(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 February 2006 (09.02.2006)

PCT

(10) International Publication Number
WO 2006/014107 A1

(51) International Patent Classification[7]: B65B 25/00, 11/54

(21) International Application Number: PCT/NL2005/000571

(22) International Filing Date: 3 August 2005 (03.08.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1026777 4 August 2004 (04.08.2004) NL

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG,*

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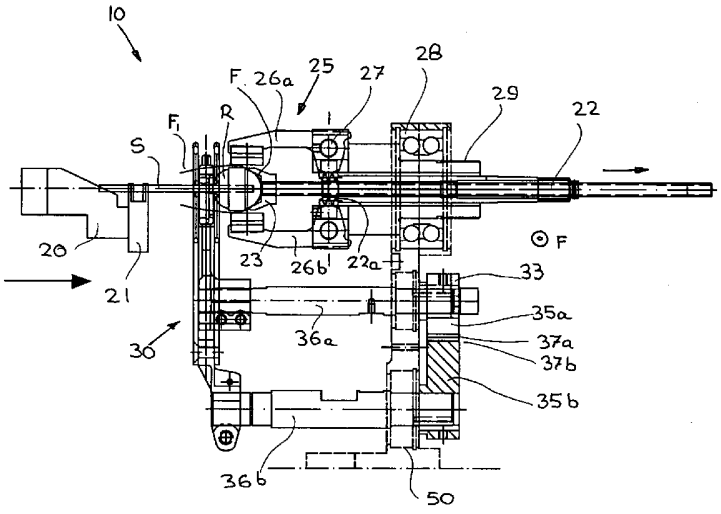
(54) Title: PACKAGING MACHINE FOR LOLLIPOPS



(57) Abstract: Packaging machine for lollipops (1), comprising a drum (8) having a stationary, fixed drum part and having a drum part that is rotatable (50) with respect thereto and includes a series of stick holders (20), a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, a discharge for discharge of packaged lollipops away from the drum, wherein the drum (8) is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory in order to let said sheet envelop the lollipop head, wherein the rotatable drum part (50) is furthermore provided with a diaphragm (31) at every stick holder, in wich the head moves through the opening defined by the diaphragm (31), wherein the diaphragm is furthermore provided with means for sealing the packaging material, wherein the drum is furthermore provided with first adjustment means (61, 65) for pre-adjusting means (61, 65) for pre - adjusting the size of the opening of the diaphragm.

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SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Packaging machine for lollipops

The invention relates to a packaging machine for lollipops.

It is known to package lollipops with a so-called bunch-wrapper approach, wherein the lollipops in singled condition, are supplied in series to a drum having a fixed drum part and a drum part rotating about a horizontal axis, on which a series of assemblies that circulate along are arranged, the assemblies each having a lollipop stick holder, a lollipop head support and two diaphragm arms provided with heating elements. At the location of a reception station the lollipop is engaged on the drum by the stick holder, wherein the lollipop head is situated at a short distance in front of the open diaphragm. In between an end portion of a foil web is fed and cut from the web as a foil sheet, after the lollipop head support extending through the diaphragm has pressed the foil sheet against the head. Subsequently, at onward rotation of the rotatable drum part, the stick holder and the lollipop head support are moved towards the diaphragm, wherein the lollipop head is moved through the diaphragm to the other side thereof. The foil sheet is then folded by the diaphragm arms against and around the lollipop head. As soon as the lollipop head has passed through the diaphragm the diaphragm arms are moved towards each other in order to fold the foil sheet behind the lollipop head. Subsequently the stick holder and the

lollipop head support are rotated about their centre lines in order to twist the part of foil sheet that is situated behind the lollipop head around the stick. Subsequently the heating elements are activated for sealing said foil part. Then the diaphragm arms are moved apart again and the lollipop is moved back by the stick holder, after which the lollipop is taken over by a remover and the assembly in question is able to go through a next cycle.

For the movement of the stick holder and the lollipop head support, they are provided with operation parts, that circulate in stationary curve tracks that are channel-shaped, formed in a curve plate, and confine the operation part, usually a roller, in radial inward and radial outward direction. The diaphragm arms are each rotatably arranged on a rotatable drum part, about rotation centre lines that are parallel to the centre line of rotation of the drum, and are biassed towards each other by means of a spring. One of the arms is extended to beyond its point of rotation and at the end is provided with an operation part that is in engagement with stationary curve tracks. Radial movement of the operation part through the curve tracks results in rotation of the arm, and due to intercoupling of the arms in a simultaneous counter rotation of the other arm. In the seal trajectory the operation part of the diaphragm arm is radially confined in a channel formed in the curve plate in question.

For singling, such packaging machines usually comprise a so-called sorting/distribution disk, which at its circumference is provided with a series of accommodation spaces for the lollipop heads, wherein the sticks are able to extend radially outwards in order for them to be easily picked up by stick holders of a transit conveyor. When there is a change in the diameter of the lollipops to be packaged, the sorting disk can simply be replaced by a sorting disk having accommodation spaces

of another diameter. In the drum use can be made of the stick holder and the lollipop head supports that are already present. Folding the foil sheet about the lollipop head, however, may in case of a larger difference between the opening determined by the diaphragm arms and the diameter of the lollipop head lead to creases and undesirable folds in the foil sheet folded around the lollipop head. In order to prevent this the drum has to be adapted, by replacing its unit on which the diaphragm arms and the related operation parts for said arms and the heating elements are arranged. This is a time-consuming operation. Furthermore several units adapted to the various lollipop head diameters have to be purchased and kept at the ready. The effort to be made in replacing the unit may result in opting for not carrying out a change that is actually necessary, which results in badly and ill-packaged lollipops.

It is an object of the invention to improve on this.

From one aspect the invention provides a packaging machine for lollipops, comprising a drum having a fixed drum part and having a rotatable drum part including a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order

to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at or near the location of the transition of the head to the stick, wherein the drum is furthermore provided with first adjustment means for pre-adjusting the size of the opening of the diaphragm at the location of the first trajectory.

With the provision according to the invention the opening of the diaphragm can be adjusted to the diameter of the head of the lollipops to be packaged without having to replace said entire unit including diaphragm and related parts. In this way it is possible to obtain packaged lollipops of which the foil abuts the head nice and tight.

In a way known per se the diaphragm may comprise two diaphragm arms, which can be moved towards and away from each other and are provided with sealing elements. The two diaphragm arms may be coupled with each other for simultaneous, opposite rotation.

In a preferred embodiment the diaphragm is provided with an operation part for determining and altering the opening of the diaphragm during rotation of the rotatable drum part, wherein the fixed drum part at least in the first trajectory is provided with a first curve track for guiding and moving the operation part during rotation of the drum, wherein the first adjustment means comprise means for adjusting the mutual position of the operation part and the first curve track. Preferably the first adjustment means are adapted for adjusting the position of the first curve track on the fixed drum part, so that not all diaphragms need to

be set themselves, in advance, using means mounted on each diaphragm itself.

In one embodiment the operation part is adapted for during radial outward movement reducing the opening, wherein the first curve track is situated at the radial outside of the operation part in order to form an adjustable limitation. Preferably the operation part at the radial inside is free from the first curve track.

Preferably the diaphragm is biassed towards a more closed or smaller position of the opening. The first curve track forms a radially outward limitation for the operation part and thus for the degree to which the diaphragm is closed, wherein the biassing force ensures a stable abutment of the operation part.

In a constructively simple embodiment the first curve track is formed on a bent strip-shaped plate extending in circumferential direction of the drum, which plate is provided with a first guide edge for the operation part, wherein the first adjustment means are adapted for adjusting the radial position of the first guide edge. By adjusting the radial position of the strip-shaped plate, which can for instance be done by unscrewing bolts with which the plate is attached on the fixed drum part and after adjustment tightening them again, the radial position of the guide edge for the operation part can at that location be adjusted.

