence of the spring 85. The other end (not shown) of the connecting rod 82 interacts with a cam rotating in synchronism with the main drive. The movement of the arm 80, and thus of the hooks 77, is therefore controlled by this cam. When the cam has made a complete revolution and the hooks 77 have carried out a complete reciprocating movement, in which case a rose is removed from the conveyor 12 and placed in a nearby compartment 27, the shaft 81 is again blocked against rotation, as a result of which the hooks 77 again take up the position shown in the drawing.

In order to prevent a rotation of the arms 77 about the shaft of the rod 79, an arm 86 whose end is guided by a guide 87 is fixed to said rod 79.

In the idle position the outside edge 88 of the hooks 77 lies approximately in line with the edge of the guide plates 24 and 25 situated at the side of the conveyor 12, and thereby forms a guide edge for the roses transported via the collection unit 14 in question.

For the bunching of roses present in a compartment 27, the collection unit 14 comprises a number of levers 91 lying one above the other, and each at their end being provided with a hook 92 of approximately the same shape as a hook 65 (see Fig. 9). The levers 91 with the hooks 92 can grip between the rings 63 of the wheel 62. The levers 91 are to this end hingedly connected to an arm 94 fixed on a central shaft 93. A gas spring 95, which presses the lever 91 against the column 69, is fitted between the lever 91 and the arm 94. A stop 96 is fitted on the arm 94. When the roses present in the compartment 27a have to be combined to the form of a bunch, the shaft 93 is turned anti-clockwise, which causes the lever 91 to move more or less radially outwards and in the process to slide along the column 69. At a certain point in time the end 97 of the lever 91 comes up against the stop 96. The hook 92 is then in the position indicated by dashed

lines. The lever 91 is then turned further together with the arm 94 by the shaft 93 about the axis of the shaft 93, so that the hook 92 grips around the roses present in the compartment 27a and presses them in the direction of the hook 64a bounding the compartment 27a. As soon as the roses have been combined to a more or less round bunch the binding unit 15 arranged next to the collection unit 14 places an elastic band around the bunch of roses, so that they are tied together. The shaft 93 then rotates in the opposite direction, and the lever 91 moves back to its initial position.

The binding unit 15 disposed next to each collection unit 14 is of a generally known type and will not be described in any further detail here.

Figs. 10 and 11 show schematically a different embodiment of the device according to the invention. This embodiment differs from those of Figs. 1 - 3 through the fact that instead of the cutting units 13a-f, viewed in the direction of conveyance 19, 20 of the flowers, upstream of the first collection unit 14a a combined measuring and cutting device 113 is disposed for measuring the length of each flower stem and cutting off the flower stems to the standard cut length for each stem length class.

The control of the device indicates what stem length a rose in a particular suspension element 21 has and determines at what collection unit 14 the rose in question must be removed from the conveyor 12.

In the first collection unit 14a the roses with the longest stems are taken from the conveyor 12 and formed into bunches. In the following collection units 14b-f the roses with shorter stem lengths are then removed by stem length class from the conveyor 12, and bunched.

Figs. 12 to 14 show the measuring and cutting device 113 in greater detail.

The measuring and cutting device 113 comprises a housing 131 which is fixed by means of bars 132 and 133 to the frame 11 of the device (see also Fig. 11). The measuring device

134 and the cutting device 135 are accommodated in the housing 131. The measuring device 134 comprises a number of photoelectric cells 136 which are placed above one another and are situated at a distance of 5 cm from each other, corresponding to the limits of the different stem length classes. The distance from top photoelectric cell 136 to the top side of the fork-shaped suspension elements 21 corresponds to the minimum length of the stems in the shortest stems class. When a stem of a rose passes the photoelectric cells the number of photoelectric cells indicating the stem determines the stem length class in which the rose falls.

The cutting device 135 comprises a number of rotating disc-shaped knives 137, in this case six, disposed above one another. Each knife 137 is rotatably mounted on the end of a first arm 138 of a twin-armed lever 139. All levers 139 are rotatable about a common axis of rotation 140. Control elements act upon a second arm 141 of each lever 139, as a result of which the knife 137 can be taken into the path of the stems of the roses through rotation of the lever 139 about the axis of rotation 140. These control elements comprise a tension spring 142 which acts upon the second arm 141 of the lever 139 and which has the tendency to turn the lever 139 in such a way that the knife 137 moves towards the path of the stems of the roses, and a displaceable locking element 143 which interacts with the second arm 141 and in the locking position blocks the rotation of the lever, and in the non-locking position permits such rotation. The control elements also comprise a control arm 144 which is rotatable to and fro continuously about an axis of rotation 145. The control arms 144 of all levers 139 are fixed on a common drive shaft 146 which can be rotated to and fro.

All knives 137 are driven, each via a belt 147, by a drive shaft 148 which is coaxial with the axis of rotation 140 of the lever and is driven by an electric motor 149.

When the measuring device 134 indicates that a stem of a rose falls in a specific stem length class, and thus a

specific knife 137 has to be moved into the path of the stems in order to cut off the stem in question to the correct length, a command is given via the control of the device to an electromagnet 150 which takes the locking element 143 of the lever 139 of the knife 137 in question out of the locking position into the non-locking position. The second arm 141 of the lever 139 is then pressed by the spring 142 against the end of the control arm 144. The end of the second lever arm 141 will then follow the movement of the end of the control arm 144 by which the lever 139 is going to rotate and the knife 137 is moved into the path of the stems of the roses. The lever 139 with the knife 137 and the control arm 144 are then in the position shown by dotted lines, indicated by 139', 137' and 144' respectively. When the stem is cut off at the correct length, the lever 139 will be returned to its original position through the returning movement of the control arm 144, following which the locking element 143 is again placed in the locking position by the electromagnet 150.