In a further embodiment the first curve track in process direction, directly or at a distance, is succeeded by a second curve track for with a second guide edge engaging the operation part in order to keep the diaphragm in the sealing position in the second trajectory, after the foil has been folded behind the head by the closing diaphragm.

Preferably the second curve track is situated at the radial inside of the operation part.

In a simple embodiment the operation part at the radial outside is free from the second curve track. In the known drum use is made of a curve plate provided with a channel in which the operation part is guided at two sides. In that arrangement, the second curve plate is hinged to the fixed drum part, and radially inwardly movable counter the pressure of a cylinder. Thus, when the foil sheet behind the lollipop head is relatively thick, the track for the operation part can be shifted radially inwardly, as a result of which the diaphragm will open further for providing the necessary extra space to the thickening. A drawback is that this shifting is carried out for all operation parts that are then in the channel, as a result of which in case there is no such thickening the closure behind the head will not be sufficient. By according to the invention keeping the radial outside free, the diaphragm is free to open further in order to offer room to a thickening. The said pre-biassing of the diaphragm ensures a permanent, sufficient engagement of the sheet by the diaphragm.

The second curve track preferably is formed on a curve plate having a guide edge for the operation part which coincides with an arc of a circle that is concentric with the drum centre line.

Also the position of the second curve track preferably is adjustable in circumferential direction, in order to follow the adjustment of the first curve track and possibly therewith an intermediate trajectory, yet to be discussed, if present. The adjustability preferably is along said arc of a circle, as a result of which the adjustment can be carried out in an easy and controlled way, for instance by the unscrewing and tightening again of bolts on the fixed drum part.

In one embodiment the drum comprises an axle, wherein the curve plate at one side of the axle is hinged to a coupling plate, wherein the coupling plate and the curve plate at another side of the axle are connected to each other by means of a bar, wherein the coupling plate is adjustably attached to the fixed drum part. Preferably a spring element is arranged on the bar for urging the curve plate radially to the outside, wherein the bar is provided with a stop for the radial outward movement of the curve plate.

In a further development the first curve track changes into a third curve track, provided with a third guide edge for the operation part in order to close the diaphragm, furthermore comprising second adjustment means for adjusting the position of the third guide edge in circumferential direction of the drum. It is thus ensured that the diaphragm folds the foil directly behind the head of the lollipop, so that the foil abuts tightly there. The adjustment takes place depending on the length of the head of the lollipop.

Preferably between the third and second curve track an overlapping intermediate trajectory is formed in which the diaphragm is closed and in which preferably a passage is formed having a width at least almost corresponding with the thickness of a stick.

For ensuring a two-sided and as a result reliable guiding of the operation part in the intermediate trajectory means are furthermore provided for resiliently biassing the second curve track radially towards the first curve track.

From a further aspect the invention provides a packaging machine for lollipops, comprising a drum having a fixed drum part and a rotatable

drum part including a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder said diaphragm being positioned at the side of the sheet of material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at or near the location of the transition of the head to the stick, wherein the diaphragm is provided with operation means for changing the size of the passage in the diaphragm during the circulation of the rotatable drum part, wherein the operation means comprise an operation part, wherein the fixed drum part is provided with a curve track for the operation part, wherein the drum is furthermore provided with first adjustment means for adjusting the radial position of the curve track for the operation part.

Preferably the adjustment means are operative on the curve track at the location of the first trajectory.

Preferably the packaging device is furthermore provided with second adjustment means for adjusting the circumferential position of the curve

track, in particular in connection to the first trajectory for closing the diaphragm.

From a further aspect the invention provides a packaging machine for lollipops, comprising a drum having a stationary, fixed drum part and having a drum part that is rotatable with respect thereto and includes a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at the location of the transition of the head to the stick, wherein the drum is furthermore provided with adjustment means for pre-adjusting the moment of closing the opening of the diaphragm consecutive to the first trajectory. It is thus ensured that the diaphragm folds the foil directly behind the lollipop head, so that the foil abuts tightly there. The adjustment takes place depending on the length of the lollipop head.

The invention will be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

Figure 1 shows a schematic front view of a lollipop packaging device according to the invention;

Figures 1A,C,E show schematic views of the process for arranging a foil sheet around the head of a lollipop, in consecutive steps;

Figures 1B,D,F show the position of the diaphragm arms in the stages shown in the figures 1A,C,E;

Figure 2 shows a view of a fixed part of the drum of the packaging station;

Figures 3 and 3A, respectively, show a view corresponding to the one of figure 2, wherein consecutive positions of diaphragm arms are drawn for a lollipop having a shape shown in figure 3A; and

Figures 4 and 4A, respectively, show a view corresponding to the one of figure 2, wherein consecutive positions of diaphragm arms are drawn for a lollipop having a shape shown in figure 4A.

The packaging machine 1 for lollipops shown in figure 1 comprises a frame 2, in which among others are arranged a sorting and distribution disk 3 driven about a vertical centre line S in the direction A, on which disk lollipops supplied in bulk are singled in the known manner. For removing the lollipops from the distribution disk 3 a removal roller 4 is arranged, which rotates in the direction B.

From the removal roller 4 the lollipops are transferred to a first transfer disk 5 driven in direction C, subsequently to a second transfer disk 6 rotating in the direction D, and then to a third transfer disk 7 rotating in the direction E. From the transfer disk 7 the lollipops are transferred to a drum 8 of the wrapping station 100, which drum is rotated in the direction F and in which the lollipops are surrounded with foil material supplied to them for packaging. The packaged lollipops are discharged to a discharge disk 9 rotating in the direction G and discharging the packaged lollipops to for instance a discharge chute (not shown).

The drum 8 has an axle 11, with which the rotatable part 50 (also see figure 1A) is rotated. A series of assemblies 10 of stick clamps, wrappers and diaphragm arms is arranged on the rotatable part 50.

Figure 1A shows the mutual position in axial direction of some parts of those assemblies 10. On the left-hand side a stick clamp 20 is shown, having clamping member 21, with which a stick S, on which lollipop head R, can be firmly held in the revolution of the drum part 50.

On the right-hand side of the lollipop head R there is a plug or cap 23 attached at the end of an axially reciprocally moving bar 22, of which the axial position is defined in a manner known per se by means of a curve that is not further shown and which is part of the fixed part of the drum 8.

The pin 22 extends through a sleeve 29, on which a pair 25 of wrapping arms 26a, 26b at the location of hinge points 27 are hingedly arranged, wherein the sleeve 29 is provided with teeth that are not further shown, which mesh with a rack that is not further shown and which belongs to the fixed part of the drum 8. The sleeve 29 is rotatably bearing mounted in bearing 28. At the side the pin 22 is

provided with teeth 22a that mesh with teeth on the wrapping arms 26a, 26b in order to rotate them when the pin 22 moves.

On the left-hand side of the wrapping arms 25 an assembly 30 of diaphragm arms 31a, 31b is arranged, which are further shown in figure 1B. The diaphragm arms 31a, 31b are provided with heating elements 32a, 32b in order to be able to seal the foil sheet. The diaphragm arm 31a is shorter than the diaphragm arm 31b, and a particularity is that it is provided with an operation arm 33 having an operation part 34 designed like a roller. The operation arm 33 is situated at the same side as the aforementioned (not shown) teeth of the sleeve 29. The arms 31a, 31b, respectively, are rotation-fixedly attached on axles 36a, 36b. The operation arm 33 is rotation-fixedly arranged on the axle 36a. The operation part 33 forms one fixed unity with part 35a, which is provided with teeth 37a that mesh with teeth 37b on part 35b that is rotation-fixed to the inner end of the axle 36b. With a spring that is not shown, the arms 31a, 31b are biassed towards each other.

By rotation of the part 35a, induced by movement of the roller 34, the arm 31a will rotate, wherein, due to the meshing of the teeth 37a, 37b, the arm 31b will to an equal extent rotate in the opposite direction.

In figure 1B it is shown that the opening O that is left free by the diaphragm arms 31a, 31b is adjusted to the size of the head R of the lollipop.

Figure 1A shows the moment in which a foil sheet for the head R is already supplied and subsequently secured on the head R by means of the cap 23, after which the foil sheet is cut off from the web of foil material from which it originated. Subsequently the clamp 20 in a

manner known per se that is not shown, is moved to the right, as considered in the drawing, in order to pass the foil sheet F and the head R through the opening O, within the reach of the wrapping arms 25. The pin 22 is moved along.

In figure 1C the foil head R has almost been passed through the opening O. As a result of the slight play of the head R with respect to the diaphragm arms 31a, 31b, the foil sheet S has been wrapped in a snugly covering and smooth manner around the head R. The diaphragm arms 31a, 31b are now moved towards each other under the influence of the spring connecting said arms to each other (figure 1D).

In figure 1E the passage of the lollipop head R with foil F has fully been passed through the opening O. The diaphragm arms 31a, 31b clamp around the stick S, while clamping the part F1 of the foil sheet F that is situated around the stick. As a result of the meshing of the teeth of the arms 26a, 26b with the teeth 22a on pin 22, the wrapping arms 26a, 26b have been brought into a position engaging the head R at a returning motion of the pin 22.

In this case the design is such that the cap 23 in the position shown in figure 1C remains slightly free from the lollipop head R.

Subsequently the sleeve 29 and thus the wrapping arms 26a, 26b are rotated about the lollipop head R, wherein the clamp 20 keeps holding the stick S and the foil sheet part F1. As a result the foil sheet F is twisted behind the head R. Said part F1 is then also sealed by activation of the heating elements 32a, 32b.

After the twisting and sealing has been completed the diaphragm arms 31a, 31b are opened again and the clamp 20 is moved back again, in order to be able to discharge the lollipop to the discharge station 9.

Then a new cycle can be started again.

Figures 2 and 3 schematically show where the various trajectories are situated. In trajectory K the head R is passed through the opening O. In trajectory L the twisting and sealing takes place. In trajectory M additional twisting and sealing can take place, and in trajectory N discharge takes place.

Figure 2 shows a view of the fixed drum part 60 of drum 8. A number of curve plates 61, 62, 64 and 65 have been arranged in the plane of the track of the roller 34, which curve plates are provided with respective guide edges 91 and 92, 93, 90 and 94 for the roller 34.

The curve plate 64 is situated in the discharge station, at the end of M and N and is attached to the drum 60 by means of bolts 84a, b. With its radial inward component the guide edge 90 will guide the roller 34 to the inside, in order to move the diaphragm arms 31a, 31b apart, in order to make it possible for the lollipop head to be axially moved back.

At the location of bolts 83a and 83b, the curve plate 61 is attached to protrusions 60c and 60d that are fixed with the fixed edge 60a of fixed drum part 60. The bolt 83b extends through a radially oriented elongated hole in the plate 61. The guide edge 91 of curve plate 61 smoothly changes into the more radially outwardly situated edge section 92 via a slight bend. An adjustment bolt 111 is attached on the curve plate 61, the head 112 of which adjustment bolt is operable and of which the tip 113 abuts the fixed edge 60b. By rotating the bolt

111, after some unscrewing of the bolts 83a,b the plate 61 can be swung in direction W, about the point of rotation formed by bolt 83a. In this way the radial position of the edge 92 is set, and thus the radial track of the operation roller 34 in trajectory K.

The curve plate 65 is in the extension of plate 61, and is connected thereto by means of bolts 82a,b, that extend in elongated holes 81a, b extending in circumferential direction. Elongated hole 81a is wider than bolt 82a. The plate 65 abuts the edge 60b with tip 65a. By some unscrewing the bolts 82a,b the position of the plate 65 in circumferential direction can be set, and thus its guide edge 94, which has a convex and concave trajectory. In this way the moment of closing the diaphragm arms can be adjusted. The wider elongated hole 81a allows some rotation of plate 65 about bolt 82a, so that for securing it can be ensured that the tip 65a abuts the edge 60b, and the position of the roller 34 at that location can always be the same.

The guide edge 93 of the curve plate 62 is circular and has a run-in section 93a which with the guide edge 94 defines a passage 108 for the roller 34. The width of the passage 108 is slightly larger than the diameter of the roller 34. The curve plate 62 is hinged to fixed drum part 60 by means of a bolt 101. The bolt 101 extends through an elongated hole 66 in fixed drum part 60. The bolt 101 also extends through a suitable hole in a bent plate 63, which extends upwardly about the axle 11. The plate 63 is provided with elongated holes 67a, 67b through which detachable fastening threaded bolts 68a, 68b extend, in suitable screw holes in the fixed drum part 60.

At the upper end at the location of 69, the plate 63 is connected to a bar 70, which at the other end 74 is hinged to the upstream end of the plate 62. A stop 71 is provided on the bar 70, which stop forms a unity

with the end of the bar, and serves as a stop for a compression spring 73, which is attached to a plate 72 at the location of the end near 69. As a result a radially outwardly oriented resilient compression force is exerted on the plate 62, about the hinge/bolt 101.

In figure 3 the curve plate 61 has been put in the position shown in figure 2. The opening O between the diaphragm arms 31a, 31b is adjusted to the lollipop shown in figure 3A, having a diameter of d1, of for instance 35 mm. The opening O is then for instance set at 43 mm.

Due to the location, considered in radial direction of the drum, of the curve plate 61 and thus the guide edge 92, the position of the roller 34 in the trajectory K is also determined radial direction, and thus the mutual position of the diaphragm arms 31a, 31b and thus the size of the opening O, in this case adjusted to the lollipop head shown in figure 3A.

Due to the spring force exerted on the diaphragm arms 31a, 31b in a direction towards each other, the roller 34 keeps properly abutting the guide edge 91 and the guide edge 92.

In the intermediate section, where the guide edge 94 is situated, the roller 34 is confined between the guide edge 94 and the guide edge 93. The run-in section 93a of the guide edge 93 here ensures a smooth insertion of the roller 34 in the passage 108 formed there.

As soon as the largest diameter of the lollipop head has been passed through the opening O the diaphragm arms 31a, 31b can be closed, which -after setting with adjustment bolt 111- takes place in the intermediate trajectory at a location depending on the length of the

lollipop head, guided by edge 94, inwardly limited by the guide edge 93a and a part of the edge 93.

When the roller 34 comes out of the passage 108, the roller 34 is only guided radially to the inside by the guide edge 93. The position of the guide edge 93 is selected such that the diaphragm arms are not fully closed, but offer room to the stick and to the wrapped foil sheet part F1. When a thick wad of foil part F1 is being formed, a radially inward force can be exerted by the related roller 34 on the guide edge 93 and thus the curve plate 62, which, by adjustment of the spring force of spring 73, is able to deflect slightly radially to the inside. The guide edge 93 is placed such that a suitable pressure force is indeed exerted on the roller 34 and thus sufficient force can be exerted by the diaphragm arms 31a, 31b on the wrapped foil part F1 during sealing and wrapping.

Once arrived at 66, the downstream end of the curve plate 62, said pressure force is not longer necessary, and a curve plate in the next trajectory can be dispensed with, in which trajectory sealing and wrapping, however, can still take place.