20 An adjustable end stop 151 is provided in order to prevent the lever 139 from turning too far during the cutting.

CLAIMS

1. Device for processing cut flowers, in particular roses, comprising a conveyor for conveying the flowers one by one, which is provided with suspension elements gripping directly below a flower bud or calyx, so that each flower is conveyed in the position with the stem hanging down, means for sorting by stem length and grouping of the flowers into a number of stem length classes, and a number of collection units disposed near the conveyor for collecting the flowers by stem length class, characterized in that the device is provided with means (13; 113) disposed next to the conveyor for cutting off the flower stems to a predetermined standard cut length for each stem length class, these means being disposed upstream of the collection unit (14) for the particular stem length class, viewed in the direction of conveyance of the flowers, and in that each collection unit (14) is arranged in such a way that in the collection unit the cut ends of the flower stems lie essentially in line with one another.
2. Device according to Claim 1, characterized in that, viewed in the direction of conveyance (19, 20) of the flowers, a cutting unit (13) is set up directly upstream of each collection unit (14), each cutting unit (13) is equipped for cutting off to the standard cut length the flower stems of which the length falls within the stem length class which is collected by the collection unit disposed directly downstream of the cutting unit, and each cutting unit (13) is provided with signalling means (40, 43, 48) for indicating the cutting off of a flower stem in the cutting unit in question, which signalling means are connected to control means which ensure that a flower whose stem is cut off in the cutting unit is picked up by the collection unit (14) directly downstream of the cutting unit (13).
3. Device according to Claim 2, characterized in that each cutting unit comprises a disc-shaped knife (31)

rotating about an essentially vertical axis, in addition to a guide (36) with a guide slit (39) ending near the periphery of the knife, for guiding the flower stems in the tangential direction to the knife, and an arm (40) which is hinged in line with the knife and is fitted near the end of the guide slit and essentially in line therewith, and at the free end (41) is provided with a fork gripping with slight play around the peripheral edge of the knife, which arm is pressed at one side by a spring (44) towards the axis of the knife and at the other side is retained by a stop (46), so that the fork-shaped end of the arm falls over the periphery of the knife only over a predetermined short distance, and in which the arm interacts with a detector (48) for indicating a hinge movement of the arm.

4. Device according to Claim 3, characterized in that the disc-shaped knife (31) is provided at the top side with a concentric disc (35) with a slightly smaller diameter than the disc-shaped knife, and in that the position of the stop (46) is such that the end (41) of the arm (40) remains at a short distance from the periphery of the disc (35).

5. Device according to Claim 1, characterized in that, viewed in the direction of conveyance (19, 20) of the flowers upstream of the first collection unit (14a), a measuring device (134) for measuring the length of each flower stem and a cutting device (135) for cutting off the flower stems to the standard length for each stem length class are disposed, and in that the device is provided with control means for sending the flowers whose stem has been cut off in the cutting device to the correct collection unit (14).

6. Device according to Claim 5, characterized in that the cutting device (135) comprises a number of rotary disc-shaped knives (137) which correspond to the number of collection units (14), and which can each be moved into the path of the flowers brought in by the conveyor (12) for sorting.

7. Device according to Claim 6, characterized in that

each knife (137) is rotatably mounted at the end of a lever (139), and in that control means act upon the lever (139) for taking the knife (137) into the path of the flowers to be sorted.

5 8. Device according to Claim 7, characterized in that the cutting device (135) comprises several parallel knives disposed above one another, and in that all levers (139) are mounted so that they rotate about a common axis of rotation (140), and in that all knives (137) are driven by a drive
10 shaft (148) which is coaxial with the axis of rotation (14) of the levers (139).

9. Device according to Claim 6 or 7, characterized in that the control means for each of the knives (137) comprise a spring (142) which acts on the lever (139) and has the
15 tendency to move the knife (137) into the path of the flowers to be sorted, and also a displaceable locking element (143) which in the locking position blocks the movement of the knife into the path of the flowers to be sorted, and in the non-locking position permits this
20 movement, and a continuously to and fro rotating control arm (144) against which the lever (139) in the non-locking position of the locking element (143) is pressed by the spring (142), in such a way that the knife (137) can be taken in a movement controlled by the control arm (144) into
25 the path of the flowers to be sorted.

10. Device according to Claim 9, characterized in that the control arms (144) of all levers (139) are fixed on a common drive shaft (146) which is rotatable to and fro.

11. Device according to any of Claims 1 - 10,
30 characterized in that each collection unit (14) comprises a wheel (26) which can rotate about its axis and has on the periphery a number of compartments (27) for accommodating a specific number of flowers coming off the conveyor (12), and also a transfer element for removing flowers with a
35 particular stem length from the conveyor (12) and placing them in a nearby compartment (27) of the wheel (26), the flower stems standing on the cut ends.

12. Device according to Claim 11, characterized in that the transfer element comprises a number of interconnected L-shaped hooks (77) which are to be placed from the side of the wheel (26) between the flowers on the conveyor (12), and which can grip behind the stem of a flower hanging in a suspension element (21), and can place this flower in the nearby compartment (27) of the wheel (26).

13. Device according to Claim 11 or 12, characterized in that the wheel (26) comprises a number of rings (63) which are disposed above each other and which at the outer periphery are provided with a number of pairs of hooks (64, 65) which are bent towards each other, the pairs of hooks (64, 65) of the different rings (63) lying above one another, and forming the compartments (27) for accommodating flowers coming off the conveyor (12).

14. Device according to Claim 13, characterized in that the rings (63) are mounted at the inner periphery and are driven at the inner periphery.

15. Device according to any of Claims 11 - 14, characterized in that each collection unit comprises a pressure element (91, 92) for combining flowers present in the compartments (27) to a bunch.

16. Device according to any of Claims 11 - 15, characterized in that a binding unit (15) is set up next to each collection unit (14) for binding bunches of flowers formed in the collection unit (14).

17. Device according to one or more of Claims 1 - 17, characterized in that the conveyor (12) is a circulating endless conveyor belt comprising a number of individual, mutually parallel narrow belts (12a-e) spaced apart, on which the suspension elements (21) and carrier elements (22a-d) of the flowers are fixed.