When lollipops of another lollipop head size are treated the operator may open the drum 8, in the manner known per se, and gain access to the aforementioned bolts in order to slightly unscrew them and subsequently sliding the curve plate 61 in circumferential direction (direction V) and then tightening the bolts again in the desired position. By unscrewing the bolts 68a, 68b and bolt 101 he will also be able to rotate the assembly of curve plate 62, plate 63, and bar 70 (directions Q and T), so that the relative position of the guide edge 92 and the guide edge 93a, are taken over in the new situation. The passage 108

has to suit the diameters of the roller 34, which in this adjustment is not replaced.

In figure 4 an exemplary situation after adjustment is shown, wherein the lollipop shown in figure 3B having a head diameter d3 of for instance 18 mm can be treated. The diameter of the opening O can in this case be d4, for instance 23 mm. The process and the location along the circumference of the various process parts is in this case the same as in figure 3.

Claims

1. Packaging machine for lollipops, comprising a drum having a stationary, fixed drum part and having a drum part that is rotatable with respect thereto and includes a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at or near the location of the transition of the head to the stick, wherein the drum is furthermore provided with first adjustment means for pre-adjusting the size of the opening of the diaphragm at the location of the first trajectory.

2. Packaging machine according to claim 1, wherein the diaphragm comprises two diaphragm arms, which can be moved towards and away from each other and are provided with sealing elements.

3. Packaging machine according to claim 2, wherein the two diaphragm arms are coupled with each other for simultaneous, opposite rotation.

4. Packaging machine according to claim 1, 2 or 3, wherein the diaphragm is provided with an operation part for determining and altering the opening of the diaphragm during rotation of the rotatable drum part, wherein the fixed drum part at least in the first trajectory is provided with a first curve track for guiding and moving the operation part during rotation of the rotatable drum part, wherein the first adjustment means comprise means for adjusting the mutual position of the operation part and the first curve track.

5. Packaging machine according to claim 4, wherein the first adjustment means are adapted for adjusting the position of the first curve track on the fixed drum part.

6. Packaging machine according to claim 5, wherein the operation part is adapted for during radial outward movement reducing the opening, wherein the first curve track is situated at the radial outside of the operation part.

7. Packaging machine according to claim 6, wherein the operation part at the radial inside is free from the first curve track, wherein preferably the diaphragm is biassed towards a more closed or smaller position of the opening.

8. Packaging machine according to any one of the claims 4-7, wherein the first curve track is formed on a bent strip-shaped plate extending in circumferential direction of the fixed drum part, which plate is provided with a first guide edge for the operation part, wherein the first adjustment means are adapted for adjusting the radial position of the first guide edge.

9. Packaging device according to any one of the claims 4-8, wherein the first curve track in process direction, directly or at a distance, is succeeded by a second curve track for with a second guide edge engaging the operation part in order to keep the diaphragm in the sealing position in the second trajectory.

10. Packaging machine according to claim 9, wherein the second curve track is situated at the radial inside of the operation part.

11. Packaging machine according to claim 10, wherein the operation part at the radial outside is free from the second curve track.

12. Packaging machine according to any one of the claims 9-11, wherein the second curve track is formed on a curve plate having a guide edge for the operation part which coincides with an arc of a circle that is concentric with the drum centre line.

13. Packaging machine according to any one of the claims 9-12, wherein the position of the second curve track is adjustable in circumferential direction.

14. Packaging machine according to claim 12 and 13, wherein the second curve track is adjustable along said arc of a circle.

15. Packaging machine according to claim 12, 13 or 14, wherein the drum comprises an axle, wherein the curve plate at one side of the axle is hinged to a coupling plate, wherein the coupling plate and the curve plate at another side of the axle are connected to each other by means of a bar, wherein the coupling plate is adjustably attached to the fixed drum part.

16. Packaging device according to claim 15, wherein a spring element is arranged on the bar for urging the curve plate radially to the outside, wherein the bar is provided with a stop for the radial outward movement of the curve plate.

17. Packaging machine according to any one of the claims 4-16, wherein the first curve track changes into a third curve track, provided with a third guide edge for the operation part in order to close the diaphragm, furthermore comprising second adjustment means for adjusting the position of the third guide edge in circumferential direction of the drum.

18. Packaging machine according to claim 17, wherein between the third and second curve track an overlapping intermediate trajectory is formed in which the diaphragm is closed and in which preferably a passage is formed having a width at least almost corresponding with the thickness of a stick.

19. Packaging machine for lollipops, comprising a drum having a fixed drum part and a rotatable drum part including a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively

bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder said diaphragm being positioned at the side of the sheet of material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at or near the location of the transition of the head to the stick, wherein the diaphragm is provided with operation means for changing the size of the passage in the diaphragm during the circulation of the rotatable drum part, wherein the operation means comprise an operation part, wherein the fixed drum part is provided with a curve track for the operation part, wherein the drum is furthermore provided with first adjustment means for adjusting the radial position of the curve track for the operation part.

20. Packaging device according to claim 19, wherein the adjustment means are operative on the curve track at the location of the first trajectory.

21. Packaging device according to claim 19 or 20, furthermore provided with second adjustment means for adjusting the circumferential position of the curve track, in particular in connection to the first trajectory for closing the diaphragm.

22. Packaging machine for lollipops, comprising a drum having a stationary, fixed drum part and having a drum part that is rotatable with respect thereto and includes a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at the location of the transition of the head to the stick, wherein the drum is furthermore provided with adjustment means for pre-adjusting the moment of closing the opening of the diaphragm consecutive to the first trajectory.

22. Packaging machine for lollipops, comprising a rotatable drum including a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said

sheet envelop or surround the lollipop head, wherein the rotatable drum is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at the location of the transition of the head to the stick, wherein the drum is furthermore provided with first adjustment means for pre-adjusting the size of the opening of the diaphragm at the location of the first trajectory.

23. Packaging machine for lollipops, comprising a rotatable drum including a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop or surround the lollipop head, wherein the rotatable drum is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at the location of the transition of the head to the stick, wherein the diaphragm is provided with operation

means for changing the size of the passage in the diaphragm during the circulation of the rotatable drum part, wherein the operation means comprise an operation part, wherein the drum is provided with a fixed curve track for the operation part, wherein the drum is furthermore provided with first adjustment means for adjusting the radial position of the curve track for the operation part.

24. Packaging machine for lollipops, comprising a drum having a stationary, fixed drum part and having a drum part that is rotatable with respect thereto and includes a series of stick holders, a supply for the lollipops towards the stick holders and a supply for packaging material for the lollipops, such as a foil, towards the drum, a discharge for discharge of packaged lollipops away from the drum, wherein the packaging material supply is adapted for consecutively bringing a sheet of packaging material in front of the lollipop heads, wherein the drum is furthermore provided with means for relatively moving the stick holder and the sheet of packaging material in a first trajectory on the drum in order to let said sheet envelop the lollipop head, wherein the rotatable drum part is furthermore provided with a diaphragm at every stick holder, said diaphragm being positioned at the side of the sheet of packaging material facing away from the lollipop head in order to dispose said sheet around the head in said relative movement of the stick holder and said sheet of packaging material, in which the head moves through the opening defined by the diaphragm, wherein the diaphragm is furthermore provided with means for in a next, second trajectory on the drum sealing the packaging material at the location of the transition of the head to the stick, wherein the drum is furthermore provided with adjustment means for pre-adjusting the moment of closing the opening of the diaphragm consecutive to the first trajectory.

25. Packaging provided with one or more of the characterising measures described in the attached description and/or shown in the attached drawings.