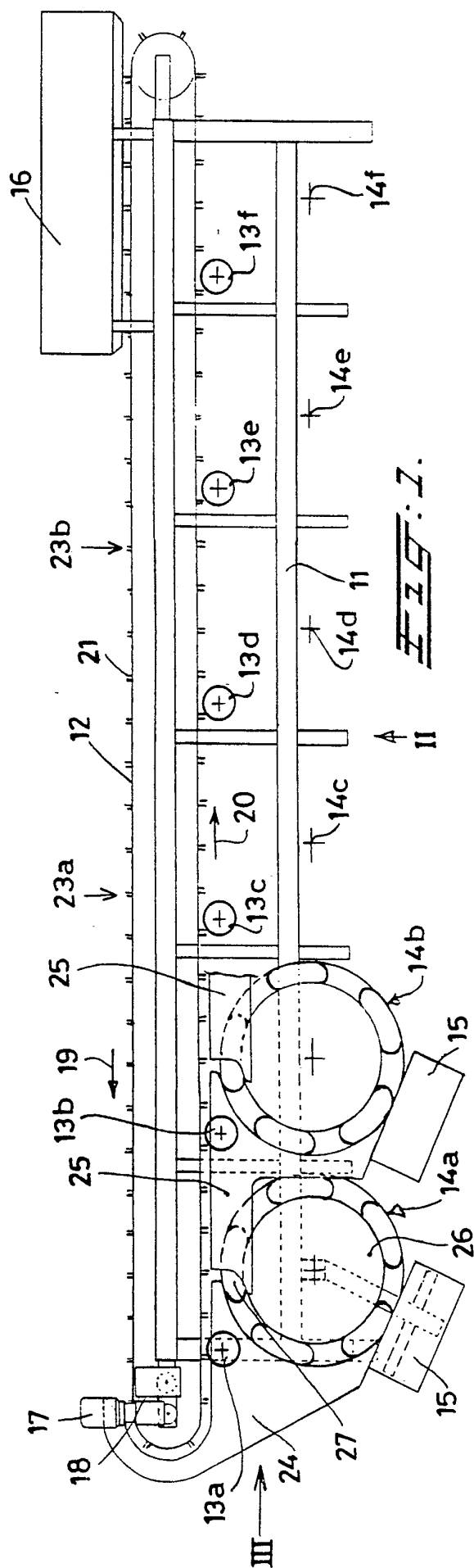


Fig. 1.

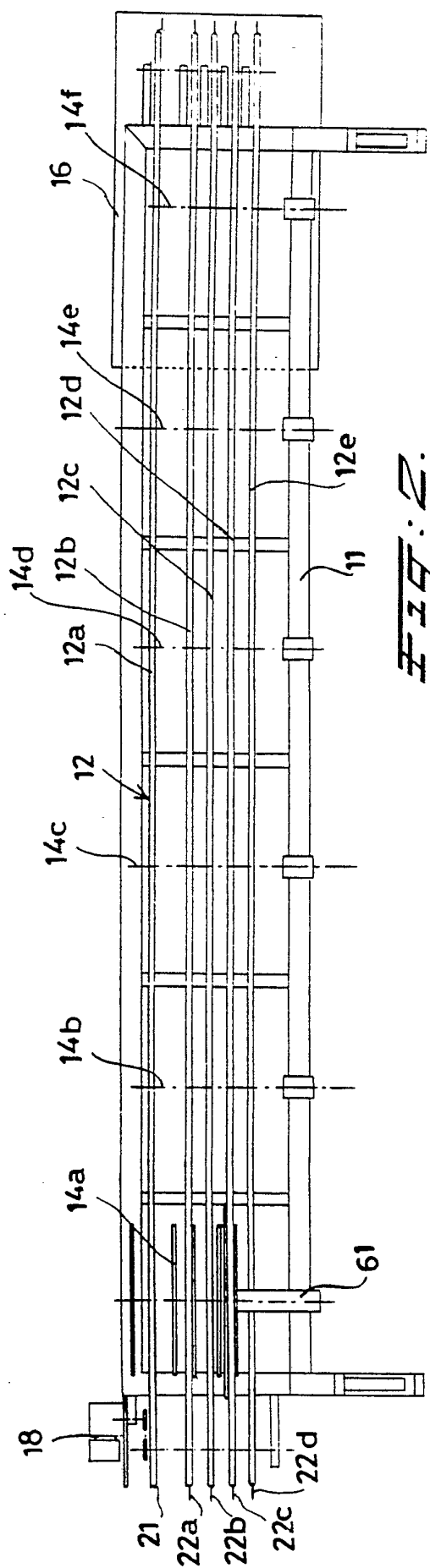


Fig. 2.

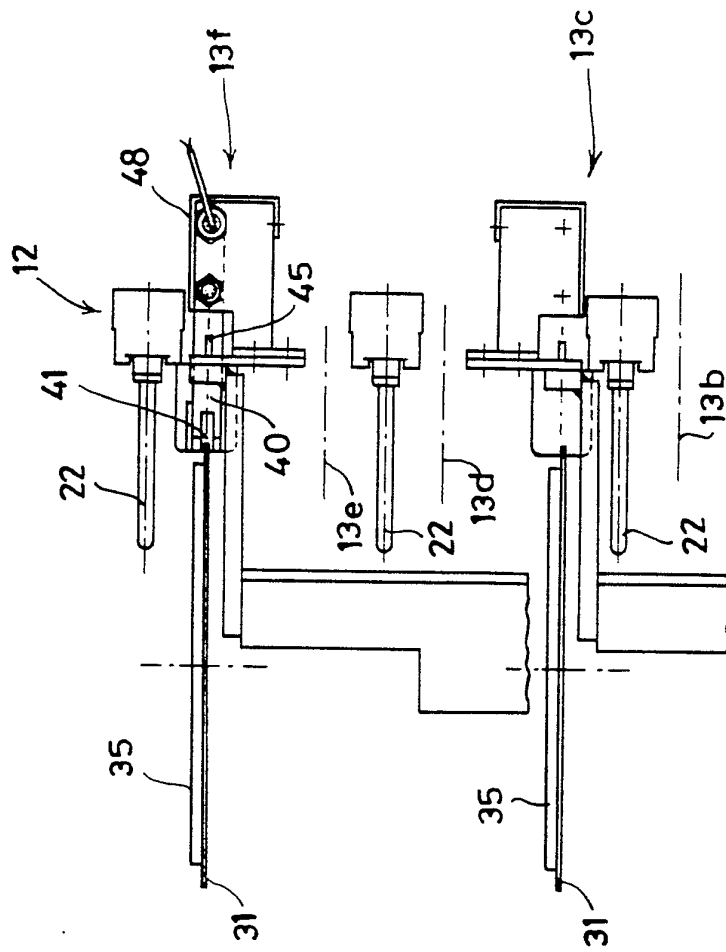


Fig. 5.

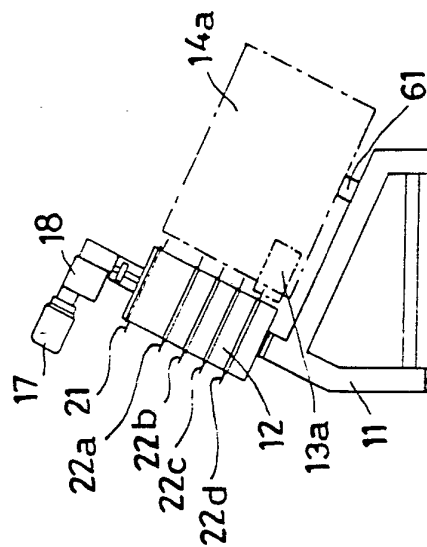
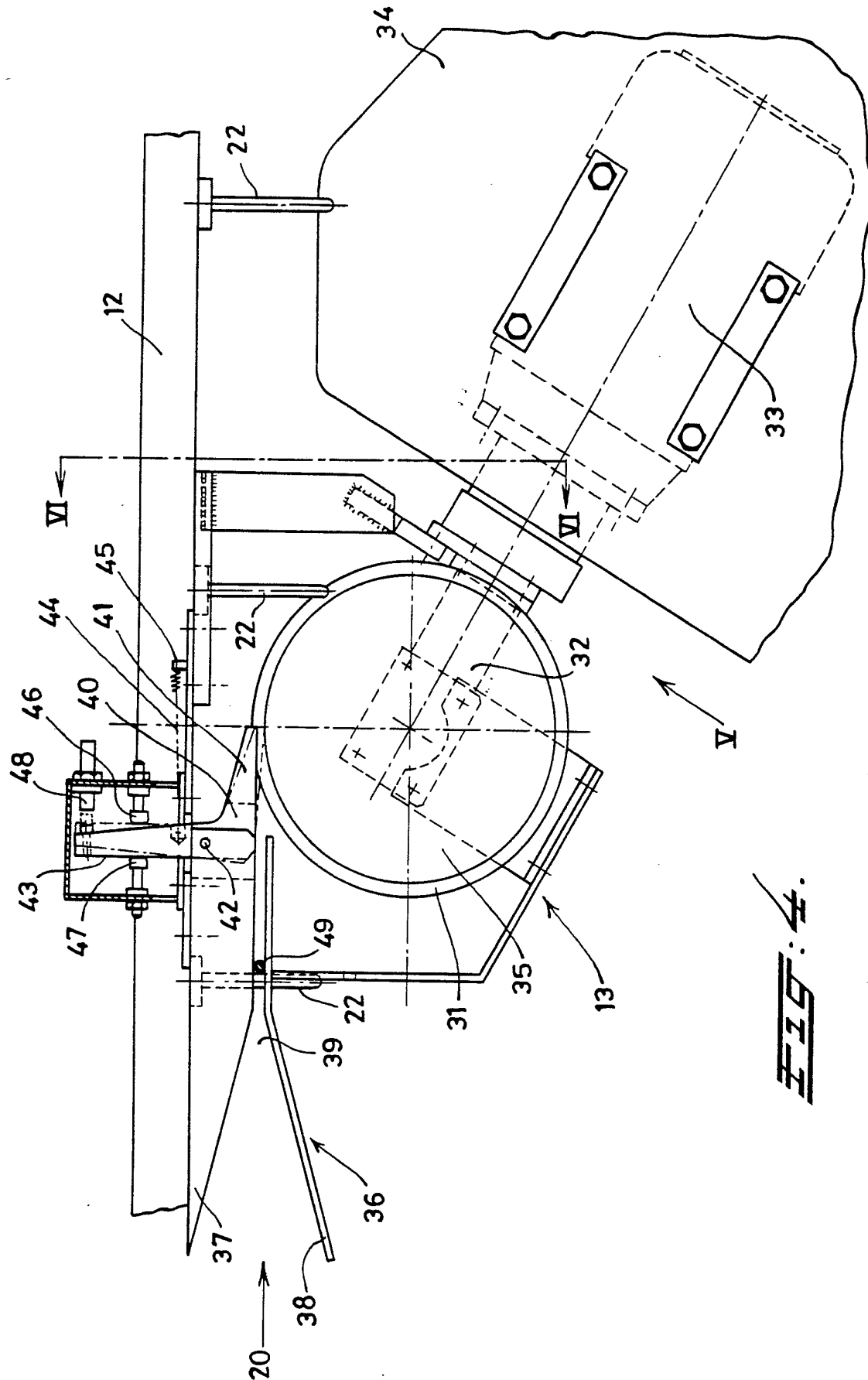


Fig. 6.