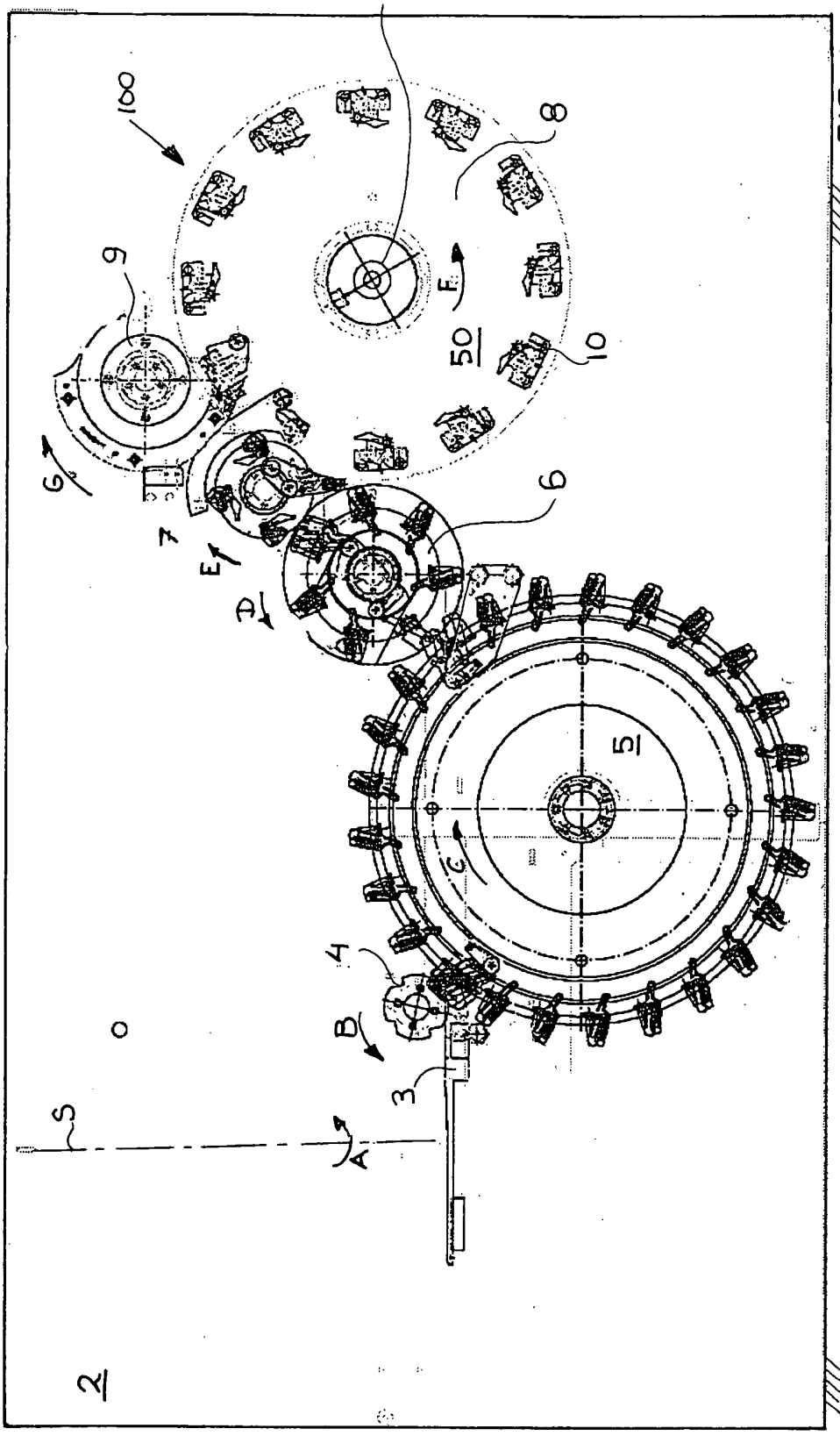
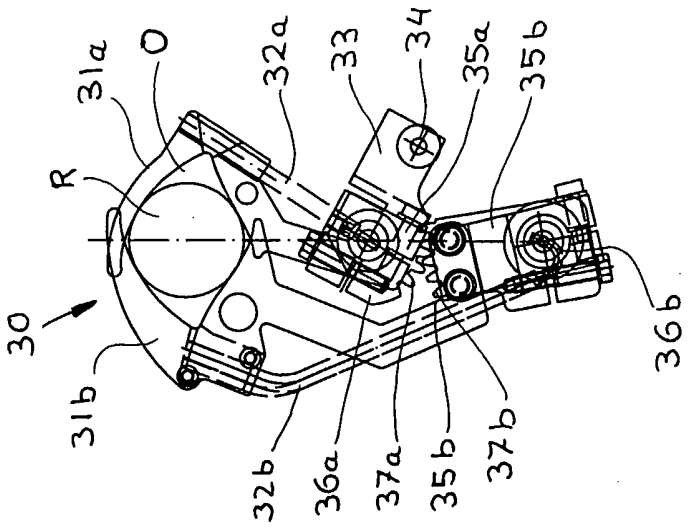


FIG. 1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36b

FIG. 1B

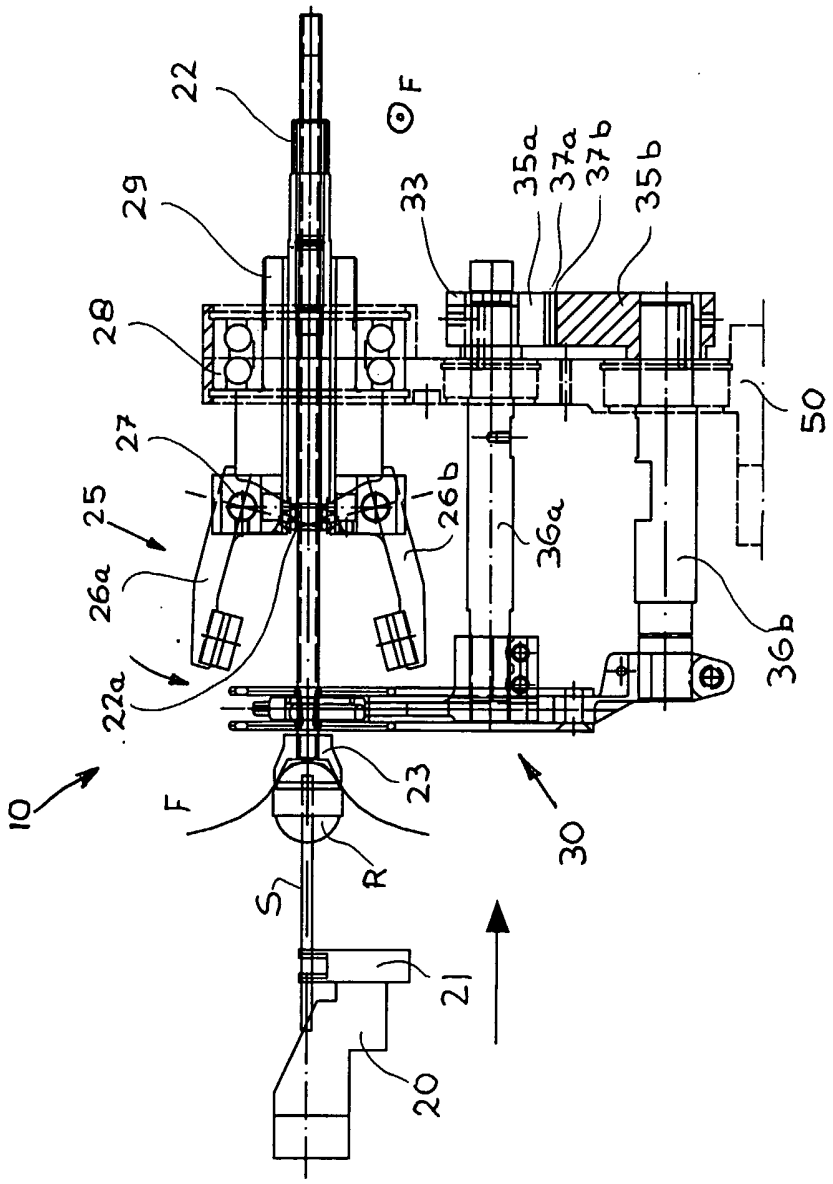
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FIG. 1A