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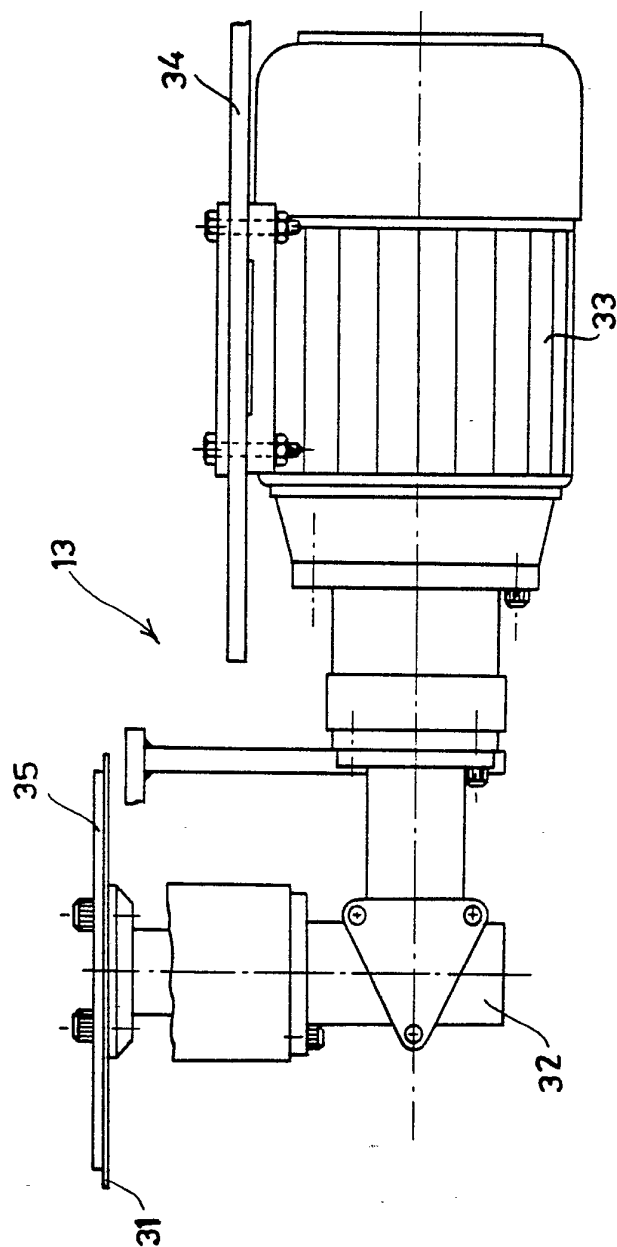
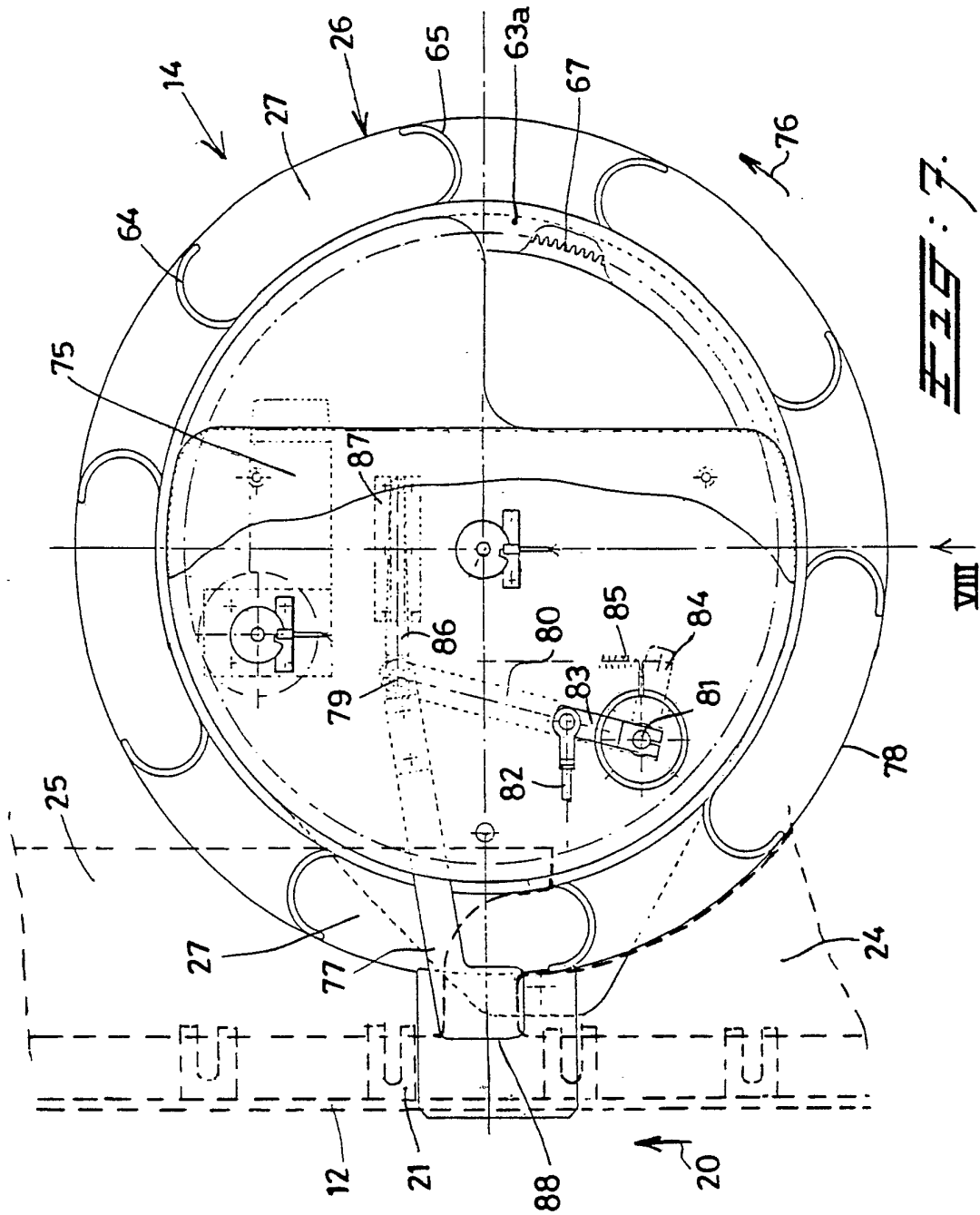
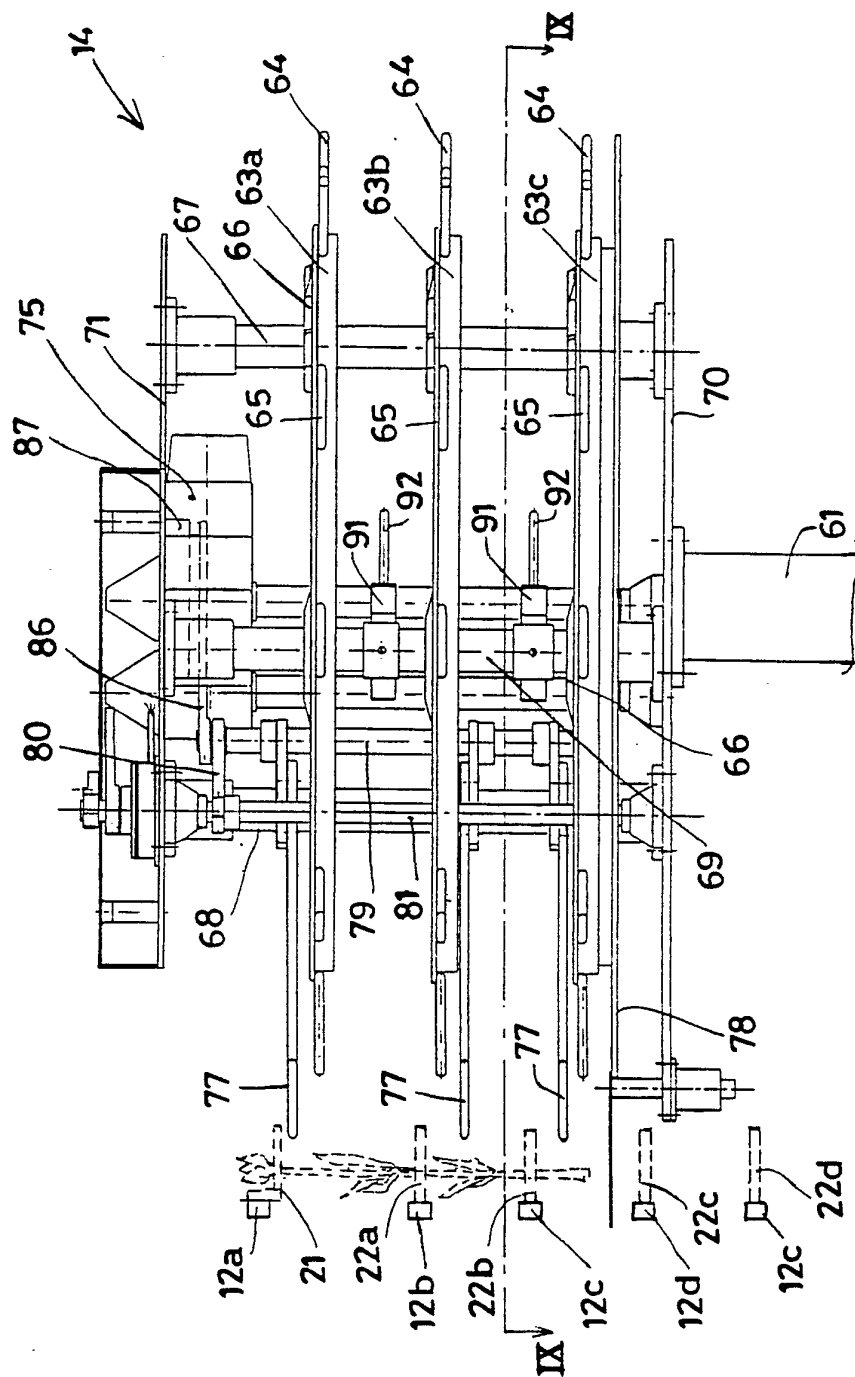
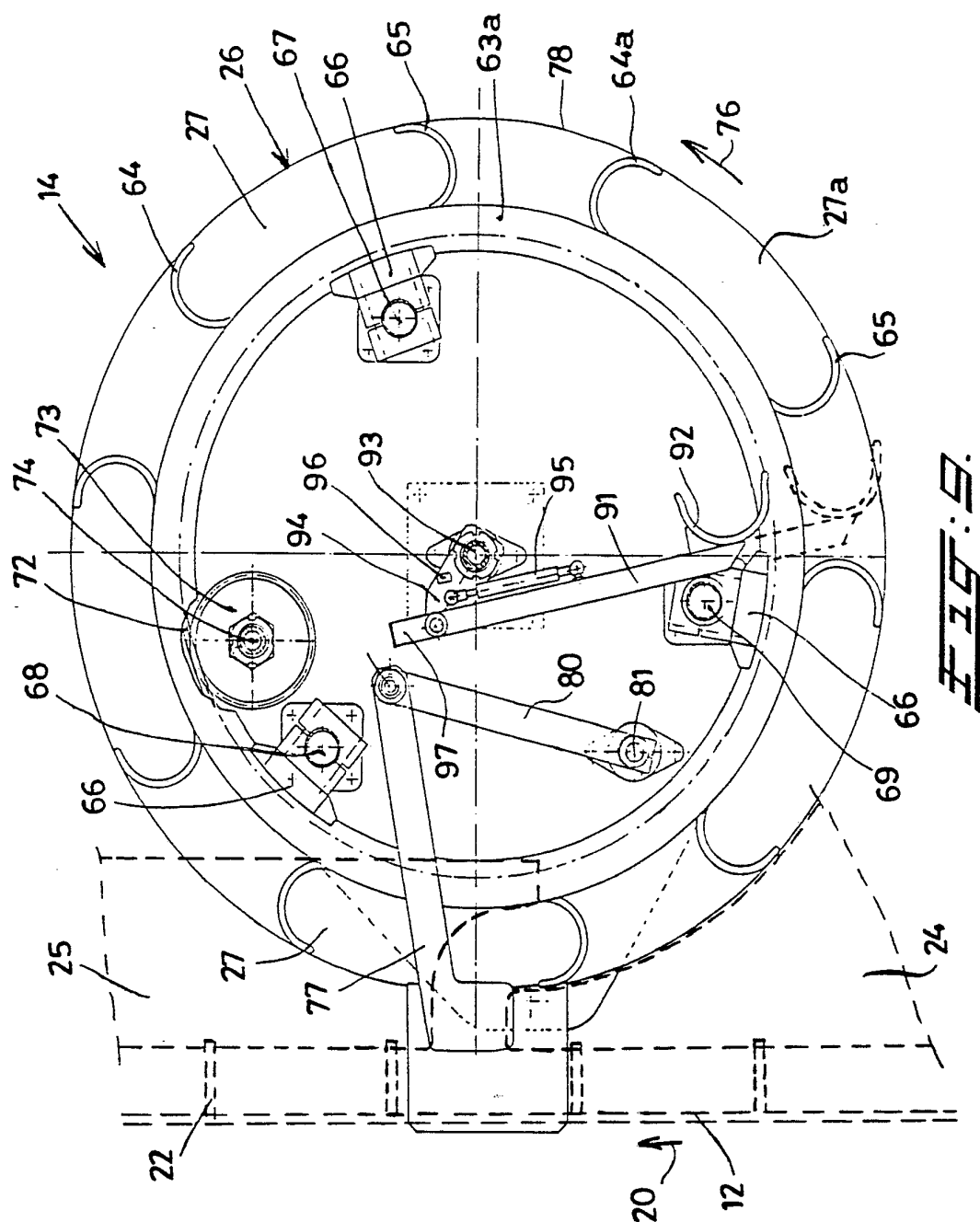


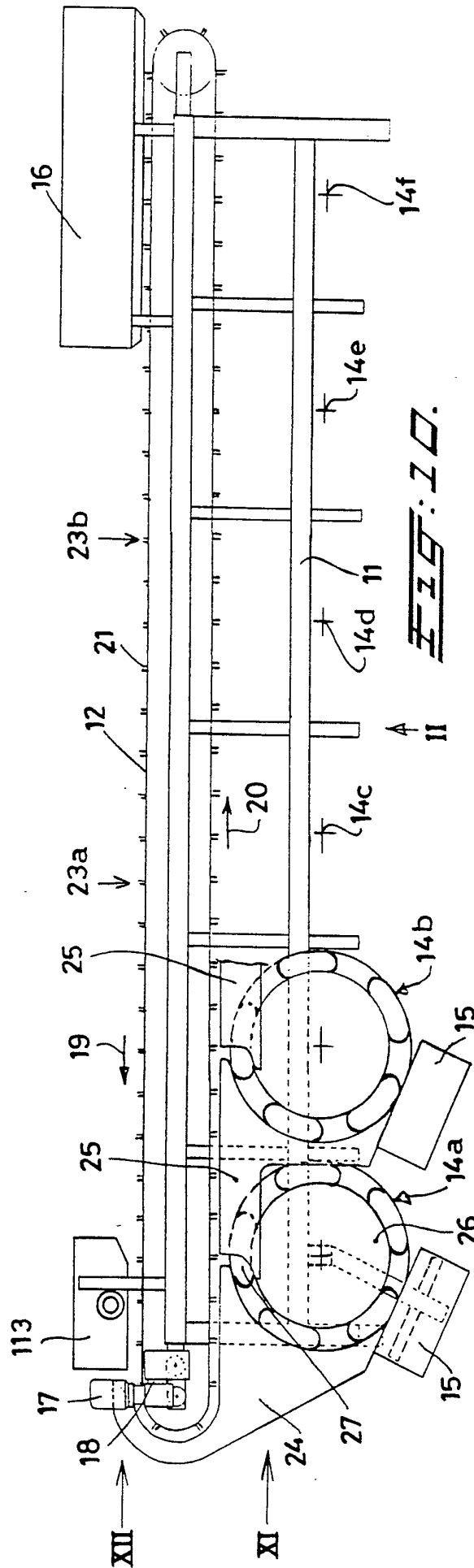
Fig. 5.