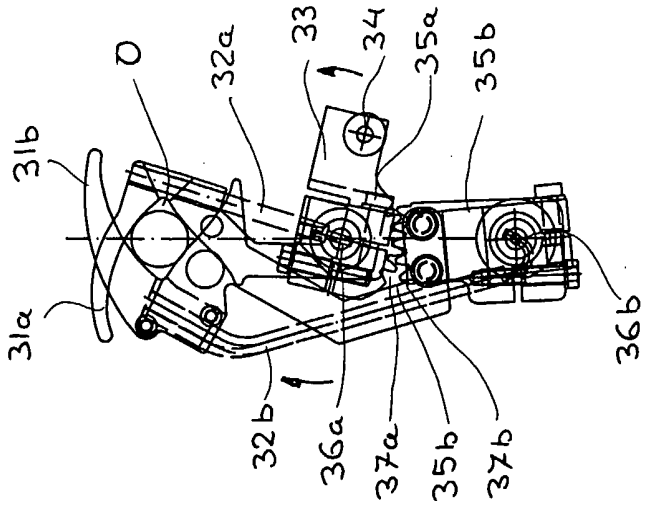
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FIG. 1D

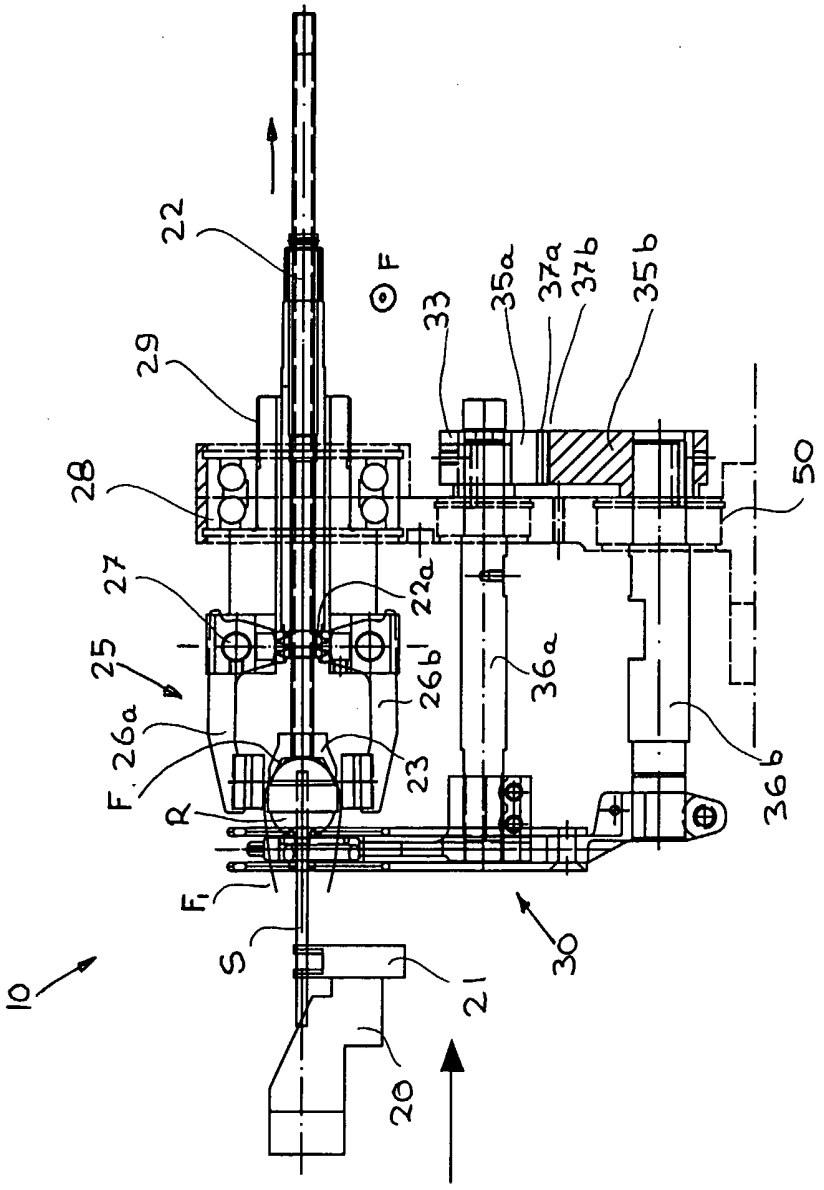
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FIG. 1C

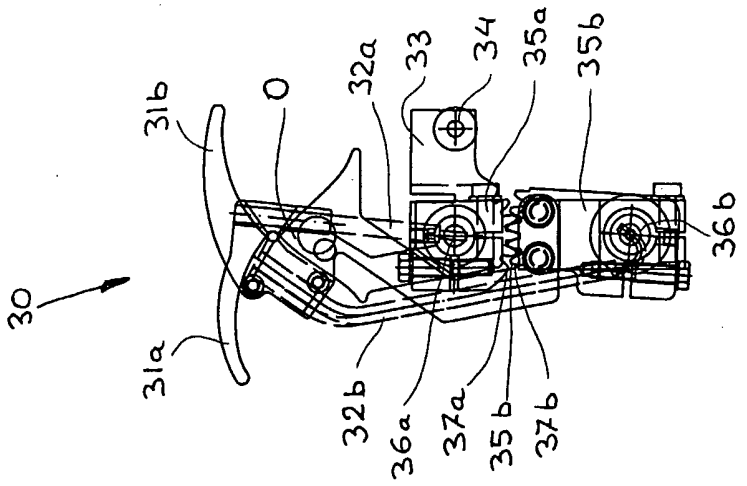
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FIG. 1F