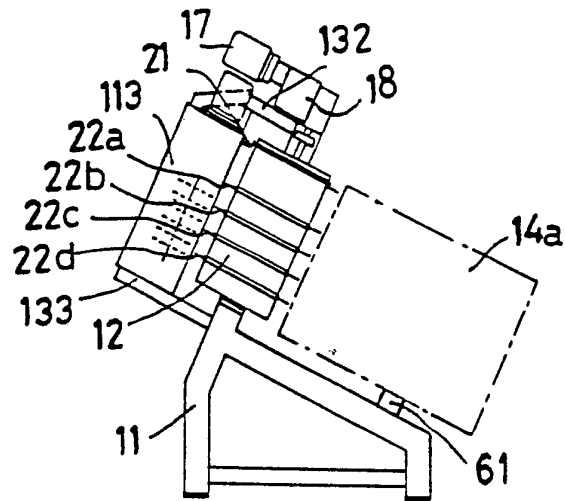
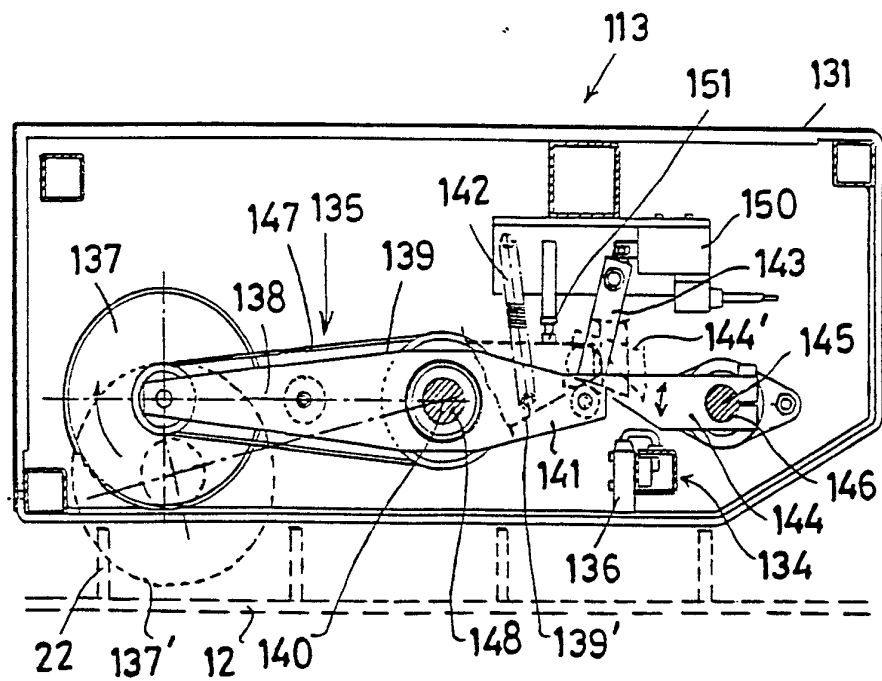
**Fig. 2B.**



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**FIG. 11.****FIG. 14.**

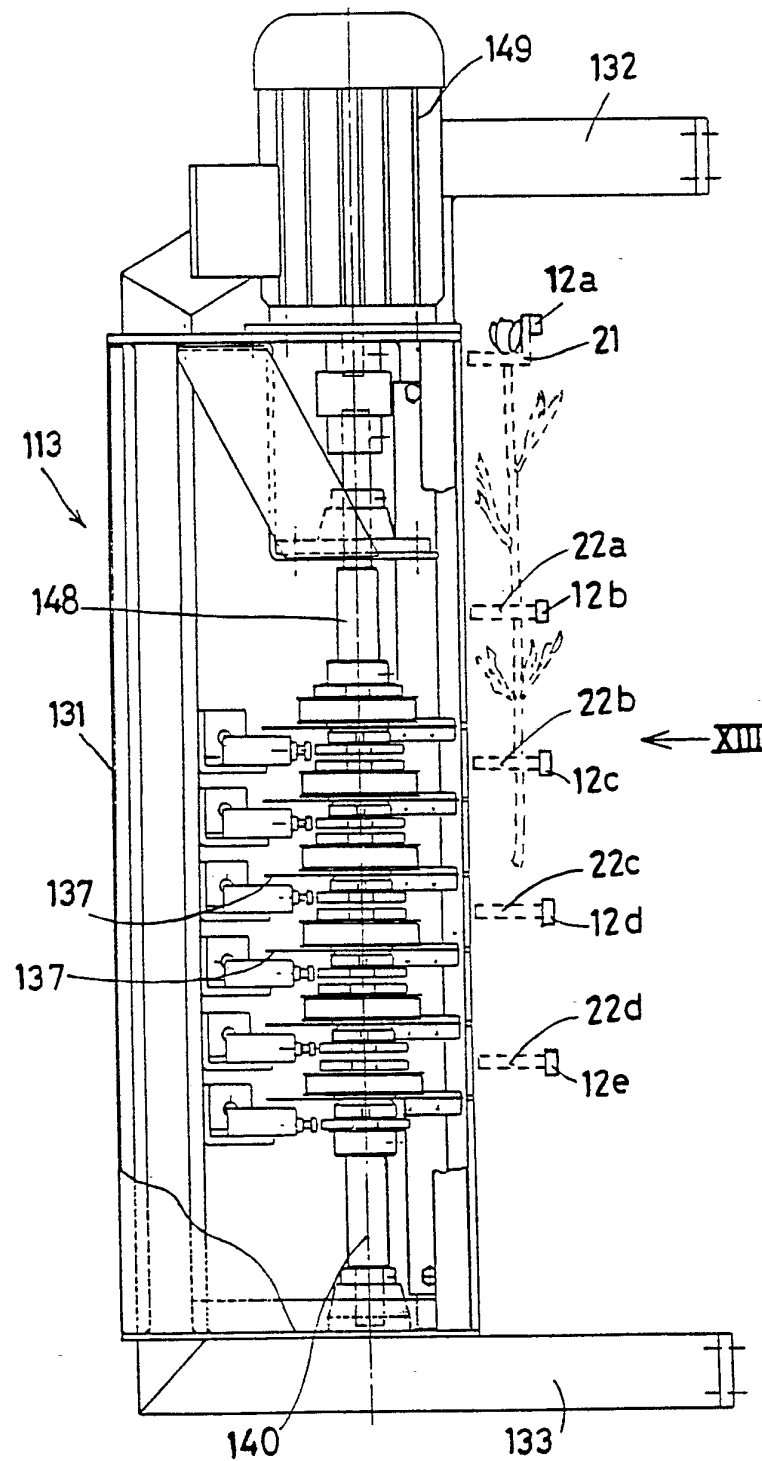


Fig: 12.

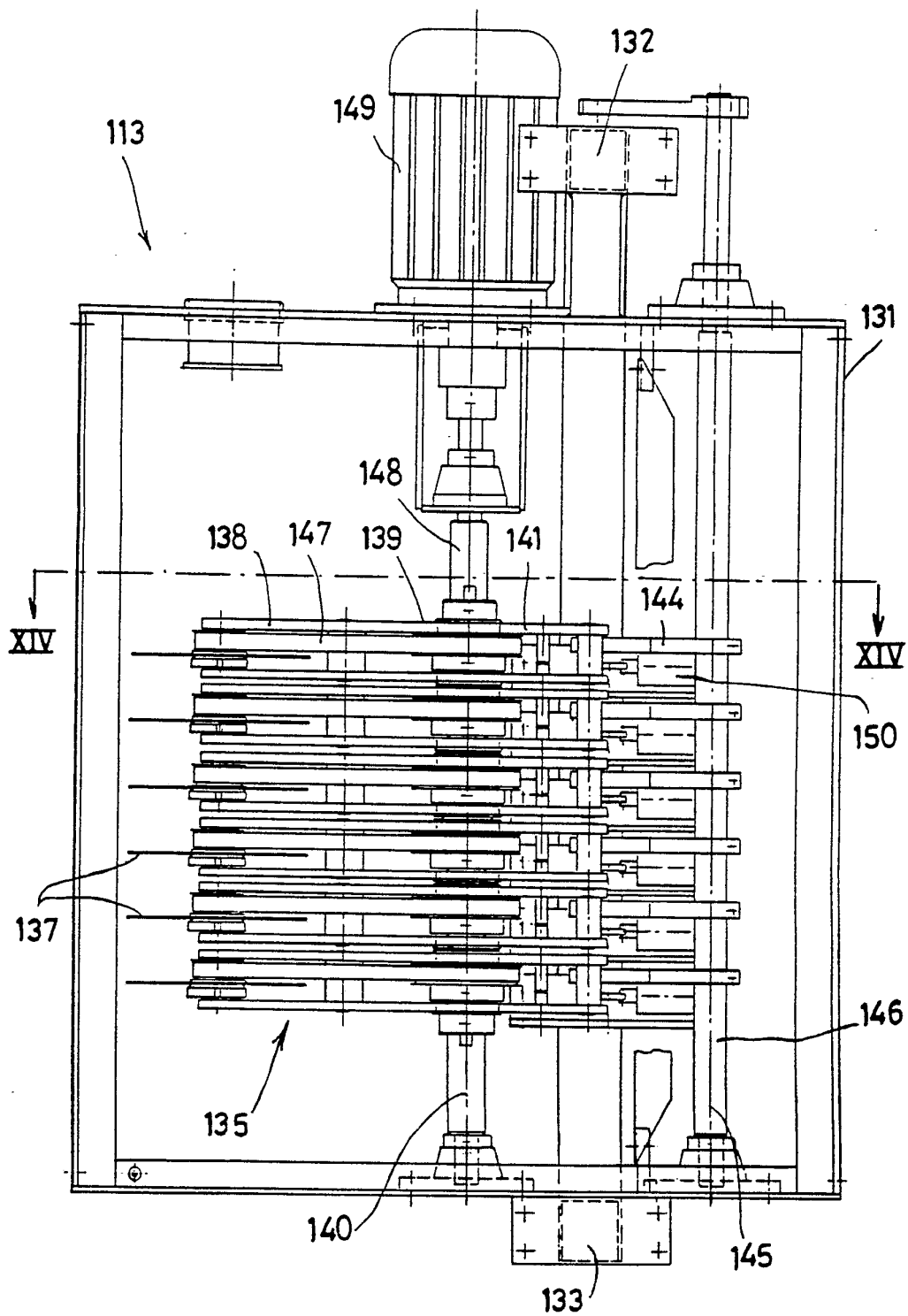
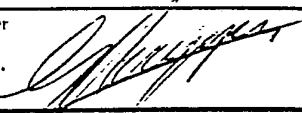


Fig: 13.

INTERNATIONAL SEARCH REPORT

PCT/NL 90/00109

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 A01G5/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	A01G ; B07C	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	NL,A,7309739 (STOLK) 14 January 1975 see the whole document ---	1
A	NL,A,7310250 (BLOM) 27 January 1975 see page 4, line 19 - page 7, line 21: figures 1-6 ---	1
A	NL,A,8601729 (VAN DEN BERG) 01 February 1988 see page 4, line 7 - page 8, line 1; figures 1-5 ---	1
A	US,A,3659709 (BARTLETT) 02 May 1972 see column 2, line 1 - column 8, line 41: figures 1-9 ---	1
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
2 16 NOVEMBER 1990	05. 12. 90	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	HERYGERS J.J. 	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. *pa / nl go / 0010*

SA 39156

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office FDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL-A-7309739	14-01-75	None	
NL-A-7310250	27-01-75	None	
NL-A-8601729	01-02-88	None	
US-A-3659709	02-05-72	None	