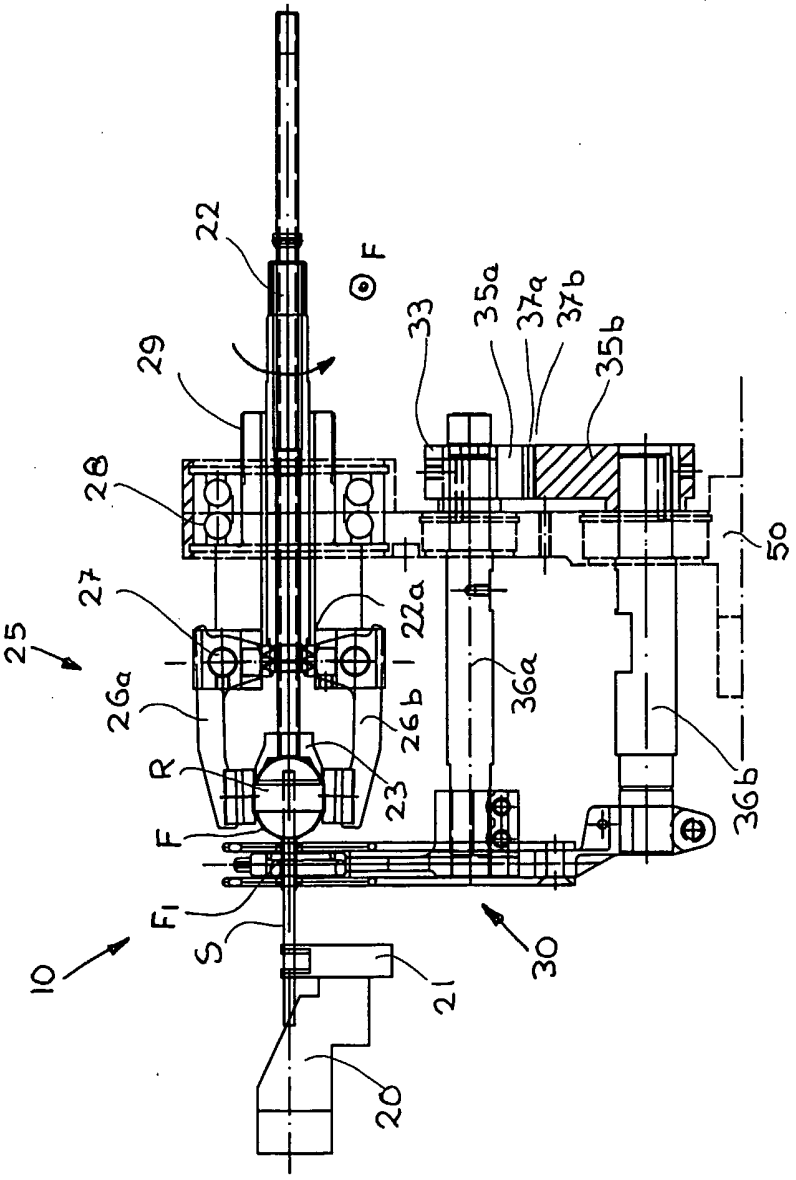
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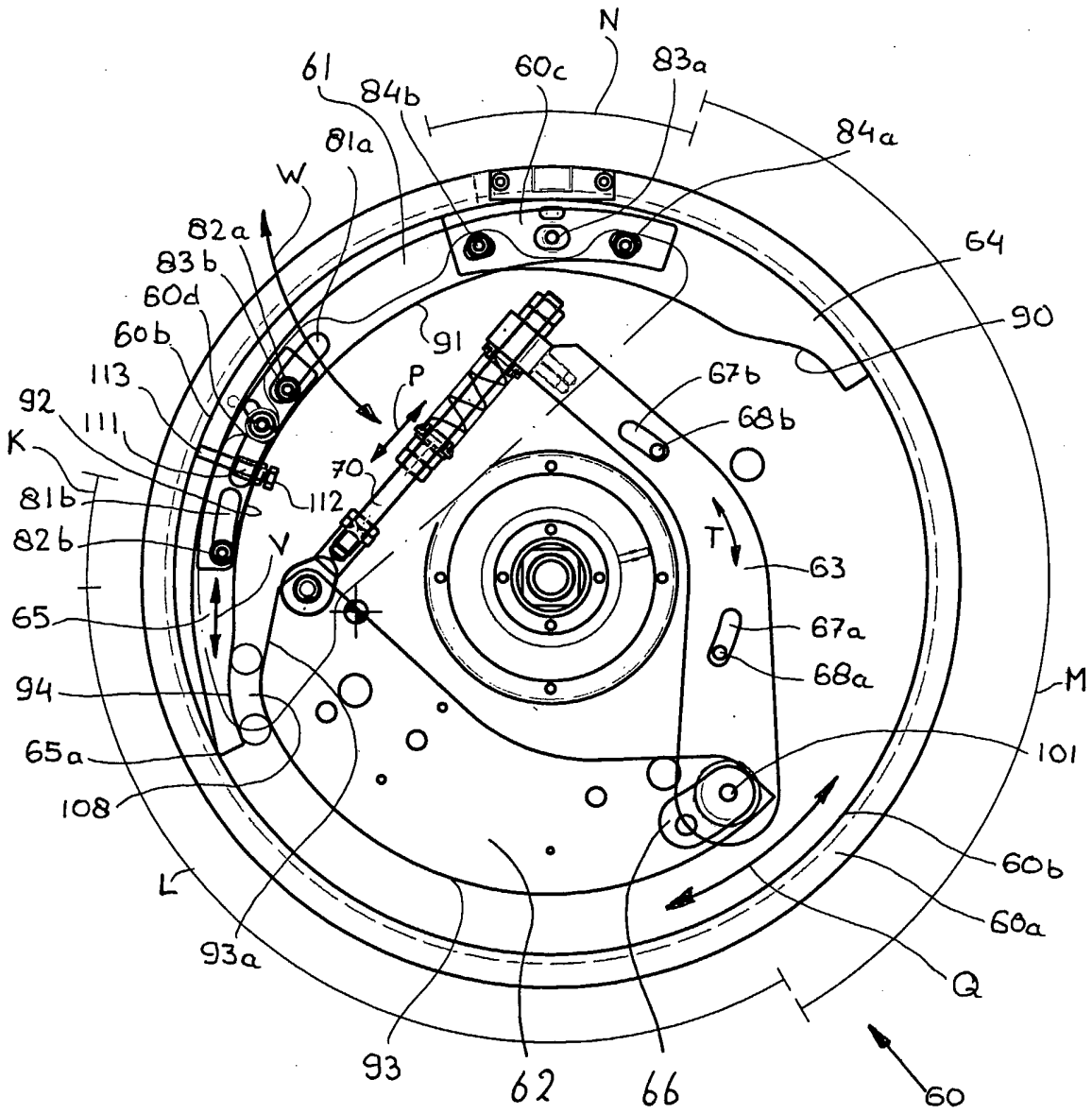
FIG. 1E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60
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112
V

FIG. 2

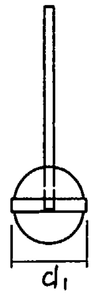
d1

FIG. 3A

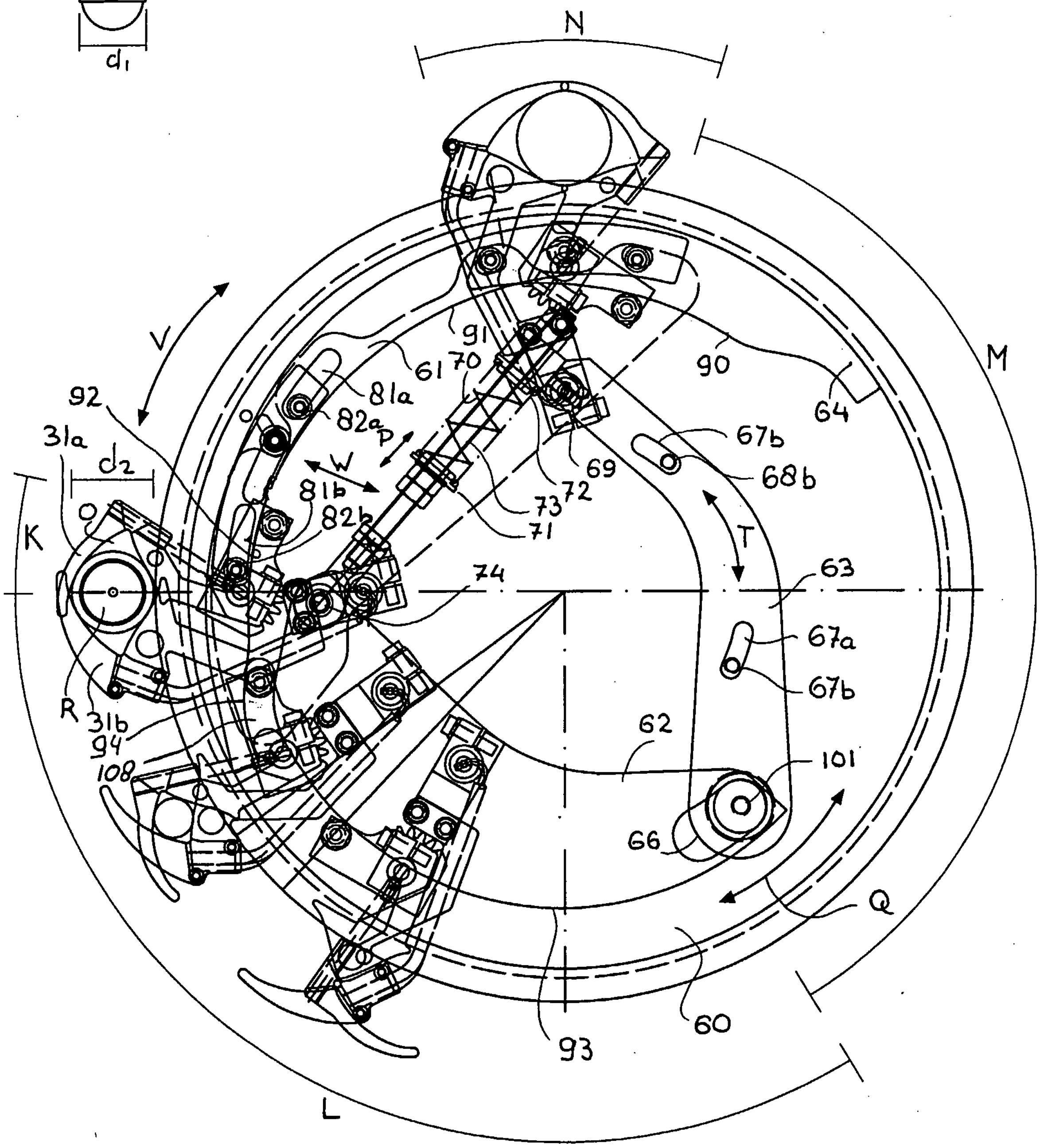
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FIG. 3

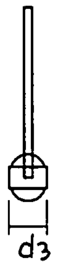
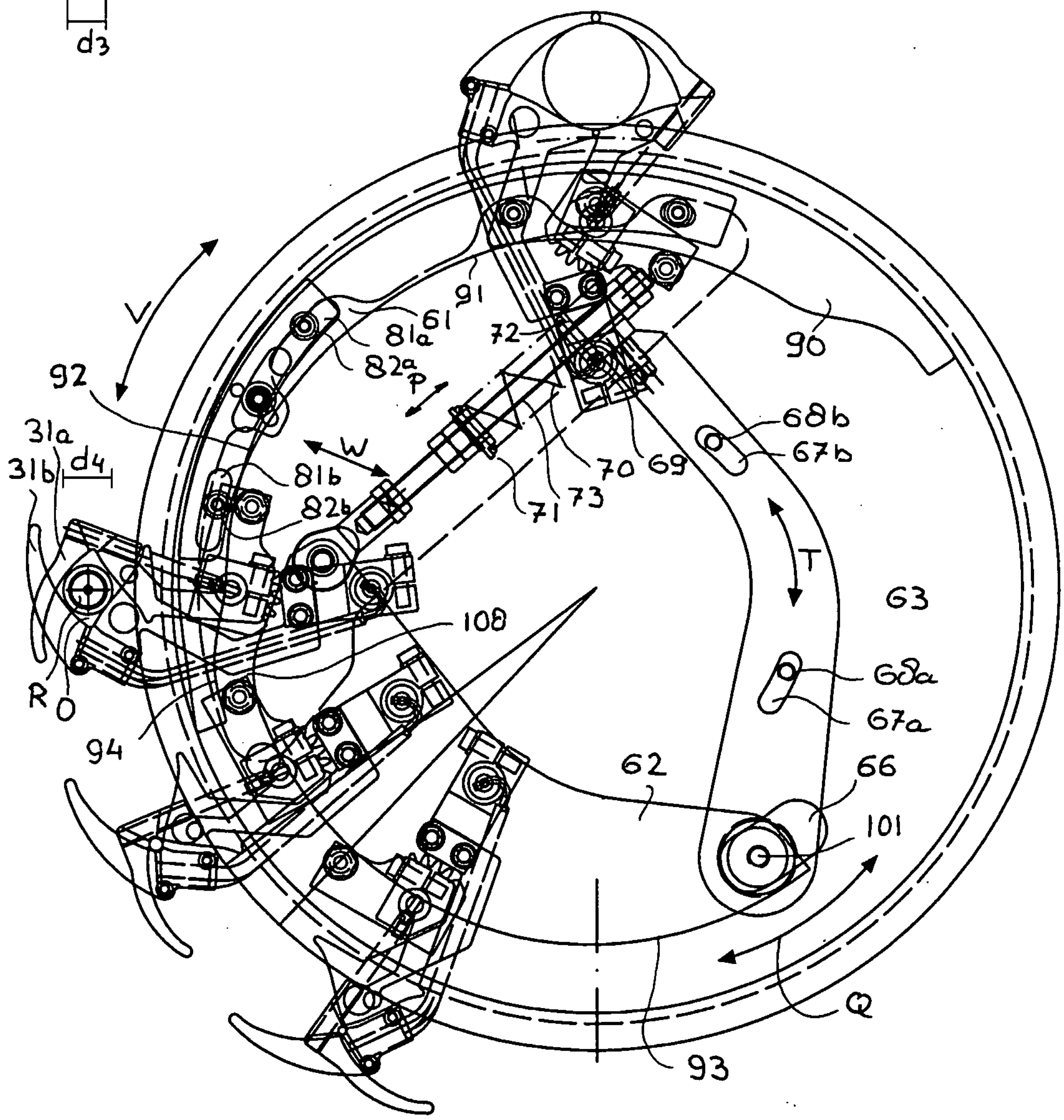

d3

FIG. 4A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68b
67b
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108
R
O
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68a
67a
62
66
101
Q
93

FIG. 4

INTERNATIONAL SEARCH REPORT

Internat plication No
PCT/NL2005/000571

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65B25/00 B65B11/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 450 706 A (LATINI ET AL) 19 September 1995 (1995-09-19) column 2, line 67 - column 10, line 16; figures	1-3,19, 22-24
X	WO 03/086871 A (CFS WEERT B.V; ASMA, SEFERINUS, JELLE) 23 October 2003 (2003-10-23) page 18, line 24 - page 22, line 27; figures	1-3,19, 22-24
A	EP 0 718 192 A (DERCKX, HENDRICUS ANTONIUS JACOBUS MARIA) 26 June 1996 (1996-06-26) column 3, line 5 - column 4, line 8; figures	4,5,7,8

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 November 2005	10/11/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Vigilante, M

INTERNATIONAL SEARCH REPORT

Internat pplication No
PCT/NL2005/000571

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 036 282 A (WM. WRIGLEY JR. COMPANY) 23 September 1981 (1981-09-23) the whole document	1-24
A	US 4 459 792 A (DERCKX ET AL) 17 July 1984 (1984-07-17) the whole document	1-24

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL2005/000571

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 25
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 25

Rule 6.2(a) PCT. Claims cannot contain reference to drawings or description.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Interr Application No
PCT/NL2005/000571

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5450706	A	19-09-1995	NONE		
WO 03086871	A	23-10-2003	AU	2003235459 A1	27-10-2003
			BR	0309351 A	08-03-2005
			EP	1497178 A1	19-01-2005
			US	2005217218 A1	06-10-2005
EP 0718192	A	26-06-1996	DE	69503744 D1	03-09-1998
			DE	69503744 T2	25-03-1999
			ES	2121289 T3	16-11-1998
			NL	9402167 A	01-08-1996
EP 0036282	A	23-09-1981	NONE		
US 4459792	A	17-07-1984	NONE		